European science review

№ 1–2 2018
January–February

PREMIER
Publishing

Vienna
2018

European Sciences review

Scientific journal

№ 1–2 2018 (January–February)

ISSN 2310-5577

Editorial office

Premier Publishing s.r.o. Praha 8 – Karlín, Lyčkovo nám. 508/7, PSČ 18600

E-mail:

pub@ppublishing.org

Homepage

ppublishing.org

European Journal of Arts is an international, German/English/Russian language, peer-reviewed journal. It is published bimonthly with circulation of 1000 copies.

The decisive criterion for accepting a manuscript for publication is scientific quality. All research articles published in this journal have undergone a rigorous peer review. Based on initial screening by the editors, each paper is anonymized and reviewed by at least two anonymous referees. Recommending the articles for publishing, the reviewers confirm that in their opinion the submitted article contains important or new scientific results.

Premier Publishing s.r.o. is not responsible for the stylistic content of the article. The responsibility for the stylistic content lies on an author of an article.

Instructions for authors

Full instructions for manuscript preparation and submission can be found through the Premier Publishing s.r.o. home page at:
http://www. ppublishing.org.

Material disclaimer

The opinions expressed in the conference proceedings do not necessarily reflect those of the Premier Publishing s.r.o., the editor, the editorial board, or the organization to which the authors are affiliated.

Premier Publishing s.r.o. is not responsible for the stylistic content of the article. The responsibility for the stylistic content lies on an author of an article.

Included to the open access repositories:

Typeset in Berling by Ziegler Buchdruckerei, Linz, Austria.
Printed by Premier Publishing s.r.o., Vienna, Austria on acid-free paper.

Section 1. Biology

Boboyev Sobir Murjdullayevich,
Professor, Samarkand State University
Keldiyarova Gulmira Farhadovna,
Ph D., Samarkand State University
E-mail: lutfullobek@mail.ru

ANALYSIS DETECTION OF HARMFUL SUBSTANCES FROM BRICK FACTORIES

Abstract: This article analyzes the impact of harmful emissions on the environment from the production of bricks. And also results of calculation of allocated dust in manufacture of a brick are resulted.

Keywords: Kattakurgan, sourc, analys, inorganic dust, coal, ash, nitrogen oxides, carbon, manganese, iron oxides, sulfur dioxide, scraper D-569, material, calculation, brick-factory.

Kattakurgan brick factory is specialized in the production of bricks. At the brick factory, the "100" brick is produced in accordance with GOST 530–95. As a basis for the technological scheme adopted a plastic method of production of bricks. The amount of pollutants emitted into the atmosphere depends on the production product. The brick factory has 20 sources. When the company operates in the air, pollutants of 13 names are released: – inorganic dust, coal and ash, nitrogen oxides, carbon, manganese and iron oxides, sulfur dioxide and nitrogen dioxide, diesel fuel, soot, aldehydes and benzapyrene. Calculation of emissions of harmful substances into the atmosphere from an organized source is made by the formula: $m = Q^*Zg/s$ where,

m – maximum amount of harmful substances released into the atmosphere, g/s;

Q – volume of air – gas mixture; nm^3/year;

Z – concentration of pollutant in the air – gas mixture at the outlet from the emission source, g/nm^3. One of the sources of emission of a brick factory is the DZ-42 bulldozer. The extraction of inorganic dust occurs when the layer is removed and the loess soil is worked out with a bulldozer. The total volume of movement of loamy soils per year is – 40848 m^3/year. The total time of work is 1040 hours, the wind speed is up to 2 m/s (1.81). Calculation of dust emission during loading operations on the working site, performed by a bulldozer is determined by the formula:

$$П = K_1^* K_2^* K_3^* K_4^* K_5^* K_7^* G^* 10^6/3600, \text{ g/s},$$

where;

K_1 – weight fraction of dust fraction in rock-0.05;

K_2 – fraction of volatile dust passing into aerosol-0.02;

K_3 – coefficient, taking into account the wind speed in the working area of the bulldozer-1.0;

K_4 – coefficient, closeness of node-1;

K_5 – coefficient, taking into account the moisture content of the material-1;

K_7 – coefficient, taking into account the size of the material-0.1;

G – productivity of the bulldozer-15 t/h.

Then the amount of dust emission is;

$P = 0.05 * 0.02 * 1.0 * 1.0 * 1.0 * 0.1 * 15 * 106/3600 =$
$=0.2083$ g/ s, taking into account the coefficient of local conditions 0.0208g/s or 0.078-t/year.

Source of scraper D-569. Isolation of inorganic dust occurs when removing the soil layer and developing a loess soil with a scraper. Calculation of combustion products emissions during excavator operation. The source of emissions of combustion products of diesel

fuel. When fuel is combusted, nitrogen dioxide, carbon monoxide, sulfur dioxide, carbon black are released. The standard fuel consumption for 1 mechanism is: excavator EO-10011–11 kg/h. The duration of the mechanisms is 2080 hours per year. Carbon monoxide. Calculation of carbon monoxide emissions per unit time: (t / year, g/s) is determined by the formula:

P_{so} = 0.001 * *Cso* * *B* * (1-*q*4/100) where;

B – fuel consumption (*t* / year, thousand m^3/year, *g/s*, l/*s*)

C_{co} – emission of carbon monoxide in the combustion of fuel (kg / ton, kg/thousand m^3 of fuel) is calculated by the formula:

Cso – *q*3 * *R* * *Qir*

*q*3 – loss of heat due to chemical incompleteness of fuel combustion (%)

R – coefficient, taking into account the share of heat loss due to the chemical incompleteness of fuel combustion, due to the presence of combustion products of carbon monoxide. For solid fuel *R* = 1, for gas.

R = 0.5, for fuel oil *R* = 0.65

Q, the lowest heat of combustion of natural fuel (MJ / kg, MJ/m^3)

*q*4 – heat loss due to mechanical incompleteness of fuel combustion (%)

Specific emissions of diesel combustion products by diesel engines are: -carbon dioxide 100 g/kg.

P = 100g/kg * 11kg/hour/3600sec = 0.306g/*s* or 2.288t/year. Oxides of nitrogen.

The amount of nitric oxide emitted per unit time (*t* / year, *g/s*) is calculated by the formula:

Pso = 0.001 * *B* * *Qir* * *KNO*2 * (1-*β*) where;

B – consumption of natural fuel for the considered period of time, (*t*/year, thousand m^3/year, *g/s*, l/*s*) Qin is the heat of combustion of natural fuel (MJ / kg, MJ/m^3)

K_{NO2} – parameter characterizing the amount of nitrogen oxide generated per 1 *GJ* of heat (kg/*GJ*),

β – coefficient, depending on the degree of reduction of nitrogen oxide emissions resulting from the application of technical solutions. Specific emissions of diesel combustion products by diesel engines are: nitrogen oxides – 40 g/kg.

P = 40g/kg * 11kg/hour/3600sec = 0.122g/s or 0.9152t/year.

Nitrogen dioxide = 0.9 * 0.122 = 0.0977*g/s* or 0.73216t/year

P of nitrogen oxide = 0.2 * 0.122 = 0.0244 *g/s* or 0.18304t/year.

Particulate matter. The calculation of particulate matter emissions of fly ash and unburnt fuel (tons/year, g/s) discharged into the atmosphere with the boiler boiler fumes per unit time during the combustion of solid fuel and fuel oil is performed according to the formula: *Пmo* = *BA'x* (1 – *ђ*)where,

B – fuel consumption (t/year, g/s)

A – ash content of fuel (%)

€ –the fraction of solid particles trapped in ash collectors;

The specific emissions of combustion products of diesel fuel by diesel engines are: soot-15.5 g/kg. *P* = =15.5g/kg * 11kg/hour/3600sec = 0.04736g/taking into account the coefficient of local conditions 0.00474g/s or 0.0355t/year.

Aldehydes.

Specific emissions of diesel combustion products by diesel engines are: aldehydes –2.4 g/kg. *P* = 2.4g/kg* * 11kg/hour/3600sec = 0.061g/s or 0.4576t/year.

The amount of benzapyrene entering the atmosphere at each technological operation is calculated using the formula:

Qbp = (*C*⟦*bn* ⟧ ^ "*Vbtn*")/(10 ^ 6)

Sbp – concentration of benzapyrene μg/m^3.

Vв – volume of gas – air mixture at one technological operation from one source m^3/s.

Specific emissions of diesel combustion products by diesel engines are: benz (a) pyrene – 0.00031g/kg.

Qbp = 0.000001g/s or 0.000007t/year.

The movement of vehicles MMZ-555 in the quarry is responsible for the release of dust, as well as gases from internal combustion engines: it is emitted as a result of the interaction of the wheels with the road bed and blowing off the surface of the laden car body.

The total amount of dust emitted by road transport within the quarry according to the methodology is characterized by the following equation:

Q = *C*1 * *C*2 * *C*3 * *N* * *a* * *q*1/3600 + *C*4 * *C*5 * *C*6 * * *F*0 * *n* * *q*2, *g/s*. Where:

*C*1 – coefficient, taking into account the average carrying capacity of a vehicle, with a load 12*t C*1 = 1.1

*C*2 – coefficient that takes into account the average speed of movement of the transport and the quarry, at a transport speed of 10 km/*h, C*2 = 0.6

*C*3 – factor taking into account the state of roads, *C*3 = 0.5

*C*4 is a coefficient that takes into account the profile of the surface of the material on the platform, *C*4 = 1.3.

*C*5 – coefficient, taking into account the blowing speed of the material *C*5 = 1.0

*C*6 is a coefficient that takes into account the moisture content of the material, with a humidity above 10%

*C*6 = 0.4.

N –number of walkers (round trip) of the whole transport per hour *N* = 1.5.

a – the average length of one walker within the pit, 0.16 km.

*q*1 – dust emission into the atmosphere per 1 km of run, *q*1 = 1450 g

*q*2 – dust emission from the unit surface of the material on the platform, *q*2 = 0.002 g/m^2 * s

F_0 –is the average platform area, 11.25m^2.

n –number of machines simultaneously working in the quarry *n* = 1.

Q = 1.1 * 0.6 * 0.5 * 1.5 * 1450 * 0.16/3600 + 1.3 * *1.0 * 0.4 * 11.25 * 1 * 0.002 = 0.00436*g*/*s*. The annual release of dust from the rock mass is given by the formula 2:

Q = 0.00436 * 2080 * 3600/1000000 = 0.03265*t*/yr.

Dust extraction during planning works in a quarry. Planning work in the quarry is carried out by bulldozer. The specific emission of dust during the operation of the bulldozer, and according to the procedure, is *Q* = 0.044 *g*/*s*.

The dust emission taking into account the gravitational settling of the dust (0.1) in the quarry will be *Q* = 0.044 *g*/*s*. The bulldozer's operating time is 1040 hours/year. The annual emissions from the bulldozer operation are:

Q = 0.0044 * 1040 * 3600 * 0.85/1000000 = 0.01647*t*/yr.

Blowing dust off the surface of the blade. The annual area of the dump formed is –3000m^2. The discharge caused by the blowing of dust from the surface of the dump by wind is determined in accordance with the procedure according to the formula:

Q = *k*3 * *k*4 * *k*5 * *k*6 * *k*7 * *q*1 * *F*, *y*/*s* where:

*k*3 – coefficient taking into account the wind speed in the work area –1.0

*k*4 – coefficient, taking into account the closedness of the node-1.0

*k*5 – coefficient, taking into account the moisture content of the material-0.4

*k*6 –coefficient, taking into account the surface profile of the material to be stored – *k*6 = 1.3.

*k*7 – coefficient, taking into account the size of the material-0.4

*q*1 – specific drift of dust from the surface, *g*/*m*^{2} * *s* –0.00002

F – dusting surface of the blade surface, *m*2–300 *m*^{2}

Q = 1.0 * 1.0 * 0.4 * 1.3 * 0.4 * 0.00002 * 300 = = 0.001248*g*/*s*.

The annual release of dust from the surface of the heap, taking into account the duration of dry days, is:

Qg = *Q* = 3600 * 6240/1000000 = 0.001248 * 6240* * 3600/1000000 = 0.0280*t*/*g*

The unorganized source of emissions of harmful substances is the storage of raw materials – loess. The release of harmful substances occurs as a result of dusting from a warehouse of loess area of 50*m*^{2}. Dust is observed during dry and hot days, the duration of which is about 100 days. The time of dusting in the year will be-2400 hours. The emission power of the inorganic dust was calculated by the formula:

M = *K*3 * *K*4 * *K*5 * *K*6 * *K*7 * *g* * *F*. where

*K*3 – coefficient taking into account local weather conditions. *K*3 = 1.0

*K*4 – coefficient, taking into account local weather conditions, the degree of protection from external influences, dust generation conditions, *K*4 = 0.5

*K*5 – coefficient, taking into account the moisture content of the material, *K*5 = 0.1

*K*6 – coefficient taking into account the surface profile of the warehouse, *K*6 = 1.4

*K*7 – coefficient, taking into account the size of the material, *K*7 = 0.8

g – drift of dust from 1m^2 of the actual surface, *g* = 0.002

F – surface of dusting, m^2, *F* = 50m^2.

The maximum one – time ejection from the warehouse surface will be:

M_{mr} = 1.0 * 0.5 * 0.1 * 1.4 * 0.8 * 0.002 * 50 = 0.0056 *g*/*s*

Total amount of dust inorganic, ejected from the surface of the warehouse per year: M_g = 0.0056 * 2400 * *3600/106 = 0.04838*t*/year.

The foreseen analysis of the calculation of the surface of the environment by means of production emissions showed that their contribution to the level of atmospher-

ic pollution is insignificant and does not exceed the established quotas at the border of the production site of the quarry and the plant. Emissions of pollutants from mobile sources are 4.4 tons/year.

References:

1. "Regulations on the state environmental review of Uzbekistan" Decree of the Cabinet of Ministers of the Republic of Uzbekistan in – 2001.
2. Collection of methods for calculating air emissions of pollutants from various industries. Under. Ed. LI Verev, Leningrad, Gidrometeoizdat,– 1986.
3. The draft EIS of the construction of a brick factory with a raw material base on the territory of the Chimbaiabad massif in the Pastdargomsky district of the Samarkand region. Samarkand – 2007.
4. Ecological Herald – No. 11–12 (91). – 2008.

Karimova Irodakhon Ibrohimjonovna,
Physiology and biophysics department,
Biology faculty,
National University of Uzbekistan, Tashkent
Sadikov Bahodir Asrorovich
Bioorganic chemistry institute of
Academy of Sciences of
the Republic of Uzbekistan, Tashkent
E-mail: turdimurod@gmail.com

MEMBRANE HYDROLYSIS O F CARBOHYDRATES IN SMALL INTESTINE OF GROWING, ADULT AND OLD RATS, OBTAINED SOLUTION OF LEAD SALT OF DIFFERENT DOSES TOGETHER WITH FOOD

Abstract: It was shown that the chronic intake of lead salt of different concentrations with food into the organism of growing, adult and old rats leads to different to negative alterations in the activity of carbohydrases of the small intestine mucosa. The higher concentration of lead salt, the more profound alterations in the hydrolytic function of the small intestine, and the mechanisms of membrane digestion of the growing organism turned out to be more vulnerable.

Keywords:

1. Introduction

Heavy metals are considered to be of particular ecological, biological and health protective importance among ecotoxicants of chemical nature. Mass pollution by salts of heavy metals of the environment leads to pronounced toxicoses of plants, animals and humans. It was established that food contains various salts of heavy metals and they have a serious influence on the health of the population [1, 2].

In our earlier research, it was shown that in offspring of rats, whose mothers were fed on a diet contaminated by heavy metals, the mechanisms of cavity and membrane hydrolysis of carbohydrates in the small intestine lag behind in development [3]. Chronic intake of lead salt at the dose of 5.0 mg/kg leads to a decrease in the hydrolytic function of the pancreas and small intestine of growing, adult and old rats [4].

2. Materials and methods

In our work we comparatively studied the age features that occur in enzymes of the lower stages of digestion and mitochondria of intestinal enterocytes as a result of intoxication of growing, adult and old rats with lead ions. The study of alterations in the digestive system as a result of the ten-day poisoning by lead organisms of various ages in comparative terms has not been studied.

Lead chloride was administered orally by 1.0 mg and 5.0 mg per kg of body weight. Animals were observed within 10 days after intoxication. Lead chloride salt influenced differently on the change in the mass of the digestive organs and the body.

3. Results and discussion

In this experiment, the effect of different doses (1.0 mg/kg and 5.0 mg/kg) of lead chloride on the proximal-distal gradient of the small intestine of growing, adult and old rats was studied.

Initially, influence of a low dose (1.0 mg/kg) of lead chloride on the activity of lactase on the proximal-distal gradient of the small intestine of growing rats was investigated. According to this, lactase activity in the intestinal gradient decreased in the duodenal section in 37.5%, in the proximal one in 28.6%, in the medial one in 27.3% and in the distal one in 11.2%.

At the increase in the toxicant dose (5.0 mg/kg), activity of the enzyme has changed as follows. In the duodenal, proximal, medial and distal sections, activity of lactase decreased by 60.5, 3.1; 41.9 and 19.5%.

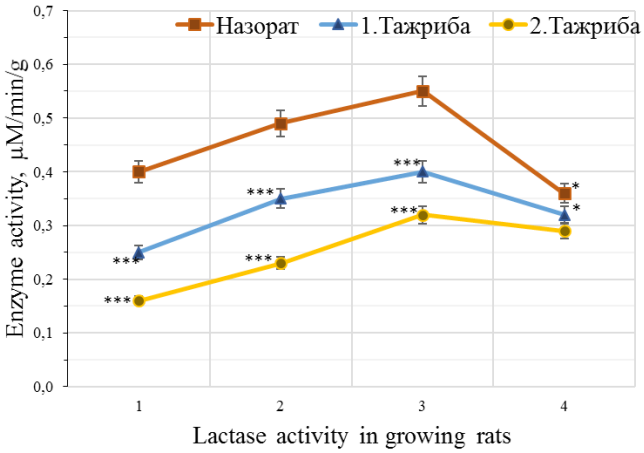


Figure 1. Change in lactase activity in the proximal-distal gradient of the intestine of growing rats under the influence of the lead chloride salt (1. Experiment – 1.0 mg/kg and 2. Experiment – 5.0 mg/kg) (n = 8)

*Note: * – P < 0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1–duodenal, 2–proximal, 3–medial, 4–distal).*

Hence, lead ion caused a decrease in intestinal lactase along the proximal-distal gradient in the body of growing rats. These alterations were reduced depending on the dose of the toxicant. At an increase in the dose of 5.0 mg/kg in the initial intestinal tract, repression is observed in the enzymes activity, while in the last distal section, on the contrary, the parameters were close to the control.

It can be seen that the activity of enzymes in the duodenal section of the intestine undergoes a stronger effect depending on the dose of the toxicant (Figure 1).

In experiments with adult rats under the influence of a low dose of lead chloride (1.0 mg/kg), lactase undergoes the following changes in different parts of the small intestine. According to the results, in the duodenal, proximal and medial sections of the small intestine, the activity of the enzyme decreases by 27.1 and 17.8, respectively. However, at moving to the distal section, the activity of the enzyme approaches the normal values. A significant decrease in lactase activity in the intestinal gradient occurs in the duodenal, proximal and medial sections. However, at going to the distal section, the opposite phenomenon is observed (Figure 2).

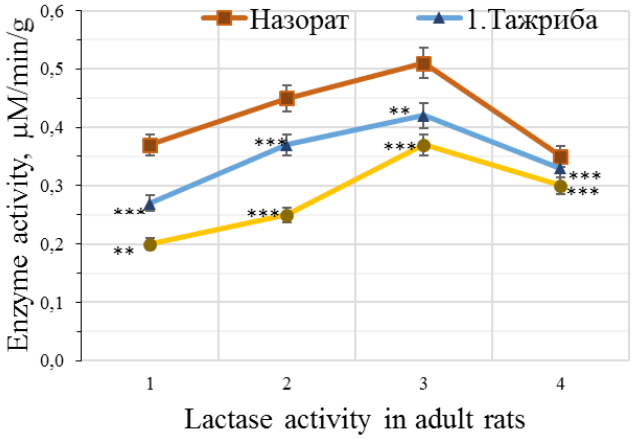


Figure 2. Change in lactase activity under the influence of lead chloride (1 experiment – 1.0 mg/kg and 2 experiments – 5.0 mg/kg) in the proximal-distal gradient of adult rats (n = 8)

*Note: * – P < 0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1 – duodenal, 2 – proximal, 3 – medial, 4 – distal).*

At the influence of high dose of lead chloride (5.0 mg/kg) in adult rats, activity of lactase in the duodenal, proximal, medial and distal sections of the small intestine is reduced by 46.0, 44.5, 27.5 and 14.3%, respectively (Figure 2).

In the experiments with old rats, the following changes were observed. Under the influence of a low dose of lead chloride (1.0 mg/kg) in the duodenal, proximal, medial sections of the small intestine, respectively, decreases by 14.3, 9.4, 8.2, and the distal end index approached the control (Figure 3).

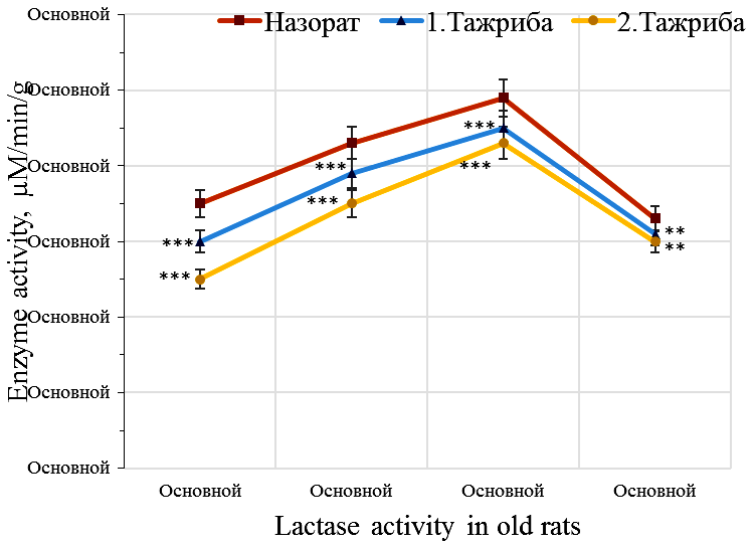


Figure 3. Change in lactase activity under the influence of lead chloride (1 experiment – 1.0 mg/kg and 2 experiments – 5.0 mg/kg) in the proximal-distal gradient of old rats (n = 8)

*Note: * – P < 0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1 – duodenal, 2 – proximal, 3 – medial, 4 – distal)*

As a result of the high dose (5.0 mg/kg) of lead chloride in old rats, lactase activity in the duodenal, proximal, medial sections of the small intestine is reduced by 28.6, 18.7, 12.7, respectively, and the indicator in the distal section approached the control (Figure 3).

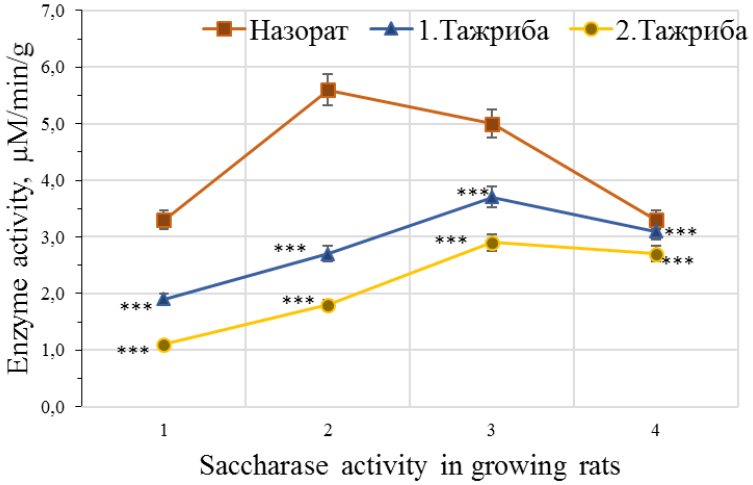


Figure 4. Changes in saccharase activity under the influence of lead chloride (1 experiment – 1.0 mg/kg and 2 experiments – 5.0 mg/kg) in the proximal-distal gradient of growing rats (n = 8)

*Note: * – P < 0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1 – duodenal, 2 – proximal, 3 – medial, 4 – distal).*

The next stage of the experiment was carried out with the determination of saccharase activity. Under the influence of a low dose of lead chloride (1.0 mg/kg) on growing rats in the duodenal, proximal, medial parts of the small intestine, the activity of saccharase decreased by 42.5, 51.8, 26.0, respectively, the distal indicator approached the control and was 6.1% (Figure 4).

As a result of a high dose of toxicant (5.0 mg / kg), the following changes in saccharase activity in growing rats are observed. The activity of this enzyme in the duodenal, proximal, medial and distal sections of the small intestine decreased by 66.7, 67.9, 42.0 and 18.2%, respectively (Figure 4).

In experiments with adult rats, a decrease in saccharase activity in the duodenal, proximal and medial sections was observed, respectively, at 43.2, 38.9 and 36.1%, as the approach to the distal section increases in enzyme activity was observed (Figure 5).

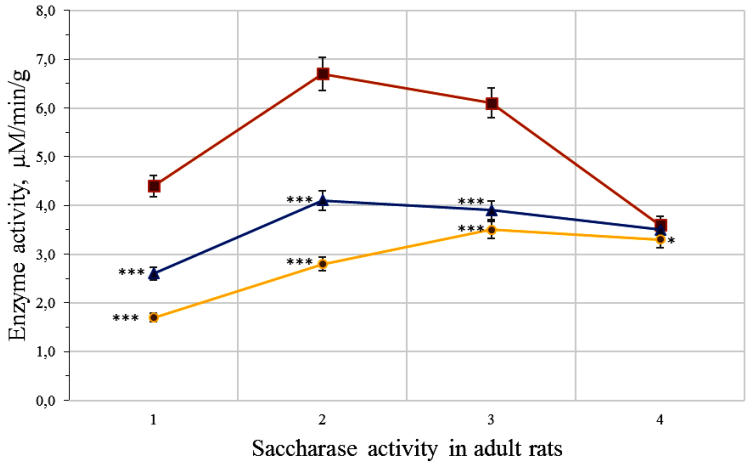


Figure 5. Change in saccharase activity under the influence of lead chloride (1 experiment – 1.0 mg/kg and 2 experiments – 5.0 mg/kg) in the proximal-distal gradient of adult rats (n = 8)

*Note: * – P < 0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1 – duodenal, 2 – proximal, 3 – medial, 4 – distal)*

At the administration of a high dose (5.0 mg/kg) of lead chloride to adult rats, it was recorded a decrease in the activity of saccharase in the duodenal, proximal, medial and distal sections of the small intestine, respectively, by 61.4, 58.3, 42.7 and 8.4% (Figure 5).

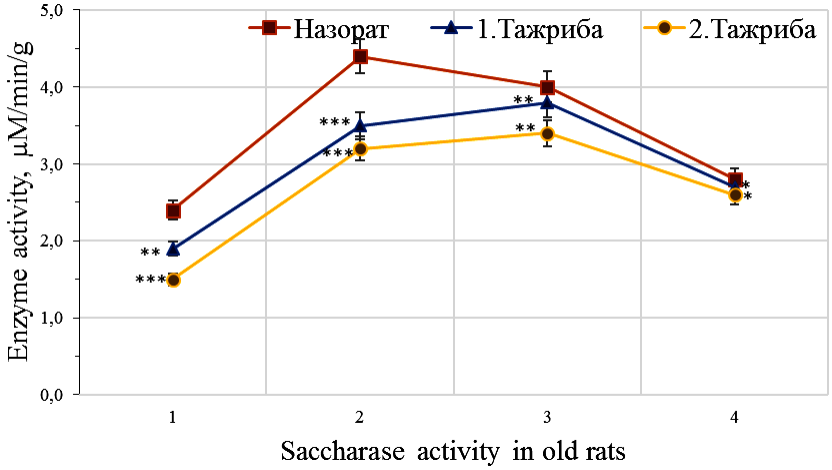


Figure 6. Change in saccharase activity under the influence of lead chloride (1 experiment – 1.0 mg/kg and 2 experiments – 5.0 mg/kg) in the proximal-distal gradient of old rats (n = 8)

*Note: * – P < 0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1 – duodenal, 2 – proximal, 3 – medial, 4 – distal)*

In experiments with old rats, enzyme activity of the through the proximal-distal gradient undergoes peculiar changes. In experiments with a low dose (1.0 mg/kg) of lead chloride, saccharase activity in the duodenal and proximal sections decreased by 20.9 and 20.5%, respectively, in the medial and distal sections approached the control parameters (Figure 6).

As a result of the high dose of lead (5.0 mg/kg) in saccharase activity in growing rats, the following changes are observed. Enzyme activity in the duodenal, proximal, medial and distal sections of the small intestine decreased by 37.5, 27.3, 15.0 and 7.2%, respectively (Figure 4).

The next stage of the experiment was carried out with the determination of maltase activity. Under the influence of a low dose of lead chloride (1.0 mg/kg) on growing rats in the duodenal, proximal, medial parts of the small intestine, in maltase activity repression was observed, at 31.2, 38.1, 30.8%, respectively, approaching the distal section was 16.7% (Figure 7).

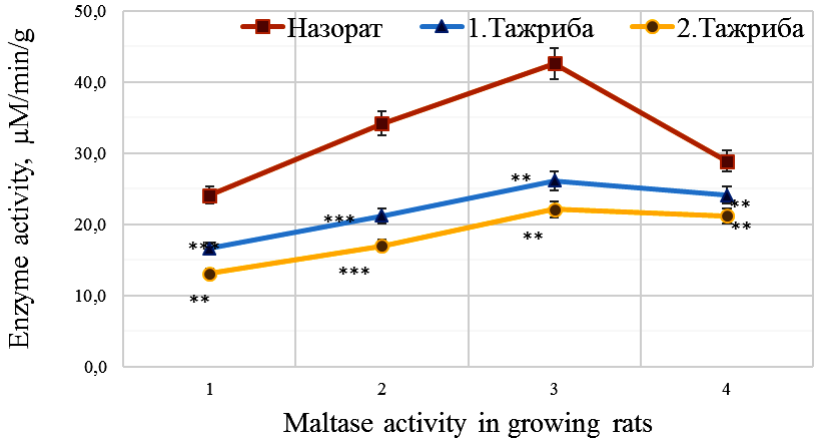


Figure 7. Changes in maltase activity under the influence of lead chloride (1 experiment – 1.0 mg/kg and 2 experiments – 5.0 mg/kg) in the proximal-distal gradient of growing rats (n = 8)

*Note: * – P < 0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1 – duodenal, 2 – proximal, 3 – medial, 4 – distal)*

As a result of a high dose of toxicant (5.0 mg/kg) in maltase activity in growing rats, the following changes are observed. The activity of this enzyme in the duodenal, proximal, medial and distal sections of the small intestine decreased by 45.7, 50.9, 48.2 and 26.7%, respectively (Figure 7).

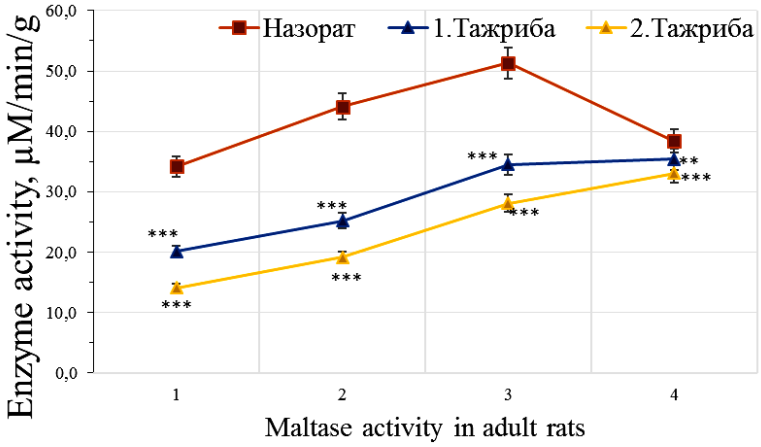


Figure 8. Change in maltase activity under the influence of lead chloride (1 experiment – 1.0 mg/kg and 2 experiments – 5.0 mg/kg) in the proximal-distal gradient of adult rats (n = 8)

*Note: * P < 0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1-duodenal, 2-proximal, 3-medial, 4-distal)*

In experiments with adult rats, it was observed a decrease in the duodenal, proximal and medial parts of the lower doses (1.0 mg/kg) of lead chloride, respectively, by 41.3, 42.9 and 32.8%; in the distal section, an approach to the control reading was observed (Figure 8).

As a result of the high dose of lead (5.0 mg/kg), the maltase activity in adult rats in the duodenal, proximal, medial and distal sections of the small intestine decreased by 59.0, 56.6, 45.3 and 13.9%, respectively (Figure 9).

In experiments with old rats under the influence of a low dose (1.0 mg / kg) of lead chloride in maltase activity in the duodenal and proximal sections, respectively, 25.3%, in the medial section by 28.8%, in the distal section there is no change (Figure 9).

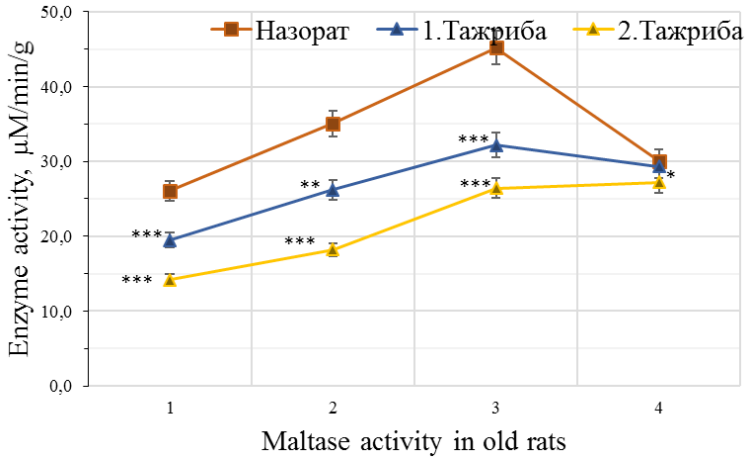


Figure 9. Change in maltase activity under the influence of lead chloride (1 experiment – 1.0 mg / kg and 2 experiments – 5.0 mg / kg) in the proximal-distal gradient of old rats (n = 8)

*Note: * – P <0.05; ** – P < 0.01; *** – P < 0.001 – confidence level relative to the control; On the X-axis, the small intestine (1 – duodenal, 2 – proximal, 3 – medial, 4 – distal)*

As a result of the high dose of lead (5.0 mg / kg), maltase activity in old rats in the duodenal, proximal and medial divisions of the small intestine decreased by 45.6, 48.1, 41.6%, respectively, in the distal section, enzyme activity rises and approaches the control readings (Figure 9).

3. Conclusion

Based on obtained results, it can be concluded that a low (1.0 mg/kg) and high (5.0 mg/kg) dose of lead chloride in adults and old rats resulted in a change in carbohydrase activity from the proximal-distal gradient of the small intestine. The topography of the distribution of lactase and maltase throughout the intestine lumen in animals of all ages has not changed, but saccharase distribution undergoes a change. The decrease in the activity of common enzymes in each part of the intestine is recorded in all age representatives. In growing rats, these changes became more apparent compared to other age groups.

Poor development of digestive enzymes and high absorption capacity of the small intestine wall of growing organisms in comparison with representatives of other age groups can be the reasons for such changes. Therefore, sometimes pure proteins that are not split into amino acids can freely pass into the blood. As a result of this property of the small intestine of growing rats, they are more likely to have food poisoning compared to other groups. Hence, under the influence of toxicants, growing rats are more strongly influenced compared to adults and old rats. In addition, carbohydrases activity in the small intestine is not the same and the rate of absorption of monosaccharides varies. For example, in the proximal part of the small intestine, glucose is absorbed three times faster than in the distal part. The composition of food, the general condition of the body, environmental factors affect the rate of absorption of carbohydrates. According to studies, 3% of the lead coming from food is absorbed into the small intestine. In hungry animals, this indicator is doubled. The absorption of metal along the gradient of the small intestine is not the same and in the medial section is higher in percentage. The influence of calcium with such absorption in the body is revealed. Lead with food inhibits the work of food enzymes in the small intestine and as a result digestion decreases. This condition negatively affects intestinal peristalsis.

Thus, the results of the experiments show that the intake of heavy metal – lead chloride from the food, significantly reduces the hydrolytic function of the small intestine with respect to various sugars. The degree of severity of the shifts depended, first, on the age of the animals and, secondly, on the enzymatic activity being determined. Comparison of the results obtained on animals of different ages indicates that the more vulnerable to intoxicant were the growing organisms and less-old ones.

From the results of the experiments, it can be concluded that the chronic intake of lead salt from the food has a negative effect on the mechanism of assimilation of nutrients. In our experiments, the use of a high dose gave deeper shifts than a low dose, in addition, lead salt intoxication caused significant disturbances in the function of the small intestine in a growing organism. These indicate that a growing body is more vulnerable to the effects of an unfavorable factor than an adult or an old organism.

Our data confirms once again the fact that the daily intake of heavy metal salts with the food acts as chronic stress, causing a change in the hormonal status, changing the function of the hypothalamic-pituitary-adrenal and hypothalamic-pituitary-thyroid systems, leads to certain shifts in the mechanisms of cavity and membrane digestion [5, 6, 7]. These data are consistent with the results of other studies in which it was shown that chronic effects are unfavorable environmental factors leads to deep changes in the structure and function of the digestive system of a growing organism [8, 9, 10, 11, 12]. In old organism, the reaction to the effect is weakly expressed, obviously connected with the fact that in the old age the metabolism decreases, the hydrolytic function of the digestive organs slows down the passage of food along the gastrointestinal tract [13].

References:

1. Tutel'yan V. A. Gigiyena pitaniya: sovremennyye problem // Mater KH se'zda gigiyenistov i sanitarnykh vrachey.– M.,– 2007.– T. 1.– P. 1050–1053.
2. Khotimchenko S. A. Ispol'zovaniye kontsentratsii analiza riska v sisteme monitoringa za bezopasnost' pishchevykh produktov. Mater. X s'ezda gigiyenistov i sanitarnykh vrachey.– M.,– 2007.– P. 1054–1055.
3. Vasilevskiy A. M. Riski dlya naseleniya Krasnoyarskogo Kraya, obuslovlennyye potrebleniyem produktov pitaniya, kontaminirovannykh tyazholymi metallami // Voprosy pitaniya.– 2009.– T. 78.– No. 1.– P. 63–66.
4. Korobkova A. I., Sorokina N. S., Molodkina N. N. i dr. Svinets i yego deystviye na organizm (obzor literatury). Med.truda.– 2001.– No. 5.– P. 29–34.
5. Sadykov B. A., Kuchkarova L. S., Ermatova S. U., Ergashev N. A. Aktivnost' pishchevaritel'nykh fermentov u potomstva krys, poluchavshikh vo vremya laktatsii ratsion, kontaminirovannyy tyazholymi metallami // Voprosy pitaniya.– Rossiya.– 2009.– T. 78.– No. 2.– P. 47–50.
6. Dahlqvist A. Assay of intestinal disaccharides // Anal.Biochem.– 1968.– 22.– No. 1.– P. 99–107.
7. Rukovodstvo po fiziologii: Biologiya stareniya. L. Nauka.– 1982.– 618 p.
8. Abeuov B. A. Osnovnyye zakonomernosti gemo-i likvorodinamiki i vliyaniye enterosorbtsii na ikh narusheniya pri svintsovoy intoksikatsii. Avtoref.dis.dok.med.nauk.– Almaty.– 1995.– 41 p.
9. Goncharuk Ye.G., Bardov V. G., Kartysh A. P. i dr. Eksperimental'noye izucheniye mekhanizma kombinirovannogo deystviya na organizm ioniziruyushchego izlucheniya, pestitsidov, soley tyazholykh metallov, nitritov // Vrachebnoye delo. Rossiya.– 1995.– No. 5–6.– P. 25–27.
10. Grazhdankina Ye. I. Toksichnyye elementy tyazholyye metally v biosubstratakh zhivotnykh i cheloveka na territorii krupnykh promyshlennykh tsentrov Tashkentskoy oblasti // Nauchno-tekhn.konf. "Aktual'nyye problemy osvoyeniya mestorozhdeniy poleznykh iskopayemykh". Institut geologii i geofiziki ANRUz.– Tashkent.– 2001.– P. 245–246.
11. Bhanthumnavik K., Schuster M. M. Aging and gastrointestinal function. In Handbook of biology of aging // Ed Finch C. E. Hayflick L. N. Y. Van Nostrand Reinhold Company.– 1981.– P. 709–723.
12. Karimova I. I., Sadykov B. A. Gidroliz uglevodov v tonkoy kishki u rastushchikh, vzroslykh i starykh krys pri khronicheskom vozdeystvii sol'yu svintsa // Uzb.biol.zhurn.,– 2012.– No. 2.– P. 9–11.
13. Sadykov B. A., Syrov V. N., Khushbaktova Z. A., Ermatova S. U., Karimova I. I. K voprosu o korrektsii narusheniy fiziologicheskikh sistem posle intoksikatsii khloridom kadmiya // DAN

Mamatova Irodakhon Yusupovna,
Phd., student, of the Andijan State University,
of Uzbekistan
Almatov Karim Tajibaevich,
Professor, of the National University
of Uzbekistan
E-mail: rrobia@inbox.ru

THE EFFECT TEMPERATURE OF DIFFERENT INTENSITY OF ENVIRONMENTS FOR THE ACTIVATION NADH OXIDASE OF THE RATS LIVER MITOCHONDRION

Abstract: Study of the determination of the negative and positive effect of temperature of various intensity (22–41 ◦ C) on the processes in the cell and tissues on the functions and structures of mitochondria, will give a chance to understand the mechanism of more effective treatment.

Keywords: liver, mitochondria, NADH2, rotenone high temperature.

Actuality of the topic: It is known that climatic and meteorological factors exert a great influence on the general state of the organism and the processes of its vital activity. Among them, special attention is paid to the thermal factor (hyperthermia), which is one of the specific elements of the hot climate of Central Asia. It is known that hyperthermia refers to dangerous stressing states. However, heat therapy was applied in antiquity, and artificial hyperthermia is likely to become one of the medical technologies of the 21st century. One of the directions of the problem of hyperthermia is the study of physiological and biochemical reactions of the organism to the effect of high temperature.

There are many organelles in the cell of living organisms with individual functions that support the vital activity of the cell. Among these organelles mitochondria is half the cell, producing the energy necessary for the functioning of the cell. Substrates are oxidized in the mitochondria, ATP is produced and it has all the properties inherent in the cell such as: contraction, ion transport, synthesis of proteins and lipids, and the transfer of genetic information by inheritance [1, 3, 5, 24].

In recent years, information has been obtained about the favorable effect in the treatment of diseases under the influence of controlled ambient temperature [8;11; 13; 14; 15]. But at the same time, the structures and functions of the mitochondria of various organs are almost not studied in the treatment of humans. Study of the destruction of the synthetic processes of the central nervous system, heart, liver, kidneys and other organs, a decrease in the function of cells associated with energy by 75–80%, with a 15–20% decrease in the formation of ATP in mitochondria [3]. The study of the determination of the negative and positive effect of temperature on the processes in the cell and tissues on the functions and structures of mitochondria will give a chance to understand the mechanism of more effective treatment.

Objective: Determination of the amount of NADH oxidizes of rat liver mitochondria under the influence of temperature of different intensity (22–24, 28–30, 35–36 and 41–42 ◦ C).

Materials and methods of research: The studies were carried out on male rats of the Westar line, weighing 160–180 g. Experimental animals were on a standard diet and a feeding regimen.

For the study, the animals were divided into 4 groups. The first group (22–24 ◦ C) was left for monitoring. The second, third and fourth groups of rats were left at 28–30; 35–36 and 41–42 ◦ C. After 30 and 60 minutes, the rats were clogged, the liver was removed and immersed in a beaker with a release medium. The liver was cleaned of extraneous tissue (fat, connective tissue), then its mass was determined by weighing, cut by scissors and placed in a tenfold volume compared to the organs of a pre-cooled isolation medium and homogenized for 30–40 seconds in a homogenizer with Teflon pestle. Mitochondria were

isolated from the liver of animals according to the conventional method of differential centrifugation [7] with some modifications [19].The mitochondria were then washed twice with isolation medium without ethylenediaminetetraacetate.

The activity of oxidize systems of liver mitochondria was determined after freezing and thawing of the mitochondria. NADH2- and succinate oxidase activities were evaluated by adding 3 μmol NADH2, 10 μmol succinate to a 1 ml cell. The N2-oxidase activity was also determined in the presence of 2 μg of rotenone. Change medium: 0.25 M sucrose containing 50 mM Tris-HCl, pH 7.4 and 5 mM histidine [20]. The activity of oxidase systems in the mitochondria was registered polarographically with a rotating platinum electrode under standard conditions in a 1-ml polarograph cell at 25 ° C.

Results and discussion:

It is known that liver mitochondria have two oxidation systems – the internal phosphorylating pathway for oxidation of succinate and substrates oxidized via NAD, and the external pathway of free oxidation of added NADH; the initial part of the respiratory chain of this path is $NADH_2$-cytochrome b5-reductase [12]. One of these oxidation pathways is inhibited by rotenone (internal oxidation pathway). In Table 1 shows the results of the separate determination of the oxidation rates of NADH on the inner and outer paths at 25 ° C. It can be seen that moderate and high ambient temperatures affect the NAD oxidase systems of rat liver mitochondria differently. Holding the animals at 28–30 ° C for 30 and 60 minutes increases the rate of oxidation of NADH through the respiratory chain by 6.7 and 12.9%, respectively, from the control (at 22–24 ° C), along the external – the rotenone-sensitive oxidation pathway NADH increased by 4.6 and 12.3%. With an increase in the temperature of the medium to 35–36 ° C the increase in the activity of oxidase systems is markedly enhanced. In this case, the rotenone of sensitive NADH oxidase is increased by 22.8 and 32.8%, and the rotenone of insensitive NADH oxidase is increased by 24.8 and 38.4%.

Table 1.– Influence of different intensity of ambient temperature on NADN oxidase systems of liver mitochondria membranes (M ± м; n = 5–6)

Time, min	Calcium-accumulation capacity of mitochondria,nmol / mg protein			
	Temperature intensity, ° C			
	22–24	28–30	35–36	41–42
	the rotenone sensitive NADH oxidase			
30	53.44 ± 3.09	57.02 ± 3.00	65.62 ± 4.12**	49.64 ± 2.13
%	100	106.7	122.8	92.9
60	55.32 ± 3.55	62.45 ± 3.67**	73.46 ± 4.42***	45.75 ± 3.09**
%	100	112.9	132.8	82.7
	the rotenone insensitive NADH oxidase			
30	5.05 ± 0.32	5.28 ± 0.40	6.30 ± 0.49***	7.69 ± 0.54****
%	100	104.6	124.8	152.4
60	5.11 ± 0.49	5.74 ± 0.41*	7.07 ± 0.54**	9.33 ± 0.66***
%	100	112.3	138.4	192.5

Thus, an increase in the temperature of the medium accelerates the activity both along the internal and external oxidation pathways of NADN. With increasing intensity of temperature, these processes are markedly enhanced. In our opinion, an increase in temperature to 35–36 ° C is associated with an increase in the access of substrates to the active center of NADH-dehydrogenase of liver mitochondria. At the same time, there is no elimination of cytochrome c from the inner membrane of the mitochondria. This means that the controlled high temperature does not disrupt the compactness of the mitochondrial membranes.

However, at a temperature of 41–42 ° C, another pattern is observed: the internal oxidation pathway of NADH is inhibited, and the external pathway rises NADH is markedly increased. Under these experimental conditions, the activity of the rotenone of sensitive NADH oxidase decreases by 7.1 and 17.3%, respectively, from the control level (22–24 ° C), while the rotenone of insensitive NADH oxidase, by contrast, increases by 52.4 and 92.5%.

In our opinion, the conditions for activation of the external pathway of oxidation of NADH and inhibition of the internal pathway of oxidation of substrates under conditions of high temperature of the medium are associated with a violation of the function of coenzyme Q and desorption of cytochrome c from the inner mitochondrial membrane into the inter membrane space, as a result of which the flavin 5- cytochrome c 5 to cytochrome oxidase. These results indicate a profound disruption of conjugation between protein phospholipid bonds of the inner mitochondrial membrane during swelling [17]. Disturbances in membranes associated with changes in phospholipids significantly change the ability of the inner mitochondrial membrane to accept cytochrome c [17]. These characteristics are very sensitive to the formation of membrane disturbances and change even at small degrees of "hidden" damage [17] In our opinion, the cleavage of the phospholipids of the internal mitochondrial membranes by endogenous phospholipases upon swelling leads to a disruption of the function of the free-floating carrier of the reducing equivalents from dehydrogenases to cytochrome chains, coenzyme Q [9] In the respiratory chain, there are three binding centers for coenzyme Q: 1) investigated and characterized by LS Yaguzhinsky and coworkers [23] hydrophobic site in succinate dehydrogenase; 2) the region of the respiratory chain between the cytochromes b and c1, where antimycin A, 2-hydroxy-3-alkylbenzo and naphthoquinones bind; 3) the site of binding of the rotenone to NADH-dehydrogenase [24]. At these binding points, the coenzyme Q interaction of the coenzyme nucleus with the corresponding enzyme is realized at the expense of different functional groups of the coenzyme Q molecule [23].

Damaged mitochondria are the trigger for the release of cytochrome c through mitochondrial pores [22]. Released by cytochrome c is the "death sentence" of the cell [6]. Cytochrome c entails the transmission of an apoptosis signal, the result of which is often various diseases. Mitochondrial DNA mutations (mtDNA) can also be the cause of many diseases [6]. Compared to nuclear DNA, mtDNA is round, small and simple [10; 16]. An interesting detail about mutations and mtDNA diseases is that the more nuclear mutations occur, the more severe symptoms are encountered [19]. Generation of ATP may decrease with mtDNA mutations; therefore, cells that depend on DNA produced in mitochondria are considered to be the highest risk of disease [11]. Many patients in resuscitation departments have a clinical state of mitochondrial dysfunction caused by active oxygen species and mtDNA damage [10].

The most important antioxidant of mitochondria is coenzyme Q10, which is contained in virtually all tissues of the body. As is known, coenzyme Q10 is a carrier of electrons in the respiratory chain, while at the same time effectively protects the lipids of biological membranes and lipoproteins of blood from peroxidation, protects DNA and proteins from oxidative modification [22].

Here, first of all, we are not interested in what further processes will be and the role of cytochrome c, which is released, is, but the fact of its release from the mitochondria. From our point of view, this simple, at first glance, act is very important, because as a positive feedback supports the violation of the transport of electrons in the respiratory chain, reduces the utilization of molecular oxygen by mitochondria and, therefore, promotes its accumulation in the cell and the stability necessary for apoptosis states of oxidative stress first in the mitochondria, then in the cytoplasm and throughout the entire cell. In addition, positive feedback on the maintenance of oxidative stress in cells is realized, obviously, through other channels. One of them is the active form of oxygen-dependent damage to mitochondrial DNA (mtDNA) with the formation and accumulation, in particular, of 8 hydroxy 2' deoxyguanosine. This oxidative damage of mtDNA is repaired to some extent [2]. Another channel of such feedback may act by oxidative damage to the mtDNA polymerase, which should result in a decrease in mtDNA replication and, accordingly, mitochondrial base attenuation. Thus, in mitochondria, there are different ways of keeping the oxidative stress that arises in them no lower than a certain level.

Discussion. When rats are kept at 28–30 and 35–36 °C, the permeability of membranes for substrates is slightly exceeded, but stability will not change. The cell passed from one physiologically metabolic state to the second active state, improves the delivery of substrates, oxygens and energy to cells and tissues of the body. When the rats are kept at a temperature of 41–42 ° C, the mitochondria of the liver are inflated, the outer membranes are cracked and, in connection with the injury of the inner membrane, cytochrome c and other propooptical proteins from the membrane will escape and reach the nucleus of the cells to injure it.

References:

1. Alam T. I., Kanki T. et al. Human mitochondrial DNA is packaged with TFAM // Nucleic Acids Res.,– 2003.– V. 31.– P. 1640–1645.– No. 1.– P. 1–10.
2. Bohr V. A., Stevnsner T., de Souza-Pinto N. C. Mitochondrial DNA repair of oxidative damage in mammalian cells // Gene.– 2002.– V. 286.– No. 1.– P. 127.
3. DiMauro S., Schon E. A. Mitochondrial DNA mutations in human disease // American Journal of Medical Genetics,– 2001.– V. 106.– No. 1.– P. 18–26.
4. Garrido N., Griparic L. et al. Composition and dynamics of human mitochondrial nucleoids // Mol. Biol. Cell,– 2003.– V. 14.– P. 1583–1596.
5. Green D. R., Reed J. C. Mitochondria and apoptosis. Science,– 1998.– V. 281.– P. 1309–1312.
6. Hageboom O. N., Scheider W. C., Pallade O. H. Isolation of mitochondria and submicroscopic particulate material // J. Biol. Chem.– 1948.– V. 172.– No. 2.– P. 619–641.
7. Lang H., Nadalin S. et al. A porcine model for investigation of hyper thermic isolated liver perfusion // J. Invest Surg.– 1998.– V. 11.– No. 6.– P. 401–408.
8. Lenaz G. The role of lipids in the structure and function of membranes. In: Subcellular biochemictry // Ancona, Italy.– 1979.– No. 6.– P. 233–317.
9. Murphy M. P., Smith R. A. Drug delivery to mitochondria: The key to mitochondrial medicine. Advanced Drug Delivery Reviews,– 2000. 41(2),– P. 235–250.
10. Oglesbee M. J., Diehl K. et al. Whole body hyperthermia: effects upon canine immune and hemoststic functions // Vet. Immunol. Immunopathol,– 1999.– Aug 2.– V. 69.– No. 2–4.– P. 185–199.
11. Skulachev V. P. Role of uncoupled and non-coupled oxidations in mainte-nance of safely low levels of oxygen // Quart. Rev. Biophys.– 1996.– V. 29.– P. 169–202.
12. Vertrees R. A., Bidani A. et al. Veno-venous perfusion-induced systemic hyperthermia: hemodynamics, blood flow, and thermal gradients // Ann Thoras Surg.,– 2000.– Aug; – V. 70.– No. 2.– P. 644–652.
13. Vertrees R. A., Bidani A. et al. Venovenous perfusion-induced systemic hyperthermia: hemodynamics, blood flow, and thermal gradients // Ann Thoras Surg.– 2000.– Aug; – V. 70.– No. 2.– P. 644–652.
14. Yshitake S., Noguchi T. et al. Changes in intramucosal pH and gut blood flow during whole body heating in a porcine model // Int. J. Hyperthermia.– 1998.– V. 14.– No. 3.– P. 285–291.
15. Wallace D. C. Mitochondrial diseases in man and mouse // Science,– 1999.– V. 283.– No. 5407,– P. 1482–1488.
16. Агзамов Х. Изучение скрытых повреждений полиферментных систем внутренней мембраны митохондрий при патологии и стресс воздействиях: Дисс… канд.биол.наук.– Ташкент: институт биохимия,– 1982.
17. Алматов К. Т., Агзамов Х., Рахимов М. М., Туракулов Я. Х.,– 1981.
18. Алматов Ш. К., Ахмеров Р. Н., Алматов К. Т. Особенности динамики изменения обмена углеводов, аденинну клеотидов и энергетического метаболизма клетки печени крыс в зимнее и летнее время года в условиях перегревания организма. Известия ВУЗов. Химико-биологические науки.– 2003.– № 1, 2.– С. 88–93.
19. Алматов К. Т. Ферментативные превращения фосфолипидов мембран митохондрий. Ташкент, Университет.– 1993.– 30 с.
20. Гурин В. Н. Терморегуляция и симпатическая нервная система.– Минск: Наука и техника.– 1989.– 231 с.
21. Коган А. Х., Кудрин А. Н., Кактурский Л. В. и др. Свободнорадикальные перикисные механизмы патогенеза ишемии и ИМ и их фармакологическая регуляция. Патофизиология,– 1992.– № 2.– Р. 5–15.
22. Костырко В. А., Колесова Г. М., Кожухова А. И., Обольникова Е. А., Самохвалов Г. И., Ягужинский Л. С. О природе взаимодействия ингибиторов с местами связывания KoQ в дыхательной цепи митохондрий. Митохондрии. Аккумуляция энергии и регуляция ферментативных процессов.– Москва: Наука.– 1977.– С. 116–123.

23. Куцый М. П., Гуляева Н. А., Кузнецова Е. А., Газиев А. И. Исследование ДНК-связывающих белков митохондрий печени крыс // Известия РАН. Серия биологическая.– Москва,– 2005.– Т. 5.– С. 531–538.
24. Холмухамедов Э. Л. Роль митохондрий в обеспечении нормальной жизнедеятель-ности и выживания клеток млекопитающих. Автореф. дис. … док. биол. наук.-Пущино.– 2009.– 160 с.

Mirkhamidova Parida,
Doctor, of biology, professor, Uzbekistan
E-mail: parida.mirxamidova@mail.ru
Babakhanova Dilnoza Bakhadirovna,
Teacher, Uzbekistan
E-mail: dilnoza.boboxonova@mail.ru
Khujanazarov Uktam Eshtemirovich,
Candidate, of biology,
associated professor, Uzbekistan
E-mail: khuzhanazarov74@mail.ru
Batirov Bobir Mekhmanovich,
Candidate, of biology,
associated professor, Kazakhstan
E-mail: sgzzh.itf.2016@mail.ru,
Mukhamedov Gafurjan Israilovich,
Doctor, of chemistry, professor, Uzbekistan
E-mail: rector@tvchdpi.uz

DEFINING OF TOTAL ANTIOXIDANTS QUANTITY IN THE LEAVES OF DIFFERENT FRUIT TREES IN UZBEKISTAN TERRITORY

Abstract: The total amount of antioxidants in different trees for example in Morus nigra L., Prunus persica L., Serasus vulgaris L. and Juglans regia L. leaves were found at different seasons. The results showed that the highest concentration of antioxidants in spring was found in walnuts and peaches than summer season. The amount of walnut leaves was about 9.105 ± 0.05 mg/g, and in peach leaves was about 9.082 ± 0.075 mg/g.

Keywords: antioxidant, Morus nigra L., Prunus persica L., Serasus vulgaris L., Juglans regia L., Vitis vinifera, extract, leaf.

1. Introduction

Antioxidants are biologically active compounds and are important in plant and animal organisms. Antioxidants are essential for the function of natural detoxification systems to remove free radicals and radical forms from the body. Free radicals would arise as a result of chronic stress and the accumulation of radioactive, various chemicals in the environment in the body [1, 2].

2. Results and discussion.

As you know, the negative effects of environmental factors and applying of the pesticides in agriculture will cause as harm to the health of the population. The human body accepts residual pesticides through the nutritional chain. It gradually begins to accumulate in different organs, especially in the liver. As a result, the metabolism in the cells changes and causes the gradual formation of various free radicals. Our department has been studying the effects of karate pesticides on rats during many years and ways of their correction have been studying [1, 3, 5]. Plant antioxidant used in correction. The main purpose of our work is to find cheap and suitable natural antioxidants. Therefore, we detected the total antioxidant quantity in the plant antioxidant factor by Rogojin method [4]. In the correction the plant antioxidant factor (PAF) was applied from extracted 3 different fruit trees of leaves in Morus nigra L., Prunus persica L., Juglans regia L. and positive results were obtained. Therefore, we researched the total amount of antioxidants in a number of fruit trees. The results were shown in (Table 1).

Table 1.– Total amount of antioxidants in different fruit trees (mg/g)

Name of the plant	Spring	Summer	Autumn
1. A leaf of Juglans regia L.	3.61± 0.07	9.105±0.05	5.7±0.07
2. A fruit of Juglans regia L.	3.15 ±0.125	5.801 ± 0.032	–
3. A leaf of Morus nigra L.	4.65 ± 0.55	2.693 ± 0.29	0.233± 0.07
4. A leaf of Prunus persica L.	3.3125 ± 0.113	9.082 ± 0.075	5.7 ± 0.22
5. A leaf of Ficus carica L.	2.735 ± 0.167	4.234 ± 0.045	1.725 ± 0.025
6. A leaf of Vitis vinifera	4.192 ± 0.239	6.85 ± 0.11	0.83 ± 0.5
7. A branch of Vitis vinifera	3.8 ± 0.483	7.068 ± 0.108	0.403 ± 0.097
8. A curl of Vitis vinifera	2.065 ± 0.25	4.168 ± 0.009	–
9. A leaf of Cerasus vulgaris L.	3.65 ± 0.433	6.63 ± 0.341	0.94 ± 0.195
10. A branch of of Cerasus vulgaris L.	2.275 ± 0.175	4.632 ± 0.109	0.601 ± 0.273
11. A fruit of of Cerasus vulgaris L.	2.45 ± 0.05	3.08 ± 0.079	–

The results showed that the highest concentration of antioxidants was found in summer that in walnut and peaches leaves than spring and autumn. In walnut leaves its content was 9.105 ± 0.05 mg/g and in peach leaves it was 9.082 ± 0.075 mg/g.

There are xinons, flavonoids, vitamins B and C (4–5%), carotene 12 mg/%, various xanthines and efir (ether) oils in walnut leaves. The high concentration of total antioxidants in the extract of Morus nigra L. leaves was 4.65 ± 0.55 mg/g in the spring, it was 2.693 ± ± 0.29 mg/g in summer, and its quantity lowered to 0.233 ± 0.07 mg/g in autumn. We observed that the total amount of antioxidants in peaches in summer and autumn is much higher than the concentration of leaves of Ficus carica L. and Morus nigra L. plants. From leaves of Prunus persica L. and Morus nigra L. were used in the gastrointestinal tract diseases to cure. A boiling of Prunus persica L. is used to treat diabetes, skin diseases. The total amount of antioxidants in the sprig of Vitis vinifera in the summer season was 7.068 ± 0.108 mg/g, and in the leaves were 6.86 ± 0.11 mg/g. The high concentration of antioxidants in Serasus vulgaris L. was about 6.63 ± ± 0.341 mg/g in summer. It was about 4.632 ± 0.109 mg/g in the rod, in fruit it was about 3.08 ± 0.079 mg/g.

3. Conclusion

Thus, the highest amount of antioxidants in the leaves of different fruits was found in the leaves of walnut and peaches in summer.

References:

1. Alimbabaeva N. T., Khalitova R. A., Mirkhamidova P. and others. Effect of karate on lipid peroxidation in rat mitochondria and microsomes // Uzb. Biol. journal.– Tashkent,– 2005.– No. 6.– P. 34–36.
2. Menshikova E. B., Zankin V. Z., Zentov N. K., Bondar and others. Oxidizer stress. Prooxidants and antioxidants // – Moscow: "Word",– 2006.– 556 p.
3. Mirkhamidova P., Alimbabaeva N., Isabekova M. A. and others. A studying of the effect of residual amount of pyrethroid of karate in the liver on the activity of membranes of related to enzymes // NUUz reports.– Tashkent,– 2011.– No. 3.– P. 93–96.
4. Rogojin V. V. Practicum on biological chemistry // Sankt-Petersburg-Moscow-Krasnodar,– 2006.– 254 p.
5. Saydalieva L., Mirkhamidova P., Alimbabaeva N. T. and others. A studying of the effect of pesticide karate to activity of MOS of the liver of rat embryos // NUUz reports.– Tashkent,– 2013.– No. 4.– P. 172–174.

Muminov Rano Dalabaevna,
Tashkent State Agrarian University
Assistant of Professor of Deportment Plan protection from Pest and quarantine.
Mamatov Kamol Shavqievich,
Docent, Head of Laboratory,
Research Institute of Plant Protection.
Jumaev Rasul Axmatovich,
Tashkent State Agrarian University.
Ph D., of Deportment Plan protection from Pest and quarantine
E-mail: rasul-jumaev@mail.ru; jumaevrasul1990@gmail.com,

THE DEVELOPMENT OF RUSSET MITE IN VARIOUS PLANTS AND EFFECTIVENESS OF PESTICIDE

Abstract: the level of development of russet mite in various plants and the amount of insectacaricide used for these pests and their biological efficacy has been studied. Moreover, based on these result, recommendation have been made for commercial grower.

Keywords: plants, host plants, *Aculops lycopersici,* biological efficacy.

One of the main problem nowadays is to provide the population of our country with quality products of vegetables. Among other agricultural crops, pests and diseases impacte tomato crop yield severe. In recent years, tomatoe production yield lost attributed to russet mite (*Aculops lycopersici* Massee) damage in Uzbekistan.

The russet mite dameges many plant during its all life satges except egg phase. We conducted experiments to detect different levels of russet mite damage in various plants. Damaged plants were observed every 3 days. In some plants, the development of russet mite is slow that others where russet mite reproduce on stem rather than on the leaf of the plant. Monitoring results are shown in (Table 1).

Russet mite damage was observed on stems and leaves of Solanaceous plants. The pest movies upword on the plant until the plant dies. In the potatoes (*Solanum tuberosum* L.) plant turns in to light bronze color and deformities unevenly, where plant leaves drys and the plant dies just like in tomatoes.

Black nightshade (*Solanum nigrum* L.) is more susceptible to the russet mite damage. Pest completes more life cycle than on tomato. Moreover, the pest fecundity was higher in black nightshade plant than on tomato plant. Eggplant (*Solanum melongena* L.) is also considered a very good host for russet mite. The russet mite reproduces very good on eggplant as a result the plant leaves turn in to yellow color and eventually plant dies. On tomatillo (*Physalis ixocarpa*) the pest develops rapidly on the both side of the leaf. As a result, both side of the leaf turn in to yellow color and it starts drop out from the stem. This symptom might be due to the damage of the leaf trichomes. There was a moderate development of the russet mite on field bindweed (*Convolvulus arvensis*). In other plants no development of russet mite was observed.

The biological effectiveness of chemicals on tomato plant growth in 2016–2017 was rising in "Sevara Brend Tayr" farmer, Qibray district of Tashkent region. Experiment was conducted base on Sh. T. Hodjaev (2004). To calculate the amount of russet mite, samples were taken from a middle of tomatoes. Ten samples were taken from each treatment 10. One leaf was selected for observation from infested plant. The amount of russet mite was counted on one life. The observations were made on plants day one, three, seven, and 14 days after acaricide was applied. The efficacy of the chemical control estimated using the Abbot's (1925) formula. Look for table 2 for results.

Rainbee Effectum Duo, 40% clarity. (0.2 l/ha), Neomectin, 3.6% k.e. (0.15 l/ha), Benthos, 1.8% k.e. (0.5l/ha), column, 50% p.p. (1.0 l/ha) Vertimek, 1.8%

k.e. (standard) pesticides have been tested. It was found that the above-mentioned pesticides have a biological efficacy from 86% to 94%.

Therefore, these pesticides are considered to be an effective way of controlling when they are used mentioned amount in above.

Table 1. – Host plants of russet mite (2016–2017 years)

№	The scientific name of the plant	Common name of plant	Damage rate
1.	*Lycopersicum esculentum Mill.*	Tomato	+++
2.	*Physalus ixocarpa Mill.*	Tomatillo	+++
3.	*Solanum tuberosum L.*	Potato	+++
4.	*Solanum dulcamara L.*	Red nightshade	++
5.	*Solanum nigrum L.*	Black nightshade	+++
6.	*Convolvulus arvense*	Field bindweed	++
7.	*Capsicum annuum L.*	Hote red pepper	+
8.	*Nicotiana tabacum L.*	Tobacco	0
9.	*Nicotiana longifolia L.*	Long leaf tobacco	0
10.	*Brassica oleraceae L.*	Cabbage	0
11.	*Petroselinum cricpum L.*	Parsley	0
12.	*Doucus carota L.*	Carrot	0
13.	*Cucumis sativa L.*	Cucamber	+
14.	*Mello sativa Duch.*	Melon	+
15.	*Solanum melongena L.*	Eggplant	++
16.	*Cucurbita maxima Duch.*	Squash	0
17.	*Gossypium hirsutum L.*	Cotton	0

Explanation. 0 – Russet mite cannot reproduce.

+ – hope does not show symptom;

++ – host plant attracts the russet mite, host plant shows severe damge and sometimes host palnt dies;

+++ – Russet mite reproduce fast and feed well, the plant loses most of its yield.

Table 2. – Efficiency of pesticide in tomatoes in the field experience farmer. "Sevara Brend Tayr" Kibray district work fluid 300 l/ha, 2017

Treatment	Application, l/ha.	Active agent	Numbers of russet mite on tomato stem.					Biological efficacy, days,%			
			after application	Days after application							
				1	3	7	14	1	3	7	14
Effectum-Duo, 40% c.e.	0.2	lambda-cyhalothrin + imidacloprid	37.5	4.5	3.3	1.7	3.0	88.5	92.2	96.1	93.5
Neomektin, 3,6% c.e.	0.15	Abamectin	40.1	5.2	4.3	4.0	6.7	87.6	90.5	91.4	86.4
Benthos, 1,8% c.e.	0.5	Abamectin. 1.8% EC	38.2	4.2	3.0	1.5	2.8	89.5	93.1	96.6	94.0
Colo, 50% p.s.	1.0	Diafenthiuron	35.9	4.3	3.2	2.0	2.3	88.6	92.1	95.2	94.8
Vertimek, 1,8% c.t. (etalon)	0.2	Abamectin	35.4	3.1	2.5	2.2	3.9	91.6	93.8	94.6	91.0
Control (water)	–	–	34.6	36.2	39.5	40.2	42.4	–	–	–	–
HCP_{05}											3.4

References:

1. Hodjaev Sh. T. Basic requirements for small and large-scale experiments of insecticide test in agricultural crops. A set of methodological guidelines for testing insecticides, acaricides, biologically active substances and fungicides.– Tashkent. Uzinformagroprom.– 1994.– P. 4–18.
2. Abbots W.S. A method of computing the effectiveness of insecticide, – 1925.– V. 18.– № 3. – P. 265–267.

Ramazonov Baxtiyor Ramazonovich,
Senior researcher applicant,
Research institute of Soil science and Agrochemistry
E-mail: ramazonov_b@umail.uz
Kuziev Ramazon,
DSc., (Doctor of science in Biology), professor,
Research institute of Soil science and Agrochemistry
E-mail: kuziev_gosniipa@mail.ru

EVOLUTION OF SOILS OF THE ARAL SEA AREA UNDER THE INFLUENCE OF ANTHROPOGENIC DESERTIFICATION

Abstract: The article summarizes information on changes in natural and anthropogenic processes of desertification and patterns of their manifestation in the Aral Sea area. In connection with the intensification of desertification, arid-zonal factor – the rapid transition of hydromorphic soils to automorphic desert regions – began to play a decisive role in soil-forming processes. It was revealed that because of sharp change of climate and intensification of desertification in the main part of the Aral Sea region, hydromorphic conditions disappeared and landscapes acquired a desert nature, the soil cover reached a typically deserted stage of development, its biogeocenoses disappeared, and tugai vegetation also dried out.

Keywords: Aral Sea, zonal factors, desertification, aridization, hydromorphic soils, automorphic soils, soil formation, climate.

At the end of the 1950s and 1960s, the water flow of the Amudarya and the Syrdarya declined sharply, which led to significant changes in the natural and ecological situation in the Aral Sea area. With the draining of the Aral Sea – the process of desertification, changes in soil formation conditions began here. A decisive role in soil-forming processes began to play the arid-zonal factor, which led to a sharp transition of hydromorphic soils to automorphic desert soils. Such a rapid transition, when for a few years the groundwater level has significantly decreased and soil has dried up, predetermined the peculiarities of their evolution in the first stage of aridization. As a result of the development of evolutionary processes, the evolutionary soils have fallen out of evolutionary chain, and the transition from meadow soils to marshy soils, characteristic for the ancient lowland plains of the lower reaches, has been erased. The genesis of soils at this stage, with the exception of solonchaks, is almost completely determined by the features inherited from the preceding, initial soil-forming processes. Therefore, the soils of the first stage – the drying stage, which lasts 25–30 years, refer to residual-meadow and residual-meadow tugai. And together with these soils, solonchaks are formed, also having residual signs of the original floodplain-alluvial soils [9].

According to the data of N.V. Kimberg, M.I. Kochubey and S. Sh. Shuvalov, in the "living" delta areas, on the site of the dried up lakes there were about 40% of the total area, semihydromorphic solonchaks and residual peaty-bog or silty-bog soils are developing. In the group of residual soils, drying desiccating soils are distinguished (Borovskii, Pogrebinsky, 1958, Kievskaya, 1983). The criterion for separation is the degree of desiccation of the soil profile, determined by the composition of the changed vegetation, as well as the signs of desertification and soil degradation. At the end of the last stage, the soil acquires the characteristics of one of the zonal desert soils [1].

The evolutionary orientation of the development of soils in the delta is not uniform, it is determined by geomorphological and hydrogeological conditions, and together with this lithological composition of soils and grounds [8].

The soil map of the lower part of the delta of the Amudarya (Popov, Sektimenko, Tursunov, 1992) reflects the current state of its soil cover. The location of soils within geomorphological regions in a certain genetic sequence – from hydromorphic soils to desert automorphic ones – allows us to see the paths of their evolutionary development under conditions of sharply arid and widely spread aridization [8].

Hydromorphic conditions on the prevailing part of the territory disappeared long ago and landscapes acquired a deserted character, the soil cover reached a typically deserted stage of development. Takyr, desert sandy soils and residual solonchaks are widespread in these territories, and the residual-hydromorphic soils have clear signs of takirazation. Deep cracking of soils during drying, formation of large karst-suffosive valleys and huge basins of blowing, formation of sandy hillocks and drifts is very widespread here. Funnels of shrinkage-erosion origin are formed where there are clayey and heavily loamy soils with a large volume shrinkage coefficient. When dried, they form pronounced cracks of desiccation (Felitsiant, 1953; Zemsky, 1954; Shelayev, Weilert, 1956) [9].

The distribution of sandы in these parts of the delta is to a certain extent connected with the location of ancient channels, in which almost sand deposits are deposited, sometimes covered with a thin clayey crust. As a result of the intensification of the aridity of the climate, deflation processes become more active. In the paleochannels, huge funnels are formed, blowing up to 2–3 m in depth, up to 10 m in diameter. Also in the paleochannels as a result of accumulation of deflated material, so-called chokalaks are formed and a kind of chokalak relief is formed. The height of the sandy hillocks reaches 5 m, the diameter is 10–15 m. Often their dimensions are smaller, respectively 2 and 3–5 m. All of the above negative phenomena leading to soil degradation are the indispensable companions of desert soil formation on drying delta plains.

As a result of extensive aridization of the region, some elevated areas passed through a stage of alluvial meadow and semi-hydromorphic drying soils and entered the phase of desert automorphic soil formation, which, depending on the nature of the deposits, flows in two directions, takyr soils are formed on loams and clays, with residual marshy features, and on sand and sandy loams – desert sandy soils. Together with the aforementioned solonchaks with increasing aridization, they pass a semi-automorphous stage of solonchak soils and subsequently desalinate surface of them and become takyr. In the evolutionary development, in some cases, can reach the stage of the residual marsh soils [13].

To date, the delta is dominated by various genetic variants of residual semihydromorphic soils, including solonchaks. They have more than half the territory. The initial stage of the evolution of soils under the influence of anthropogenic aridization is completed and places in semi-automorphic conditions of the soil enter the next stage of desertification, which this stage will also be transitional. In the future, under the influence of high desert hydrothermal factors, the residual signs of meadow and bog soils in their morpho-genetic characteristics will have subordinate significance and begin to prevail signs of takyr and desert soils. Similarly, the processes of desertification will affect solonchaks (Popov et al., 1982, 1985a, Tursunov, 1987) [11].

V. V. Egorov (1959), considering the question of the evolution of the soils of the delta of the Amu Darya, comes to the conclusion that "… the transition from the marshy to the meadow stage does not always occur gradually. A sharp decrease in the water regime towards drainage may be accompanied by a weakening of biological activity and a relative decrease in the effective fertility of soils. Only with great convention can you name such soils, as is done, marsh-meadow. In them only the residual properties of bog soils predominate, while the properties of meadow soils have not yet developed. The systematic position of these soils also needs to be clarified, taking into account the fact that their immediate passage into desert soils in the corresponding zone …" The correctness of these conclusions is confirmed even now, and they can be extended not only to hydromorphic soils, but also to the rest of the variety of transitional soils common in the lower reaches. Following the disappearance of the Aral Sea and the appearance of the base of the Aral Sea (Aralkum), the decrease in the basis of erosion and the sharp drop in the level of the delta's groundwater, meadow and marshy soils, as well as solonchaks, quickly transform into semi-hydromorphic humidification conditions and undergo a drying. Within 25–30 years they retain the basic morphogenetic features of hydromorphic soils, although by the end of this stage groundwater

in them can descend deeper than 5 m. In them, as it were, the high reserves of organic matter inherent in marsh and meadow soils are preserved. Here, residual signs of oxide and especially ferrous iron forms of gley horizons are clearly preserved. That is why at the first stage of the general process of regional anthropogenic aridization of the Aral Sea, during the drying out stage, the transitional soils were decided to be called residual-marsh and residual-meadow soils. They are also isolated as an independent genetic subdivision and soils drying tugai – residual-meadow tugai soils [8].

With the desiccation of the Aral Sea and desertification of the delta, its biogeocenoses sharply declined and its tugai vegetation dried up. Reed is modified into molding forms and perishes. Most of the territory of the Aral Sea is used as pastures, often unproductive. In the future, with the broad development of the processes of desertification and degradation, the quality of pastures will further decrease. Proceeding from this, it is necessary to resort to periodic flooding of pasture and hayfields, which simultaneously with increasing their productivity somewhat suspend the desertification of individual territories. It should also be noted for a good experience of creating the juniper reeds in Muynak.

At the stage of desertification, the soil will acquire the characteristics of one of the zonal soils-takyr, desert sandy or residual solonchaks. Differences in soil processes in the prognostic stage are smoothed out, but facies differences that predetermine salinity, deflation, the degree of profile differentiation to genetic horizons, and fertility indicators of soils acquire great importance. In extra arid conditions, there is a further convergence of soils, and the main indicators on which their division was-the content of humus, the level of provision of gross and mobile forms of nutrients is leveled. The level of facies and lithologic properties or differences in the mechanical composition come to the fore [9].

According to V.Y. Sektimenko and other scientists, based on the study of soil cover, the main variety of soils in the lower part of the Amudarya delta can be represented by the following list:

I-hydromorphic: 1-meadow-residual-bog, 2-solonchaks typical, 3-solonchaks bog, 4-solonchak-meadow;

II-transitional: 1-residual-bog, (a-drying, b-dried, in-desiccated), 2-residual-meadow (a-drying, b-dried, in-desiccated), 3-residual-meadow tugai (a-drying, b-dried, in-desiccated), 4-meadow-takyr, 5- solonchaks-residual-bog, 6-solonchaks-residual-meadow.

III-automorphic: 1-takyr, 2-desert sandy (a - on alluvial deposits, b – on tertiary sandstones), 3-solonchaks residual.

IV-irrigated: 1-meadow, 2-meadow-takyr [9].

The systematic list reflects both the classification-taxonomic levels of genetic groups of soils in accordance with the "Classification and diagnostics of soils" (1977), and the same indicators according to the classification of B.V. Gorbunova and N.V. Kimberg (1962, 1974).

In addition, the list includes classification-taxonomic levels for residual-bog, residual-meadow, residual-meadow tugai soils, as well as solonchaks-residual meadow and residual-marshy (V.E. Sektimenko, A.A. Tursunov, 1988) which are revealed in the delta for the first time [10].

The aforementioned soils represent one of the stages of drying of bog soils formed in these territories during the past alluvial-flood regime of humidification, which is also reflected in the residual signs of the marsh process along their profile. Therefore, these meadow soils are referred to meadow residual-bog soils, which, with further drying of the delta, can go to meadow-takyr or residual-meadow through a stage of intensive salinization [9].

Meadow residual-bog soils occupy the youngest surfaces in the lower part of the Amu Darya delta and are mainly confined to territories that, as a result of local support of river and waste waters, maintain a close groundwater level, most often within three meters. The profile of soil data is characterized by the presence of gley horizons in both the upper and lower layers. In the absence of flooding, there is an effusion and dissociative-effluent water regimes that, with mineralized groundwater, contribute to the formation of a salt profile in the type of solonchaks. With meadow soil formation, a special composition of vegetation develops. In meadow residual-bog soils, first of all, reeds grow, which, with increasing drying, turns into a creeping shape, in the form of separate plants up to 10–15 cm in height. Meadow communities from tamarisk, reed, and chingil come to replace marsh vegetation. From leguminous plants there is licorice, and also a camel thorn. With increasing of soil salinity, meadow vegetation dies off, giving way to halophytes – Kareliania, parselystnik, Kermek, some solyanka. Meadow residual-bog soils are formed mainly on sediments of the lake facies of sedimentation [5].

In the desert zone, bog solonchaks are widespread, it is a subtype of solonchaks combining salt accumulation with swamping. These solonchaks are called in various places by blinders, salty mud. An indispensable condition for their development are constantly close, highly mineralized, drainless groundwater, which together with capillary removal of salts to the surface of the soil creates conditions for anaerobiosis in it. This affects the strong gleying of the entire profile. Solonchaks of the described subtype are developed on the coasts of saline lakes, as well as in closed depressions of modern alluvial plains. The profile of the bog solonchaks of the desert zone is given in the example of the sample cut No. 27.

Sample cut 27, 2017 August 23. B. R. Ramazonov, A. J. Ismanov. Muynak district, from the road 350 meters to the north-west. The surface is devoid of vegetation and covered with a rough dark crust with white spots.

0–1 cm. Earth-salt, durable moist crust.

1–6 cm. Rick, moist, saturated with salts.

6–40 cm. Light-brownish, gray and rusty patches, weakly dense, wet loam.

40–92 cm. Clay of the same color, but with 75–78 cm intensely blue with bright rusty spots, reed residues and a mass of large particles of gypsum.

92–150 cm. The whitish gray, moist, medium sand with large rusty and bluish spots, there are small seashells – Cardium edula.

From 150 cm begins salty groundwater.

Bog solonchaks are allocated in a large amount of salt accumulation, usually by the chloride character of salinity and increased carbonate content. Residual saline solonchaks of the desert zone – in which the solonchak process has stopped, salt accumulations are relict in character and with them signs of a transition to some sort of, depending on lithology, automorphic soil: takyr or desert sand. Residual solonchaks are always found on high river terraces, in ancient deltas or dried parts of modern deltas. All these surfaces in the recent past experienced hydromorphic conditions, as evidenced by rusty stains of iron oxide. Morphological varieties of residual solonchaks are the same as typical: plump, cortical, cortical-plump. In addition, there are solonchaks with a takyr surface, which are called takyr solonchaks [6]. The impact of mankind and its economic activities on the environment is one of the most important issues of our time. Nature itself undergoes changes under the influence of various factors. Especially dynamic are the water systems, and their evolution even in one developed natural history area proceeds in different ways depending on the set of environmental conditions.

References:

1. Borovsky V. M., Pogrebinsky M. A. The ancient delta of the Syr Darya and the Northern Kyzylkum, Alma-Ata – 1958.– No. 351.– Tashkent: Publishing house «Fan»,– 1985a.– P. 1–16.
2. Gorbunov B. V., Kimberg N. V. Classification of Soils of the Uzbek SSR // Tr. Uzb. filial of geogr. obsch-va,– Vol. 6.– Tashkent.– 1962.– P. 80–90.
3. Zemsky P. M., Soils of ancient irrigation areas within the Janadarya ancient alluvial plain // Mat. by nature. earth. fund. bass. rivers. Amudarya and Syr Darya. M. Izd-vo AN SSSR, SOPS, Aralo-Caspian exp., Iss. 1.– 1954.
4. Egorov V. V. Soil formation and the condition for conducting irrigation reclamations in the deltas of the Aral-Caspian lowland,– M.,– 1959.– 295 p.
5. Kimberg N. V. Soils of the desert zone of the Uzbek SSR, Publishing house "Fan" Uzbekistan – 1974.– P. 95–98.
6. Kimberg N. V., Kochubey M. I., Shuvalov S. A. Soils of the Karakalpak ASSR T. 3, Tashkent: Uzbekistan,– 1964.– P. 3–131.
7. Kievskaya R. X. Changes in the soil cover of the present delta of the Syr Darya River during aridization. The author's abstract of the candidate of agricultural sciences, Alma-Ata,– 1983.– 20 p.
8. Popov V. G., Sectimenko V. E., Tursunov A. A. Soil cover of the lower reaches of the Amu Darya and ways of its rational use, Inf. messages. № 351. Tashkent: Publishing House of Fan,– 1985 a.– P. 1–16.
9. Popov V. G., Sectimenko V. E., Tursunov A. A. Changes in the soil cover of the present delta of the Amudarya under the influence of anthropogenic desertification. Tashkent, "Fan" Publishing House of the Academy of Sciences of the Republic of Uzbekistan.– 1992.– 18 p.

10. Sectimenko V. E., Tursunov A. A. To the question of taxonomy and classification of soils of the drying part of the Amudarya delta // Scientific problems of soil science and agrochemistry. Tashkent: Uzgiprozem,– 1988.
11. Tursunov A. A. Changes in the soil cover of the modern delta of the Amudarya under the influence of desertification. Author's abstract of Cand. diss.– T.,– 1987.
12. Popov V. G., Sectimenko V. E., Tursunov A. A. On the question of the evolution and taxonomy of soils, the lower parts of the Amudarya delta are frequent // Scientific problems of soil science and agrochemistry. Sat. tr. IPA of the Academy of Sciences of Uzbekistan,– No. 22. Tashkent: Publishing house of the Ministry of Agriculture of Uzbekistan,– 1982.– P. 89–95.
13. Tursunov A. A. Changes in the soil cover of the modern delta of the Amudarya under the influence of desertification. Author's abstract of Cand. diss.– T.,– 1987.
14. Felitsiant I. N. To the question of the geomorphological structure and evolution of the soil cover in the left-bank part of the Amudarya delta. Izv. Academy of Sciences of Uzbekistan,– No. 2.– 1953.– P. 48–52.
15. Shelayev A. F., Waylert G. I. Shrinkage-erosion formations in the delta of the Amu Darya // Izv. AN Uzbekistan,– 1956.– No. 4.

Sulaymonov Botirjon Abdushukirovich,
Academician, Rector of Tashkent State Agrarian University,
Kimsanbaev Xojimurod Xamraqulovich,
Professor, Department of Plant protection from pests and quarantine,
Jumaev Rasul Axmatovich,
Ph D., Department of Plant protection from pests and quarantine,
Sabirov Sobir Karimbaevich,
Master degree, Department of Plant protection from pests and quarantine,
E-mail: rasul-jumaev@mail.ru; jumaevrasul1990@gmail.com

REARING OF TRICHOGRAMMA SPECIES (T. EVANESCENS, T. PINTOI, T. CHILONIS) IN VITRO CULTURE

Abstract: This article reports *Trichogramma evanescens, Trichogramma pintoi* and Trichogramma chilonis (Hymenoptera: *Trichogrammatidae*) were cultured in vitro from eggs to adults on artificial diets, which contained no insect components. The results of our experiments using artificial media devoid of insectan additives for rearing *T. evanescens, T.pintoe, T.chilonis* in vitro.

Keywords: Artificial media, parasitoid growth factors, in vitro, hemolymph, egg yolk, inorganic salt mixture, cow milk, *Trichogramma* spp, predator, biological efficiency.

Introduction

At the process of entirely rearing trichogramma parasite in the laboratory condition cultivates *Sitotrogo cerealella* Olive egg a lot of corn productions such as grain, maize, barley and worker force are spent. In the result of it, rearing price is increased. More than 150-thousand-ton barley is emitted in exist biolaboratories in Uzbekistan in a year [4; 5; 6].

Emitting this barley, other diets cultivation happens in the account of decreasing producing of plants or enterprises. This testifies that above mentioned process is damaging for diets industry.

In Uzbekistan 2014–2016 years for 3 year' investigations rearing trichogramma in the diets medium, which belongs to artificial medium researches showed its good results. (Jumaev R., 2016., 2017).

The artificial rearing of Trichogrammatidae started a long time ago, with the main goal to try obtaining a mean to multiply and produce parasitoids to be released in biological control strategies. But it is also a powerful tool to conduct studies on biology, physiology and behavior of entomophages, especially endoparasitoid species [1; 3; 5].

Materials and methods

Trichogramma stock: *T. evenecens, T.pintoe, T.chilonis* were collected from Tashkent province, Buka, Okkurgan and Piskent districts, and reared in the laboratory on *Heliothis armigera* and *Agretus segetum*.

Ingredients for in vitro medium: Pupae hemolymphy (*G.melonnellan or H.armigera*), cow milk or 10% powdered milk solution, chicken embryo extract and Neisenheimer's mixture salt.

Preparation of the ingredients

– Insect hemolymph collection: A live pupa was immersed in water bath at 60 ° C for 6 or 7 min to avoid blackening of the hemolymphy. After surface sterilization with alcohol and need sterile condition.

Chicken embryo extract collection: The Chicken embryo extract, only it should be the egg yolk and need sterile condition (Jumaev R., 2016., 2017).

– Milk: Fresh cow milk or 10% powdered milk solution also need sterile condition.

– Inorganic mixture salt: Use Neisenheimer's mixture salt (NaCl 7.5 g, KCl 0.1 g, $CaCl_2$ 0.2 G, $NaHCO_3$ 0.2 g, H_2O 100 ml).

Artificial "egg-cards"

There are 2 types of artificial "egg-cards Tri-ring "egg-cards" 2 pieces of plastic film are used. The semispherical concaves are made on the upper plastic film. Artificial medium is poured into concaves fully (but without overflow) with a micro-syringe or micro-pipette. The bottom

plastic film has no concaves. The upper and bottom plastic films are separated and stretched tightly by three plastic ring with different inner diameters, in our Cass they are: 5:5 cm, 5.4 cm, 5.2 cm respectively [1; 2; 4].

Components of artificial diets for 3 Trichogramma spp.

The first medium: for *Trichogramma evanescens,* Hemolymph (A) *G.melonnellan* (A_1) 41.5 ± 0.5%, Neisenheimer's (A_2) 15.5 ± 0.5%, Chicken egg yolk (A_3) 20.5 ± ± 0.5%, milk (A_4) 22.5 ± 0.5%.

The second medium: for *Trichogramma pintoi,* Hemolymph (B) *Heliothis armigera* (B_1) 45.5 ± 0.5%, Neisenheimer's (B_2) 13.5 ± 0.5%, Chicken egg yolk (B_3) 20.5 ± ± 0.5%, milk (B_4) 20.5 ± 0.5%.

The three medium: for *Trichogramma chilonis,* Hemolymph (C) *Agretus segetum* (C_1) 45.2 ± 0.5%, Neisenheimer's (C_2) 13.2 ± 0.5%, Chicken egg yolk (C_3) 21.6 ± ± 0.5%, milk (C_4) 20.0 ± 0.5% [2; 4; 5; 6].

The results of the research

It was showed in the Table 1 that the pupae hemolymphy of either *G.melonnellan* or *H.armigera* Hb could be used as the main component of the artificial diet for the development of *T. evenecens, T. pintoi, T.chilonis*. There was no significant difference in their parasitism, survival, percentage of pupation, adult emergence and reproductively when the pupae hemolymphy of *G.melonnella* was used instead of that of *H.armigera* Hb [4; 5].

Table 1. – Development of Trichogramma spp, (T. Evanescens, T. Pintoi, T. Chilonis) reared in vitro laboratory experiences, 2017 year**. (**+ 26 ±2° C, RH 75 ± 3%)

№	Composition of medium%				The amount of damage%	Development degree of Trichogramma spp generation in artificial medium by days				Genders proportion ♂: ♀
						larva period	Pupa period	Mature period (imago)	larva period	
1.	T/E Trichogramma evanescens				68.3	1.5 ± 0.3	4.3 ± 0.3	4.2 ± 0.5	3.5 ± 0.5	1:4
	TE_1	TE_2	TE_3	TE_4						
	41.5 ± 0.5	15.5 ± 0.5	20.5 ± 0.5	22.5 ± 0.5						
2.	T/P Trichogramma pintoi				81.8	1.6 ± 0.3	4.6 ± 0.3	4.4 ± 0.5	4.2 ± 0.5	1:5
	TP_1	TP_2	TP_3	TP_4						
	45.5 ± 0.5	13.5 ± 0.5	20.5 ± 0.5	20.5 ± 0.5						
3.	T/CH Trichogramma chilonis				83.5	1.8 ± 0.3	5.1 ± 0.3	4.8 ± 0.5	5.9 ± 0.5	1:7
	TC_1	TC_2	TC_3	TC_4						
	45.2 ± 0.5	13.2 ± 0.5	21.6 ± 0.5	20.0 ± 0.5						
Control					91.3	1.4	4.1	3.7	7.5	1:7
H.armigera eggs										

It is obvious in the research, prepared all mediums of diets are harmed with Trichogramma spp generation and put their eggs [4; 5; 6].

References:

1. Li Li-ying, Liu Wen-hui. Rearing Trichogramma spp, with artificial diets, containing hemolymph of different insects. Parasitoids and predators (insecta) of agricultural and forestry arthropod pests – 1997.– P. 335–337. (In China).
2. Li Li-ying, Liu Wenhui, Chen Chaoshian, Han Shityou, Shin Jiachi, Du Hansun, Feng shuyi. In vitro rearing of Trichogramma spp and anastatus sp in artificial "eggs" and the methods of mass production. Parasitoids and predators (insecta) of agricultural and forestry arthropod pests – 1997.– P. 344–357. (In China).
3. Grenier S., Liu W. H. Antifungals: mold control and safe levels in artificial media for Trichogramma (Hymenoptera, Trichogrammatidae).– Entomophaga, 35.– 1990.– P. 285–290.

4. Жумаев Р. А. In vitro rearing of trichogramma (Hymenoptera: Trichogrammatidae) // European Science Review No. 9–10. Austria, – Vienna, – 2016. – P. 11–13.
5. Жумаев Р. А. The technology of rearing Braconidae in Vitro in biolaboratory // European Science Review № 10. (DOI: htp://dx.doi.org/10.20534/ESR-17–3.4–3–5). Austria,– Vienna – 2017. – P. 3–5.
6. Жумаев Р. А. Массовое размножение трихограммы на яйцах хлопковой совки в условиях биолаборатории и ее применение в агробиоценозах // Халқаро илмий-амалий конференция “Ўзбекистон мева-сабзавот маҳсулотларининг устунлиги” мақолалар тўплами.– Тошкент.– 2016.– С. 193–196.

Khujanazarov Uktam Eshtemirovich,
Candidate of biology sciences, associated professor,
Tashkent state pedagogical university
named after Nizami, Uzbekistan.
E-mail: khuzhanazarov74@mail.ru
Xonkhadjayeva Nodira,
Candidate of agriculture sciences, associated professor,
Tashkent state pedagogical university
named after Nizami, Uzbekistan.
Pulatova Nilufar Abdusafievna,
Senior teacher,
Tashkent state pedagogical university
named after Nizami, Uzbekistan.
Sodiqova Dilafruz Khusanovna,
Researcher,
Tashkent state pedagogical university
named after Nizami, Uzbekistan.
Sadinov Jasur,
Researcher,
Tashkent state pedagogical university
named after Nizami, Uzbekistan.

ECOLOGICAL SITUATION OF THE TYPE OF POETA BULBOSAE-CARICETA PACHYSTYLIS PASTURES

Abstract: The article contains of ecological situation of foothill area in Kashkadarya basin. The productivity of efemer and efemeroid plantsandsize of the influence of anthropogenic factors are given. The increasing of cattle and shortening of the pastures will influence to decreasing of plant communities andit causes to desertification.

Keywords: pasture. Ephemeras, ephemeroid, cattle, livestock, plant, basin, productivity, desertification.

Ephemeral-ephemeroidsare mainly mesophyll and xerosmesophyll species. Their vegetation period consists of autumn and spring, partly winter. The edificatory plants of this type are: Carex pachystilis and Poa bulbosa and Ephemers – Ephemerophyta, where many plants participate in a harmonious combination.

The productivity of efemer and efemeroid plantsdepends primarily on climatic conditions. During the years when moisture is high, the productivity of these communities can increase by 1.5–2 times. Moreover, their productivity is also dependent on the current ecological state of pastures – the type and size of the influence of anthropogenic factors. The main indicator of this is the increasingof wild plants that not ate by cattle in the pastures. This negatively affects to the development of livestock and their reproduction. All of this gives informationthat it is the degradation of the ecological situation or the degradation of the ecosystem [2].

The pastures of Cariceta pachystylis consist of Ephemeropoia – Poeta bulbosae – Cariceta pachystylis, ephemeral – Poa bulbosa – Phlomis thapsoides and-Carex pachystylis with the mixtureof Cousinia resinosa,

Cousinia resinosa – Artemisia sogdiana – Carex pachystylis and others.In general, large herbs, Artemisia sp., Alhagi sp., with the mixture of Carex pachystylisin foothillsin autumn-spring, partly in winter monthswill be nourished by cattle and productivity will be got to 3.3–3.4 centers per hectare, freezing soil is the main pastures in the territory.

The Carex pachystylis pastures are widely spread on the foothills at the altitudes of 500–900 (1000) m above the sea level and spread among the dried cultivating and form the essential pastures for livestock.

Ephemeral – Poeta bulbosae – Cariceta pachystylis pastures are found around the village of Kizilchaura on the left side of the Kumdarya, around Otchopar and Hayitkul, in Lolabulak foothills, in the surroundings of the village of Sarakamish and Karakiya.Large grassy, that Alhagi sp., Carex pachystylis, Lagonychium farctum, Artemisia sp., ephemers, Carex pachystylis are grown in thearound Old-Anhor channel, in the Kuktosh, Gallachi and Chorshanbe villages.

Carex pachystylis, Phlomis thapsoides and Artemisia sp., that they are ephemeroids and grows on the left sides of the Kumdarya, in the area of Kattatukmor, inthe right sides of Kashkadarya.The population of Amygdalus spinosissima, Aretemisia sp., Carex pachystylis grows on the left sides of the Jinnidaryo and in Kurgancha and Tosh villages.

List of widespread plants in the pastures of Poeta bulbosae – Careceta pachystylis pastures

Small bushes and semi bushes
Artemisia serotina
A.sogdiana
A.turanica
Hulthemia persica
Lagonychium farctum
Perennial herbs
Acroptilon repens
Alhagi canescens
A.pseudalhagi
Astragalus cottonianus
A. korolkovii
A.sieversiana
Achilea biebersteinii
A.santolina
Capparis spinosa
Centaurea squarrosa
Convolvulus subhirsutus
Delphinium semibarbatum
Eremostachus arctiifolia
E.labiosissima
Eremurus L.
E.olgae
Haplophyllum perforatum
H.pedisellatum
Phlomis thapsoides
Psoralea drupacea
Stipa hohenackeriana
Trichodesma incanum
Ephemeroids
Bunium chaeropylloides
Carex pachystylis
Gagea gageoides
Gentiana olivieri
Hordeum bulbosum
Poa bulbosa
Scaligeria allioides
Two and annualherbs
Artemisia scoparia
Aegilops crassa
A.cylindrica
A.triuncialis
Bromus dantoniae
B.oxyodon
B.macrostachys
Anisantha tectorum
Cousinia resinosa
C.radians
Carthamnus oxyacantha
Capsella bursa-pastoris
Euclidium syriacum
Galium tricorne
Garhadiolus papposus
Heterocarium macrocarpum
Hordeum leporinum
Hypecoum parviflorum
Koelpinia linearis
Lappula microcappa
Strigosella turkestanica
Neslia apiculata
Papaver pavoninum
Roemeria refracta

Spinacia turkestanica
Taeniatherum crinitum
Trigonella grandiflora
Turgenia latifolia
Torilis leptophylla
Veronica campylopoda
Vulpia myuros

The practical development of pasture-sheep breeding technology in production ensures the restoration and increase in feed productivity of arid pasture ecosystems, the elimination of seasonal (winter) deficit in the fodder balance of sheep breeding and the sustainable development of pasture economy in the arid regions of the Central Asian region [1].

So it is advisable to feed cattle more on the northern slopes and exchange feeding is the main factor to improve the plant community, such as superficial improvement we can say about fertilization, planting of ephemeral and efemeroids and clean the stones.

References:

1. Shamsutdinov Z. Sh. Biotechnology and experience ofbiodiversity and fodder productivity of disturbed pastureecosystems ecological restoration in arid regions of the Central Asian region. Steppes of Northern Eurasia. Materials of the seventh International symposium.International steppe forum of the Russian geographical society. Orenburg,– 2015.– P. 111–113.
2. Khuzhanazarov U. Current state of the pastures of the upper zone of the Kashkadarya basin. Bulletin of Agrarian Science of Uzbekistan.– No. 1–2 (47–48),– 2012.– P. 111–114.

Section 2. Geography

Mukhammedova Nazokat Jurayevna,
Scientific researcher, Department of Geography
National University of Uzbekistan named after Mirzo Ulugbek,
Tashkent city, Uzbekistan
E-mail: nazoguli85@mail.ru

THE GEOGRAPHICAL FEATURES OF POPULATION MORTALITY IN UZBEKISTAN

Abstract: The article analyzes the dynamics of population mortality rates during Uzbekistan's independence. The mortality rates and the mortality rates for some reasons were analyzed nationally.

Keywords: death, maternal death, infant death, tanatogeographic ovens, and nozoecology.

It is well known that the regions of the republic have certain differences with regard to socioeconomic development, demographic situation and ecological situation. In particular, in the Republic of Karakalpakstan and Khorezm region, due to the ecological situation, due to the drying up of the Aral Sea, there is a sharp deterioration of the nozoecological condition. The occurrence of a dangerous environment for the population to have a negative impact on the population's death, high levels of desertification, and changes in the structure of soil, have accelerated the mortality. In the region, the balance of nature has changed dramatically. Also, it is possible to observe the ecological situation in big cities and industrial centers (Chirchik, Angren, Navoi and others). A lack of access to clean drinking water and similar inconveniences in residential areas also leads to a significant increase in mortality [1].

In recent years, Uzbekistan has shown a statistically significant analysis of mortality. In particular, the death rate in the republic in 1991 decreased by 0.8 pro mil.

One of the achievements of the country's socio-demographic development during the years of independence is the reduction in mortality in all age groups. During this period, the country's healthcare system was improved, and the attention to maternal and child health was enhanced. Also, the proportion of young people and middle age and the decline in the population have led to a reduction in the number of children under one year of age, maternal mortality and general mortality. In the short-term period (1991–2016), the overall death rate in the country decreased by 1.2 percent, or by 6.2 promille per thousand people to 4.9 pro mil.

The overall mortality rate in the country is lower than in some CIS countries. For example, Russia has 13.0%, Ukraine 13.9%, Baltic States (Latvia-14.4, Lithuania –14.4 and Estonia –11.6), which is a few times higher than the general mortality rate in Uzbekistan possible [2].

In the assessment of the socio-economic situation of the country, the overall mortality rate does not precisely define, but the infant mortality rate, specifically the age group, clearly affirms its level. High or low mortality rates include the populism and sexuality of the population. When analyzing the mortality rates in Uzbekistan, rural mortality rates were smaller than in urban areas. In Uzbekistan, the mortality rate among the working age population is 8, the mortality rate is 28.5 and the working age is 63.5 percent, and the infant mortality rate is partially observed. State programs are being developed to prevent this and reduce infant mortality. It is observed that the proportion of young people in all ages is declining, except for age-related deaths. An increase in the number of deaths in adults and elderly people should be related to their age-related illnesses.

The socio-demographic development of the population of Uzbekistan has been reflected in the healthcare system and its qualitative improvement has been reflected in the prolongation of childbirth, infant mortality, child and maternal health. Because in many years the population of the country under one year of age and maternal mortality has undergone considerable influence due to endogenous and exogenous factors.

Dynamics of population mortality in the regions of the republic has been observed to decline during the years of independence (Table 1). Socio-economic reforms carried out in our country resulted in a decrease in the population's mortality rate, an increase in the medical culture of the population, and the growth of women's employment. The highest mortality rates in Tashkent, Tashkent and Andijan provinces have been observed in recent years. The mortality rate in these regions is higher than the national average due to the fact that most of the medical facilities are located in the center, in Tashkent, on the transport node and the industrial zone around it. The situation in the Tashkent region has a significant impact on the overall mortality rate and is relatively high in other regions, where the proximity of settlements around the industrial enterprises, the diversity of national ethnicity, the low birth rate, and the age-related age distribution of the population. Andijan Region is the most populous region where population deficit decreases, and the main source of labor – the majority of able-bodied population lives in other provinces and republics, and the aging population has a significant increase in mortality.

Table 1.– Territorial coefficient of mortality rate in the Republic of Uzbekistan

Regions	1991*	1995	2000	2005	2010	2015	1991–2015 average increase in years
the Republic of Uzbekistan	6.2	6.4	5.5	5.4	4.8	4.9	0.65
Republic of Karakalpakstan	6.8	6.5	5.6	5.8	4.6	4.6	0.10
Andijan	6.1	6.2	5.2	5.2	5.2	5.2	1.20
Bukhara	5.4	5.4	4.7	4.5	4.4	4.4	0.75
Jizzakh	5.3	5.7	4.4	4.2	4.2	4.2	1.00
Navoi	-	6.3	5.3	5.3	4.5	4.5	0.50*
Namangan	5.9	6.1	5.1	4.9	4.7	4.7	1.10
Samarkand	6.0	6.2	5.3	5.0	4.5	4.5	0.70
Surkhandarya	5.6	5.7	4.6	4.3	4.1	4.1	1.20
Syrdarya	6.4	5.8	5.4	5.5	4.8	4.8	0.25
Tashkent	6.6	7.2	6.4	6.8	5.9	5.9	0.45
Fergana	6.4	6.2	5.3	5.2	5.0	5.0	0.70
Khorezm	5.9	6.0	5.2	4.6	4.5	4.5	0.90
Kashkadarya	5.3	5.1	4.4	4.1	4.0	4.0	1.20
City of Tashkent	8.1	9.2	8.5	8.6	6.9	6.9	0.00

** In the Navoi region unreduced 0.50-year the average annual population mortality rate in the Navoi region was estimated as 1992. The data is based on the data from the Statistics Department of the Republic of Uzbekistan*

According to the data of the table, the regions with the lowest mortality rate are Kashkadarya, Surkhandarya and Jizzakh regions. These zones are characterized by the good nature of the ancient ecological situation and the positive impact on human life. In this area, where the mortality rate is low, population is mainly engaged in agriculture and livestock production. The industrial sector is relatively poor. The traditions and customs of the Uzbek people have been preserved and the birth of many children is higher than some industrialized and densely populated areas, largely due to the fact that most of the working age population is migrating to large cities.

Mortality rates in Uzbekistan by age and sex show that death rates in males are higher in all age groups. Only 85 years of age and over, the coefficient of mortality is high and should be explained by the relatively small

number of males in these age groups. Additionally, the proportion of males in the age and sex age of the country is still unchanged at the highest age groups, with the proportion of men aged 35 years old.

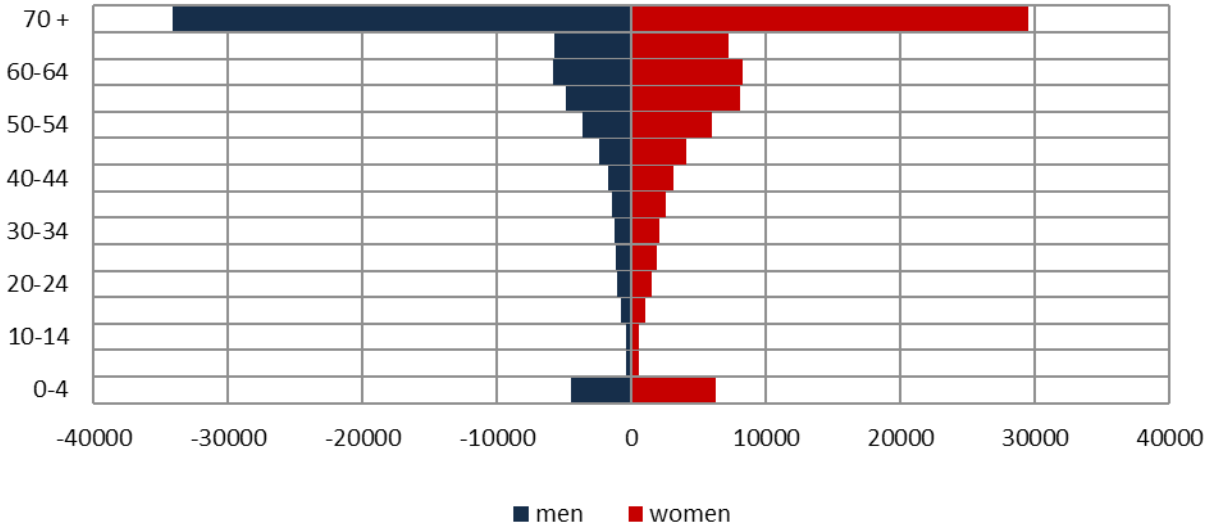


Figure 1. Age-related mortality rates in Uzbekistan

The age-related death rate in Uzbekistan is reflected in the picture above and can be seen in the 0–4 age group. This can be seen mainly in the death of infants, ie deaths of up to one year. The mortality rate in the younger age groups has been expanding rapidly. When learning about this pyramid, the death toll from the age of 60–64 is 65–69 years. If we analyze this situation, it will be the first five years of the holiday. It is also an organism's aging process, as well as the effects of occupational diseases on the body. The low mortality rate among males in terms of mortality is due to the employment of men in such heavy and dangerous labor conditions.

The geographical location of Turkey differs greatly from the second region according to its natural conditions and climatic characteristics. The location of the population in the mountains, valleys and deserts and chaliyol zones will change dramatically over their death, and the causes of the disease are different.

According to the (Table 2), mortality from circulatory diseases is high in Tashkent city, Tashkent and Andijan regions, where population density is high and urbanization is high. The opposite is observed in Kashkadarya region, the Republic of Karakalpakstan and Jizzakh region. High mortality rates with dangerous tumor diseases are observed in Tashkent, Tashkent region and the Republic of Karakalpakstan. These territories are industrial and transport-dependent in comparison with other regions, with a population of 100000 to 88.3; 58.4; 50.0; part with dangerous tumours. The diseases of the digestive organs are also one of the region-specific disease groups, directly linked to water, soil and atmosphere, and the tanotogeographic area of the digestive organs is Tashkent, Ferghana and Navoi. As can be seen from this, the influence of soil composition, underground and surface water, and the impact of industrial enterprises on these areas, especially the chemical industry, is noticeable.

Table 2.– Indicators of Uzbekistan's population for some reasons in 2015

Regions	**Death for some reasons (Relative to 100,000 population)**			
	From the diseases of the circulatory system	**Tumors**	**From the digestive organs**	**Accidents, poisoning and injuries**
1	***2***	***3***	***4***	***5***
the Republic of Uzbekistan	287.4	42.7	28.8	32.5
Republic of Karakalpakstan	224.5	50.0	18.3	39.2

1	*2*	*3*	*4*	*5*
Andijan	327.5	42.7	28.7	26.8
Bukhara	253.9	44.0	25.5	30.9
Jizzakh	227.3	41.0	29.7	39.3
Navoi	266.3	37.7	31.8	36.7
Namangan	271.0	38.5	30.1	28.0
Samarkand	264.9	29.6	26.6	25.7
Surkhandarya	258.2	27.6	26.2	24.9
Syrdarya	284.0	44.4	30.6	38.2
Tashkent	342.3	58.4	31.0	56.0
Fergana	319.8	37.0	33.9	35.7
Khorezm	264.2	44.7	26.2	28.1
Kashkadarya	209.4	29.4	29.1	24.5
City of Tashkent	415.3	88.3	38.0	36.7

The table is calculated based on the data from the Statistics Office of the Republic of Uzbekistan

Although the overall mortality rate does not reflect the specific levels, the age-related structure of the regional differences, and the mortality rates for the reasons, have revealed the nature of the regions. The difference in the mortality rate in Uzbekistan is directly related to the geographical environment in the regions and requires studying the geographical characteristics of each region.

In general, the impact of natural, ecological, socio-economic and demographic factors on the demise of the population has been explained. In particular, natural and ecological factors such as climate change, drinking water and soil composition are the result of short-lived life expectancy of the population of the Republic of Uzbekistan, as well as relatively early biological mortality caused by digestive tract diseases (Karakalpakstan, Khorezm region). Economic and Social Factors: The relative increase in mortality rates in populated and urban areas, including Tashkent city, Tashkent and Andijan regions, is due to the combination of industrial enterprises, the density of traffic congestion in the atmosphere exceeds the normal requirements for the most vulnerable population, as well as a substantial increase in maternal and infant mortality rates. This means that the improvement of the population's settlement system and prevention of premature death of the population, the need to develop measures to improve the natural and socio-economic condition of the regions to extend the life expectancy of the population.

References:

1. Komilova N. K. Theoretical-practical issues of the geography of medicine. – Tashkent: "Sharq",– 2016.– 263 p. (in Uzbek).
2. Tojiyeva Z. N. Population of Uzbekistan: Growth and location. – Tashkent: "Fan va texnologiya",– 2010.– 276 p. (in Uzbek).
3. Demographic Yearbook of Uzbekistan,– 2016.– T.– P. 107. (in Uzbek).

Section 3. Materials Science

Saydakhmedov Ravshan Khalhodjaevich,
Tashkent State Technical University, Professor,
E-mail: ravshansaid@mail.ru

Kadirbekova Kutpinisa Karimovna,
Tashkent State Technical University,
Associate professor,
E-mail: niso_51@mail.ru

Bakhadirov Kudratkhon Gayratovich,
Tashkent State Technical University,
Senior teacher,
E-mail: bahadirov@gmail.com

INVESTIGATION OF THE STRUCTURE, DISPERSION, AND PROPERTIES OF NANOSTRUCTURAL COATINGS BASED ON CHROME MODIFIED BY MAGNETRON SPUTTERING

Abstract: In the article nanostructured coatings based on chromium, formed by magnetron sputtering with preliminary surface treatment by ion source have been investigated. The thickness, adhesion strength and of chrome coatings were determined. It was found that, depending on the formation regimes, the coatings consist of crystallites with dimensions from 45 nm to 200 nm.

Keywords: Chromium coatings, magnetron sputtering, adhesion strength, corrosion resistance, thickness coatings, nanostructures.

Introduction

Recently, interest in the study of materials with nanocrystalline structure has been increased, since the reduction of crystal size below a certain point, etc. to drive a radical change in physic-chemical properties of these materials. The most significant change of properties of nanomaterials e reaches in the range of crystallite sizes up to 100 nm. Thin films and coatings can be obtained by PVD and CVD methods. Thus, well-known coating carbide and titanium nitride on the beam are ion-plasma deposition of it, which leads to the formation of nanocrystalline structure [1, 2].

Coatings based on chromium and chromium nitride used in industry as a solid thin film to protect the items and possessing excellent wear resistance, high hardness, sufficient strength, good adhesion to the substrate, good corrosion resistance and heat resistance up to 600 °C [3–6]. In the industry galvanic coatings of chromium are widely used on steels and alloys, characterized by high chemical and mechanical resistance, however they are obtained by environmentally harmful chemical technology, requiring it to be treated with sewage treatment plants. When chromium plating and electroplating using toxic hexavalent chromium, as well as to a significant tensile stress which lead to the appearance of the grid of cracks in the coating immediately after precipitation [7, 8].

In a number of cases, it is advisable to use vacuum methods for setting chromium coatings magnetron sputtering. Due to the low deposition temperature of coatings by magnetron sputtering, it is possible to form them

on non-metallic materials, in particular on the reflecting surfaces of the headlamps and as decorative coatings on other parts of cars.

Currently, the automotive industry uses aluminum alloys to produce reflective and decorative coatings. Coatings based on aluminum do not meet the requirements for their reflective and corrosive properties. A chromium-based coating can be used successfully as a reflective coating in the automotive industry. Coatings based on chromium nitride are solid e coatings which can successfully apply abrasion I e coating to protect wear surfaces her parts and tools.

In [9] investigated multilayer based coating and chromium nitride and carbo-nitride and chromium. Multi-layer alternating layers of coating based on CrN/CrCN are formed by the PVD (CAD – cathode arc deposition). It has been experimentally established that the wear resistance of multilayer coatings based on chromium nitride and chromium carbonitride is higher than the individual coatings CrN and Cr CN. A sublayer of chromium 0.1μm thick was used as a sublayer.

Composition, microstructure and residual stresses, as well as the effects of chromium coatings obtained by PVD (Physical Vapor Deposition) studied in ah [10, 11]. CrN coating, are obtained on a titanium substrate by physical vapor deposition (PVD) with enhanced capabilities.

Proceeding from the foregoing, it is necessary to note the relevance of the investigation of the technology of formation of coatings based on chromium and chromium nitride by the ion-plasma method.

The objective of this study is to study the structure, composition, and properties of chromium-based metal and non-metallic materials formed by magnetron sputtering. Investigation of the effects of magnetron sputtering regimes on nanoparticle structures and sizes.

Methods of research

For the deposition of chromium-based coatings, a magnetron sputtering method was used, with preliminary treatment of the surface with a source of ions. Argon ions were used to treat the surface of the products. The treatment with ions was used to improve the adhesion strength of chromium plated coatings.

After obtaining a starting vacuum degree of the order of 10^{-2} Pa, the tooling with moving samples and a control plate was processed by the ion source in the following modes:

– the control of the working gas (argon) is $2 \cdot 10^{-1}$ Pa;
– discharge voltage – 4,5–5,0 kV;
– current discharge ion source – 80–100 mA;
– density of current onto the surface – up to 1 mA/cm^2;
– in the time of surface treatment of samples – 3 minutes.

Directly at the time of the ion source operation, a magnetron source was turned on, then the rigging was transferred to a position opposite the source of the spray. Precipitation of chromium coatings was carried out in the following technological regimes:

– The distance from the cathode to the surface of the samples – 120–130mm;
– the control of the working gas (argon) is $2 \cdot 10^{-1}$ Pa;
– Voltage cathode spray – minus 550V;
– current of discharge during spraying 2.0–2.2A;
– in the time of precipitation of the chromium coating – 5–20 minutes.

The temperature of the samples during the deposition of the coatings did not exceed 150 °C. The thickness of the vacuum-deposited chromium coatings was determined from the reference silicon wafer, which was under the same processing conditions as the steel samples.

The thickness was measured on a microinterferometer of the MII-4 type using the standard procedure. According to the measurements made, the maximum thickness of the chromium- based coating was about 2.4μm for a settling time of 20 minutes. Studies have shown that the thickness of chromium coatings is proportional to the deposition time in the interval of 2–20 minutes.

Adhesive strength of coatings was investigated by the method of normal detachment from the surface of coatings of glued metal rods. The coated sample was placed in a cassette with vertical 7 rods (diameter of the glued part 1 mm), which were adhered to the coating and torn off using a tearing machine. Studies have shown that the adhesive strength exceeded 70–80MPa (700 kg/cm^2), since the gap occurred over the glue.

The corrosion problems observed in the coating materials are usually the result of penetration of aggressive reactants through defects and their entry onto the substrate. Coating, especially multi-layer, improves corrosion resistance durability of the material. Coatings based on Cr and CrN with a dense structure and finely dispersed crystals make them less permeable for an aggressive environment. The absence of direct diffusion channels due to non-columnar structure, as a result of

which the rate of diffusion of oxygen through the coatings is significantly reduced.

Proceeding from this, we were investigated and the chemical stability of samples with chromium-based coatings in a solution of nitric and hydrofluoric acid, which He is shown on their high corrosion resistance. For coatings less than 1μm thick, the number of corrosion points (pores in the coating) was 5–10 times greater than for coatings with a thickness of 2.3–2.5μm. As the experiment shows, corrosion resistance changes with a change in the thickness of the nanostructured coating based on chromium, which implies the existence of through channels or their absence with increasing thickness of the coatings. Another important feature Strongly nanostructured chromium coatings are structurally constituent, i.e. dimensions of nanoparticles in coatings which have a significantly impact on e corrosion system "coating-substrate".

High-temperature with the oxidation resistance is one of the most attractive properties of nanocoatings. This property is highly dependent on, and so on from the phase and chemical composition of the film. If the continuous path along the grain boundaries from the coating surface through the entire thickness to the substrate is interrupted, it is possible to increase the oxidation resistance. This second can be achieved if the amorphous film structure [12].

Given all these features, by e-contact microscopy was investigated, and s surface morphology and particle size in the structure of chrome coatings.

Information on the surface relief and the size of the agglomerates of chromium nanoparticles was obtained by transmission electron microscopy. To study the surface, two-step Pt / C replicas were obtained [13, 14].

Results and discussion

Electron microscopic studies have shown that structures with chromium nanoparticles are observed for the samples (Fig. 1, 2). It is shown that the formation of nanostructures from Cr with the maximum number of chromium-containing phases are obtained when 1-provided spherical nanoparticles formed of chromium nano particles from 45 nm to 130 nm (Fig. 1), while the sample prepared with 2-condition observed nanoparticles chromium a larger size (66–200 nm) (Fig. 2)

Conclusions

Revealed what, varying the process conditions can be controlled dimensions and volumetric quantity of nanoparticles into the coatings of chromium, for example, at a pressure in the vacuum chamber $P = 3 \cdot 10^{-2}$ Pa – nanoparticle sizes in the range from 50 to 100 nm, and at a pressure $P = 3 \cdot 10^{-3}$ Pa – volumetric content of the nanoparticles sizes as follows: nanoparticles s with dimensions of 70 nm in coatings are present in an amount of 55%, with dimensions of 120 nm – 15%, and with dimensions of 170 nm – 30%.

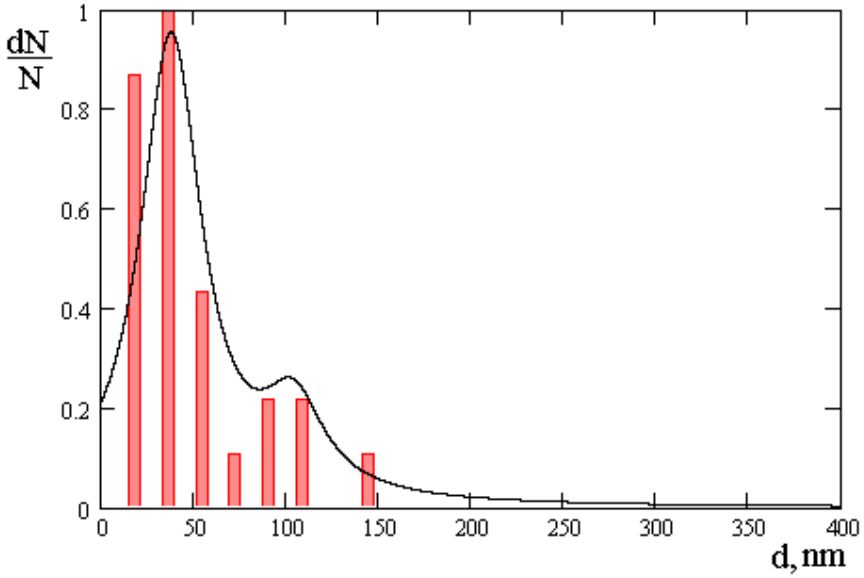


Figure 1. The amount of nanoparticles: 97% – 45 nm, an number of cities account for major nanoparticles of 50 nm in size and 100 nm

It has been established, with increasing thickness, the corrosion resistance of chromium coatings varies several times. With an increase in coating thickness from 1μm to 2.3–2.5μm, the corrosion resistance increases by a factor of 5–10.

On the basis of the conducted researches it is possible to draw a conclusion about the wide possibilities of using vacuum-deposited magnetron sputtering of chromium coatings instead of galvanic coatings.

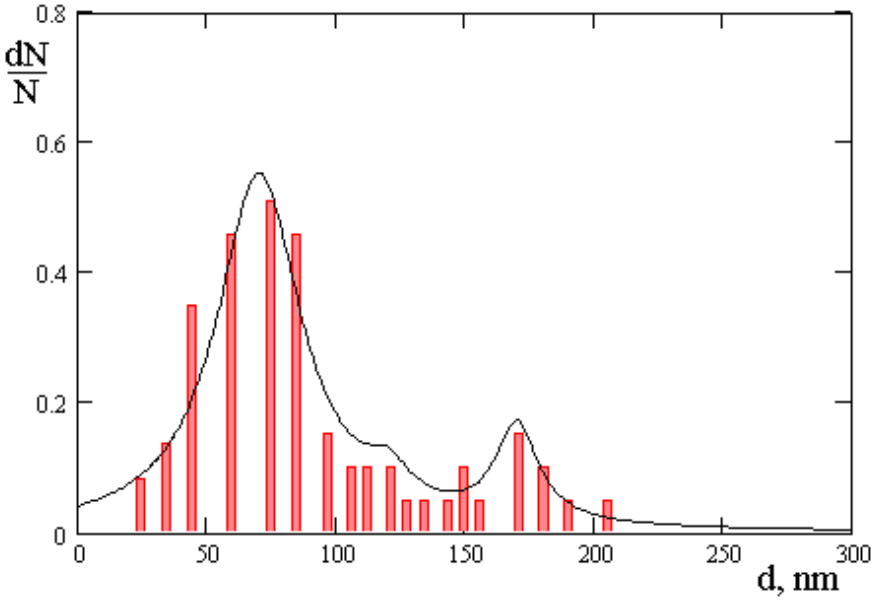


Figure 2. Number of nanoparticles: 55% – 70 nm; 15% –120 nm; 30% –170 nm

References:

1. Гусев А. И., Рempель А. А. Нанокристаллические материалы.– М.: ФИЗМАТЛИТ,– 2001.–224 с.
2. Суздалев И. П. Нанотехнология: физико – химия нанокластеров, наноструктур и наноматериалов.– М.: КомКнига,– 2006.– 592 с.
3. Suh C. M., Hwang B. W., Murakami R. I. Behaviors of residual stress and high–temperature fatigue life in ceramic coatings produced by PVD. Material Science Engineering,– 2003.– No. 343.– P. 1–7.
4. Lamastra F. R., Leonardi F., Montanari R., Casadei F., Valente T., Gusmano G., X–ray residual stress analysis on CrN/Cr/CrN multilayer PVD coatings deposited on different steel substrates Surface and Coatings Technology,– 2006.– No. 200.– P. 6172–6175.
5. Сайдахмедов Р. Х., Кадырбекова К. К., Камардин А. И. Наноструктурные покрытия и современные методы обработки материалов.– Ташкент: Фан,– 2012.– 200 с.
6. Сайдахмедов Р. Х., Кадырбекова К. К. О свойствах защитных нанопокрытий на основе хрома. Металлургия машиностроения,– 2011.– No. 5.– С. 29–30.
7. Панков Р. В., Надтока В. Н., Масляный Н. В., Дейнеко Л. Н. Свойства хромовых вакуумно–дуговых покрытий. Вісник Дніпропетровського університету. Серія «Фізика, Радіоелектроніка»,– 2012.– Т. 20.– No. 2.– С. 106–111.
8. Arieta F. G., Gawne D. T. The wettability and durability of chromium plating. Surface and Coatings Technology,– 1995.– Vol. 73.– No. 1.– P. 105–110.
9. Gilewicz A., Warcholinski B., Myslinski P., Szymanski W. Anti–wear multilayer coatings based on chromium nitride for wood machining tools. Wear, – 2010. – No. 270. – P. 32–38.
10. Perillo P. M. Properties of CrN Coating Prepared by Physical Vapour Deposition. American Journal of Materials Science and Application,– 2015.– Vol. 3.– No. 2.– P. 38–43.

11. Lippitz Th. Hübert. XPS investigations of chromiumnitride thin films. Surface and Coatings Technology,– 2005.– No. 200.– S. 250–253.
12. Наноматериалы, нанопокрытия, нанотехнологии: Учебное пособие / Азаренков Н. А., Береснев В. М., Погребняк А. Д., Маликов Л. В., Турбин П. В.,– Х. ХНУ имени В. Н. Каразина,– 2009.– 209 с.
13. Техника электронной микроскопии. Под редакцией Д. Кей, издательство Мир, – М. – 1965.
14. Jayme G., Hunger G. Mikroskopie, 13, 24. – 1958.

Shakirov Shukhrat Musayevich,
Phd., of a Tashkent State technical University
Norkhodjaev Fayzulla Ramazonovich,
Professor, of a Tashkent State technical University
E-mail: begalibektemirov94@gmail.com

SCALE RESISTANCE OF POROUS PERMEABLE MATERIALS BASED ON IRON AFTER THE THERMO–DIFFUSION SATURATION WITH SIMULTANEOUSLY CHROMIUM AND ALUMINUM

Abstract: This article presents the results of a study of the hardness of porous permeable materials based on iron powder that have been thermally diffusion saturated simultaneously with chromium, aluminum and silicon in hermetically sealed containers, in two versions: – thermal diffusion saturation after sintering of compacted samples; and – thermal diffusion saturation simultaneously with sintering of compacted samples; scale resistance of the corresponding samples, two methods were used: – measurements of the electrical resistivity of the material the sample in intensive filtering process and – microstructural analysis, the obtained results of the analysis are the most resistant to scale, the sample has passed the thermodiffusion saturation with sintering.

Keywords: powder metallurgy, thermo–diffusion saturation, porous permeable materials, scale resistance, chromium and aluminum, oxidation, sintering.

At present, the demand for porous permeable materials is rapidly increasing, as they have been used practically in all fields of technology as filters for cleaning gas–air fluids, various aggressive liquids and solutions from small abrasive particles [1–5]. In a number of industries, filtration of different media can be carried out at high temperatures. When porous permeable materials are used in high temperature conditions, their scale resistance is considered as a important property.

Scale resistance is the ability of a material to resist the oxidizing action of a heated medium. The process of oxidation of the pore surface is influenced by the chemical composition of the material of particles and oxide films, the temperature, the composition of the filtered gas (air), the duration of the oxidation process, and the structural characteristics of the porous material.

The initial stage of oxidation is a purely chemical process. But the further course of oxidation is already a complex process, consisting not only in the chemical combination of oxygen and metal, but also in diffusion of oxygen and metal atoms through a multiphase oxidized layer [5]. As a result, the material is destroyed.

The increase in the scale resistance is achieved by alloying the iron base mainly with chromium and aluminum or silicon, that is, elements in a solid solution and forming protective films of $(Cr, Fe)_2O_3$, $(Al, Fe)_2O_3$ oxides during heating [6]. Doping of porous permeable materials based on iron powder simultaneously with chromium and aluminum can be carried out by thermal diffusion saturation from the gas phase [7]. Thermodiffusion saturation of powder materials from the gas phase can be carried out in two cases, after sintering from the formed powders in the article or during sintering. In both cases, the saturation of the volume of the porous material from the gas phase simultaneously with chromium and aluminum can be assessed by testing the appropriate samples for scale resistance.

For this purpose, samples of porous materials were made in the form of a bush with dimensions: the outer diameter of 40 mm, the inside diameter of 34 mm and the height of 50 mm., From the powder of the mark ПЖВ1 of iron with particle sizes of 200–250 μm. The powder was pressed at a pressure of 300 MPa in die molds. The thermodiffusion saturation of the samples prepared simulta-

neously with chromium and aluminum was carried out in two ways: – after sintering the compacted samples and together with the sintering of the compacted samples.

A saturating medium consisting of a mixture of 40% Cr + 15% Al + 40% Al2O3 + 5% NH4Cl powders was prepared for the thermodiffusion saturation of the porous samples simultaneously with chromium and aluminum. Saturation of porous samples simultaneously with chromium and aluminum was carried out at a heating temperature of 1150 °C for 3 hours in a hermetically sealed container. In Fig. 1 shows scheme of a container with a hermetically sealed cover, porous samples and a saturating medium disposed therein.

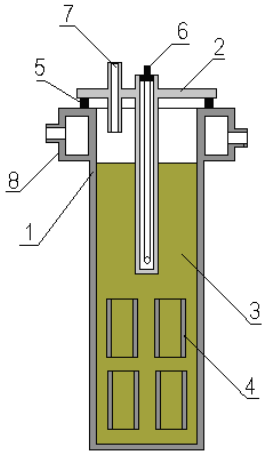


Figure 1. Container: scheme of the location of samples and the saturating medium in the container; 1 – container body; 2 – cover; 3 – saturating powder medium; 4 – porous samples; 5 – rubber; 6 – thermocouple; 7 – the valve for gas removal; 8 – radiator

The peculiarities of the structure of porous permeable materials do not allow the methods used to assess the scale resistance of non-porous materials to be used to assess the scale resistance of a porous material. The difficulty in determining the degree of oxidation of porous permeable materials is that in the pores of the porous body there remains the product of the interaction between the material and the medium. Attempting to remove oxidation products, blowing air or other methods from the entire branched surface of the porous material can lead to distortion of the true picture of the oxidative destruction of the porous material.

To assess the scale resistance of porous permeable materials, the measurement of the specific electrical resistivity of a porous material is most suitable [8]. This method is based on measuring the specific electrical resistivity of a porous sample during a filtration process. In (Fig. 2) shows the scheme of the stand for testing cylindrical porous samples for scale resistance. The samples were tested in a mode of filtration of a mixture of air with water vapor heated to 600 °C. The hot air flow rate during the test was 0.25 m^3/h.

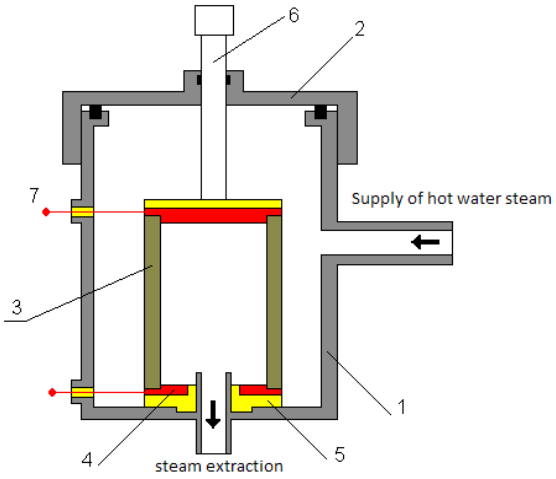


Figure 2. Scheme of the stand for scale resistance testing: 1 – body; 2 – cover; 3 – porous sample; 4 – conductor; 5 – insulator; 6 – clamp; 7 – outputs for measuring the electrical resistance

The results of the scale resistance tests are shown in (Fig. 3) in the form of a diagram of the change in the specific electrical resistance of porous permeable samples, depending on the duration of running time.

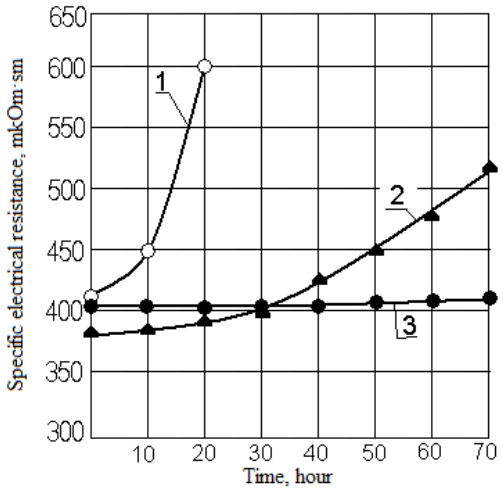


Figure 3. Diagram of the change in the specific electrical resistance of porous samples depending on the duration of running time: 1 – unsaturated sample; 2 – saturated after sintering; 3 – saturated simultaneously with sintering

As can be seen, in a diagram (Figures 3 and 3) under identical conditions of thermodiffusion saturation of pre–sintered and not sintered samples, the most resistant to oxidizing actions of heated air with water vapor turned out to be a porous sample in which the thermal diffusion saturation with chromium and aluminum was carried out simultaneously with sintering.

The relatively low scale resistance of a saturated after sintering sample is most likely due to the difficulty of penetrating the saturating gas into the central parts of the porous body. To clarify this, microstructure analyzes of the samples were carried out. In (Fig. 4) shows a micrograph of porous samples obtained on a microscope MIM 7 at 200 times magnification.

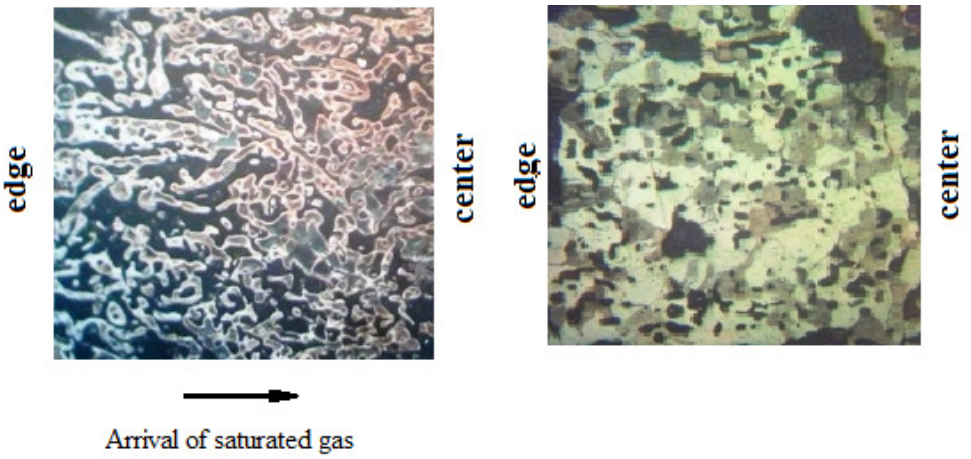


Figure 4. Photograph of the microstructure of the samples: a – saturation after sintering; b – saturation with sintering (× 200)

Microstructural analysis established that the thermodiffusion saturation of the pre–sintered sample occurs due to the passage of the saturating gas through the porous channels of the porous body (Fig. 4, a). In the initial stages of the process, the deposition of elements from the gas phase occurs in places with increased curvature of the surface of the walls of the pore channels. Because of the difference in the rates of entry of elements from the gas phase and their diffusion into the depth of walls of the channel, the pore diameter narrows. As a consequence, the access of the saturating gas into depth of the porous body is complicated. In connection with this, there is an inhomogeneous saturation of the thoroughbred body with elements of the gas phase.

The thermodiffusion saturation of unsintered samples occurs due to the passage of the saturating gas, along the surface of the compressed particles penetrating into the contact areas between the particles. In this case, the deposition of elements from the gas phase occurs mainly in contact areas between the particles. Due to the high rate of diffusion of the elements of the gas phase into the particle of the powder, there is no accumulation of elements that prevent the gas from entering the central parts of the porous body (Fig. 4, b). In connection with these, the porous body is uniformly saturated throughout the volume with chromium and aluminum, which ensures the best scale resistance of the samples.

References:

1. Rogov V. A., Soloviev V. V., Kopilov V. V. New materials in mechanical engineering: Textbook. allowance.– Moscow: RUDN,– 2008.– 324 p.
2. New materials. Call authors. under the scientific editorship of Y. S. Karabasova.– M: MISIS.– 2002–736 p.
3. Powder Material Science. Andrievskiy R. A.– M.: Metallurgy,– 1991.– 205 p.
4. Belov S. V. Porous permeable materials.– M.: Metallurgy,– 1987.–335 p.
5. Vityaz P. A., Kaptsevich V. M., Sheleg V. K. Porous powder materials and articles thereof.– M: High School,– 1987.– 161 p.

6. Material Science: A Textbook for Universities / B. N. Arzamasov, V. I. Makarova, G. G. Mukhin and others.; Under the Society. edition. B. N. Arzamasova, G. G. Mukhina. – 3rd ed., The stereotype. – M.: MGTU after named N. E. Bauman, – 2002. – 648 p.
7. Chemical–thermal treatment of metals and alloys. Directory. Borisenok G. V., Vasiliev L. A., Voroshnin L. G. and others. – M.: Metallurgy, – 1981. – 424 p.
8. Pugin V. S., Kornienko P. A., Pavlenko N. P., Bussel O. D. Influence of diffusion silicification on the porous structure of a material based on iron // Powder metallurgy, – 1980. – No. 4. – P. 102–104.
9. Shakirov Sh. M. Investigation of the corrosion resistance of composite filters made on the basis of powders of chromium–nickel steels // Composite Materials, – 2006. – No. 3. – P. 27–30.

Section 4. Mechanical engineering

Bakhadirov Gayrat Atakhanovich,
scientific adviser, professor
Umarov Bekhzod Turg'unpo'latovich,
doctoral student, Ferghana Polytechnic Institute,
E-mail: bexzodumarov@mail.ru

BASICS OF CALCULATION OF CERTAIN PARAMETERS OF THE BELT DRIVE OF THE MACHINE FOR SORTING OF POTATOES

Abstract: The article gives data on the calculation of machine design parameters for potato sorting, using known methods for calculating the dimensions of shafts and belts.

Keywords: potatoes, sorting, belt drive, pulley, shaft, tension, voltage.

Potatoes are cultivated in 130 countries on an area of more than 18 million hectares, where annually more than 300 million tons of tubers are harvested [1].

At present, the sorting of potatoes on farms involves considerable labor costs due to low mechanization and electrification of the technological process. Serial production of machines for sorting potatoes has practically ceased due to their high cost and low reliability of work, due to the large number of rotating and failing parts, therefore, the share of manual labor in sorting potatoes has sharply increased in farms. The use of obsolete, worn and energy-intensive equipment is not effective. The disparity of prices between agricultural products and prices for equipment and energy requires the improvement of technology and technical means in the production of agricultural products [2].

In this regard, the creation of machines for sorting potatoes with high technical and economic indicators is an urgent task [2].

We propose a new design of the sorting machine, with the purpose of qualitative sorting of potatoes according to external dimensions, taking into account the size-mass properties of tubers of cultivating potato varieties [3].

A potato sorting machine, containing conveyors for loading and removing the potatoes isolated on the fraction, a sorting surface formed by infinitely closed flexible elements enveloping pulleys of the same diameter mounted on transport shafts with the possibility of axial movement, hinged parallelograms for axial movement, characterized in that the infinitely closed flexible elements of the sorting surface are arranged on pulleys diverging from the middle to the edges of the sorting surface in the direction of travel, the pulleys being mounted on the transport shafts in alternating sequences, one being free, and the other being kinematically associated with transport shaft, in turn, the transport shafts are provided with a drive for communicating to them different speeds of rotation [3].

It is necessary to calculate its basic parameters, for reliable operation of the machine. The basis of the mechanism of the machine is the belt drive (fig. 1). Determining the forces and dependencies between them, you can determine the stresses in the belts, the required shaft sizes. Consider, for transmitting motion from the engine to the belts through a reduction gear and a first pulley. The branch between the 1st and 2nd pulleys is the leading one (fig. 1).

According to Euler's formula [4, 5]:

$$Q_1 = Q_4 e^{\mu a}; \quad (1)$$

The tension in the branches connected to the tension roller is mutually equal [7]:

$$Q_2 = Q_3 = N_1 = N_2 \quad (2)$$

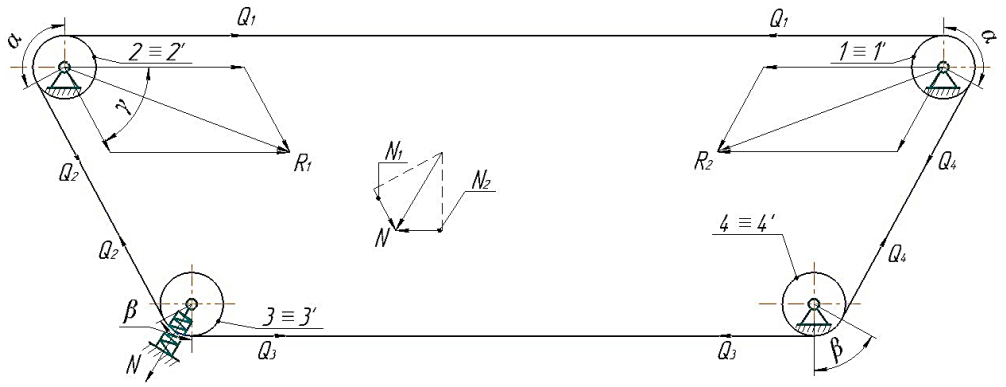


Figure 1. Strength in the branches of a sorting machine belt

where, Q_1, Q_2, Q_3, Q_4 – respectively, the tension in the branches, N_1, N_2 – the tension obtained from the tension pulley, e – the base of the natural logarithm, μ – the coefficient of friction between the pulley and the belt.

The values of $\mu\alpha$ and $\mu\beta$ will always be positive. Therefore, the relationship between forces will be:

$$Q_1 > Q_4 \tag{3}$$

Suppose that this shape (fig. 1) is an isosceles trapezoid, this allows us to determine the following dependences between the angles α, β, γ:

$$\alpha = \pi - \gamma, \beta = \gamma \tag{4}$$

Because of the small value of β and μ, we take $\mu\beta \approx 0$. Thus:

$$Q_2 \approx Q_3 \approx Q_4 \tag{5}$$

To operate the belt in 1 and 2 pulleys without sliding, it is necessary to satisfy the following inequality [4]:

$$Q_0 > \frac{F}{2}\left(\frac{e^{\mu\alpha}+1}{e^{\mu\alpha}-1}\right) \tag{6}$$

where, Q_0 is the initial tension force transmitted to the belt through the tensioning roller-3 ($Q_0 = N_1 = N_2$), F-force is the generated torque transmitted to the pulley-1 from the motor through the reduction gear.

In the work of this mechanism from the centripetal force generated in the branches will be the following [4]:

$$Q_v = \frac{q}{g}v^2 \tag{7}$$

where, q is the weight of one running meter of the belt, N / m.. v is the linear speed of the belt, m/s.

In the work of the mechanism, the linear speed of the belts will be low: $v \leq 1$ m/s. The weight of one running meter of the belt is not large. Therefore $Q_v \approx 0$.

It is possible to determine the forces acting on the shaft and its supports with the 1 and 2 pulleys installed according to the formula [4]:

$$R_1 = R_1 = \sqrt{Q_1^2 + Q_2^2 + 2Q_1 Q_2 \cos\gamma} \tag{8}$$

Determine the stresses in the belts. The greatest stress occurs in the leading branch between pulleys 1 and 2, and it consists of σ_1 arising from Q_1 and $\sigma_{эг}$ of the formation in the part of the belt that runs around the pulley surface [4]:

$$\left.\begin{aligned}\sigma_1 &= \frac{Q_1}{S} = \frac{Q_0}{S} + \frac{F}{2S} = \sigma_0 + \frac{\sigma_F}{2}\\ \sigma_{эг} &= \frac{\delta}{D}E\end{aligned}\right\} \tag{9}$$

where, E is the modulus of elasticity, $S = b\delta$ is the cross-sectional area of the belt, δ is the height of the profile of the belt, D is the diameter of the pulley (fig. 2).

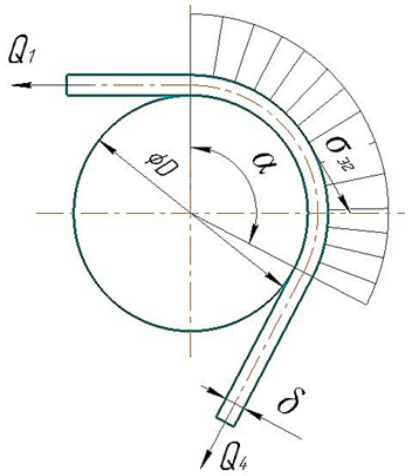


Figure 2. The diagram of the envelope forces in the belt

Thus, the voltage in the leading branch of the belt has the following form (fig. 3) [4]:

$$\sigma_{\max} = \sigma_1 + \sigma_{эг} = \sigma_0 + \frac{\sigma_F}{2} + \sigma_{эг} \tag{10}$$

where, $\sigma_F = \frac{F}{S}$ – is a useful strain.

Due to voltage increase, the voltage arising from the initial tension increases the useful voltage [4]:

$$\sigma_F = 2\sigma_o \frac{e^{\mu\alpha} - 1}{e^{\mu\alpha} + 1} \qquad (11)$$

It is impossible to increase without limit the value of σ_o, because an increase in σ_o will lead to a decrease in the strength of the belt [4].

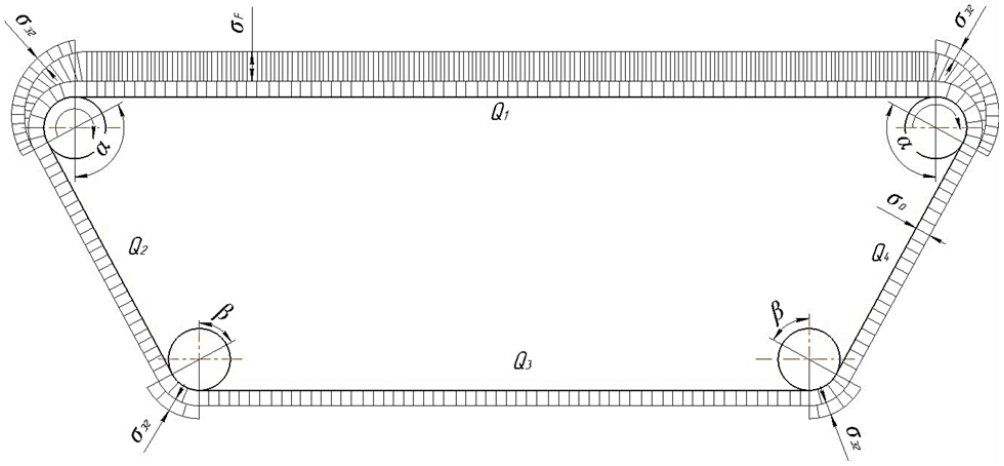


Figure 3. Stress diagram in the branches of the belt

In the state of motion transmitting to the *2'* pulley from the electric motor through the reducer, the branch between the *2'* and *3'* pulleys will be leading. Thus, taking into account (5), the ratio between the tension forces in the branches *2' – 3', 3' – 4', 4' – 1', 1 ' – 2'* is as follows:

$$Q'_2 \approx Q'_3 \approx Q'_4 > Q'_1 \qquad (12)$$

and

$$Q'_2 = Q'_1 e^{\mu\alpha} \qquad (13)$$

Depending on the design of the machine, the initial tension force transmitted to the belt through the tensioning roller-*3'* will be $Q'_0 = Q_0$, but the forces forming the torque transferred to the *2'* pulley from the electric motor through the reducer will be $F' \neq F$. For this reason, the tensile forces and stresses in the branches 1 of the belt do not match the amount of tension and tension in the branches of the belt. You can choose the desired belt size and pulley diameter to the maximum calculated values.

Thus, we can draw the following conclusion: The necessary dimensions of the shafts are selected with a certain number of pulleys, the resulting motions from both shafts and belts of the enveloping pulleys, determining the forces acting on the shafts according to the formula (8) [6].

References:

1. Golikov A. A. Perfection of the technological process and the working body for the separation of potato harvesters: Thesis for the degree of candidate of technical sciences. Ryazan,– 2014.–130 p.
2. Gilvanov V. F.. Development of self–oscillating linear asynchronous electric drive of a machine for potato sorting: the dissertation Author's abstract on competition of a scientific degree of the Cand.Tech.Sci. Izhevsk,– 2012.– 18 p.
3. Bakhadirov G. A., Sabirjanov T. M., Umarov B. T., Bakhadirov K. G. Sorting machine. Patent. Republic of Uzbekistan. № FAP 01241. State Patent Office of the Republic of Uzbekistan, Official Gazette No. 10 (198),– 2017.
4. Sulaymonov I. Details of the machine / I.Sulaymonov: Tashkent– "O'qituvchi",– 1981.– 303 b.
5. Nosirov S. Completion of course project on "Details of the machine" / S. Nosirov: Tashkent – "Yangi asr avlodi",– 2008.– 218 p.
6. Mansurov K. M. Material Strengthening Course / K. Mansurov: Tashkent– "O'qituvchi",– 1983.– 498 p.
7. URL: http://mash–xxl.info/map/Энциклопедия по машиностроению XXL. – С. 471–472.

Section 5. Medicine

Abdullaeva Vasila Karimbekovna,
Doctor of Sciences in Medicine, head of the department of psychiatry, addiction and child psychiatry, medical psychology, psychotherapy
Tashkent Pediatric Medical Institute
E-mail: vasila.abdullaeva@tashpmi.uz

Nurkhodjaev Sabir Nasirkhodjaevich,
Research assistant, department of psychiatry, addiction and child psychiatry, medical psychology, psychotherapy
Tashkent Pediatric Medical Institute
E-mail: sabir.nurkhodjaev@tashpmi.uz

THE STRUCTURE OF PERSONALITY DISORDERS IN PATIENTS WITH THERAPEUTICALLY RESISTANT DEPRESSIONS

Abstract: The article is devoted to reveal the correlation between affective disorders and personality disorders with the evaluation of the diagnostic structure of personality disorders. It was revealed that among patients with therapeutically resistant depressions in the main group with personality disorders and in the group of affective disorders without personality pathology was dominated by the diagnosis of recurrent depressive disorder with depressive episodes of varying severity.

Keywords: personality disorders, therapeutically resistant depressions, relation.

The problem of the relationship between personality disorders and affective pathology is reflected in such an important discussion as the differentiation of manifestations of the dynamics of personality disorders and affective phases [1, 15–20; 3, 4–10]. In recent years, there are several theoretical models justifying the modern views on the relationship of affective and personality disorders: the total causality spectrum, predispositional or model of vulnerability, photoplasticity and model complications [4, 32–34]. In the work of Klein D. N. et al. (2011) presents data on the relationship between personality and depression with the release of association between depression and personality types [5, 270–280]. Most personality traits associated with depression are related to other forms of psychopathology, especially anxiety disorders [6, 13–20]. However, it remains unclear how best to present personality traits: as predecessors or predisposition to depressive disorders, as there is evidence supporting both hypotheses. In addition, it appears unlikely that depressive episodes produce long-term changes in most personality traits, but personality traits can have predictive value and can affect the course of depression and therapeutic response [2, 91–95].

The aim: of the investigation was to reveal the correlation between affective disorders and personality disorders with the evaluation of the diagnostic structure of personality disorders.

Material and methods: 68 patients, 44 women and 22 men, with a current moderate or severe depressive episode in the framework of a depressive episode, recurrent depressive disorder, bipolar affective disorder who were screened and treated at the City clinical psychiatric hospital in Tashkent. The average age of women was 44,4± ± 10,2 years and men 40,6 ± 11,0 years. The diagnosis of depressive and personality disorders was verified according to the ICD-10 diagnostic criteria.

Quantitative assessment of the severity of depression, as well as the dynamics of the state and efficacy of antidepressant therapy was carried out using a reduced version of the scale SIGH-SAD [Williams J., Link M., Rosentha N. E. et al., 1992], which includes 17 points of the Hamilton depression scale and 7 points concerning atypical depressive symptoms: social departure, weight gain, appetite increase, hyperphagia, craving for carbohydrates, hypersomnia, fatigue. Assessment of personality disorders was carried out with a Standardized method of multi-factor research personality-SMIL (MMPI) [Sobchik L. N., 2002]. The TCI-125 personality and temperament structure questionnaire was used to study the personality structure [Cloninger S. et al., 1991].

For statistical processing of material was used statistical analysis and information delivery SAS (Statistical Analysis System).

Results and discussion: In accordance with the aim of the study, one of the main tasks was to identify the cases of the relationship of monopolar and bipolar affective disorders with personality disorders in a continuous sample of patients with affective disorders in the framework of F31–33 with an assessment of the diagnostic structure of the identified personality disorders (according to the criteria of ICD-10).

The general study group of patients with therapeutically resistant depressions was divided into two groups, taking into account the frequency of occurrence of personality disorders among patients with affective disorders. The main group-38 patients, including 28 women (73.7%), 10 men (26.3%), which consisted of patients with concomitant personality disorders. Comparison group-30 patients, including 22 women (73.3%), 8 men (26.7%) without concomitant personality disorder. The mean age of patients of the main group at the time of examination was 39.9 ± 10.8 years, patients of the comparison group – 46.3 ± 9.5 years ($p < 0.001$).

Thus, the main group and the comparison group were comparable in age with the predominance of women in both groups ($p < 0.05$).

According to the design of the study, patients with the current depressive episode of varying severity were examined. In the main group of patients – the only depressive episode (DE) – 9 (23.7%) patients, depressive episode in the framework of recurrent depressive disorder (RDR) (F32–33) – 18 (47.4%) patients, as well as depressive episode in the framework of bipolar affective disorder (BAR) (F31) – 11 (28.9%) patients, and in the comparison group- 7 (23.4%), 19 (63.3%) and 4 (13.3%) patients, respectively.

In our study, personality disorders in the main group were presented in 73.7% (n = 28) cases – mixed personality disorder (F61.0), 10.5% (n = 4) borderline personality disorder (F60.31), in 15.8% (n = 6) – hysterical personality disorder (F60.4). In the main group, gender-related personality disorders are presented as follows: 28 women (73.7%) and 10 men (26.3%) and had statistical differences in sex ($p < 0.05$).

The distribution of patients of the main group with personality disorders depending on the nosological affiliation of affective disorders is presented in (Table 1).

Table 1.– Nosological structure of personal pathology in patients of the main group depending on the structure of affective disorders

Affective disorders	Personal disorders	Number of patients	
		n	%
DE (n = 9)	Hysterical personality disorder	2	22.2
	Mixed personality disorder	5	55.6
	Borderline personality disorder	2	22.2
RDR (n = 18)	Hysterical personality disorder	2	11.1
	Mixed personality disorder	15*	83.3
	Borderline personality disorder	1	5.6
BAR (n = 11)	Hysterical personality disorder	2	18.2
	Mixed personality disorder	8	72.7
	Borderline personality disorder	1	9.1

** – intragroup difference ($p < 0,05$)*

It should be noted that the diagnosis of mixed personality disorder prevailed in all diagnostic categories ($p < 0.05$).

According to our data also revealed statistically significant intergroup differences: in 57,9% of cases with RDR significantly more often diagnosed mixed personality disorder ($p < 0.05$).

Conclusions:

Thus, among patients with therapeutically resistant depressions, the frequency of personal pathology was 55,9% with predominance of cases of mixed personality disorder – 73,7%, while both in the main group with personality disorders and in the group of affective disorders without personal pathology prevailed diagnosis of the recurrent depressive disorder with depressive episodes of varying severity (47,4% and 63,3%) ($p > 0.05$).

References:

1. Краснов В. Н. Расстройства аффективного спектра // М.: Практическая медицина,– 2011.– 432 с.
2. Симуткин Г. Г., Яковлева А. Л., Бохан Н. А. Проблема коморбидности аффективных расстройств и расстройств личности (обзор зарубежной литературы) // Социальная и клиническая психиатрия.– 2014.– № 2.– С. 91–97.
3. Смулевич А. Б., Дубницкая Э. Б., Читлова В. В. Расстройства личности и депрессия // Журнал неврологии и психиатрии им. С. С. Корсакова.– 2012.– № 9.– С. 4–11.
4. Степанов И. Л., Ваксман А. В. Особенности течения циркулярных депрессий у больных с сопутствующим личностным расстройством // Соц. и клин. психиатрия.– 2013.– Т. 23.– № 4.– С. 32–36.
5. Klein D. N., Kotov R., Bufferd S. J. Personality and depression: explanatory models and review of the evidence // Ann. Rev. Clin. Psychol.– 2011.– V. 7.– P. 269–295.
6. Newton-Howes G., Tyrer P., Johnson T.– Personality disorder and the outcome of depression: meta–analysis of published studies // Br. J. Psychiatry.– 2006.– Vol. 188.– P. 13–20.

Abdullayeva Charos Abdudjalilovna,
Yarmuhamedova Gulnora Khabibovna,
Kamilova Umida Kabirovna,
Madaminova Sayyora Abdujalilovna,
Abduhalikov Oybek Ziyodulla ogli,
Tashkent Institute of Postgraduate Medical Education,
The Republican Specialized Scientific and Practical Medical Center of Therapy and Medical Rehabilitation, Tashkent Medical Academy,
Tashkent Medical College
E-mail: charos27_81@mail.ru

ESTIMATION OF DIASTOLIC DYSFUNCTION IN PATIENTS WITH POSTINFARCTION CARDIOSCLEROSIS

Abstract: In the development of CHF (chronic heart failure) attach importance to the violation of the diastolic function of the heart. Decreased myocardial compliance leads to an increase in the end-diastolic pressure, which can be detected at an early stage of heart failure even before the onset of systolic dysfunction. The mechanical properties of the myocardium, which are characterized by elasticity, compliance and stiffness, affect LV (left ventricle) filling processes: hypertrophy, fibrosis or myocardial infiltration increase its stiffness, which leads to a sharp increase in LV filling pressure. LV compliance decreases with dilatation [3, 5]. Violation of active relaxation is one of the earliest manifestations of myocardial dysfunction in most cardiovascular diseases. Fibrosis of the ventricular myocardium (increase in the content of collagen in them) is the most important risk factor for worsening heart function. Clinico-anatomical comparisons and experimental data on hypertensive rats show that the severity of fibrosis and the development of collagen in the myocardium corresponds to the severity of heart failure [1, 2]. Fibrosis is a determinant of myocardial stiffness and diastolic dysfunction, it also favors systolic dysfunction and arrhythmogenicity. Fibrosis is initially an adaptive process for necrosis after a heart attack, ischemia, and inflammatory processes in the myocardium.

Keywords:

The aim of the study. To study left ventricular remodeling processes in patients with postinfarction cardiosclerosis complicated by chronic heart failure.

Materials and methods of research. We examined 219 men with PICS, complicated with CHF, aged 40–60 years (mean age 53.42 ± 6.2 years). Patients according to TSH according to the New York classification of cardiologists are divided into the following FC of CHF: 31 (18.8%) patients with I FC, 92 (36.6%) patients with II FC and 96 (44.6%) patients with III FC CHF. Depending on the severity of diastolic disturbances, three types of LV filling are distinguished: delayed relaxation, pseudonormalization and restriction. Detection and analysis of variants of diastolic LV dysfunction have an important clinical significance, since they indicate the degree of severity of diastolic disorders contributing to the formation of CHF.

Evaluation of the diastolic function indices showed that in patients with CHF, the normal E/A values can be observed with increased values of the isovolumic relaxation time (IVRT) and the delay of the early diastolic filling (DT) of the left ventricle, which should be taken into account when diagnosing.

The analysis of the obtained results revealed the following types of diastolic LV disturbances: of 219 patients with CHF, relaxation disorders were determined in 48.4% of cases, pseudonormalization in 23.7%, restrictive

changes in 15.1% of cases and normal diastolic function values in 12.4% (28) patients.

Patients, depending on the severity of diastolic dysfunction of the left ventricle, were divided into 3 groups: I (n = 106) – with relaxation disturbance, II (n = 52) – with pseudonormal type, III (n = 33) – with restrictive type of filling. To evaluate the relationship between left ventricular contractility and diastolic left ventricular dysfunction, 191 patients with CHF were divided into 2 groups: a group with preserved left ventricular systolic function (ejection fraction ≥ 50%) and a group with a reduced ejection fraction < 50%).

An analysis of the prevalence of different types of diastolic left ventricular dysfunction showed that severe diastolic left ventricular function – pseudonormal and restrictive type – was significantly more frequent in the group of patients with reduced left ventricular systolic function. The analysis of the main indices of myocardial contractility and LV geometry in the examined patients, depending on the type of diastolic dysfunction, revealed that the volume parameters of the left ventricle – the end-diastolic volume and the end-systolic volume in the group with pseudonormal and restrictive type – were significantly higher in comparison with group of patients with disturbed relaxation. The PV index was also significantly lower in the group of patients with a restrictive type of LV diastolic dysfunction.

The diastolic function of the LV depends on both the relaxation of the myocardium and its mechanical properties. Relaxation of the myocardium of the LV is an active process, depending on the functioning of the sarcoplasmic reticulum of cardiomyocytes. As a rule, the basis of such CHF is the violation of diastolic LV function, i.e. his inability to adequately fill without increasing the average pulmonary venous pressure.

The results of epidemiological studies in recent years have shown that in 30–50% of patients with a clinically confirmed diagnosis of CHF, systolic cardiac function is preserved and an average of 3 to 20 people per thousand of the population have asymptomatic left ventricular dysfunction. According to the European Society of Cardiology (EOK), systolic dysfunction of the myocardium (without clinical signs of CHF) can reach 5–6% in the population, which makes up another 20 million in Europe with a population of about 900 million [7]. According to F. T. Ageeva [4, 6], the prevalence of I-FC CHF is 4 times greater than II–IV FC and more than 55% of patients with HF have practically normal myocardial contractility and the number of such patients will increase steadily. An analysis of the prevalence of different types of diastolic left ventricular dysfunction showed that severe diastolic left ventricular function – pseudonormal and restrictive type – was significantly more frequent in the group of patients with reduced left ventricular systolic function. The analysis of the main indices of myocardial contractility and LV geometry in the examined patients, depending on the type of diastolic dysfunction, revealed that the volume and geometric parameters of the left ventricle in the group with pseudonormal and restrictive type were significantly higher in comparison with the group of patients with disturbed relaxation. The results are consistent with data from multicenter studies of PEP-CHF, CHARM, Aldo-DHF, which show the prognostic significant role of diastolic dysfunction in patients with CHF.

Postmyocardial LV leads not only to LV structural reorganization, accompanied by dilatation of the cavity, thinning of the wall, a decrease in the contractility of the myocardium, but also to a change in the geometric shape of the LV. LV remodeling in patients with CHF was characterized by a violation of the diastolic function of the heart, which manifested itself more in violation of relaxation. An analysis of the prevalence of different types of diastolic left ventricular dysfunction showed that severe diastolic left ventricular function – pseudonormal and restrictive type – was significantly more frequent in the group of patients with reduced left ventricular systolic function. With the progression of the disease, there was an increase in the number of patients with an eccentric type of remodeling, as well as a restrictive type of diastolic LV dysfunction.

References:

1. Gheorghiade M., Vaduganathan M., Fonarow G. et al. Rehospitalization for Heart Failure Problems and Perspectives. J Am Coll Cardiol. – 2013; 61(4): 391–403.
2. Gaasch W. H., Delorey D. E., St John Sutton M. G., Zile M. R. Patterns of structural and functional remodeling of the left ventricle in chronic heart failure // Am J Cardiol. – 2008; 102: 459–462.

3. Habal M. V., Liu P. P., Austin P. C. et al. Association of heart rate at hospital discharge with mortality and hospitalizations in patients with heart failure. Circ Heart Fail.– 2014; 7: 12–27.
4. Levantesi G., Marfisi R. M., Mozaffarian D. et al. Wine consumption and risk of cardiovascular events after myocardial infarction: Results from the GISSI-Prevenzione trial. Int J Cardiol – 2013; 163: 282–287.
5. Mann D. L. Heart failure: a companion to Braunwald's heart disease// Curr Opin Cardiol.– 2010.– No. 15.– P. 1–902.
6. Mills E. J., Rachlis B., Wu P. et al. Primary prevention of cardiovascular mortality and events with statin treatments: a network meta-analysis involving more than 65,000 patients. J Am Coll Cardiol.– 2008; 52: 1769–81.
7. Ravi V. Desai, Philippe Meyer, Musyafa I.ahmed et al. Relationship between left and right ventricular ejection fractions in chronic advanced systolic heart failure: insights from the BEST trial. European J. of Heart Failure.– 2010; 13: 392–397.

Adilov Kozim Zakirovich,
Clinical resident of the Faculty of Therapeutic Stomatology
E-mail: adilov70@gmail.com

Rizaev Jasur Alimjanovich,
MD., PhD., Professor, of Dental Medicine,
Rector of the Tashkent State Dental Institute

Adilova Shoira Talatovna,
PhD., Assistant professor, of the Department
of Therapeutic Stomatology
of the Tashkent State Dental Institute

Mavlyanova N. T.,
Assistant of professor, of the Department
Of Improvement Qualifications
of the Tashkent State Dental Institute

INFLUENCE OF ADVERSE CONDITIONS OF MINING MANUFACTURE ON THE STATE OF L HARD TOOTH TISSUES (LITERATURE REVIEW)

Abstract: This article presents the results of the literature review reflecting the modern understanding of the adverse effects of the factors of the mining enterprises on state of the hard tooth tissues.

Keywords: mining manufacture, adverse working conditions, workers, dental caries, non-carious lesions of the hard tooth tissues.

Introduction

It is known; the mining branch is one of the key branches of processing sector and introduces the contribution to increase of export part of the economy of Uzbekistan. The priority directions in the economy are growth of manufacture, development of industrial capacities, economic independence.

One of priority tasks of the concept of development of public health services is the formation of a healthy life style; the key moment in the given context is the providing of sanitary – hygienic well-being of the working population. Alongside it is known, that influence of the adverse industrial factors of biological, chemical and physical nature results in change of functioning of various systems of the human body [1, 4, 7, 8, 11, 12, 16, 20].

It is established, that oral cavity plays the special role in perception of an environment, and the state of the organs of the mouth is the informative parameter reflecting dynamic changes of all organisms, reacting to the effects of the anthropogenic factors of an environment. In this connection, the study on the effects of unfavourable factors of mining industry on the condition of hard tooth tissues of the workers has become of special significance [2, 9, 20].

The working zone of mining enterprise is characterized by a high level of dust production. The maximum levels of dust production can exceed maximum permissible concentrations in tens time. Intensive noise, vibration, intensive gas accumulation and aerosols of air, physical overloads, all this renders harmful influence on the bodies of the workers [4, 16, 19, 20].

In the modern world, introduction of new technological processes, the application of means of individual protection allows to lower a level of occupational diseases among the workers. However this level continues to remain high [6, 9, 11].

The high level of prevalence of diseases of the hard tissues of the teeth, periodontium and the mucous membrane of the mouth is maintained by direct contact and influence of mining dust. With increase of the professional

experience the frequency and burden of the lesions of the oral cavity is growing too [1, 2, 4, 5, 10, 14, 19, 20].

The long influence of vibration leads to development of vibrating disease touching all body organs and systems: cardiovascular, endocrine, urinary, respiratory, digestive, peripheral nervous systems and high nervous activity [1, 3, 7, 8, 11, 12, 14, 20]. This situation is characterized by disorders of protein and carbohydrate metabolism, changes in the other metabolic processes. The vibrating disease promotes disturbance of hemodynamic processes, depending on a stage of disease the tone of capillaries varies from spastic to spastic-hypotonic [13, 16]. The vascular changes develop by phases and aggravate depending on the length of service and conditions of the vibration effects [13].

The pathological changes in the body of the workers under influence of vibration are accompanied by significant hemostatic changes as oxidative stress, exhaustion of reserves of the antioxidant defensive system (AOD) [3, 5]. Besides, the vibrating disease promotes expressed secondary immunodeficiency [7, 8].

The influence of noise results in development of noise disease with characteristic changes of parameters of the central hemodynamics, arterial hypertension, change of peripheral resistance of the vessels [3, 7, 8, 19]. The nonspecific reactions increasing risk of stomatological diseases are also noted [2, 5, 10, 15, 23, 31, 32, 36]. The noise, being powerful stimulant of the acoustical analyzer, negatively influences on the health of man. It also reduces working activity, induces disorders of the functional state of the regulatory mechanisms of the body, exhausting adaptive reserves [12, 13]. The patients with noise disease have changes in the maintenance and orientation of vegetative reactions [16, 19]. There are also found marked manifestations of the syndrome of vegetative dystonia, poor sleeping, change of tolerability to physical loadings [13, 19]. It is noted that the noise of medium and high frequency provides for immunity decrease in the workers suffering with noise disease [7, 8].

The ore output is carried out basically by blast-hole drilling method, secondary splitting, and delivery it on a surface. The majority of explosive substances include trinitrotoluene, which is considered as toxic substance (second class on danger). In the body this substance effect by two ways: inhalation and per oral rendering both local and general effect [17]. The contact to toxic substances of explosive material causes not only specific clinical manifestations of chronic poisoning (trinitrotoluene cataract), but also paratoxic and metatoxic [4, 19].

The production of ore is accompanied by excess dust formation, which composition includes free silicon dioxides in a crystal form (quartz) and ferric oxides. The meals of these substances with deposition of dust on the surface of teeth forming a plenty of dental depositions [2, 11, 14, 19], induce inflammatory parodontium diseases [5, 9, 10, 15, 17, 20]. The chronic trauma of a mucous membrane of the oral cavity by the ferric ore dust is accompanied by changes in the epithelium at the as catarrhal inflammation, hyperemia, edema. The long influence is accompanied by occurrence of erosion, ulcers surrounded by the opaque epithelium [20]. The epithelium of the oral mucosa is condensed; there are noted focuses of hyperkeratosis, papillomatosis, increased xerostomy, change of the biocenosis of the oral cavity. It was noted that quartz- silicate dust has chronic immunodepressive effect [7].

Ferric ore dust, concentrating in a saliva, renders abrasive effect on the chewing surface of teeth, thus, promotes fast dental abrasion, development of the pathological abrasion with formation of the cracks and having chopped off enamel. Non-carious damages of the hard dental tissues in the workers of the mining enterprises meet much more often, than in the persons not connected with this manufacture [2, 9, 20].

The analysis of the level of hygiene of the oral cavity of the workers in the mining enterprises testifies to a low level of hygienic state of mouth and "high level" of an index of hygiene.

The prevalence of caries in the workers engaged on the mining enterprises accounted for 92–100% [2, 18, 20]. The study of interrelation of the caries intensity with harmful production factors has shown direct dependence: the higher experience of job, the higher index of KPU. It is interesting that in the workers having direct contact with harmful industrial effects during all working change, the index of KPU seems to be 10% higher than in workers having indirect contact with harmful production factors ($p < 0.01$) [2, 18].

The similar picture is observed at the analysis of the special weight of teeth, subjects to removal depending on the experience time. So, it is marked, that in the workers with the long working experience, more than 10 years, the

quantity of teeth, selected to removal, is 3,5 more than in the workers having the working experience till 5 years ($p < 0.01$) [2, 18]. It testifies to growth of a parameter "У" in an index KPU that confirms influence of harmful production factors on development the carious process.

The analysis of the non-carious damages of the hard dental tissues in the workers of mining industry revealed high level of pathological changes, such as enamel decoloration breaks of the corners and cutting edges of enamel, pathological deleting of teeth. The iron-ore dust, concentrating in saliva, renders abrasive action on the masticatory surface of teeth, thus, promotes fast snagging of the dental hard tissues, development of the pathological erasibility and formation of cracks and splits on the enamel. Non-carious lesions of the dental hard tissues in the workers of mining meet in 16,4% more often, than in the persons not connected with this manufacture [2, 9, 20].

The characteristic state of enamel in the workers engaged in the mining industry showed that the enamel has a dim shade and darkly grey or yellow – red colour in 60.7–78.4% of surveyed workers. The disturbance of the enamel structure, particularly fissures, were noted in 38.5–64.6% of studied persons. The change of the anatomic form of the teeth looking-like splits of the corners of the crown part, of the scalprums, as well as splits of the enamel of tubers of the masticatory surface were noted in 61.2–96.1% of studied workers [18].

The character of the industrial adverse factors is reflected also on the pathological erasibility of teeth. Pathological erasibility of the II and III degree is noted in 80.2–83.9% of the workers having direct contact with harmful industrial influences during all working change, than having indirect contact with harmful industrial influences found in 20.1–30.5% ($p < 0.01$) [2, 9, 18].

Conclusions:

The analysis of the literature data has revealed:

1. The effect of the harmful factors of the mining enterprises renders on the body of the workers, both general and local influence;

2. The analysis of a level of hygiene of the oral cavity in the workers engaged on the mining enterprises testifies to a low level a hygienic condition of a mouth and high index KPU;

3. The high level of non-carious damages of the dental hard tissues such as enamel decoloration, snapping off of corners and enamel scalprums, pathological erasibility is noted;

4. The direct dependence of pathological processes severity on the experience of working activity is revealed.

References:

1. Ablamunets K. Ya. Dynamics of osteoporosis in the vibrating disease // Effect of industrial factors on the body.– Tula,– 1990.– No. 3.
2. Anifeev T. A. The state of oral cavity in the workers of the mining manufacture: The thesis – cand.med.nauk: 14.00.21.– R.,1071.– 27.
3. Vibroparodontial syndrome / Ed. by. T. V. Nikitina, E.N Rodina.– Moscow: Medicina,– 2003.– 286 p.
4. Visochin V. I. Dental diseases, and level of temporary invalidity of mining workers, having contact with trinitrotoluene / V.I Visochin// Stomatologiya.– 1991.– No. 5.– P. 32–83. Высочин // Стоматология.– 1991.– No. 5.– C. 82–83.
5. Zubachik M. V. Pathogenic value of the endothelial dysfunction in the microcirculatory bed in periodontium formation and generalized parodontosis // Sovr. Stomatologiya.– 2013.– No. 4.– P. 50–53.
6. Ivanov V. S. Perodontium diseases.– 4 ed.– M.: Med.inform agenstvo,– 2001.– 300 p.
7. Agirova A. Kh., Tugus A. R., Sharipova N. G. et al. Immunity of workers having contact with industrial factors //Medicina I ecologiya.– 2005.– No. 9.– P. 41–44.
8. Kolesov V. G., Cideltsev V. V., Sideltseva E. V. et al // Medicina truda I prom.ecologia.– 1998.– No.– 10.– P. 13–17.
9. Kabirova F. M. Optimization of pdevention and treatment of the main stomatological dseases in workers underwent effect of the factors of chemical etiology (example of petrochemical manufacture): The thesis.dis. doctor of med.nauk.– Kasan.– 2011.– 36 p.
10. Kovulchuk L. V., Gangosckiy L. V., Rogov M. A. Role of cytokines in the mechanism of the development of chronic inflammation in the periodontium tissues // Immunologiya.– 2000.– No. 6.– P. 24–26.

11. Kudasheva A. R. Osteopeny in the workers engaged in copper–zinc–chalcopyrite ore output with underground method and its prevention feasibility: The thesis dis.cand.med.nauk.,– Moscow,– 2010.– 30 p.
12. Kulgibaev G. A., Ismailova A. A. Assessment of the psychological status of the mining workers underwent effect of noise loading // Hygiena I sanitaria.– 2002.– No. 3.– P. 29–32.
13. Kultanov B. J. Neurovascular disorders in the workers under the effects of industrial factors // Medicina I ecologia.– 1998.– No. 4.– P. 27–28.
14. Nurgaleev N. V. Effect of copper–zinc chalcopyrite ore on the metabolism of bone tissue. The thesis diss.cand. med.nauk: Chelyabinsk,– 2013.– 23 p.
15. Bogatireva B. A., Bots M. I., Gunchenko L. S., et al Parameters of prevalence and intensity of diseases of periodontium in workers of ore–dressing and processing enterprose if Krivbass // Etiologiya I zdorovie: All Union Conference: Report Abstracts.– Donetsk; – 1991.– P. 49–50.
16. Rudenko A. Ya., Gorobets Yu. I. About tendency to growth of noise pathology among workers of the industrial enterprises in Krivbass: Abstracts of Reports of Scient.Pract.Conf.: Actual questions of hygiene, labor physiology and professional occupational pathology in the industry.– Krivoy Rog,– 1995.– 48 p.
17. Salikhova G. A., Clinical–laboratory characteristic of the oral cavity state in persons, having contact with mercury under the industrial and non–industrial conditions: The thesis dis. cand.med.nauk: Ufa,– 1999.– 23 p.
18. Trofimchuk A. A., Gulyaeva O. A., Karimova L. K., Tulhvatulina D. N. The state of the dental hard tissues in the workers of mining industry // Problemi stomatologii.– 2006.– No. 1.– P. 56–61.
19. Gural O. I., Beletskaya V. S., Bichevskaya E. G., Ribkin P. Yu. Comparative hygienic assessment of the working conditions at the mining enterprises in Krivbass// Reg.Scient.Pract.Conf: Abstracts of Reports.– Donetsk,– 1993.– P. 20–21.
20. Karnaukh N. G., Vischipan F., Naumenko B. S. Experience time dose of vibration and vibrating disease // Likarska sprava.– 2003.– No. 8.– P. 77–81.

Azimova Fatima Vahidovna,
The head of the scientific department of dermatocosmetology
of the Republican specialized scientific
and practical medical center of dermatology and venereology
Sabirov Ulugbek Yusupkhanovich,
Director of the Republican specialized scientific
and practical medical center of dermatology and venereology
Shorakhmedov Shorahmat Shorasulovich,
Scientific employee of the department of dermatocosmetology
of the Republican specialized scientific
and practical medical center of dermatology and venereology
E-mail: evovision@bk.ru

MARKERS OF FACTORS OF GROWTH AND APOPTOSIS IN FORECASTING THE CURRENT OF NEST ALOPECION

Abstract: Markers of growth factors and apoptosis in patients of the Uzbek population with alopecia areata as risk factors for the development of severe forms of the disease. Molecular genetic studies of patients with alopecia areata revealed the prognostic value of the polymorphisms G (–634) C and G (–1154) A of the VEGF G-308A gene of the TNF-α gene. Genobiological ensembles of these polymorphisms with growth factors and apoptosis were determined, on the basis of which markers determining the severity of the pathological process were identified.

Keywords: alopecia areata, polymorphism, genes, non-scarring alopecia.

In modern dermatocosmetology, there is a tendency to increase the incidence of skin of the scalp, in particular, hair loss – non-scarring forms of alopecia. Despite the long history of the problem of non-scarring forms of alopecia, the issues of etiopathogenesis, diagnosis and treatment of non-scarring alopecia have not been sufficiently studied yet [1, 2]. The main share of non-scarring hair loss is nested alopecia. As a pronounced cosmetic defect, alopecia alopecia often leads to psychoemotional discomfort, which reduces the quality of life, and causes both social problems caused by restrictions in the choice of profession, employment and social prospects, and economic, due to the length of treatment and its high cost. In 5–10% of patients with small focal form of the disease, complete hair loss on the scalp (total form) develops, and in 1–2% of cases – complete hair loss on the head and trunk (universal form) [3, 4]. Curing the universal form of alopecia areata in less than 10% of cases.

Multicentre studies in the field of molecular genetics have revealed many genes of growth factors and apoptosis, which play an important role in the phases of anagen and telogen in alopecia [5, 7, 6].

Purpose of the study: Revealing of markers of growth factors and apoptosis in patients of the Uzbek population with nest allopathy as risk factors for the development of severe forms of the disease.

Materials and methods: 67 patients with alopecia nest at the age of 14 to 50 years were monitored, 52.8% were men, 47.2% were women who were on inpatient and outpatient care at the clinic of the Republican Specialized Scientific and Practical Medical Center of Dermatology and venereology. Molecular genetic studies in patients with non-scarring forms of growth factor alopecia and apoptosis was performed by real-time PCR. To assess the differences in the values of biochemical or clinical parameters between carriers of different genotypes, the Mann-Whitney U test or the Student's t-test for independent elections was used for the investigated genes. The value of $P < 0.05$ was taken as statistically significant. Prognostic efficiency of genetic markers was

determined by the standard AUC-classifier. The correlation relationships of growth factor polymorphisms and apoptosis with FGF, PDGF, FAS molecules were determined based on the Kendall rank correlation coefficient.

Results and discussion. Patients with focal form were 36.2%, polychial – 29.7%, ribbon-shaped – 1.9%. The heavier forms were recorded to a lesser extent and differed in the torpid current: 16.1% in the subtotal form, 4.5% in the total form, and 18 in the universal form (11.6%). The percentage of women in the study is 16.2% higher, because the immune system of women is more labile than that of men. 38.6% of patients had lesions of the nail plates of the hands: dystrophic changes, small-point indentations of the "thimble" type, pronounced longitudinal striation combined with the dim color of the plates themselves. Onychodystrophy depended on the severity of alopecia and was more often observed in patients with total and universal forms of the disease. In 71.6% of patients with alopecia areata there was a progressive stage of the disease, which was characterized by a "zone of shaky hair" around the foci (with easy sipping of hair along the edge of the focus, their painless epilation occurs). In 27.1% of patients, there was a growth of hair follicles (velus) in the focus of alopecia against the background of the progress of the pathological focus. The stationary stage of alopecia areata was noted in 23.9% of patients, regressing stage – in 4.5%. In 7,5% of patients there were subjective sensations in the form of hypersensitivity of the skin, paresthesias and erythema, preceding the appearance of a new focus of hair loss. Relapses of the disease occurred in 68.2% of patients, the duration of the intervals between the occurrence of new foci is variable. Analyzing the duration of the disease, the largest part of the patients suffered nest alopecia before 1 year (43.8%) and from 1 year to 5 years – 38.7%. Longer terms of the disease were observed in 1/5 of patients (17.5%). Diseases of the thyroid gland in the form of diffuse goiter of various degrees (51%), as well as iron deficiency anemia (32.9%) and gastrointestinal tract diseases (27.7%) represented the concomitant pathology of patients with alopecia areata.

Previously, in our studies, a method for testing the G (–634) C and G (–1154) A polymorphisms of the VEGF gene based on real-time PCR in patients with alopecia areata and individuals of the control group was modified and tested. The observed distributions of heterozygous genotypes of both loci reliably corresponded to the expected law for the Hardy-Weinberg equilibrium. Because the frequency of heterozygosity of polymorphisms is not very high, their prognostic value was also low (AUC = 0.57 and 0.54, respectively), which indicated the non-independence of these loci in the development of alopecia. According to the calculated odds ratio, the probability of development of angiogenesis disorders in patients with alopecia was more than 3.5 times higher than in the control group (OR = 3.9, 95% CI 0.33238, 46.17) with a level of χ^2 = 1.2 and P = 0.2. Molecular genetic studies of tumor necrosis factor (TNF-α) polymorphism revealed the detection of the homozygous genotype of the mutation-AA G-308A polymorphism of the TNF-α gene in 3.6% of cases, while in the control group this factor was 2.9%. In the group of patients with alopecia, a heterozygous genotype of the TNF-α (G-308A) – G/A mutation was found with a corresponding incidence of 32.1%. In the control sample, those carrying the mutant allele A were 8.6%. These differences are statistically significant and indicate the association of G-308A polymorphism of the TNF-α gene with the development of alopecia. Carrying of allele A and heterozygous genotype G/A is reliably associated with an increased risk of developing the disease (χ^2 = 4.4, P = 0.036, OR = 3.2, 95% CI = =1.033, 9.772 and χ^2 = 5.6; P = 0.018, OR = 5.05, 95% CI = 1.216–21, respectively). Allele G and genotype G / G, in contrast, are protective markers.

But the most informative in predicting the course of alopecia areata is the detection of markers predicting the course of the disease by identifying correlation. Therefore, in order to reveal the relationship in patients with alopecia between the investigated genotypes of growth factors and apoptosis with FGF, PDGF, FAS, and a correlation analysis was performed, which showed interesting data.

Correlation analysis of fibroblast growth factor with endothelial growth factor and tumor necrosis factor polymorphisms in patients with alopecia areata showed a significant negative correlation of FGF with genotype GA of polymorphism G (–1154) A of the VEGF gene and a correlation trend with the remaining polymorphism of both genes (Fig. 1). It is supposed that the detection of this genotype of the VEGF gene in patients with alopecia areata proves a decrease in the concentration of fibroblast growth factor, which is a key factor in the realization of the cell cycle of the hair follicle, and indicates a severe course of the disease.

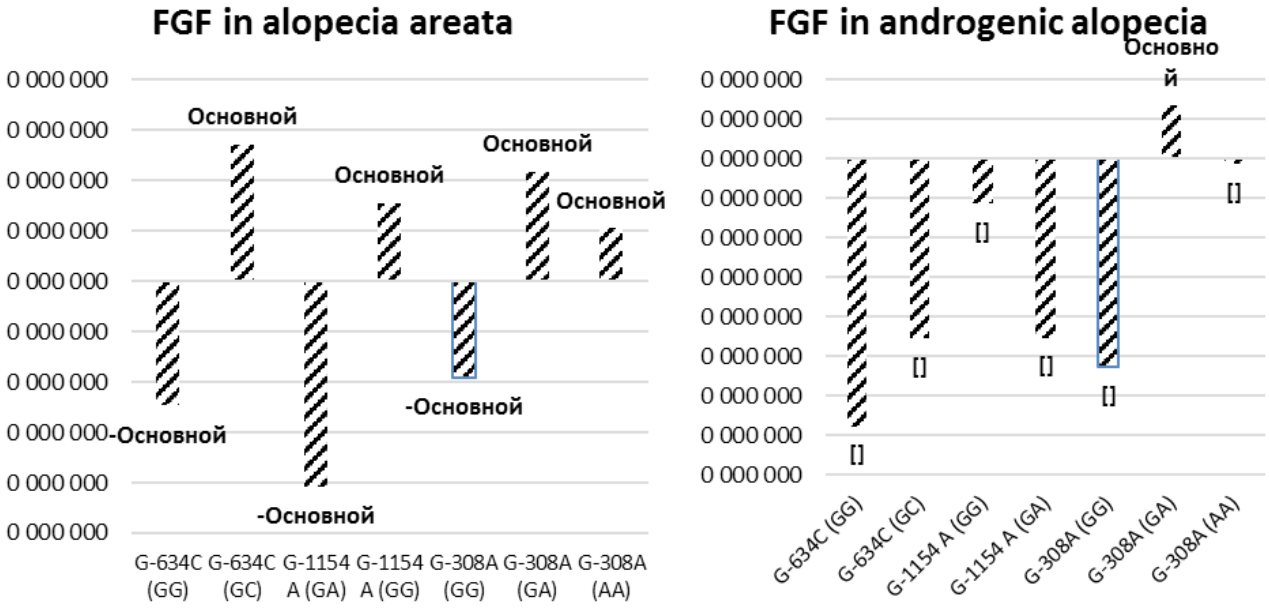


Figure 1. Correlation analysis of fibroblast growth factor with endothelial growth factor and tumor necrosis factor polymorphism

The correlation analysis of platelet growth factor with the indices of endothelial growth factor and tumor necrosis factor polymorphisms in patients with alopecia nest showed only the correlation tendency of both negative and positive of this growth factor with all the polymorphisms of the investigated genotypes (Fig. 2). Presumably, platelet-derived growth factor is not significant for endothelial growth factor and tumor necrosis factor polymorphisms and is not a marker of the course of the disease.

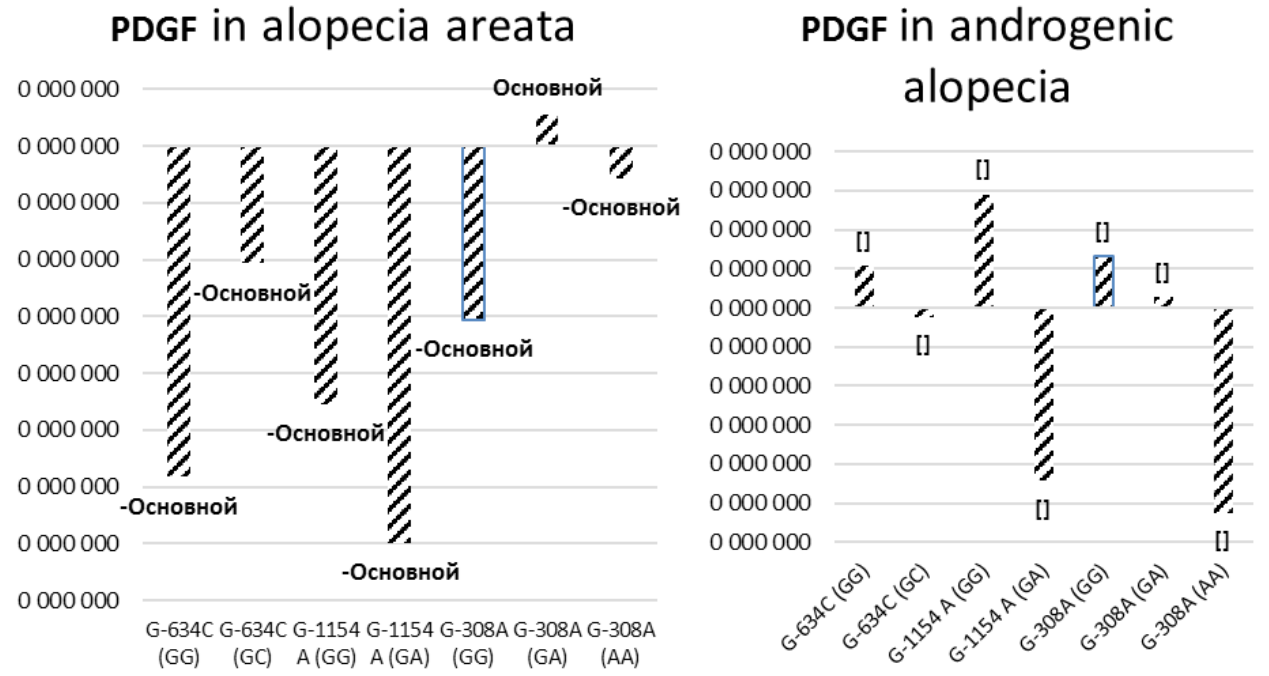


Figure 2. Correlation analysis of platelet-derived growth factor with indicators of endothelial growth factor and tumor necrosis factor polymorphisms

The highest correlation analysis results with endothelial growth factor and tumor necrosis factor polymorphism in patients with alopecia areal showed the FASL apoptosis factor (Fig. 3). Thus, a significant positive correlation is observed between this factor and the genotype of G polymorphism of the G (–634) C gene of the VEGF gene and a negative significant correlation with the GG genotype of the G (–308) A gene of the TNF-α gene in patients with nested alopecia.

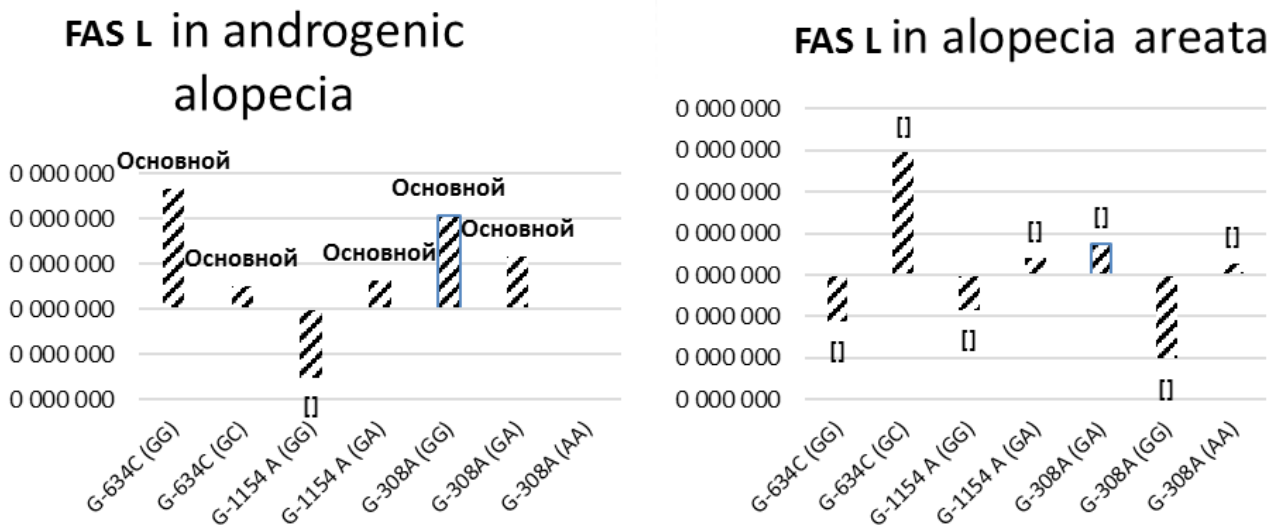


Figure 3. Correlation analysis of the apoptosis factor with indicators of endothelial growth factor and tumor necrosis factor polymorphisms

With the remaining indicators of the polymorphism of the studied genes and FASL, there is a tendency to correlate. Apparently, the detection of the G genotype of the G (–634) C polymorphism of the VEGF gene indicates an increase in FASL apoptosis in patients with alopecia areata, which translates the cycle of the hair follicle from the anagen phase into telogen, is an unfavorable marker and indicates a severe course of the disease. Persons with this marker are prone to a more severe course of alopecia areata. In contrast, the detection of the GG genotype by the G (–308) A polymorphism of the TNF-α gene is a favorable marker of the course of alopecia areata and observes a decrease in the FASL apoptosis factor and a lighter course of the disease.

Conclusions: Identification of genobiological ensembles between FGF and genotype GA of polymorphism G(–1154) A of the VEGF gene (significant negative correlation), FASL with genotype G (–634) C polymorphism of the VEGF gene (significant positive correlation) and GG genotype of polymorphism G (–308) A of the TNF-α gene (significant negative correlation), a pathogenetic relationship of the genotypic variants of VEGF and TNF-α with growth factors and apoptosis in alopecia are established. These genotypes can be considered markers of nesting alopecia in people of the Uzbek population and used to predict the course of this pathology and prevent the development of severe torpid forms of the disease.

References:

1. Адаскевич В. П., Мяделец О. Д., Тихоновская И. В. Алопеция.– М.,– 2000.– 187 с.
2. Гаджигороева А.Г. Болезни волос: классификация. Нерубцовые алопеции // Дерматология.– 2008.– № 1.– С. 25–26.
3. Breyer B., Vanichakarn P., Szatkowski J.P., Park J.Y., He T. Osteogenic Activity of the Fourteen Types of Human Bone Morphogenetic Proteins (BMPs) // J Bone Joint Surg Am.– 2003.– Vol. 85.– P. 1544–1552.
4. Clark A. F. Synergistic Signaling from Extracellular Matrix–Growth Factor Complexes. Journal of Investigative Dermatology.– 2008.– Vol. 128.– P. 1354–1355.

5. Kozlowska U., Blume–Peytavi U., Kodelja V. Expression of vascular endothelial growth factor (VEGF) in various compartments of the human hair follicle // Arch Dermatol Res.– 1998.– Vol. 290.– P. 661–668.
6. Simonetti O. Expression of vascular endothelial growth factor, apoptosis inhibitors (survivin and P. 16) and CCL27 in alopecia areata before and after diphencyprone treatment: an immunohistochemically study // British Journal of Dermatology.– 2004.– Vol. 150.– No. 5.– P. 940–948.

Azimova Fatima Vahidovna,
The head of the scientific department of dermatocosmetology
of the Republican specialized scientific
and practical medical center of dermatology and venereology
E-mail: evovision@bk.ru

NEW METHODS OF DIAGNOSTICS OF NON-TUBE ALOPECY

Abstract: In this study, patients with non-scarring alopecia of the Uzbek population underwent videotrich dermatoscopy. As a result, an algorithm for the diagnosis of non-scarring alopecia was developed, which accurately determines the form and stage of the disease, the degree of atrophy of the hair follicles, the presence of pathological hair in alopecia areata, and an increase in the number of hair-like hair less than 30 micro.– with androgenic alopecia. Such a diagnosis is also applicable in the monitoring of disease therapy and is in many cases an alternative to histological examination.

Keywords: videotrichodermatoscopy, non-scarring alopecia, vellus-like hair.

The problem of treatment of non-scarring alopecia in the modern world is one of the leading, as according to WHO, not only the number of people with alopecia grows, but their therapy is often ineffective, relapse of the disease occurs [1, 2]. Despite some success in studying the pathogenesis and therapy of patients with non-scarring alopecia, a new area of increased research interest is being formed, namely, accurate diagnosis of the disease [3, 4, 7]. For this purpose, a hairbrush is used in the scalp [5], which is important not only in determining the form of the disease, the stage, but also for monitoring therapy.

Purpose of the study. To develop algorithms for the diagnosis of non-scarring alopecia.

Materials and methods of research. We examined 247 patients with non-scarred alopecia, 94 (38.1%) patients with alopecia areata, 153 (61.9%) with androgenic alopecia. All patients underwent videotrich dermatoscopy of the scalp, which was performed with a camera Aramo-SG (Korea) with lenses X60 and X200 and computer program Trichoscience. This diagnostic program has the following capabilities:

– evaluation of the density and diameter of hair in the androgen-dependent and androgen-independent areas of the scalp.

– Calculation of the percentage of vellus hair, thin, medium and thick hair in the investigated areas.

– Evaluation of hair distribution in follicular units and the state of perifollicular phenomena.

– Evaluation of the phototrichogram in a semi-automatic mode.

– Hair calculator and calculation of the speed of hair growth. Automatic calculation of the total amount of hair on the patient's head, assessment of the individual rate of hair loss of the patient, calculation of the actual daily hair loss.

– Statistical processing of the results – the standard deviation, the average of the arithmetic mean.

– dermatoscopy – assessment of the skin condition of the scalp.

– evaluation of the condition of the hair shafts and hair follicles. Comparison with samples from the database.

– graphical representation of the received data, comparison with the norms.

Results and discussion: Determination of the ratio of hair in the stages of anagen and telogen in patients with focal alopecia areata showed a decrease in the amount of hair in the anagen stage – 62.1 ± 8.1% ($p < 0.001$), (control –87.1 ± 4, 3%) in the parietal region of the scalp and 69.4 ± 1.6% ($p < 0.001$), (control –85.4 ± 3.9%) in the occipital, and an increase in the number of hair in the telogen stage – 37, 9 ± 1.2% (p <0.001), (control – 12.9 ± ± 1.9%) in the parietal region of the scalp, and 30.6 ± 0.9% ($p < 0.001$), (control – 14.6 ± 2.3%) in the occipital (tabl. 1). In patients with polyocutaneous and ribbon-like alopecia areata, a more pronounced decrease in the amount of hair in the anagen stage was found – 46.3 ± 3.5%

(control –87.1 ± 4.3%) and an increase in the number of hair in the telogen stage – 53.7 ± 2.1% (control –12.9 ± 1.9%) in the parietal region of the scalp. In the occipital region there is also a decrease in the amount of hair in the growth stage – 41.1 ± 3.8% (control –85.4 ± 3.9%) and an increase in the number of hair in the resting stage – 58.9 ± 2.4% (control – 14.6 ± 2.3%). The anagen phase was sharply reduced in patients with subtotal and alopecia areata form, in which the amount of hair in the growth stage in the parietal region of the head is 24.7 ± 1.1% (control –87.1 ± 4.3%) and resting at 75.3 ± 3.2% (control –12.9 ± 1.9%).

Table 1.– Hair ratio in stages of growth and rest on the scalp in p2atients with alopecia areata

Ratio of hair on the scalp (%)		**control group (n = 25) focal (n = 50)**	**Forms of alopecia areata**		
			multifocal and tape-visible (n = 23)	**subtotal (n =21)**	
parietal region anagen	anagen	87.1 ± 4.3	62.1 ± 8.1***	46.3 ± 3.5***	24.7 ± 1.1***
	telogen	12.9 ± 1.9	37.9 ± 1.2***	53.7 ± 2.1***	75.3 ± 3.2***
Occipital areal	anagen	85.4 ± 3.9	69.4 ± 1.6***	41.1 ± 3.8***	35.4 ± 1.7***
	telogen	14.6 ± 2.3	30.6 ± 0.9***	58.9 ± 2.4***	64.6 ± 1.3***

Note: the differences with respect to the control group are significant (*** – P < 0.001)*

In the occipital region of the scalp, there is a less pronounced decrease in the amount of hair in the anagen's steel – 35.4 ± 1.7% (control – 85.4 ± 3.9%) and hair growth in the telogen stage – 64.6 ± 1.3% (control – 14.6 ± 2.3%).

Consequently, in patients with alopecia nest with an increase in the severity of the disease, there is a significant increase in hair density throughout the entire scalp, a violation of the ratio of hair phases in the anagen and telogen phases in favor of the latter, indicating a progressive stage of the disease.

In the outbreaks of alopecia, a large number of "yellow dots" (empty hair follicles) were observed, pathological hair in the form of "exclamation marks" and "cadaveric" hair, as well as dysplastic roots of the hair follicles, which confirm the progress of the disease, were observed in alopecia areas.

Trichodermatoscopy of the scalp in male patients with androgenic alopecia showed a sharp significant decrease in the number of hairs in the parietal region compared to the occipital and this decrease was more pronounced with increasing degree of lesion. The study of the phases of anagen and telogen in male patients with androgenic alopecia showed a highly significant decrease in the amount of hair in the anagen phase and an increase in the number of hair in the telogen stage in the parietal region, whereas the ratio of growth and rest phases in the occipital regions was not reliable at grade III and significantly decreased at III–IV and IV–V stages. Thus, in patients with grade 3 androgenic alopecia (Table 2), the amount of hair in the growth stage in the parietal region was 58.4 ± 3.1%, III–IV degree – 41.7 ± 1.1%, IV–V degree – 32.1 ± 0.8%, whereas in the control group this indicator was 87.1 ± 4.3%. In parallel, the amount of hair in the resting stage increased from 41.6 ± 1.8% at grade III, 58.3 ± 2.4% at grade III–IV to 67.9 ± 2.0 at grade IV–V.

Table 2.– Hair ratio in stages of growth and rest on the scalp in male patients with androgenic alopecia

Ratio of hair on the scalp (%)		**control group (n = 25) III degree (n = 47)**	**Types of androgenic alopecia**		
			III–IV degree (n = 38)	**IV–V degree (n = 36)**	
parietal re-gion anagen	anagen	87.1 ± 4.3	58.4 ± 3.1***	41.7 ± 1.1***	32.1 ± 0.8***
	telogen	12.9 ± 1.9	41.6 ± 1.8***	58.3 ± 2.4***	67.9 ± 2.0***
Occipital areal	anagen	85.4 ± 3.9	81.7 ± 1.1	79.2 ± 3.2	72.1 ± 1.8***
	telogen	14.6 ± 2.3	18.3 ± 2.4	20.8 ± 1.4*	27.9 ± 2.5***

*Note * – the differences with respect to the control group are significant (* – P < 0.05, ** – P < 0.01, *** – P < 0.001)*

A study of the relationship between the phases of hair growth and rest in women with androgenetic alopecia showed a significant decrease in the amount of hair in the anagen phase and an increase in hair in the telogen stage in the parietal region of the scalp. Also disproportion of phases is observed in the occipital region of the head, which distinguishes female androgenic alopecia from the male. Thus, at the I degree of androgenetic alopecia in the parietal region in women, the amount of hair in the anagen phase was 68.1 ± 3.02%, at II –59.7 ± 5.2%, at III – 51.4 ± 8.7%, while the same parameters in the control group were 87.1 ± 4.3%. The amount of hair in the telogen stage increased and amounted to: 31.9 ± 2.1% at grade I, 40.3 ± 8.9% at grade II, 48.6 ± 10.2% at grade III (control – 12.9 ± 1.9%). In the occipital region, the amount of hair in the anagen stage in women with androgenic alopecia significantly decreases: at grade I 73.2 ± 1.9 at II –63.7 ± 3.5%, at III – 58.9 ± 1.3% while the same parameters in the control group were 85.4 ± 3.9%. The amount of hair in the telogen stage parallel to the anagen stage increased significantly: 26.8 ± 1.4% at grade I, 36.3 ± 2.2% at grade II, 41.1 ± 1.07% at grade III (Table 3) (control –14.6 ± 2.3).

Table 3. – Hair ratio in stages of growth and rest on the scalp in female patients with androgenic alopecia

Ratio of hair on the scalp (%)		**control group (n = 25) I degree (n = 9)**	**Degrees of androgenic alopecia among women**		
			II degree (n = 12)	**III degree (n = 11)**	
parietal re-gion anagen	anagen	87.1 ± 4.3	68.1 ± 3.02**	59.7 ± 5.2***	51.4 ± 8.7***
	telogen	12.9 ± 1.9	31.9 ± 2.1**	40.3 ± 8.9**	48.6 ± 10.2**
Occipital areal	anagen	85.4 ± 3.9	73.2 ± 1.9*	63.7 ± 3.5***	58.9 ± 1.3***
	telogen	14.6 ± 2.3	26.8 ± 1.4**	36.3 ± 2.2***	41.1 ± 1.07***

*Note * – the differences with respect to the control group are significant (* – P < 0.05, ** – P < 0.01, *** – P < 0.001)*

Typical for this type of alopecia is the pronounced thinning of the hair rods in the parietal region (polymorphism), reaching up to 80% of fine hair (< 10% norm). Many empty hair follicles in the form of "yellow points", as well as single units. In the occipital region, in men, hair shaft changes in the form of thinning were not observed. Only 13% of male patients had a slight decrease in hair density and polymorphism in the occipital region of the scalp, which is probably associated with a high duration of the disease (more than 7–10 years). At this category of patients, atrophic hair follicles were observed. All examined female females showed a change in the hair rods in the form of thinning and in the occipital region, but less pronounced in the parietal region. When examining the scalp under the X200 lens, oily, sometimes dry seborrhea was more often noted, the hair follicles of the hair being examined were mostly in the telogen stage. One of the important criteria for the visual-dermatoscopic examination of the skin of the scalp is the phototrichogram, which is used to conduct a differential diagnosis between androgen-dependent and diffuse hair loss. A characteristic feature of the phototrichogram of patients with androgenic hair loss, held in the parietal zone, is an increased amount of velus hair and thinned hair – more than 40%.

Because of our studies, we determined algorithms for the diagnosis of alopecia:

1. Trichoscopic criteria for androgenic alopecia:

– in male patients:

III degree – "yellow" points 54.8%, "white" points 45.2%, phototrichogram> 40.8%

III–IV degree – "yellow" points 28.3%, "white" points 71.7%, phototrichogram > 55.6%

IV–V degree – "yellow" points 11.4%, "white" points 88.6%, phototrichogram > 73.2% – in female patients:

I degree-II degree – "yellow" points 86.1%, "white" points 13.9%, phototrichogram > 34.1%

III degree – "yellow" points 63.5%, "white" points 36.5%, phototrichogram > 69.1%

2. Trichoscopic criteria for nested alopecia (Table 5):

– chain and poliochagovaya form – "yellow" points 91.2%, "white" points 8.8%, pathological hair 76.5%

– subtotal form of "yellow" points 58.6%, "white" points 41.4%, pathological hair 21.7%

– total and universal forms – "yellow" points 4.1%, "white" points 95.9%, pathological hair 3.4%.

Conclusion: Thus, trichodermatoscopy is a newly developed method that has significant potential in dermatological practice. The results of the research showed that, being a non-invasive and accurate method of visualization of hair structures, trichodermatoscopy can be used not only to diagnose androgenic alopecia, but also to evaluate the effect of various therapeutic agents and cosmetic products on the condition of the hair and scalp.

Table 4. – Trichoscopic criteria for alopecia areata

Forms of alopecia areata	**Criteria for diagnosis**		
	Non-atrophied hair fol-licles «yellow» points (%)	**Atrophied hair follicles «white» points (%)**	**Pathological hair cadaveri-zed hair and hair in the form of an exclamation mark (%)**
Focal and polyocidal	91.2	8.8	76.5
Subtotal	58.6	41.4	21.7
Total and universal	4.1	95.9	3.4

Perhaps, trichodermatoscopy will later be successfully applied in various monitoring studies

References:

1. Adaskevich V. P., Myader O. D., Tikhonovskaya I. V. Alopecia. – M: The medical book of – 2000.
2. Ruk A., Dauber R. Diseases of the hair and scalp. Trans. sangl. – M: Medicine – 1985.
3. Amos Gilhar and Richard S. Kalish Alopecia Areata: A tissue specific autoimmune disease of the hair follicle // Autoimmunity Reviews. – 2006. – Vol. 5. – Issue 1. – P. 64–69.
4. D'Ovidio R., Claudatus J., Di Prima T. Alopecia areata: review of particular clinical forms and insight into possible pathogenetic mechanisms // Ann Dermatol Venereol. – 2002. – Vol. 129. – P. 15515.
5. McElwee K., Hoffman R. Growth factors in early hair follicle morphogenesis // Eur J Dermatol. – 2000. – Vol. 10. – P. 341–350.

Akkiev Bobomurod Boltayevich,
Kurbanov Ravshanbek Davletovich,
Abdullaev Timur Atanazarovich,
The Republican Specialized Center of Cardiology
E-mail: Guzal-m@inbox.ru

INTERRELATION OF THE HEART RATE VARIABILITY WITH VENTRICLE EXTRASYSTOLE IN LEFT VENTRICLE SYSTOLIC DYSFUNCTION OF THE PATIENTS WITH MYOCARDIAL INFARCTION

Abstract:

Objectives: The aim of our research was to study interrelations between heart rate variability and ventricle extrasystole in systolic dysfunction of the left ventricle in the patients with acute Q-wave myocardial infarction.

Study design: This study includes 84 male patients with acute Q-wave myocardial infarction. All the patients underwent echocardiography on the 10–14 day of disease in order to estimate systolic function of the left ventricle, ECG Holter monitoring with measurement of heart rate variability and ventricular extrasystole. All patients received standard therapy including β-blockers, antiagregants, antiarrhythmic agents, aldosteron antagonists, ACE inhibitors, calcium antagonists, nitrates, statins.

Results: After the first clinical-functional examination there was found systolic dysfunction of the left ventricle in 23 (27,4%) patients. The development of the early left ventricle remodeling, acute heart failure, increasing level of inflammation markers were noted more frequently in this group of patients. We revealed that interrelation between heart rate variability and ventricular arrhythmia had reliable character in systolic dysfunction.

Conclusion: In the group of patients with systolic dysfunction on the 10–14 day of acute Q-wave myocardial infarction there was reliably registered more often potentially dangerous ventricle arrhythmia and lower heart rate variability connected with dysbalance of sympathetic and parasympathetic part of the autonomous nervous system. There has been established reliable interrelation between frequency of development of potentially dangerous ventricular arrhythmia and lower parameters of the heart rate variability in the patients with systolic dysfunction.

Keywords: myocardial infarction, heart rate variability, ventricular extrasystole, left ventricle, systolic dysfunction, male patients.

Introduction

It is well known that during the first year after myocardial infarction (MI) 6.5–11% of patients die and about half of them die suddenly [1, 2, 5, 6]. The frequency of sudden cardiac death (SCD) accounts for 0.36–1.28 per 1000 persons a year [2, 5, 6], and survival during a year in SCD (after successful reanimation measures against cardiac clinical death) is not higher than 15–20% by the various data [1, 7, 8]. Taking into consideration the importance of this problem, the great attention has been paid to the search for predictors of the fatal arrhythmia and also stratification of the patients with ischemic heart disease (IHD) with regard to the risk severity of SCD. The current predictors include demographic indicators, lower fraction of the left ventricle ejection (LV FE), reduction of heart rate variability (HRV), ventricular rhythm disturbance (VRD) and others [5, 6, 7, 8].

We have not found data in the literature about correlation of the heart rate variability and ventricular extrasystoles in systolic dysfunction of the left ventricle in the patients with myocardial infarction.

According to the above-mentioned the purpose of our report is to study correlation between heart rate variability and ventricular extrasystole in systolic dysfunction of the left ventricle in the patients with acute Q-wave myocardial infarction.

Material and methods

Following the purposeful tasks we examined 84 male patients with primary Q-wave myocardial infarction of the age from 29 to 65 years, (52 ± 8.6 years). Diagnosis was established on the basis of WHO criteria at presence of two or three signs: special attack of anginous pain or its equivalent for 30 minutes, appearance of pathological Q or QS in two or more leads of ECG, creatininphosphakinase prevailed upper normal level more than 2 times. All patients gave written consents for participation in this investigation. The patients with the following complications of the myocardial infarction and accompanied pathology were excluded from the study: ciliary arrhythmia, AV-blockade of stage II–III, arterial hypotension (AP < < 90/60 mm Hg), age above 65 years, chronic pulmonary diseases with marked respiratory insufficiency and symptoms of bronchospasm, diabetes mellitus at the stage of compensation, malignant arterial hypertension, oncological diseases, consequences of the acute cerebral circulation disorders and echonegative patients.

All patients received standard therapy (β-blockers, antiagregants, antiarrhythmics, aldosteron antagonists, ACE inhibitors, calcium antagonists, nitrates, statins).

The patients were performed EchoCG on the echocardiograph "Solnoline Versa Pro" (Siemens, Germany) on the basis of therapy performed on the 10–14 day after acute myocardial infarction; evaluation of the LV contractility was carried out with use of its fraction of ejection: FE = ((EDV – ESV)/EDV)*100%.

According to the recommendations of 2010, the third revision, of the Society of Experts on Heart Failure (SEHF) the stage of systolic heart failure is measured by the level of findings of the fraction of ejection: lowered – FE < 40%; "gloaming zone" – FE40–50%; preserved – LV FE > 50%. Among the studied patients the men with marked stage of heart failure were very few. In this connection we divided the patients into two groups: the group with marked stage of systolic dysfunction included the patients with LV FE ≤ 45%, and the group with preserved function of the left ventricle consisted of the patients with LV FE > 45%.

The ECG Holter monitoring (HM) was performed with use of apparatus "Cerdio sens+" (HAI–MEDIKA, the Ukraine) for measurement of VE and HRV. The ventricle extrasystole (VE) was characterized by traditional classification of B. Lown (1971) and prognostic classification of J. Bigger (1982). The interpretation of the HRV was made according to the recommendation of working group of the European Society of Cardiologists and the North-American Society of Stimulation and Electrophysiology (1996). For evaluation of HRV there were used the following time and spectral parameters:

Table 1.

SDNN (ms)	Standard deviation of all intervals N-N
ADANN (ms)	Standard deviation of mean values of intervals N – N, calculated by 5-minute intervals during whole recording
pNN50 (%)	Value NN50, divided by total number of intervals N – N
TP (ms^2)	Total power of all intervals R – R
LF (ms^2)	Power in diapason of low frequencies (0.04–0.15 Htz)
HF (ms^2)	Power in diapason of high frequencies (0.15–0.4 Htz)
LF/HF	Ratio of low frequency to high frequency component of the spectrum

Mathematic processing of the results obtained was made on the personal computer "Pentium IV" with use of pocket of programs STATISTICA version 6 "StatSoft" as well as Biostat. For analysis of reliability of differences between qualitative signs the criterion χ^2 was used. The inter-group comparative analysis of quantitative values was

performed in two groups with use of criterion Student t. All values were presented as arithmetical mean ± standard deviation (M ± SD), and sign changes as mean change (± %). The differences in p < 0,05 were accepted as reliable.

Results

The complex clinical-functional examination was carried out on 84 patients (Table 1). While studying histories It was revealed that 55 (65,4%) patients suffered from HD before onset of MI; DM was revealed both in the history and primary in 16 (19%) patients. RPIS was found in 34(40,4%) patients. Analysis of MI development in acute and subacute period showed that in 47(55.9%) cases there were observed lesions of the anterior wall, and in the rest 37(44%) of cases in the lower wall. In 40(47.6%) patients the progressing of acute period of disease was complicated by development of clinical evidences of acute heart failure (HF) (Killip, class II–IV) including 26 (65%) cases of class II, 11 (27.5%) cases of class III, 3(7.5%) cases of class IV (cardiogenic shock). Clinical evidences of CHF II "A" stage were revealed in 46(54.7%), of II "B" stage in 1(1.1%) patients. It is interesting that of them in 33 (39%) patients the symptoms of CHF were correlated to FC I–II by NYHA classification, and in 14 (16.4%) patients – to CHF FC III–IV.

Table 2.– Clinical characteristics of the studied patients

Characteristic	Absolute number (n=84)	%
History HD	55	65.4
EPIS	34	40.4
Histories and primary defined DM	16	19
Anterior MI	47	55.9
Lower MI	37	44
AHF by Killip (I–II)	26	31
AHF by Killip (III–IV)	14	16.6
CHF II'A'st. FC I–II by NYHA	33	39
CHF II "A" st. FC III–IV by NYHA	13	15.4
CHF II "B" st. FC III–IV by NYHA	1	1.1

According to the initial data of EchoCG the patients were divided into 2 groups. Group 1 included 23 (27.3%) patients with systolic dysfunction LV FE ≤ 45%. The rest 61 (72.7%) patients entered group 2 LV FE> 45% (Table 2). The patients of the comparative groups have no reliable differences by age, 53.74 ± 1.3 years and 51.24 ± 1.4 years ($p < 0.05$), HD in histories was noted in 14 (60.8%) and 41 (67.2%) patients in group I and II, respectively (χ^2 = =0.08; $P = 0.7$), DM type 2 was revealed in 5 (21.7%) and in 11 (18%) patients in group I and II, respectively ($\chi^2 = 0.006$; $P = 0.9$). According to data of ECG and EchoCG the anterior localization of MI (χ^2 = =1.68; $P = 0.19$) was register not reliably in the patients from group 1, and in group II the lower localization ($\chi^2 = 1.68$; $P = 0.19$) was found, respectively.

Table 2.– Comparative characteristic of the patients with different fraction of ejection.

Parameters	Group I (n = 23) LVFE ≤ 45% abs.(%) or M±m	Group II (n = 61) LVFE > 45% abs.(%) or M ± m	χ^2; P
1	*2*	*3*	*4*
Age. years	53.74 ± 1.3	51.34 ± 1.4	> 0.05
HD	14 (60.8)	41 (67.2)	$\chi^2 = 0.08$; $P = 0.7$
EPIS	10 (43.4)	24 (39.3)	$\chi^2 = 0.0009$; $P = 0.9$
DM	5(21.7)	11 (18)	$\chi^2 = 0.006$; $P = 0.9$

1	*2*	*3*	*4*
CHF II «A» st. FC I–II by NYHA	12 (52.1)	21 (34.4)	$\chi^2 = 1.5$; $P = 0.2$
CHF II «A» st. FC III–IV by NYHA	5 (21.7)	8(13.1)	$\chi^2 = 0.4$; $P = 0.52$
CHF II «B» st. FC III–IV by NYHA	1 (4.3)	0	$\chi^2 = 0.26$; $P = 0.61$
AHF by Killip	19 (82.6)	21 (34.4)	$\chi^2 = 13.6$; $P = 0.000$
LV early remodelling	9 (39.1)	8 (13.1)	$\chi^2 = 5.48$; $P = 0.02$
LV FE (%)	39.52 ± 1.6	57.5 ± 1.9	< 0.001
LV anterior wall	16 (69.5)	31(50.8)	$\chi^2 = 1.68$; $P = 0.19$
LV posterior wall	7(30.4)	30 (49.1)	
C-reactive protein mg/l	8. 4±1. 1	5. 6 ± 0. 7	< 0. 05

In the comparative groups the quality of the patients with potentially hazardous ventricle arrhythmia (PHVA) is reliably different and accounts for 21 (91,3%) and 3 (21.3%), respectively in group I and II ($\chi^2 = 31.1$; $P = 0.000$). Besides, high grade VE: by Lown-Wolf III (12–52.1% and 9–14.7%, $\chi^2 = 10.5$; $P = 0.0010$, IVA (13–56,5% and 7–11,4%, $i^2 = 16,3$; $P = 0.000$), IVB (7–30.4% and 3–4.9%, $\chi^2 = 8.08$; $P = 0.004$) were reliably recorded in group 1 (Table 3).

Table 3.– Findings of ECG HM in the patients of the compared groups

Parameters	**Group I (n = 23)**	**Группа II (n = 61)**	**χ^2; P**
	Abs(%) M ± SD	**Abs (%) M ± SD**	
PDVA	21 (91. 3)	13 (21. 3)	$\chi^2 = 31. 1$ P = 0. 000
VE by Lown-Wolf III	12 (52. 1)	9 (14. 7)	$\chi^2 = 10. 5$ P = 0. 001
IV A Cl.	13 (56. 5)	7 (11. 4)	$\chi^2 = 16. 3$ P = 0. 000
IV B Cl.	7 (30. 4)	3 (4. 9)	$\chi^2 = 8. 08$ P = 0. 004
V Cl.	1 (4. 3)	1(1. 6)	$\chi^2 = 0. 006$ P = 0. 94
SDNN ms	91. 57 ± 32. 7	107. 7 ± 28. 89	< 0. 05
SDANN ms	80. 52 ± 27. 0	96. 8 ± 25. 8	< 0. 05
pNN50%	5. 85 ± 1. 1	8. 65 ± 1. 0	< 0. 05
TP ms2	1458. 3 ± 314. 8	1583. 7 ± 209. 4	> 0. 05
LF ms2	414. 6 ± 18. 3	449. 7 ± 18. 8	> 0. 05
HF ms2	154. 3 ± 18. 9	197. 4 ± 16. 7	< 0. 05
LF/HF	2. 82 ± 0. 91	2. 6 ± 1. 16	> 0. 05

Discussion

The question about prognostic value of the myocardium infarction localization is still discussing: a number of authors observed the higher level of frequency of "end points" (cardiac death, repeated MI, unstable angina pectoris) at the anterior than at lower MI [9]. During observation of the patients having MI it was established that frequency of postinfarction complications in lower MI was 2 times less that in anterior myocardium infarction [11]. At the same time analyzing 5-year survival of

the patients with MI there was no revealed significant differences by the level of survival in different localization of the process (in anterior – 90%, in lower – 93%) [10]. In opinion of other authors localization of MI had no independent prognostic meaning and character of disease clinical course is mainly determined by the stage of myocardium contractility reduction [9]. To the present time the sufficiently determined opinion about prognostic role of left ventricle dysfunction in myocardium infarction has been accepted. Brugada P., analyzing prognostic role of 70 clinical signs in 2-year observation identified HF III functional class by NYHA classification as independent predictor of sudden cardiac death (SCD) [12]. It should be noted that by the results of our study in group of patients with evident systolic dysfunction in the stationary period of myocardial infarction the development of CHF ($\chi^2 = 13.6$; $p = 0.000$) and early LV remodelling ($\chi^2 = 5.48$; $p = 0.02$) were registered reliably more often. Besides, biochemical analysis showed reliably higher level of CRB in group 1, than in group II (8.4 ± 1.1 mg/l, and 5.6 ± 0.7 mg/l, respectively in group I and II, $p < 0.05$).

At present time the opinion has become widely distributed that reduction of the myocardial contractility is the predictor for ventricular arrhythmia, and the frequency of identification of VA high grades dependents on the degree of cardiac muscle dysfunction. There was revealed reverse correlation between VA severity degree and volume of the left ventricular fraction of ejection [13]. This is confirmed by the more frequent identification of the complex types of the VE in the patients having MI in the history in comparison with patients without MI, as well as in the patients with large focus and especially transmural MI [14].

The dysbalance between sympathetic and parasympathetic parts of the autonomous nervous system occurring in ischemic heart disease and acute myocardial infarction resulted in reduction of electric rhythmicity of the myocardial functioning. In this case the process of distribution of the depolarization wave, inducing myocardial contraction, has become unstable. Sympathetic effect provoke occurrence of dangerous ventricular arrhythmia, vagus nerves play defensive role. It is necessary to note that in out investigation analysis of the parameters of heart rate variability also showed reliable differences between levels in the comparative groups. So, the mean level of SDNN was 91.57 ± 32.7 ms and 107.7 ± 28.8 ms in group II ($p < 0.05$). SDANN mean level accounted for 80.5 ± 27 mc and 96.8 ± 25.8 mc in group I and II, respectively, ($p < 0.05$). Analysis of the frequency parameters was as follows: high frequency power was 154.3 ± ± 18.9 and 197.4 ± 16.7 ms^2 in group I and II, respectively, ($p < 0.05$). The parameter, characterizing indirectly balance between sympathetic and parasympathetic systems was 2.82 ± 0.9 and 2.6 ± 1.2 in group I and II, respectively ($p < 0.05$). According to data of some authors in lowering SD less than 50 msec the risk of development of dangerous ventricular arrhythmia (FV, VT) increases sharply. Decrease in the total spectrum power (it is proportional to SD quadrate which occurs mainly due to decrease in HF power at relative increase in LF power. If normal proportion LF/HF is 2–3, then in AM it may increase to 10 [15].

Conclusions

1. The obvious systolic dysfunction of the left ventricle (FE ≤ 45%) develops in more than one fourth of patients on the background of standard therapy on the 10–14 day of acute Q-wave myocardial infarction.

2. In the patients with LV systolic dysfunction the development of acute heart failure, early remodeling of LV were observed reliably more often and the level of C-reactive protein was reliably high to the end of stationary period of acute MI treatment.

3. The potentially dangerous ventricular arrhythmia was observed reliably more often and lower HRV connected with dysbalance of sympathetic and parasympathetic parts of the autonomous nervous system in the group of patients with systolic dysfunction on the 10–14 day of acute myocardial infarction.

4. There has been established reliable relationship between frequency of the PDVA development and lower HRV findings in the patients with systolic dysfunction.

Limitations of the study

The sample size was relatively small and conducted at a single center. Therefore, future large multi-center prospective cohort studies are needed to address this issue.

Conflict-of-interest issues regarding the authorship or article: None declared.

References:

1. American Heart Association / American College of Cardiology Foundation / Heart Rhythm Society Scientific Statement on Noninvasive Risk Stratification Techniques for Identifying Patients at Risk for Sudden Cardiac Death. Circulation – 2008;118:1497–1518.
2. Zipes D.P., Camm A.J., Borggrefe M. et al. ACC/AHA/ESC – 2006 guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: a report of the American College of Cardiology / American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines. J Am Coll Cardiol – 2006; 48: e247–e346.
3. Heart rate variability. Standards of measurements, physiological interpretation and clinical utilization. Working group of the European Cardiological Society and the Northern-American Society of Stimulation and Electrophysiology. Vestnik Aritmologii – 1999;11: 53–78.
4. Disegni E., Gouldbourt U., Reicher – Reiss H. et al. and the SPRINT Study Group. The predictive value of admission heart rate on mortality in patients with acute myocardial infarction. J. Clin. Epidemiol.– 1995; 48: 1197–205.
5. Priori S., Blomstrom – Lundqvist C. Task Force on Sudden Cardiac Death of the European Society of Cardiology. Eur. Heart J – 2001; 22(16): 1374–1450.
6. Mazur N. A. Sudden cardiac death. Clin.Med.– 1988; 11: 28–35.
7. Cavelieva I. V. Stratification of the patients with ventricular rhythm disorders with regard to the risk groups of the sudden death. Kardiologiya – 1997; 8: 82–96.
8. Myerburg R. J., Kessltr K. M., Castelannos A. Pathophysiology of sudden cardiac death. PACE – 1991; 14: 935–943.
9. Stadius M. L., Davis K., Maynard C., et al. Risk stratification for 1 year survival based on characteristics identified in the early hours of acute myocardial infarction. Circulation – 1998; 74 (4): 703–711.
10. Gohlke H., Betz P., Roskaum H. Prognosis – Stratification and Languet therapy nick Hers infarct. Intensive med. Nonfatal med.– 1999; 26 (4): 197–203.
11. Golikov A. P., Gazaryan G. A., Spasskiy A. A. The role of early loading test in the patients with myocardial infarction complicated by development of left ventricular aneurysm. Kardiologia – 2001; 9: 25–28.
12. Brugada P. Smeets J., et al. The value of the clinic history to assess prognosis of patient with ventricular tachycardia or ventricular fibrillation myocardial infarction. Europ. Heart J.– 1999; 10 (8): 747–752.
13. De Soyza N., Haisten S., et al. Correlation of left ventricular wall motion abnormalities in patients with coronary artery disease. Inf. J. Cardiol – 2002; 1 (3): 281–288.
14. Ryan M., Lown B., Horn H. Comparison of ventricular ectopic activity during 24 hour monitoring and exercise testing in patients with coronary artery disease. N. Engl. J. Med.– 1999: 292 (5): 224–229.
15. Farrell T. G., Soshin Y., Cripps T. et al. Risk stratification for arrhythmic events in postinfarction patients based on heart rate variability, ambulatory electrocardiographic variables and signal – averaged electrocardiogram. J. Am. Coll Cardiol.– 2001; 18: 687–691.

Alimova Hilola Pulatova,
Republican Research Center of Emergency Medicine,
Tashkent, Uzbekistan
E-mail: fma-xiva77@mail.ru
Sharipova Visolat Khamzayevna,
Research Fellow,
Department of Anesthesiology and Reanimatology
Uzbekistan, Tashkent,
E-mail: visolat_78@mail.ru

PREVALENCE AND CHARACTER OF POLYTRAUMATIC INJURIES AMONG CHILDREN POPULATION IN UZBEKISTAN FROM 1995 TO 2015

Abstract: Current retrospective analysis contains detailed information on prevalence, character and methods of treatment of polytraumatic injuries among children population in Uzbekistan from 1995 to 2015. Analysis of mortality, disability and total number of injuries are given in accordance to three separate phases of development and establishment of Emergency Medical Service in Uzbekistan.

Keywords: polytrauma, mortality, disability, emergency medical service.

During the historically short period of independence of the Republic of Uzbekistan, a unique system of emergency medical care was created in the country, a non-gaming counterpart in the world that meets the requirements. Significant results in providing emergency medical care at the level of world standards have been achieved. Provision of qualified emergency medical care for children is an important state direction and a nationwide task. The EMC system employs about 700 pediatricians, 160 pediatric surgeons, 61 pediatric traumatologists, and more than 400 children's anesthesiologists-resuscitator. The number of emergency pediatric beds in the SEMP is more than 2500 (30%), including the surgical profile – about 1000, somatic – 1530. In 2015 the number of calls for outpatient care for children accounted for 15858 calls, for stationary care – 12843. Increasing yearly turnover and patient confidence in the emergency medical care system requires constant improvement of the quality of emergency medical care [1].

Aim: To study the frequency, dynamics and results of treatment of combined pediatric trauma in Uzbekistan during the period between 1995 and 2015.

Material and methods: To analyze the frequency and dynamics of combined and shockogenic injuries, we selected a period of 20 years (1995–2015). This long segment was conditionally divided by us into 3 periods:

1. The period from 1995 to 2001, before the emergency medical service had been created;

2. The period of creation and start of the operation of emergency medical services (2002–2008);

3. The period of upgrading and improving the emergency medical service care with great attention to diagnostic and medical standards in treatment (2009–2015).

Each period had its own peculiarities, experienced a historical change in the health care system.

We analyzed each of the conditionally separated periods with a deep analysis of the following indicators:

– General traumatism in the Republic of Uzbekistan;

– General traumatism in children / ratio of total injuries;

– General injuries in children per 100 thousand children;

– The number of combined injuries in children / the proportion of the total number of children's injuries;

– Mortality;

– Disability;

– Duration of the average bed-day in the department of intensive care unit and clinic.

The analysis uses the data of the Institute of Public Health and the organization of health care of the Ministry of Health of the Republic of Uzbekistan, as well as

the data of the State Statistics Committee of the Republic of Uzbekistan.

Analysis of the 1 study period. After gaining its independence, Uzbekistan inherited a cumbersome multi-level health management system and a multi-stage patient care system, a large number of different types of medical institutions, and deterioration of buildings and equipment [2]. Emergency medical care was provided according to the old principles. These old principles consisted in the fact that each medical institution had certain days a week on duty for emergency medical care. As for children with co-traumatic injuries, such patients went to various children's hospitals, or departments of pediatric surgery at regional and republican hospitals. Accordingly, these hospitals could not provide specialized assistance, as the staff of a neurosurgeon, a traumatologist was not provided in these hospitals, an anesthesia and resuscitation services were not developed enough, and minimally invasive surgery was not developed. At best, experts were invited from other institutions. This resulted in the loss of the "golden hour" and as a result, worsened the outcome of the treatment, leading to lethality and disability. As for the diagnostic measures, the situation here was even worse. The obsolete and unwieldy technical base did not allow to diagnose various types of damage in time and accurately. This rested either in the absence of equipment, or in the malfunction of this equipment due to wear and tear or in the absence of a specialist who can work on this equipment. The 24-hour watch of the radiologist, ultrasound doctor was not stipulated, therefore the equipment also did not function at night and on weekends. All these factors complicated the diagnosis, the choice of tactics for emergency medical care. Basically, children with a combined trauma were redirected from one hospital to another. The motivation for transferring and roaming patients from the hospital to the hospital was the lack of specialists and diagnostic equipment. All of the above was a prerequisite for the deterioration of the quality of emergency medical care, especially for children with co-traumatic injuries.

Analysis of the 2 study period. The initial stage of structural healthcare reform began after the release of the Decree of the President of the Republic of Uzbekistan PD-2107 as of October 10, 1998 "On the State Program for Reforming the Public Health System of the Republic of Uzbekistan" and "Concepts for Reforming the Health System in 1998–2005" [5]. In the emergency medical care system, the Republican Center for Emergency Medical Assistance (RCEMA), 13 of its regional branches and 173 regional sub-branches in the form of emergency aid departments were established. The transition from an unstructured emergency aid system to a centralized and well-managed system on the basis of different types of medical facilities made it possible to improve the quality and availability of emergency medical care, to ensure its real "urgency," and to increase the return on the used medical equipment, transport, buildings and premises [3]. The created system of emergency medical care is a unique system that fully meets the requirements for such structures. The uniqueness was that the doctrine, according to which a fundamentally new organizational model of emergency medicine was created, was based on 4 key provisions in accordance with the generally accepted concept of "Goldenhour" – the golden hour of the "First Aid": timeliness (speed) of medical care; accessibility of treatment for all segments of the population; compliance of emergency assistance with approved standards; high-tech medical care. The launch of the emergency medical service led to:

1. Concentration of all specialists at one place (neurosurgeon, traumatologist, abdominal surgeon, vascular surgeon, anesthesiologist- resuscitator);

2. Noctidial functioning of diagnostic equipment (ultrasound, Computer Tomography, X-ray, clinical and biochemical laboratory) and specialist diagnostician.

This created the prerequisites for improving the quality of care for children with co-trauma. Such patients began to enter emergency medical centers in the areas where prompt, qualified and specialized care started. Full-fledged diagnostics, assessment of vital functions of the body, detection of injuries and immediate provision of emergency medical care with the involvement of all specialists began to affect the results of treatment. At the time of sanitary aviation, the necessary specialist could leave at any time of the day to carry out operations, consult a specialist, re-transfer to RCEMA if necessary.

At the sub-branch level, children who received co-traumatic or polytrauma received qualified care, which consisted in stabilizing the condition, removing from shock, splinting the injured limbs, conducting diagnostic procedures. Later, these patients were transferred to branches to provide highly qualified, specialized care upon necessity.

Analysis of the 3 study period. According to the Resolution No. 91 of the Cabinet of Ministers of the Republic of Uzbekistan as of March 29, 2012 "On Measures for Further Strengthening the Material and Technical Base and Improving the Organization of the Activity of Medical Institutions", an additional purchase of 400 special sanitary vehicles and 30 ambulances for the amount of $9,6 million and associated portable medical equipment amounting to $780,000 has been provided. In the same document, the acquisition of modern high-tech medical equipment for the amount of 5.2 million US dollars was proposed for the purpose of retrofitting RCEMA [4]. To equip the coordination and dispatching service in the EMC system with modern radio communication systems and computer equipment, an amount of 1.9 billion soums has been allocated. Each branch and sub-branch were equipped with modern ventilator equipment, which allows ventilating patients in different ventilation regimes, and monitoring respiration rates. Modern anesthetic and respiratory equipment allowed to conduct inhalation anesthesia, monitor ventilation parameters. Cardiac monitors, which allowed to continuously monitor the vital functions of the body, syringe pumps, which allow to dose medication, suction, functional beds. The presence of tracking equipment, continuous monitoring, modern diagnostic equipment (X-ray machines, computer tomography machines, ultrasound equipment, endoscopic equipment, laboratory equipment, ECG devices) brought the quality of provided emergency medical care to a new level, with the corresponding requirements, facilitated the work of staff, facilitated timely diagnosis of severe injuries and correct diagnosis.

The developed standards for providing emergency medical care began to be introduced into the work of branches and sub-branches. Working on the basis of standards and protocols of actions, with this or that emergency pathology, allowed to avoid mistakes in diagnosing and choosing the right path when providing care to the patient. This was especially true for patients with polytrauma, combined injuries, accompanied by a shock of various genesis, where the actions of a team of assisted physicians should be immediate and focused, while minimizing errors in the diagnosis and treatment of patients with shock injuries [5].

For a visual demonstration of the results of the operation of the emergency medical service, in particular in children with combined trauma, we decided to compare the three periods of the formation and development of the EMC service described above.

Results of the study

As can be seen from (Fig. 1), the population of the Republic of Uzbekistan for the study period tended to increase. In the 2nd period of the study, the population of Uzbekistan increased by 8% compared to the 1st period of the study, and in the 3rd period of the study, the total population of Uzbekistan increased by 13%.

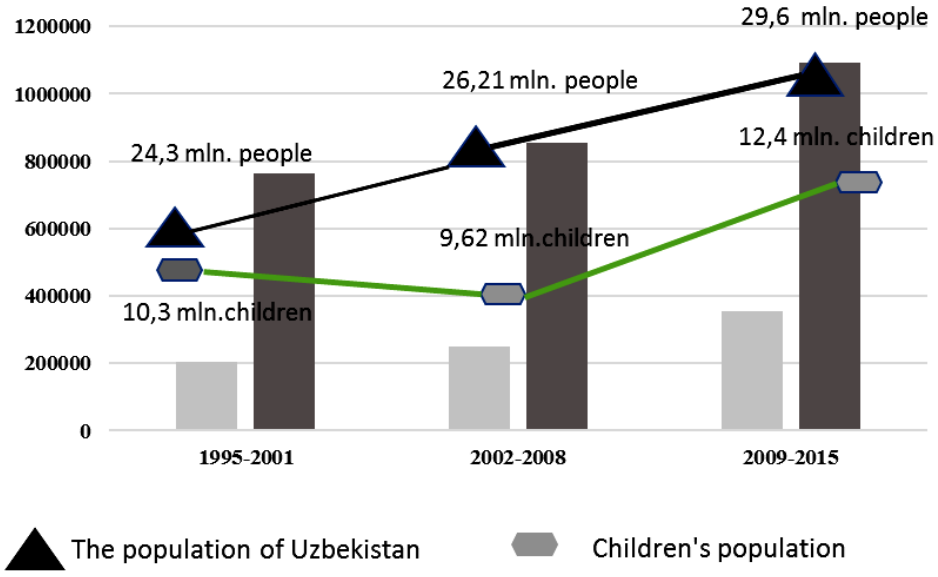


Figure 1. Indicators of general injuries and child injuries by study period

With the growth of population there was a tendency to an increase in the index of general injuries, which in the 2nd period of the study increased by 9.4% compared to the 1st period of the study. In the 3rd period of the study, this indicator increased by 22.5% compared to the 2nd period and by 30% compared to the initial period of the study. During 1995–2001, the number of children's population was more than 43% of the total population.

Subsequently, Common trauma rate there was a trend towards a decrease Pediatric trauma rate in the number of children due to a slight decrease in the birth rate and an increase in the number of adults, due to an increase in the average life expectancy. In the 3rd period of the study, the number of children increased by 28.8%. This indicator increased due to the increase in the child age from 14 to 18 years in 2014.

According to the State Statistics Committee, the population aged 16–18 years is an average of 14% of the total population (Figure 2).

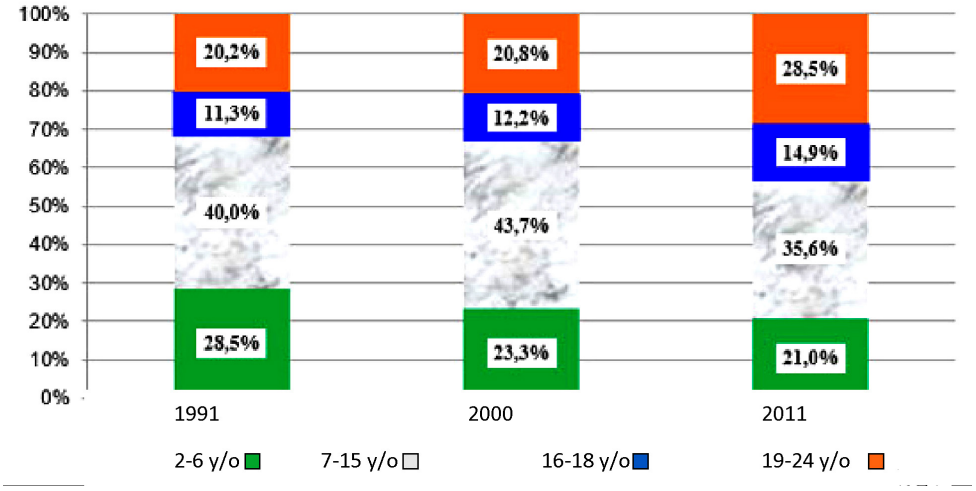


Figure 2. Age composition of the population of the Republic of Uzbekistan (source: State Committee of the Republic of Uzbekistan on Statistics)

The index of childhood injuries in the first period of the study was 26.7% of the total injuries. In the second period of the study, despite the decline in the number of children, the rate of child injuries rose to 29.3% of total injuries. In the 3rd period of the study, with an increase in the number of children, an increase in the rate of child injuries was reported up to 30.6% of the total injuries in Uzbekistan (Fig. 1).

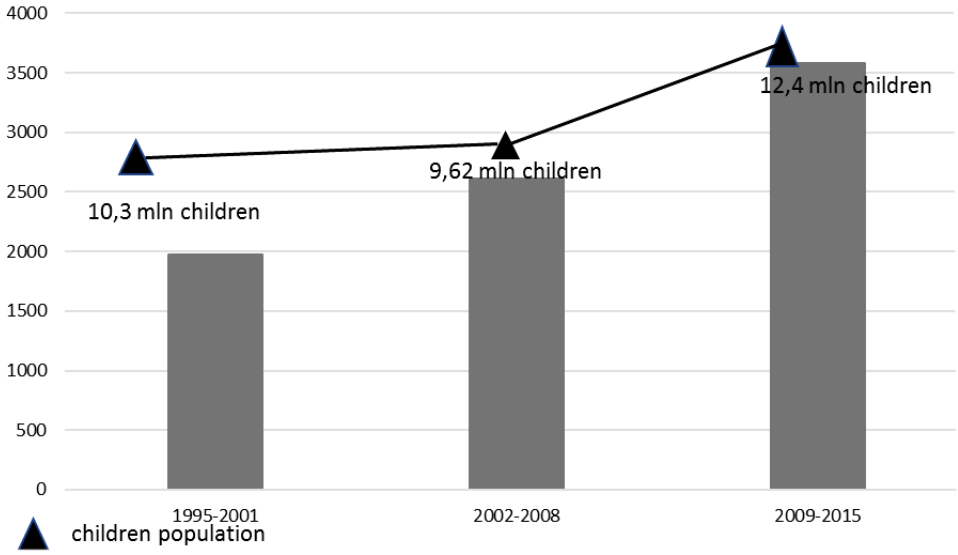


Figure 3. The index of child injuries per 100 thousand children

The child injury rate for 100 thousand children's population studied by us also increased despite a decrease in the number of children in the 2nd period by 32.3% compared to the first period of the study (Figure 3). In the 3rd period, this indicator increased by 37%, which in general spoke about the growth of child injuries against the background of growing urbanization, increased flow of vehicles, and the growth of scientific and technological progress.

The share of combined injuries also tended to increase, amounting to 5.6% of the total number of injuries in children in the 1st period of the study. At the 2nd stage of the study, the proportion of combined injuries in children was 6.1% of the total number of childhood traumas. Accordingly, at the 3rd stage of the study, this indicator increased to 9.4% (Figure 4).

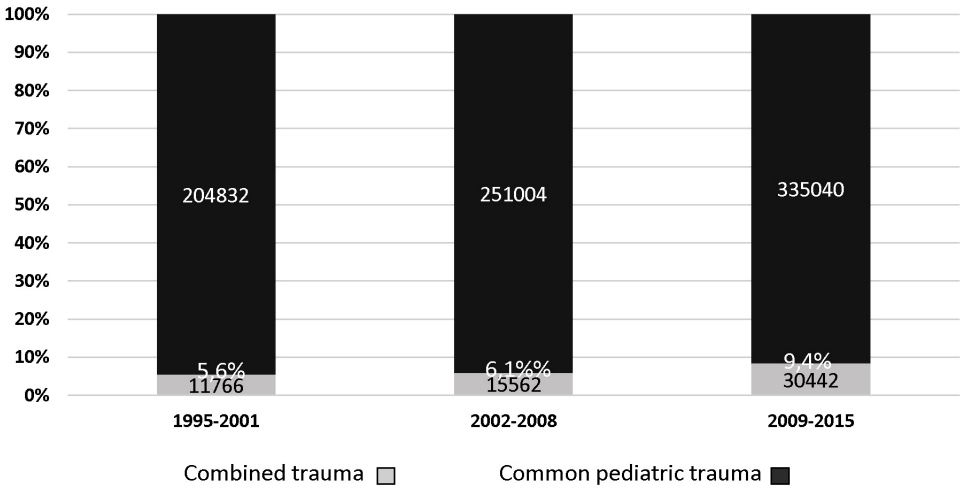


Figure 4. Specific weight of combined injuries in children from the total number of children's injuries

In quantitative terms, this indicator increased by 32.2% in the 2nd study period. In the third period of the study, in quantitative terms, this indicator increased by 48.8% compared with the second stage of the study.

The increase in the number of combined trauma in children from year to year could not but affect the index of combined trauma in children per 100,000 children's population (Fig. 5). At the 2nd stage of the study, this indicator increased by 28.4% compared to the 1st stage. At the 3rd stage, the further growth of this indicator was 53.1%.

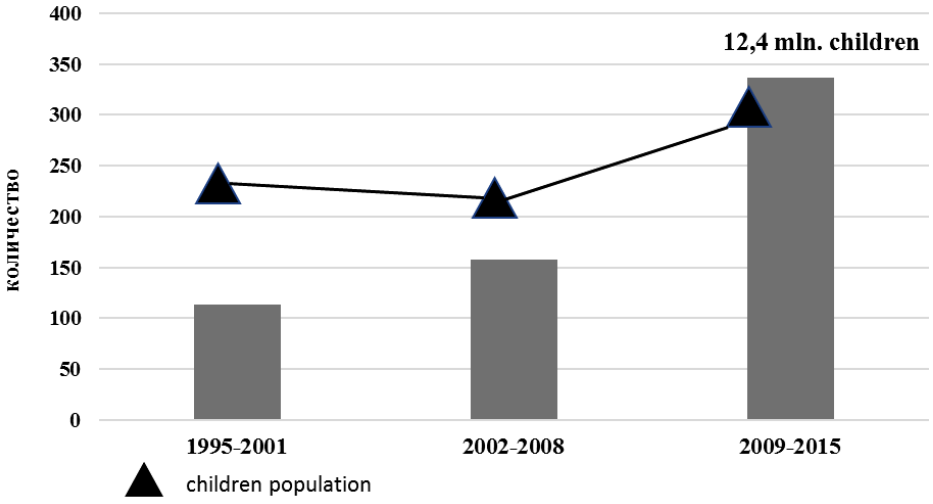


Figure 5. The index of combined injuries in children per 100 thousand children

The analysis of mortality, disability and number of surviving children in a combined trauma revealed the following trend (Fig. 6). In the period from 1995 to 2001, that is, the period before the creation of the EMS, the death rate for combined trauma in children was 37.6% of the total number of combined injuries in children. In the period from 2002 to 2008, that is, the beginning of functioning of the EMS, this figure was 29.9% of the total number of combined injuries in children, despite the fact that the rates of general injuries in children and the indicator of the number of combined traumas in children tended to increase. During the period from 2009 to 2015, the death rate decreased to 28.6%, which indicated an improvement in the results of providing emergency medical care to this contingent of patients.

The indicator of disability in combined traumas in children, according to the literature, remains high, ranging from 30 to 48%. In our study, this indicator at the initial stage of the study was 38%, later this indicator tended to decrease, amounting to 35.5% in the 2nd stage of the study, and 32.5% at the 3rd stage of the study. According to the changes in the mortality rate, the survivors' index changed, making 62.3% at stage 1, and 70.2% at stage 2. and at stage 3 71.3% of the total number of combined injuries in children.

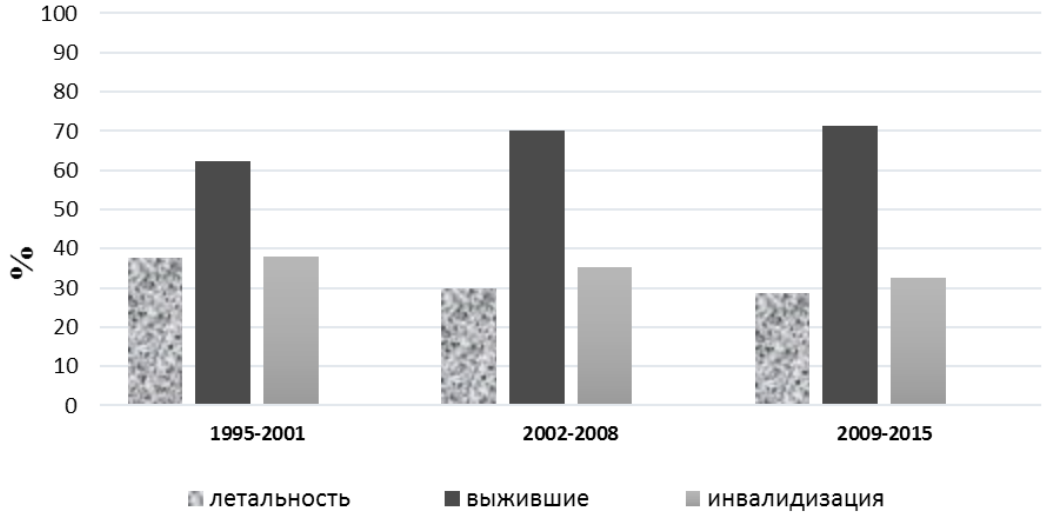


Figure 6. Specific weight of indicators of disability, mortality and survivors of the total number of combined injuries in children

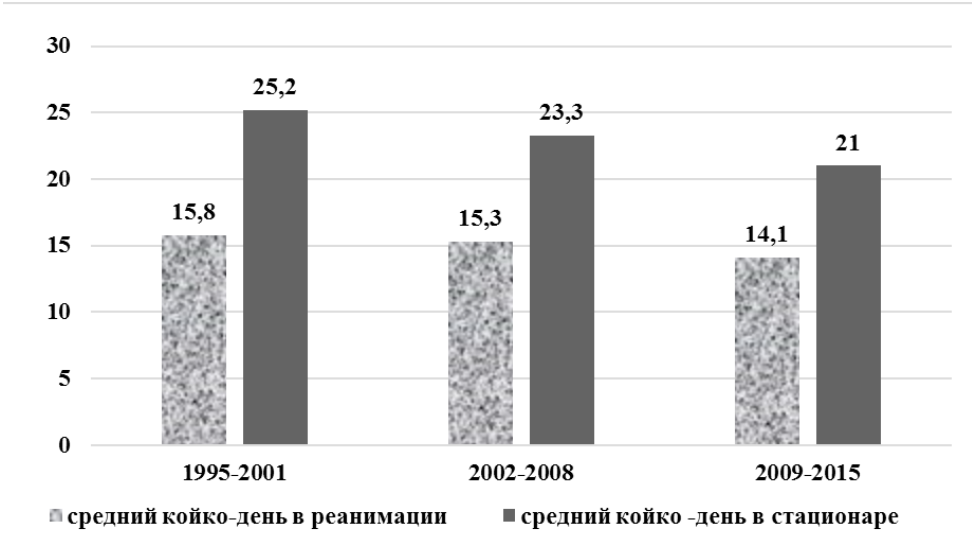


Figure 7. Length of stay of patients with combined trauma in intensive care and inpatient

The results of treatment were reflected in such indicators as the average bed-day of stay in the intensive care unit and also the average bed-day of stay in the hospital. These indicators tended to decrease. (Fig. 7). Accordingly, the time spent finding these patients was reduced, which indirectly proved that the start of functioning of the EMS (Stage 2), the introduction of standards and protocols for the provision of emergency medical care and equipping branches and sub-branches with modern high-tech diagnostic, laboratory, monitoring the state of the vital functions of the body equipment (stage 3) led to an increase in the effectiveness of emergency medical care.

The presence of ambulance equipped with monitors, portable ventilators, suctions, defibrillators, ECG devices allowed to deliver children with combined injuries to specialized emergency medical centers where specialists from all directions were deployed within the "golden hour" time. The presence of cardio monitors, modern anesthesia and respiratory apparatuses made it possible immediately to provide assistance at the stage of hospitalization with the involvement of necessary specialists and use of the necessary diagnostic equipment.

Conclusion. A timely and unique emergency medical care system based on accessibility, continuity, high-tech and gradualness began to give results of its activity that manifested itself in the above-examined indicators, thus proving the need for the creation and existence of this emergency medical care system. The established system – starting from the pre-hospital stage and ending with the hospital stage in its work is based on scientifically grounded standards of emergency medical care, especially for patients with combined trauma and polytrauma, which require immediate provision of highly qualified, specialized care. Work is continuing to improve the quality of emergency medical care that meets international standards, standards and protocols for EMS are constantly being updated, training and retraining of highly qualified personnel is conducted at leading foreign similar centers, new modern diagnostic equipment is being updated and supplied.

References:

1. Alimov A. V. Tuychiev L. N., Organizational aspects of provision of emergency periatric care for children in the Republic of Uzbekistan. Вестн экстр медицины – 2014; 2: 5.
2. Asadov D.A, Aripov T. Y., Irgashev Sh. T. Health system of the Republic of Uzbekistan: main trends and development prospects. Tashkent – 2011: 20.
3. Ikramov A.I., Khadzhibaev A. M. Organization of emergency medical care for traumatological patients in the Republic of Uzbekistan. Вестн экстр медицины – 2010; 2: 6.
4. Musaev T.S. Optimization of organizational aspects of rendering assistance to children with combined trauma. Вестн экстр медицины – 2014; 2: 6.
5. Khadjibaev A.M., Sabirov D.M., Akalaev R.N Organization of emergency medical care in critical conditions in the emergency medical care system. Вестн экстр медицины – 2013; 3: 5.
6. Farkhad A. Ilkhamov Elke Jakubovski. Health systems in transition: Uzbekistan.– 2001: 12.

Almukhamedova Barno Gulmukhamatovna,
Tashkent city branch of RSSPMCO&R,
Alieva Dilfuza Akmalevna,
RSSPMCO&R
Yusupov Behruz Dilmuratovich,
The women's Wellness center,
Orzikulov Sunnatulla Doniyorovich,
TUIT for Al-Horezmiy
Ruzibaev Ortik Bakhtiyorovich,
E-mail: alievada@yandex.ru

THE PROBLEMS OF CERVICAL CANCER SCREENING IN UZBEKISTAN

Abstract: this article attempts to research main existing problems of cervical cancer screening in Uzbekistan within the scope of the methodological framework and implementation, also provides insight information on how it can be organized screening information system, in order to succeed and insure the high quality measures.

Keywords: cervical cancer, screening, methodological approach, information system.

Алмухамедова Б. Г.,
Ташкентский городской филиал РСНПМЦОиР
к.м.н. Алиева Д. А.,
РСНПМЦОиР,
Юсупов Б. Д.,
Центр здоровья женщин,
Орзикулов С. Д.,
ТУИТ им. Аль-Хорезмий
Рузибаев О. Б.,
ТУИТ им. Аль-Хорезмий
E-mail: alievada@yandex.ru

ПРОБЛЕМЫ СКРИНИНГА РАКА ШЕЙКИ МАТКИ В УЗБЕКИСТАНЕ

Аннотация: В данной статье изучены основные проблемы, имеющиеся в настоящее время в плане проведения скрининга рака шейки матки в Узбекистане, также приведены предпринимаемые меры для правильной методологии его организации, с созданием информационной системы обеспечивающей поддержку и успешность его проведения.

Ключевые слова: рак шейки матки, скрининг, методологические подходы, информационная система.

The problem of cervical cancer (CC) does not cease to remain relevant, given the high incidence of morbidity and neglect. It should be noted, that this situation is typical for many countries, including Uzbekistan.

Studies of cervical epidemiology, risk assessment, territorial features are in demand and necessary for the formation of targeted prevention programs, early diagnosis and screening activities [1, 58–71; 4, 30–44; 5, 275–289].

Purpose: to study the possibility of conducting screening studies at the population level in the Republic of Uzbekistan.

Cervical cancer occupies the third position, after breast cancer and stomach cancer, in the structure of morbidity of malignant neoplasms (MN) among all nosonomies. Cervical cancer ranks second, after breast cancer, in the structure of MN among the female population, the incidence rate, which in Uzbekistan is 4.6 and deaths 2.5 per 100 thousand of population, remains high.

The cervical cancer has a long period of development (on average, up to 10 years): the disease can be diagnosed in the preclinical phase, with effective treatment; there are opportunities for a screening test.

Theoretically, the program of cytological screening of cervical cancer was formed in the 1940s of the last century. During this period it was already known that methods of early diagnosis and prevention can help improve the situation, i.e. lead to a decrease in morbidity and mortality.

To date, three morphological classifications of cervical smears have been widely used: the Papanicolaou test (Pap test, Pap smear, cervical smear, or smear test) [6, 153–159; 9, 202–215; 12, 115–132], WHO, Bethesda System [11, 191; 12, 115–132].

According to the classification of Papanicolaou, there are 5 classes of gynecological smears: I class – normal cells; II class – inflammatory type of smear; III class-dyskaryosis, morphological changes in epithelial cells; IV class – atypical cells, suspicious for malignancy; V class – malignant cell changes.

In the WHO classification (Cervical intraepithelial Neoplasia), the following degrees are distinguished:

- IN I – mild cervical dysplasia;
- CIN II – moderate dysplasia;
- CIN III – severe dysplasia;
- Cancer in situ.

In 1988, in Bethesda City, Bethesda Terminology System was developed (Terminology Bethesda System, TBS) [2, 66–73; 11, 191]. Its main terminological characteristics include:

- ASC (Atypical glandular cells) – atypical glandular (glandular) cells;
- ASC (Atypicals squamous cells) – atypical squamous cells of flat epithelium;
- ASC-US (Atypicals squamous cells undertermined significance) –atypical flat epithelial cells of undertermined significance;
- ASC-H (Atypicals squamous cells cannot exclude HSIL (high grade squamous intraepithelial lesion)) – atypical cells of the flat epithelium, which do not allow to exclude the defeat of the epithelium of severe degree;
- CIN I, II, III (Cervical intraepithelial neoplasia I, II, III) – cervical intraepithelial neoplasia of I, II and III degree;
- CIS (Carcinoma in situ) –cancer in situ
- HSIL (High grade squamous cells intraepithelial lesion) –high degree of squamous cells intraepithelial lesion;
- LSIL – (Low grade squamous cells intraepithelial lesion) – low degree of squamous cells intraepithelial lesion;
- NILM (Negative for intraepithelial lesionor malignancy) –negative for intraepithelial lesionor malignancy;
- NOS (Not other wise specified) – not other wise specified.

According to the literature, the sensitivity of the cytological examination ranges from 66% to 83%, but, at the same time, in 70–90% there are cases that cause false-negative responses due to poor material intake, 10–30% are erroneous interpretation.

The effectiveness and results of cytological screening are as follows:

– detection of premalignant diseases;
– identification of early stages of cancer;
– detection of cancer in situ;
– treatment in time.

With the proper methodology and implementation of cervical cancer screening, it is possible to achieve results in changing the structure of cervical cancer incidence, by identifying the number of patients in the early stages and reducing common and neglected forms; death rates and one-year mortality, and the reduction of disabled patients. To achieve this, it is necessary to ensure continuity in the work of primary health care (family

clinics, RMC, women's clinics) and specialized centers that provide assistance to cancer patients.

Currently, two systems of cytological screening of cervical cancer are accentuated: organized (systematic) screening and unorganized (sporadic) screening. When screening is organized, a definition of groups of women that are subject to screening is carried out, for which they are actively invited to participate in the survey. In case of sporadic screening, women are examined for treatment in connection with the presence of complaints for any pathology.

According to the data [1, 58–71; 3, 16–19; 6, 153–159; 8, 2649–2658] the effectiveness of organized screening is higher than that of unorganized screening.

Screening of cervical cancer involves three stages:

– Stage I (population screening) – division into subgroups is healthy / sick on the basis of visual examinations;

– Stage II (diagnostic screening) – division into subgroups according to the degree of cancer risk on the basis of pre-examination data: background diseases, precancer, cancer;

– Stage III – formation of dispensary observation groups for monitoring and correction according to the nosological principle.

Early detection of cervical cancer requires extensive coverage of the female population by cytological screening, which can lead to changes in the structure of morbidity and the stabilization of mortality by identifying early stages and reducing neglect. The informative value of the cytological method is 50–87%, in connection with which it is necessary to search for modern methods with increased sensitivity and specificity.

Given the high role of the human papillomavirus (HPV) in cervical cancer, one of the methods of early diagnosis is HPV testing, which is currently carried out in private clinics in our republic, just as the cost of this method is expensive. Despite this, the need to introduce modern approaches in the early diagnosis of cervical cancer, and screening programs is obvious.

In our republic, on April 4, 2017, a resolution and the President's state program on improving the provision of specialized care for cancer patients were adopted, within the framework of which screening programs for various diseases of the MN, including cervical cancer, are envisaged.

In this regard, population-based screening studies have been initiated at the family clinic of the Yakkasaray district of Tashkent, with the assistance of the private clinic "Women's Health Center", in which HPV testing will be carried out. To this end, the distribution of women, who will participate in a screening program with cytological testing and HPV testing, across all areas of the clinic's service area was conducted.

To optimize the implementation and conduct of screening studies, an information system (IS) is being developed, which will include questionnaires and questions to determine the risk factors for the development of cervical cancer, which will subsequently be a database of women, who underwent a screening study with further monitoring.

The existing problem of a high incidence rate, despite the availability of organ visualization, is apparently due to the destruction of the earlier existing system, which provides for the presence of observation rooms separate for the male and female population, the inability and low quality of inadequate preventive examinations, the lack of methodological bases for conducting screening studies and programs, which is currently being developed.

In this regard, the modern strategies and measures taken in this direction require integration and friendly work on the implementation of methodologically tested screening programs in conjunction with the regional centers of oncology and radiology, which will be developed on the basis of current trends in cervical cancer development, taking into account the risk factors of this disease separately for of each territory.

References:

1. Комплексная борьба с раком шейки матки: Краткое практическое руководство. ВОЗ,– 2010.– 290 с.
2. Новик В. И. Скрининг рака шейки матки // Практическая онкология.– 2010.– № 2.– С. 66–73.
3. Профилактика рака шейки матки: Руководство для врачей / Под. Ред. Г. Т. Сухих и В. Н. Прилепской.– М.: МЕД пресс информ.– 2012.– 192 с.

4. Старинский В. В., Петрова Г. В., Грецова О. П. Эпидемиология злокачественных новообразований / В кн. «Руководство по онкологии» / Под ред. В. И. Чиссова, С. Л. Дарьяловой.– М.: ООО «Медицинское информационное агентство».– 2008.– С. 30–44.
5. Урманчеева А. Ф. Рак шейки матки: скрининг, диагностика и стадирование. Образовательный курс Европейского общества по медицинской онкологии // Онкогинекология.– 2006.– P. 275–289.
6. Шабалова ИП., Касоян К. Т. Цитологическая диагностика заболеваний шейки и тела матки. ТриадаТверь.– 2010.– 382 с.
7. American College of Obstetricians and Gynecologiests. ACOG Practice Bulletin number 109, December – 2009. Cervical cytology screening // Obstet. Gynecol.– 2009.– V. 114.– P. 1409–1420.
8. Anttila A., von Karsa L., Aasmaa A., et al. Cervical cancer screening policies and coverage in Europe // Eur J Cancer – 2009.– V. 45.– P. 2649–2658.
9. Crusswell J. M., Rancoholf D. F., Rramer B. S. Principles of cancer screening: Lessons from history and study design issues // Semin.Oncol.– 2010.– V. 37.– P. 202–215.
10. Shipitsyna E., Zolotoverkhaya E., Kuevda D. et al. Prevalence of high-risk human papillomavirus types and cervical squamous intraepithelial lesion in women over 30 years of age in St. Peterburg, Russia // Cancer Epidimiol.– 2011.– V. 35.– P. 160–164.
11. The Bethesda System for reporting cervical cytology. Definition, criteria, and explanatory notes. D. Solomon, R. Nayar (eds) // Springer.– 2004.– XXIII.– 191 p.
12. World Health Organization (WHO). Comprehensive Cervical Cancer Control. A guide to essential practice. Geneva: WHO – 2006.– 364 p.

Almuradova Dilbar Muradovna,
Assistant of Department of Oncology and Radiation Diagnosis
of Tashkent Medical Academy, Uzbekistan
Atakhanova Nigora Ergashevna,
Head of Department of Oncology and Radiation Diagnosis
of Tashkent Medical Academy, Uzbekistan
E-mail: evovision@bk.ru

THE IMPORTANCE OF ANDROGEN RECEPTORS AS A FACTOR OF PROGNOSIS IN TRIPLE NEGATIVE BREAST CANCER

Abstract: Triple negative breast cancer (TNBC), in which tumor cells do not express estrogen and progesterone receptors and do not contain amplification sites for the Her-2 / neu gene, has attracted the attention of an increasing number of researchers in the field of both clinical and theoretical oncology in recent years, and this is not surprising. Triple negative breast cancer (TNBC) is approximately 15% –20% of all diagnosed breast cancers and is characterized by a lack of expression of estrogen receptor (ER), progesterone receptor (PR), and lack of expression of the human epidermal growth factor protein (HER2) squirrel. The heterogeneity of the triple negative breast cancer is the main obstacle in the treatment of this tumor subtype. Although the estrogen receptor (ER) and the human epidermal growth factor receptor (HER2) are the main therapeutic targets in breast cancer, the androgen receptor (AR) has been recent developed as a molecular target in the treatment of tumors resistant to standard therapies.

Keywords: triple negative breast cancer, histological subtypes, androgen receptors, prognosis factor.

Breast cancer (breast cancer) is one of the most common forms of cancer in women and one of the main causes of death of women around the world. That is why the search for new ways of treating breast cancer is a paramount task of modern oncology [1–3]. Despite the success of experimental and clinical oncology, breast cancer (breast cancer) remains the most common oncological disease in women. Triple-negative BCs are characterized by the negative estrogen and progesterone receptors and negative HER2, and represent 12–18% of all BCs. Breast cancer is the most common oncological disease in women in the Uzbekistan. The highest standardized incidence rates registered in Tashkent city (22.5%), Navaiy (12.4%), Bukhara (11.1%) and Tashkent regions (11.0% and lowest in Surkhandarya (6.3%) and Kashkadarya (7.5%). (13.2%) than rural (8.5%) [1, 3]. In Russia, at least 54000 new cases of breast cancer are diagnosed every year [4, 7]. The highest rates were recorded in Moscow – 52.3 and St. Petersburg – 48.1 per 100 thousand women [7–9]. In the United States, in 2013, there were 232, 332 new cases and 39,620 deaths [10, 11]. In the literature, there is an increased interest in the study of androgen receptors (AP) at various molecular subtypes of breast cancer (BC), but we have not found a consensus on the effect of androgen levels and their metabolites in biological fluids on the development of triple negative breast cancer [12, 13]. Determining the level of androgen receptors in a tumor in patients with breast cancer is a very relevant and promising direction in studying the prognosis of the disease and finding new additional approaches to endocrine therapy for breast cancer, especially with a basal-like molecular subtype. In the domestic and foreign literature, there has recently been an increased interest in the study of androgen receptors (AP) at various molecular subtypes of breast cancer. There are many publications on the role of androgen receptors in breast tumors, which points to the need for their more thorough research using molecular biological methods,

including IHC [14]. Data on the role of androgen receptors in breast cancer are highly controversial, but the prevailing view is that patients with tumors expressing AR are characterized by a better prognosis of the disease. This suggests that further study of AP in various biological subtypes of breast cancer should be considered, not only with triply negative breast cancer, but also with luminal subtypes.

The aim of the study was to study the incidence of AP in patients with triple negative breast cancer subtypes, to analyze their relationship to the outcome of the disease, and to determine the future prospects of modern and future anti-androgen strategies in the treatment of breast cancer.

Material and methods of research. The analysis of retrospective data of 96 patients with triple negative breast cancer, who were treating during the 2010–2017 years in the departments of the Tashkent City Oncological Dispenser and the Institute of Oncology and Radiology Kazakhstan, studied the levels of expression of AR in triple negative breast cancer. The average follow-up time was 87.9 ± 47.4 months (from 3.4 to 179.2 months, median – 87.9 months). The age of the patients varied from 32 to 67 years (mean age – 49.9 ± 11.5 years, median – 50 years). All patients received combined treatment, only 3% of patients were treating only surgically. All patients were dividing into stages of disease, morphology and malignancy of the tumor in comparison with the expression of androgen receptors and the features of the course of the disease. The greatest number of patients had stage II disease – 37.1%, the average age of patients was 54.8 ± 11.7 years [28]. Based on the results of the morphological investigation, invasive ductal carcinoma G2–3 was diagnosed in 36 (74.4%) cases, invasive lobular carcinoma G2–3 in 34 (10.3%), 11 (10.3%) – medullary (G3) and in 15 (5%) – undifferentiated cancer (G3). the average age of patients is 52.6 ± 11.8 years. Note: in this group of patients, the percentage of detection of the mutation BRCA1 was statistically significant ($\chi 2 = 4.87$, $p = 0.0274$) higher than in the group of women without taking into account hereditary burden with diagnosis of breast cancer. Histological three cases of thrice negative breast cancer were evaluated as invasive ductal cancer (1 – G2 and 2 – G3), 1 case – as medullary and 1 – undifferentiated cancer (G3). The stage I disease was not identified, IIa 11 (11.4%), IIb 18 (18.75%), IIIa 23 (23.95%), IIIb 24 (25.0%), IV 30 (31.25% According to the molecular genetic classification, taking into account the parameters of the receptors of estrogens (RE), progesterone receptors (RP), Her-2 / neu and Ki 67, all patients had triple negative breast cancer.

Statistical analysis of the results of the study was carried out using the analytical package Statistica 7.0. A comparison of the two independent samples by the quantitative trait was made using the Mann-Whitney test, the differences were considered significant at $p < 0.05$. To compare the frequencies of occurrence of symptoms in different groups, the χ^2 test.

Results. In all patients, the expression of androgen receptors was evaluated by an immunohistochemical method on an 8-point scale. In most cases, the level of expression of AR corresponded to 7 points – 47.2% (Table 1). In the absence of AR expression, all patients were in a subgroup with a nonspecific form of breast cancer with grade II or III malignancy.

When analyzing the distribution of patients with triple negative subtypes of breast cancer, it was found that the expression of AR significantly more often ($p = 0.034$) was observed in patients with triple negative breast cancer. In a statistical analysis of the survival rates of breast cancer patients, life expectancy was significantly higher ($p = 0.007$) in patients with high level of AR expression. In patients with high androgen receptor expression, the 5-year survival was 91%, the 10-year survival rate was 83%, respectively. While in the group of patients with breast cancer with a negative value of AR, the 5-year survival was 33.3% ($p = 0.0007$), no patient overcame the 10-year line after treatment. Thus, it can be concluded that the absence of AR expression determines a worse prognosis, even in spite of the more favorable molecular subtype of the tumor. Overall survival of breast cancer patients depending on the level of androgen receptor expression as a function of long-term outcomes. AR-status (n = 96) – Negative (n = 44) Positive (n = 52) 1-year survival rate 85.4 ± 2.6%, 3-year survival 56.7 ± 19.2%, 5-year survival 23.3 ± 19.2% median survival, month 39.9. Differences are statistically significant in comparison with the group of patients with AR-negative status ($p = 0.007$).

Discussion. In recent years, the notion of the features of the biology of breast cancer has expanded sig-

nificantly, and a number of characteristic genetic and molecular changes have been identified. Various biological indicators that can have a certain prognostic value are studied, different markers of good and poor prognosis of the disease are studied in patients suffering from BC [23, 25]. The authors concluded that the positive effect of positive AR expression could be the result of the androgen receptor inhibition of estrogen receptor signaling pathways. Similar data were obtained by us, in particular, in the overwhelming majority of cases in AR positive patients, breast cancer of stage I and tumors of grade II malignancy were determined. The prognostic value of AR has been evaluated in several studies that have yielded conflicting results [24, 26]. For example, Hu and co-authors, analyzing the expression of AP in 211 cases of TNBC, noted that overall mortality is higher in the AR negative group [27, 28]. In some AR studies, positive TNBC have been characterized by a decrease in the incidence of metastases in the lymph nodes [20,21], smaller tumor sizes, higher differentiation [26]. Perhaps these differences are associated with different approaches to assessing the positivity of AR expression [29]. In contrast, McGhan and co-authors showed that AR expression correlates with a higher clinical stage and an increase in the incidence of metastases in the axillary lymph nodes [30].

The conclusion. Patients with negative AP status had a nonspecific histological form of BC and a grade II or III tumor malignancy. In patients with triple-negative breast cancer, the level of AR expression is significantly higher ($p = 0.034$) compared to other molecular subtypes of breast cancer. The long-term survival rates are significantly higher in patients with high-grade breast cancer. AR are a promising factor in predicting the course of breast cancer in all molecular subtypes and can be a promising target for targeted therapy.

References:

1. Khudaykulov T. K., Khudaykulov A. T. Epidemiological aspects of breast cancer in Uzbekistan // Bulletin of the Tashkent Medical Academy.– 2013.– No. 3.– P. 95–97.
2. de Ruijter T. C., Veeck J., de Hoon J. P., van Engeland M., Tjan–Heijnen V. C. Characteristics of triple–negative breast cancer // J Cancer Res Clin Oncol.– 2011.–Vol. 137.–P. 183–92.
3. Bosch A., Eroles P., Zaragoza R., Vina J. R., Lluch A. Triple negative breast cancer: molecular features, pathogenesis, treatment and current lines of research // Cancer Treat Rev.– 2010.– Vol. 36.– P. 206–15.
4. Dent R., Trudeau M., Pritchard K. I., Hanna W. M., Kahn H. K., Sawka C. A. Triple–negative breast cancer: clinical features and patterns of recurrence // Clin Cancer Res.– 2007.–Vol.13.– P. 4429–34.
5. Metzger–Filho O., Tutt A., de Azambuja E., Saini K. S., VialevG., Loi S. Dissecting the heterogeneity of triple–negative breast cancer // J Clin Oncol.– 2012.– Vol. 30.– P. 1879–87.
6. Jiao Q., Wu A., Shao G., Peng H., Wang M., Ji S. The latest progress in research on triple negative breast cancer (TNBC): risk factors, possible therapeutic targets and prognostic markers // J Thorac Dis.– 2014.– Vol.6.– P. 1329–35.
7. McNamara K.M., Yoda T., Takagi K., Miki Y., Suzuk T., Sasano H. Androgen receptor in triple negative breast cancer // J Steroid Biochem Mol Biol.– 2013.– Vol.133.– P. 66–76.
8. McNamara K.M., Moore N. L., Hickey T. E., Sasano H., Tilley W. D. Complexities of androgen receptor signalling in breast cancer // Endocr Relat Cancer.– 2014.– Vol. 21.– P. 161–81.
9. Safarpour D., Pakneshan S., Tavassoli F. A. Androgen receptor (AR) expression in 400 breast carcinomas: is routine AR assessment justified? // Am J Cancer Res.– 2014.– Vol. 4.– P. 353–68.
10. Crown J., O'Shaughnessy J., Gullo G. Emerging targeted therapies in triple–negative breast cancer. Ann Oncol – 2012; 23(Suppl 6): vi56–65.
11. Gao W. Androgen receptor as a therapeutic target // Adv. Drug. Deliv. Rev.– 2010.– Vol. 62.– No. 13.– P. 1277–1284.
12. Hu Z., Fan C., Oh D. S. The molecular portraits of breast tumors are conserved across microarray platforms // BMC Genomics.– 2006.– Vol. 7.– 96 p.

13. Cancer Genome Atlas N. Comprehensive molecular portraits of human breast tumours – Nature.– 2012.– Vol. 490.– P. 61–70.
14. Lehmann B. D., Bauer J. A., Chen X., Sanders M. E., Chakravarthy A. B., Shyr Y. Identification of human triple–negative breast cancer subtypes and preclinical models for selection of targeted therapies // J Clin Invest.– 2011.– Vol. 121.– P. 2750–67.
15. Xu H., Eirew P., Mullaly S. C., Aparicio S. The omics of triple negative breast cancers // Clin Chem.– 2014.– Vol. 60.– P. 122–33.
16. Perou C. M. Molecular stratification of triple–negative breast cancers // Oncologist.– 2010.– Vol. 15 (Suppl 5).– P. 39–48.

Akhmedzhanova Nargiza,
Samarkand State Medical Institute,
Ph D., in medicine, department of pediatrics № 3 and medical genetics
E-mail: n_ismailovna@mail.ru

EFFECT OF COMPLEX TREATMENT ON INDICATORS OF ENDOGENOUS INTOXICATION IN DISMETABOLIC CHRONIC PYELONEPHRITIS IN CHILDREN

Abstract: The aim of this work was an attempt to evaluate the effect of complex treatment on some endogenous intoxication (EI) indicators in chronic pyelonephritis developed on the background of dismetabolic nephropathy (DMN) (DCP). Materials and methods – A survey of 130 children DCP, aged from 4 to 15 years has been carried out. Patients were divided into 3 groups depending on treatment method. Results – comparative assessment of the results of the study of endogenous intoxication conducted after treatment in children with DCP, depending on the method of treatment, demonstrated the effectiveness of "renal tyubazh" compared to other methods of therapy. Conclusion – the use of complex treatment of "renal tyubazh" with DCP is the most appropriate method of therapy. This method leads to the restoration of the TCA (total concentration of albumin) and ECA (effective concentration of albumin) in the blood, TCA and AMP (medium molecular peptides) in the urine.

Keywords: endogenous intoxication, medium molecular peptides, regional lymph antibiotic therapy, kanefron N.

Introduction. Chronic pyelonephritis (CP) in children is characterized by a high tendency to growth and represents a serious medical and social problem, accounting for 40% to 70% in the structure of the urinary system. Often, pyelonephritis become disease in childhood, and suffers from it all subsequent life [1, 2]. At present, it has been established that an important component of the pathogenesis of CP is the instability of cytomembranes of the renal epithelium [3, 4, 5]. The prevalence of DMN is from 1 to 32–42 per 1,000 children. The prevalence of oxalate-calcium crystalluria in Uzbekistan is 30–60 per 1,000 children. In addition, the surface of the crystals creates a layer between the microorganisms and the cells of the renal tubules, and the absence of direct contact with bacteria weakens the bactericidal properties of the urothelium. We cannot deny the direct effect of calcium oxalate crystals on the urinary tract epithelium, which induces the development of the inflammatory process, possibly through the amplification of osteopontin by renal cells, which is a known stimulator of the cascade of inflammatory reactions. Among the mechanisms that cause damage to biological structures of cells in dysmetabolic chronic kidney disease DCKD is the activation of the production of toxins of metabolic disorders [6]. EI occurs in chronic inflammatory diseases of the kidneys; their presence in the urine is a qualitative and quantitative criterion of damage to cells of the proximal tubules [7]. An increase in the level of urinary AMP in urine with DCP is associated with the fact that their low molecular weight allows free passage through glomerular capillaries, but in the proximal tubules they are reabsorbed by 99,9%. In the inflammatory-destructive processes of the tubulointerstitial system, the reabsorption of AMP is disrupted and their excretion in the urine is observed [8, 9]. Despite the use of all new antibacterial agents in pyelonephritis and the development of optimal options, the effectiveness of traditional methods of administration is reduced. It is known that lymphotropic administration gives completely new properties to low-molecular drugs (antibiotics), through which they penetrate through biological barriers and penetrate into scar-altered and inflamed kidney tissue, which allows creating a sufficient

therapeutic concentration there (Shodmonov A. K., 2012) [10, 11].

The aim of the work is to study the effect of complex treatment on EI indices in chronic pyelonephritis in children.

Materials and methods. 130 patients with chronic pyelonephritis were examined at the stage of exacerbation and at discharge from the hospital at the age of 4 to 15 years. Patients were conditionally divided into 3 groups depending on the method of treatment. Group 1 included 48 patients who received conventional therapy (in the first three days, usually cefotaxime i.m, after receiving the results of bacteriological study – antibacterial drug depending on the sensitivity of the pathogen). Group 2 consisted of 45 patients who received regional lymphotropic antibiotic therapy (RLAT) in combination with Kanefron H, and the third group consisted of 37 patients who received "renal tuba" (RLAT in combination with water load, Kanefron H and electrophoresis with 0,5% euphyllin). The material for the study of endogenous intoxication was peripheral blood taken from the ulnar vein in patients on the background of exacerbation of the chronic recurrent process and during remission. Determination of the content of medium-molecular peptides in blood serum and in urine was carried out according to the method of I. I. Zhadenova (2002), the total concentration of albumin (TCA) by a unified method for the reaction with bromocresol green (BKZ) using the "albumin-UTS" kits and the effective concentration of albumin (ECA) in the serum by the fluorescent Gryzunov method (1994) on the analyzer AKL-01. The binding capacity of albumin (BCA) was calculated by the formula: BCA = ECA / TCA (%). Mathematical processing of the obtained results was carried out using the parametric t-test of the Student and the non-parametric Mann-Whitney criterion using computer statistical programs. It is generally accepted in cholecystitis that the tubyage proposed in 1948 by G. S. Demyanov (blind probing), on the basis of this term, we propose to call this complex treatment "renal tuba" (patent RU No. 04046 (2009), patent RU No. 20150248 (2017)), since this method promotes the isolation of salts and small concrements from the renal pelvis in the urine. The technique of complex treatment of "renal tuba" was performed. Water is used by using 15 ml / kg of liquid (warm boiled water, unconcentrated tea), then the drug kanefron H is used at a dose of 1–2 tablets 3 times a day orally and lymphotropic administration of a lymphostimulant and an antibiotic, after which, 15 minutes electrophoresis with 0,5% solution of euphyllin in warm water on the lumbar region. The causal relationship between the set of essential features of the claimed method and the technical result achieved is as follows. RLAT was carried to the paranephric fiber through the intersection point XII of the rib and the outer edge of the long back muscle (m. sacrospinalis), where the skin was pre-treated with alcohol or iodine. Then, at this place, a thin needle puncture was performed and 0,25% solution of Novocain was administered as a lymphostimulator at the rate: for children with a body weight of up to 16 kg, 3–5 ml and more than 16 kg, 5–10 ml, after 5–10 min antibiotic (cefotaxime) was administered in the amount of 1/3 of the daily dose (i.e., from the calculation of 50 mg/kg of body weight). We directed the needle perpendicular to the skin surface or with a slight inclination of its acute end to the midline of the body. The depth of needle insertion did not usually exceed 2–3 cm (depending on the age and nutrition of the child). Electrophoresis with euphyllin (0.5% solution in warm water) from the negative pole is the final stage of "renal tuba". Clinical, instrumental and special biochemical studies were performed in comparison with control data obtained in 30 healthy children of comparable age (±) and gender (11 boys and 17 girls).

Results. When studying some indicators of endogenous intoxication in patients with DCP in the active period before treatment, a significant decrease in the relative amount of TCA ($P < 0.001$), ECA ($P<0.001$), BCA in serum ($P < 0,001$), AMP level in urine significantly increased ($P < 0.05$) (table 1). Along with this, we observed a significant (more than 5-fold) increase in the content of TCA in urine ($P< 0.001$ – see table 1). A comparative evaluation of endogenous intoxication after treatment in children with DXD, depending on the method of treatment, showed various changes in these indicators (see table 1). Thus, in children with DXP who received conventional therapy (group 1), before discharge from the hospital, the level of AMP in urine not only did not improve, but even a tendency to further decrease ($P1 > 0.1$) was observed. The level of TCA, ECA, BCA in the serum did not change significantly ($P1 > 0.1$). Also, we did not reveal positive dynamics of the TCA index in urine ($P1 > 0.1$, see table 1).

Table 1.– Dynamics of indices of endogenous intoxication of the kidneys in blood plasma and in the urine in patients with CCP, depending on the method of treatment (M ± m) (X ± m)

Indexes	Healthy n = 30	Before treatment n = 130	After treatment		
			1st group. n = 48	2nd group. n = 45	3rd group. n = 37
Blood					
TCA. g/l	47.5 ± 0.55	30.1 ± 0.96 $P < 0.001$	31.0 ± 1.03 $P_1 > 0.1$	35.1 ± 1.86 $P_1 < 0.001$. $P_2 < 0.001$	40.1 ± 1.27 $P_1 < 0.001$. $P_2 < 0.001$
ECA. g/l	40.4 ± 3.7	23.4 ± 0.84 $P < 0.001$	23.02 ± 0.91 $P_1 > 0.1$	28.8 ± 1.55 $P_1 < 0.001$. $P_2 < 0.001$	34.5 ± 1.3 $P_1 < 0.001$. $P_2 < 0.001$
BCA. (ECA\ TCAx100)%	93.0 ± 2.7	77.0 ± 1.3 $P < 0.001$	73.3 ± 2.4 $P_1 > 0.1$	82.0 ± 1.2 $P_1 < 0.001$. $P_2 < 0.001$	85.9 ± 1.3 $P_1 < 0.001$. $P_2 < 0.001$
Urine					
AMP. units	0.136 ± 0.021	2.2 ± 0.02 $P < 0.05$	0.754 ± 0.047 $P_1 > 0.1$	0.605 ± 0.023 $P_1 > 0.1$. $P_2 > 0.1$	0.287 ± 0.012 $P_1 < 0.05$. $P_2 < 0.05$
TCA. g/l	0.20 ± 0.01	4.34 ± 0.094 $P < 0.001$	4.77 ± 0.18 $P_1 > 0.1$	2.14 ± 0.12 $P_1 < 0.02$. $P_2 < 0.01$	0.28 ± 0.06 $P_1 < 0.001$. $P_2 < 0.05$

Note: P – reliability of the difference between indices of healthy children and in children with chronic pyelonephritis. P1 – the reliability of the difference between the indicators before and after treatment. P2 – the reliability of the difference between traditional therapy and the group of children who received RLAT in combination with electrophoresis with about 5% of euphyllin.

We found more positive changes in the indices of endogenous intoxication in patients with the use of RLAT in combination with Kanefron-H (group 2). Thus, there was a decrease in the level of AMP ($P1 > 0.1$) and TCA ($P1 < 0.02$) in the urine, a significant increase in TCA ($P1 < 0.001$), ECA ($P1 < 0.001$), BCA ($P1 < 0.001$) in serum compared with similar indicators before treatment. Positive changes were also revealed in comparison with the 1st group for TCA ($P2 < 0.001$), ECA ($P2 < 0.001$) and BCA ($P2 < 0.001$) in serum. Only the content of AMP in urine has not improved ($P1, P2 > 0.1$). In general, the use of RLAT in combination with Kanefron H in children with DXP had a positive effect on certain parameters of EI, mostly on TCA and ECA, BCA, but less on the level of AMP in the urine.

Patients of the 3rd group were assigned, in addition to RLAT + kanefron-H, a water load and electrophoresis with 0,5% euphyllin. We noted the positive dynamics of practically all studied EI indices in this group. Thus, the content of TCA, ECA, BCA ($P1, P2 < 0.001$) in blood serum, as well as AMP and TCA in urine not only significantly improved in relation to the relevant parameters before treatment and to the parameters after treatment of patients of Groups 1 and 2 ($P1, P2 < 0.05$), but also reached the level of healthy children ($P > 0.1$).

Discussion. Our investigations on the study of some EI parameters in patients with DXP in the active period before treatment indicated a decrease in the level of TCA ($P < 0.001$), ECA ($P < 0.001$), BCA ($P < 0.001$) in the blood serum. At the same time, a significant decrease in the parameters of the TCA ($P < 0.001$) and AMP ($P < 0.05$) in urine was found. The obtained data are confirmed the information from the literature on the presence of a combined metabolic disorder in DCP [3]. In our opinion, this may be related to DMN, to a certain extent, against which pyelonephritis developed in the patients examined. It potentiates and modifies a stable inflammatory process in the kidneys by irritating the mucous membrane of the urinary tract, reducing the effectiveness of the mechanisms of sanogenesis, thereby creating conditions for a long persistence of uropathogens in the kidneys, which causes a significant change in

the EI indices. In addition, before receiving, patients received long courses of antibiotic therapy i.m. and per os. Comparative evaluation of EI after treatment in children with DXD, depending on the treatment method, showed different changes in EI parameters. Thus, in children with DXP who received conventional therapy (group 1), many of the EI indicators studied did not change significantly before discharge from the hospital ($P > 0.1$). Perhaps this is due to the fact that the introduction of a large number of antibiotics further inhibited the EI indicators. Traditional therapy had no effect on the maintenance of TCA ($P > 0.1$), ECA in the serum ($P > 0.1$), and the serum levels of BCA not only did not improve ($P > 0.1$), but even a trend to an even greater decrease. A significant increase in the TCA content ($P1, P2 < 0.001$) and ECA in the blood serum ($P1, P2 < 0.001$) and a decrease in the TCA in the urine ($P1 < 0, P1, P2 < 0.001$) were observed in the presence of RLAT in combination with Kanefron-*H* (group 2) 02, $P2 < 0.01$), compared with similar indicators before treatment. At the same time, inadequate efficiency of RLAT in combination with Kanefron-*H* in relation to AMP in urine ($P1, P2 > 0.1$), which play an important role in DHP, in our opinion, requires additional use of water load and electrophoresis with 0,5% euphyllin. Therefore, in addition to RLAT in combination with Kanefron-H, a third group of patients was assigned water loading and electrophoresis with 0,5% euphyllin. We noted the positive dynamics of virtually all the studied EI indices in the complex application of the water load + RLAT + kanefron-H + electrophoresis with 0.5% euphyllin. So, the content of TCA, ECA, BCA in the blood serum, TCA in urine not only significantly improved in relation to the corresponding parameters before treatment ($P1 < 0.001$), but also reached the level of healthy children ($P > 0.1$). The best results were achieved with this method of treatment and for AMP in urine, their content decreased almost 4 times ($P1, P2 < 0.05$).

Summarizing the results of our research, it is necessary to once again focus on the following points. After the conventional treatment for the observation period, there was no significant improvement in the EI indices. Using RLAT in combination with Kanefron-H, we detected a significant improvement in some parameters of EI, a significant increase in TCA and ECA in the serum, a significant decrease in TCA in the urine. AMP in urine decreased with this method of treatment in half. Finally, using the complex water load + RLAT + kanefron-H + electrophoresis with 0.5% euphyllin, it was possible to achieve the best results: recovery of a number of studied parameters (serum BCA) and significant improvement of the rest (TCA, ECA in blood serum, AMP in the urine). All this makes it possible to presume high effectiveness of the proposed methods of therapy in children with DCH (water load + RLAT + kanefron-H + electrophoresis with 0.5% euphyllin) with respect to EI parameters.

Conclusions

1. Patients with DXP with preserved renal function, changes in EI parameters are noted, which requires finding new approaches to treatment aimed at normalizing the signs of endogenous intoxication.

2. The use of RLAT in combination with kanefron-H in the complex therapy of patients with DXP has a positive effect on the main EI indicators.

3. The use of complex treatment of "renal tuba" in DXP is the most acceptable method of therapy. This method contributes to an earlier recovery of TCA, ECA, BCA in the serum and has a positive effect on the state of AMP and TCA in the urine due to pronounced membrane-stabilizing, antibacterial and detoxification effects.

References:

1. Dasayeva L. A., Shatokhina I. S., Shabalin V. N. Modern ideas about the mechanisms of chronic pyelonephritis in people of different ages. Wedge honey – 2012; (2): 19–23.
2. Mukhina SOUTH, Osmanov I. M., Dlin V. V. Nephrology of childhood. Medicine, Moscow,– 2010; 199–240.
3. Khalmatova B. T., Kasymova M. B., Tadzhieva Z. Dismetabolic nephropathy and asymptomatic uraturia in children. Honey magazine Uzbekistana – 2012; (2): 96–99.
4. Oskolkov S. A., Zhmurov V. A., Dizer C. etc. Clinical and laboratory manifestations of chronic pyelonephritis on the background of nephrolithiasis combined with arterial hypertension. Nephrology – 2013; (2): 81–86.
5. Mikheeva N. M., Zverev Y. F., Vykhodtsev G. I. Idiopathic hypercalciuria in children. Nephrology – 2014; (1): 33–52.

6. Mikheeva N. M., Zverev Y. F., Vykhodtsev G. I., Lobanov U. F. Hypercalciuria in children with urinary tract infection. Nephrology 2014; 74–79.
7. Pleshkova E. M., Yailenko A. A., Khimova Yu. A. Features of the course of oxidative stress in exacerbation of chronic pyelonephritis in children. Ros Pediatrician magazine – 2012; (2): 30–32.
8. Khamidova G. S., Berdiev U. G., Khodzhanova T. R., etc. Endogenous intoxication in patients with chronic pyelonephritis living in the South Priaralye. Pathology – 2009; (3): 71–73.
9. Nikolskaya V. A. Influence of oxidative stress in vitro on the level of molecules of medium mass in blood serum and hemolysate of erythrocytes sus scrofa. Ecosystems, their optimization and protection – 2011. (4): 123–126.
10. Kasimov S. et al. Haemosorption In Complex Management Of Hepatargia // The International Journal of Artificial Organs.– 2013.– T. 36.– No. 8.– C. 548.
11. Sirozhidinov A. S., Ganieva M. Sh., Shevketov L. S., Umarov N. A. Efficacy of lymphotropic therapy and immunological status in acute pyelonephritis complicated by kidney failure in children. Lymphology – 2009; (1–2): 169–170.
12. Khan M. A., Novikova E. V. Restorative treatment of children with chronic pyelonephritis. Pediatrics (Journal of the name of GN Speranskii) – 2011; (3): 128–131.
13. Lazarenko N. N., Gerasimenko M. J., Hamidullin G. N. Electrostimulation with bipolar–impulse currents and galantamine–electrophoresis in the rehabilitation of patients with diabetes. Questions of balneology, physiotherapy and therapeutic physical training – 2011; (6): 16–20.
14. Tretyakov A. A., Kaysinova A. S., Mishchenko M. M. Rehabilitation of patients with chronic calculous pyelonephritis at the resort. Questions of balneology, physiotherapy and therapeutic physical training – 2012; (3): 19–22.

Bondarenko Sergey Georgievich,
Head of department of pediatric urology
Municipal hospital № 7.
Volgograd. Russian Federation,
Agzamkhodjaev Saidanvar Talatovich,
Head of department of pediatric urology
Tashkent pediatrical medical institute,
Tashkent, Uzbekistan
E-mail: evovision@bk.ru

EVALUATION OF URETERO-PELVIC JUNCTION URODYNAMICS IN CHILDREN WITH CONGENITAL HYDRONEPHROSIS

Abstract: Parameters of diuretic ultrasonography (DUS) were analyzed in 44 normal and 27 hydronephrotic renal units. Pelvis area, diameter of pyelo-ureteral segment (*D*) before and after (*Dd*) increase of diuresis, velocity of pelvis area normalization (*V*) after increase of diuresis, incrementations of pelvis area as a tone of pelvis (ΔS) and diameter of pyelo-ureteral segment (Δ*D*) after increase of diuresis was measured. To find out whether parameters of DUS reflect urodynamics at pelvis-ureter level we compared intercoupling in parameters of DUS with regularity hydrodynamic parameters of mathematic model of fluid outflow. Reliable correlation between theoretical model and empirical data was observed.

Our study suggests that diuretic ultrasonography is an appropriate method for evaluation of urodynamics of pyelo-ureteral segment.

Keywords: Uereteropelvic junction, diuretic ultrasonography, hydronephrosis, obstruction.

Introduction

Assessing of uretero-pelvic junction (UPJ) condition has important significance in establishing treatment plan of urodynamic disturbances in this zone of urinary tract [1]. If that is the case, widely performed method – diuretic ultrasonography (DUS) is considered as the least invasive diagnostic tool [2]. As a matter of practice, in urodynamic condition assessment of UPJ obstruction lesions, such parameters as characterizing dilatation of pelvis and time of pelvic area reduction after forced diuresis are used [6] Additionally, evaluation of pathologic values is based on comparing with empirical and observational data, retrieved during assessment of normal kidney without taking into consideration of natural hydrodynamic regularity and variable UPJ physiology. Latter is linked to impossibility of non-invasive hydrodynamic parameters estimation in upper urinary tract [5].

Aim of research. To study urodynamic normal and hydronephrotic values, their interpretation with urodynamic mathematic modeling.

Methods. Parameters of DUS were analyzed in 44 children: 18 boys and 26 girls aged 1 to 5 years. 17 of them had suspecting obstructive uropathy and 27 with UPJ obstruction. In one sided hydronephrosis group contralateral kidney values were examined with intravenous pyelography, all patients did not have infection of urinary tract and compensatory enlargement and hyperfunction of normal kidney.

Following DUS parameters were studied:

– Pelvic area initially on cross sectional scan, *S* (mm^2);

– Pelvic area after 5 mins of diuretic injection, S_{max} (mm^2);

– Pelvic area after 20–40 mins of diuretic injection on cross sectional scan, *St* (mm^2);

Percentage of increased area when diuresis reached its maximum, Percentage of increased area when diuresis reached its maximum, ΔS

Velocity of pelvic area normalization after increase of diuresis, V, calculated by (*Smax-St*)/*t*, (mm^2/min);

– Diameter of *UPJ* area before (*D*) and after (*Dd*) increase of diuresis;

– *UPJ* diameter increase when max diuresis is reached, *ΔD* (mm);

Following statistical analysis methods were used: rank correlation and regressive; since values variation have not normal distribution, non-parameteric Craskel-Wallis analysis and *K*-values cluster method was also used. Chosen parameters included in next table are: *M*-mean, *s*-standard deviation, *n*- size of analyzed subgroup, p reached significance value. Critical values of significance level are taken as 5%. Statistical data analysis performed using SPSS 11.5 package.

Results and discussion. During the study obtained results showed quite considerable deviations of mean values from initial pelvic area size *S*, pelvic area normalization velocity after increased diuresis and its increased area when diuresis reached its max (table 1). he rate of drainage of the pelvis *V* and the area.

Table 1. – Diuretic ultrasonography in the general group of children under test

Parameters	n	min	max	M	s
S	44	7.85	507.11	149.67	136.47
V	44	0.25	11.74	3.46	3.08
D	44	35.29	880.00	188.39	185.46
D	44	0	4.0	0.67	1.1
D_A	44	1.5	4.0	2.34	0.64
D	44	0	4.0	1.62	1.11

Additionally, there was observed positive correlation between initial pelvic area and pelvic area normalization velocity after peak diuresis *V* (Spirman correlation coefficient $r = 0.77$; $p < 0.0001$) and negative correlation stated between S and ΔS (Spirman correlation coef. $R = –0.62$, $p = 0.0003$). These data witness requirement subgroup division, depending on initial pelvic area size *S* (Table 2).

Table 2. – The rate of drainage of the pelvis V and the area increments ΔS in clusters

Parameters	Cluster		
	I Cluster n=19	II Cluster n = 15	III Cluster n = 10
S	96.7 ± 36.6	237.9 ± 66.0	579.2 ± 124.6
V	1.4 ± 0.75; $\chi^2 = 18.9$; $p < 0.0001$	3.7 ± 1.7; $\chi^2 = 8.7$; $p = 0.003$	9.2 ± 3.9
D	191.6 ± 84.5; $\chi^2 = 8.48$; $p = 0.004$	60.8 ± 18.1; $\chi^2 = 0.42$; $p = 0.52$	58.4 ± 9.1

While studying velocity parameters V, in clusters were found essential differences depending on cluster relation, but less deviation grade was observed compared to mean group values

Analysis of percentage increase of initial pelvis size ΔS, depending cluster relation, it was found that these values had practically close numbers in II and III clusters, which were significantly less than cluster I.

Further, there was not established direct relation between *ΔS* grade and *V* (regression coef. $F = 0.006$, $p = 0.94$), additionally, since those parameters depend on initial pelvic size S, established positive relation between stated before values ($r = 7$, $p = 0.005$, when $S = \text{const}$).

UPJ examination in 11 cases (25%) had successful identification before furosemide injection, it's mean diameter was 2.04 ± –0.76 mm. during max postfurosemide diuresis this segment visualized in all children and its size was 2.6 ± –0.7 mm.

UPJ diameter during diuresis stimulation significantly differed in 2 age groups. Thus, in group were children were less than age 1 pelvis diameter D was quite smaller in comparison with group were kids were older, between 1 and 5 years and as in elder group. Segment diameter practically did not differ in 1-5 year age group from group elder than 5 year old children (Table 3).

Table 3. – The rate of drainage of the pelvis V and the area increments ΔS in clusters

Parameters	Under 1 year	From 1 to 5 years	Older than 5 years
Dd	1.9 ± 0.09	2.3 ± 0.4	2.6 ± 0.8
χ^2	6.85 ($p < 0.001$)	1.76 ($p > 0.05 = 0.19$)	3.2 ($P < 0.001$)

Performed regressive analysis revealed absent relationship as between velocity pelvic drainage, V and max diameter UPJ –Dd (regressive coef = 0.07, $F = 0.08$; $p = 0.93$), as between Dd and pelvic area increase value ΔS (regressive coef = 0.16; $F = 0.49$; $p = 0.49$). Also, has been found positive connection between post-furosemide pelvic area increase ΔS and *PUJ* diameter increase ΔD (Spearman correlation coef. rs = 0.75; $p = 0.0001$), as in contrast negative connection between diameter increase ΔD and initial pelvic area size S ($rs = -0.70$; $p = 0.0001$). Significant ΔD difference was found in cluster I as well as in II and III clusters (2.6 ± 0.6 and 1.7 ± 0.09 relatively, $\chi^2 = 7.7$; $p = 0.005$).

Before going over to interpretation of obtained results it is essential to elaborate some aspects of UPJ physiology and urine passage thru the junction. During normal diuresis and pelvis filling, UPJ and proximal end of ureter is in a collapsed state. Electrical activity at UPJ is absent [4]. When intra pelvic pressure and wall tangential tension is increased, pacemaker is activated that leads to pelvic contraction and UPJ opening. After urine volume passed to proximal segment of ureter pressure in pelvis is decreased, pacemaker activity disappears and UPJ collapses. Thus, there is 2 main hydrodynamic factors determine urine passage efficiency- intra-pelvic pressure and UPJ diameter. Theoretically, interaction of those two factors may be expressed using math model of fluid outflow thru hole underlying a level, which may be used in pelvic-ureteral system:

$$D = \sqrt{4Q / \mu\pi\sqrt{2(Pp \pm Pu)/\rho}}$$

So, this equation concludes that larger Radius is, hence size and volume of pelvis, the lower hyperbolic pressure is. Except various factors (wall elasticity) pelvis tone or tangential tension grade defines basic pressure- the higher this is, the higher wall tension grade is, therefore, lower ability to expand and to increase volume is.

Thus, post-furosemide area increase ΔS, seems to be indicator, expressing pelvis tone condition (tangential tension grade), indirectly-basic pressure level.

As we can see on equation, pelvic drainage efficiency with increased urine passage either determined with UPJ diameter D while pressure is constant Pp, or with increased intra-pelvis pressure Pp, whereas there is negative correlation between diameter and pressure of PUJ.

This regularity corresponds with obtained results – Pelvis drainage velocity V during forced diuresis have most essential value where pelvic area increase grade ΔS is low, i.e high pelvic wall tone (basic pressure) and positive correlation with UPJ opening grade ΔD. as performed diuretic US analysis suggests, first type urine passage in forced condition is more distinctive for kidneys with bigger pelvis area, where higher drainage velocity is conducted not only because of adequate UPJ diameter, but also in result of more higher pelvic wall tone. Accordingly, taking into count urine dynamic peculiarities stated above, there is obvious need to distinguish normative groups depending on initial pelvic size.

When assessing Diuretic US values in 27 children with hydronephrosis (14 cases with UPJ obstruction due to intrinsic factors and 13 crossed vessels) there found significant deviation in comparison with DUS values from 3rd cluster (kidneys with bigger pelvic area). Thus, in 23 (85%) cases UPJ was not visualized, and in 4 patients (15%) its diameter after forced diuresis Dd and its increase ΔD were 1.4 ± 0.3 mm and 0.7 ± –0.2 mm, respectively, which was considerably less than normative means. ($\chi^2 = 31.7$; $p < 0.0001$ and $\chi^2 = 28.1$; $p < 0.0001$, respectively). In 18 cases (66.7%) pelvic area after forced diuresis increased progressively and drainage velocity values were negative, mean –2.2 ± –0.6 mm^2/min. in 9 patients expressed slow pelvis drainage velocity occurred ($v = 0.98$ mm/min, $\chi^2 = 38.9$, p,0.0001). analysis also showed that pelvis area increase ΔS values in 15 cases (55.6%) were considerably lower normal means (26.8 ± 14.6%, $\chi^2 = 17.0$; p = 0.0001), i.e there was hypertonic state; in 7 (25.9%) – hypotonic state: ΔS values significantly higher (162.5 ± 51.4%, $\chi^2 = 9.8$; $p = 0.002$), lastly in 5 (18.5%) ΔS was not practically different than normal and was equal to 71.8 ± 14.6%.

As performed research suggests, obtained DUS values appears to be in complex co-dependency. Established correspondence showed with mathematic model

shows that DUS values characterizes urine dynamics in pelvis-ureter level.

Standard DUS assumes assessing two main parameters: time of pelvis area normalization and its dilatation grade [3] where slow or absent normalization pelvis area and its excessive dilatation after forced diuresis, interpreted as urine passage lesion. Parameters of DUS introduced gives us measurable urodynamic estimation and UPJ condition, values relationship with initial pelvis area and age obtained during study suggest to divide normative groups for more precise comparison and DUS analysis in lesions is required. Moreover, mathematic model and data in patients with hydronephrosis points to incompetence of interpreting that area increase after forced diuresis as obstruction sign. As research concludes, latter value only expresses pelvis tone grade, i.e its ability to dilate when diuresis is increased. Performed study in children with hydronephrosis suggest that:

– UPJ obstruction and urine passage impairment may have various grade;

– Functional state of UPJ is complicated: as it may appear to be in hyper-, hypo- and normotonic state. These data also confirmed by results of direct assess of pelvic and UPJ functional state in hydronephrosis.

Conclusion. To summarize, DUS is non-invasive functional method, which lets assess urine dynamics in UPJ and more precisely give quality and quantity characteristics in hydronephrosis.

References:

1. Abadir N., Schmidt M., Laube G. F., Weitz M. Imaging in children with unilateral ureteropelvic junction obstruction: time to reduce investigations? // Eur J Pediatr. – 2017. – Vol. 176(9). – P. 1173–1179.
2. Akgun V., Battal B., Kocaoglu M., Ozcan E., Akay S., Ilgan S. Sonographic measurement of diuretic–induced renal length changes: are they correlated with renal function? // J Ultrasound Med. – 2012. – Vol. 31(9). – P. 1351–1364.
3. Chow J. S., Koning J. L., Back S. J., Nguyen H. T., Phelps A., Darge K. Classification of pediatric urinary tract dilation: the new language // Pediatr Radiol. – 2017. – Vol.47(9). – P. 1109–1115.
4. Constantinou C. E., Djurhuus J. C. // Am J Physiol. – 1981. – Vol. 241. – P. 398–402.
5. Kincaid W., Hollman A. S., Azmy A. F. Doppler ultrasound in pelviureteric junction obstruction in infants // J Pediatr Surg. – 1994. – Vol. 29(6). – P. 765–8.

Botirov Murodjon Turgunboyevich,
Fergana branch Tashkent, Medical Academy
E-mail: arsif@mail.ru

MORPHOLOGICAL INDICATORS OF THE FACIES OF BIOLOGICAL FLUIDS IN PATIENTS WITH LIVER DISEASES

Abstract: The article discusses the results of morphometric studies of the solid phase serum of patients with liver disease. It is shown that the marker enzymes, minerals and proteins bioliquid facies (serum) obtained by dehydration wedge observed facies different zones.

Keywords: blood serum, facies, a biological fluid, a wedge-shaped dehydration, liver cirrhosis.

Relevance of the work. A few decades ago, many predicted the imminent accession of science in the age of biology. Twenty-first century has been called the century of the life sciences – including health, his longevity, place in nature. And indeed the revision of priorities in science occurred.

In Uzbekistan, along with the developed countries of the world, this process came to the government level, and was reflected in the reorientation of the socio-economic approaches, causing health and environmental problems attached particular importance – as a priority. It is significant that in the first place among scientific programs cost the budget in developed countries is biology, which hold a large amount of applied medical problems.

Biological fluids (blood, urine, saliva, etc.) Play an important role in the organism. The organisms are entire systems and mechanisms that support in the normal conditions of their composition, structure, quantity, parameters and other properties. It is found that the deviation of these parameters outside the adaptation rules always leads to pathological processes in the body at the cellular, organ or system level [4].

Changing the parameters of body fluids can occur either as a result of external causes or effects, either as a result of failures in the components of the organism. In any case, the parameters and properties of body fluids are indicative of the state of health as its individual elements as well as whole body [5].

The purpose of the study was to examine the features of the system of organization and identification of serum markers of healthy and sick people with liver disease.

Materials and methods. To achieve the objectives for the period from 2012 to 2014, the method of wedge dehydration, solid phase serum were obtained of 283 patients (137 males, females, 146) at different ages, with viral liver disease (total 225 patients, of whom 111 in acute, chronic period 104), with liver cirrhosis (68 patients in all stages of a, B, C by Child Pugh) and 51 healthy people. All patients were treated at the Ferghana regional infectious diseases hospital and Fergana regional diversified medical centers.

Clinical diagnoses were established physicians of medical institutions where patients are treated on the basis of patients' complaints, medical history, typical clinical picture, the results of clinical, biochemical, immunological tests and imaging studies. The diagnosis was in accordance with the existing classifications for International Classification of Diseases – ICD-10.

Structural analysis of the blood serum of patients was conducted by the method of wedge dehydration a control group of healthy people (according to the medical certificate of military enlistment offices and medical form 086 / y) was taken for comparison facies crystals of biological fluids (BF) aged 17–30 years. Determine the types of facies classification V. N. Shabalin and S. N. Shatokhina [3].

Crystallographic picture of dried droplets (facies) was investigated using a stereo microscope Leica Magnum – T 2721 c photosystem MPS60. Facies image processing performed on the computer program "ExterNET AMI systems" [1].

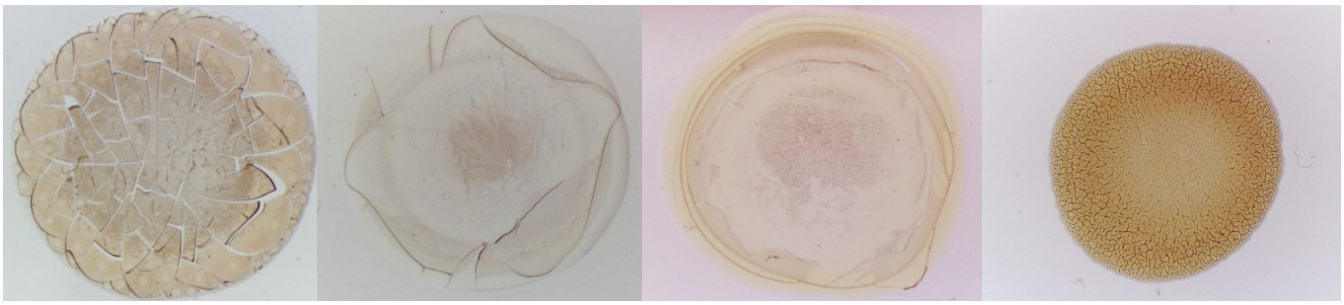
Results and discussion. Analysis blood serum crystallographic features let highlight 4 types of its structural organization in the pathology of the liver: partly radial, irradialny, circulatory and "three-fold".

The first type – partly radial had mild to moderate deviations from the radial-ordered arrangement of sectors, individual and nodules (Figure 1a.).

The second type – irradialny characterized by significant impairment on the systemic level. Figure facies characterized by asymmetry, the number of basic elements have been reduced, and their configuration is varied (Fig. 1 b).

A feature of the third type – circulatory was the presence of large cracks, are arranged parallel to the edge facies between the peripheral and intermediate zones, the formation of which is determined by the circular distribution of the observed basic structures (Fig c.).

The structural pattern of the fourth type, is fundamentally different from the above types of facies serum did not contain the basic elements of her drawing was created by a network of small convoluted (three-prong) cracks that gave us a reason to call this type of "three-beam" (Fig. 1g).



a) b) c) g)

Figure 1. The types of structural organization of serum liver diseases

The distribution of facies types of blood serum in patients examined is shown in (Table 1).

Table 1.– Facies types of blood serum liver diseases

Facies type	acute viral hepatitis (n = 111)		chronic hepatitis (n = 104)		cirrhosis of the liver (n = 68)		Control (n = 51)	
	абс	%	абс	%	абс	%	Абс	%
Partially groove	–	–	–	–	–	–	51	100
Irradialny	45	40.5	54	51.9	45	66.2	–	–
Circulatory	30	27	32	30.8	16	23.5	–	–
Three-prong	36	32.4	18	17.3	7	10.3	–	–

Thus, the serum of patients in the study using the method of wedge dehydration, with significant differences from the norm, is characterized by the presence of at least one of the major structural elements (large cracks, sectors, individual or nodules).

In addition to the identified changes in the main items of the facies in the structural organization of the serum examined patients determined a wide variety of abnormal structures.

Analysis of the results revealed the most typical and most common abnormal structure with cirrhosis who were treated leaf structure and various types of cracks, concentration, etc. are free. The hallmark of facies blood serum in liver disease was pathologically modified polymorphism cracks. There were cracks circulatory, knotted blocks, the structure of the "harness" in the central area and the periphery.

In the spectrum of the most frequently detected violations of local structural organization of the blood serum with liver cirrhosis leading position occupied by leaf-shaped structure, is a sign of sclerosis process, triradial cracks – markers of stagnation.

Our results showed that leaf-shaped structure was significantly more common with cirrhosis than in patients with chronic hepatitis and moss figure rounded circular crack on and recorded at approximately the same frequency.

It is known that the pattern being the level of blood serum reflects the degree of tension of adaptive systems of the body: the pronounced adaptive response, the higher the activity of structure. In addition to the basic elements of the identified changes facies in crystallographic picture of blood serum of patients examined was determined by a wide variety of abnormal patterns (Table 2).

Table 2. – The frequency of abnormal structures in the morphological picture of blood serum in liver disease

Pathological structure	Groups of patients							
	Acute Viral Hepatitis (n = 111)		chronic hepatitis (n = 104)		cirrhosis of the liver (n = 68)		Norm (n = 51)	
	abs.	%	abs.	%	abs.	%	abs.	%
Dendrites	58	52.2	101	97.1	15	22.1	–	–
spherulites	20	18.0	18	17.3	2	2.9	–	–
Whiskers	–	–	–	–	5	7.4	–	–
defective spherulite	–	–	2	1.9	18	26.5	–	–
Dual facies	20	18.0	35	33.6	4	5.9	–	–
Rounded inclusion	28	25.2	48	46.2	25	36.8	–	–
Circular waves	–	–	10	9.6	17	25	–	–
Asymmetric separately located	58	52.3	104	100	6	8.8	–	–
Arcade-radial cracks	–	–	–	–	10	14.7	51	100
concentration wave	–	–	–	–	8	11.8	–	–
Local concentration waves	–	–	–	–	2	2.9	–	–
The funnel-shaped cracks	–	–	–	–	–	–	40	78.4
Wrinkles	–	–	–	–	17	25	–	–
blur effect	10	9.0	–	–	4	5.9	–	–
Blyashkoobraznye structure	–	–	–	–	10	14.7	–	–
The structure of the “harness”	–	–	48	46.1	14	20.6	–	–
Circular cracks	–	–	55	52.9	30	44.1	45	88.2
nodules	31	27.9	68	65.4	–	–	–	–
The structure of the “harness” on the periphery	58	52.3	104	100	22	32.3	–	–
The structure of “tow” in the central zone of the type	58	52.3	104	100	35	51.5	–	–
Moss	75	67.6	104	100	68	100	–	–
leaflike structure	–	–	–	–	26	38.2	–	–
crack three-beam	10	9.0	15	14.4	49	72.1	–	–
Availability zones	90	81.1	100	96.1	60	88.2	51	100

As (Table 2) shows that the dendrites enable rounded asymmetrical spaced apart, such as “plait” structure at the periphery and in the central zone occurs in a large amount (more than 50% cases) during the acute and chronic hepatitis. Circular cracks structure “harness” the type of circular waves, defective spherulites occur in chronic hepatitis and liver cirrhosis. Figures in the form of a “Mocha” and the presence of the zones found in all patients in the facies of blood serum. Zoning is available in all facies of patients examined. Measurement of the diameters of zones, shows that the relationship between them is almost the same in all cases.

We were the first in liver disease have been found, “moss” figure is a sign of increasing concentration of bilirubin in the blood. The figure of “moss” facies in serum in chronic liver disease and cirrhosis of the liver occurs 100%. The emergence of these types of crystals in the blood serum of patients mainly due to the increase in bilirubin, ALT, AST, and total protein. This is confirmed by

the testimony of the biochemical laboratory of the Fergana regional infectious diseases hospital.

As a result of our research found that increasing excess of bilirubin (normal bilirubin 8,53–20,5 mmol / l), moss area of the figure is increased by 3,4 ± 0,3 mm 2. Thus, we can say that the blood bilirubin appears in the central area of its dried solid phase in the form of figures "Moss" type area that clearly correlates with the quantity [2].

It has been shown that more frequent during cirrhosis of the liver than in acute viral hepatitis and chronic hepatitis leaf, tri-radial cracks, and rounded on and circulatory crack recorded at approximately the same frequency. The incidence of the structure of the "harness" in the central zone of facies that are considered dehydration marker in chronic hepatitis was higher than in acute viral hepatitis and liver cirrhosis.

Conclusions:

1. The blood serum of patients in the study using the method of wedge dehydration, with significant differences from the norm, is characterized by the presence of at least one of the major structural elements (large cracks, sectors, individual or nodules). In addition to the identified changes in the main items of the facies in the structural organization of the serum examined patients determined a wide variety of abnormal structures.

2. revealed the most typical and most common abnormal structure with cirrhosis who were treated leaf structure and various types of cracks, concentration, etc. are free. The hallmark of facies serum in liver disease was pathologically modified polymorphism cracks. There were cracks circulatory, knotted blocks, the structure of the "harness" in the central area and the periphery.

3. It was found that the leaf structure was significantly more common with cirrhosis than in chronic hepatitis and moss figure rounded circular crack on and recorded at approximately the same frequency.

4. We were the first in liver disease have been found, "moss" figure is a sign of increasing concentration of bilirubin in the blood.

References:

1. Abdumanonov A. A., Botirov M. T., Karabaev M. K. Development of computer programs and algorithms for automatic morphometry bioliquid facies // New look. International Scientific Gazette.– 2014.– No. 6.
2. Botirov M. T., Abdumanonov A. A., Karabaev M. K. Diagnostic informativeness crystallographic imaging of biological fluids and their computer recognition // Prospects of development of information technologies.– 2013.– No. 12.
3. Shabalin V. N., Shatokhina S. N. Morphology of biological fluids in laboratory diagnostics // Clinical Laboratory Diagnostics.– 2002.– No. 3.– P. 25–32.
4. Shabalin V. N., Shatokhina S. Morphology human biological fluids.– M.: Chrysostom,– 2001.– 304 p.
5. Shatokhina S. N. Diagnostic value of the crystal structures of biological fluids in the clinic of internal diseases: Dis.dokt. honey. nauk.– M.,– 1995.– 225 p.

Daljanov Berdimurat Matjanovich,
Ph.D., head of the Bureau of Forensic Medical
Examination of the Ministry of Health
of the Republic of Karakalpakstan
E-mail: mbshakur@mail.ru

FORENSIC ASSESSMENT OF CHRONIC SUBDURAL HEMATOMA

Abstract: These characteristic features of chronic SH normally determine the basic problem of forensic assessment of these hemorrhages, i.e. the necessity of objective differentiation of traumatic or non-traumatic genesis.

Keywords: subdural hematoma, chronization, forensic medical examination.

Subdural hematoma (SH) is considered to be chronic if it is detected or deleted after its encapsulation. The terms of SH encapsulation depend on many factors and are characterized by expressed variability. That is why in literature it is proposed to consider chronic hematoma of various terms those from 1 week to 3 months [1, 2, 4]. Though majority of authors think that usually the capsule can be detected in 2 weeks after hemorrhage to subdural space and exactly that term is most often used for differentiation of sub-acute and chronic SH [2]. Correspondingly, sub-acute hematoma are those diagnosed within 3–14 weeks after its formation, while acute hematoma are the ones revealed within initial three days of existence (599). Detection of hematoma is considered to be its clinical manifestation with the development of cerebral compression symptoms. Pathogenesis of chronic SH is still under discussion. Particularly, the causes of delayed clinical manifestation and persistence of chronic SH are not clear yet. The basic outcomes of SH evolution with any genesis, including traumatic ones, are development of compression and dislocation of brain, organization with partial or complete resorption and encapsulation [4]. Though the causes and mechanisms of the formation of sub-acute and chronic SH are still non-clarified.

The objective of the research was definition of the causes, terms, and mechanisms of formation of sub-acute and chronic SH and provision of expert assessment.

We measured the volume of brain and dura mater, and its mass in corpses of 61 men and 32 women, who died in the age from 19 to 72 years old. The research did not include corpses with traumatic alterations of scull and intra cranial structures. For the exclusion of possible impact of any medical interventions in our research we did not enroll those whose death occurred in hospitals.

Definition of the volumes of dura mater and brain was performed by means of immersion of these anatomical structures into water with further measurement of the volume of superseded water. Relative error of the brain volume measurement did not exceed 0.5%, and dura mater volume 3%. Relative error of brain mass measurement did not exceed 1%.

Correlation analysis revealed presence of moderate negative age dynamics of mass-volume parameters of brain and absence of a significant impact of the age on dura mater volume.

The most important risk factor of SH development is cerebral atrophy with any genesis leading to tension of cerebral veins passing through the enlarged subdural space and increase of damaging of these veins even with minimal traumatic impacts. Big volume blood hemorrhage occurring due to the increase of intra cranial reserve capacity does not lead to brain compression in case of usual progressing of SH, while without explicit clinical manifestations it undergoes organization with formation of a thick capsule (more than 0.7 mm), consisting of fibrous tissue with plenty of sinusoid capillaries and intensive inflammatory infiltration. Later, recurrent hemorrhages into the capsule, appearing due to the peculiarities of local circulation, cause enlargement and manifestation of chronic SH. As the most often reason of cerebral atrophy is brain age involution, old age is typical for formation of chronic SH, though that fact does not exclude the possibility of chronic SH development in younger age.

The risk of recurrent intra capsular hemorrhages and formation of chronic SH is the highest one during initial three months of hematoma existence, when granulation tissue functioning at the border of dura mater is not mature, contains a lot of sinusoid capillaries and inflammatory cellular infiltration. Three months later fibrous layers, which substitute SH, undergo gradual transformation to a shaped dense fibrous connective tissue with few vessels, well developed fibrous component and minimal inflammatory infiltration significantly diminishing the number and volume of recurrent micro hemorrhages, and the risk of chronic SH occurrence, respectively. All the aforesaid let us differentiate the intervals of stable and unstable organization divided by a point of remoteness equal to three months within the resorption stage f any SH.

From the pathophysiological point of view the appearance of recurrent hemorrhages into the capsule of chronic SH is explained by the development of hem stasis pathology both at the level of hematoma content and organism as a whole.

The content of chronic SH, particularly, is characterized by various degrees of decrease in the concentration of plasma coagulation factors and simultaneous increase of anticoagulant and fibrinogen degradation products amount. In the endothelium of macro capillaries of chronic SH capsule we revealed a strong immune expression of thrombomodulin anticoagulants. In blood plasma and SH content there are registered platelet dysfunctions. Besides that, we determined that cranial trauma with ADB is accompanied by development of acute coagulopathy.

The performed studies revealed that high permeability of sinusoid capillaries for blood corpuscles of plasma proteins is explained by the peculiarities of these vessels' structure. Being a compulsory and typical structural component of chronic SH capsules, sinusoid capillaries differ by a large diameter (more than 40mkm). The wall of sinusoid capillaries consists of a usual layer of flat endothelial cells and incomplete layer of few spider cells and smooth muscle cells. Endothelial layer of macro capillaries is not continuous and it differs by the presence of 2 mkm gaps between endothelial cells. Basal membrane of sinusoid capillaries is also fenestrated. The complex of the listed defects in endothelial lining, capillary basal membrane, and spider cells layer provide possible exit not only to blood plasma, but also its corpuscles to extra vascular space. These mechanisms support persistence of chronic SH and promote its spontaneous enlargement and relapses after surgical evacuation of the hematoma.

Conclusions

Thus, chronic SH have the following differentiating characteristic features:

1. The main source of hematoma is damaging of subdural elements of superficial cerebral veins.
2. Prevalent development after minimal intensity mechanical cranial trauma and no trauma.
3. Development with background age cerebral atrophy or cranial cerebral dystrophy with other genesis.
4. Delayed development of the symptoms of cerebral compression.
5. Ability for persistence and spontaneous enlargement of its volume.

References:

1. Potapov A. A., Lichterman, Zelman V. A., Korniyenko V. N., Kravchuk A. B. Evidence–based neurotraumatology. Burdenko SRI of neurosurgery. RAMS,– 2003. (in Russian).
2. Adam D. Tudot C. Subacute subdural haematoma. Pom J Neutol Psychiatry.– 1993.– Jan Mar, 3(1).– P. 63–9.
3. Wang H. K. Chen H. J. Hu K.ef al. A pediatric chronic subdural hematoma after dodgeball head injuti. Pediatr Emerd Care,– 2010.– Sep. 26(9).– P. 667–8.
4. Okumura Y., Shimomura T., Park T. S. A study of acuta subdural hematoma developing into hematoma with capsule formation. No Shinke: Cee Ka,– 1998.– Aug. 26(8).– P. 691–8. Japanese.
5. Etingin L. E. Normal physiology of geriatric age human,– M.,– 2003. (in Russian).
6. Speranski V. S. Basic medical craniology.– M., Medicine,– 1988. (in Russian).

Zakirova Salomat Kasimbaevna,
Doctoral student,
National University of Uzbekistan
named after M. Ulugbek, Tashkent
Abdullaev Sagdulla,
Professor, of the department
National University of Uzbekistan
named after M. Ulugbek, Tashkent
E-mail: physiologist0107@gmail.com

THE SALINITY STATE OF SOILS IN THE LOWER REACHES OF KASHKADARYA AND THE BASIS FOR ITS REGULATION

Abstract: In the article, with the help of experimental studies, the present state of salinity in irrigated soils of the lower reaches of the Kashkadarya River has been revealed, and their movements and regulatory factors have been scientifically substantiated.

Keywords: salinity, soils, effective land use, Kashkadarya region, soil fertility, irrigation, underground water.

Introduction

The solution of the problem of effective land use is determined by the development of agricultural production, the climatic conditions of soils, and the ameliorative state of the terrain and the indicator of the use of land and water resources. The emergence of erosion and salinization of irrigated lands disrupts the fertility of the soil, sharply reduces the crop yield from crops, and damages irrigated agriculture. Today, one of these territories exists in the irrigated lands of the Kashkadarya region and 70% of the region's land fund is salinized to varying degrees [3].

Continuous use of irrigated soils of the Kashkadarya oasis in production, violation of the irrigation order and as a result of slow implementation of agro technical measures, increase of underground water of the soil layer, the emergence of various degrees of salinity was revealed [1].

The study of soils in field and laboratory conditions and their analysis showed that the weak activity of aquatic farms and the surrender of unfinished work on the compilation of land to households and, in turn, the assumption of a number of inaccuracies in the use of virgin lands by farms, i.e. Due to the long-term immersion of land, the spreading of soil developed. In addition, the agro physical, agrochemical and ameliorative state of soils began to deteriorate due to monoculture in the same field for many years without reckoning with reclamation measures. As a result, the newly acquired irrigated lands did not yield the expected result, soil salinity began, and secondary salinization and irrigation erosion arose. Despite this, in the present day the development of reclamation works in the oasis does not give a sufficient effect, because the agro technical measures carried out have negative sides along with positive sides, i.e. The process of secondary salinization of irrigated land with the threat of accumulation of salts neither decrease. The accumulation of a large number of toxic salts in different soil layers leads to a decrease in soil fertility [1].

It is necessary to emphasize the importance of the fact that the main reason for the slow increase in the fertility of agricultural crops is the incomplete improvement of irrigation and collector systems-drainage ditches and specialists often do not take into account the properties of soil layers when using water during prolonged irrigation and the diversity of ameliorative stratification of different regions and landscapes and widespread use in the practice of a monotonous agricultural system, a soil order, and as a result, a decrease in the amount of humus and nutrient substances increase erosion, salinity, gypsum, occurrence saline soils as well as processes of strong seal [2].

The main and most important reason in this direction is the increased salinity of the soil, because in the

fields where experiments are carried out, cotton yields have decreased by 8–10 c per hectare.

Materials and methods

Geomorphological, hydrogeological conditions of the terrain, relief and lithological structure were taken into account from the scientific point of view, morphology of soil of lands where agricultural crops are grown, samples from genetic layers were determined, the content of water-soluble salts in laboratory conditions were determined. The percentage of salts in the soil was determined on the basis of the manual "Guidelines for the conduct of chemical and agro physical analyzes of soils in the monitoring of land", published in 2004 with the approval of the State Committee of Land Resources of the Republic of Uzbekistan. Preparation of aqueous extract and easily soluble salts of chlorine ions by the Mohr method, content of the SO_4 method of extracting sulfuric acid, Ca^{++} and Mg^{++} by Trilon-B, part of Na^+ and K^+ is determined by a flame photometer, and the other part by calculating the difference between anions and cations by evaporation dry residues. In addition, based on the foregoing guidance, saline stocks in different soil layers, salinity levels and types of salinity were identified [2].

For this reason, a successful solution to this problem can be achieved only through a thorough and comprehensive analysis of the soil layers of the region, research of the ameliorative model (regional, territorial, specific area), increase and regulation of the plant system of soil and increase their yield. To this end, it is necessary to improve, use and develop methods that improve soil fertility, assess the ecological and ameliorative state and increase the productive capacity of irrigated lands, exfoliate soil properties, relief, weather and land reclamation system depending on the type of crops and the wide use of agrochemical, other methods.

To do this, based on analytical analysis of data obtained from production experiments based on existing methods in natural conditions for reclamation of saline lands, practical use of the conclusions and recommendations based on the comparison of the data obtained as a result of our scientific research is important.

This article presents data on the assessment of the current reclamation state of the lands of the supporting farms of the Karshi steppe and our main goal is to demonstrate the opportunities for widespread use of the soils of the Kashkadarya region, the preservation, restoration and enhancement of their fertility, thereby ensuring a high yield from the lands of the region.

A diverse analysis of scientific research conducted in the lower reaches of Kashkadarya has shown that the process of accumulation of salts in the soil is mainly due to evaporation and in the midst of transpiration, i.e. late spring, summer and autumn months. In winter and early spring, under the influence of precipitation, such water-soluble salts as Na_2SO_4, $MgSO_4$ along with downstream currents seep to groundwater and increase their level of mineralization.

Sulfates such as Na_2SO_4, gypsum ($CaSO_4$) and calcium carbonate ($CaCO_3$) move during heavy precipitation with seasonal salinity reduction (in winter and spring), and a negligible amount returns to groundwater. In the last month of spring the next seasonal water rotation process is repeated, in the sedimentary season the process of reducing salinity again changes and the ground waters are again enriched with water-soluble salts. For several centuries the repetition of a salt pattern of this type leads to delamination of the salts and leaving this compound, the ground waters of $Fe(Al)_2O_3$ and SiO_3, Ca-$Mg(CO_3)_2$, $CaCO_3$ and $CaSO_4$ are not returned back to the soil layers. Na_2SO_4 forms dense and soft salt-bearing layers between soil layers and groundwater, and some NaCl, $MgCl_2$, $MgSO_4$ and Na_2SO_4 accumulate in the soil and groundwater solution and continue its circulation in different soil layers.

In addition, the process of salt circulation is the process of accumulating slightly soluble salts (SiO_2, $Ca(HCO_3)_2$, $Mg(CO_3)_2$, $CaCO_3$ and $CaSO_4$) in solid soil layers. Accumulation of salts in solid soil layers, highly soluble salts have a sharp seasonal character and appear in the upper soil layers ($NaNO_3$, $MgCl_2$, $CaCl_2$, NaCl, Na_2SO_4).

The weaker the solubility of salts, the earlier they reach the saturation point of the solution, and the wider their circulation in the soil layers and their geographic range of accumulation.

The direction of the change in the content of salts in the soils of the studied regions is determined by transpiration and evaporation in plant tissues. At the same time, the depth of groundwater and high pollination, characterizing their mechanical composition and low sandy state, strongly influence the intensity of salinity.

Observations have shown that the diversity of natural and irrigation-economic conditions is manifested on a large scale and diverse in irrigated agriculture, in the pro-

cesses of quantitative and qualitative composition of salinization and accumulation of salts in land use, because the direction and intensity of the salinization process are very high. The appearance of this process, in our opinion, depends on the thickness of the collectors and the drainage ditches and the weak differentiation of their distance according to the lithology and geomorphology of the terrain.

As field observations and many analytical data have shown, in different soil sections and in some places of the surface layer of the investigated areas are not saline, even washed-out soils are partially salinized and the appearance of fields with salty spots.

The reason is that it is possible to single out the entire degree of salinity in terms of the degree and type of salinity in irrigated takyr, takyr-meadow and meadow soils and at the same time in the structure of the layers containing salts.

In terms of the depth of the salt layer (salt maximum), its depth, according to the degree of salinity, shows various, mainly lithological, geomorphological, hydrogeological, climatic, soil-ameliorative and irrigation-economic conditions, among the studied soils, besides saline soils salts at a depth of 0–30 cm), heavily saline soils (30–50 cm), deeply saline (50–100 cm), saline-marsh (50–100 cm), deep salt-marsh (100–150 cm) and not saline soils salts at a depth of 0–200 cm) (1-table).

As shown in the table, the content of water-soluble salts in the investigated territory varies on a large scale, i.e. there are not saline soils (washed by irrigation of the soil) to strongly saline soils. According to the content of salts in the layers of the investigated soils, where the root system of plants is widespread, the salinity is mainly weakly and in an average degree and in some cases on the highly saline upper arable layer, the salt content is from 0.110–0.130 to 0.560–0.730%, the chlorine content is 0.014–0.09% and sulfates 0.037–0.325%, and in the lower layers it increases to 0.880–1.235% (8, 53, 14 cuts). Throughout the section to groundwater (43-section) the salt content is high; i.e. soil is saline throughout the profile.

Results and discussion

According to the nature of salinity, the soils are divided into chloride-sulfate, rarely chloride. Basically, the chloride-sulfate type of salinity is rare and typical for medium saline soils and their highly saline types remain the same. By variety and quality composition among the various salts, sulfates, Na_2SO_4, $MgSO_4$ and the next place is occupied by $CaSO_4$.

Table 1.– The content of water-soluble salts of irrigated soils of the lower reaches of Kashkadarya,%

Section No., farm, district	Depth of the layer, cm .	Dry residue	Cl^-	SO_4^{-2}	Salinity	
					Type	Degree
1	*2*	*3*	*4*	*5*	*6*	*7*
17. KP "Pakhtakor" Kasbi	0–15	0.130	0.021	0.037	x-c	low
	15–34	0.095	0.017	0.020	C-x	low
	34–54	0.150	0.014	0.064	x-c	low
	54–82	0.425	0.021	0.232	C	low
	82–160	0.450	0.024	0.220	C	low
14 KP "Pakhtakor" Kasbi	0–21	0.180	0.031	0.068	x-c	low
	21–62	0.150	0.028	0.045	x-c	low
	62–90	0.185	0.034	0.066	x-c	low
	90–125	0.975	0.101	0.529	x-c	strong
	125–155	1.235	0.094	0.740	C	strong
	155–180	0.925	0.059	0.549	C	strong
39. KP "Galaba" Kasbi	0–31	0.510	0.038	0.269	C	middle
	31–48	0.145	0.021	0.053	x-c	low
	48–72	0.110	0.021	0.033	x-c	low
	72–99	0.095	0.014	0.029	x-c	low
	99–136	0.120	0.021	0.041	x-c	low

1	*2*	*3*	*4*	*5*	*6*	*7*
39. KP "Galaba" Kasbi	136–185	0.110	0.017	0.037	x-c	low
	185–220	0.115	0.021	0.033	x-c	low
53. MG "Gulistan" Mubarak	0–33	0.200	0.028	0.070	x-c	low
	33–53	0.235	0.024	0.103	x-c	low
	53–85	0.970	0.038	0.570	C	middle
	85–120	1.040	0.052	0.625	C	middle
	120–160	1.095	0.060	0.648	C	middle
63 MX "Hitoy" Mubarak	038	0.235	0.028	0.076	x-c	low
	38–58	0.265	0.021	0.117	x-c	low
	58–90	0.515	0.035	0.251	C	middle
	90–106	0.420	0.031	0.208	x-c	low
	106–150	0.410	0.035	0.201	x-c	middle
66. MX "Khitoy" Mubarak	0–30	0.215	0.024	0.080	x-c	low
	30–40	0.200	0.028	0.060	x-c	low
	48–79	0.225	0.031	0.068	x-c	low
	79–121	0.220	0.024	0.072	x-c	low
	121–163	0.185	0.028	0.055	x-c	low

In addition, in order to reliably classify saline soils in our studies, we tried to evaluate the studied soils by salinity. As shown by the data of the two tables in the soil layers of farms, the total content of water-soluble salts is significantly different from each other. For example, in "Pakhtakor" and "Khitoy" farms in the arable horizon, the soil varies from 4.6–5.2 to 9–10 tons/ha, then in the "Galaba" and "Gulistan" farms this indicator reaches 23–30 tons/ha.

Analysis of the obtained data on the salt reserve showed that in the soil layers the total reserve of water-soluble salts in the two-meter layer varies from 35–73 ("Galaba" farm) to 226–232 tons/ha ("Gulistan" farm), respectively, in one meter layer of soil of Gulistan of Mubarak region, this indicator ranges from 17–46 to 81–112 t/ha, and the lowest content of salts is distributed on the fields of the "Galaba" farm of the Kasbi district. The remaining farms occupy intermediate positions (2-table).

Table 2.– Stock of water-soluble salts of irrigated soils of the lower reaches of Kashkadarya, t/ha

Farm, district	**Section №**	**Layer, cm**			
		0–30	**0–100**	**100–200**	**0–200**
"Pakhtakor" Kasbi	17	5.46	37.46	63.00	100.46
	15	6.72	19.30	27.76	47.06
	14	7.56	34.80	144.28	179.08
"Galaba" Kasbi	32	6.51	46.97	26.92	73.89
	27	4.62	17.63	17.43	35.06
	39	21.42	33.0	16.02	49.02
"Gulistan" Mubarak	53	8.40	81.11	151.76	232.87
	43	30.66	112.33	113.89	226.22
	55	23.52	37.36	41.09	78.45
"Hitoy" Mubarak	63	9.87	48.87	57.49	106.36
	60	6.09	20.06	13.21	33.27
	66	9.03	30.30	26.93	57.23

On the surface and two-meter layers of soil horizons, the average reserve of water-soluble salts was taken from 15 soil sections from 1.4 g/cm3 of volume, too large salinity patches were observed not only in the general fields

of the studied areas, but also in individual farm boundaries such changes (3-table).

Table 3. – Stock of water-soluble salts in the average mass of irrigated soils of the lower reaches of Kashkadarya, t/ha

Farm, district	Section №	Layer, cm			
		0–30	0–100	100–200	0–200
"Pakhtakor" Kasbi	17, 15, 14	6.58	30.52	78.35	108.87
"Galaba" Kasbi	32, 27, 39	10.85	32.53	20.12	52.65
"Gulistan" Mubarak	53, 43, 55	20.86	76.33	102.25	178.58
"Khitoy" Mubarak	63, 60, 66	8.33	33.08	32.54	65.62

As can be seen from the table, water-soluble salts are distributed in the fields of the Kasbi and Mubarak regions in a bulk mass of the soil layer with a calculation of 1.4 g/cm^3. On the basis of the data obtained, one can come to the conclusion that the irrigation started in different periods and different irrigation and economic conditions exerted a peculiar influence on the ameliorative-ecological state of soils distributed in the lower reaches of the Kashkadarya. At present, this confirms the intensification of salinity at the stage of a peculiar development of the studied soils. However, this process is supported by the formation of a type of erosion in the regulation of annual washing and redistribution of water in a certain part of irrigated areas.

The increase in the content of accumulated water-soluble salts in the two-meter layers of the studied soil layers to 200 tons/hectare is currently considered not very high, but if timely not to take ameliorative measures to prevent factors that promote secondary salinization and cause accumulation of salts they can gradually increase. Because soil horizons and groundwater movement show an increase in the total salt content compared to the previous 40–50 years.

On this basis, the reclamation of the irrigated lands in the Kashkadarya region together with the areas studied is not stable, because the groundwater of the land retains an average (3–10 g/l) and strong (10 g/l) mineralization.

For centuries, the presence of a process of underground water flow and its expending to transpiration leads to a weak formation of a drainage system and the accumulation of a large number of salts, for example, for the upper 10 meter layer per hectare, this figure exceeds one thousand tons, at the same time a large part of water-soluble salts (at depths of 0–3 m) accumulate on the evaporating surface [1].

Conclusion

The obtained data allow us to estimate the soil-ameliorative state of the irrigated areas of the Kashkadarya Oasis in this way: there are soils with medium and strong salinity in each farm (area), irrespective of such conditions; it is possible to conduct irrigated agriculture efficiently and with great success. To achieve such success, first of all, it is necessary to take measures to reduce the salinity of groundwater and at the same time, it is necessary to intensively carry out reclamation work, and also to bring the soil to the necessary condition.

References:

1. Rasulov A. M. Saline soils of the Karshi steppe and ways of their development and enhancement of fertility. Author's Diss. Doctor of Science.– Tashkent,– 1969.– 50 p.
2. Rasulov A. M. Soils of the Karshi steppe: ways to develop and improve fertility // Tashkent: FAN,– 1976.– 248 p.
3. Abdullaev S. (ed.). Guidelines for conducting chemical and agrophysical analyzes of soils in land monitoring // Tashkent: State Committee for Land Resources of the Republic of Uzbekistan,– 2004.– P. 39–40; – P. 64–65.

Zakirkhodjayev Rustam Asrolovich,
Ph.D., predoctoral student of Tashkent Doctors
Postgraduate Studies Institute
E-mail: mbshakur@mail.ru

EYE HEM DYNAMIC STATUS IN CHILDREN WITH CONGENITAL ABNORMALITIES OF THE DISC OF OPTIC NERVE

Abstract: The revealed alterations of hem dynamic parameters in children with CADON indicate a certain role of vascular disorders played in the pathogenesis of atrophic and dystrophic processes in optic nerve.

Keywords: congenital abnormalities, optic nerve disc, eye hem dynamics, children.

The frequency of the revealed congenital pathology of the eye varies from 2% to 4%. Genetic alterations are the reason of blindness of children in 50% of the cases [1, 4]. Diagnostics of the development of eye abnormalities stimulated the interest to the identification of the etiology and pathogenesis. In spite of it, unfortunately it should be noted that etiology of the pathology stays unknown in 50% of malformations [1, 3].

Detection and adequate verification of congenital abnormalities of optic disc nerve (CADON) in children is important for duly ophthalmological rehabilitation [2, 5]. There is poor description of problems relevant to hem dynamic alterations in children with CADON in ophthalmological literature.

The objective of our research was the analysis of eye hem dynamic parameters in cases of optic nerve disc abnormalities in children.

Materials and research methods. We observed 40 children with optic nerve hypoplasia (ONH), the average age of whom was 8.2 ± 0.6 years old. Among them there were 18 girls (45%) and 22 boys (55%).

Within the collection of history data we revealed that the main reasons of ONH development among the examined children were pre and perinatal damages of fetal central nerve system (periventricular meumilation). Neonatal risk factors of ophthalmopathy development in the most cases were characterized by CNS damages and neonatal infectious diseases. It is necessary to note high frequency of alterations in eyes of children with perinatal damages of CNS (75.1%), the character of which varied dependently on the kind and severity of neurological pathology, characterized by hypoxic-ischemic damage of brain, cerebral excitability syndrome or CNS suppression, structural alterations in brain, and intra cranial hemorrhages. According to the received results of our research it was determined that the markers of retinal hemorrhages were various manifestations of hemorrhagic syndrome (cephalohematoma, dermal hemorrhagic syndrome), associate to these in 44.9% cases.

Research methods included not only common ophthalmological, but also ultra sound dopplerography (USD) of the eye vessels.

We performed correlation analysis of the functional results and the parameters of ultra sound dopplerography of the eye vessels of all patients with ONH (basic group) and 20 healthy children of the same age (control group).

Results and discussion. ONH was observed either in one (75%), or in both (25%) eyes. Typical ophthalmological manifestations of ONH are: diminishing of the size of OND (in 100% cases), its decoloration (in 47.5%), "double ring" symptom (in 42.5%), corkscrew curvature of retinal vessels (in 32.5%), absence of macula and fovea reflexes (in 95%).

Children with ONH had a high rate of ametropia (92%), oculomotor disorders (80%), associate alterations of anterior and posterior parts (64%), causing difficult diagnostics and deteriorating optic deprivation, conditioning frequent development of amblyopia.

All children with CODON had decrease of vertical and/or horizontal diameter of ON disc, decrease of reflexes ($p < 0.01$) of SNBS and its becoming thin in all or (in case of segmental forms of ONH) in certain quadrants, decrease of the total average thickness of SNBS

(average up to 52.1 ± 23.8 mkm) compared to normal parameter in that age ($p < 0.01$).

Patients with CODON had decrease of the average velocity of blood flow compared to the normal value in all examined vessels (CA, CAT, PSCA). That difference was particularly notable in PSCA (7.44±0.38 versus normal 9.08 ± 0.23, $p < 0.05$). At the same time we determined statistically reliable decrease of the resistance index in posterior short cilliary arteries (PSCA), indicating deficit of blood supply in retina and optic nerve.

According to our research linear blood flow velocity (LBFV) in case of CODON was statistically significantly decreased compared to the normal value ($p < 0.05$). Besides that, the approach of diastolic blood flow in CAT to isoline was characteristic and testified the increase of peripheral resistance to blood flow. Sometimes we observed bipolar blood flow characterized by spontaneous alteration of the waves with negative and positive polarity. In our opinion, that kind of registration indicates the absence of constant pressure gradient between the systems of internal and external carotid arteries. In these cases pressure gradient fluctuation caused changes of blood flow direction, either to the side of brain or from it.

Dopplerogram analysis in the control group showed antegrade blood flow with a peak of LBFV equal to14.4 0.87 cm/si diastolic speed taking 10–20% of the impulse one and absence of side asymmetry (below 30%).

Ultra sound dopplerography revealed direct correlation dependence between the stage of optic nerve hypoplasia and decrease of blood flow velocity, especially expressed in PSCA and CAT. Correlation feedback of resistance index RI increase) to the OND hypoplasia stage in the same vessels testifies a significant obstruction in blood flow in the proper vascular membrane of the eye in that category of patients.

Deterioration of hem dynamic parameters registered by us, explains vascular aspects of the pathogenesis of atrophic and dystrophic processes not only in optic nerve, but also other structures of fundus oculi (retina and vascular membrane).

The data of ultra sound dopplerography characterize significant alterations in hem dynamics and neural conductibility in the pool of ocular artery in children with CODON.

Conclusions:

1. The study of hem dynamics revealed a direct correlation between the stage of optic nerve hypoplasia and decrease of blood flow velocity, and correlation feedback of resistance index (RI increase) in children with CODON.

2. The revealed alterations of hem dynamic parameters in children with CODON indicate a certain role of vascular disorders played in the pathogenesis of atrophic and dystrophic processes in optic nerve.

References:

1. Aslanova V. S. Congenital abnormalities of optic nerve and exfoliation of retina // Fedorov's readings.– M.,– 2012.– P. 89. (in Russian).
2. Rikun V. S., Kuritsin O. A., Solyannikova O. V., Kinzerski A. U., Konovalova Y. B. Hem dynamics in eye and orbital vessels in the patients with various kinds of clinical refraction based on the convergent dopplerography data. "Visualization in clinic" – No.18, June – 2001. (in Russian).
3. Farkhutdinova A. A. Hem dynamics in the eye and orbital vessels in children with refraction ambliopy // Topical problems of ophthalmology: Russian scien. conf. of young scient.: col. of scien. works. K. P. Takhchidi red.,– M.,– 2006.– P. 495–497.
4. Alamouti B., Funk J. Retinal thickness decreases with age: an OCT study // Brit. J. Ophthalmol.– 2007.– Vol. 87.– No. 7.– P. 899–901.
5. Guthoff R. F., Berger R. W., Winkler P., Helmke K., Chumbley L. C. Doppler ultrasonography of the ophthalmic and central retinal vessels. Arch. Ophthalmol.– 2013.– Vol. 109.– 532 p.

Bahritdinova Fazilat Arifovna,
Kangilbaeva Guzal Erkinovna,
Mirrakhimova Saida Shukhratovna,
Zhurabekova Aziza Zakirovna,
E-mail: doctorguzal70@gmail.com

DEVELOPMENT OF DOPPLEROGRAPHIC CRITERIA FOR THE PROGRESSION AND PROGNOSIS OF DIABETIC RETINOPATHY

Abstract: The authors studied the correlation between the volumetric rate of blood flow and the severity of retinopathy, and developed a risk index for the progression of diabetic retinopathy. A pathogenetically grounded method of treatment with nonproliferative diabetic retinopathy is proposed, the effectiveness of which is confirmed by the risk index of progression.

Keywords: retinopathy, maximal systolic blood flow velocity, index of severity of retinopathy.

In connection with the wide and ubiquitous spread of diabetes mellitus (DM) according to WHO preliminary data, more than 360 million people will be affected by diabetes by 2030. Along with other vascular complications of diabetes, diabetic retinopathy (DR) is a serious problem, leading to blindness and disability. In connection with this, further study of the pathogenetic mechanisms underlying the development of DR and the search for the best, pathogenetically conditioned treatment of nonproliferative diabetic retinopathy (PDR) are topical.

With prolonged glycemia, the capillary walls change (thickening of the basement membrane, the disappearance of pericytes, changes in endothelial cells) and the rheological properties of the circulating blood, which contributes to the formation of microthrombi and the occlusion of capillaries. Local hypoxia of tissues arises, which in turn leads to an increase in the synthesis of nitric oxide (NO), a powerful vasodilator. It is known that NO is synthesized from L–arginine with the participation of NO–synthases, increased production of NO in retinal ischemia leads to depletion of the source of NO–L–arginine synthesis [14, 15] and, accordingly, to a decrease in NO synthesis. There is a weakening of NO–dependent processes, such as vasodilation, platelet aggregation increases. This leads to the further development of microthrombosis of the vascular system and local ischemia of the retina, which in turn stimulates the synthesis of vasoproliferative factors and, as a consequence, neovascularization and proliferation [12, 13]. According to the literature data [7, 10], in the early stages of the development of diabetic retinopathy, increased NO production leads to an increase in the volume blood flow in the retinal and orbital arteries, which is a compensatory mechanism for ensuring normal blood supply and maintaining a high level of metabolism in tissues lacking oxygen or nutrients. According to the data of other authors [2, 9, 11], from the very beginning of development of DR, there is a progressive decrease in the volume blood flow in the vessels of the retina and orbital artery. The inconsistency of the literature data on the blood flow in the eye vessels at different stages of the DR and the significance of hemodynamic changes in the pathogenesis of DR cause the need for further study and development of ultrasonic diagnostic and prognosis criteria for DR. Correlative connections of changes in the hemodynamics of the eye with the severity of retinopathy remain unexplained. The solution of the problem of effective therapy of PDR is impossible without taking into account the pathogenetic mechanisms of the disease and should pursue the goal of a balanced and targeted influence on the general links of the process. In this regard, the study of the interaction of key pathophysiological factors that affect the nature of angiogenic changes in the retina is of great scientific and practical interest.

Objective: to study the Dopplerographic criteria for the progression of PDR and evaluate the effectiveness of treatment with the inclusion of endonasal electrophoresis with tanakan based on the index of progression of PDR.

Materials and methods. Clinical studies were conducted during the treatment of 108 patients (197 eyes).

Of these, 76 eyes with PDR Ia stage, 75 eyes with PDR Ib and 46 eyes with PDR Ic stages. The age of patients was in the range of 18–81 years, men – 43, women – 65. Depending on the ongoing conservative treatment, all patients were divided into 3 groups:

1 (control) group – 36 patients (65 eyes). Standard treatment was received (systemic: hypoglycemic preparations, angioprotectors, metabolic treatment, nootropil IV and local with the use of emoxipin b / w).

2 (I primary) group – 36 patients (63 eyes). Against the background of standard treatment, 1 group received instead of nootropil – tanakan in tablets.

3 (II primary) group – 36 patients (69 eyes). Against the background of treatment of patients in the second group, instead of emoxipin, tanakan was obtained in the form of endonasal electrophoresis. Groups are homogeneous by sex, age and stages of PDR.

The stages were determined by ETDRS classification, widely used in scientific studies and publications, based on the modified scheme of Airlie House [4]. A group of 10 healthy people aged 50 to 60 years old was also under observation. Before the treatment and after the course of therapy, the patients underwent a general ophthalmological examination and color duplex mapping of the vessels of the eye.

Results and discussion. When assessing the blood flow in the vessels of the eyeball and the retrobulbar space before treatment, increased blood flow was observed in the CS in the initial stage of the PDR stage and a progressive significant (p <0.001) decrease in blood flow in the CS and OCCA in the second Ib and third stage of the IH stage of the PDR compared with normal values, as well as an unreliable increase in the resistance index (RI) of the CS and OCCA (Table 1).

Table 1. – Hemodynamic data for the stages before treatment (M ± m)

	CS V_s	**OCCA RI**	**OCCA V_s**	**OCCA RI**	**GA V_s**	**GA RI**
Practically healthy	13.7 ± 0.3	0.68 ± 0.009	14.8 ± 0.3	0.667 ± 0.01	41.7 ± 0.7	0,764 ± 0,01
PDR Ia	14.7 ± 1.12	0.72 ± 0.002	11.4 ± 1.25*	0.65 ± 0.008	30.2 ± 3.3	0,72 ± 0,02
PDR Ib	7.3 ± 0.27**	0.73 ± 0.007	10.6 ± 0.4**	0.71 ± 0.005*	44.4 ± 2.2	0,73 ± 0,02
PDR Ic	5.03 ± 0.33**	0.65 ± 0.01	9.8 ± 0.6**	0.70 ± 0.01	34.7 ± 2.26	0,77 ± 0,02

*Note. Vs is the maximum systolic blood flow velocity; * $p < 0.05$; ** $p < 0.01$ – reliability of differences with respect to indicators before treatment*

The dynamics of ophthalmoscopic changes in the retina in the pre– and postoperative period was assessed using a scoring scale developed by us on the basis of the classification of the American Academy of Ophthalmology (2003), which is based on the final severity scale of ETDRS [4, 6] and corresponds to the problems of early detection of DR in patients SD. The index of severity of retinopathy was assessed by a 20–point system (Table 2).

Table 2. – Correlation of the volumetric flow velocity with the gravity index of the DR

Stages of DR	**The index of severity of retinopathy**	**The correlation coefficient of the maximum blood flow velocity with the severity of retinopathy (r)**		
		CS V_s	**OCCA V_s**	**GA V_s**
PDR Ia	5.5 ± 0.2	–0.53	–0.55	0.25
PDR Ib	8.6 ± 0.25	–0.68	–0.75	–0.33
PDR Ic	15.2 ± 0.4	–0.75	–0.81	–0.13

A mean inverse in Ia and a strong inverse in the Ib – Ic stages of the correlation between the space velocity of blood flow in the CS, OCCA and the severity of retinopathy were detected. In connection with which these hemodynamic indicators can be the criteria for diagnosing the stages of PDR (Table 1).

A month after the therapy, the ophthalmoscopic picture improved in all groups, the severity index of DR significantly decreased in the second and third groups. Long–term follow–up showed that progression of diabetic retinopathy was observed at 51 eyes (78%) at 6 months in the control group, and in 12 eyes (18.5%), NDR progressed

to the proliferative stage, whereas in the main groups the result of treatment remained stable (table 3, Diagram 1).

Table 3.– Dynamics of the gravity index of the DR (M ± m)

	before treatment	after treatment	after a month	after 3 months	after 6 months
Control group (n = 65)	7.9 ± 0.4	6.7 ± 0.5	6.7 ± 0.5	7.8 ± 0.5	9.8 ± 0.5*
I primary group (n = 63)	7.7 ± 0.3	5.04 ± 0.5**	4.5 ± 0.5**	5.4 ± 0.5**	5.7 ± 0.5*
II primary group(n = 69)	8.2 ± 0.5	3.7 ± 0.4**	3.04 ± 0.4**	3.05 ± 0.4**	3.2 ± 0.4**

*Note. n is the number of eyes; * p < 0.05 ** p < 0.01 – reliability of differences relative to indicators before treatment*

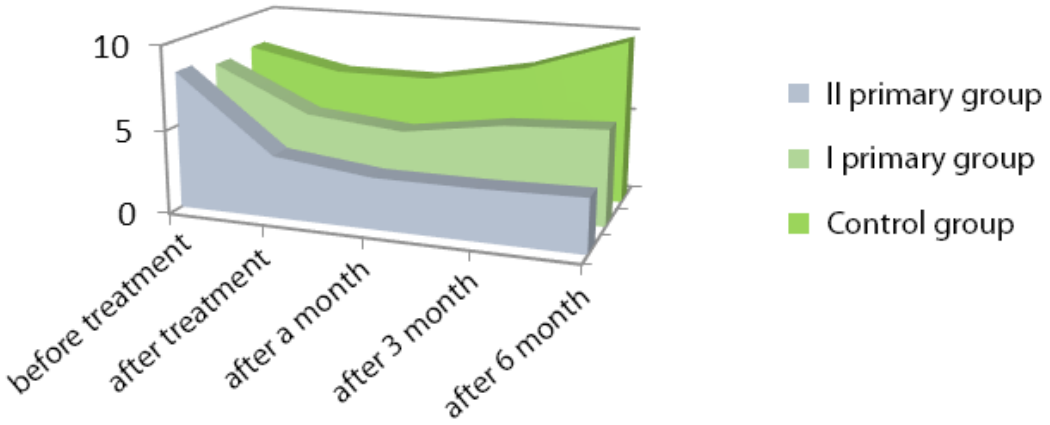


Diagram 1. Dynamics of the severity index of DR in the study groups

Hemodynamic parameters also significantly improved in the I and II major groups (Table 4).

Table 4.– Dynamics of blood flow in the eye vessels (M ± m) during treatment

Index	I primary group (n = 63)		II primary group (n = 69)		Control group (n = 65)	
	before treatment	after treatment	before treatment	after treatment	before treatment	after treatment
OS: V_s. sm/s	10.1 ± 1.3	13.5 ± 0.9*	9.96 ± 0.27	13.2 ± 0.5**	10.9 ± 1.2	12.9 ± 1.4
RI	0.89 ± 0.04	0.65 ± 0.03**	0.71 ± 0.02	0.65 ± 0.02*	0.91 ± 0.06	0.78 ± 0.06
OCCA: V_s. sm/s	10.3 ± 0.9	13.5 ± 1.2*	10.22 ± 0.7	13.8 ± 0.4*	11.2 ± 1.2	12.5 ± 0.8
RI	0.82 ± 0.03	0.64 ± 0.03**	0.81 ± 0.02	0.65 ± 0.07*	0.84 ± 0.04	0.77 ± 0.06
GA: V_s. sm/s	30.6 ± 2.2	37.5 ± 2.5*	30.33 ± 2.4	38.6 ± 2.6*	32.6 ± 4.1	35.3 ± 3.5
RI	0.85 ± 0.03	0.76 ± 0.03*	0.82 ± 0.04	0.72 ± 0.03*	0.83 ± 0.01	0.75 ± 0.07

*Note: n is the number of eyes; * p < 0.05, ** p < 0.01 – reliability of differences relative to indicators before treatment.*

According to the above–identified correlation, a risk index for the progression of diabetic retinopathy was developed and calculated based on the blood flow velocity in the main arteries of the eye before and after treatment:

IRP = Vs before treatment / Vs after treatment.

The ratio of these factors in dynamics can be considered as a prognostic criterion for the risk of progression of DR (Table 5).

With a progression risk index of less than 1.0, the course of nonproliferative diabetic retinopathy is favor-

able, with an incidence greater than or equal to 1.0, an unfavorable with progression. As can be seen from the table, the most effective treatment is the inclusion of endonasal electrophoresis with tanakan.

Table 5. – The index of the risk of progression (IDP) of diabetic retinopathy in patients of three groups (n = 197), (M ± m)

Группы	IDP DR on CS(Vs before treatment/Vs after treatment)	IDP DR on OCCA(Vs before treatment/Vs after treatment	IDP DR on GA (Vs before treatment/Vs after treatment
Контрольная (n = 65)	1.4 ± 0.01	1.32 ± 0.01	1.89 ± 0.02
I основная (n = 63)	0.85 ± 0.01	0.91 ± 0.01	0.73± 0.02
II основная (n = 69)	0.53 ± 0.01	0.54± 0.01	0.58 ± 0.01

To confirm the prognostic value of the developed risk of progression, a correlation analysis of the IRP and dynamics of the index of severity of retinopathy in the long–term follow–up period was performed (Table 6).

Table 6. – Correlation interrelations between the studied indicators

Progression risk index	The difference in the severity index of the DR before the treatment and 6 months after the treatment	Coefficient correlations (r)
IDP V_s CS	Δ DR after 6 months	0.63 ± 0.05
IDP V_s OCCA	Δ DR after 6 months	0.75 ± 0.04
IDP V_s GA	Δ ДР after 6 moths	0.72 ± 0.05

Note: ΔDR – ophthalmologic signs of progression of DR: the difference of the EDGE in 6 months after treatment and before treatment.

As can be seen from the table, there is a direct moderate correlation between the SRI calculated from the maximum systolic blood flow velocity in the CS and ΔDR, and a strong direct correlation was found between the SRI calculated from the maximum systolic blood flow velocity in the OCCA and GA and the ophthalmological signs of the progression of retinopathy ΔDR. This indicated that the higher the calculated dose, the more signs of progression of DR in the long–term period. Thus, the results confirm the prognostic significance of the proposed risk index for the progression of diabetic retinopathy.

Conclusions:

1. Dopplerographic criteria for the staging of PDR have been established: a decrease in the maximum systolic blood flow velocity in the CS and OCCA corresponds to an increase in the severity of DR. Based on clinical studies and duplex mapping of the vessels of the eye, inverse correlation links between blood flow velocities in CS and OCCA and the severity index of DR were revealed, which made it possible to determine the prognostic significance of the studied factors as markers and predictors of progression of the DR.

2. Improving the rheological properties of blood with tanakana prevents damage to the vascular endothelium with increased blood flow in the initial stage of PDR and improves the perfusion of retinal tissues in all stages of PDR. In the second and third stages of PDR, after treatment with tanakan in the form of endonasal electrophoresis, the speed and volume blood flow in the retinal vessels increases.

3. The developed SRI DR, based on the ratio of the maximum systolic velocities of the CS, OCCA and HA before and after treatment (Vs after treatment / Vs before treatment) allows to evaluate the effectiveness of the treatment, as well as predict the development of vascular changes and the progression of DR.

References:

1. An X. F., Zhao Y., Yu J. Y. Treatment of Early Diabetic Retinopathy by Liuwei Dihuang Pill Combined Ginkao Leaf Tablet // Zhongguo Zhong Xi Yi Jie He Za Zhi.– 2016. – No. 7.– P. 674–677.
2. Blum M., Eichhorn M., Vilser W. Haemodynamics and Diabetic Retinopathy // Klin. Augenheilk.– 2005.– Jun.– Vol. 222.– No. 6.– P. 463–470.
3. Bucolo C., Marrazzo G., Platania C. B., Drago F., Leggio G. M., Salomone S. Fortified extract of red berry, Ginkgo biloba, and white willow bark in experimental early diabetic retinopathy // J Diabetes Res.– 2013.– No. 3.– P. 35–40.
4. Early Treatment Diabetic Retinopathy Study Research Group. Grading diabetic retinopathy from srereoscopic color fundus photographs – an extension of the modified Airlie House classificacion. ETDRS Report № 10 // Ophthalmology – 1991.– Vol. 98.– P. 786–806.
5. Huang S. Y., Jeng C., Kao S. C., Yu J. J., Liu D. Z. Improved haemorrheological properties by Ginkgo biloba extract (Egb 761) in type 2 diabetes mellitus complicated with retinopathy // Clin Nutr.– 2004.– No. 4.– P. 615–621.
6. Fernando J Arevalo. Classification of diabetic retinopathy and diabetic macular edema // World Journal of Diabetes.– 2013.– Vol 4.– No. 6.– P. 290–294.
7. Азнабаев Б. М., Габрахманова А. Ф. и др. Особенности гемодинамики глаза при диабетической ретинопатии // Медицинский вестник Башкортостана.– 2013.– Т. 8.– No. 4.– С. 21–24.
8. Борисова Н. А., Нигматуллина К. Ф., Зенкина А. Р. Эндоназальный электрофорез с танаканом при лечении ранних форм сосудистых заболеваний мозга // Журнал неврологии и психиатрии.– 2003.
9. Влазнева И. Н., Пилягина А. А. Гемодинамика глаза при диабетической ретинопатии по данным цветового допплеровского картирования // Вестник ТГУ.– 2015.– Т. 20. вып. 3.– С. 535–538.
10. Габдрахманова А. Ф., Галямова Г. Р., Александров А. А. Состояние гемодинамики глаза при диабетичсеской ретинопатии и офтальмонейропротекция // Медицинский вестник Башкортостана.– 2014.– Том 9.– No. 2.– С. 110–113.
11. Гаврилова Н. А. Патогенетические механизмы развития диабетической ретинопатии, диагностика ранних стадий, прогноз и профилактика, дифференцированный подход к лечению // Автореф.дисс. … д.м.н.– М.,– 2004.– 47 с.
12. Ермакова Н. А., Анциферов М. Б., Климова Н. В. Клиническое значение раннего выявления диабетической ретинопатии // Русский медицин. журнал.– 2006.
13. Занозина О. В. Роль окислительного стресса в развитии и прогрессировании поздних осложнений сахарного диабета 2–го типа. Возможности антиоксидантной терапии // Международный эндокринологический журнал. Эндокринологу от других специалистов.– 2010.– No. 7.– С. 31–33.
14. Мошетова Л. К., Аржиматова Г. Ш., Строков И. А. и др. Современная антиоксидантная терапия диабетической ретинопатии // Клиническая офтальмология – 2006.– Т. 7.– С. 2–3.
15. Солонина С. Н., Шишкин М. М., Бойко Э. В. и др. Влияние комплексной терапии с использованием Танакана на перекисное окисление липидов и антиоксидантную активность крови больных с пролиферативной витреоретинопатией // Русский медиц. журнал.– 2010.– No. 3.– 96 с.

Karimov KH. YA.,
Research Institute of Hematology and Blood Transfusion
Israilov R. I.,
Tashkent Medical Academy
Maksudova F. T.,
Tashkent Medical Academy
E-mail: ludmilamedlib@mail.ru

MORPHOLOGICAL CHARACTERISTIC OF THE OVARIES IN ANDROGENIZATION OF THE ANIMALS

Abstract: In this work there are presented data of the ovaries morphology in androgenization which was accompanied in the ovary by formation of follicular cysts due to atresia and delay of differentiation of the follicular epithelium with destruction of the surrounding theca tissue. In subsequent the thecomatosis, sclerosis, thickening of the albugineous tunic was developed with luteinization of the internal theca layer of the ovary interstice.

Keywords: ovaries, androgenization, cysts, thecomatosis, sclerosis, polycystosis.

It is known, that most widespread endocrine pathology resulting in infertility is syndrome of polycystic ovaries, which comes to light at 4–10% of all women of the reproductive age [1, 4, 6, 7]. In the structure of anovular infertility this pathology is in the dominating position, sometimes up to 80% of cases. According to results of the consensus on diagnostic criteria accepted in 2003 in Rotterdam there have taken place displacement of accents and change of diagnostic criteria therefore now the leading criterion of diagnostics of the syndrome of polycystic ovaries is anovulation instead of increase of ovaries or expressing of hyperandrogenia [2, 3, 5]. The essential progress is observed in laboratory diagnostics of the syndrome of polycystic ovaries with underlying modern methods of the hormone determination. The data of morphological studies of the ovaries in syndrome of polycystic ovaries are scant, the available literature resources are devoted only to macroscopic changes in the ovaries [7, 8]. The results of microscopic research have shown that in the ovaries there are reorganizations as sclerocystic ovaries.

In this connection, in the present work there has been is carried out morphological researches of the ovaries from experimental animals in modeling of androgenization. The slices of ovariesяичников were fixed in 10% solution of neutral formalin during 48 hours, after washing in flowing water during 2–4 hours there was performed dehydration in ethanol of rising concentration and in the chloroform, they were filled in paraffin with wax. From the paraffin blocks there were prepared histological slices of thickness 5–8 microns which were stained by the following histological and histochemical methods: for the general morphology with hematoxiline and eosine methods: for revealing of mucopolysaccharides and glycogen with SHICK reaction; for identification of the collagen tissues by method of Van-Gizon.

It is known, that ovary consists of granular layer of the cerebellar cortex and molecular layer of the cerebellum layers. The surface cortex substance was covered by one-layer cubic and flat epithelium. The framework of the ovary cortical layer is presented by spindle fibroblasts, chaotically located fibres and intercellular substance. The fibrous structures and intercellular substance are located more or less in parallel to ovarian surface. Under the tegumental epithelium among the stromal cells the cords appear from the cells, which are similar the tegumental epithelium which in subsequent invade into the thickness of ovarian cortical stroma. Among the cells of these epithelial cords there are appeared primary sex cells and formed primary primordial follicles. The cells surrounding the oocyte by one layer are called follicular cells or granular cells. In process of follicle development the ovarian stroma occurs around it creating membrane from the theca cells (cell alveolus). The theca cells closely surround follicular epithelium and differentiated into

two layers. The internal layer – theca interna has more cellular character and contains many capillaries. An external layer – theca externa is predominantly fibrous structure with not enough of vessels.

The results of microscopic examination of the ovaries in androgenization showed that in the ovary there was noted reorganization of the tissue elements with formation of a lot of cysts with predominance of follicular cysts. Our data have shown that follicular cysts can be formed both from the mature follicles and from the premature secondary follicles. The formation of the cysts from secondary follicles occurs because of atresia and delayed differentiation of the follicle in the following stages of maturation. In this case there is noted thinning of the follicle epithelial layers due to their dystrophic and destructive changes with the subsequent accumulation in the image of albuminous liquid (Fig. 1). These changes are accompanied by destructive changes of the surrounding theca tissue, where separate theca cells being swelling are vacuolated with karyolysis and karyopyknosis. In the thickness of the theca tissue there is determined presence of small, but diffusive inflammatory infiltration. On the basis of above shown it may be concluded that originally there is occurred disorganization of follicle surrounding theca tissue with nutrition disturbance of the latter. In the further time the dystrophic and destructive changes occur in the follicular epithelium with extending of the cavity and there is noted cyst formation.

In other cases in the secondary follicles there was marked hyperplasia of the follicular epithelium looking like as formation of small hyperchromic spindle cell layers, which completely fill in a follicle lumen (Fig. 2). Around the oocyte the cellular bank appears consisting from dark cambial cells, which closely surround oocytes. The latter is exposed to vacuolization and disintegration and perishes and small cystic cavity is formed. In a circle of such changed follicle the stroma underwent the dystrophic and destructive changes. And directly near the basal membrane of follicle the dark cellular bank from theca cells has been formed.

In the third case in the follicle there is noted atrophy of the follicular epithelium on the one side of the circle almost to disappearance of basal cells. On the opposite part, where the oocyte is located, the follicular epithelium is saved, and closely surrounds the oocyte, but the functionality and viability of the oocyte is not saved. In the latter there is noted vacuolization of the cytoplasm and destructive changes of the nucleus as caryolysis and caryopyknosis. In the such follicles the patency is sharply dilated the cystic cavity is formed (Fig. 3). In a circle of the such follicles the interstitial tissue also undergoes edematic-destructive changes looking like vacuolization, necrobiosis of the theca cells and loosening and disorganization of fibrous structures.

In our supervisions it was marked, that cysts in the ovaries can be formed directly from theca tissue. In this case there is noted primary focal or diffusive hyperplasia of the theca tissue cells. If hyperplasia has focal character, then in a circle of the center of hyperplasia the fibrous tissue develops which closely surrounds the focus of hyperplasia of theca cells. The disturbance of blood supplying and development of dystrophic and destructive changes occurs evidently due to strangulation of the theca tissue. In this case in the center of theca tissue the cells are vacuolated and change destructively with caryolysis and caryopiknosis of nucleus structures. The vacuolated cells and intercellular space adhere and form the cystic cavity (Fig. 4).

We noted that cysts in the ovaries can be formed from hyperplastic granulosa cells. In one case there was found strengthened development of the focuses of hyperplasia of granulosa cells with rejection from surrounding stromal elements. Then there was noted disturbance of nutrition of these hyperplastic cells with subsequent massive necrosis and formation of cystous cavity. In the other cases in structure of granulose cells there was noted presence of inflammatory infiltration with lymphoid, plasmatic cells and macrophages which infiltrate granulosa cells with following cytolytic effect on them and destruction or transformation into stromal cells between which the cysts are formed.

Conclusions

The androgenization was accompanied in the ovary by formation of the follicular cysts because of atresia and delay differentiation of the follicular epithelium with destruction of the surrounding theca tissue.

The cystic atresia of follicles was accompanied by sclerosis, thickening of the tunica albuginea, luteinization of the external membrane or internal theca layer of the ovary intersticia.

Is was established, that initial hyperplasia of theca cells, appearance in it of the groups of hypertrophic epithelioid theca cells comes to the end by formation of the centers of thecamatosis of the various form and size.

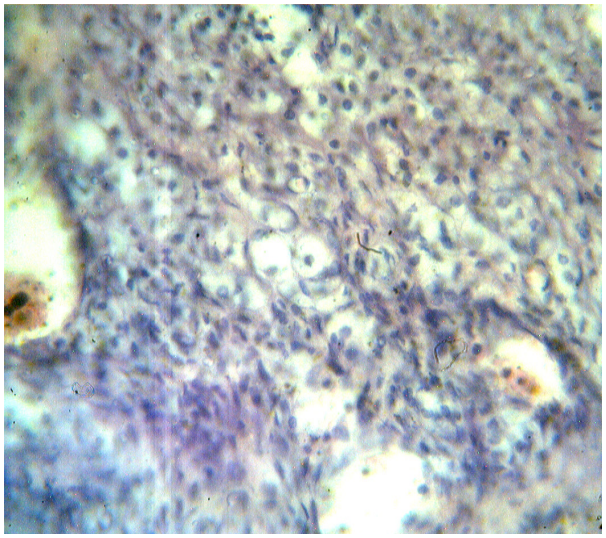


Figure 1. In this figure the ovarian cortical layer in androgenization with formation cystic cavities in the atretic follicles and in the edematous theca tissue. Staining: hematoxylin and eosine. Ув: ок.10, об.20.

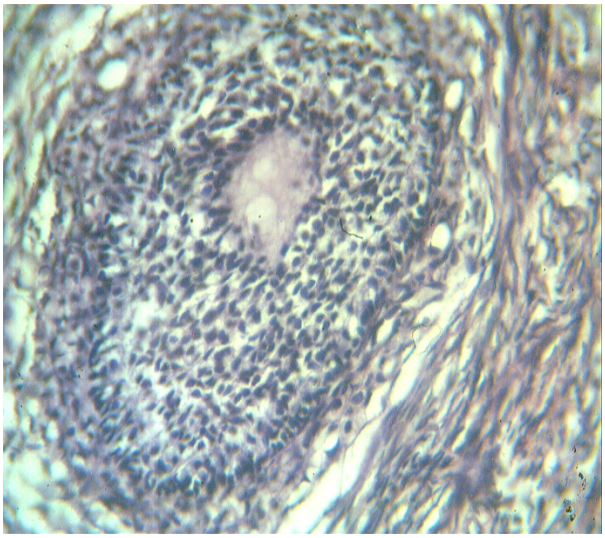


Figure 2. Hyperplasia of the follicular epithelium, oocyte death with cyst formation. In the surrounding tissues there is noted fibrosing of the theca tissue. Staining: hematoxylin and eosine: ок10, об.20.

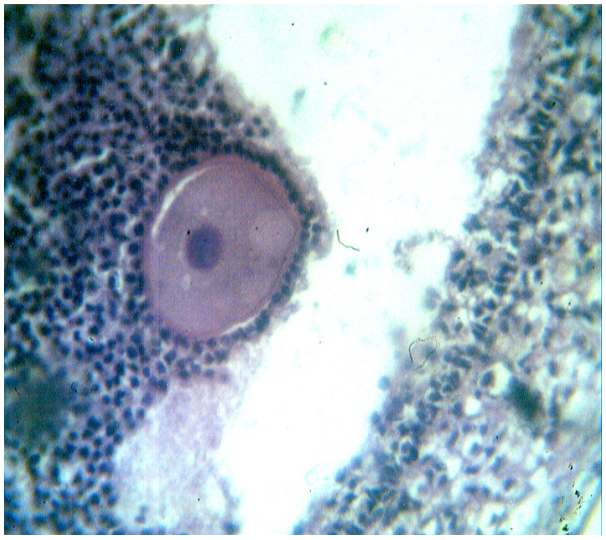


Figure 3. Rejection of the oocyte, desquamation and necrosis of the follicular epithelium with formation of the cyst. Staining: hematoxylin and eosine. Ув: ок10, об.40.

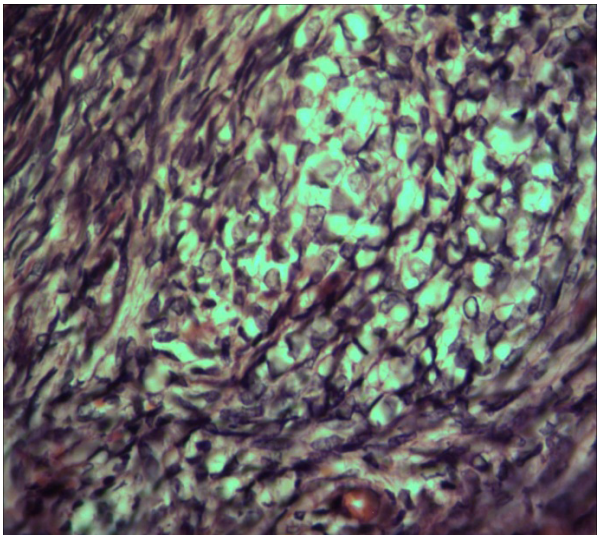


Figure Edema and fibrosing of the theca tissue with formation of the cyst. Staining: hematoxylin and eosine: ок.10, об.20.

References:

1. Akmaev I. G., Sergeev V. G. Neuroimmunoendocrinology of a fatty tissue. Uspekhi Physiol. Nauk.– Moscow,– 2002; 33 (2): 3–16.
2. Eisner I. R., Dumesic D. A., Kemnitz J. W., Abbott D. H. Timing of prenatal androgen excess determines differential impairment in insulin secretion and action in adult female rhesus monkeys. J. Clin. Endocrinol. Metab.– 2000; 86: 1206–1210.
3. ESHRE/ASRM (2004) Revised – 2003 consensus on diagnostic criteria and longterm health risks related to polycystic ovary syndrome. Hum. Reprod.– 2009; 19(1): 41–47.

4. Gevorkyan M. A., Manujhin I. B., Kushdinskiy N. E., Metabolic disorders in the patients with polycystic ovary syndrome. Problemi Reproductcii. Moscow,– 2000; 6 (6): 38–42.
5. Goverde A. J., van Koert A. J., Eijkemans M. J., et al. Indicators for metabolic disturbances in anovulatory women with polycystic ovary syndrome diagnosed according to the Rotterdam consensus criteria. Hum. Reprod.– 2009; 24.3: 710–717.
6. Ismailov S. I., Khaidarova F. A., Muzaffarova S. A. Syndrome of hyperandrogenemia: Guidelines. Tashkent; – 2012.
7. Manukhin I. B., Gevorkyan M. A., Kushlinskiy N. E. Polycystic ovary syndrome.– M.: MIA,– 2004; 9–3.
8. Zikova T. A. Polycystic ovary syndrome – new aspects of an old problem.– Arkhangelsk,– 2001.

Mamasaliyev Nematjon Solievich,
doctor, of medical sciences, professor, manager of chair
of therapy of faculty of improvement of doctors
of the Andizhan State medical institute,
Andijan State Medical Institute, Andijan, Uzbekistan.
E-mail: prof.mamasoliyev.ns@mail.ru

Shadmanov Mirzamakhmud Alisherovich,
Doctoral candidate, of the Andizhan State medical institute,
Andijan State Medical Institute, Andijan, Uzbekistan.
Mirzoulugbek Mirmakhmudovich Mirsaydullayev,
Doctor, of Philosophy in Medical Sciences,
Andijan State Medical Institute, Andijan, Uzbekistan.
E-mail: m.mirsaydullaev@mail.ru

Usmanov Burhonjon Umarovich,
assistant, of the department of therapy of faculty of improvement of doctors
of the Andizhan State medical institute,
Andijan State Medical Institute, Andijan, Uzbekistan.

PECULIARITIES OF PREVALENCE OF URINARY INFECTION OF HIV–INFECTED POPULATION AND THEIR RELATIONSHIP WITH A LINE OF SOCIO-HYGIENIC FACTORS

Abstract: Epidemiological study of 507 HIV-infected women (263) and male (244) sex between the ages of 20 and 69 was conducted at the regional center for AIDS prevention and control in the Andijan region. In creation of design of a research the modern WHO recommendations (2000), criteria of inclusion of clinic-epidemiological screening of the state research center of preventive medicine of the Russian Federation (2007) and experience of carrying out population researches in Andijan (2008) were used.

The most frequent HIV-associated infections of the urinary tract were observed in young people (20–29 years) of age (66.08%), in the group of 30–39 years their frequency was 31.45%, and at the age of 40–59 years 19,31% (Table 2). Analysis of the frequency of HIV-associated urinary tract infection in men showed that it is highest in the group of 20–29 years (51.51%), a relatively lower prevalence is found in men 30–39 years (17.73%, $p < 0.001$) and > 40–50 years (11.26%, $p < 0.001$).

Keywords: Epidemiological study, HIV-infected persons, urinary tract infection.

Introduction. According to recent literature, it is obvious that not only clinical work on methodological principles and quality assurance mechanisms for medical care is of interest to modern science and practical public health services, but also population results on the issues of improvement, prevention and metaphylaxis of major diseases [1, 2, 3].

The realization of these results in practice could become an actual opportunity to improve the treatment and diagnostic process. Adequate therapy and prevention, to a certain extent, depend both on scientifically based clinical recommendations, and on high-risk population strategies or on their results in certain population groups. This is especially significant for a population of HIV-infected people, for studying epidemiology and clinical manifestations of various pathologies, including urological diseases against HIV/AIDS.

Such information is practically absent in the modern literature. Undoubtedly, questions of epidemiology of an infection of a urinary tract infection at HIV of the infected persons are of special interest.

Research Aim. A study of the prevalence of urinary tract infections among HIV-infected population.

Materials and methods. Epidemiological study of 507 HIV-infected women (263) and male (244) sex between the ages of 20 and 69 was conducted at the regional center for AIDS prevention and control in the Andijan region. In creation of design of a research the modern WHO recommendations (2000), criteria of inclusion of clinic-epidemiological screening of the state research center of preventive medicine of the Russian Federation (2007) and experience of carrying out population researches in Andijan (2008) were used. During the screening, epidemiological, clinical, functional and laboratory methods were used. The questionnaire is applied to preliminary identification (WHO, 1990) where questions concerned addictions, lifestyle, a physical activity, and attempt to cope with addictions, the commitment to treatment, deliveries increased or an underweight of a body, existence of business trips "in hot spots".

In addition, to each patient the questionnaire of primary inspection of a state and stage of HIV infection consisting of 5 sections and 118 questions was filled out. Diagnosis of HIV infection/AIDS was performed on specific (blood plasma IFA on 4 generations the test – systems), to rapid tests for identification of antibodies to HIV in saliva, blood, serum and a blood plasma (agglyutinatsionny, immunofiltrational, immunochromatographic, and renal and chromatographic tests), to an immunoblot and methods of polymerase chain reaction and also a nonspecific method – determination of number of CD of 4 lymphocytes with keeping of strategy of testing according to WHO recommendations (2001).

A strategy 3 was implemented with the involvement and direct involvement of specialists from the regional AIDS center (one test with two confirmations of a positive result).

The diagnosis of HIV-associated urinary tract infection (acute pyelonephritis, urethritis, prostate, urolithiasis, cystitis) was based on interview standards (frequent and painful urination, aching or paroxysmal pain and / or bloody urine, imperative urge and incontinence, temperature reaction with the cognition), the results of clinical, biochemical, functional and instrumental studies. The diagnosis of HIV-associated urinary tract infection was formulated according to generally accepted criteria, the verification of diagnosis in each HIV-patient was based on the analysis of clinical manifestations (typical subjective, physical symptoms and clinical syndromes), anamnestic data and complex research data.

Statistical processing of materials was carried out on a Pentium IV personal computer using standard Microsoft Excel 2007 application software. Multidimensional statistical analysis methods, rank correlation analysis (correlation coefficient r) were applied. The reliability of differences in the studied indicators was estimated using the Student's test (t): unreliable – $P > 0.05$, reliability low – $P < 0.05$, mean $P < 0.01$ and high $P < 0.001$.

Results and its discussion. We analyzed the frequency of urinary tract infection among the male and female HIV-infected population of Andijan 20–59 years (table 1).

According to the data obtained, the surveyed population has a rather high (41.02%) prevalence of HIV-associated urinary tract infection and large differences in the incidence of it in men and women, in whom it is significantly higher.

Table 1.– Prevalence of urinary tract infection among HIV-infected people

Surveyed population groups	HIV-infected patients without urinary tract infection		HIV-infected patients with urinary tract infection		Total	
	n	%	n	%	n	%
1	*2*	*3*	*4*	*5*	*6*	*7*
HIV-infected men (1)	195	79.60	50	20.40	245	100.00
HIV-infected women (2)	104	39.69	158	60.31	262	100.00
In general. the overall HIV-infected population	299	58.98	208	41.02	507	100.00

1		2	3	4	5	6	7
Statistics of differences in the t-test (p)	$p < 0.05$	–					
	$p < 0.01$	–					
	$p < 0.001$	2–1					

In the literature, mainly data on the epidemiology of urinary tract infection among HIV-negative populations are presented, the results of which are certainly valuable for understanding the epidemiology of HIV-associated urinary tract infection in modern conditions, but there are no differences in sex.

As can be seen from Table 1, every fifth HIV-infected man has urinary tract infection, and among HIV-infected women they are more often more than 3 times ($p < 0.001$). This, too, confirms the need to further develop aspects of improving the methods of early detection and prevention of this pathology.

In our opinion, the epidemiological and preventive making treatment tactics not less, than surgical, can make a contribution to effectiveness of treatment and that is especially important, in social adaptation of the operated HIV patients.

The analysis of frequency of the HIV-associated infection of an uric path in various age groups, in surveyed by HIV-infected population showed rather big differences of prevalence of HIV-associated of an infection of urinary in separate age groups. The most frequent HIV-associated infections of the urinary tract were observed in young people (20–29 years) of age (66.08%), in the group of 30–39 years their frequency was 31.45%, and at the age of 40–59 years 19,31% (Table 2). Analysis of the frequency of HIV-associated urinary tract infection in men showed that it is highest in the group of 20–29 years (51.51%), a relatively lower prevalence is found in men 30–39 years (17.73%, $p < 0.001$) and > 40–50 years (11.26%, $p < 0.001$), (Table 3).

Table 2. – Prevalence of urinary tract infection in different age groups of the HIV-infected population

Age group		HIV-infected patients without urinary tract infection		HIV-infected patients with urinary tract infection		Total	
		n	%	n	%	n	%
20–29 years (1)		58	33.92	113	66.08	171	100.00
30–39 years (2)		170	68.55	78	31.45	248	100.00
40–59 years (3)		71	80.69	17	19.31	88	100.00
Statistics of differences in the t-test (p)	$p < 0.05$	2–3					
	$p < 0.01$	1–2					
	$p < 0.001$	1–3					

Table 3. – Prevalence of urinary tract infection in different age groups of male HIV-population

Age group		HIV-infected patients without urinary tract infection		HIV-infected patients with urinary tract infection		Total	
		n	%	n	%	n	%
20–29 years (1)		16	48.49	17	51.51	33	100.00
30–39 years (2)		116	82.27	25	17.73	141	100.00
40–59 years (3)		63	88.73	8	11.26	71	100.00
Statistics of differences in the t-test (p)	$p < 0.05$	2–3					
	$p < 0.01$	1–2					
	$p < 0.001$	1–3					

Further, one of the main objectives of this study was to study the prevalence of urinary tract infection in different age groups of the HIV-infected female population (Table 4).

Table 4.– Prevalence of urinary tract infection in different age groups of the HIV population of women

Age group		HIV-infected patients without urinary tract infection		HIV-infected patients with urinary tract infection		Total	
		n	%	n	%	n	%
20–29 years (1)		45	32.61	93	67.39	138	100.00
30–39 years (2)		46	42.99	61	57.01	107	100.00
40–59 years (3)		13	76.48	4	23.52	17	100.00
Statistics of differences in the t-test (p)	$p < 0.05$	2–3					
	$p < 0.01$	1–2					
	$p < 0.001$	1–3					

The highest incidence of urinary tract infection, exceeding that of men, was characterized by the age group of women 20–29 years old (67.39%), compared to 1.2 (57.01%, $p < 0.05$) and 3.2 times (23.52%, $p < 0.001$), age groups of 30–39 years and 40–59 years, respectively, were of lesser prevalence.

Analysis of incidence rates of the surveyed populations indicates that the peak of the prevalence of HIV-associated urinary tract infections, decreasing with age, falls on the age group of 20–29 years. The findings indicate the need for further monitoring of these epidemiological indicators in prospective studies, as well as coordinated actions of medical structures and AIDS prevention centers in the Ferghana Valley region.

Conclusions:

1. In the HIV-positive population of the population, a high prevalence of infections of the urinary tract was found (41.2%). In women, HIV-associated urinary tract infections are 3 times more common than men (60.31% and 20.40%, respectively).

2. There are significant differences in the epidemiological indicators of HIV-associated urinary tract infections in different age groups. The most commonly HIV-associated urinary tract infections are observed in HIV-infected patients aged 20–29 (66.08%) and 30–39 years (31.45%), relatively less often, at the age of 40–59 years (19.31%).

References:

1. Bachou H., Tylleskär T., Downing R., Tumwine J. K. Severe malnutrition with and without HIV-1 infection in hospitalised children in Kampala, Uganda: differences in clinical features, haematological findings and CD4+ cell counts // Nutrition Journal.– 2006.– Oct. l6.– P. 5–27.
2. Czaja C. A., Schole D., Hooton T. M., Stamm W. E. Population-based epidemiologic analysis of acute pyelonephritis // Clinical Infectious Diseases.– 2007.– Aug 1;45(3).– P. 273–80.
3. Esposito S., Noviello S., Leone S. Catheter-associated urinary tract infections: epidemiology and prevention // Le Infezioni in Medicina.– 2008.– Sep 16(3).– P. 130–43.

Muminova Ziyoda Abrorovna,
Assistant, of Department of Obstetrics and Gynecology
of Tashkent Medical Academy, Uzbekistan
E-mail: evovision@bk.ru

THE ANALYSIS OF CORRELATION BETWEEN FETAL AND MATERNAL EXTRACELLULAR DNA IN PREGNANT WOMEN WITH IMPAIRED FETAL DEVELOPMENT

Abstract: One of the promising and quite new directions of non-invasive prenatal diagnostics can be the analysis of extracellular fetal DNA in the blood of pregnant women. Seventeen pregnant women with fetal pathology in the second trimester were examined in the dynamics of gestation in obstetric complex No. 9 in Tashkent. Control group included 29 pregnant women with physiological course of gestation and without pathology. The concentration of fetal DNA in plasma of pregnant women with fetal malformations in the second trimester exceeds the indicators of pregnant women without fetal pathology in 1.8 times. The total concentration associated with the surface of cells of fetal DNA in 2.3 times higher than in women without fetal pathology. The maternal DNA in fetal pathology was significantly decreased (in 3.1 times) in the fraction associated with the surface of blood cells, whereas the level of the mother's DNA in plasma from pregnant women with fetal abnormalities was lower in 1.7 times, in comparison with pregnant women without fetal pathology. The analysis of correlation between fetal and maternal extracellular DNA showed that this relationship is higher in the plasma and in the fraction associated with ionic interactions than in the fraction of extracellular DNA associated with cell surface proteins as in the physiological course of pregnancy, as in fetal abnormalities. The obtained results allow concluding that to increase the informative value of non-invasive diagnosis of fetal pathology at different stages of pregnancy, it seems appropriate to use fractions of fetal and maternal extracellular DNA associated with the surface of blood cells of the mother.

Keywords: pregnant women, fetal and maternal extracellular DNA, blood plasma, impaired fetal development.

Introduction. In the last time, due to the high incidence of viral infections among the population, interest in viruses and their role in the genesis of reproductive losses is growing. In acute viral infections, intrauterine infection of the fetus and placental damage often occur [1]. In recent years, there has been an increase in the incidence of acute respiratory viral infections (ARVI) in pregnant women, reaching 35.6% [2], which adversely affects the course and outcome of pregnancy.

There is very inconsistent evidence that ARVI in the mother may increase the risk of certain congenital malformations in children such as hydrocephalus, esophageal atresia or anophthalmia/microphthalmia [3, 4]. There are cases of increased risk of anencephaly because of flu epidemic in the United States and Asia [5, 6].

A case-control study of congenital developmental anomalies in Hungary demonstrates the relationship between ARVI in the mother in the second and third months of pregnancy and congenital malformations in the child, such as cleft lip or palate, neural tube defect and cardiovascular malformations [7].

A case-control study, involving 363 neonates with neural tube defect and 523 healthy children, revealed that an increased risk of this disease was associated with ARVI in the mother [8]. In a number of case-control trials, the association between diseases in the mother and

high risk of congenital defects [9]. In the literature, there is insufficient information about the course of gestation and complications from the fetus, depending on the duration of pregnancy and the severity of course of the infectious process.

The significance of the level of fetal DNA as a predictive marker in pregnant women with fetal pathology remains practically unexplored that determines the urgency of the problem and necessity for targeted research in this direction.

The need for developing new methods for non-invasive diagnosis of fetal development disorders is dictated by the following reasons. On the one hand, genetic analysis of fetal material obtained by invasive procedures reflects the true chromosome status of fetal cells with high accuracy; on the other hand, such manipulations involve a risk of abortion. The available non-invasive methods of prenatal diagnosis of chromosomal pathology are safe for maternal and fetal health; however, their informativeness does not exceed 60% [10, 11, 12].

One of the promising and quite new directions of non-invasive prenatal diagnostics can be the analysis of extracellular fetal DNA in the blood of pregnant women. In 1997, for the first time, the presence of fetal extracellular DNA in the serum of pregnant women was determined [13, 14]. This discovery stimulated intensive study of fetal DNA as a marker for non-invasive prenatal diagnosis. However, until now, the reason for the increase in the concentration of extracellular fetal DNA in the blood of women bearing fetuses with intrauterine growth disorders remains unclear. Obtaining new data on the peculiarities of DNA circulation in fetal developmental anomalies will make it possible to evaluate the possibility of analyzing extracellular fetal DNA as a marker of non-invasive prenatal diagnosis.

Materials and Methods

Pregnant women were examined in the dynamics of gestation in obstetric complex No. 9 in Tashkent. The main group consisted of 17 pregnant women with fetal pathology in the second trimester. Control group included 29 pregnant women with physiological course of gestation and without pathology. The average age of women was 26.3 ± 0.5 years.

The method for measuring the concentration of fetal DNA in the mother's blood was to carry out quantitative real-time PCR. In order to evaluate the features of circulation of extracellular DNA in the blood of pregnant women in the second trimester of pregnancy, the levels and ratio of fractions of freely circulating in plasma and cell-bound DNA were analyzed. The material was taken with the informed consent of the pregnant women participating in the study.

Results and Discussion

We conducted analysis of correlation between fetal and maternal extracellular DNA in the blood of pregnant women bearing healthy fetuses and those with violations of intrauterine development in the second trimester of gestation. The study of the relationship of fetal and maternal DNA in blood fractions is necessary in the light of the fact that the successful detection of some fetal loci depends on the amount of fetal DNA found among DNA molecules of maternal origin [15]. Thus, for example, in most cases it is not possible to identify the DNA replicas inherited by the fetus from the father in the fraction that circulates in the DNA plasma. At the same time, when using samples obtained by electrophoretic separation of maternal and fetal DNA, the loci inherited by the fetus from the father were determined in all the cases analyzed [12].

Analysis of the level of fetal extracellular DNA freely circulating in plasma and associated with the cell surface during normal pregnancy showed that most fetal DNA (more than 60%) is bound to the surface of blood cells of the mother (Table1).

The mechanisms by which such a distribution of extracellular DNA is observed in the blood of pregnant women is currently unknown [12, 16]. It is likely that a higher concentration of extracellular DNA on the surface of blood cells, compared to plasma, is due to the presence of a certain degree of affinity for membrane structures and circulating DNA, as demonstrated previously [17, 18].

The study of fetal DNA levels circulating and bound to the surface of cells in the blood of pregnant women showed that the concentration of fetal DNA in the plasma of pregnant women with fetal malformations in the second trimester was 77.9 ± 1.6 copies/ml in the mother's plasma that is 1.8-fold higher than those of pregnant women without fetal pathology. Whereas, the concentration of the total cell-bound fetal DNA was 156.2 ± 4.5 copies/ml, which is 2.3-fold higher than the values of women without fetal pathology (Table 1). It should be noted that in the group of women with fetal malformations, the concentration of total bound fetal DNA was 2 times lower relative to its concentration in the plasma.

Table 1.– The concentration of extracellular fetal DNA (copies/ml) in the blood of pregnant women with fetal malformations in the second trimester of gestation

Study groups	The level of plasma DNA	The mother's DNA bound to the surface of blood cells		Total bound DNA
		II	CSP	
Pregnant women with fetal pathology (n = 17)	77.9 ± 1.6	65.9 ± 3.2	90.3± 1.5	156.2 ± 4.5▪
Pregnant women without fetal pathology (n = 29)	43.3 ± 1.4	31.4 ± 5.2*	36.5 ± 2.6*	67.9 ± 3.7*▪
	$p \leq 0.05$	$p < 0.01$	$p < 0.01$	$p < 0.001$

*Note: * – differences between the level of fetal DNA in pregnant women with and without fetal pathology; ▪ – differences between total bound fetal DNA and its plasma concentration (P < 0.001); (II - ion interactions, CSP – cell surface proteins).*

Consequently, the concentration of fetal DNA reflects the level of proliferative / apoptotic changes occurring in the placental tissue and, thus, can serve as a marker of impaired fetal development. Indeed, in addition to the cases of miscarriage of fetuses with pathology, a significant increase in the level of fetal DNA is observed in such complications of pregnancy as pre-eclampsia [19], premature births [20], and placenta accreta [21].

It is not excluded that the changing nature of the distribution of extracellular DNA between plasma and formed elements in women's blood is also observed in such complications of pregnancy as undeveloped pregnancy, pre-eclampsia, as in our cases, the gestation of fetuses with malformations [15, 19, 20, 22]. In this regard, it seems appropriate to study the features of circulation of extracellular DNA of the mother and fetus to assess the potential use of this marker for non-invasive prenatal diagnosis, as well as for monitoring the course of pregnancy.

The level of extracellular DNA of the mother in the second trimester of gestation in fetal pathology showed low DNA values relative to the mother's DNA without fetal development pathology (Table 2). Thus, the level of maternal DNA was significantly reduced (in 3.1 times) in the fraction bound to the surface of blood cells. While the level of mother's DNA in plasma in pregnant women with fetal pathology was only in 1.7 times lower, in comparison with the indices of pregnant women without fetal pathology. This, in turn, affected the difference of the total bound DNA relative to its plasma concentration (P<0.001). So, if in women without fetal pathology the total bound extracellular DNA of the mother exceeded the values of DNA in plasma in 8.4 times, then in fetal pathology the difference was observed to a lesser degree (in 4.6 times).

It should be noted that changes in the extracellular mother DNA were of opposite nature to changes in fetal DNA in fetal pathology, the values of which exceeded the parameters of women with physiological course of gestation.

Table 2.– The concentration of extracellular maternal DNA (copies/ml) in the blood of pregnant women with fetal malformations in the second trimester of gestation

Study groups	The level of mother DNA in plasma	The mother's DNA bound to the surface of blood cells		Total bound DNA
		II	CSP	
Pregnant women with fetal pathology (n = 17)	160.2 ± 3.5	33.0 ± 2.1	705.5 ± 4.4	738.5 ± 2.6▪
Pregnant women without fetal pathology (n = 29)	272.4 ± 4.9*	95.7 ± 1.8*	2193.5 ± 4.9*	2289.2 ± 4.8▪

*Note: * – differences between the level of maternal DNA in pregnant women with and without fetal pathology; ▪ – differences between total bound fetal DNA and its plasma concentration (P < 0.001); (II - ion interactions, CSP – cell surface proteins).*

The analysis of correlation between fetal and maternal extracellular DNA in plasma and on the surface of red blood cells of pregnant women without fetal pathology in the second trimester showed that the ratio in the physiological pregnancy is higher in plasma and in the fraction associated with ionic interactions (II) than in the fraction of extracellular DNA bound to cell surface proteins (CSP). The analysis of correlation between fetal and maternal extracellular DNA in plasma and on the surface of blood cells of pregnant women with intrauterine fetal development disorders showed a similar correlation with only a larger difference.

Thus, the obtained results allow to conclude that to increase the informative value of non-invasive diagnosis of fetal pathology at different stages of pregnancy, it seems appropriate to use fractions of fetal and maternal extracellular DNA associated with the surface of blood cells of the mother.

It is shown that in such developmental disorders, the concentration of the mother's DNA is significantly reduced, in comparison with the norm, in the fraction of DNA bound to the surface of blood cells. Since fetal cells are considered as the main source of extracellular fetal DNA in the mother's blood, it should be noted that the fetal DNA concentration, which reflects the level of proliferative/apoptotic changes occurring in placental tissue, can serve as a marker of disturbances in the course of gestation [22]. However, the use of fetal DNA in combination with other markers in programs for screening pregnant women increases the information content of detection of Down syndrome in the fetus [20]. Thus, the analysis of the level of extracellular DNA in the blood of pregnant women, including in combination with the assessment of the nature of the distribution of DNA between the plasma and the surface of the blood cells, can be successfully used as an additional non-invasive marker of fetal development pathology and gestation disorders.

Conclusions

1. The concentration of fetal DNA in plasma of pregnant women with fetal malformations in the second trimester exceeds the indicators of pregnant women without fetal pathology in 1.8 times. The total concentration associated with the surface of cells of fetal DNA in 2.3 times higher than in women without fetal pathology.

2. The maternal DNA in fetal pathology was significantly decreased (in 3.1 times) in the fraction associated with the surface of blood cells, whereas the level of the mother's DNA in plasma from pregnant women with fetal abnormalities was lower in 1.7 times, in comparison with pregnant women without fetal pathology.

3. The analysis of correlation between fetal and maternal extracellular DNA showed that this relationship is higher in the plasma and in the fraction associated with ionic interactions than in the fraction of extracellular DNA associated with cell surface proteins as in the physiological course of pregnancy, as in fetal abnormalities.

References:

1. Balyasinskaya G. L. Acute respiratory viral infections and complications // Medical Bulletin.– 2007.– No. 2.– P. 9–10. In Russian.
2. Dolgushina N. V., Makatsariya A. D. Viral infections in pregnant women – M.: Triada X,– 2004.– 144 p. In Russian.
3. Sergeeva I. V. Acute respiratory viral infections and pregnancy / I. V. Sergeeva, E. P. Tikhonova // Infectious diseases.– 2011.– Vol. 9. Annex – No. 1.– 341 p. In Russian.
4. Scott M. F., Rollnick S. A. Colds and pregnancy // Russian Bulletin of the obstetrician–gynecologist.– 2008.– No. 1.– P. 66–68. In Russian.
5. Rasmussen S. A., Jamieson D. J., Bresee J. S. Pandemic influenza and pregnant women // Emerg. Infect. Dis.– 2008.– Vol. 14.– P. 95–100.
6. Siston A. M., Rasmussen S. A., Honein M. A. et al. Pandemic 2009 influenza A(H1N1) virus illness among pregnant women in the United States // JAMA.– 2010.– Vol. 303 (15).– P. 1517–1525.
7. Getahun D., Ananth C. V., Peltier M. R. et al. Acute and chronic respiratory diseases in pregnancy // Am. J. Obst. Gynecol.– 2006.– Vol. 195 (4).– P. 1180–1184.
8. Lim W. S., Macfarlane J. T., Colthorpe C. L. Treatment of community–acquired lower respiratory tract infections during pregnancy // Am. J. Respir. Med.: drugs, devices, and other interventions.– 2003.– Vol. 2 (3).– P. 221–33.

9. Sappenfield E., Jamieson D. J., Kourtis A. P. Pregnancy and susceptibility to infectious diseases // Infect. Dis. Obst. Gynecol.– 2013.– 2852 p.
10. Fedchenko V. I., Guriev C. O., Semenova N. V. PCR non–invasive prenatal diagnosis of sex // Biomed. Chemistry.– 2005.– Vol. 51.– P. 527–535. In Russian.
11. Tamkovich S. N., Vlasov V. V., Laktionov P. P. Circulating DNA from blood and their using in medical diagnostics // Molecular biology.– 2008.– Vol. 42 (1).– P. 12–23. In Russian.
12. Tokarev A. G., Lebedev I. N. et al. Extracellular nucleic acids of the fetus in the mother's blood: characterization, origin, and significance for prenatal diagnosis // Medical genetics.– 2006.– Vol. 5.– P. 8 (50). In Russian.
13. Lo Y. M., Corbetta N., Chamberlain P. F. et al. Presence of fetal DNA in maternal plasma and serum // Lancet.– 1997.– Vol. 350.– P. 485–487.
14. Lo Y. M., Zhang J., Leung T. M.et al. Rapid clearance of fetal DNA from maternal plasma // Am. J. Hum. Genet.– 1999.– Vol. 64.– P. 218–224.
15. Li Y., Zimmerman B., Zhong X. Y., et al. Determination of RhD zygosity using real–time guantitative PCR // Swiss Med. Wkly.– 2003.– Vol. 133.– P. 442–445.
16. Laktionov P. P. Tamkovich S. N., Rykova E. Y. Extracellular circulating nucleic acids in human plasma in health and disease // Nucleosides Nucleotides Nucleic Acids.– 2004.– Vol. 23.– P. 879–883.
17. Chan K. C.A., Zhang J. et all. Size distributions of maternal and fetal DNA in maternal plasma // Clin. Chem.– 2004.– Vol. 50.– P. 88–92.
18. Bryzgunova O. E., Skvortsova T. E., Kolesnikova E. V. et al. Isolation and comparative study of cell–free nucleic acids from human urine // Ann. N. Y. Acad. Sci.– 2006.– Vol. 1075.– P. 334–340.
19. Lo Y. M., Leung T. N., Tein M. S.C. et al. Quantitative abnormalities of fetal DNA in maternal serum in preeclampsia // Clin. Cem.– 1999.– Vol. 45.– P. 184–188.
20. Farina A., Leshane E. S., Romero R. et al. High levels of fetal cell–free DNA in maternal serum: a risk factor for spontaneous preterm delivery // Am. J. Obstet. Gynecol.– 2005.– Vol. 193.– P. 421–425.
21. Sekizawa A., Jimbo M., Saito H. et al. Increased cell–free fetal DNA in plasma of two women with invasive placenta // Clin. Chem.– 2002.– Vol. 48.– P. 353–354.
22. Jahr S., Hentze H., Englisch S., et al. DNA fragments in the blood plasma of patients: quantitations and evidence for their origin from apoptotic and necrotic cells // Cancel Res.– 2001.– Vol. 61.– P. 1659–1665.

Chinieva Marina Ilinichna,
Assistant, of Department of Histology and Pathological Anatomy
of Tashkent Pediatric Medical Institute

Rasulova Khurshidakhon Abduboriyevna,
Head of Department of Coordination of Research
Activity of Tashkent Pediatric Medical Institute

Zokirova Nargiza Bakhodirovna,
Assistant, of Department of Histology and Pathologica
Anatomy of Tashkent Pediatric Medical Institute

Rakhmanov Alisher Khudayberdiyevich,
Head of Pharmacology and Toxicology Department
of Tashkent Medical Academy

Kendjaeva Khilola Khudayberganovna,
Assistant, of Department of Histology and Medical Biology
of Tashkent State Dental Institute, Uzbekistan
E-mai: evovision@bk.ru

MORPHOLOGICAL CHANGES IN STRUCTURES OF KIDNEY TUBULAR AND VASCULAR SYSTEMS UNDER PROTEIN HOMEOSTASIS DISTURBANCE IN RATS

Abstract: The regulation of protein homeostasis is provided by structural-functional systems, and can be accompanied by proteinuria. Therefore, in order to study the structural bases of integration of functional kidney systems in the regulation of protein homeostasis, was reproduced a model for the disturbance of protein homeostasis in blood in rats. The morphological study of the kidney established that, under different physiological conditions, there are regular changes in the cells of the juxtaglomerular apparatus and capillaries of the glomeruli of superficial and juxtamedullary nephrons, which are aimed at increasing the functional reserve of the kidneys in regulating protein homeostasis.

Keywords: protein loads, kidneys, glomerular filtration rate, arterioles, juxtamedullary nephrons.

Introduction

The life of the organism is a wide spectrum of genetically programmed continuous reconstructions in response to the action of various factors of the external and internal media, changes in the parameters of homeostasis arising from the dynamism of constantly going metabolic processes. Formed as a result of evolution, adaptive reactions are realized in ontogeny as genetically programmed, and for all their varieties are subdivided into relatively fast (fractions of a second, seconds) and slow (days, months, years) [5].

Due to its homeostatic role in the body, the kidneys are extremely sensitive to changes in diet. In addition, the kidneys perform not only excretory, but a number of important functions, in particular metabolic and homeostatic. Despite the fact that the kidneys are very sensitive even to the slightest fluctuations in the content of various ingredients in the diet, it may take a different amount of time for full development of renal response to changes in the intake of a particular substance. To decipher the mechanisms of homeostatic functions of the kidney, the integration of functional systems that ensure its functioning, a model of protein load was reproduced in different age periods. At the same time, the structural mechanisms of interaction of various functional kidney systems with different physiological states remain insufficiently elucidated [2].

The purpose of this work was to identify the structural basis for the integration of certain functional kidney systems in the regulation of protein homeostasis.

Materials and Methods

The experiments were performed on forty-five sexually mature non-native white rats, weighing 140–160 g. The first group of rats (n = 15) had rotein load on the kidneys by parenteral single and repeated administration of albumin. The second group of rats (n = 15) underwent protein starvation, without restriction of access to water. The third group of rats (n = 15) served as a control.

In all series of experiments, the right kidney was cut through the middle from the convex surface to the gate area. Then a plate 1.5 mm thick was cut out parallel to the plane of the cut and the cortex was separated from the cerebral. Subsequently, the cortical part of the kidney was cut into three equal parts: internal, intermediate and superficial. The kidney tissue corresponding to the superficial and juxtamedular nephrons was fixed in 2.5% buffer solution with glutaraldehyde acid. The process of making the sections of the tissue under investigation was performed on ultramicrotome using the general method used in electron microscopy. Sections were mounted on a slide, dried at room temperature and stained with methylene blue and fuchsine. Microscopic images were performed on a light microscope equipped with a digital camera.

The tissue of the kidneys at the 1st, 3rd and 7th day of the experiments was studied by morphometric and electron-microscopic methods.

Results and Discussion

The results showed that at 1st day of protein load there were dilation of the afferent and narrowing of the efferent arterioles, an increase in the percentage of glomeruli with a greater degree of opening of the blood capillaries and activation of cells of the juxtaglomerular apparatus [1].

The structure of cells of the proximal tubules was not changed. It was characterized by a light homogeneous cytoplasm with basally located nuclei. Mesangial matrix was present in a small amount, in which only single mesangiocytes were detected.

After 3 days with normalization of structure of the juxtaglomerular apparatus, the degree of opening of the blood capillaries of both surface and juxtamadullar nephrons exceeded the parameters of control animals.

The cells of the dense spot were enlightened; the extent of the basal and lateral parts of their outer membrane was enlarged. Juxtavascular cells were hypertrophic and contain secretory granules. Mesangiocytes became larger in protein load, they acquired an irregular shape.

When fasting after 3 days the degree of opening of the blood capillaries increased, however, activation of the juxtaglomerular apparatus was not observed [4].

After 7 days, the degree of opening of the blood capillaries remains high only in juxtamidullary nephrons [3].

The regular morphological changes in various parts of the nephron were detected light-optically. There was increase in the size of the glomeruli with the expansion of the urinary space of the Bozeman capsule, the expansion of the mesangial matrix with a moderate increase in the number of mesangiocytes, adhesion of the capillary loops to the capsule walls, and compression of the capillary loops. In addition, focal sclerosis of the capsule and sclerosis of the capillary loops were detected in some glomeruli. Significant changes were found in the proximal tubules. Among them, increase in the content of secretory granules in the cytoplasm of cells, the swelling of the apical part of the cytoplasmic membrane of tubular cells in the lumen, as well as the apical and intermediate position of nuclei in a significant number of cells.

Thus, under different physiological conditions, regular changes occur in the cells of the juxtaglomerular apparatus and capillaries of the glomeruli, the tubules of the superficial and juxtamedullary nephrons, which are aimed at increasing the functional reserve of the kidneys.

In control animals juxtaglomerular cells of the afferent arterioles are the main renin-producing component of the juxtaglomerular apparatus of the kidneys [9]. They are polygonal in shape, contain numerous organelles: the profiles of the rough reticulum, which are evenly distributed throughout the cytoplasm, closely interact with rounded, moderate-sized mitochondria; The Golgi complex is localized near the nucleus. Secretory granules in a moderate amount, rounded, high electron density, evenly distributed throughout the cytoplasm. These data indicate their moderate functional activity [7].

In the wall of the efferent arterioles, the juxtamendullar cells are smaller and contain less secretory granules than in the wall of the afferent arterioles. Cells of a dense spot of cylindrical shape, basal folds single, low, do not contact mitochondria, diffusely distributed along the cytoplasm. In the areas of contact of the plasmolemma of cells, the basal membrane is thin, discontinuous [8].

Juxtavascular cells located between the afferent and efferent arterioles, irregularly elongated, poor in organelles, rich in ribosomes and polysomes. The mesangial cells are located between the glomerular capillaries, almost identical in ultrastructure to the juxtavascular [2, 6].

Conclusions

The data obtained indicate that a single protein load is accompanied by activation of the juxtaglomerular complex and change in the functioning of nephrons.

Morphological data characterize the relatively early stages of development of experimental chronic renal dysfunction, since along with obvious morphological signs of changes in glomerular hemodynamics and dystrophic changes in the tubules, only initial evidence of nephrosclerosis formation was found.

The obtained data opens new prospects for studying the role of kidneys in protein metabolism in developing renal failure, including tubular reabsorption of not only endogenous, but also exogenous proteins, and draw attention to the need to study the violations of the most important non-excretory functions of the kidneys and their consequences in analyzing the progression of nephropathies.

References:

1. Yuldashev A. Yu., Rakhmanov R. R., Yuldashev A. A., Tarinova M. V. Histophysiology of vascular glomeruli and juxtamedullary apparatus of the kidneys after protein loading and fasting // Nephrology.– 2007.– Vol. 11 (2).– P. 68–71. In Russian.
2. Kucher A. G., Kayukov I. G., Yesayan A. M., Ermakov Yu. A. Influence of the quantity and quality of protein in the diet on the activity of the kidneys // Nephrology.– 2004.– Vol. 8 (2).– P. 14–34. In Russian.
3. Perevezentseva B., Smirnova N. N., Rumyantseva I. V., Belyaev A. P. Features of renal hemodynamics in conditions of functional load // Nephrology.– 2003.–Vol. 7 (1).– P. 51–57. In Russian.
4. Yuldashev A. A., Rakhmanov R. R. Ultrastructure of the juxtaglomerular apparatus of the kidneys under protein loading // The 7th Congress of International Association of Morphologists. Morphology.– 2004.– Vol. 12 (4).– 147 p. In Russian.
5. Kucher A. G., Yesayan A. M., Nikoghosyan Yu.A., Ermakov Yu.A., Kayukov I. G. The effect of single loads of moderate doses of soy and meat protein on the activity of the kidneys in healthy volunteers // Nephrology.– 1998.– Vol. 2 (2).– P. 52–56. In Russian.
6. Yesayan A. M., Kucher A. G., Kayukov I. G., Ermakov Yu.A., Nikoghosyan Yu.A., Ryabov S. I. Influence of the protein load on the functional state of the kidneys in patients with chronic glomerulonephritis // Therapeutic archive.– 2002.– No. 6.– P. 19–24. In Russian.
7. Kucher A. G., Yesayan A. M., Nikoghosyan Yu.A., Ermakov Yu.A., Kayukov I. G. Features of the functional response of the kidneys of healthy people to loads of various types of protein and its derivatives // Nephrology.– 2004.– No. 4.– P. 81–90. In Russian.
8. Gozhenko A. I., Kuksan N. I., Gozhenko E. A. Method for determining the renal functional reserve in humans // Nephrology.– 2001.– Vol. 5 (4).– P. 70–73. In Russian.
9. Kucher A. G., Yesayan A. M., Nikoghosyan Yu.A., Ermakov Yu.A., Konstantinova V. A., Kukoleva L. N., Kayukov I. G. Features of functioning of kidneys of healthy people in conditions of hyperfiltration // Nephrology.– 2000.– Vol. 4 (1).– P. 53–58. In Russian.

Rakhimov Abdulla Khaitovich,
researcher of the Department of Immunoprophylaxis,
Republican Specialized Research-Practical Medical
Center of Pediatrics, Republic of Uzbekistan.
E-mail: rabdulla@mail.ru

Khalilova Gulnara Mukhamedovna,
Head of the Department of Immunoprophylaxis,
Doctor of med. sciences, Republican Specialized Research-Practical
Medical Center of Pediatrics, Republic of Uzbekistan

IMMUNOLOGICAL PARAMETERS IN CHILDREN WITH SECONDARY IMMUNODEFICIENCY

Abstract: This article deals with immunological investigations carried out in 70 children with clinical signs of secondary immunodeficiency. The parameters of cellular and humoral immunity in children with HIV are characterized by discoordinated disorders, which are related to immune deficiency state. The results obtained show necessity of the following study on serocontrol of the antibody titres and cells of immunologic memory for the further development of individual scheme of buster performance of vaccination for children with HIV.

Keywords: children, secondary immunodeficiency, immunity, vaccination, immunological parameters.

Immunodeficiency or syndrome of immunological insufficiency is a disorder of normal immune status, related to defect of one or several mechanisms of immune responses. It should be noted that secondary immunodeficiency is a pathological state developing on the background of normally functioning system with persistent marked lowering of quantitative and functional characteristics, relating to various chains of immune system [2, 4].

Three forms of secondary immunodeficiency (SID) are classified as [5]:

– Induced SID-states, when the concrete reason is present, inducing their appearance (roentgen radiation, immunodepressants, traumas, hormone therapy, tumors etc.)

– Acquired SID-HIV-infected (AIDS)

– Spontaneous SID-states, characterized by absence of clear reason, inducing disturbance of immunological reactivity.

– The secondary immunodeficiency states are characterized by reversible dysfunctions of immune system, changes of the processes of differentiation, proliferation and its cell adaptation, resulting to attenuation of immune response, expressing by impairment of humoral and cellular immunity, synthesis of the complement components, absence or reducing of the activity of the cytotoxic lymphocytes and macrophages [1, 3, 6, 7].

Therefore the study of immunological parameters of immune system in children of this category appeared to be topical for determination of the category of deviations of immunologic parameters.

Materials and methods

The immunological investigations were performed in 70 children with clinical signs of secondary immunodeficiency. All children were of the age from 6 months to 5 years. Of them 34 (48.5%) children were with induced form of SID and 36 (51.5%) with spontaneous form of SID. Control group included 30 practically health children. In connection with that secondary immunodeficiencies are not independent diseases, and the whole complex of the features indicates about impairment of functioning of the immune system and diversity of the existing classifications of SID, we used screening clinical-anamnestic criteria for clinical diagnosis of immunodeficient diseases in the target selection of the patients (Kazmirchuk V. E., Drannic G. N., 2003, National Medical

University after O. O. Bogomolets, The Ukraine). These criteria were based on the association of various signs in 5 groups: 1. Clinical symptoms, including 32 signs. 2. Anamnesis of the life and disease, comprising of 19 signs. 3. Antenatal immunological anamnesis, having 12 signs. 4. Family anamnesis (congenital and hereditary diseases) including 12 signs. 5. Laboratory data of 9 findings. Totally 74 signs.

Diagnosis of SID was determined at presence more than 3 clinical criteria of group 1, absence of data of group 4 (family anamnesis(, presence of more than one sign of group 3 (antenatal anamnesis) and presence of 3 and more criteria of group 2 (anamnesis of disease).

In order to study immune status in children with SID the following immunological investigations were performed: Lymphocytes were isolated by the common method in the gradient of density of ficoll-verografin. Phenotyping of the lymphocytes was carried out with use of monoclonal antibodies of series LT ("Sorbent", Moscow, Russia) and there were revealed numbers of CD4+, CD8+, +CD16+. The contents of immunoglobulins was measured with method of radial immunodiffusion by Manchini with use of monospecific serums against IgA, IgM, IgG of Russian production of Moscow Institute of Microbiology and Epidemiology after N. F. Gamaleya. Phagocytic activity of neutrophils (FAN) was determined in the test with latex (LLC"Biopreparations" MH RF). 2. Determination of the levels of interleukins: IL-1β, 1L-8, IL-4, IL-10 was performed in the blood serum with method of immune enzymatic analysis-IFA with use of test-systems LLC"Cytokin" (Saint-Petersburg, Russia).

Analytical researches. The data of complex investigation of the patients were processed with use of appropriate computed program. The analysis of the obtained data was carried out with application of the modern statistic mathematic methods. There were used universal methods of statistical process of the data, evaluation of the statistic reliability with use of criterion Student t and statistic methods of comparison of non parametric data.

Results. In order to study character of immunological disorders in children with HIV infection there was carried out study of cellular, humoral parts and intrasystemic connections of immune system in 70% of children with seronegative and low titres of the seroconversion response. This was made because identification of the changes in these parameters reflects functional peculiarities of the immune system disturbances in children with HIV and in the further they will promote to give more precise definition of the pathogenic regularities of the immune system functioning. As it is known many secondary disorders of immune system are reversible (beside HIV-infection) therefore comparison of immunological disorders between these two forms of HIV will allow choice of the tactic of immunization of these children. This, in its turn, will help to form adequate immune response and reduction of the postvaccinal responses and complications.

Table 1.– Immunological parameters in children with spontaneous and induced forms of the secondary immunodeficiency

Parameters	Groups of studied children			P
	Children with HIV spontaneous form (SP) (n = 36)	Children with HIV induced form (IF) (n – 34)	Control group (relatively healthy children) (n = 30)	
1	*2*	*3*	*4*	*5*
Leucocytes	4500 ± 157	4400 ± 229	7925 ± 148	> 0.05* < 0.001** < 0.001***
Lymphocytes.%	36 ± 0.7	33 ± 0.8	43 ± 0.7	< 0.01* < 0.001** < 0.001***
Lymphocytes. abs.	2700 ± 95	2500 ± 106	3600 ± 108	> 0.05* < 0.001** < 0.001***

1	*2*	*3*	*4*	*5*
T-lymphocytes.%	56 ± 0.5	55 ± 0.6	65 ± 0.4	> 0.05* < 0.001** < 0.001***
T-lymphocytes. abs.	1750 ± 49	1700 ± 53	1950 ± 65	> 0.05* < 0.05** < 0.05***
B-lymphocytes.%	28 ± 0.07	32 ± 0.16	24 ± 0.4	< 0.001* < 0.001** < 0.001***
B-lymphocytes. abs.	1200 ± 4.0	1250 ± 2.0	960 ± 12	< 0.001* < 0.001** < 0.001***
CD4.%	30 ± 0.8	29 ± 0.45	40 ± 0.08	> 0.05* < 0.001** < 0.001***
CD4. abs.	1200 ± 24	1100 ± 29	1450 ± 14	< 0.05* < 0.001** < 0.001***
CD8.%	28 ± 0.15	31 ± 0.04	25 ± 0.45	< 0.001* < 0.001** < 0.001***
CD8. abs.	1200 ± 12	1250 ± 10	890 ± 18	< 0.01* < 0.001** < 0.001***
CD4+/ CD8+	1.07 ± 0.04	0.93 ± 0.05	1.60 ± 0.02	> 0.05* < 0.001** < 0.001***
CD16.%	19 ± 0.15	22 ± 0.30	13 ± 0.07	< 0.01* < 0.001** < 0.001***
CD16. abs.	600 ± 4.0	650 ± 2.0	410 ± 11	< 0.001* < 0.001** < 0.001***
PAN.%	58 ± 0.07	45 ± 0.6	57 ± 0.11	< 0.001* > 0.05** < 0.001***
IgA. mg%	150 ± 2.0	160 ± 1.6	116 ± 2.9	< 0.001* < 0.001** < 0.001***
IgG. mg%	1200 ± 8.0	1250 ± 6.0	1100 ± 11.0	> 0.05* < 0.001** < 0.001***

IgM. mg%	150 ± 19.5	110 ± 4.0	115 ± 2.0	< 0.05* < 0.05** > 0.05***

*Note: * The value is reliable between data of spontaneous and induced form. ** – between spontaneous form and control group, *** – between induced form and control group*

Immunological investigations in children were performed after complete course of vaccination with use of The National Calendar of Vaccinations of the Republic of Uzbekistan. The investigations of the cellular immunity gave the results presented on the (table № 1). It was revealed that the total number of leucocytes had no reliable differences between groups with HIV, but in comparison with healthy children these parameters had reliable differences ($P < 0.001$). The number of lymphocytes expressed in percentage ratio had reliable differences between two groups with HIV ($P < 0.01$) and healthy children ($P < 0.001$).

The quantity of T-lymphocytes between groups with HIV had no differences (P<0,05), reliability was noted only in comparison with group of healthy children (P<0,001). The reliable increase both in percent and absolute quantity among B-lymphocytes (P<0,001) was noted in groups of children with IF in comparison with HIV SF and group of control, that shows activation of B-cellular part of immunity with low level of T-cellular immunity. This revealed more deep disorders in functioning of the immune system at the early stage of the body defense. It should be also noted that B-lymphocytes were reliably higher in group of SF in comparison with group of control ($P < 0.001$), however with preserving functioning phagocytic activity of neutrophiles (PAN). The ratio of CD4 cells between groups HIV were reliably increased ($P < 0.05$) in relation to absolute number in favour of group SF HIV, that is, immune reaction is characterized by helper type of immune disorders.

Analyzing the results obtained on study of the humoral immunity it was revealed that the content of IgA was reliably increased ($P < 0.001$) in the both groups with HIV in comparison with group of control ($P < 0.001$). There was also noted reliable rising ($P < 0.001$) of this immunoglobulin in group IF in comparison with group of SF. Similar reliable increase ($P < 0.001$) was noted during evaluation of the content of IgG in the both groups with HIV in comparison with group of control. This immunoglobulin had no reliable differences between groups with HIV ($P < 0.05$). IgM was reliably increased only in group of SF in comparison with IF and group of control ($P < 0.05$). It should be noted that the content of this immunoglobulin in group with induced form was relatively reduced ($P > 0.05$) in comparison with group of control. but reliably decreased in relation to group of SF ($P < 0.05$). This fluctuation of immunoglobulin M. in our opinion. was connected with coincidence of the conversion of the II-critical period of the making of immune system into III critical period and development of the child with period of vaccination.

In the second period the IgM-mediated immune response develops to the majority of antigens without formation of immunological memory and the defects of immune system appeared in this period. In the third critical period of the children development the primary character of immune response has been still preserved to the majority of pathogens. However the ability appeared for transfer of the immunoglobulin synthesis to the class of IgG consequently reducing production of Ig M. The change of the suppressive type of immune response to helper and formation of adequate humoral immune response in norm has been made.

Thus, the analysis of the state of cellular and humoral immunity in children with HIV shows that in children with induced form of HIV-infection there are found deeper disorders both in the cellular and humoral part of immune system characterized by more severe disturbances in the functioning of immune system. We consider that these functional shifts are connected with etiopathogenic character of various forms of secondary immunodeficiency.

The following stage of researches included study of cytokine profile in 50 children with secondary immunodeficiency at the age from 6 months to 5 years (Table 2). There were studied parameters of the intrasystemic regulation of the immunity. There were studied proinflammatory cytokines IL1β, IL-8 and proinflammatory cytokines IL-4, IL-10. Among the children with spontaneous form HIV the proinflammatory cytokines

accounted for IL1β 35.5 ± 2.2 pg/ml and IL-8 22.5 ± ± 2.0 pg/ml. and in children with induced form of HIV IL1β 36.5 ± 2.2 pg/ml and IL-8 23.0 ± 2.0 pg/ml. During evaluating proinflammatory cytokines in children with spontaneous HIV form IL-4 was 3.0 ± 0.5 pg/ml and IL-10 was 11.0 ± 1.5 pg/ml. and in children with induced form of HIV IL-4 was 2.8 0.5 pg/ml and IL-10 was 10.5 1.5 pg/ml.

Table 2.– The contents of cytokines in the blood serum of studied children with HIV (pg/ml), (M ± m)

Immunologic parameters	Spontaneous form	Induced form
IL-1β	35. 5 ± 2. 2	36. 5 ± 2.2
IL-8	22. 5 ± 2. 0	23. 0 ± 2. 0
IL-4	3. 0 ± 0. 5	2. 8 ± 0. 5
IL-10	11. 0 ± 1. 5	10. 5 ± 1. 5

Discussion

Analyzing the results of cellular and humoral parts of immunity in children with HIV it may be concluded that in children with induced form of HIV there are found deeper disorders both in cellular and humoral parts of immune system, characterized by more serious disturbances of the immune system functioning. In children with induced form of HIV the levels of proinflammatory cytokines are higher, than in spontaneous form, but the reliable differences were not found ($P > 0.05$). The values of the levels of proinflammatory cytokines had practically no differences between the both groups. The obtained data of the cytokine status correlate with duration of the inflammatory processes in the body of the children with HIV-infection that enhances picture of immune status. In our opinion, these functional changes are connected with etiopathogenic character of different forms of secondary immunodeficiency. Consequently, this situation dictates individual approach to immunocorrection, rehabilitation of immunodeficiency states in children for the following performance of effective vaccination and requires the further scientific researches.

Conclusions:

1. The parameters of cellular and humoral immunity in children with HIV characterized by discoordinated disorders which are characteristic for immunodeficiency state.

2. The ratio of CD4 cells between groups with HIV was reliably increased ($P < 0.05$) by absolute number in favor of group HIV SF, that is, immune reaction is characterized by helper type of immune disorders.

3. The quantity of CD8 cells as in percentage, so as in absolute ratio show reliable differences between groups HIV. This reliable rising of CD8 cells in induced form of HIV indicated about immune disorders by suppressor type.

4. In children with induced form of HIV the levels of proinflammatory cytokines was higher than in spontaneous form, however there were no reliable differences ($P > 0.05$). The values of the levels of proinflammatory cytokines between the both groups have almost similar parameters.

5. The results of immunological investigations dictate obligatory following study of serocontrol of the titres of antibodies and cells of immunological memory for the further development of the individual scheme of booster performance of vaccination in children with HIV.

References:

1. Ataullakhanov R. I., Ginzburg A. L. Immunity and infection: dynamic opposition of alive systems // Pediatria (Jurnal after G. N. Speransky).– 2005.– No. 4.– P. 47–61.
2. Veltischev Yu. E. Immune insufficiency in children // Rossiyskiy vestnik perinatologii I pediatrii,– 2004.– Vol. 49.– No. 4.– P. 4–11.
3. Immunology / D. Mail, J. Brostoff, D. B. Rot et al; transl. from Eng.,– M.: Logosphera.– 2007.– 568 p.
4. Malakhova S. I., Kirillov E. S. Correction of the disorders of secretory immunity with topic immunomodulators in children with secondary immunodeficiency state // Detskie infectsii,– 2011.– No. 3.– P. 51–55.
5. Khaitov R. M., Pinegin B. P. Mechanism of effect and clinical usage of immunomodulators // Allergia, astma I klinicheskaya immunologiya.– 2003.– 8.– P. 43–47.
6. Yarilin A. A. Immunologiya.– M.: GEOTAR–Media,– 2010.– 752 p.
7. Yarilin A. A. Age–matched changes in the thymus and T–lymphocytes. Immunologiya.– 2003.– 24(2).– P. 117–128.

Suleymanov Suleyman Fayzullaevich,
PhD., Senior Researcher, Associate Professor,
of the Chair of Microbiology and Pharmacology
of the Bukhara State Medical Institute,
Bukhara, Uzbekistan
E-mail: ss-1961@mail.ru

IMPAIRED IMMUNE HOMEOSTASIS AND ITS CORRECTION IN PATIENTS WITH CHRONIC CHOLECYSTITIS

Abstract: Immune system was analyzed in 55 patients with Chronic Cholecystitis (CC) and 36 healthy individuals. Patients identified suppression of T-Systems and its subpopulations, voltage moral immunity. Traditional methods of treatment did not lead to the elimination of the immunodeficiency in patients with chronic cholecyctitis.

Thymoptinum a total dose of 1.0 mg – 1.2 mg (per course), applied in 21 patients with chronic cholecyctitis eliminated immune disorders, raised the entire spectrum of cell-mediated immunity, possessed immune correction and therapeutic effect.

Keywords: chronic cholecistitis, immune status, immunodeficiency, immunocorrection, thymoptinum.

Chronic Cholecystitis (CC) is the most common pathology among time-personal hepatobiliary diseases zone and does not tendency to decrease. Disorders of the immune status, detected in chronic inflammatory diseases of the nutritional-rhenium, in a certain way influence the course of the disease, contribute to chronicity of inflammation-reducing process and eventually repair mechanisms. Shifts in the immune system can lead to the development of CC [5, 6, 13, 14].

The aim of the study was to determine the main parameters of the immune system and checking immune correction in patients with CC.

Materials and methods. Indicators of immune system have been studied in 55 patients with a diagnosis of CC in an exacerbation stage aged 38 to 72 years, of which 38 were women (69.1%) males – 17 (30.9%). In 24 (43.6%) patients had concomitant diseases: Chronic Gastritis – 9, Chronic Pancreatitis – 7, Chronic Peptic Ulcer of the Stomach – 4, Chronic Ulcer Duodenum – 2, Duodenitis – 2. 21 (38.1%) patients were operated for Chronic Calculous Cholecystitis, the rest – 34 (61.8%) – were treated conservatively.

Diagnosis CC was based on data of the clinical picture of the disease and the results of laboratory by instrumental methods.

Phenotyping of lymphocytes was performed by indirect immunofluorescence method with monoclonal antibodies to the receptors of CD-production «Sorbent Ltd» Institute of Immunology, Ministry of Health of the Russian Federation on the microscope "Luminal P-8." T cells was determined (total population – CD3); helper T cells (a subset of Th – CD4); T-suppressors (a subset of Ts – CD8); B cells (a subset of CD19) and Immunoregulatory Index (IRI) – the ratio of CD4 / CD8 [12].

The concentration of serum immunoglobulins (SI) classes A, M and G were determined by radial immunodiffusion [9], the level of circulating immune complexes (CIC) – method precipitation [1], and the values were expressed in optical density units (opt.dens.un.). Immunological examination was carried out for 2–5 hours after hospital admission and 1 month after treatment. The control group for comparison immunological figure was 36 healthy subjects (25–55 years). The drug Thymoptinum (Uzbekistan) received 19 (34.5%) patients with CC.

Efficacy was assessed by immunotherapy dynamics immunological indices in comparison with the same data before the treatment by the formula:

$Ki = [(B - A)/A] \times 100\%$, where Ki is – immune index; A – immunological parameters before treatment;

B – treatment after immunological parameter. Immune correction considered effective when *Ki* > 10%.

Statistical processing of the data was carried out on Pentium-IV computer with using program Exel Statistic (Version 6.0) for Windows. The significance of differences on comparison meaning values was determined by Student's t test. Data are presented as M ± m. Differences were considered significant at $p < 0.05$.

Results and discussion. Results of the study of the immune system parameters in patients with CC presented in the (Table 1, 2), and indicate an imbalance in the functioning of the immune system. In CC was found a decrease in the relative size of T (CD3) cells ($p < 0.001$). At the same time watched first degree by A. M. Zemskov disorders (–31.3%) [17]. The results indicate a significant reduction in the blood in patients fraction of Ts (of CD8) ($p < 0.001$), a mo-derate reduction in the level of Th (CD4) ($p > 0.05$) and the inversion of the IRI, which was reflected in its increase (Table 1). The relative magnitude (of CD19) lymphocytes was sta-tistically higher than the control group values ($p < 0.01$) (Table 1).

Patients with chronic cholecyctitis marked shortage of basic parameters of humoral immune system: IgA and IgM (Table 2). In this group occurred IgG increase more significantly – CIC ($p < 0.001$).

We suppose that increasing the concentration of IgG and CIC in patients with CC occurs due to the presence of a constant source of inflammation in the gallbladder. Reduction in blood

T (CD3) – lymphocytes, and maintaining at the same time a high level of IgG and CIC at this pathology indicates that the inflammatory process in the gastrointestinal tract has not been completed and its chronization takes place [7, 8].

Table 1.– Dynamics of cellular immunity in patients with CC disease in process of immune correction treatment (M ± m)

Indicators	Patients with CC	Healthy patients	
CD3 (%)	A	35.3 ± 1.8***	51.2 ± 1.7
	B	52.4 ± 2.2	
CD4 (%)	A	31.3 ± 1.3	35.8 ± 0.7
	B	34.8 ± 1.7	
CD8 (%)	A	10.7 ± 0.8***	17.4 ± 1.2
	B	13.1 ± 0.6***	
IRI (CD4/CD8)	A	2.88 ± 0.17***	2.16 ± 0.10
	B	2.63 ± 0.21*	
CD19 (%)	A	18.7 ± 1.4**	14.8 ± 0.9
	B	21.3 ± 1.6**	

*Note: A – indicators before treatment, B – indexes after treatment; * – P < 0.05; ** – P < 0.01; *** – P < 0.001 compared to the control*

Evidently, increasing the amount concentration of IgG in patients is due to zone presence of antigens as a permanent "focus excitation" in these as relates to the IgG antibodies are actively functioning, with the direct participation of which agglutination and lysis of foreign agents[5–8, 10].

A significant increase in the index of the CIC in patients with CC in the blood and tissues leads to what is happening in the tissues of a metabolic disorder that is causing degeneration and regeneration mechanisms in the gallbladder [13, 14, 16].

Thus, patients with CC has the following changes in their immunogram: decreasing CD3, CD4, CD8 cells; increasing in CD19; decrease levels of IgA and IgM; increase in IgG and CEC. Changes in the immune system suggests that patients had to identify immunodeficiency, especially on the part of the T-immunity. Apparently, immunodeficiency state by nature is secondary. To eliminate immune disorders drug thymoptinum (Uzbekistan) was used as an adjunct to conventional treatment conducted, which included conservative therapy and operator-porate intervention treatment conducted, which included conservative therapy and surgery.

Analysis of the clinical and immunological and laboratory instrumental research methods, depending on the used treatments pointed to favorable for pathologists-agency process in patients when applying immune correcting treatment.

Table 2.– Dynamics of humoral immunity in patients with CC disease in process of immune correction treatment (M ± m)

Indicators	Patients with CC	Healthy patients	
IgA, g/l	A	1.81 ± 0.62	2.82 ± 0.31
	B	1.45 ± 0.74	
IgM, g/l	A	1.27 ± 0.22	1.64 ± 0.11
	B	0.90 ± 0.36*	
IgG, g/l	A	18.60 ± 1.40	15.90 ± 0.94
	B	15.74 ± 1.26	
CIC (opt.dens.un.)	A	0.174 ± 0.04***	0.046 ± 0.006
	B	0.190 ± 0.032***	

*Note: A – indicators before treatment, B – indexes after treatment; * – P < 0.05;** – P < 0.01; *** – P < 0.001 compared to the control.*

The generally accepted standard treatment (Surgery + Therapy), conducted in 36 patients, did not lead to the restoration of disturbed immune status indicators. For example, after treatment the relative number of CD3 was 37.6 ± 1.5% and was statistically lower than those values of the control group ($p < 0.001$), the greatness of CD19-on amounted to 16.2 ± 0.7% ($p > 0,05$), the concentration of SI consisted: IgA – 1.92 ± 0.74% g/l, IgM – 1.21 ± ± 0,34 g/l, IgG – 17.45 ± 1.31 g/l and did not reach the background level of the control group($p > 0.05$). Number of CIC tended to increase 0.183 ± 0.045 opt.dens.un.

Introduction to the scheme of combined treatment of patients with CC Thymoptinum led to an increase in cellular and humoral immunity. Under the influence of Thymoptinum hap-pening efficiency increase initially reduced values of the immune system. It was registered statistically significant increase in the total pool of T cells (phenotype of CD3), B-lymphocytes (of CD19) ($p < 0.001$), as well as IRI decline with an increase in the proportion of Ts (of CD8), which is certainly, a predictor of the effectiveness of immunotherapy CC, as it leads to a dec-rease, in the intensity of autoimmune processes (Table 1).

This *Ki* for CD3 cells was 48.4% and for B-lymphocytes (CD19) – 13.9%, which is undoubtedly a reflection of the positive dynamics of the changes carried out by immunocor-rection.

In addition, there was a trend to decrease IgG ($p > 0.05$) in the course of immunotherapy, but IgM and IgA remained low (Table 2).

Our data on the number of positions is quite consistent with the results of other resear-chers [5, 8, 16].

It is known that in chronic diseases of the gallbladder and biliary tract are non-specific pathogenic mechanisms, as hypoxia, tissue destruction, production of endogenous toxins are an important pathogenetic link, resulting in aggregate, of a violation of the function of the thymus and secondary immunodeficiency states, and this, in turn, contributes to the chronicity of the pathological process in the gall bladder [3, 4, 11, 15, 16].

Conclusions:

1. In CC observed deep depression T-immunity in the functioning of humoral immunity.

2. Traditional methods of treatment did not lead to the restoration of disturbed parts of the system that we have immunity in patients with CC.

3. Application Thymoptinum as a corrector of disorders of the immune system in pa-tients with CC contributed to the effective elimination of disorders of cell-mediated immunity (T-lymphocytes), as evidenced by *Ki* factors, and reduce stress in humoral component of the immune system. Immunomoduline possess immunomodulatory effects in patients with CC.

References:

1. Digeon M., Laver M., Riza J. et al. Detection of circulating immune complexes in human sera by simplified assays with polyethylene glycol // J. Immunol. Methods.– 1977; 16: 165–83.
2. Grigorie P.Y Correlation motor–evacuation disorders of the biliary tract // Gastrobyulleten.– 2001.– P. 2–3; Proceedings of the 3–rd Russian Scientific Forum "St. Petersburg–Gastro 2001".– 45 p. (In Russian).

3. Gritsenko I. I., Kosinski S. V., Zalevsky V. I. Chronic disease of the bile excretory system – problems of diagnosis // Private gastroenterology.– 2001.– 3(5).– P. 37–42. (In Ukrainian).
4. Gvozd' N.G., Pasechnik A. V., Frolov V. A. et al. Pathophysiological analysis of proathero–genic lipid and carbohydrate metabolism, induced subclinical inflammation and oxidative stress // Bulletin of the Peoples' Friendship University of Russia. Medicine Series.– 2004.– 1(25).– P. 100–2. (In Russian).
5. Kovalchuk L.A, Wenger I. K. Violation of immunological tolerance in patients with chronic calculous cholecystitis // Clinical surgery.– 1989.– 9.– P. 6–8. (In Russian).
6. Kozlov V.A, Airapetov D.V, Makarochkin A.G et al. Should one always have to stop an attack of acute calculous cholecystitis with conservative methods of treatment? // Anatomy. Surgery.Hepatitis.– 2002.– 2 (7).– P. 51–7. (In Russian).
7. Khvorostinka V. N., Bobrovnikova L. R., Ilchenko I. A. Pathogenic mechanisms chronic cholecystitis // Private gastroenterology.– 2004.– 3.– P. 32–4. (In Russian).
8. Lazarchuk T.B. Dynamics of parameters of t–and B–links of immunity in patients with chronic pancreatitis during treatment // Journal of scientific achievements.– 1999.– 2.– P. 76–9.(In Ukrainian).
9. Mancini G., Carbonara A. O., Heremans J. F. Immunochemical quantitation of antigens by single radial immunodiffusion // Immunochemistry.– 1965.– 2.– P. 235–54.
10. Maurer K.J., Carey M.C. Fox J.G. Rolesofinfection, inflammation, and the immune sys–tem in cholesterol gallstone formation // Gastroenterology.– 2009.– 136.– P. 425–40.
11. Novgorodtseva T. P., Endakova E. A., Yan'kova V. I. Manual methods studies parameter sys–tems "lipid peroksidation – antioxidant protection" in biological liquid. Vladivostok: Publish. by the Far Eastern Federal University,– 2003.– 80 p. (In Russian).
12. Novikov P. D., Novikov D. K. The comparative characteristic of modern methods the immune phenotype of lymphocytes // Immunology, Allergology, Infectology.– 2000.– 1.– P. 62–6. (In Rus–sian). (In Russian).
13. Suleymanov S. F. Application of immunomodulin in chronic cholecystitis // Pharmaceutical Bulletin of Uzbekistan.– 2006.– 3.– P. 85–8. (In Russian).
14. Venglinskaya Ye.A., Parachonskiy A. P. Immune system in gastroenterological pathologies patients // Funda mental'nyye issledovaniya (Fundamental study).– 2008.– 2.– P. 31–2. (In Russian).
15. Yurenko A. V., Antonyuk M. V., Demyunenko N. N., Shedrina O. B. Immunometabolic features of the comorbid course of chronic cholecystitis and metabolic syndrome. Bulletin of SB RAMS – 2012.– 2(12).– P. 67–73. (In Russian).
16. Yurenko A. V., Antonyuk M. V., Hodosova K. K., Demyunenko N. N. Immune system state in chronic cholecystitis and metabolic syndrome patients // Eur. J. Nat. History.– 2008.– 3.– P. 48–51. (In Russian).
17. Zemskov A. M., Zoloedov V. I., Polyakov S. D. et al. The principles of purpose immune–corrective funds // Russian Medical Journal.– 1996.– 6.– P. 44–7. (In Russian).

Usmanova Durdona Djurabaevna,
Doctor, of Medical Sciences, Assistant,
the Department of Neurology,
Tashkent Pediatric Medical institute,
Pediatric Neurology and Medical Genetics
Arifdjanova Jonona Farrukh qizi,
Student, the Faculty of Pediatrics
Tashkent Pediatric Medical institute,
E-mail: jaanonaa@gmail.com

IMMUNOLOGICAL MECHANISMS OF PROGRESSING AND COURSE OF CHRONIC BRAIN ISCHEMIA ON THE BACKGROUND OF ARTERIAL HYPERTENSION AND ATHEROSCLEROSIS

Abstract: Nowadays, cerebral vascular diseases remain at the center of society's attention due to the very alarming epidemiological situation of the incidence of stroke in Uzbekistan, as well as the catastrophic consequences of different forms of cerebrovascular pathology for the physical and mental health of the nation [1].

Keywords: chronic cerebral ischemia, proinflammatory cytokines, arterial hypertension.

Numerous large-scale studies have shown that the main cause and the most important factor of chronic cerebral ischemia (CCI) is AH (arterial hypertension) and cerebral artery atherosclerosis [3, 8, 9]. They have a key role in vascular dementia [1, 5, 7]. Numerous studies have demonstrated the involvement of inflammation in atherogenesis and the development of CCI [4, 9]. Even with relative functional preservation, patients with CCI develop autoimmunization to the structural components of the neural tissue, which depends not only on the antigen release beyond the blood-brain barrier, but also on the violation of the complex regulation of the neuroimmune system that determines immune homeostasis [6, 10]. However, the role of the immuno-mediated inflammatory process as a possible universal constituent pathogenesis of CCI of various genesis is unspecified.

The aim of the study was to study the proinflammatory cytokines: IL-1β, TNF-α and IL-6, in the serum of peripheral blood of patients with CCI, depending on its genesis (hypertonic and atherosclerotic), and on the degree and duration of hypertension.

Material and methods of the study. We studied several proinflammatory cytokines: IL-1β, TNF-α and IL-6, in the serum of peripheral blood of 84 patients with CCI, depending on its genesis (hypertonic and atherosclerotic.) All the examined patients were divided into 2 groups according to the pathogenesis of the development of the CCI.1 group comprised 53 (63.1%) patients with CCI, which developed mainly on the background of hypertension. According to the classification of hypertension depending to the level of blood pressure in accordance with the recommendations of the Russian Society for Arterial Hypertension and the All-Russian Scientific Society of Cardiology (3rd revision, 2008) [2], we divided the patients of group 1 into 3 subgroups: 21 patients with AH I degree, 22 patients with AH of II degree and 10 patients with AH of III degree. Also divided by the duration of hypertension: AH I degree 5 years were10 patients, more than 5 years – 11. With AH II degree 5 years – 12 patients, more than 5 years were 10 patients. The 2nd group included 31 (36.9%) patients with CCI, which developed mainly on the background of atherosclerosis. A control group for the purpose of comparing immunological studies comprised 29 practically healthy donors. Studies of the cytokine content (IL-1β, IL-6, TNF- α) in serum of peripheral blood were determined by ELISA analysis using commercial test systems Vector-Best, Novosibirsk, Russia, 2013. Statistical processing was carried out on a personal computer Pentium-4.

Results and its discussion. A comparative analysis of the level of proinflammatory cytokines in patients with CCI in both groups of patients revealed the presence of a significant difference with the values of the control group (Table 1). Thus, the content of IL-1β in the serum of patients with CCI showed a significant increase in 1.51 ($P < 0.05$) and 1.28 ($P < 0.05$) times, relatively to the values of practically healthy individuals, respectively, in 1st and in the 2nd groups. Moreover, the highest content of IL-1β was diagnosed in patients of the 1st group: an increase in 1.18 ($P < 0.05$) times the values of patients with CCI of atherosclerotic origin: in the first group of patients IL-1β was 14.96 ± 0.86 pg/ml, whereas in the second group – 12.71 ± 0.58 pg/ml.

Table 1.– The average indices of proinflammatory cytokines (pg / ml) in patients with CCI of different genesis, M ± m

Index	Control group. n = 29	1st group. n = 53	P_1	2 nd group. n = 31	P_1	P_2
IL-1β	9.94 ± 1.78	14.96 ± 0.86	< 0.05	12.71 ± 0.58	< 0.05	< 0.05
IL-6	3.42 ± 0.28	9.06 ± 0.54	< 0.001	6.94 ± 0.34	< 0.001	< 0.01
TNF-a	4.58 ± 0.81	11.70 ± 0.64	< 0.001	8.04 ± 0.36	< 0.001	< 0.001

According to literature data, IL-1β is a multifunctional cytokine with a wide spectrum of action, plays a key role in the development and regulation of nonspecific defense and specific immunity, one of the first included in the response protective reaction of the organism under the action of pathogenic factors (Biochemmak). The main producers of IL-1β are macrophages and monocytes, as well as lymphocytes, fibroblasts. IL-1β initiates and regulates inflammatory, immune processes, activates neutrophils, T- and B-lymphocytes, stimulates the synthesis of acute phase proteins, cytokines (IL-2,–3,–6, TNF-a), adhesion molecules (E -selectins), procoagulants, prostaglandins. It increases chemotaxis, phagocytosis, hemopoiesis, permeability of the vascular wall, cytotoxic and bactericidal activity, has a pyrogenic effect, etc. Endothelial cells of human vessels under the influence of IL-1α and β secrete polypeptides, like thrombocyte growth factor. These polypeptides can stimulate cellular migration and proliferation and cause the release of vascular mediators of inflammation, which, with a significant increase in these cytokines, can lead to an disseminated intravascular coagulation. The observed increase in the level of IL-1β in our patients seems to be due to the stimulation of pre-ILβ ligand by the CD40 ligand and the release of biologically active cytokine in endothelial cells and arterial cells, thus indicating both the mechanism of DIC activation in the inflammatory process atherogenesis and other pathological conditions, as well as a new mechanism of IL-1β activation in vascular cells. It has been established that Th1 cells produce powerful cytokines with a pro-inflammatory effect, such as IL-1β, TNF-α, etc. [6, 8]. Th2 cells secrete anti-inflammatory cytokines, such as IL-4, which stimulate the predominantly humoral immunity unit. Violation of the balance of production of Th1/Th2 cytokines is of great importance in the immunopathogenesis of the development of CCI and its progression. Based on the foregoing, we studied the cytokine content of IL-6 in the serum of patients with CCI. Analysis of the content of IL-6 in the serum of peripheral blood of patients with CCI allowed to reveal a significant increase in all study groups relatively to control. Thus, in the 1st group, the IL-6 level was increased 2.65 times ($P < 0.001$), in the 2nd group – in 2.02 times ($P < 0.001$), with respect to the control, making 9.06 ± 0, 54 pg/ml and 6.94 ± 0.34 pg/ml, respectively. As can be seen from the data presented, at CCI of hypertensive genesis, the changes in IL-6 level are more pronounced and significantly exceed the values of patients with CCI atherosclerotic genesis of 1.31 times ($P < 0.01$). It should be noted that IL-6 induces the synthesis of acute phase proteins, and therefore (as well as IL-1β and TNFα) can be referred to as inflammatory cytokines. According to the literature, IL-6 causes a significant increase in the level of the c-sis gene (β-chain) mRNA in cultured human endothelial cells, which can mediate inflammatory vascular effects. Another cytokine that determines the development of inflammatory processes is TNF-α. The study of its level in patients with CCI of different genesis showed a significant increase in all patients. Thus, it was found that the serum level of TNF-α in the group of patients of the 1 st and 2nd groups was increased in 2.56 ($P < 0.001$) and 1.76 ($P < 0.001$), respectively, relatively to the control group, 11.70 ± 0.64 pg/ml and 8.04 ± 0.36 pg/ml in the 1st and 2nd groups, with a control value of 4.58 ± 0.81 pg/ml. We found a significant increase in the levels of TNF-α in groups of patients

with CCI in the background of hypertension, and in the first group of patients the level of TNF-α was increased in 1.45 times compared with the value of the second group. Consequently, we found a significant increase in serum TNF-α in both groups of patients with CCI, which can serve as a criterion for the presence of an inflammatory process in CCI.

It should be noted that the group of tumor necrosis factors includes TNFα and β (lymphotoxin). TNFα is a product of monocytes/macrophages, endothelial, mast and myeloid cells, glia cells, in special cases – activated T-lymphocytes. The latter are the main producers of TNFβ, which is formed by the action of antigens and mitogens on T-cells much later than TNFα (2–3 days after activation). There are three main areas of action of TNF: cytotoxic, directed at tumor cells or cells infected with viruses; immunomodulatory and anti-inflammatory, causes the activation of macrophages, neutrophils, eosinophils, and endothelial cells; influence on the metabolism, which can lead to hyperglycemia, bone resorption and increased muscle glycogenolysis, i.e. cachexia, observed in some parasitic infections. As a result of the release of TNF, the permeability of capillaries increases, the endothelium of the vessels is damaged, and intravascular thrombosis develops. It is TNF-α that plays an important role in the development of inflammatory vascular lesions. Excessive levels of pro-inflammatory cytokines, such as TNF-α, IL-1β and IL-6, contribute to the maintenance of the inflammatory process in the body as a whole and can enhance blood coagulation.

At the same time, of the proinflammatory cytokines studied by us, the highest level was determined by IL-6 in relatively to the control. However, the severity of these changes was different. The greatest increase was characteristic for IL-6 and TNF-α. Thus, in patients with hypertensive CCI, the level of these cytokines exceeded the values of IL-1β and TNF-α in 1.76 ($P < 0.01$) and 2 ($P < 0.001$) times, respectively. In patients with CCI of atherosclerotic genesis, this increase was 1.59 ($P < 0.01$) and 1.37 ($P < 0.05$) times, respectively, IL-6 and TNF-α cytokines. In our opinion, this is due to the development of inflammatory vascular effects under the influence of IL-6 and TNF-α: an increase in the penetration of capillaries, damage to the endothelium and the development of intravascular thrombosis. Next, we studied the status of proinflammatory cytokines, depending on the degree of hypertension in patients with chronic hypertensive genesis (Table 2). It was found that the serum level of IL-1β in patients with AH I degree was 11.39 ± 1.17 pg/ml, AH II degree – 15.95 ± 0.98 pg/ml ($P < 0.01$), AH III – 20.27 ± 2.26 pg/ml ($P < 0.01$). It should be noted that the content of IL-1β in AH I degree only tended to increase, whereas as the weight of hypertension increased, the changes were statistically significant: an increase of 1.61 ($P < 0.01$) in AH II degree and 2, 04 ($P < 0.001$) times with AH III degree in relation to the control. In the intergroup difference, it was found that the level of IL-1β was increased by 1.4 ($P < 0.01$) in patients with AH II and in 1.78 ($P < 0.01$) in patients with AH grade III group AH I degree.

Table 2. – The average indices of proinflammatory cytokines (pg / ml) in patients with chronic hypertensive genesis as a function of the degree of hypertension, M ± m

Index	Control group. n = 29	Group 1 (n = 53)		
		AH degree I. n = 21	AH of II degree.n = 22	AH III degree. n = 10
IL-1β	9.94 ± 1.78	11.39 ± 1.17	15.95 ± 0.98**^^	20.27 ± 2.26**^^
IL-6	3.42 ± 0.28	6.89 ± 0.82***	9.75 ± 0.61***^^	12.12 ± 1.29***^^
TNF-a	4.58 ± 0.81	9.07 ± 0.96***	12.63 ± 0.81***^^	15.21 ± 1.32***^^^

*Note: * – the differences with regard to the control group are significant (** – P < 0.01, *** – P < 0.001); ^ – the differences relatively to the AH data of the 1st degree are significant (^^ – P < 0.01, ^^^ – P <0.001).*

Unlike the IL-1β indices, the content of IL-6 in the serum of peripheral blood of patients increased more strongly. Thus, in patients with AH I degree, the level of IL-6 increased statistically significantly in 2.1 ($P < 0.001$) times, in 2.85 ($P < 0.001$) times – with AH II degree and in 3.54 ($P < 0.001$) times – with AH III degree in relation to the control. Thus, IL-6 in the group of patients with AH I degree was 6.89 ± 0.82 pg/ml, with grade II AH – 9.75 ± 0.61 pg/ml, while in the group with grade III AH – 12, 12 ± 1.29 pg/ml. Regarding the values of patients with AH I degree, in patients with II grade hypertension the level of IL-6 increased in 1.42 ($P < 0.01$), and in patients with AH III this increase was 1.76 ($P < 0.01$) times. As can be seen from the data presented, the IL-6

content progressively increases with the aggravation of the pathological process. Analysis of the level of TNF-α in the serum of patients with AH showed a progressive increase in it. Thus, in patients with AH I, AH II and AH III degrees, the level of this cytokine was increased in 1.98 ($P < 0.001$); 2.76 ($P < 0.001$) and 3.32 ($P < 0.001$), respectively, with respect to the values of the control group of individuals. We found a significant increase in the level of TNF-α in the group of patients with AH III degree. In comparison with the indices of the group of patients with AH I degree, the values of TNF-α increased in 1.4 ($P < 0.05$) times in the group of patients with AH of II degree and in 1.7 ($P < 0.01$) times – in patients with AH III degree.

Thus, the conducted studies showed a progressive increase in the content of the cytokines studied as the degree of hypertension increased. The greatest changes are characteristic for AH III degree, especially IL-6 and TNF-α. Next, we studied the content of proinflammatory cytokines as a function of the duration of hypertension in patients of group 1 (Table 3). Comparative analysis showed that the serum level of IL-1β in patients with AH I degree up to 5 years was 10.22 ± 0.92 pg/ml, more than 5 years – 12.67 ± 2.23 pg/ml. They had only a tendency to increase relative to the values of practically healthy individuals, the differences between the groups were statistically insignificant. The serum IL-6 level was 6.26 ± 0.62 pg/ml and 7.59 ± 1.60 pg/ml in the group of patients with AH I degree with duration of disease up to and above 5 years, exceeding the normative values of 1, 83 ($P < 0.001$) and 2.22 ($P < 0.001$) times, respectively. The differences between the groups were statistically insignificant. The level of TNF-α in the group of patients with AH I degree to 5 years and more than 5 years was 8.15 ± 0.71 pg/ml and 10.08 ± 1.86 pg/ml, exceeding the normative values of 1.78 ($P < 0.01$) and 2.2 ($P < 0.01$) times, respectively, with respect to the control. The differences between the groups were statistically insignificant. As can be seen from the data presented, the differences in the content of proinflammatory cytokines as a function of the duration of hypertension were insignificant and not reliable.

Table 3. – The content of proinflammatory cytokines (pg / ml) in patients, depending on the duration of hypertension, M ± m

Index	**Control group (n = 29)**	**1 group (n = 43)**	
		AH 1st degree (n = 21)	
		AH < 5 years (n = 10)	AH >5 years (n = 11)
IL-1β	9.94 ± 1.78	10.22 ± 0.92	12.67 ± 2.23
IL-6	3.42 ± 0.28	6.26 ± 0.62***	7.59 ± 1.60*
TNF-a	4.58 ± 0.81	8.15 ± 0.71**	10.08 ± 1.86*
		AH of II degree (n = 22)	
		AH < 5 years (n = 12)	AH > 5 years (n = 10)
IL-1β	9.94 ± 1.78	14.75 ± 1.36*^^	17.15 ± 1.38**^^^
IL-6	3.42 ± 0.28	9.36 ± 0.81***^^	10.15 ± 0.94***^^
TNF-a	4.58 ± 0.81	11.89 ± 1.07***^^	13.36 ± 1.23***^^

*Note: * – the differences relatively to the control group are significant (* – P < 0.05, ** – P < 0.01, *** – P < 0.001), ^ – differences relatively to group AH data < 5 years are significant (^^ – P < 0.01, ^^^ – P < 0.001).*

The level of IL-1β in the group of patients with AH of II degree up to 5 years was 14.75 ± 1.36 pg/ml, and in the group with grade II AH more than 5 years – 17.15 ± 1.38 pg/ml, exceeding normative values in 1.48 ($P < 0.05$) and 1.73 times ($P < 0.01$). The differences between the groups were statistically insignificant. The IL-6 content in the group of patients with grade II AH up to 5 years was 9.36 ± 0.81 pg/ml, and in the group with grade II AH more than 5 years – 10.15 ± 0.94 pg/ml. These values were statistically significantly higher than those of practically healthy individuals at 2.74 ($P < 0.001$) and 2.97 ($P < 0.001$) times. However, the differences in the rates between the groups, depending on the duration of the disease, we did not reveal. The TNF- α content in the group of patients with grade II AH up to 5 years was 11.89 ± 1.07 pg/ml, and in the group with grade II AH

more than 5 years – 13.36 ± 1.23 pg/ml. These values statistically significantly exceeded those of healthy subjects in 2.6 ($P < 0.001$) and 2.92 ($P < 0.001$) times. However, the differences in the rates between the groups, depending on the duration of the disease, we did not reveal.

Consequently, in patients with grade II AH, the changes in the indices of all cytokines studied did not depend on the prescription of hypertension.

Thus, the severity of changes in the content of proinflammatory cytokines in patients with CCI of hypertonic genesis, depending on the duration of the disease, was not revealed.

The increase the levels of IL-1β, IL-6 and TNF-α in patients with CCI on the background of hypertension convincingly reflects the dynamics of the immunopathological process, correlating with the clinical picture and the more pronounced decrease in the cognitive scores in this group of patients. In many respects the development of cerebrovascular insufficiency is determined by the formation of micro- and macroangiopathies, leading to the formation of metabolic and hemodynamic disorders. Diffuse lesion of small arteries, observed with CCI hypertensive genesis is accompanied by a wide range of changes in the brain. The defeat of the brain is characterized by the gradual accumulation of ischemic and secondary degenerative changes in the brain, caused by repeated ischemic episodes in various vascular pools, primarily in the blood supply zones of shallow penetrating cerebral arteries and arterioles.

It is known that cerebral ischemia itself leads to the accumulation of cytotoxic substances, which in turn lead to the activation of microglia, which begins to progressively produce cytokines. Apparently, the results obtained by us confirm the increase in the level of proinflammatory cytokines. In addition, a significant increase in production of IL-6 was a marker of the activation of the pathological process in the atherosclerotic genesis of CCI, It is known that IL-6 is an intermediate cytokine, the long-term activation of which is clinically manifested by chronicization and autoimmunization of the organism.

Conclusion: CCI is characterized by an increase in the level of pro-inflammatory cytokines, especially IL-6. The greatest changes were noted in patients with CCI of hypertonic genesis and the dynamics of their level change was directly dependent on the degree of hypertension. The expression of changes in the content of proinflammatory cytokines in patients with chronic hypertensive genesis does not depend on the duration of the disease.

References:

1. Gafurov B. G., Alikulova N. A. Early neuroprotection reduces the risk of developing post–stroke dementia: a scientific publication // Neurology.– Tashkent, 2011.– No. 4.– P. 85–86.
2. Diagnosis and treatment of hypertension. Russian recommendations (revision III). M: VNOK – 2008.
3. Kataeva L. N., Karzakova L. M., Saperov V. N., Oreshnikov E. V. The study of cytokine status in cerebral stroke // Immunology.– 2005.– T. 26.– No. 3.– P. 161–164.
4. Kuvacheva N. V., Salmina A. B., Komleva Yu.K. and others. Normal permeability of the blood–brain barrier, with developmental disorders of the brain and neurodegeneration // Journal of Neurology and Psychiatry.– Moscow,– 2013.– No. 4.– P. 80–85.
5. Martynova G. I. Clinical and immunological comparisons for chronic ischemic disease of the brain of atherosclerotic genesis // Journal of Neurology and Psychiatry named S. S. Korsakov: Appl. Stroke.– Moscow,– 2001.– No. 2.– P. 40–44.
6. Nechunaeva E. V. Immuno–biochemical indicators in the early diagnosis of chronic cerebral ischemia: Abstract.– Ekaterinburg,– 2011.– 25 with.
7. Poletaev A. B., Alferova V. V., Abrosimova A. A. and others. Natural neurotropic autoantibodies and pathology of the nervous system. Neuroimmunology.– 2003.– T. 1.– No. 1.– P. 11–17.
8. Buga A. M., Di Napoli M., Popa–Wagner A. Preclinical models of stroke in aged animals with or without comorbidities: role of neuroinflammation //Biogerontology.– Craiova (Romania),– 2013.– Vol. 14.– No. 6.– P. 651–62.

9. Kuriyama N.(1), Mizuno T., Kita M., et al. Predictive markers of blood cytokine and chemokine in recurrent brain infarction // J Interferon Cytokine Res.– 2009.– Nov 29(11).– P. 729–34. doi: 10.1089/jir.2009.0012. Kyoto, Japan.
10. Smith J.A.(1), Das A., Ray S. K., Banik N. L. Brain Res Bull.– 2012. Jan 4.– 87(1).– P. 10–20. Role of pro–inflammatory cytokines released from microglia in neurodegenerative Diseases // Brain Res Bull.– 2012. Jan 4.87(1).– P. 10–20. Charleston, SC29425, USA.

Hazratkulov Rustam Bafoevich,
Republican Scientific Practical Medical Center
of Neurosurgery, Uzbekistan
E-mail: arslanovazera@gmail.com

CLINICAL COURSE OF TRAUMATIC INTRACRANIAL HEMATOMAS

Abstract: Studied the features of clinical course of 64 patients with traumatic intracranial hematoma in acute period. Were chosen 2 ways of clinical passing – decompensate and sub compensated. Decompensate way of clinical passing marked at 71.0% of victims, when at the first hours after injury had been developed heavy, very heavy, and at one third of sick's terminal state, depression of consciousness level 8 and less marks by Glasgow Coma Scale, (GCS), prevails rude dislocation syndrome. Subcompensated variant develops at 29.1%, state might be as satisfacted, as heavy with depression of consciousness level from 9 to 15 marks by GCS, during expressed cerebral and dislocation symptom otology, focal hemispheric neurological symptoms at half of patients.

Keywords: traumatic brain injury, hematoma, treatment.

Trauma in the past and now days remains one of the main causes of mortality. It is the second leading cause of death after cardiovascular and oncology diseases. Epidemiological data shows that among different types of injuries craniocerebral trauma is one of the main causes of mortality and morbidity and significantly influence on decrease of population labor activity in the industrial countries [1, 2, 4, 9].

The incidence of craniocerebral trauma is 36–40% of all trauma cases [7, 8]. The majority of victims are people of working age. Among the causes of disability, the leading place is occupied by a severe craniocerebral injury (SCCT). It leads to irreversible health disorders in 25–30% of the cases, and the lethality at it is – 68–70% [3, 11].

Serious craniocerebral trauma include now brain damage, which causes a violation of the patient's consciousness level in 3–8 points on the Glasgow coma scale (GCS), when assessing it not less than 6 hours after the injury, in conditions of correction of arterial hypotension, hypoxia and the absence of any intoxication and hypothermia [6, 10].

One type of T SCCT is traumatic intracranial hematomas of large volume. They range from 2% to 16.6% of the total CCT [5, 12].

The purpose of the study: to investigate the clinical course in patients with traumatic intracranial hematomas.

Materials and methods. 64 patients were hospitalized in the Republican Scientific Practical Medical Center of Neurosurgery. They were examined and treated. Among them men – 55 (85.9%), women – 9 (14.1%). All patients recieved urgent care. The majority of patients 48 (75.0%) were delivered in severe or extremely serious condition (the level of oppression on the Glasgow coma scale was 8 or less, 45 (70.3%), acute subdural hematomas. epidural hematomas were 14 (21.9%), and in 7.8% (5 patients) episubdural hematomas were detected.

All patients underwent a comprehensive examination: general and neurologic examination, craniography, ECHO-ES, CT or MRI of the brain. Consciousness was evaluated on the Glasgow coma scale: clear (GCS15 points), moderate stunning (13–14 points), deep stunning (11–12 points), sopor (9–10 points), moderate coma (7–8 points), deep coma (4–6 points), terminal coma (3 points). The task of CT and MRI was to determine the localization, type and volume of hematomas, the volume of foci of brain contusions and all foci of pathological density (hemoangiopathic posttraumatic ischemia, perifocal edema around the hematoma, limited and widespread foci of brain contusion, hygroma).

In patients, the volume of hematomas was 100–160 cm^3 (average volume –130 cm^3). In 75% of the affected patients, the volume of acute subdural hematoma is up to 150 cm^3 (the average volume is 130 cm^3). The volume of acute epidural hematoma in patients varied from 100 to 250 cm^3 (the average size of the acute epidural hematoma was 120 cm^3). The volume of episubdural hematoma

with an average value of 130 cm^3 did not exceed 180 cm^3. In 4 (0,6%) patients bilateral hematomas were detected, their volume in the total exceeded 100 cm^3.

Results and its discussion. Neurological symptoms were divided into cerebral, focal hemispheric and stem. Contraindication to the intervention was only an extremely serious condition of the patient, which required resuscitation (unstable hemodynamics, blood pressure below 80 mmHg). After stabilization of the condition, such patients were also operated. During the traumatic intracranial hematomas surgery, decompressive or osteoplastic craniotomy was performed.

The clinical picture with traumatic intracranial hematomas (TIH) of large volume already in the first hours significantly differed from the classical one. The so-called "light gap" in high-volume TIH was observed rarely in 7 (10,9%) patients. The majority of patients 48 (75,0%) who arrived from the scene were taken in a serious and extremely serious condition, in a coma. Three (0,5%) patients were affected in terminal condition (GCS – 3 points), 4 (0,6%) patients were delivered in extremely serious condition – 4 points according to GCS. Only in 2 (0,3%) patients with high-volume TIH, the level of consciousness during admission was determined by 15 points.

Of the 45 patients with acute subdural hematomas, 25 (39,0%) reported with an inhibition of consciousness of 8 or fewer points in the GCS, with epidural hematomas in 7 (50,0%), and of 5 patients with episubdural hematomas, there were 3 (60,0%)). Severe condition and expressed disorders of consciousness, observed in most cases in patients with high-volume TIH, were characteristic features in the clinical picture. Since most patients came in a coma, to identify verbal disorders, sensitive disorders were often not possible. Of all the victims with traumatic intracranial hematomas of large volume, hemispheric focal neurological symptoms were detected in 19 (29,7%). In the remaining patients, against the background of oppression of consciousness to the coma, clinical signs of dislocation took place. The more severe the condition of the victims, the less frequent and difficult it was to identify focal symptoms. Out of 48 patients admitted with depression of consciousness of 3–8 points, focal symptomatology was detected in 20 (21,7%), out of 13 patients admitted in the state of 9–11 points, local neurologic symptoms were noted in 5 (35,7%). Local neurologic symptoms were more common in acute epidural hematomas 47,6% and less often with acute subdural hematomas – 24,2%. Less detectable focal symptomatology in patients with acute subdural hematomas is most likely due to the severity of their condition. As it was already shown, in the patients with acute subdural hematomas the condition was more severe. The absence of focal neurological symptoms is also attributed to the distinctive features of the clinical picture of traumatic intracranial hematomas of large volume. Lethality in the absence or presence in the clinical picture of traumatic intracranial hematomas of a large volume of local neurologic symptoms was 71,9%, respectively.

Symptoms of brain stem lesions in these patients testified to the induction of the brain in the stage of gross decompensation. Depending on the severity of the patients' condition, the clinical signs of brainstem lesions were manifested by a combination of symptoms, the most frequent of which were eyeballs (83%) mydriasis on the side of the hematoma (80%), bilateral pathological step reflexes (64%). Bilateral mydriasis was noted in 62% of patients admitted in terminal and extremely serious condition. Mortality among patients with a decompensated variant of the clinical course was 71.9% (46 patients out of 64 died).

Subcompensated variant of the clinical course. With this variant of the clinical course, the patients' condition was assessed as satisfactory (2 patients), moderate (5 patients) and severe (12 patients). The level of oppression of consciousness in these observables was estimated from 9 to 15 points according to the GCS. Even with oppression of consciousness to the level of sopor, respiratory disturbances and hemodynamics requiring urgent instrumental correction in patients of this variant of the clinical course of traumatic intracranial hematomas, we did not note. Just like in patients with a decompensated variant of the clinical course, the frequency of detectable hemispheric neurological symptoms depended on the patient's level of consciousness. Focal neurological symptoms were detected in 33% of the patients who received 9–12 GCS depression, and in 62% of patients with a consciousness level of 13–15. Local signs of brain damage (verbal disorders, flattening of the nasolabial fold, deviation of the tongue, hemiparesis or hemiplegia) necessarily accompanied by certain stem symptoms in the form of anisocoria, a decrease in pupillary response to light, diverging strabismus, unstable bilateral patho-

logical reflexes, bradycardia. In 38.3% of patients with HF in the clinical picture prevalent cerebral symptoms (headache, nausea, vomiting), accompanied by moderately expressed stem symptoms (anisocoria, bradycardia, unstable bilateral pathological stop reflexes).

Thus, as in the case of a decompensated variant, the dislocation syndrome prevailed in patients with a subcompensated variant of a large volume of TIH in a clinical picture, and focal neurological symptoms were manifested only in half of the observations. Mortality with a subcompensated option was 33.3%.

Increased mortality among patients with a lack of local neurological symptoms compared with patients who had local neurological symptoms was also associated with a rapidly developing dislocation syndrome and impaired vital brain stem function. The clinical picture of the expressed dislocation syndrome was determined by the damage to the brain stem sections, which often had an irreversible character.

Conclusion. Two variants of the clinical course of acute traumatic intracranial hematomas of large volume are distinguished: decompensated and subcompensated. The decompensated variant of the clinical course was noted in 71.0% of the victims, during which, in the first hours after the trauma, a severe, extremely severe, and in a third of patients the terminal state, the level of oppression of consciousness corresponds to 8 or less points in the GCS, a rough dislocation syndrome predominates hemispheric symptoms. The lethality with this variant reaches 71.9%.

A subcompensated variant of the clinical course develops in 29.1% of the patients – the condition can be either satisfactory or severe with depression of consciousness from 15 to 9 points according to the GCS; on the background of severe cerebral and dislocation symptoms focal hemispheric neurologic symptoms were noted in half of the patients. Mortality with a subcompensated version of the clinical course is 33.3%

References:

1. Golovko S. M. Errors in the diagnosis of traumatic intracranial hematomas (HBH) and ways to overcome them / S. M. Golovko, V. Krylov // IV congress of Russian neurosurgeons: Mater. Congress in the Research Institute of Neurosurgery named after. N. N. Burdenko RAMS, 18–22.06.2006.– Moscow.– 2006.– 325 p.
2. Kasumov R. D. Basic principles of providing urgent neurosurgical care to patients with isolated severe craniocerebral trauma / R. D. Kasumov // Neurosurgery.– 2006.– No. 2.– P. 66.
3. Kasumov R. D. Results of the development of surgery for severe craniocerebral trauma / R. D. Kasumov, V. R. Kasumov // Rus. neurosurgery. journal. after named. prof. A. L. Polenov.– 2009.– Vol. 1.– No. 1.– P. 20–24.
4. Kondratiev A. N. Urgent neurotraumatology / A. N. Kondratiev.– Moscow: GEOTAR–Media,– 2009.– 192 p.
5. Krylov V. V. Decompressive trepanation of the skull in severe craniocerebral trauma. Krylov, A. E. Talypov, Yu. V. Puras.– M.: [б.и.],– 2014.– 272 with.
6. Likhterman L. B. Neurology of craniocerebral trauma / L. B. Lichterman.– M.: Andreeva T. M.,– 2009.– 385 p.
7. Potapov A. A. Craniocerebral trauma: problems and perspectives / A. A. Potapov, L. M. Roshal, L. B. Likhterman, A. D. Kravchuk // journal. questions. neurosurgery.– 2009.– No. 2.– P. 3–8.
8. Potapov A. A. Craniocerebral injury: the foundamental problems and clinical. solutions / A. A. Potapov, A. N. Konovalov, A. D. Kravchuk et al. // Modern technologies and clinical studies in neurosurgery / under. ed. A. N. Konovalov.– Moscow: Edition IP T. A. Alekseeva,– 2012.– T. 1.– P. 159–265.
9. Talypov A. E. Diagnostics errors in traumatic intracranial hematomas. Part 2 / A. E. Talypov, S. M. Golovko, J. S. Ioffe, V. V. Krylov // Neurosurgery.– 2009.– No. 1.– P. 43–48.
10. Bhatia A. Neuromonitoring in the intensive care unit. I. Intracranial pressure and cerebral blood flow monitoring / A. Bhatia, A. K. Gupta // Intensive Care Med.– 2007.– Vol. 33.– No. 7.– P. 1263–1271.
11. Steyerberg E. W. Predicting outcome after traumatic brain injury: development and international validation of prognostic scores based on admission characteristics / E. W. Steyerberg, N. Mushkudiani, P. Perel et al. // Publ. Lib. Sci. Med.– 2008.– Vol. 5.– No. 8.– P. 1–165; discussion.– P. 165.
12. De Bonis P. Decompressivecraniectomy for elderly patients with traumatic brain injury: it's probably not worth the while. P. de Bonis, A. Pompucci, A. Mangiola et al. // J. Neurotrauma.– 2011.– Vol. 28.– No. 10.– P. 2043–2048.

Shukurov Ravshan Tulkinovich,
Candidate of Medical Science,
Clinical Care Deputy Director
of the Republican Specialized Cardiology Center,
E-mail: ravshan.shukurov@minzdrav.uz

Kurbanov Ravshanbek Davletovich,
Member of the Academy of Sciences,
Director of the Republican Specialized Cardiology Center,
E-mail: ravshan.shukurov@minzdrav.uz

Abdullaev Timur Atanazarovich,
Doctor of Medicine, Professor,
Head of the Non-Coronarogenic Myocardial Diseases
and Heart Failure Department,
E-mail: ravshan.shukurov@minzdrav.uz

SELF-MONITORING TRAINING AND ACTIVE OUTPATIENT OBSERVATION IN PATIENTS WITH CHRONIC HEART FAILURE

Abstract: The influence of group self-monitoring and self-care training of 204 patients with chronic heart failure of II–IV functional class according to NYHA (average age – 58.7 ± 12.9 years) on functional status, quality of life, exercise tolerance, echocardiography indices, rate of adverse events development was studied. The duration of follow-up period was 6 months. Self-monitoring and self-care training of patients with CHF contributed to functional status improvement, quality of life improvement and exercise tolerance. The following results were noted: therapy high compliance maintenance, rate and risk of repeated admissions associated with CHF decompensation reduction, left ventricular ejection fraction increase in group training group.

Keywords: chronic heart failure, outpatient observation, therapeutic training, patient training, self-monitoring, self-care.

To the present day cardiovascular diseases consolidated their leading position in the structure of morbidity and mortality and in Uzbekistan their share is 59.3% in the structure of total mortality [1]. Chronic heart failure (CHF) hardly worsens the quality of life of patients, 4 times increases the risk of mortality, and mortality rate of patients within 1 year is 15–50%. Despite the certain achievements in CHF diagnosis and treatment, the prognosis for these patients remains unfavorable. The half of all patients dies within 5 years after diagnosis establishment [2]. Heart failure (CF) remains one of the topical health care problems in many countries in the world, including Uzbekistan [3].

One of the effective methods for quality of patients with heart failure treatment improvement became the heart failure treatment regimens, the most important part of which is the training of patients and their relatives [4]. Thus, according to meta-analysis of 6 relevant clinical trials data, the training in combination with active patients' observation didn't affect their mortality compared to control group within 6 months, but it halved the risk of admission in case of CHF [5]. Analysis of the patients with CHF admission reasons showed that in almost 70% of cases they are based on behavioral factors (recommended way of life non-compliance: nutritional care, exercise regimen, drug therapy) [4]. According to study results, only one third of the patients after discharge from the hospital continue to take angiotensin-converting enzyme inhibitors (ACE inhibitors) and only 15% – beta-blockers (BB) and diuretics [5, 6]. In con-

nection with the above, the main problem of HF treatment is that even considering proper diagnosis, timely and adequate therapy, the effectiveness is inadequate, as patients poorly follow recommendations. In addition to correct treatment order, it is also necessary to ensure that the patient will follow all the recommendations.

The **aim** of this study was to determine the role of training and outpatient observation in treatment optimizing in patients with CHF.

Materials and methods: Patients' selection and their inclusion in study were carried out in the Department of the Republican Specialized Cardiology Center of the Ministry of Health of the Republic of Uzbekistan. The study was screening and included the patients diagnosed with CHF [4]. The study included 204 patients aged from 19 to 82 years (average age 58.7 ± 12.9), where 127 (62.3%) were men and 77 (37.7%) – women. Patient's medical history study allowed finding out that before admission, HF clinical features and symptoms were manifested from several months to 15 years ago.

The main cause of CHF was coronary heart disease (CHD) (58.8%), and in more than half of cases (68.3%) it was combined with arterial hypertension (AH). Noncoronarogenic myocardium diseases included: evoked and congenital heart disorders – 16.2%, cardiomyopathy – 11.3%, myocarditis – 1%, AH without visceral injury – 12.7%. The results of this study part are associated with previous multicenter trials in Europe and Russia, demonstrating the large IHD contribution to CHF development [7, 8]. In 27.5% of cases, diabetes mellitus (DM) of type 2 and 18.6% of Chronic Obstructive Lung Disease (COLD) were detected as a background disease.

All the patients underwent well-defined therapeutic training, including two group sessions for 30–40 minutes. Before discharge from the hospital, each patient received written recommendations that contained a list of drugs including the doses and dosage frequency, directions for salt consumption reduction and daily control of body weight, as well as an instruction sheet for patients with CHF and session materials. In addition, the clinic's telephone numbers for patient calling a doctor for advice are also listed. Throughout the follow-up period, patient's condition and patients' adherence to prescribed treatment were assessed via calls once per month, and treatment recommendations were given. A drug therapy was carried out at hospital in accordance with national standards for CHF treatment. After discharge from the heart disease department, all patients were recommended to continue taking prescribed drugs. The follow-up period was 52 weeks, during which each patient visited the doctor 3 times: first visit – initiating (week 0), second visit – interim (week 24), third visit – final (week 52).

Over the follow-up period, the dynamics of the following parameters was analyzed: patients' clinical state, 6-minute walk test distance, quality of life (QoL) by use of Minnesota Living with Heart Failure questionnaire (MLHFQ), heart structure and function objective indicators according to echocardiography (ECHO), patients' adherence to treatment, adverse events development – repeated admissions, CHF decompensation, death.

The study results are processed by variance analysis methods (Student's t-test for paired calculations and χ^2 criterion) using BIOSTAT software package. The data are presented in the form of M ± SD. Statistically significant were the differences at $p < 0.05$.

Study results and their discussion: Patients regularly took ACE inhibitors/angiotensin-2 receptor antagonists (AIIRA), aldosterone antagonists and indirect oral anticoagulants in 99%, 93.8% and 19.5% of cases, during the first 24 weeks, respectively, where the good tolerability and safety of these drugs were observed. By week 24, 91.8% of patients continued to take BB, where a heart rate decrease (HR) was observed in 12 patients who took drugs in combination with amiodarone, whereanent they stopped taking BB. At the same time, by week 24 of the follow-up a significant decrease to 38.5% in the need for diuretics was observed due to CHF symptoms and signs decrease in patients. By week 52 of the follow-up, 88.8%, 92.9% and 19.4% of patients continued to take BB, aldosterone antagonists and indirect oral anticoagulants on a regular basis, and respectively, the drugs were tolerated well, without side effects. During the second half of the year, 89.4% of patients took ACE/AIIRA, 19 patients stopped taking the drug due to arterial blood pressure decrease. By week 52 of the follow-up, the need for diuretics was noted in 20.6% of patients.

A close correlation between the patients' with CHF health literacy level and their adherence to treatment was revealed. Thus, Noureldin M. et al. [9] found that patients with CHF with an adequate health literacy level are more confined to regular drug intake (69.4%) than the patients with a low health literacy level (54.2%), $p = 0.001$. The authors believe that patients' health literacy

improvement should be one of the main components in their adherence to therapy increase. The study of L. B. Lazebnik's et al, in which the analysis of reasons for patients with CHF repeated admission and their cost characteristics presented, is especially noteworthy [10]. It turned out that the situation concerning patients with CHF treatment in the Russian Federation both at the hospital and at outpatient levels remains extremely alarming. Outpatients with stage II CHF received ACE inhibitors only in 50% of cases, and BB took less than 25% of patients. According to CHF severity increase, the treatment of patients becomes more inadequate to existing recommendations. Only 55% of patients with stage II CHF use ACE inhibitors, and BB – 14.7%. In patients with stage III CHF, ACE inhibitors usage decreases to 21.9% and BB to 6.2%, while the frequency of cardiac glycosides prescription increases to 71.9%.

Thus, training and dynamic monitoring of doctor's recommendations following by the patients allowed to really maintaining a sufficiently high patients' adherence to therapy. How did this affect the disease state?

The tolerance of physical activity significantly improved in patients. According to 6-minute walk test results, a significant tolerance to physical activity increase was noted in 24 and 52 weeks. The distance of 6-minute walk test initially was 196.6 ± 69.2 m. After 24 and 52 weeks of the follow-up and treatment, its increase to 302.5 ± 81.8 and 329.1 ± 82.4 m was observed, respectively, $p < 0.05$ compared to initial data. Similar data were also obtained in the study of S. Berdnikov [11], where the functional status of patients was significantly improved in the group of outpatient self-monitoring according to 6-minute walk test results. The distance run in 6-minute walk test in the group by month 9 of the study increased on average from 174.5 (108–231.5) m to 248.5 (142–324) m ($p = 0.001$). By the end of the study, the distance run in 6-minute walk test in outpatient self-monitoring group was significantly greater than in the control group ($p < 0.05$).

QoL assessment by using Minnesota Living with Heart Failure Questionnaire during the follow-up period revealed a tendency to positive dynamics in comparison with initial data. QoL improvement by week 24 was noted by 14.1% (58.7 ± 11.4 points), and by week 52 – by 28.1% (49.1 ± 9.5 points) compared with initial indices ($p < 0.05$). There is data that patients' QoL with insufficient medical literacy is lower than in patients who have an adequate medical literacy level (55.4 vs. 63.9 according to Heart Failure Symptom Scale, adjusted difference 7.20, $p < 0.01$) [12]. Based on the study conducted by Lycholip E. et al. [13] results, patients with CHF training improved their quality of life (it was assessed using Minnesota Living with Heart Failure Questionnaire, 37.9 ± 18.78 vs. 49.39 ± 17.86 before training, $p < 0.001$).

Thus, a significantly better functional state and greater tolerance to physical activity were established in patients with CHF under active care, against the background of therapy conducted.

A sufficient duration of the current study allowed obtaining evidence of cardiac remodeling progression containment possibility during adequate therapy. Central hemodynamics parameters according to ECHO data underwent significant changes. After 24 weeks of the follow-up, end-systolic dimensions (ESD) of left atrium (LA), end-diastolic (ED) and end-systolic volume (ESV) of left ventricle (LV) indices decreased from 4.37 ± 0.89 to 4.23 ± 0.8 cm, from 200.7 ± 67.2 to 192.6 ± 55.4 ml and from 112.9 ± 53.6 to 101.3 ± 45.7 ml ($p < 0.05$), respectively, and consequently, left ventricle ejection fraction (LVEF) increased from 45.6 ± 8.6 to 49.3 ± 9.4% ($p < 0.05$). The analysis after 52 weeks of the follow-up showed that the majority of patients had positive dynamics maintenance on the part of ECHO indices, compared with initial indices. Thus, by week 52, a decrease in LA ESD to 4.2 ± 0.76 cm, LV ED to 189.9 ± 55.3 ml, LV ESV to 100.1 ± 44.5 ml ($p < 0.05$) and an increase in LV EF to 48.9 ± 9.4% ($p < 0.05$) were observed. All this testifies to active follow-up and adequate therapy positive influence on our patients' basic cardiovascular system indices.

Similar results were obtained in the study of N. A. Koshelev et al. [14], where in patients of active surveillance group, by 24th week, a significant improvement of such parameters as LA ESD, LV ESD, compared with the parameters of patients from the standard treatment group was observed. At that, EF in patients of active follow-up group, become more significant than EF in patients of the control group. At further follow-up, the patients of the control group continue to show unfavorable dynamics of echocardiographic parameters changes.

Thus, adherence to recommended medication allows patients to achieve a certain intervention in cardiac remodeling in actual clinical practice. Does active outpatient management of patients with CHF affect their prognosis, adverse events development?

Yes, it does. Even over such a relatively short period, positive changes in patients' treatment results were noted. The total number of adverse events during the year was 34 cases (16.7%). At that, repeated admissions at an early stage (first 3 months after discharge from the hospital) were not required. The frequency of repeated admissions within one year after discharge was 33 (16.2%) cases, 16 (48.5%) of which were men. The main reason for repeated admissions was CHF decompensation – 24 (72.7%) cases. Other reasons for admissions were observed in 9 cases: 7 (21.2%) of patients were admitted due to atrial fibrillation seizure development, an acute cerebrovascular disease was diagnosticated in 1 patient, in another case, the cause of admission was COLD recrudescence. Causative factors and comorbidity analysis showed that comorbid conditions most frequently were observed in repeatedly admitted patients (myocardial infarction in anamnesis – 54.5% vs. 49.4% ($\chi^2 = 0.001$, $p = 0.98$), permanent form of atrial fibrillation – 33.3% vs. 16.5% ($\chi^2 = 4.04$, $p = 0.046$), type 2 diabetes mellitus 42.4% vs. 24.7% ($\chi^2 = 4.31$, $p = 0.038$), COLD30.3% vs. 12.4% ($\chi^2 = 5.56$, $p = 0.018$) compared with the group of not repeatedly admitted patients. A distinctive feature of modern therapeutic and diagnostic process is the comorbidity availability in patient [15]. In general, the comorbidity prevalence rate is 20–30% among population at large, 55–98% among elderly and senile patients [16]. According to the data of some authors, among the majority of elder patients CHF almost never runs independently: in 12% it is combined with COLD [17], a combination with type 2 diabetes mellitus is observed from 12 to 22% of cases and reaches 30% in patients with CHF of ischemic genesis [29]. When comparing the indices of systolic and diastolic blood pressure, heart rate differences are not also revealed ($p > 0.05$). According to ECHO, LV EF values in repeatedly admitted patients and the number of patients with systolic dysfunction didn't vary definitely ($p > 0.05$) in comparison with singly admitted patients. Also, the age-related aspect of re-admitted patients, which showed an increase of the mean age (70.4 ± 6.8 years) and the number of patients older than 65 years (75.8%) was analyzed. The patient's age is an important predictor in medicine. Young CHF patients have some features of relatively elderly patients, who have a lot of concomitant diseases, higher risk of side effects after drug therapy. Elderly patients are treated less intensively than young patients, as evidenced by the results obtained. According to E. V. Efremov et al. [18] the patients with CHF with a high comorbidity were older than the patients with a low comorbidity: 67.6 ± 8.2 and 55.2 ± 7.0 years, respectively, $p < 0.01$. The total number of nosologies in patients with CHF also increases with age ($p < 0.01$).

No fatal outcomes among the patients examined were detected during the first six months of the follow-up. During the period from 24th to 52nd week of the follow-up, 1 patient (0.5%) died at the age of 43 years. This patient died at home and the post mortem examination wasn't carried out. According to relatives, the patient's death occurred suddenly. Two years ago the patient was diagnosed with dilated cardiomyopathy, frequent, complicated ventricular arrhythmia types, as well as runs of ventricular tachycardia were noted. The risk factors were smoking, abuse of alcohol; the patient sometimes violated the diet and salt-water regimen. Against the background of complex standard therapy, the patient regularly took a maintenance amiodarone dose – 200 mg per day. Perhaps, a ventricular tachycardia with transition to ventricular fibrillation was developed in patient, in connection with which a sudden death occurred. Based on the results of retrospective cohort study conducted by Peterson P. N. et al. [19] it is established that low medical literacy level in patients with CHF is independently associated with high rates of their mortality – 17.6% vs. 6.3% in patients with CHF with an adequate medical literacy level (RR1.97, 95% CI 1.3–2.97, $p = 0.001$).

The need for "Schools for patients with CHF" ubiquitous organization, which would allow to timely identifying the patients who lose the capacity to conduct adequate self-monitoring and increase their adherence to treatment by training is obvious. The strategy of active outpatient monitoring and self-care among the patients with CHF, on-call consulting of them allowed not only to improve the culture of outpatient self-monitoring, adherence to treatment and functional status of patients, but also to reduce the number of repeated admissions. At the same time, the need for repeated admissions reduction realizes a significant economic effect of this form of patients' outpatient management. The directions for further research are seen in studying online training opportunities for patients, the role of nurses in patients' outpatient self-monitoring organization and multidisciplinary approach and telemedical technologies introduction.

References:

1. Нагаева Г. А., Мамутов Р. Ш., Абидова Д. Э., Аминов А. А., Алиева З. Х., Мун О. Р. Структура сердечно-сосудистой патологии на догоспитальном и стационарных этапах (фрагмент исследования РОКСИМ–УЗ) // Кардиология.– 2016.– № 1.– С. 42–47.
2. Фомин И. В., Агеев Ф. Т. Эпидемиология хронической сердечной недостаточности в Российской Федерации: Хроническая сердечная недостаточность.– М.: ГЭОТАР–Медиа,– 2010.– 77 с.
3. Курбанов Р. Д. Профилактика основных факторов риска основа снижения смертности от сердечно-сосудистых заболеваний [Электронный ресурс] // Здравоохранение Узбекистана.– 2011.– № 41.– Режим доступа: URL: http://uzssgzt.uz/ (20.12.2017).
4. Кардиореабилитация / Сост. Г. П. Арутюнов.– М.: МЕДпресс-информ,– 2014.– 336 с.
5. Мареев В. Ю., Агеев Ф. Т., Арутюнов Г. П. Национальные рекомендации ВНОК И ОССН по диагностике и лечению ХСН (четвертый пересмотр) // Сердечная Недостаточность.– 2013.– № 14.– С. 379–472.
6. Арутюнов Г. П., Колесникова Е. А., Рылова А. К. Современные подходы к реабилитации больных с хронической сердечной недостаточностью // Кардиосоматика.– 2010.– № 1.– С. 20–24.
7. Cleland J., Swedberg K., Follath F. et al. The EuroHeart Failure survey programme – a survey on the quality of care among patients with heart failure in Europe. Part 1: patient characteristics and diagnosis // Eur Heart J.– 2003.– No. 24. (5).– P. 442–463.
8. Агеев Ф. Т., Даниелян М. О., Мареев В. Ю., Беленьков Ю. Н. Исследование ЭПОХА // Сердечная недостаточность.– 2006.– № 4.– 3 с.
9. Noureldin M., Plake K. S., Morrow D. G. et al. Effect of health literacy on drug adherence in patients with heart failure // Pharmacotherapy.– 2012.– No. 32 (9).– P. 819–826.
10. Лазебник Л. Б., Дроздов В. Н., Русская Л. В. Причины повторных госпитализаций больных с хронической сердечной недостаточностью и их стоимостные характеристики // Сердечная недостаточность.– 2005.– № 6. (1).– С. 19–22.
11. Бердников С. В. Клиническая и экономическая эффективность различных стратегий амбулаторного ведения пациентов с выраженной хронической сердечной недостаточностью // Сердечная недостаточность.– 2013.– № 2. (76).– С. 89–98.
12. Macabasco–O'Connell A., DeWalt D.A., Broucksou K. A. et al. Relationship between literacy, knowledge, self–care behaviors, and heart failure–related quality of life among patients with heart failure // J Gen Intern Med.– 2011.– No. 26 (9).– P. 979–986.
13. Lycholip E., Celutkiene J., Rudys A. et al. Patient education significantly improves quality of life, exercise capacity and BNP level in stable heart failure patients // Acta Cardiol.– 2010.– No. 65 (5).– P. 549–556.
14. Кошелева Н. А., Ребров А. П. Влияние обучения и амбулаторного наблюдения на оптимизацию лечения больных хронической сердечной гнедостаточностью ишемического генеза // Вестник современной клинической медицины.– 2009.– № 2.– С. 12–16.
15. Fortin M., Stewart M., Poitras M. E. et al. A systematic review of prevalence studies on multimorbidity: Toward a more uniform methodology // Ann Fam Med.– 2012.– No. 10 (2).– P. 42–51.
16. Marengoni A., Angleman S., Melis R. et al. Ageing with multimorbidity: a systematic review of the literature // Ageing Res Rev.– 2011.– No. 10 (4).– P. 430–439.
17. Van Deursen V. M., Urso R., Laroche C. et al. Co–morbidities in patients with heart failure: an analysis of the European Heart Failure Pilot Survey // Eur J Heart Fail.– 2014.– No. 16 (1).– P. 3–11.
18. Ефремова Е. В., Шутов А. М. Коморбидность и прогноз больных при хронической сердечной недоста точности // Сердечная недостаточность.– 2014.– № 5.– С. 294–300.
19. Peterson P. N., Shetterly S. M., Clarke C. L. et al. Health literacy and outcomes among patients with heart failure // JAMA.– 2011.– No. 305 (16).– P. 1695–1701.

Ergashova Nargiza,
applicant for Ph D., Scientific Research Institute of Sanitation,
Hygiene and Occupational Diseases of the
Ministry of Health of the Republic of Uzbekistan
E-mail: javlon.anestezist@mail.ru
E-mail: ludmilamedlib@mail.ru

FEATURES OF EFFECTS OF PESTICIDE NISSORAN ON BREATHING AND OXIDATIVE PHOSPHORYLATION IN MITOCHONDRIA OF SMALL INTESTINE MUCOSA

Abstract: Tissue respiration, oxidative phosphorylation in the mitochondria of the small intestine mucosa during chronic poisoning with a pesticide Nisoran in a dose of mg / kg (1/20 LD50) under conditions of optimal (22 °C) and high air temperature (38 °C) was studied.

Nisoran pesticide in conditions of optimal and high air temperature causes a violation of the functional state of the membranes and the breaking of the oxidative-phosphorylation of substrates of the Krebs cycle in the mitochondria of the small intestinal mucosa.

The use of ascorbic acid, root of licorice, valerian and caraway as a poisoned animal increased tissue respiration and oxidative phosphorylation in the small intestinal mucosa and approaches the control group.

Keyword:

Introduction

Digestive organs disease in the clinical conditions of Central Asia occupy one of the main places among general pathologies [5].

In this regard, a study of the mechanism of the effects of pesticides on the digestive system is one of the main problems. Important information on the state of the organs of the digestive tract can be obtained by studying the function of mitochondria isolated from the mucous membrane of the small intestine [1, 3]. It has been established that, even with mild forms of pathology, the mitochondria membranes form "hidden" lesions, as a result of which the resistance of enzymatic systems to the influence of unfavorable factors decreases [1, 4]. However, we have not encountered the materials of the research of the functional state of the mitochondria of the intestinal tract during intoxication with pesticides, we have not encountered in the literature available to us.

The purpose of the study- the study of tissue respiration and oxidative phosphorylation in the mitochondria of the small intestinal mucosa during poisoning with a pesticide Nisaran under conditions of optimal (22 °C) and high temperature (38 °C) air.

Methods of research. Experiments were carried out on mature female rats weighing 160–180 g. Pesticide Nisporan was injected repeatedly intragastrically (1/20 LD50) for 3 months at an air temperature of 22 °C and 38 °C. The rats were decompensed after 30, 60, 90 days of pesticide administration. Mitochondria of the small intestine mucosa were isolated by differential centrifugation [2]. The respiration of mitochondria and oxidative-phosphorylation was carried out polygraphically (on the polarograph LR-9, Czech Republic) with the help of a platinum electrode [5]. The rate of respiration of the mitochondria was expressed in microatoms of oxygen in 1 min (mi AO2 min). As a substrate used pyruvic acid, succinic, α-ketoglutaric and oxalic-acetic acid.

In case of chronic poisoning of animals with pesticide Nissaran, oxidation rate — V2 (oxidation rate in media with oxidation substrate), V3 (oxidation rate with addition of ADP), V4 (respiration rate after phospholysis of added ADP) of the above substrates of the Krebs cycle and pyruvic acid decreases. Along with blocking the oxidation of substrates in the mitochondria of the small intestine mucosa, the rate of phosphorylation reaction is decreased, and the intensity of oxidative

phosphorylation in the mitochondria of 22 °C of pyruvic and α-ketoglutaric acids, respectively, decreases to 17–29% and 25–38 ADP/O2%, respectively, while in the case of succinic and oxalic acetic acid, the reduction rate in all terms (30, 60, 90 days) decreased 16–17% and 12–21%. In conditions of high air temperature oxidation of phosphorylation in all terms and studied substrates, the coefficient of ADP/O2 significantly changes.

In this case, a disturbance of the oxidative-phosphorylation system of pyruvic and alpha-ketoglutaric acid appears to a large extent, in comparison with the oxidation systems of oxalic acid and succinic acid.

A particularly sharp decrease in the oxidative-phosphorylation rate of the substances studied in the mitochondria of the small intestinal mucosa was observed in animals with a chemical regime, therefore, under the influence of the in-sectoacaricide Nisoran under conditions at an air temperature of 22 ° C and 38 ° C in mitochondria of the small intestine mucosa the degree of oxidation and phosphorylation of keto acids, pyruvic, oxalic-acetic, succinic and α-ketoglutaric acids, especially at elevated air temperatures.

Thus, the Nisoran pesticide under optimal and high air temperature conditions damage the functional state of the membranes and the oxidative phosphorylation of substrate substrates of the tricarboxylic acid cycle in the mitochondria of the small intestinal mucosa.

To activate the intensity of oxidative phosphorylation of the mitochondria of the small intestine mucosa in laboratory animals harvested with insecticacaricide Nisoran, we orally administered a bio-logical active substance, which consists of ascorbic acid, licorice root, valerian and cumin fruit (introduce decoction + ascorbic acid). In all studied ketoacids, tissue respiration increased from 22.6% to 32.7%, and oxidative phosphorylation from 18 to 31%. The appearance of tissue respiration and oxidative phosphorylation led to an increase in the coefficients of ADP/O2.

Thus, on the basis of the data obtained, it can be said that the oxidative phosphorylation of keto acids in the mitochondria of the small intestine mucosa of experimental animals increases, and approaches the control group after the administration of plant preparations and ascorbic acid by poisoned pesticide Nissoran to the animal.

References:

1. Sadikov A. U., Khamrakulova M. A., Iskandarova G. T., Elinskaya O. L., Sadikov U. A. Non–metabolic mechanisms of bioenergetics and methods for determining early detection of pathological processes during pesticide intoxication // Methodological recommendations.– Tashkent,– 2004.– C. 6–8.
2. Sadikov A. U., Khamrakulova M. A., Iskandarova G. T. Methods for the determination of oxidative phosphorylation in toxicology // Methodical recommendations.– Tashkent,– 1997.
3. Nagaev E. R. The influence of extreme factors on metabolism and some ways of directed correction // Ecology of industrial production. Between. branch Scientific and practical journal.–Vyp. 1.– 2005.– C. 49–51.
4. Sadikov A. U. Effect of Uzlayt on the intensity of tissue respiration, oxidative phosphorylation of α–ketoglutaric acid in mitochondria of the liver under optimal and high air temperature // Actual problems of ecology in Uzbekistan. Collection of scientific papers.– Tashkent,– 2007.– C. 96–98.
5. Khamrakulova M.A. Infringement of enzymatic activity of a small intestine at influence of the pesticide of Karate // Journal of theoretical and clinical medicine.– Tashkent,– 2012.– No. 2.– C. 63–10.

Esahanov Shukhrat Normahmadovich,
Scientific Applicant of Samarkand Medical Institute, Uzbekistan

Melieva Manzura Atabaevna,
Associate professor, of the Pediatric Department of Samarkand Medical Institute, Uzbekistan

Rustamova Gulnoza Rustamovna,
Assistant, of the Pediatric Department of Samarkand Medical Institute, Uzbekistan
E-mail: Gulichka211@gmail.com

Mamatkulova Dilrabo Hamidovna,
PhD., Assistant, of the Pediatric Department of Samarkand Medical Institute, Uzbekistan

Turaeva Nafisa Omonovna,
Assistant, of the Pediatric Department of Samarkand Medical Institute, Uzbekistan
E-mail: omonovnaN@gmail.com

CARDIOVASCULAR CHANGES OF VEGETATIVE DYSTONY SYNDROME IN CHILDREN OF 11–15 YEARS ON THE BACKGROUND OF IODINE DEFICIENCY

Abstract: The features of cardiovascular changes in the syndrome of vegetative dystonia in children aged 11–15 years on the background of iodine deficiency. The study included 65 children with VDS with confirmed iodine deficiency, who made up the I-group and 55 children with VDS of the same age who did not have iodine deficiency symptoms (group II) at the time of observation. It was revealed that the symptoms of vagotonia prevailed in the children of the VDS in both groups, and to a greater extent in patients of the I-group who were characterized by severe clinical manifestations, various and profound changes in ECG and EchoCG, which can be explained by insufficient vegetative response and maintenance, adaptive reactions in such patients.

Keywords: cardiovascular changes, vegetative dysfunction, thyroid gland.

Syndrome of vegetative dystonia has a large specific gravity in the structure of childhood diseases. Manifestations of the syndrome in 33,3% of children persist in subsequent periods of life, and in 17–20% of cases they progress, transforming into diseases such as ischemic heart disease, hypo- and hypertonic disease, arteriosclerosis of the vessels, cerebrovascular diseases, and aggravate their course [2].

The thyroid gland (TG) is one of the most important organs of human internal secretion [4]. Lack of thyroid hormones significantly slows down the growth and mental development of the child's organism, contributes to the development of vegetative disorders of generalized nature. Disorders of changes in the cardiovascular system is the most common form of vegetative dystonia in children and adolescents [3; 6]. According to Yu. F. Antropov [1] vegetative-dystonic cardiovascular disorders occur relatively late, usually on the background of pubertal rearrangement of the organism [1].

Vegetative dysfunction in VDS can be manifested locally in various heart structures – in the myocardium, which leads to disturbances in the repolarization process,

or in the conductive system of the heart, resulting in disturbances in rhythm and conductivity [4; 7]. Among the signs of cardiac syndrome of VDS in children, the latter occupy a leading place [5]. The chronic tachyarrhythmia and bradyarrhythmia characteristic of VDS are the cause of early disability and are often associated with a risk of sudden cardiac death [6; 8].

In general, the above data indicate the need to study VDS in children on the background of iodine deficiency in a broader context

Purpose of the research. To study the features of cardiovascular changes in the syndrome of vegetative dystonia in children aged 11–15 years on the background of iodine deficiency.

Material and methods. In order to study the clinical and instrumental indices in children aged 11–15 years with VDS on the background of iodine deficiency, we examined 65 patients with VDS aged 11–15 years with confirmed iodine deficiency, which formed the main group and 55 children with VDS of the same age, who do not have iodine deficiency symptoms at the time of observation (control group).

Results of the research and their discussion. The predominance of vagotonia was indicated by complaints of increased sweating in 33 (50.8%) and 19 (34.5%) (herein and after: in patients of the I and II groups. respectively); chilliness – in 32 (49.2%) and 18 (32.7%); pain in the legs – in 30 (46.2%) and 13 (23.6%); cardialgia – in 38 (58.5%) and 19 (34.5%); nausea – in 33 (50.8%) and 21 (38.2%); vomiting – in 7 (10.8%) and 2 (3.6%); periodical abdominal pain – in 26 (40%) and 17 (30.9%) patients. These patients had such subjective sensations as intolerance to stuffy rooms – in 41 (63.1%) and 22 (40%); a feeling of tightness in the chest and a lack of air – in 34 (52.3%) and 20 (36.4%) patients. Fainting occurred in 12(18.5%) and 5 (9.1%). headaches in 15 (23.1%) and 9 (16.4%). dizziness in 19 (29.2%) and 9 (16.4%) patients. Characteristic signs were: a decrease in physical activity in 41 (63.1%) and 25 (45.5%) and increased drowsiness in 33 (50.8%) and 20 (36.4%) of examined patients.

The predominance of sympathicotonia was manifested by cold extremities in 17 (26.2%) and 12 (21.8%); chilling like hyperkinesis – in 17 (26.2%) and 8 (14.5%); palpitations – in 14 (21.5%) and 12 (21.8%) patients. For patients with a predominant influence of the sympathetic nervous system. headaches were also common – in 10 (15.4%) and 12 (21.8%); mood variability – in 13 (20%) and 14 (25.5%); absentmindness and fast distraction – in 14 (21.5%) and 12 (21.8%): poor sleep – in 15 (23.1%) and 15 (23.1%) patients.

As can be seen from the characteristics of these complaints among the patients of both groups, the vagotonics prevailed, and this was manifested more significantly in the main group.

A large number of changes we have identified from the cardiovascular system. Thus, the widening of the heart borders to the left was noted in 5 (7.7%) of the patients of the main and 3 (5.5%) of the control group. The muting of tones was heard in 55 (84.6%) and 37 (67.3%), on the contrary, loud tones – in 5 (7.7%) and 7 (12.7%) patients. A common symptom is systolic murmur of a functional nature at the apex and at the Botkin point in 45 (69.2%) and 34 (61.8%) of the examined patients. The revealed auscultatory disturbances of a rhythm were noted in the majority of patients of the basic group. In this case, tachycardia was observed in 20 (30.8%), and bradycardia in 30 (46.2%). In the control group, these arrhythmias were detected somewhat less frequently, respectively: 16 (29.1%) and 14 (25.5%). Arterial pressure, as was to be expected in patients with SVD, was unstable, and in both groups there was a tendency to hypotension: 29 (44.6%) and 20 (36.4%). The tendency to increase of blood pressure was observed in 8 (12.3%) of the patients in the main and in 12 (21.8%) – in the control group.

In general, a detailed study of complaints and data from objective research showed that in children with VDS in both groups, the symptoms of vagotonia predominate, and in a greater degree in patients of the main group. All our patients underwent an ECG study. The data of this study are given in (Table 1).

Table 1.– Cardiac changes in subjects with SVD according to standard ECG

№	ECG changes	I group	II group
1	*2*	*3*	*4*
1.	Sinus tachycardia	21 (32.3%)	16 (29.1%)
2.	Sinus bradycardia	27 (41.5%)	17 (30.9%)

1	*2*	*3*	*4*
3.	Sinus arrhythmia	61 (93.8%)	40 (72.7%)
4.	Migration of the pacemaker	9 (13.8%)	2 (3.6%)
5.	Syndrome of weakness of the sinus node	4 (6.2%)	–
6.	Supraventricular extrasystole	3 (4.6%)	2 (3.6%)
7.	Ventricular extrasystole	6 (9.2%)	5 (9.1%)
8.	Paroxysmal tachycardia	1 (1.5%)	2 (3.6%)
9.	Atrioventricular blockade of the I degree	2 (3.1%)	2 (3.6%)
10.	Intra-atrial blockade	3 (4.6%)	–
11.	Blockade of the right crus His bundle	9 (13.8%)	4 (7.3%)
12.	Blockade of the left crus of His bundle	3 (4.6%)	1 (1.8%)
13.	Syndrome of premature ventricular excitability	1 (1.5%)	2 (3.6%)
14.	WPW- syndrome	2 (3.1%)	–

Changing the rhythm of the heart is the most labile and easily recorded reaction of the body in response to any effect, therefore ECG changes were observed by us in all patients. Disturbance of the function of automatism in the form of sinus tachy-, bradycardia, and arrhythmia occurred in the majority of patients in both groups. However, there were some differences. Thus, in patients of the main group, sinus tachycardia was observed more rarely and – bradycardia more often. Sinus arrhythmia is probably characteristic of patients with VDS, but it was also more often revealed in patients of the main group. Such changes as migration of the pacemaker were 2 times more often on the electrocardiogram of patients of the I-st group, we did not register the syndrome of weakness of the sinus node at all in the control group.

Approximately the same disturbances of excitability were observed, these were, in the first place, extrasystoles, which, in general, were infrequent in both groups. Attention is drawn to the more frequent occurrence of conduction disorders in patients with iodine deficiency. Thus, in the main group, compared with the control group we noted signs of an incomplete blockade of the right crus of the his bundle and the branches of the left leg 2 times more often. Although disturbances of intra – atrial conduction were revealed in both groups, clear signs of intracirculatory blockade – only in the I-st group. Finally, more often in children with VDS, iodine deficiency was accompanied by metabolic changes in the ventricular myocardium (in the form of a high, pointed T wave), increased electric systole (QT interval), supraventricular crest syndrome.

Summarizing the results of the ECG study, we can conclude that there are various changes in the electrocardiogram of patients with VDS in children. In patients of the I-st group, ECG features can be considered as more frequent discovery of respiratory arrhythmia, bradycardia, various blockades and other abnormalities, which are predominantly determined by vagotonic influences.

All patients with VDS underwent an EchoCG study. We revealed a significant ($P < 0.05$) increase in Dd in patients of both groups, but in the main group this index exceeded not only the parameters of healthy children, but also the control group indices ($P < 0.001$). In the main group, we noted a significant excess of Ac as well ($P < 0.05$) (Table 2). The increase in the diastolic and systolic dimensions of the left ventricle, most likely, can be explained by a decrease in the tone of the myocardium, which under conditions of overload could lead to dilatation of its cavity. We did not notice significant differences between such indicators of the main and control groups with healthy children, as thickness of posterior wall of left ventricle, diameter of the right ventricle ($P > 0.1$).

Particular attention was paid to the state of systolic function of the left ventricle. Systolic function of the left ventricle was evaluated according to the following indices: Vs, Vd, Impact volume (IV), Fractional index (FI). Evaluation of these indicators in the main and control groups showed that their mean values also did not differ significantly from the standards. However, in-depth analysis within each of the groups revealed heterogeneity of values in dependence not only on the type of VDS, but also on the severity of its manifestations. Thus, in

the control group, in 12 (21.8%) patients with sympathicotonic type of VDS, the mean values of Vs, Vd, IV, and FI were significantly ($P < 0.05$) higher than those of healthy patients, the other patients of this group did not differ from these ones ($P > 0.1$). In the main group, the situation was even more complicated. We also noted a significant ($P < 0.05$) high values of Vs, Vd, IV, FI in 10 (15.4%) patients with sympathicotonia, and in 15 (23.1%) with vagotonia accompanied by distinct bradycardia. Strengthening of the pumping function under vagotonia can be regarded as a compensatory reaction, in the implementation of which bradycardia plays a role, contributing to an increase in the time of diastolic filling [33]. In 10 (15.4%) patients of the primary and 10 (18.2%) children of the control group with sympathicotonia, hyperkinesia of the left ventricular wall was noted. In 12 (18,5%) patients of the main group with vagotonia, with thyroid function deficiency, and in 2 (3.6%) examined patients from a control group with a similar vegetative status, hypokinesia of the walls was revealed.

Table 2.– Echocardiographic dimensions of the heart in healthy children and those in with VDS (M ± m)

EchoCG indices	Healthy children n = 25	The I group n = 65	The II group n = 55
Diastolic diameter mm	40.4 ± 0.51	42.3 ± 0.56 *	39.0 ± 0.45* **
Systolic diameter mm	26.1 ± 0.53	23.8 ± 0.55	25.0 ± 0.49
Thickness of posterior wall of left ventricle mm	7.0 ± 0.35	6.3 ± 0.29	7.2 ± 0.32
Diameter of the right ventricle mm	10.3 ± 0.30	9.5 ± 0.43	9.6 ± 0.37

**– Reliability of indices of the main group. (P < 0.05). **– Reliability of indices of the control group(P < 0.001)*

Summarizing the results of the EchoCG survey, it can be concluded that the changes in echocardiography are more dependent on the initial type of vegetative status and the degree of its severity and are due to the adaptation of CCC in conditions of vegetative dysregulation.

Conclusions. Thus, the study of clinical and instrumental indices in children aged 11–15 with VDS showed the advantage of the vagotonic type of the initial vegetative tone in both groups. The difference in VDS in children on the iodine deficiency can be considered as more severe clinical manifestations, various and profound changes in ECG and EchoCG, which can be explained by insufficient vegetative response and maintenance, as a result of the disturbance of adaptive reactions in such patients.

References:

1. Antropov Yu. F. Functional disorders of the cardiovascular system in depression in children and adolescents // Pediatriya (Russia).– 1998.– No. 6.– P. 36–40
2. Kozlova L. V. To the discussion on the topic "neurocirculatory dystonia in children and adolescents – a disease or borderline state?" // Pediatriya (Russia).– 2003.– No. 2.– P. 105–108.
3. Musadjanova L. H. Characteristics of membrane–metabolic dysfunctions in children with VDS // Pediatriya (RU).– 2000.– No. 2–3.– P. 157–159.
4. Osotova V. P., Chichilova O. P. The prevalence of endocrine diseases in the children of the city of Izhevsk // Pediatriya (Russia).– 1998.– No. 3.– P. 27–29.
5. Poborsky A. N., Tretyak O. V., Poborskaya E. V. Features of vegetative regulation and enzymatic status of lymphocytes in schoolchildren in unfavorable climatic and ecological conditions of medium gain // Pediatriya (Russia).– 2002.– No. 2.– P. 69–73.
6. Sobirova M. M., Sultanov A. T. Vegeto–visceral characteristics of functional cardiopathies in young children // Pediatria.– 2000.– No. 2–3.– P. 203–205.
7. Shcheplyagina L. A., Lebedeva U. M., Nadezhdin D.S. et al. Experience in the use of vitamin–mineral complex containing iodine in children // Pediatriya (Russia).– 2007.– No. 5.– P. 98–103.
8. Caregorodceva L. V. Discussion questions of the VDS. // Pediatriya (Russia).– 2003.– No. 2.– P. 103–105.

Baymakov Sayfiddin Risbaevich,
PhD., of the faculty and hospital surgery.
Tashkent Medical Academy,
E-mail: bsayfiddin@yahoo.com

Adilkhodjaev Askar Anvarovish,
Tashkent Medical Academy,
MD of the Faculty and Hospital Surgery
E-mail: askar1981@mail.ru

Yunusov Seydamet Shevket-oglu,
postgraduate student, the faculty of Surgery
Tashkent Medical Academy,
E-mail: u-s90@mail.ru

Elmuratov Iskandar Urazovich,
postgraduate student, the faculty of Surgery.
Tashkent Medical Academy

THE ROLE AND PLACE OF ENTERAL MANAGMENT IN THE COMPLEX OF TREATMENT OF ACUTE INTESTINAL OBSTRUCTION NON-TOMOROUS ETIOLOGY

Abstract: We analyzed the results of treatment of 176 patients aged 20 to 78 based on the basis of 2nd and 3rd clinics of the Tashkent Medical Academy for the period 2010-2017, on the occasion of acute intestinal obstruction of non-tumor genesis. The most common was the adhesive intestinal obstruction, that was 57.9% in cases. All patients had intra- and postoperative decompression of the intestine. The standard treatment complex was amended with intestinal lavage, enterosorbtion using sorbent - zerotox and early enteral nutrition. The level of decrease of enteral intoxication was assessed by improving the general condition of the patient, determining the level of leukocyte index of intoxication, medium-weight molecules, urea and according to electroenterography, after which was started enteral feeding with a balanced nutrient mixture. Against the background of the complex treatment, spent bed-days amounted to 9 ± 1, postoperative complications 7.4%, without mortality.

Keywords: acute intestinal obstruction, enteral intoxication, syndrome of intestinal insufficiency, enterosorbtion, enteral feeding.

Acute intestinal obstruction (OIO) is one of the most complex problems in emergency surgery of the abdominal cavity [1, 3, 4]. The number of patients suffering from violations of intestinal permeability of non-tumorous genesis increases yearly, especially among the elderly and senile. Against the background of the decline in manifested forms of the disease (curvature, nodulation, invagination, etc.), the incidence of adhesive obstruction significantly increased, which entails an increase in the late treatment of patients in medical institutions, increases the number of diagnostic errors at all stages of providing care to this category of patients [2 , 8, 12].

Syndrome of intestinal insufficiency (SII) is an integral part of the pathogenesis of AIO [1, 5, 14]. SII is a complex symptoms, accompanied by a violation of all bowel functions, resulting in the latter becoming the main source of intoxication and development of multiple organ failure [7, 10, 15]. SII is the main cause of endogenous intoxication and is still one of the most difficult problems in terms of diagnosis and treatment [4, 6, 9].

Paresis of the intestine arises from the dysfunction of the autonomic nervous system, with an increase in the flow of impulses to the muscular shell of the intestinal wall along the sympathetic nerves and the suppression of parasympathetic innervation, which is caused by stimulation of the introns of internal organs and damage to the central nervous system due to intoxication [2, 8, 11]. According to a number of authors, intestinal and intra-abdominal pressure increase is observed, which causes metabolic disorders, absorption of intestinal contents, and translocation of bacterial flora, leading to intestinal insufficiency, which is the main cause of death of patients [5, 13].

Treatment of AIO should include the elimination of the source of obstruction and measures to eliminate its aftermath [1, 9].

The purpose of our study was to improve methods of correcting SII in acute intestinal obstruction of non-tumor genesis by carrying out a complex of enteric measures.

Materials and methods

We conducted an analysis of the examination and treatment of 176 patients with acute mechanical intestinal obstruction of the non-tomorous genesis in the surgical department of the II and III clinics of the Tashkent Medical Academy in the period 2010–2017 at the age of 20 to 78 years. All patients were divided into 2 groups. The control group was 81 (46.1%) patients, and the main group was 95 (53.9%). Among them, there were 109 men (61.9%), and women 67 (38.1%).

Among all the examined patients, the most common cause of AIO was adhesive obstruction, which was observed in 102 (57.9%) cases. All patients with adhesive intestinal obstruction were 5 and 6, respectively, Clinico-morphological classification of peritoneal fibrosis according to P.N. Napalkov (1977). It should also be noted that the adhesive process in 91 cases was the cause of small intestinal obstruction and only 11 cases of colonic obstruction. In 6 (3.4%) patients, intussusception of the small intestine into a thick intestinal cavity was the cause of AIO, and thin-intestinal invagination in 2 (1.2%) patients. Strangulation intestinal obstruction was diagnosed in 49 (27.8%) patients (39 patients with gut rot, 10 with abdominal hernias). Obturation intestinal obstruction was in 17 (9.7%) patients (foreign bodies – 4 patients, gallstones and bezoars – 13 cases). In both groups, in the control group 13 (16%), and in the main 9 (9.5%) patients, peritonitis was performed by peritoneal dialysis according by method of Academician Sh.I. Karimov (1991).

In the control group, postoperative management of patients included antibiotic therapy, correction of homeostatic dysfunction, parenteral nutrition, and decompression of the gastrointestinal tract with a nasogastric tube (due to the impossibility of establishing a nasoenteral probe for technical reasons and a self -productive removal of the probe after the operation, a nasogastric tube was installed).

The main group was divided into 2 subgroups. The first subgroup included 58 patients who underwent a naso-intestinal probe intraoperatively. The complex of treatment was supplemented with decompression of the intestine (DI), bowel lavage (BL), enterosorption. The second subgroup consisted of 37 patients who also had a nasoenteric probe and performed DI, BL, enterosorption and supplemented with enteric probe feeding (EPF).

To conduct BL with enterosorption in the first subgroup of group 2 from the first day of the postoperative period, 1500 ml of saline solution in a complex with enterosorbent (zerotox (domestic production)) was injected into the intestine. This manipulation was performed by patients 3–4 times a day. In the second subgroup, BL was performed with enterosorbent (zerotox) and supplemented with EPF with a balanced nutrient mixture – Perative. EPF was performed in stages, intravenous drip introduced nutrient mixture, after restoration of bowel function.

The effectiveness of the measures performed was assessed depending on the patient's general condition, according to the laboratory test (leukocyte intoxication index (LII) was determined by the Calph-Caliph method (1941), the concentration of medium weight molecules (MWM) toxins according to the method of N.I. Gabrielian and (1986), urea concentration), the appearance of peristaltic waves (determined with the help of electroenceology by EGS–4m apparatus (according to D. Sobakin (1995)).

Results of the study: In patients of the control group, the study of the level of leukocyte intoxication index, medium-weight molecules and urea revealed the first degree of endotoxemia in 18 (22.2%), II degree 45 (55.6%) and grade III – in 18 (22.2% %) of patients. In patients with I degree, peristaltic waves appeared already on day 3, with grade II on days 4–5, and from III to only

6–7 days after the operation, peristaltic waves close to normal on day 5.

The results of the study show that when using the nasogastric tube there is no possibility of adequate decompression of the intestine (there is no possibility of aspiration of the contents of the intestine, passive outflow is difficult due to a persistent intestinal paresis, active aspiration is not possible due to suction of the gastric mucosa to the probe). All this aggravated the patient's condition due to the preservation of endotoxemia for a long time, the absence of intestinal peristalsis and the intestinal absorption function, which made it impossible to start feeding the patient. Continuing intoxication played an important role in the development of complications in 19 (23.4%), and lethality in 7 (8.6%) cases.

In the main group, conducted studies at an early postoperative period revealed high indices of LII, MWM and urea levels, as well as a persistent disturbance of the digestive and suction function of the intestine. With such indicators, the supply of nutrient components was not possible, and only measures aimed at reducing the level of intoxication and compensating for hypovolemia continued. The level of dehydration was determined by the breakdown on the hydrophilicity of the tissues by P.I. Shelestyuk (1978). In the first subgroup, patients with the first degree of endotoxemia were 14 (24.1%), with grade II 32 (55.2%) and grade III 12 (20.7%). And in the second subgroup I degree was noted in 9 (24.3%), II degree 20 (54.1%) and III degree 8 (21.6%) patients.

At 2–3 days, the stabilization of laboratory test results and the appearance of peristaltic waves were noted. Parenteral nutrition was added to the carried out complex of enteral measures in the first subgroup, and in the second group, in addition to the parenteral nutrition of EZP. In the second subgroup of patients, compensatory measures were performed parenterally at the first stage, and subsequently parenterally-efferent. In this group of patients, the water-electrolyte balance was compensated for 3–4 days, and on the 4th-5th day the protein balance. The appearance of active peristaltic waves was noted on average 2–3 days after the operation, and peristaltic waves approximated to the norm on the 4th day.

When comparing the obtained data of all groups of patients, it was revealed that in patients with 2 subgroups in the ratio of patients to the control group and 1 subgroup, an earlier decrease in intoxication was observed, which was followed by evidence of improvement in all clinical and biochemical indices, as well as recovery of digestive and absorption functions of the intestine. In this group of patients, the positive balance of all the investigated parameters was observed on the 5th-6th day in the postoperative period, which was facilitated, after normalization of the digestive and absorption functions of the intestine, by the addition of enteral administration of the balanced nutritional formula Perative, which included proteins, fats and carbohydrates.

Postoperative complications in the control group were 23.4% (19 cases), and lethality 8.6% (7 cases). In patients with 1 subgroup of the main group, complications were noted in 15.5% (9 cases), lethal outcome was 1.7% (1 case), and in 2 subgroup complications were observed in 13.5% (5 cases) and deaths did not have.

In the control group, the spent bed days averaged 17 ± 2, in the first subgroup of the main group 12 ± 1 and in the second subgroup 9 ± 1. Supplementation of complex treatment with enteric treatment measures contributes to a significant reduction in the number of postoperative complications (from 23.4% to 13.5%) and mortality (from 8.6% to 1.7%), reduction of bed-days to 1.6 times.

Conclusions

1. Conducting complex enteral measures in the early postoperative period (adequate bowel decompression, intestinal lavage, enterosorption and enteral feeding) in patients with initially high endotoxemia contributes to earlier stabilization of clinical and biochemical parameters, restoration of intestinal peristalsis and digestive and absorption function of the intestine .

2. Correct implementation of enteral measures significantly reduces postoperative complications, lethality and the number of hospital days spent in a hospital.

References:

1. Asrarov A. A. Surgical and endovascular methods of prevention and treatment of purulent–septic complications and multi–organ failure in patients with diffuse peritonitis. Author's abstract. diss. Ph.D. – Tashkent, – 1994. – 38 p.
2. Karakursakov N. E., Kostyrnoy A. V., Shestapalov D. V., Govorunov I. V. Method for assessing the severity of the patient with peritonitis. Taurian Medical and Biological Herald, – 2011. – Volume 14. – No. 4. – P. 1. 68–70 p.

3. Kostyrnoy A. V., Shestapalov D. V., Trofimov P. S. Complex of treatment of the syndrome of functional insufficiency of the intestine in the postoperative period. Clinichna chirirgiya, – 2012. – No. 9. – P. 60–62 p.
4. Matyukhin V. V. Diagnosis and treatment of the syndrome of endogenous intoxication with acute obstructive small intestinal obstruction: author's abstract. dis. Cand. honey. Sciences / V. V. Matyukhin – Volgograd, – 2013. – 24 p.
5. Permyakov P. E. Assessment of the effectiveness of diagnosis of acute intestinal obstruction in children / P. E. Permyakov, Zhidovinov A. A. // The Russian Herald. – 2013. – T. 3. – No. 1. – P. 61–66.
6. Snegirev I. I., Mironov V. I., Bashlykov D. V. Acute intestinal obstruction of non–tumor genesis: diagnosis and treatment. Siberian Medical Journal, – 2010. – No. 8. – P. 163–165.
7. Filenko B. P., Zemlyanoy V. P., Borsak I. I., Ivanov A. S. Adhesive disease: prevention and treatment. St. Petersburg, – 2013. – P. 36–38.
8. Shapovalyants S. G. Acute non–intestinal intestinal obstruction. Topical issues of surgery, – Rostov–on–Don, – 2015.
9. Arumugam P. K., Dalal A. K. Peritoneal encapsulation – an unexpected cause of acute intestinal obstruction. J Visc Surg., – 2017. – 45 p.
10. Benedykt V. About the role of digestive tract decompression in patients with acute bowel obstruction. Mistakes, complication and their prevention. Georgian Med News, – 2017. – P. 103–110.
11. Chang Hwan Choi, Sae Kyung Chang The role of small intestinal overgrowth in functional gastrointestinal disorders // J. Neurogastroenterol. Motil. – 2016. – Vol. 22. – P. 3–5.
12. Decompression of the small bowel by endoscopic long–tube placement / Shi–Bin Guo [et all] // World J Gastroenterol, – 2012. – 18(15). – P. 1822–1826.
13. Federico C. Peritonealadhesionindex (PAI): proposalofascore for the "ignorediceberg" ofmedicineandsurgery / C. Federico, A. Luca, M. Roberto, C. Luca // World Journal of Emergency Surgery. – 2013. – No. 8:6. – P. 2–5.
14. Karel J., Van Erpecum K., Schaap F. G. Intestinal failure to produce FGF19: A culprit in intestinal failure–associated liver disease? // J. Hepatol. – 2015. – Vol. 62. – P. 1231–1233.
15. Scripko V. D., Kovalenko A. L., Zaplutonov V. A. Microelemental homestasis correction of and oxidative stress in patients with acute intestinal obstruction. Khirurgiia, – 2017. – P. 55–59.

Secton 6. Mechanics

Yakubov Mirdjalil Sagatovich,
Mukhamedova Ziyoda Gafurdjanovna,
"Tashkent Institute of Railway Transport Engineers,
Department of Transport Logistics
Tashkent, Uzbekistan
Mukhamedova Ziyoda,
E-mail: ziyoda.mukhamedova@email.com

ANALYSIS OF OPTIMAL PERIODICITY OF PREVENTIVE MAINTENANCE OF RAIL SERVICE CAR TAKING INTO ACCOUNT OPERATIONAL TECHNOLOGY

Abstract: Analysis of the nature, causes of damage and modes that led to a failure of rail service car operated by JSC "Uzbekiston Temir Yollari" has shown that 50% of the damage falls on mechanical equipment, 31.8% on electrical and 18.2% on hydraulic equipment. The result of the search and elimination of the failure of a rail service car, assessment of the possibility of its failure, monitoring of operation quality of technological process with complex mechanical, electrical and hydraulic equipment should be a clear, well-coordinated static and dynamic stability of the assembly site allowing the basic operations of the overhead contact system. For this purpose, a certain maintenance schedule is carried out to reduce the flow parameter (intensity) of failures. Based on the carried out analysis and calculations, the authors managed to obtain the optimal periodicity of scheduled preventive maintenance separately for mechanical, electrical and hydraulic equipment, which is, 372.8 hours, 500 hours, and 620.2 hours, respectively.

Keywords: railcar, main frame of the body, analytical-numerical method, preventive maintenance, hydraulics, mechanics.

1. Introduction

Analysis of the nature, causes of damage and modes that led to a failure of rail service car operated by JSC "Uzbekiston Temir Yollari" has shown that 50% of the damage falls on mechanical equipment, 31.8% on electrical and 18.2% on hydraulic equipment.

The result of the search and elimination of the failure of a rail service car, assessment of the possibility of its failure, monitoring of operation quality of technological process with complex mechanical, electrical and hydraulic equipment should be a clear, well-coordinated static and dynamic stability of the assembly site allowing the basic operations of the overhead contact system. For this purpose, a certain maintenance schedule is carried out to reduce the flow parameter (intensity) of failures. It is known that three principles of assignment of operation periods between preventive maintenance are distinguished: regular, calendar and combined ones [1, 2]. For rail service car, a combined principle, or a so-called mixed mode, is used; it includes scheduled precautionary repair and unplanned preventive maintenance.

To calculate the periodicity of preventive maintenance of a rail service car, it is necessary to know the effects of the periodicity of preventive maintenance. It

is necessary to mention that the maintenance requires a certain amount of time and resources, which generally reduce the technical and economic efficiency. Therefore, reliability assessment is performed taking into account financial, labor and other operating costs. Equations linking the reliability and maintenance costs can be obtained while investigating maintenance processes, taking into account some acceptable ranges of quantitative reliability indicators at minimum costs; that is, an optimal period of preventive maintenance is calculated, separately for mechanical, electrical and hydraulic equipment taking into account the technological nature of maintenance.

For a rail service car used for the assembling and repair of the overhead contact system, which is the most important part of the speed and high-speed electrified railway, the limit state of the resource is established, that is, the service life for reasons of safety, of economic and other indicators when the maintenance system is installed.

2. Determination of optimal periodicity

Below we consider and determine the optimal periodicity of each type of equipment, taking into account their physical characteristics, that is, the determinant parameters and extrapolating the changes in their value by the operating time until the limiting parameter is reached. For the rail service cars, it is advisable to use as determinant parameters the accuracy of load-carrying capacity limiter of the rotary crane, the frame strength mechanism, the tightness of the hydraulic equipment and the insulation failure, as well as the failure of connectors and contacts of electrical equipment during long service cycles. When the predetermined rates of resource production determined from the failure rate curves x (t) or the failure flow parameters ω (t), are reached, the time comes from which the unacceptable increase of λ and ω begins [4].

It is known that conducting scheduled preventive repairs at increasing deviations from the adjusted parameters and the failure flow ω (t), caused by aging and changing parameters due to deviation from the established operating conditions of the object, reduces the average frequency of loss of the normal mode of operation [5, 6].

Taking into account that each mechanical, electrical and hydraulic equipment of a rail service car is subjected to several types of failures, characterized by λ (t) and ω (t), the periodicity of scheduled preventive maintenance $T_{пл}$ can be optimized according to the criteria for a minimum of resource costs for the type of equipment and mode losses of electric trains traffic, due to failures of the equipment elements of the rail service cars.

Analysis of the average cost of preliminary inspections and routine repairs of the main parts of the equipment of the rail service cars shows that the cost of their labor expenditures $\sum C_{m.p.}$ – is less than the losses from its emergency work $\sum_{i=1} C_{ав}$, leading to a decrease in its resource and loss from the established traffic of electric rolling stock (electric locomotives). Therefore, it can be corrected in order to minimize the total specific costs by solving this problem by the method of Lagrange undetermined multipliers, which allows us to reduce the conditional optimization problem to the simpler problem of unconditional optimization based on the criterion of minimum annual costs including losses from the accidents, i.e., finding an absolute extremum [7].

$$З = \sum_{i=1}^{n}\left(C_{П.Л.З.i}\lambda_{зi} + C_{авi}\right) \to \min \qquad (1)$$

were – $\sum_{i=1}^{n} C_{П.Л.З.i}\lambda_{зi}$ – is the total costs for preventive maintenance of the i-th type of equipment of a rail service car;

$\lambda_{зi}$ – is an intensity of the i-th type of equipment failures of a rail service car;

$C_{авi}$ – a total cost of emergency repair of the i-th type of equipment;

$\lambda_{авi}$ – is an intensity of accidents from the i-th type of equipment.

The condition (1) is adequate to the criterion of the minimum of unit costs:

$$З_i = \frac{З}{C_{авi}} = \lambda = \left(\frac{\sum_{i=1}^{n} C_{П.Л.З.i}}{\sum_{i=1}^{n} C_{авi}}\right)\lambda_{ПЛi} \to \min \qquad (2)$$

Here:

$$\lambda_{Пазi} = \sum_{i=1}^{n}\left(\frac{1}{T_{ПЛi}}\right)\int_0^{T_{ПЛi}} \omega_{аЛi}(t)\,dt$$

From (2) follows the equality:

$$з_i = \sum_{i=1}^{n}\left(\frac{1}{T_{ПЛi}}\right)\left[\frac{\int_0^{T_{ПЛi}} \omega_i(t)\,dt + \sum_{i=1}^{n} c_{П.Л.З.i}}{\sum_{i=1}^{n} c_{авi}}\right] \qquad (3)$$

Realization and volumes of maintenance of mechanical, electrical and hydraulic equipment of a rail service car to the permissible error within their operating range is justified economically if the cost of its specific expenses

per unit of time is less than the cost of elimination of accidents and production costs. Therefore, the relative minimum of the objective function (3) should be sought under the limitations:

$$\sum_{i=1}^{n} c_{П.Л.З.i} \le \sum_{i=1}^{n} c_{авi}$$

or

$$\frac{\sum_{i=1}^{n} c_{П.Л.З.i}}{\sum_{i=1}^{n} c_{авi}} \le 1 \qquad (4)$$

Taking into account the limitation (4), the failure flow parameter $\omega(t)$ for a given object can be written in the first approximation in the form $\omega(t) = a \exp(bt)$, where a and b are the coefficients that take into account the failure parameters for equipment types, and k is a given coefficient of the current cost of scheduled maintenance. For the objective function (3), the Lagrange function is written as:

$$L = \sum_{i=1}^{n}\left(\frac{1}{T_{ПЛi}}\right)\left[\int_0^{T_{ПЛi}} a_i \exp(b_i t)dt + \sum_{i=1}^{n} c_{П.Л.З.i} / \sum_{i=1}^{n} c_{авi}\right] + \qquad (5)$$
$$+L\left[\sum_{i=1}^{n} k\omega_i(T_{ПЛi}) - \sum_{i=1}^{n}\omega(T_{ав})\right] \to \min$$

In the formula (5) we will point out that the average statistical growth of the failure parameter of metal structure (mainly due to the weakening of the bearings in the axial direction, cracks and curvature of the beams) can be approximated by the function (Figure 1):

$$\omega_{мет.}(t) = 0.007\exp(0.3t) \qquad (6)$$

and for electrical equipment due to the predominant wear of their insulation, failure of the connectors and contacts, the failure flow is approximated as

$$\omega_{эл.}(t) = 0.005\exp(0.2t) \qquad (7)$$

and for hydraulic equipment due to wear of the rod or piston consolidation, as well as the presence of air in the system, etc. the failure flow is expressed as

$$\omega_{гид.}(t) = 0.003\exp(0.13t) \qquad (8)$$

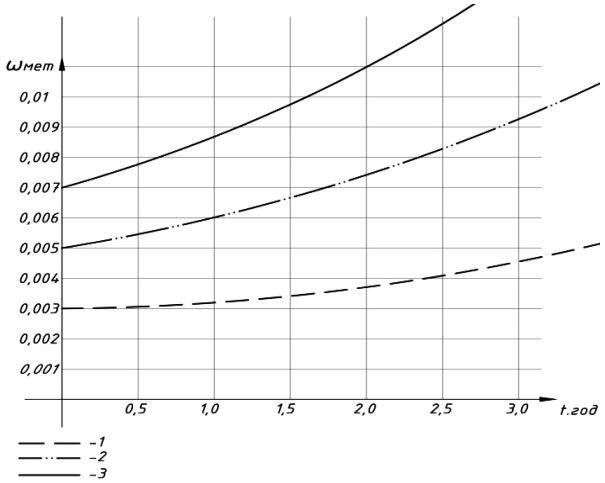


Figure 1. Change in the failure flow parameter of metal equipment. 2. – electrical equipment. 3. – hydraulic equipment

We denote the first term of (5) by $F(t)$. The minimum value of this function is determined by equating the derivatives on all variables to zero:

$$\frac{\partial L}{\partial T_{ПЛ1}} = \frac{\partial F}{\partial T_{ПЛ1}} + \frac{\partial K\omega_1(T_{ПЛ1})}{\partial T_{ПЛ1}} - \frac{\partial \omega_1(T_{ав1})}{\partial T_{ПЛ1}},$$
$$\frac{\partial L}{\partial T_{ПЛ2}} = \frac{\partial F}{\partial T_{ПЛ2}} + \frac{\partial K\omega_2(T_{ПЛ2})}{\partial T_{ПЛ2}} - \frac{\partial \omega_2(T_{ав2})}{\partial T_{ПЛ2}}, \qquad (9)$$
$$\frac{\partial L}{\partial T_{ПЛ3}} = \frac{\partial F}{\partial T_{ПЛ3}} + \frac{\partial K\omega_3(T_{ПЛ3})}{\partial T_{ПЛ3}} - \frac{\partial \omega_2(T_{ав3})}{\partial T_{ПЛ3}},$$
$$\frac{\partial L}{\partial l} = \frac{\partial F}{\partial l} + \frac{\partial K\omega(T_{ПЛi})}{\partial l} - \frac{\partial \omega(T_{авi})}{\partial l},$$

Solving the obtained system, with respect to $T_{ПЛ1}$, $T_{ПЛ2}$, $T_{ПЛ3}$, with the above numerical parameters of failures and given $C_{П.Л.З.i}$ and $C_{авi}$ we obtain the optimal periodicity of scheduled preventive maintenance separately for mechanical, electrical and hydraulic equipment, which is, 372.8 hours, 500 hours, 620.2 hours, respectively.

3. Conclusion

When designing, manufacturing and using the assembly site of a rail service car, it is necessary to be guided by both technical and economic measures aimed at ensuring not only a generalized reliability standard but also reliability indices for certain types of equipment

that provide the specified efficiency of operation with minimum operating costs. The expediency of calculating the maximum permissible values of the failure rate is shown taking into account the complexity of the existing reliability ratio of mechanical, electrical and hydraulic equipment, which is coordinated by the results of theoretical study and the recommended provisions for maintenance periodicity.

Taking into account the operational technology of assembly site and the average cost of routine repairs as well as the costs of emergency recovery work, a mathematical model for determining the optimal periodicity of maintenance with the use of Lagrange undetermined multipliers has been developed.

Mathematical models could be used in design and study of the main characteristics of the reliability of assembly sites.

References:

1. Гук Ю. Б. Теория надежности в электроэнергетике.– Л. Энергоатомиздат.– 1990.– 208 с.
2. Ильюхин И. В., Каркошка Л. З., Чекулаев В. Е., Шарапов А. И. / Техническое содержание и эксплуатация аварийно-восстановительных автомотрис. Учебное пособие.– М.: ГОУ «Учебно-методический центр по образованию на железнодорожном транспорте»,– 2008.– 295 с.
3. Площадка монтажная автомотрисы АДМ-1. Руководство по эксплуатации 77.020–35.00.000 РЭ. ОАО «Тихорецкий машиностроительный завод им. В. В. Водовского».– Тихорецск.– 2012.– 24 с.
4. Положение о планово-предупредительном ремонте путевых машин, механизмов и оборудования ГАЖК «Узбекистон темир йуллари». Приложение к приказу ГАЖК «УТЙ» от 26 ноября – 2014 г.,– № 407-Н.
5. Руководство по эксплуатации АС-АОГ-01М. Научно- производительный комплекс «Автоматизированные системы». Ростов на Дону,– 2014.– 23 с.
6. Степанов С. В. Профилактические работы и срок их проведения.– Москва. «Радио».– 1992.– 136 с.

Section 7. Pedagogy

Abramova Yana Konstantinovna,
PhD., the National University
of Science and Technology "MISIS",
Adjunct professor, the Department
of Modern Languages and Communication
E-mail: yanaabramova@mail.ru

THE DEVELOPMENT OF INDICATORS OF QUALITY ASSURANCE IN TERMS OF NEW EDUCATIONAL MODEL INTRODUCTION

Abstract: QA members of the Department of Modern Languages and Communication have created a quality assurance scheme in terms of new Blended Learning model introduction. This scheme based both on the experience gained during visits to international academic bodies and knowledge in international teacher training programs (CELTA, Bell Teacher Campus Cambridge, etc.)

Quality Assurance team by consensus has created a toolkit that allows them to monitor teachers` work and offer them individual paths of further professional development. The group's work includes multistep observations and methodological training-sessions addressing difficulties discovered thorough observations. In addition, the team has compiled a methodological reference guide for the staff which puts the QA team and teachers on the same page.

This is an attempt to introduce international standards and approaches to the professional development of our colleagues which is necessary since NUST "MISIS" is one of several universities participating in 5–100–2020 program. Entrants choose it, relying on the fact, inter alia, that the foreign language teaching here is conducted according to the international standards.

Keywords: Blended Learning, Professional development, Quality Assurance.

In order to meet the high demands stated by 5–100–2020 program, The Department of Modern Languages and Communication (NUST "MISIS") has developed and implemented a system of quality control of the educational process organization.

The need for a systematic approach to the quality control of the educational process organization was dictated not only by the standards of modern high education framework but also by the results of diagnostic observations of the faculty in 2014. The outcome showed that:

– Teachers did not always manage to prioritize the lesson stages and demonstrate competent planning in the given time frame;

– Teachers unreasonably often relied on L1 (Russian) during the lesson;

– Teachers neglected pair and group work, having groups of 23 people on average, or faced difficulties in these forms of work organization;

– Teachers provided little initiative to students, which greatly limited the opportunities for students to self-realization and language practice;

– Teachers paid no attention to their students` feedback;

– Teachers did not motivate and encourage students enough.

To solve these problems, a Quality Assurance (QA) working group was established. This group consists of five QA experts – the department faculty who passed the Teacher Trainer program at the Bell, Cambridge Advanced Training Center in 2013–14.

In the beginning of their work (spring 2015), QA members have performed the following activities:

– Analytical work with the data of the point-rating system (BRS);

– Created tools for monitoring the teacher`s work during the lesson, summarizing the results from the lesson to lesson;

– Monitored the teacher's performance during the lessons and tests;

– Identified and analyzed the typical difficulties and methodological errors that arose throughout the lessons;

– Prepared and conducted the trainings aimed at methodological errors correction and the improvement of teaching organization quality;

At the end of the implementation phase, the collected feedback was analyzed and the quality control approbation experience was assessed. Taking into account all the data gained, QA experts set themselves the following tasks for the forthcoming stage 2:

– Unify the approaches to filling out the documentation and observing the timing of information collection;

– Develop a series of practical trainings, based on the cases of real teachers` practice;

– Create a resource methodological base for professional competencies, which are verifiable while observations;

– Analyze the BRS results in the spring semester of 2015;

– Develop some additional tools for focal control of the specific professional competencies of each teacher.

In the fall semester 2015, an introductory training and several in-term seminars were held at the Department of Modern Languages and Communication. According to a feedback survey:

– 100% of teachers were positive about the trainings;

– 96% of teachers believed that the trainers managed to reveal the key points of the declared topics;

– 82% of teachers said that the training gave them information and knowledge that they could apply in the classroom.

Moreover, Quality Assurance has arranged the system of peer observations that was beneficial, according to faculty` feedback.

On the same stage, some new tools were created. One of them was an online calendar of observations, which helped the QA team to plan expeditiously the time for observations of colleagues` classes, as well as the time for trainings and seminars. It also allowed monitoring the timely tasks completion in a particular week.

Another instrument, that is Methodical booklet QA Guide to Classroom Management, has become favourable among the teachers. It represented an electronic booklet with a selection of methodological links and videos explaining the requirements for teachers within the competencies checked in the observer tool. Methodical links met the following criteria: they are specific instructions and practical advice, not contradicting each other, being clearly formulated and placed in open and trustworthy online sources. Teachers expressed gratitude for the creation of a methodical resource with clear instructions for working in the classroom. At the moment, the booklet is actively used by the QA team during the feedback sessions. The plans of the QA team include a daily review and update of the references.

Finally, Quality Assurance group has created a database of teachers that classified them according to their professional competence that was recognized as a key to the organization of an effective educational process. In order to create this database, a faculty questionnaire was launched. Based on the replies received, a table was created. This chart allows one to track the presence or absence of certain competences from a particular teacher by filtering, which in turn allows specifying individual trajectories of the professional development of each employee. The database also allows you to assign the teacher one of the following statuses:

1) Beginner Teacher; 2) Competent Teacher;

3) Advanced Teacher; 4) Expert.

According to the data gathered in 2016–2017 years, the implemented quality control system has contributed both to the growth of the quality of teaching and the growth of the students' performance indicators. Thus, we hope to continue working on the systematic approach to the quality control of the educational process organization at the Department of Modern Languages and Communication (NUST "MISIS").

References:

1. Ensuring Quality in English Language Teacher Education. Edited by George Pickering and Professor Paul Gunashekar. Selected papers from the fifth international Teacher Educator Conference Hyderabad, India 27 February – 1 March – 2015. URL: https://www.britishcouncil.in/sites/default/files/tec15_papers_final_for_web_new.pdf
2. Guidelines for Quality in Language Teaching URL: http://files.adulteducation.at/uploads/Guidlines.pdf
3. Russian Academic Excellence Project URL: http://5top100.com/

Sodikova Shokhida,
teacher, National University of Uzbekistan,
named after Mirzo Ulugbek, Taskent, Uzbekistan
E-mail: kurbanov1949@bk.ru

METHODS FOR DEVELOPING AND GIVING SPECIAL COURSES ON "LASERS AND THEIR PRACTICAL APPLICATIONS"

Abstract: The article discusses the experience of developing and giving a special course on "Lasers and their practical applications" in academic lyceums and colleges for in-depth study of physics.

Keywords: Quantum of light, absorption of light, laser, stimulated emission, stimulated transition, monochromatic light, radiation, optical quantum generator.

To ensure a better continuity between academic lyceums and university forms of education, in the academic lyceums it is recommended to practice giving lectures, seminars, workshops on special subjects, especially related to the development of new techniques and technologies along with the lessons.

Physics teacher, who holds university degree, having the physical and mathematical basic education, has the necessary scientific and methodical preparation for the development and implementation of the special courses on current trends in modern physics at academic lyceum. He acquires these skills in a modules of methodical disciplines, teacher training, preparing projects and dissertations. The selection process of modules for specialized courses in lyceum involves the defining their content and their implementation into educational curriculum, hence some methodical issues get their solution.

First of all, it should be noted that the main content of the course of physics of academic lyceum, is focused on fundamental laws and principles of physics, and for this reason, the content is, to some extent, conservative. That is why the content of the basic physics textbooks is changing slowly over the years and there is a problem of selecting the issues and questions of modern and applied physics that contributes to the value of presenting special courses. These issues include microelectronics, nanotechnology, lasers and their practical applications, semiconductors and their use, optical fiber and its practical significance, the introduction of superconductivity in physics and others.

It is important to point out the major methodological problems to be solved for the development and realization of special discipline such as "Lasers and their practical applications" in academic lyceums.

1. A complex and abstract theoretical and experimental data of modern physics should to be fully adapted to the cognitive abilities of students.

2. It is necessary to provide substantive, methodological, terminological, symbolic, graphical and symbolic continuity, as well as intra-and interdisciplinary relationship of special course with basic course in physics, mathematics and others.

3. Special courses should be focused on the implementation of the principles of polytechnics. They should reveal wide technical application of various industrial achievements of physics, the physical basis of different areas of technology and production, the most important principles of instruments and devices, clarify technical and economical problems of the national economy. Reflection of the achievements and contributions of scientists of Uzbekistan in the development of specific branches of physics and technology has an important educational and vocational guidance significance.

4. Highly informative, pedagogic and psychological properties of the physical, in particular, demonstrational experiment create the ground for realization of the tasks listed in paragraph 3, and give a chance to achieve a higher cognitive level for the trainees. In this regard, in the implementation of special disciplines, special attention should be given to the widespread use of various types of visual aids: educational films, educational posters, slides, models and real physical experiment.

Below the experience in the development and implementation of a special course "Lasers and their practical applications "for the 1^{st} – 2^{nd} year students academic lyceums of Uzbekistan with the participation of 3^{rd} – 4^{th} – year university Physics Students is described.

The program of lasers and their practical application

1. Patterns and types of radiation

Physical laws of radiation. Forced and spontaneous radiation. Energy surfaces and their formation. The design and principle of operation of lasers. Features of laser radiation. I – The first colloquium to check understanding of the chapter [1, 17–20].

2. Types and construction of lasers

Solid-state lasers. Gas Lasers. Ion lasers. Chemical lasers. Semiconductor lasers. Research works of scientists-physicists of Uzbekistan. II – The second colloquium to check understanding of the chapter [2, 164–198].

3. Applications of lasers

Optical connection. Holography. Application of lasers in medicine. Laser processing of materials. Application of lasers in agriculture. Control of individual processes using laser beams. III – The third colloquium to check understanding of the chapter [3, 83–98; 4, 308–315].

4. Demonstrational experiments with the help of laser beams on optics physics

Demonstrational experiments on the division of geometric optics. Demonstrational experiments on interference of light. Demonstrational experiments on diffraction of light. Demonstrational experiments on the polarization of light. Features of laser beams and experiments on the application. Glossary [5, 59–78].

As an example, let's take the scenario technology of the problematic study "Optical connection". The lecture can begin with the formulation of problem questions.

Can I talk on a light beam? With the invention of the laser, man has at his disposal a source of intense coherent electromagnetic radiation in the optical frequency range – up to 10^{15} Hz. In this connection, naturally, the question arose about extending the principles of radio communication to the optical range. Arose and began to develop laser communication – a connection carried out with the help of modulated laser radiation. Usually a semiconductor laser or a helium-neon laser is used. The laser radiation is modulated by sound vibrations in the modulator and through the targeting device is directed to the subscriber at the receiving end of the line. There, the laser beam enters the receiver, and then into the demodulator, which emits sound vibrations. These vibrations are amplified and fall into the sound reproduction device. The laser beam is transmitted not only by telephone conversations, it can also transmit a television program.

What is interesting and promising for laser communication? As is known, for the transmission of speech, music, images, it is necessary to modulate the electromagnetic wave accordingly, for example, it is necessary to change its amplitude according to a certain law. The frequencies characterizing the rapidity of changes in the amplitude of the wave must be at least ten to one hundred times lower than the frequency of the wave itself. The modulation frequencies occupy a certain band. Its width is the greater, the larger the amount of information transmitted per unit of time. Due to the high directivity of the laser beam, it is possible to realize several communication channels on the same carrier, choosing different directions in space each time. The radiation direction can significantly reduce the power consumption of the transmitter power. In addition, the danger of unwanted interception of transmitted information decreases. Noting the advantages of laser communication, we must at the same time point out one of its vulnerabilities. This is the influence of the atmosphere on the laser beam. Fog, rain, snowfall, dust, cloudiness – all this, as you know, sharply limits visibility, which means it tears off the optical connection.

What are the difficulties of implementing laser communications in terrestrial conditions? The main obstacle to the creation of reliable lines of laser connections in terrestrial conditions is the effect of the atmosphere on the laser beam. This impact can disrupt not only a long-range, but also a relatively close connection, for example, a laser telephone connection between two objects and the city borders. The effect of the atmosphere on the laser beam is in two ways. First, there is a gradual decrease in the intensity of the beam due to absorption and scattering of light by gases, water vapor, aerosols. Secondly, the distortions of the wave front accumulating along the propagation path occur, mainly due to the turbulence of the atmosphere. The absorption of light in the atmosphere depends very strongly on the wavelength. To combat distortions of the wave front, they tend to increase the radiation directivity, awaiting favorable weather conditions. All these measures do not allow, but, increase the length of the earth's communication lines more than a few tens of kilometers. The main thing is that there is still a dependence of quality and the very fact of having a connection from weather conditions.

It is expected, that the situation can change qualitatively when using the methods of adaptive optics in laser communication lines, allowing the necessary correction of the wave front of radiation.

How does light propagate in dielectric fibers? To get rid of the influence of the atmosphere completely, you can use special light guides. Light guides in the form of thin dielectric fibers were widely used, in connection with which a new direction in modern optics – fiber optics – arose.

The light beam introduced into the fiber is retained inside it due to the phenomenon of total internal reflection of light from the side surface of the fiber. Light runs through the fiber, obediently following all its bends. For a more reliable retention of light within the fiber, special fibers are used, called gradient ones. In them, the refractive index is maximal near the fiber axis and gradually decreases towards the side surface.

Thus, the basis of the organization of problem – based learning is the principle of the student's learning – cognitive activity, i.e. the principle of "open" to him scientific facts, phenomena, laws, methods of research and ways to apply knowledge in practice.

The direct participation of students preparing for teaching activities in the development and teaching of a special course was an important incentive for their professional growth and the development of their research skills in the field of methodology.

References:

1. Lendel B. Lasers.– Moscow: Mir,– 1964.– 200 p.
2. Kachmarek F. Introduction to the physics of lasers.– Moscow: Mir,– 1981.– 532 p.
3. Sobolev N. Lasers and their future.– Moscow: Atomizdat,– 1968.– 190 p.
4. Karasik V. E., Orlov V. M. Laser vision systems.– Moscow: MGTU,– 2001.– 350 p.
5. Mansurov A. N. Lasers and their application in the teaching of physics.– Moscow: Enlightenment,– 1984.– 88 p.

Juraev Khusniddin,
Bukhara State University,
Ph D., in Pedagogy, the Faculty of Physic- mathematics
E-mail: Husni_1982@mail.ru

WAYS OF USING EDUCATIONAL MATERIALS ON ALTERNATIVE ENERGY SOURCES AT NATURAL LESSONS

Abstract: this article explores the possibility of interdisciplinary integration in education, it shows the possibility of the integration of teaching materials of alternative energy sources in the natural sciences, and proven alternative energy solves environmental problems and others.

Keywords: interdisciplinary integration, types of natural energy, types of alternative energy sources, natural problems, education system.

At present, the education system, based on the objectives of each subject, provides a variety of training scientific-theoretical and scientific-technical concepts. During the lesson, there is the need for continuous review of students with modern achievements of science and technology.

When learning the exact and natural sciences, the use of interdisciplinary integration, the improvement is that science education system. In education, the natural sciences acquire important qualities: value, meaning and content. In the process of the formation of teachers and students express their knowledge, abilities and skills through a variety of educational methods in the forms of comparison, generalization, definitions, analysis, synthesis, deduction, induction. In the process of formation of the methods used, the methods and forms of education are diverse.

It has been proved in practice that using interdisciplinary integration you can achieve positive results in the course of the lesson. The concept of interdisciplinary integration is interpreted in different literature, as well as various methods of pedagogy and learning [2, Б. 32]. In some sources, it is treated as an interdisciplinary relationship technology, synergistic technologies, and interdisciplinary integration.

Using interdisciplinary integration in the educational process accelerates knowledge generalization arising in the minds of students and presentation. As a result, data generated development skills, their self-awareness and logical discussion. If, to use interdisciplinary integration in presenting a new theme, this will increase the interest of students to the subject matter and level of performance.

In teaching methods, interdisciplinary integration is treated as a means, methods, and conditions that allow in a perfect cognition features, quality and nature of learning objects.

As a result of interdisciplinary integration, the teacher not only to update their knowledge, but also get the opportunity to work more on themselves, to increase their theoretical knowledge.

On the "Ecology" lessons using interdisciplinary integration can provide data on the areas of scientific and research work on the natural environment protection, which are conducted at the present time; on natural resources and their varieties; on natural resources and the problems of their use; questions about the protection of nature; the main directions of environmental challenges to address these problems, etc.

In the theme "Natural resources and their species" ecology of the subject, said that the natural resources on Earth is limited, and that they decrease each time, is one of the global problems of human civilization today. That is why the problem of the need to address the issues of rational management of these resources, are very relevant. Addressing these issues requires not only a broad and thorough knowledge of all the vital functions of ecosystems and Legislation of orders, but also purposeful formation known moral foundations of society [4, б. 121]. Modern man must realize his oneness with nature, it must understand that simply need to restructure the system of social production and consumption. Rational use of natural resources is a peculiar feature of modern society. Saving man civilization simply requires a rational use of available natural resources.

In this lesson, with the above-mentioned theme will be appropriate and effective use of the following information on alternative energy sources:

– Today, the resulting energy is produced on the basis of organic waste: coal, peat, oil, natural gas and others. The use of these energy sources has its advantages and disadvantages. Firstly, the earth energy reserves such sources are very limited and they decrease with time. Secondly, the use of these energy sources are emitted into the environment different waste.

Generally used natureal power sources can be divided into two groups. Alternative (reducing) energy and renewable energy sources. For renewable energy sources are: the sun, the wind, flowing water sources, power lifting or lowering of water of the oceans and seas, geothermal energy, obtained from the soil, biogas and municipal waste – gas; and to non-recoverable include: oil, coal, natural gas, nuclear power plants.

The use of alternative energy sources leads to intensive development of many countries. The increase in population, the reduction of many fossil fuel reserves, price increases with respect to hydrocarbon lead to an increase in the use of new energy sources.

The term "alternative energy" refers to energy sources that are continually recovered by natural flow of natural processes. These include solar energy, wind energy, hydrodynamic water energy, geothermal energy, heat the soil, rivers and natural ponds. In addition, anthropogenic sources of primary energy reserves: fuel derived from biomass, biogas and other organic waste.

During the lesson, the examples can be explained that the rapid development of science and technology, an increase in the world's population every day lead to the fact that there are food problems, as well as the energy, environmental, economic and social problems. Experts strongly concerned about the occurrence of the above problems, it is possible to tell the disciples on at natural subjects learned, widely using, relevant issues, terms. The use of alternative energy sources will provide clean environment preservation and prevent energy shortages [3, P. 61].

It should be noted that it is necessary to expand the use of clean, alternative and renewable energy sources to meet energy needs, and it becomes important. That is why, throughout the world, in different sectors of the economy, paying great attention to the use of alternative energy sources (Figure. 1). Renewable energy has great potential, creates great opportunities in the preservation of a clean environment, creating new jobs to meet the demand for energy.

At present time, when intertwined energy and environmental issues, it will be timely to explain the urgency of the problem, students in continuing education.

To solve the above problems, it is necessary in the population, particularly the young, to form at the appropriate level, a culture of energy efficiency. In addition, for this purpose, in a continuous system of education, in learning natural sciences, will provide relevant information about the energy deficit in the society, about how to abolish these problems.

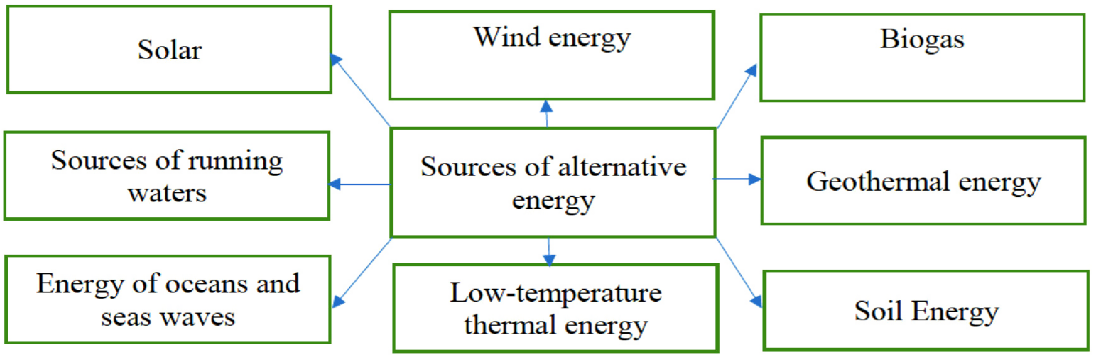


Figure 1. Types of alternative energy sources

Among the alternative energy sources, the use of solar energy is much more convenient than other forms of energy.

Alternative energy is considered to be permanently restored and the never-ending worldwide, in the Earth's biosphere, the source. The main utility of alternative energy is its endlessness and environmental friendliness. Its use does not affect the energy balance of the planet, and therefore, will not affect natural processes.

In addition, in the course of the topics: "Chemical and biological effects of light", it is possible to use training materials for one of the types of alternative energy-solar energy. The molecules of the substance, swallowing light energy can be cleaved or transformed into another molecule.

This molecule conversion is a chemical process.

When exposed to sunlight, oxygen molecules of the atmosphere will turn into ozone molecules. This process is as follows:

$$3O_2 \xrightarrow{ray} 2O_{3ie}$$

In the process of explaining this example, we recall the knowledge obtained by students in the chemistry lessons; also, the teacher uses examples for the passage of chemical processes.

Leaves of plants, from the viewpoint of optics, have a complex structure composed of a homogeneous opaque sphere. The leaves of a plant cell passes the process of photosynthesis. The leaves of the plant by photosynthesis provided nutrients carbonate anhydride absorb, emit oxygen into the environment.

The basic equation of photosynthesis is happening at the expense of solar energy:

In biology class, referring to the foregoing process, remind these subjects "cleavage".

$$6CO_2 + 6H_2O \xrightarrow[chlorophyll]{ray} C_6H_{12}O_6 + 6O_2ie$$

Photosynthesis is a complex, multistep process. Organic matter of green leaves, chlorophyll is essential in this process. Energy photosynthesis, humanity may enjoy for heating purposes, even before it began digging up fossil fuels. For example, the dried trees are used as fuel. Therefore, it is important to study the physical properties of plant leaves, the physical processes that occur in these leaves [1, P. 48].

Information about alternative energy sources also can be used at lessons of chemistry and biology.

Taking into account the above, in professional colleges, physics lessons, in accordance with each topic, you need to give information on solar technology, this will help strengthen knowledge about the possibilities of using solar energy, and contribute to independent thinking.

In the process of carrying out the topics "The Law of Reflection and Refraction of Light", "Lenses and Thin Lenses Formula", "Full Internal Return", you can use solar engineering elements.

There are many examples of the law of refraction of light. Low-temperature solar devices are covered with glass or polyethylene film. Therefore, solar energy penetrates into the device through refraction.

Solar devices such as a "warm box" that do not work by collecting energy from the sun's rays are called low-temperature solar devices.

Low-temperature solar devices include: 1) solar water desalination; 2) solar water heaters; 3) solar greenhouses; 4) solar dryers; 5) solar refrigerators.

These devices work based on the principle of the work of "warm boxes", so let us look at the principle of its operation. It consists of wood, metal or concrete box. Made of black metal plate, mountain stones, a working body is installed, which absorbs water, rays of light. The upper part is covered with glass or polyethylene film.

The manufactured box is installed at an angle of 20–40° to the south side. A known part of the incident light rays passes through the glass and is absorbed by the working body (2-figure).

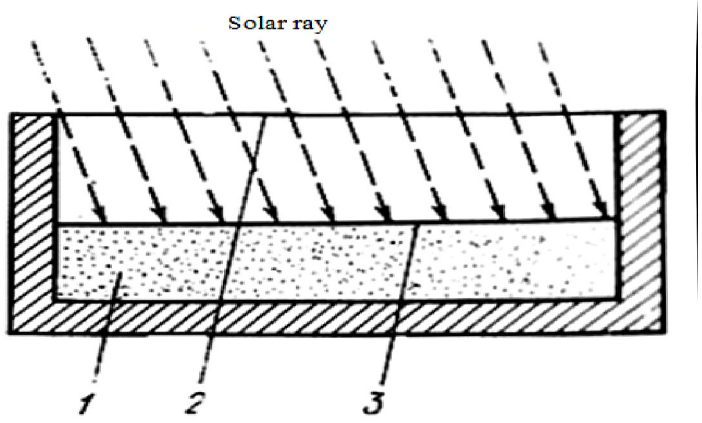


Figure 2. "Warm box" and its device: 1 – metal or concrete box, 2 – mirror, 3 – bottom drawer

The reason for raising the temperature is in the greenhouse effect. The physical explanation for this process is this: we know that the higher the body temperature rises, the shorter the wavelength of light emanating from it.

The wavelength of the rays emanating from the Sun is short, the glass conducts such waves well. Under the influence of absorbed rays, because of the low temperature, long warm waves emanate from the warmed working medium. Such waves, glass does not hold well. As a result, the box will turn into a cage holding light. Inside it rises the temperature. This phenomenon is called the "greenhouse effect" [5, Б. 115].

The loss of the "retained" energy in the surroundings and the efficiency factors passing through the glass and the energy incident on the solar device are determined by the following formulas:

$$Q_{ret} = \beta Q_{inc}$$

$$Q_{ret} = Q_{dis.in.env.} + Q_{us.en.} + Q_{lost}$$

Here: Qinc is the solar energy of the rays incident on the device; B is coefficient of glass radioconductivity, depends on the angle of incidence of the beam; Qdis. in.env is energy, which is dispersed into the environment from the device; Qus.en is use ful energy that performs work in the device; Qlost is the amount of energy lost from the device.

As an example, refraction of rays from the transparent surface of devices similar to solar hotbeds, solar air heaters can be cited; Solar water heaters; Solar houses.

When teaching the natural sciences, the application of interdisciplinary integration raises the student's learning achievement, strengthens their knowledge, develops the abilities of logical and creative thinking, improves the educational process and its optimal organization.

References:

1. Eshonkulov O. E., Khamidov J. Kh., Bekmuhamedov A. A. Biology. – Tashkent: – 2006.– 184 p.
2. Jurin A. A. Integrated media education in secondary schools.– Moscow,– 2013.– 405 p.
3. Khakhkharov S. Kh., Juraev Kh. O. Alternative energy sources.– Tashkent,– 2016.– 214 p.
4. Xolliyev I., Ikromov A. Ecology.– Tashkent,– 2001.– 280 p.
5. Xayriddinov B., Sodikov T., Nuriddinov B. Elements of solar engineering in high school – Tashkent,– 1995.– 192 p.

Gulrukhsor Ergasheva,
PhD., in Pedagogics, the Faculty of Natural sciences
Tashkent pedagogical university named
after Nizami, Uzbekistan
E-mail: egulruxsor@mail.ru

STRATEGIES FOR IMPROVING THE EFFECTIVE USE OF INTERACTIVE SOFTWARE IN BIOLOGICAL EDUCATION

Abstract: The article contains of theoretical bases, requirements and strategies for effective use of interactive software in biology education. The role of interactive software was provided by theoretical and practical bases to increase the effectiveness of biological education.

Keywords: interactive software facilities, electronic resources, educational condition, teaching management systems in the electronic educational condition, interactive equipment, interactive technologies.

The globalization of the information space in the world civilization, the development of a large-scale information system and telecommunication technologies intensify the opportunities for implementing strategies for improving using by digital educational resources, information technologies and interactive software. This creates a foundation in biological science for studying DNA, mastering knowledge in the field of terrestrial and underwater bases in the direction of biotechnology, studying the biodiversity of plants and animals in ecosystems, and also modernizing of the training of specialists in this field.

In the years of independence, special attention is paid to the organization of the educational process in the biology of educational institutions with the use of interactive software facilities, the development of electronic educational – methodical resources, information systems. As a result of successive transformations in educational institutions, advanced interactive software in biological education was created by using video conference relations and remote provisioning methods, based on best practice.

At present time along with the realized works, there is necessity to improve a quality and applied-technological system of using in the field of interactive software today. The directions for improving the quality and efficiency of the activities of higher education institutions on the basis of the introduction of international standards for assessing the quality of education and training were defined in the strategy for further development of the Republic of Uzbekistan [1], and it is particularly important to achieve effective use in biological education with interactive software and electronic resources.

In the world practice special attention is paid to scientific research on the development of competence in the use of interactive software in the biological education of students, the creation of multimedia facilities to improve the quality of students' knowledge. Also, researches are aimed to improve the pedagogical mechanisms for the development of electronic educational resources based on the management systems of learning in the electronic educational environment and mass open online courses (MOOC), which allow to effectively use interactive software in the process of biological education, the development of skills in using interactive software facilities in the process of biological education.

As a result of research, conducted in the world, in the field of improving of use of interactive software by students of pedagogical higher educational institutions, a number of results had been achieved, in particular, an effective strategy of organizing of learning with using interactive tasks had been developed; a content, structure and recommendations for use in the educational practice of the technology of web-quest (Cambridge, MA: Harvard University Press, San Diego University); it was created a system of training future specialists, who mastered the fundamentals of biotechnology in protein engineering and bioinformatics with the computation of studying DNA (University of Tokyo); it was worked out a method for applying construction in the research of intellectual computer literacy (Association of Information

Technology Professionals, www.aitp.org.), it was realized a projecting, relation with the environment and certification of modern teaching materials (Stiftung Digital Chances, Germany); a training system had been developed that allows the use of computer technologies in education in various situations (National Council for Educational Technology); organizational and strategic mechanisms for implementing international cooperation in the development of educational technologies (European Information Technologies Certification Institute) had been improved; Nanotechnology had been introduced in biological research to ensure successful study of animal and plant biodiversity in terrestrial and underwater ecosystems (Scientific Center for Biological Research, Russia).

In Uzbekistan, the problems of preparing students for use with interactive software were explored in the following directions:

– The improving of the methodology of teaching biology through pedagogical and information technologies was studied by A. T. Gafurov, J. O. Tolipova; the introduction of pedagogical and information technologies in higher educational institutions was worked out by A. Abdukodirov, N. N. Azizkhodzhaeva, U. Sh. Begimkulov, R. Kh. Dzhuraev, Sh. S. Sharipov and others [2–6].

In the countries of ISC (Independent States of Cooperation), the perfection of the methodology of teaching biology, the pedagogical effectiveness of educational materials on biology, calculated for the use of information technologies was studied by M. S. Artyukhina, S. I. Boris, M. Bulycheva, E. V. Titov and others; problems of applying modern technologies in the information process of the educational system and increasing the professional competence of future teachers had been studied by V. P. Bespalko, O. N. Vershinskaya, E. S. Polat, I. V. Robert, A. Levitskaya, A. V. Feyodorov, I. V. Chelishev and others. [7–17]

In developed foreign countries, effective research in the field of theory and practice of media education, application of interactive multimedia in the teaching of the spheres of science: multimedia, web-quest, intellectual game technologies was conducted by such scientists as B. Dodge, S. Goodman, R. Kozma, D. Leveranz, A. Šorgo, L. Masterman, T. March, Newton, A. Hart, L. Henderson, S. Hennessy, J. Huppert, S. M. Lomask, R. Lazarowitz, J. Klemes [18–34].

Dedicated to the problem of developing on a total conceptual basis of scientific and methodical aspects of improving of use of interactive software in biological education was studied. The conclusions follow from the experimental study:

1. In accordance with the trends of important trends in the development of higher educational institutions of our republic and in a world scale, one of the main tasks is the preparation of future biology teachers in accordance with the requirements of the labor market and society based on the student-centric approach. Improving the effective use in the educational process of information and communication technologies, interactive software serves the preparation of students for professional work on the basis of modern development trends.

2. The use of information and communication technologies more extends the composition of components and the opportunities of the educational sphere. In the given conditions the list of sources of educational information is supplemented with databases and information-reference systems, electronic textbooks and encyclopedias, Internet resources, etc. The facilities of educational activity are enriched due to computer simulators, control programs and other means of communication – local computer networks, Internet facilities. The information and communication education sphere (ICES) can also be referred to the basics of information and communication technologies.

Under these conditions, the role of subjects is changing: the student will be at the center of training, his motives, goals and psychological characteristics. All methodical actions (the organization of the educational material, applied ways and methods, exercises, etc.) will be directed to the personality of the student, his needs, abilities, activity, intelligence, etc.

3. Improving the effective use of interactive software for biological education supposes, first of all, the creation of its organizational and didactic system. Technical equipment (computer, electronic board, projector, smart phones), teaching management systems in the electronic educational environment of the LMS (Learning Management System) (MOODLE, ILIAS, e Front, e Study, etc.) are necessary for effective use of interactive software in biological education, educational Internet resources (MOOC, Vacademia), pedagogical software (simulators, monitoring, training, demonstra-

tion, imitation-modeling, game, problem-based training, information – reference, etc.), interactive programming facilities (interactive: educational-methodical complex, textbook, reference book, simulator, tasks, laboratory exercises, visual aids), interactive equipment (interactive board, tablet (planshet), plasma panel, test systems, etc.), interactive technologies (web-quest, virtual laboratory, intellectual games, QR code), web services (prezi.com, plickers.com, zunal.com, bestwebquests.com) are essential part of education system.

4. In improving of use of interactive software in biological education, it is necessary to pay special attention to the strengthening of methodological support. For this purpose, a mechanism was developed for enriching electronic resources of interactive software facilities, used in biological education with classroom development, interactive assignments, tests created on the basis of interactive presentation materials, an electronic textbook, an interactive complex, interactive technologies; constant replenishment with new materials and site of realization (dr-ergasheva.tdpu.uz).

5. Currently, the standard of the system of educational buildings for higher educational institutions was approved, which based on the definition of place and significance in the educational process, the differentiation of functional characteristics includes the publication of four groups: program-methodical (education plans and education programs); educational-methodical (methodical instructions, guidance, materials, concerning the content of the methodology of teaching spheres, the study of the course, the performance of course final qualification (diploma) works); educational textbooks, teaching aids, lecture texts, lecture notes); assistant processes (workshops, collections of management and tasks, literature, books for reading); control facilities (test programs, databases).

Achievement of effective use by students of interactive software in biological education serves to develop the process of mastering the skills of readiness for professional activity at the organizational- management, explanatory-motivational, cognitive, technological, and creative levels.

6. The use of interactive software facilities creates an opportunity for the systematic implementation of work on the organization and implementation of operational methods of monitoring, monitoring the level of knowledge of students, optimizing of study time in the electronic educational sphere on the base of Moodle system, QR code technology in biological education.

7. It is advisable to postpone the course of "Information – communication technologies in Biology» from the "Disciplines of Choice" in the block of "Special Disciplines" of the educational curriculum for the direction of education "Methodology for the teaching biology".

All inventions of mankind have as positive and negative consequences; one of them will be used for good purposes, and other one is harmful to the interests of mankind. Our goal is to use Internet and computer technologies as a strong means of educating and upbringing of the future generation, preparing of literate professionals, members of society, that who deals of internet and computer technologies they are able to actively and independently use of information and computer technologies.

References:

1. The Decree of the President of the Republic of Uzbekistan dated February 7,– 2017. "About Strategy for the Further Development of the Republic of Uzbekistan".– Collection of the legislation of the Republic of Uzbekistan,– 2017.
2. Tolipova J. O., Gafurov A. T. Biological education technologies.– T., Teacher,– 2002.– 126 p.
3. Abdukodirov A. Innovative technologies in education.– T., Istedod,– 2008.– 180 p.
4. Azizhodzhaeva N. N. Pedagogical technologies and pedasgogical mastering – T., TSPU,– 2003.– 193 p.
5. Begimkulov U. Sh. Scientific and theoretical bases of introduction of modern information technologies in pedagogical education.– T., Fan,– 2007.– 143 p.
6. Sharipov Sh. and others. The theory and practice of the development of the intellectual system of knowledge. "Monograph".– T., Fan,– 2011.–72 p.
7. Zenkina S. V. Informational–educational sphere as factor raising of education quality // Pedagogics. T.–2008.– No. 6.
8. Artyukhina M. S. Interactive means of teaching: theory and practice of application. Monograph. Barnaul: IG "Si–press",– 2014.– 168 p.

9. Boris S. I. Hannanov N. Possibilities of using Russian electronic publications in biology lessons / Biology.– № 6.– 2005. year.– P. 18–25.
10. Bulycheva M. The use of informational communication technologies at the lessons of biology // Biology.– 2008.– No. 16 (Aug.).
11. Titov E. V. The technique of application of information technologies in the teaching of biology: Textbook.– M.: Publishing Center "Academy",– 2010.– 176 p.
12. Bespalko V. P. Education and training with the participation of computers (pedagogy of the third millennium).– Moscow, Publishing house of the Moscow Psychological and Social Institute; – 2002.– 352 p.
13. Vershinskaya O. N. Information and communication technologies.– M., Science,– 2007.– 203 p.
14. Levitskaya A. A. Synthesis of media education and media criticism in the process of preparing future teachers: monograph / under total. Ed. A. A. Levitsky.– Rostov–on–Don: Ed. Southern Federal University,– 2016.– 574 p.
15. New pedagogical and information technologies in the education system / Ed. E. S. Polat.– M., Publishing Center "Academy",– 2002.–272 p.
16. Robert I. V. Information and communication technology in education. Teaching–methodical manual.– M., "Drofa",– 2007.– 35 p.
17. Chelyshev I. V. Method and technology of media education in school and university.– M .: Direct–Media,– 2013.– 544 p.
18. Dodge B. Some Thoughts About WebQuests.– 1995–1997. URL: http://webquest.sdsu.edu/aboutwebquests.html
19. Goodman S. Teaching Youth Media. New York and London: Teacher College Press,– 2003.– 129 p.
20. Kozma R., & Russell J. Multimedia learning of chemistry. In R. E. Mayer (Ed.). The Cambridge handbook of multimedia learning,– 2005.– P. 409–428. New York: Cambridge University Press.
21. Masterman L. Media Education Worldwide: Objectives, Values and Superhighways. Media Development.– 1995.– No. 2.– P. 6–9.
22. March T. Web–Quests for Learning.– 1998.–URL: http://www.ozline.com/webquests
23. Newton L. R.– 1997. Information Technology in Biology Teaching: Challenges and Opportunities. Journal of Biological Education, 31(4).– P. 274.
24. Šorgo A. Information and Communication Technologies (ICT) in Biology Teaching in Slovenian Secondary Schools // Eurasia Journal of Mathematics, Science & Technology Education,– 2010. 6(1),– P. 37–46.
25. Hart A. Understanding the Media: A Practical Guide. London and New York: Routledge,– 1991.– 268 p.
26. Henderson L., Klemes J., & Eshet Y. Just playing a game? Educational simulation software and cognitive outcomes. Journal of Educational Computing Research, 22 (1).– 2000.– P. 105–129.
27. Hennessy Sara. Pedagogical strategies for using the interactive whiteboard to foster learner participation in school science.
28. Huppert J., Lomask S. M., & Lazarowitz R. Computer simulations in the high school: students' cognitive stages, science process skills and academic achievement in microbiology. International Journal of Science Education, 24 (8).– 2002.– P. 803–821.
29. Goodman S. Teaching Youth Media. New York and London: Teacher College Press,– 2003.– 129 p.
30. Kozma R., & Russell J. Multimedia learning of chemistry. In R. E. Mayer (Ed.), The Cambridge handbook of multimedia learning,– 2005.– P. 409–428. New York: Cambridge University Press.
31. Masterman L. Media Education Worldwide: Objectives, Values and Superhighways. Media Development.– 1995.– No. 2.– P. 6–9.
32. March T. Web–Quests for Learning.– 1998. URL: http: //www.ozline.com/webquests
33. Newton L. R.– 1997. Information Technology in Biology Teaching: Challenges and Opportunities. Journal of Biological Education, 31 (4),– 274 p.
34. Šorgo A. Information and Communication Technologies (ICT) in Biology Teaching in Slovenian Secondary Schools // Eurasia Journal of Mathematics, Science & Technology Education,– 2010.– 6 (1).– P. 37–46.

Section 8. Political science

Kuppaeva Botagoz Tulegenovna,
Candidate of political sciences,
associated professor,
Kazakh National Agrarian University, Almaty,
E-mail: Bota 160@mail.ru

MARXISM AS THE MOST POWERFUL INTELLECTUAL BREAKTHROUGH

Abstract: Marxism was a philosophy connected with revolutionary practical action, not only explaining the world, but also indicating how it should be changed. Marxism was the basis of the worldview of millions of people. This teaching placed at the center of its problems the most burning social problems of its time. Marxism was the most important spiritual force of our time. The confrontation between Marxism and Western ideology was the nerve of life, the nerve pervading the whole epoch. And today this doctrine remains in the status of one of the most theoretically developed and internationally accepted paradigms.

Keywords: Marxism, dialectical analysis method, social justice, collectivist solidarity, class conflicts, category of "one-dimensionality", theory of alienation.

Куппаева Ботагоз Тулегеновна,
кандидат политических наук, ассоциированный профессор,
Казахский Национальный Аграрный Университет,
Алматы,
Bota 160@mail.ru

МАРКСИЗМ КАК САМЫЙ МОЩНЫЙ ИНТЕЛЛЕКТУАЛЬНЫЙ ПРОРЫВ

Аннотация: Марксизм былфилософией, связанной с революционным практическим действием, не только объясняющий мир, но и указывающий, как его нужно изменить. Марксизм был основой мировоззрения миллионов людей. Это учение ставилов центр своих проблем самые жгучие социальныепроблемы своего времени. Марксизм являлся важнейшей духовной силой современности.Противостояние марксизмаи западной идеологии былонервом жизни, нервом, пронизывающим всю эпоху. И сегодня это учение остается в статусе одной из наиболее теоретически разработанных и получивших мировое признание парадигм.

Ключевые слова: марксизм, метод диалектического анализа, социальная справедливость, коллективистская солидарность, классовые конфликты, категория «одномерности», теория отчуждения.

Marxism was one of the most powerful intellectual breakthroughs, ever performed in human civilization history. Two great inventions were the basis of it: materialist interpretation of history and disclosure of capitalist exploitation secrecy. Marxism consequences and its impact on the world were so monumental that it is impossible to concern Marxism as a regular theory.

Marxism is an epoch seized in thoughts; it is a printout of real social environment and political culture of its days. Many principal Marxism ideas save its continued importance. However in new historical conditions they require critical reinterpretation. Marxism entered the thesaurus of human intellectual ideas and social powers, mind of political and social powers, complied in real structure of historical existence. New political world map arisen under its influence.

Marxism genesis became a landmark in development of human thought; an opportunity to learn and realize the deep roots of social exclusion and terms of its elimination appeared. Marxism gave a powerful impulse to the philosophy, politology and sociology.In the field of philosophical idea applied Marxism enriched the science with dialectical analysis method. Marks brightly applied qualitatively modified Hegelian dialectic to the analysis of social development, first of all, to the analysis of contradictions and tendencies of capitalistic development.

It is necessary to mention that communism was considered by Marks not as an aim, but as a method of human emancipation. "Communism,– he wrote,– is a necessary form and energy principle of the nearest future, but communism itself is not an aim of human development and form of human society" [1]. At Engels' work "The Condition of the Working Class in England" has an analogous conception of communism.Communism, due to Engels' conception, is "a matter of not only workers, but of the whole humanity" [2].

In the words of Lenin, Marxism is an integral learning, cast of the one piece of steel. It cannot be cut on "good" or "bad" pieces. Marxism is not only violence, as a midwife of new society, not only proletarian dictatorship and repressive methods of world development. Marxism is an idea of intellect practical actualization; it is an efficiency, pushed to the limit; it is a dialectic character of formalism; active existence analysis. Concepts of social justice and community solidarity are included in Marxist project's constants. Non-prejudicial inventory of concepts and conclusions of Marxism should demonstrate the historical role of Marxism today. Marxism was a basis of ideology, culture and mentality of few millions of Soviet people. While western philosophy was and is a lot of inner circle of intellectuals. Marxism can become a starting base of new culture and new system. Range of new culture should save that positive what withstood the test of time. It is materialism, as an underlying philosophy of existence, reasonable dialectic, and historical determinism. Marxism did not disappear in the history of philosophical and political concept, it is nowhere near exhaust. Marxism includes potential of new rise of philosophy, new culture and new mentality. Probably, we need a new genius, modern Marks, who would understand spirit of his age, spirit of his epoch, and perform new intellectual breakthrough.

Attitude to Marxism was different. From pervasive denial to intention to use his ideas. Marks's social and economic views, gnoseology and theory of proletarian dictatorship were the fair games from western scientists. There is no any more or less significant Marxism theory, which did not face criticism, doubts or rebutment. For example, an idea about defining role of existence in relation to consciousness, about the meaning of economic aspect in social development, law of value and added value, statement about pauperization, about tendency to earnings dilution, about capitalism elimination, about a way and exercise of social revolution performance.

For western science the characteristic feature is an intention to assimilate separate fragments, ideas, Marxism concerns, to borrow its research designs and certain problematics. For example, in 20-s K. Mannheim borrowed the problematic of cognitive social predicament from Marxism and called it as the sociology of knowledge. E. Fromm tried to convert Marxism theory of alienation and use it in criticism of modern capitalism. Veber's theory of ideal types is an assimilation of Marxism method of idealization. Subsequent to Marks I. Schumpeter started to research the problematics of economic development. Schumpeter uses Marxism methodological principles in his capitalism concept – analysis of structural and institutional aspects of capitalistic system as well as consideration of its system in real time.

Western theorists also tried to prove the existence of different "Marxism" opposing to each other or by areal parameters: "European", "Asian", "African" "Marxism"; or

by national ones: "Soviet", "Chinese"; or by political ones "totalitarian", "statist" "Marxism".

Western scientists studied to find challenges in Marxism study and provide different variants of Marxism – Leninism – on the basis of it.They claimed that there are significant differences between "young" Marks and "mature" Marks; between Marks and Engels; between Marks and Lenin; between "young" Lenin (period of "Materialism and empiriocriticism") and "mature" Lenin (period of "Philosophical books"), that there are challenges between Leninism and Marxism, between Leninism and "soviet" Marxism. Western marxologists thought that Leninism is "a theory of revolution in precapitalistic societies" or that Leninism should be characterized as "an appliance of Marxism to the countries with non-industrialized economics and with a prevalent peasant population" [3].

In "Dictionary of international relations" published by Western University of Michigan the following Marxism variants are specified. 1) Economic, political, social theories of K. Marks and F. Engels – dialectical materialism is absent; 2) Leninism, which is introduced as a "theoretical interpretation and practical application of Marxism by Lenin"; 3) Stalinism, theoretical interpretation and practical application of Marxism by Stalin from 20-s to 1953; 4) Trotskyism. Race for power between Trotsky and Stalin is mentioned after Lenin's death; 5) Titoism is considered to be a theory and practice of national communism; 6) Contribution of Khrushchev to communistic doctrine and its application in USSR in the period of 1953–1963. 7) Maoism is introduced as a theory of civil war in backward peasant and semi-colonial countries [4].

One of the famous American sociologists Talcott Parsons also didn't ignore Marxism. In his two works: 1) "Social Classes and Class Conflicts in the Light of Recent Sociological Theory" in the book "Essays in Sociological Theory", 1949; 2) "Few notes about K. Marks's sociology" in the book "Sociological Theory and Modern Society", 1967, Parsons definitely states his point of view concerning Marxism [5].

The sociologist breaks integral inner structure of Marxism down. He separates Marxism as an ideology from Marxism as a science. He separates Marks-sociologist and Marks-economist. Parsons treats Marxism as a psychosocial personality theory. Also in these works he enunciates a conclusion about theoretical desuetude of Marxism as a social study.Parsons criticizes Marxist theory of class struggle. Due to the scientist's opinion Marks is mistaken when he narrows all class conflicts down single model of conflict between bourgeois class and proletariat. Parsons thinks that conflicts in industrial society are not the determining factor of development. Class conflicts are inevitable and unrecoverable. It means that Marxism theory of classless society is quixotic. The sociologist thinks that exploitation by Marxism as the main source of class antagonism is a result of accidental confluence of several factors which could be independent in other circumstances. As for the problem of alienation, due to Parsons' opinion, it is nothing more than nostalgia for discredited condition of agrarian or handicraft shop community. Bourgeois are aristocrats subject to frustration, but proletariat is peasants subject to frustration.Due to Parsons' opinion, dramatics of capitalism became not topical, and along with this the problem of exploitation and alienation passed.

The sources of class conflicts, due to the scientist's opinion, are contest, authority and discipline, strategic positions, different cultural types. Under this approach Parsons excludes the problems of creation and assumption of added value, problem of property and attitude to it.Parsons tries to prove that Marks's social forecasts are groundless. Contrary to Marxism's forecasts no pauperization process is noticed in capitalistic states; class polarization is absent; in industry man power doesn't increase proportionally to workforce productivity and number of mental workers; class solidarity is substituted by national or ethnic one; there is no regression of government machinery in socialist society.

Parsons thinks that Marks's forecasts are untenable for other cases too. Revolutionary situation, which is due to Marxism, is connected with the level of industrial development of the country, is untenable. Parsons refers to experience of France in XIX century. In economic terms it was less developed than modern England. Though it was France suffering from penetrating class conflicts. Socialistic revolutions, as the scientist mentions, happened not in the most developed capitalistic countries.As for the subject of revolution, it has been changed. Class ground is displaced towards from proletariat to peasantry.

Also, due to Parsons' opinion, Marks missed three issues in his theory: 1) "Durkheim's problem", or the problem of social connections and roles of institutes;

2) personal theory, human motivation and role of cultural codes in activity stipulation; 3) "Verber's problem", or the problem of place and role of ideas and factors of culture in social system.These problems did not receive appropriate theoretical development. Marks takes into account only material factors, paying no appropriate attention to the system of values. Also limitation of Marxism is in fact that it avoids the problematics of social structure and social organization of the system. Parsons tries to prove that Marks didn't develop the theory of structure and functions of socialistic society. Here Parsons doesn't consider that Marxism developed such theories – it is the concept of classless society, planned distribution and liquidation of alienation.

As for methodological criticism of Marxism, here Parsons indicates two aspects. He thinks that the meaning of Marks's researches is limited by the frames of just one historical epoch – epoch of early capitalism. The next remark of the sociologist comes down to that Marxism methodology doesn't allow to make universal generalization, comprised all social systems and historical periods. That is why Parsons limits Marxism by definite dimensional and time extents.

As for the method, here the sociologist accuses Marks of the fact that in his researches he doesn't follow methodological principle: liberty from values. Parsons thinks that one cannot pass value judgments of social or political character in the name of science. Due to Parsons' opinion, Marxism, scientific socialism in particular, mixes two incommensurable systems of values: ideological and scientific ones. Ideological system is attributed the status of scientificity. Marxism is simultaneously a science and ideology, as a theory and as an activity program.

Parsons denies any cognitive value of Marxism for modern age. In theoretical and methodological terms Marxism is proclaimed to be "obsolete", "psychologically naive" and referred to "penetrated" period of development. Marxism stays within the frames of XIX century. Marks's study comes down only to four points, which are proclaimed to be only significant. This is the specific form of materialism; concept of society as integrity, controlled by dichotomy; confluence of economic and political factors and principle of historicism.

The next scientist, who tried to contradistinguish his theoretical structure to Marks borrowing the list of his statements (conceptional machinery), was Herbert Marcuse. American philosopher of German origin, "thought leader" of staunch left rebellious young people of 60-s. During the events of May-June of 1968 in France, Italy and other European countries Marcuse's papers, and first of all his book "One-Dimensional Man" became bestsellers. 450 thousands exemplars of "One-Dimensional Man" were sold in France for the period of May-June of 1968.

In 1964 this programmatic work of Marcuse "One-Dimensional Man: Studies in the Ideology of Advanced Industrial Society" was published. Ideas described in "One-Dimensional Man" quickly made Marcuse a popular ideologist of "new leftist", an idol of oppositional student movements of 60-s and one of the most important western philosophers. Core idea of Marcuse's book is an idea of "one-dimensionality".

Category of "one-dimensionality" allows, due to Marcuse's opinion, to commit the essence of this society clearly and concisely. "One-dimensionality" is uniformity, lack of well-defined and efficient alternative (social, political, ideological). That is a commonality and unidirectionality. "One-dimensionality" means the lack of confrontation, any criticism, any overrun of existing attitude system, institutes, evaluations, conciliation with the existing system. In social and political terms "one-dimensionality" means the lack of social powers, withstanding to existing social relations and heading to overturn them inside the society. Due to Marcuse's opinion there are no antagonistic powers within the frames of the system, because both proletariat and bourgeoisie persecute the shared objectives and share common political ideals.

Lifestyle of developed industrial society is one-dimensional. Worker and entrepreneur watch the same TV-programs, movies, read the same printed press, use the same hyped tooth paste, drive own automobiles. Foremost, they both are mostly satisfied by these amenities and don't feel the aspiration to destroy the existing pattern of requirements and push its limits. "One-dimensional" art, "one-dimensional" language, as well as radio, cinema, TV, advertisement allow influencing proletariat's mind in such a way that he begins to think in direction, beneficial for augmenters. His proletarian mind becomes blunt, the working class ceases to be "a class for itself", i.e. revolutionary class.

Marcuse links the formation of "one-dimensional" society, "one-dimensional" person with his "one-dimensional" consciousness with new forms of human control,

based on the modern science and techniques, on "technical rationality".Marcuse distinguishes three elements in them. 1) System of creation and satisfying of submitted requirements. 2) All-permeating communication media – TV, radio, printed press."When worker and owner enjoy the same TV program and visit the same leisure area …" 3) New forms of social control. Due to Marcuse's opinion, theories of human relationship at the enterprise and used science about influence on human mentality prevent the possibility of oppositional climate's formation [6].

Domination of class powers in terms of developed industrial society loses political character under new control forms. Labor leaders' transfer to the positions of social partnership, methods of economic cessions, contagion of "welfare state" theory, western democracy – all of this liquidate class struggle, due to Marcuse's point of view.

Capitalism created powerful centers of mass brainwashing, of development and implementation of the standards not only in material field, but also in spiritual life of the society. The culture becomes "mass"; the culture suppresses the individuality of mass consumer and deprives him the own face. Intellectual producer of the middle class lives on the standard mental food, his mind is controlled and driven, and it seems to him that the whole world is "one-dimensional" and standard. Due to the philosopher opinion the disaster is in that mass culture in the terms of capitalism gives a rise to "one-dimensional". i.e. obedient and non-critically thinking person [6, P. 59].

Due to Marcuse's ideas, human consciousness defines their behavior, their solutions, and evolution of the history therewith. He distinguishes two ways of thinking – bi-dimensional and one-dimensional. The first one pushes the frames of reality, struggles for passing of that reality on behalf of better reality. The second one considers reality as a mentality implementation and denies any thought's pushing the frames of the existing reality.

Scientific and technical revolution gave such communication media and human mind control that allow defining their way of thinking and political opinions "in one-dimensional way" and preventing the rise and forming of revolutionary class mentality of proletariat. Due to Marcuse's point of view, the level and speed of production powers and production of mass consumption articles do not only satisfy the vital requirements of the crowd, but also create new requirements, replacing the class requirements of the proletariat.

Marcuse finds "the reasonable one-dimensionality" to be a negative characteristic of his modern society. This society is irrational, Marcuse says. Marcuse thinks that due to the fact that direct open and enforced control gives a place to administrative, ideological and psychological control, the nature of work is changed and also certain rise of living standard is observed.It doesn't matter that the most of the people of one-dimensional" society doesn't understand its addiction "Slaves under developed industrial civilization are the slaves with sublimated feelings, but they are still the slaves …" [6, P. 32]. In his concept Marcuse gives negative estimation – mostly because development of that society deforms the liability and skills of the individual and devotes him to definite even though conceal slavery (Mancurtism). Marcuse concludes that such a society should be destroyed by revolution and replaced by the essentially innovative society. He dreams about social revolution.

Student unrest in the latter half of 60-s, dissatisfaction by bureaucratization and militarization of the society from the side of intellectuals gave Marcuse the basis for "Political foreword of 1966", for "Eros and civilization", and then for a foreword for French publication of "One-dimensional man" (1967) to speak about young students and intellectuals as about the forces, having revolutionary potential.

At the work "The End of Utopia" (1967), "An Essay On Liberation" (1969) Marcuse forms new concept of revolution: concept of world revolution, where he raises a question about processes, carried in "the Third World" and about its' interconnections with dynamic of social changes in "developed industrial countries", as well as about concept of revolution concerning developed countries themselves. Due to Marcuse's opinion, radical students and intellectuals are "detonator" and "catalyst" of revolution in developed industrial society and its motivating force. Due to his opinion, they can begin anticapitalistic revolution.

Concept of Marks led him to reconsideration of Marxism thesis about proletariat as a revolutionary class of capitalistic society. Marcuse denies neither proletariat existence itself nor presence of challenges in modern capitalism.However, due to Marcuse's opinion, the newest means, equity drawdown of manual labor, increase of the role of office workers, manufacturing automation lead to decrease of the worker's political voice. Student

unrest of 60-s and dissatisfaction by growing bureaucratization and militarization of the western society led Marcuse to the idea about young students' and intellectuals' being a force having revolutionary potential. At works "The End of Utopia" (1967), "An Essay on Liberation" (1969) these ideas were developed. Due to the philosopher's idea, students and intellectuals are the catalyst of revolution, its motivating force; they awake proletariat and lead them.

Marcuse mentions that intellectuals themselves, or young people themselves or ghetto population itself or all of them together are not able to blow a society up. They are "avant-garde", "catalyst", "detonator", they are the force of oppositional concentration, but in the best case they would lead to disintegration of the society, due to Marcuse's opinion. Later Marcuse in his "An Essay on Liberation" calls a working class a potential revolutionary force and writes that new concept of revolution comes down to the period of enlightenment, preceding the material alteration, the period of education, but education inverted to practice: demonstrations, confrontations, revolt. Marcuse found the problem of "the agent of historical action" to be postponed and, ultimately, he estimated the role of students and intellectuals as pessimistic, as a role of working class.

Therefore, Marcuse tried to generate new revolutionary ideology, competitive to Marxism.At works "The Obsolescence of Marxism", 1967, and "Reason and Revolution" Marcuse was against Marxism. He accuses Marxism that it doesn't contain the certain vision of the future.At the work "Soviet Marxism: A Critical Analysis", 1958, Marcuse writes that theory of socialism is not a study, directed to the future. The philosopher tries to prove that denying the past and defining future prospects Marxism stays at the level of social structures and relationship, that it doesn't postulate the change of character of technology and productive forces.I.e. Marxism is not critical enough, burden with traditions; it reduces a jump from "pre-history" to "the history" of the person to transformation in the field of social relationship. Marcuse analyses an issue of the subject of revolution. Marxism ground of proletariat role as a subject of socialist revolution is given a significant meaning.The philosopher thinks that proletariat really was the only one meaningful revolutionary class in XIX century. But capitalism of XIX century was subject to significant alterations dashed Marks's conclusions. As Marcuse writes in "One-Dimensional Man", nowadays reality of modern industrial societies converted Marks's theory of "proletariat" category to myth. Working class lost its revolutionary potential and not able to play a role suggested by Marks anymore.Marcuse thinks that due to growing economical welfare proletariat becomes a prisoner of the same requirements and means of its satisfaction as bourgeoisie.Capitalism arrested the labors by golden chains. The field of requirements controlled by advertisement and entertainments encouraged it. Due to Marcuse's opinion, working class loses its revolutionary potential as long as it confluent with capitalistic system. The philosopher rejects proletariat as a subject of revolution.

If proletariat is not a revolutionary force Marxism is not able to pretend to the role of progressive ideology. That is Marcuse's conclusion.Marxism lost its meaning for modern ages due to its insufficient radicalism and also due to obsolete role of working class. Marcuse thinks that some theoretical concepts are valuable in Marxism, for example, theory of profit as an aim of the present system, theory of immanent contradictions of capitalism and impossibility of its application within its frames, about submission of the person and his requirements to market relations.

Marxism is obsolete as an ideology, as the philosopher says. Marxism is a museum specimen, study of the past, which lost its meaning nowadays. Marcuse interprets Marxism as a theory which refers to "human prehistory", limits the meaning of Marxism by class societies and proclaims Marxism to be historically obsolete due to the fact that proletariat lost its potential as the main impelling power and subject of revolution.

Jurgen Habermas is a German sociologist, representative of the second generation of Frankfurt's, offers metaparadigm theory of communicative activity, based on analysis of human communication, cooperation and dialectic.Through its prism he analyses democracy, morality and right of late capitalism.Habermas is an author of the following works: "Democracy, Mentality, Morality", "The Theory of Communicative Action", "Knowledge and Human Interests", "Technique and Science as Ideology".

Habermas criticizes the following in Marks's theory – theory of value and immiserating, study about basis and superstructure, facilitated, due to his opinion, concept of interconnection between productive forces and productive relations. Habermas aims at development of such problems as study about transformed forms of

consciousness, analysis of ideology, study of the problems of communication and criticism of materialization of social communicative relations. With the help of theoretic synthesis, activity concepts, rationality, social communicability Habermas tried to lay the foundation of renew critical theory, which could deeper and fully influent the development of modern society. For development of new concept of communicative activity and consciousness Habermas mobilizes everything more or less valuable what exists in western spiritual heritage.

Habermas pretends to extend large-scale theory of the society and builds theory of communicative activity as its beginning, basis.Habermas, offering and developing the theory of communicative action, first of all critically redefines Marxism. Habermas proclaims, that his aim is "to develop theoretical program, which I understand as a reconstruction of historical materialism" [7, P. 95].

Theory of alienation created by Marks appeals to Habermas. Due to Habermas opinion, alienation by Marks is interpreted quite unilaterally – within a context of production relations, apart from social networking and communicative actions of people. Marks didn't investigate human communications themselves. That is more important problem, concerning the whole society, than contradictions and alienation in one economic field of society. Habermas at his work "Knowledge and Human Interests" criticizes Marks for the fact that he narrows everything down to labor, that communication and human relationship do not exist in philosophical and historical generalizations of the classic [8].The scientist distinguishes importance of labor and communication. While labor is "persistent natural requirement of human life" for Marks, for Habermas communication is the most important social cultural feature. The labor as a purposeful rational action should be opposed by the labor as a communicative activity, i.e. free and creative labor.

Western scientists draw a parallel between Habermas's and Marks's concepts.While Marks saw a way to liberty and overcoming of alienation in annihilation of capital as a private property, Habermas saw it in elimination of barriers on the way to natural original communication.

In all his researches Habermas always dialects with Marxism. He often uses elements of Marxism analysis. At work "Knowledge and Human Interests" the philosopher says that Marxism should be narrowed down social content. Habermas finds Marxism to be a type of systematic consciousness, the subject of which is a social problematics. Marxism subjects not to the rules of empirical verification, but to the regularity of social psychology and ideology. Marxism theory is aimed to be a criticism. Marxism can't prescribe any technical directives for society changes, because as a criticism it cannot be "interpreted" to the language of instrumental norms. That is why such its statements as a call to creation of proletarian party and preparation for socialistic revolution should be recognized as a mistake.

At the work "Technique and Science as Ideology" of 1968 Habermas thinks that historical materialism is not suitable for modern capitalism, which experienced two types of alterations. The first alteration is connected with a phenomenon of state interventionism, i.e. state activity in economic field. The activity of the state protects economics from destructive crises and depressions. It brings significant alterations for historical materialism. Due to interventional activity of the state the basis character is changed. Basis political structure comes to the foreground, apart from narrow economical one.

The second alteration is connected with approach of science and technique.Habermas considers two issues: the first concerns the evaluation of productive forces from the point of its role in the process of social release. The second one concerns the law of value. The development of productive forces does not always release a person from governmental structures. Due to Habermas's opinion, technique and social practice are two fields, subject to different regularities. With the development of technique and science technical approach to human and social issues is spread. As for the issue of value law, due to Habermas, it is not applicable for modern capitalism. Different types of qualified difficult labor are not narrowed down to simple labor and expression in the units of labor hours. Scientific information also became independent factor of delivering value. Theory of value is always in the thick of criticism from the side of western scientists. This theory is in the basis of such Marxism concepts as Marxism political economy, theory of added value, theory of exploitation. Habermas's conclusion narrows down to the fact that law of value is not applicable to the terms of modern capitalism.

At the work "Technique and Science" Habermas replaces Marxism term of productive forces by term of labor, or by the term of object-oriented rational action.

Productive relations are opposed to the terms of interaction, communicative action, institutional frames, or organization principle. In the field of labor, due to Habermas, the processes of education and assimilation of technically useful information are carried, and in the field of interaction processes of socialization and personality formation are performed. The first field corresponds to technical interest, the second one – to the practical one.

As Habermas thinks, it is possible to detach four social formations: primary, traditional, capitalistic and postcapitalistic. In the first formation the kinship system plays the role of organizational principle, in the second one – the political system, in the third one – economical system.

Habermas also considers the history of human development from the different point of view.Before capitalistic epoch the field of interaction dominated and comprised the field of productive activity. In phase of progressive capitalism the separation of these fields is performed, and production field becomes independent. For modern ages the headship of technical activity is a characteristic feature.I.e. on the first stages of human history original communication existed. Authentic sympathy was reached thanks to immediate communication. Economic, political, informational structures appeared after it apart from consciousness and liberty of people began to expropriate people from natural communications, and hereby from themselves.

Due to Habermas's opinion ideal is the emancipated society with mutual communication, free from coercion and supremacy.Dialogue of everybody with everyone. It rejects any forms of control, from treatment of pharmacologic agents and gene engineering to control, based on use of cybernetics, system analysis, and solutions' theory. Due to Habermas's point of view, the only method of control is self-administration, based on free approval of knowledge and value, which is approved by the way of "Socratic dialogue". Also Habermas thinks that essential condition of that ideal is an elimination of the classes and the state, ideology as a "false consciousness", i.e. all the factors limiting inter-human communication.

The main issue at Habermas's works is his intention to reveal potential of human consciousness, developed in racialization and modernization of actions of individuals and social groups, in formation and rational improvement of that what for human society was created: cooperation (interaction), human communication.

One of the characteristic features of Aron Raymond's works is a keen criticism of Marxism philosophy. R. Aron criticized different treatments of Marxism: dogmatic treatment, existentialistic interpretation of Marxism by J. P. Sartr; Marxism of L. Althusser. In 1955 Aron published a book "The Opium for the Intellectuals", in which he tried to antagonize the influence of Marxism.

Due to Aron's opinion, Marks overestimated the meaning of class conflicts. Stating, that capitalism is not able to distribute all the benefits of technical progress between everybody, Marks proclaimed about future shocks, which should lead directly to elimination of classes and all the prejudices, common for capitalism. Aron thought that Marxism in modern life became a peculiar religion. Aron writes: "K. Marks called religion an opium for people. Church, whatever it wants or not, strengthens established prejudice. It helps people to bear or forget their endurances instead of avoiding them. Being at the mercy of religious ideas, person of faith becomes indifferent to existing public peace" [9]. Due to Aron's opinion, Marxism ideology, which was transformed to generally accepted religion by the state, can be criticized from the same points of view. It also teaches masses to obey and establish absolute power of governors. However, Christianity did not allow despotism of governors. Secretary General of communistic party retains the right to "rewrite" the history of communistic party.

Aron mentions that communistic religion in modern ages has absolutely different meaning in comparison with Christian religion. Christian "opium" makes people passive, communistic "opium" impels people to rebellion.

In the last chapter of "The Opium for the Intellectuals" he writes that Marxism ideology in its presentation of history and future repeats the scheme, peculiar for Judeo-Christian idea and presentation of chiliasts about millennial empire. The following features are peculiar for it: criticism of the existing; turning point connected with apparition of elected person or group; promised future, represented in the most glowing colors. Functions of Messiah is taken upon proletariat as an elected class, as "collective rescuer"; turning point is a socialistic revolution; God's Kingdom or millennial empire is a classless socialistic society.

The philosopher doesn't notice any groundings of historical Messiah for working class at Marks's works. Aron says that Marxism doesn't have any empirical

validations and draws strength from myths. That is why Marxism doesn't only have a structure of myth, but also can be considered as a myth, as the modern variant of dream about future millennium.

However, Aron tries not to downgrade himself to the level of primitive anti-communism. Aron doesn't reject economic terms of Marxism and proclaims: "Any wealth is created by labor and being multiplied as a result of added value, which is withdrawn by exploiters from workers of own country and workers of periphery" [10, P. 412]. Due to his words, "Marxism theory of added value owes its popularity to the fact that it is irrefutable" [11].

As for Marxism categories of "productive forces, productive relations, class struggle, class consciousness, and moreover, basis and superstructure, they can be used in any sociological analysis. Trying to analyze Soviet and American societies myself, I gladly start with economic condition and even with condition of productive forces, and then come over to productive relations, and then to social relations. Critical and methodological use of these terms is allowed for understanding and explanation of modern, and maybe even any, society" [11, P. 190].

Marking the great contribution of Marxism to historical interpretation, which was represented before it as a chaotic agglomeration, Aron wrote: "even if we become Marxists or not – we are saturated with historical points of view of Marxism" [11]. Aron opposed his "philosophy of history" to Marxism sociology – historical materialism. In his philosophical criticism he opposed "young" Marks to the "mature" one. The basis for it was "Economic and Philosophic Manuscripts of 1844", where humanism prevails under economic determinism.

Marks saw the task of philosophy in change of the world. Aron in his work "Imaginary Marxism", recognizing philosophical status of Marxism, refuses to consider it as a scientific study [12].

However, notwithstanding total criticism from the side of western philosophers and politologists, in the western science there is no alternative to Marxism equal to it by deepness, immensity and practical embody. "Shumpeter being not a Marxist once noticed that all the people writing about society would like to have the same coefficient of realized forecasts as Marks did" [13]. Marxism was a philosophy connected with revolutionary practical action, not only explaining the world, but also indicating how to change it. Marxism was a basis of world view for millions of people. This study centered on the most burning social problems of its age. Marxism was the most important spiritual power of modern age. Opposition of Marxism to western ideology was the nerve of life, a nerve, penetrating all the epoch. And nowadays this study keeps the status of one of the most theoretically developed and received the worldwide acceptance of paradigm.

In the Soviet system Marxism philosophy served as the basis of all social sciences and proved their integrity, there is no such integrity on the West. Western science cannot opposite to Marxism any integral consistent alternative, able to become the basis of natural-science and social knowledge.

References:

1. Marks K. Engels F.– W.– Vol. 42.– 127 p.
2. Marks K. Engels F.– W.– Vol. 2.– 516 p.
3. Mordginskaya E. D., Nikitin V. A. Anti–communism of right leaders and theorists of social–democratic reformism / In col.: Ideology of the modern reformism.– M., Science.– 1970.– 445 p.
4. International Relations Dictionary. USA. Western Michigan University,– 1969.– 125 p.
5. Parsons T. Fact and Theory in Social Science.– N.Y.,– 1964.– 140 p.
6. Marcuse H. One – Dimensional Man.– N.Y.,– 1964.– 28 p.
7. Habermas J. Communication and the evolution of society. Boston,– 1979.– 95 p.
8. Habermas J. Knowledge and human interests. Boston,– 1970.
9. Aron R. Opium for intellectuals.– M.,– 1995.– 300 p.
10. Aron R. Peace and war between nations.– M.,– 2000.– 412 p.
11. Aron R. Stages of sociological idea.– M.,– 1993.– 412 p.
12. Aron R. Imaginary Marxism.– M.,– 1993.
13. Quotation of Aron R. History lessons.– Paris,– 1989.– P. 234–235.

Section 9. Psychology

Toto Giusi Antonia,
Ph D., in Culture, Education, Communication,
Department of humanities. Literature, Cultural Heritage
University of Foggia,
E-mail: giusy.toto@unifg.it

AMUSIA, DIDACTIC AND DIAGNOSTIC EVOLUTION OF THE PROBLEM OF MUSICAL LEARNING

Abstract: Amusia is a specific disorder of musical learning, which is having ample space in international studies. Twenty years of research have led to a standardization of diagnostic tools and an understanding of compromised cognitive dimensions.

Keywords: Amusia, Music education and musical learning disorders.

Amusia is a specific disorder of musical learning, to which in Italy no great space has been given in specialist literature or in manuals because musical skills are not indispensable for daily survival or cognitively inferior to speaking, writing and calculation. The hierarchy in the sciences and disciplines is also reflected in a hierarchy of pathologies and disorders [1, 95–97]. Current research has addressed the complexity of the topic, reviewing the correlations observed between musical education, intelligence and memory, and the association between music and other cognitive abilities [2, 801–807]. Studies have shown that music education improves general intelligence that is linked to many cognitive and academic skills, thus confirming the hypothesis that music education can improve overall cognitive skills in children and adolescents, and could have effects secondary on all other skills and competences. Therefore the presence of the amusia disorder could be one of the causes of deficit in all these areas that music education would instead improve.

A systematic review of the existing literature was adopted to search for articles in the main international databases on the theme of amusia and musical learning disorders, using "amusia", "music education" and "musical learning disorders" as words key. Subsequently the contributions were selected on the basis of the abstracts and published articles. In general, various studies consider the musical learning and the use of music are fundamental components for psychophysical and social development, so much so that a recent study [2, 20] has focused attention on language and music as typical human behaviors, based on a unique blend of biological and cultural characteristics that brings out complex behaviors. Both behavior and cognition are evolving and for this reason they can be studied by a multiplicity of investigative perspectives. The study of music in recent years, in fact, benefits from contemporary cognitive science applied to language and tries to interpret the obstacles in linguistic research from a phonological point of view and this is why this hybridization is desired.

The dimensions studied between music and language have so far methodologically followed parallel paths: psychology has mainly analyzed music in the caregiver and infant relationship, or in relation to the prosocial behavior up to group cohesion. Language has specialized in communicative and indicative dimensions of group identity. Comparing the various studies, a possible overlap between music and language is found in the dimensions of emotional communication and social interactions. Neurospicological research has shown that the temporal lobes of both hemispheres are involved in the memory of musical experiences, whereas the areas of musical perception are located in the lower right frontal

lobe. The defect in the development of such areas would be the cause of Amusia [3, 2652–2670]. A recent survey has partially confirmed these data by advancing a fascinating hypothesis: amusians had higher diffusivity indices in the corpus callosum, the lower / upper right longitudinal fascicle and the right lower frontal-occipital fascicle compared to subjects without the syndrome but controlling the demographic variables. The analysis showed that the efficiency of the brain network was reduced in amusici and that the white matter impairments were correlated with a reduced network efficiency in the circuits described above in those presenting the amusia disturbance so much to suggest that the congenital amusia is a disconnection syndrome [4, 473].

Congenital amusia, therefore, is a neuro-evolutionary disorder of perception and musical production. Amusing individuals are not able to recognize a familiar melody (without the help of texts) or to realize that someone (including themselves) sings out of tune, or even they have difficulty even in memorizing melodies. To be deficient, peripheral hearing loss, brain injury or general cognitive or social disability should be excluded in the diagnosis. The last two decades of studies have shown that this disorder is a dysfunction of tone processing. A test battery called "Montreal battery for the evaluation of Amusia" (MBEA) has been developed since 2003 [5, 58–75]. The MBEA verifies the ability of perception and memory of music by listeners. Participants must listen to two short melodies and say if they are exactly identical or different. The main deficit of individuals affected by amusia is altered tone discrimination, impaired tone memory and impaired knowledge of the regularity of the western tonal system. According to the main hypothesis, what would cause the condition of amusia would be linked to a deficit in tone processing. Today the Montreal battery for Amusia evaluation is a quantitative tool widely used to diagnose congenital amusia. The use of this standardized measure ensures that the individuals tested can be ascribed to a specific neuropsychological profile. From 2003 to today, the MBEA has developed strongly both in its online version, with the Amusia test of 2008 and with the accompaniment to the profile of Gordon's musical Aptitude, another battery of tests widely used in the field of musical learning and academic success [6, 341–373]. The Montreal battery is considered a complete protocol in the diagnosis of congenital amusia, although according to some it is not a single diagnostic tool but a phase in the screening process of Amusia [7, 58–75].

Authoritative studies have documented the complete recovery of this deficit in children, unlike adults, if appropriately and previously diagnosed and treated. Last but not least, it should be remembered that musical skills, especially in children, are precursors from the earliest childhood of social skills and vehicle of musical intelligence. This hypothesis is based on the theory of plasticity of the brain that in a series of experiments and observations [8, 37–55] can explain some of the sensorimotor and cognitive improvements that have been associated with music training. the association of motor actions with specific sound and visual models (for example musical notation), strengthens the connections between auditory and motor regions (eg arched dossiers) and multi-modal integration regions, which according to studies would be involved in the amusia disorder [9, 1–12].

The influence of education on executive functions as a basis for the transfer of skills has been the subject of study of other explanatory hypotheses, since the treatment of music during early adolescence and childhood are positively correlated with working memory, cognitive control or cognitive flexibility [11, 442–448]. Moreover, when considering music education in relation to the study of an instrument, the specificity of the training involves various executive functions. Musical learning is intersecting with linguistic, communicative and social skills; in adolescence, in fact, the consulted studies have shown that musical education has effects not only on brain development but also on the acquisition of various cognitive abilities [12, 321–327]. Within the Italian context, the current educational policy states that children and adolescents who have attended music education courses have undoubtedly become the leading scholars. These concepts are today the subject of debate regarding the general planning of the school and the introduction of new experimental secondary school courses, in which music must take on an educational, psycho-social and cultural role. This new type of educational opportunity could direct future research towards a better understanding of the role of music in learning and general intelligence. On the other hand, if the validity of causal relationships between music education and general learning will be tested, then important

implications will be implicit in terms of rethinking teaching methodologies with new learning objects. Finally, a fruitful field of research focuses on the link between emotional and musical intelligence and how they influence each other in order to explore future implications in the educational field. In addition to the relationship between music and intelligence, there is a lack of research in the educational enhancement between amusia and general intelligence and cognitive abilities, in fact even in this field the necessary tools for the development of learning and skills are lacking.

References:

1. Toto G. Il disturbo specifico dell'apprendimento musicale: l'Amusia // Educare.it.– 2016.– No. 16.10.– P. 95–97.
2. Toto G. A. The Role of The musical Learning in the Development of the socio and cognitive abilities. A review // The Online Journal Of Educational Technology.– 2017.– No. 16.– P. 801–807.
3. Ravignani A., Thompson B., & Filippi P. The evolution of musicality: What is to learn from language evolution research? // Frontiers in Neuroscience.– 2018.– No. 16.– 20 p.
4. Hyde K. L., Zatorre R. J., Griffiths T. D., Lerch J. P., & PeretzI. Morphometry of the amusic brain: a two–site study // Brain.– 2016.– No. 129.– P. 2562–2570.
5. Wang J., Zhang C., Wan S., & Peng G. Is Congenital Amusia a Disconnection Syndrome? A Study Combining Tract–and Network–Based Analysis // Frontiers in human neuroscience.– 2017.– No. 11.– 473 p.
6. Peretz I., Champod A. S., & Hyde K. Varieties of musical disorders // Annals of the New York Academy of Sciences.– 2003.– No. 999.1.– P. 58–75.
7. Peretz I., et al. On–line identification of congenital amusia // Music Perception.– 2008.– No. 25.– P. 331–343.
8. Vuvan D. T., et al. The montreal protocol for identification of amusia // Behavior research methods.– 2017.– P. 1–11.
9. Schlaug G. Musicians and music making as a model for the study of brain plasticity // Progress in Brain Research.– 2015.– No. 217.– P. 37–55.
10. Chen X., et al. The lateralized arcuate fasciculus in developmental pitch disorders among mandarin amusics: left for speech and right for music // Brain Structure and Function.– 2018.– P. 1–12.
11. Adamo A. et al. Connecting art and science for education: learning through an advanced virtual theater with "talking heads" // Leonardo.– 2010.– No. 43.5.– P. 442–448.
12. Bentoglio A., Merli C. Pubblico e pubblici della musica // Balestra C., Malagutt A.(eds.), Organizzare musica. Milano: Franco Angeli.– 2003.– 384 p.

Section 10. Agriculture

Muratkasimov Alisher Sattarovich,
Senior Researcher,
The Gallaaral Scientific Experimental Station
Research Institute of cereals and legumes,
Yusupov Khasan Yusupovich,
Candidate, of Agricultural Sciences
The Gallaaral Scientific Experimental Station
Research Institute of cereals and legumes,
Umurzakov Abdukarim Abdukhamivoch,
The Gallaaral Scientific Experimental Station
Research Institute of cereals and legumes,
Senior Researcher
Gafurova Laziza Akramovna,
Doctor, of Biological Sciences, Professor
Soil Science Department, Biology Faculty
National University of Uzbekistan named after M. Ulugbek,
E-mail: alisher.muratkasimov@mail.ru

WAYS OF RATIONAL USE OF DRY SIEROZEMS

Abstract: The results of studies on the study of the effectiveness of organic and mineral fertilizers, absorbents and biologically active substances, while preserving the fertility of the soil of the country's dry fields with partial provision of moisture, feeding of grain crops after new arable land, economical use of soil moisture.

Keywords: irrigated lands (bogars), typical serozem, yield, moisture, crop rotation, organic and mineral fertilizers, root nutrition, tillage, agrotechnology, humus, yield increase, efficiency.

Introduction

Under the influence of global climatic influences around the world, Uzbekistan, like countries located in dryland regions in peculiar soil and weather conditions due to a stable harvest from agricultural crops, while providing the population with food products of rainfed lands, currently scientifically based use of 751.4 thousand of ha of arable land remains a requirement of time [3].

By the Decree of the President of the Republic of Uzbekistan dated February 7, 2017, it was adopted the strategy of the five priority development directions of the Republic of Uzbekistan in 2017–2021.

In item 3.3 of the third priority direction of this program (modernization and accelerated development of agriculture), the urgency of effective use due to additional reserve of rainfed lands is indicated with further strengthening of food security of our country and expansion of production of ecologically clean products.

In solving the above-mentioned urgent problems, the improvement of agro technical developments recommended for the cultivation of spiked crops in rainfed lands and the widespread introduction of scientific success are the main objectives of the research carried

out within the framework of the applied project KHA-9–054–2015, planned for 2015–2017.

According to stationary experiments conducted in steppe-hilly regions (280–360 mm) semi-rainfed lands, intensive soil cultivation for cereals that are grown extensively for 60 years and plowing at a depth of 20–22 cm, as well as in variants without organic and mineral fertilizers, the content of organic substances (humus) decreases from 1.2–1.3% to 0.58–0.65% (0–20 cm) [2, 5, 7].

The main decisive factor in agriculture, as well as the preservation and improvement of soil fertility, the cultivation of environmentally friendly agricultural products in all rainfed regions (plain, steppe, piedmont and mountainous) is the introduction of short rotation schemes (2.3, 4 field) crop rotation for farms [6].

Materials and methods

The study of organic and mineral fertilizers, polymeric absorbents, accumulating soil moisture (absorbing) and biologically active substances in the new plowland of rainfed lands for cultivation of spiked crops and their influence on soil moisture and mineral nutrition regime, growth and development of winter wheat are the tasks of this study.

The soils of the experimental fields are loam, with water and wind erosion typical of sierozem and their arable layer (0–20 cm) consists of 0.55–0.88% humus, 0.18–0.20% nitrogen, 0.16–0.18% of phosphorus and 1.6–1.8% of total potassium, the pH of the soil medium is 7.9–8.0 [8].

All agrotechnical measures for growing soft wheat of "Bahmal-97" variety were made on the basis of agrotechnical recommendations developed by the scientific research institute of cereals and legumes of the Gallaaral scientific-experimental station [4].

Phenological observations, the number of plant bushes, the dynamics of accumulation of dry and raw biomass, soil moisture, analysis of the nutrient content of wheat in the vegetative period, and other results of field experiments were affected by the variance analysis based on the "Field Works Methodology" (1985) of B. A. Dospekhov [1].

Results and Discussion

The content of perennial precipitation was 362.0 mm and in 2014–2015. In 2015–2016 agricultural years this indicator was respectively 362.3 and 400.6 mm, the average multi-year annual temperature of 11.6 ° C, by years 10.4–11.2 °C, the average multi-year relative humidity of 50%, in the corresponding years was 70–73%. In May 2015, the amount of precipitation is less by 13.3 mm relative to the average perennial sediment, the air temperature was +20.7 ° C and relative to the multi-year average temperature was higher by + 8.3 ° C. Conversely, in May 2016, the amount of precipitation compared to the perennial was 31.7 mm higher, and as a result, strong damage to the crops was observed in yellow rust disease, and as a result of a sharp increase in air temperature in the third decade of May, the yield dropped sharply.

The number of variants of field experiments was 9 with a threefold repetition. The volume of experimental plots was 200 m^2. Organic and mineral fertilizers (phosphoric, potassium), as well as absorbents of the experiments were given under the plow in the second half of April before the raising of new arable land. In July, the soil was treated at a depth of 14–16 cm with a flat cutter against weeds. Before sowing winter wheat, the soil was surface treated by harrowing and 2.5 million seed seeds of wheat of "Bahmal-97" variety were sown on ha of area.

In order to study the dynamics of soil moisture in new arable land, samples were taken from a depth of 0–160 cm.

On May 29, 2015, the moisture content in the arable layer of the soil (0–20 cm) was 11.2–13.8% in variants, and the moisture reserve in the depth of 0–160 cm averaged 2936.0–3177.3 m^3/ha. Because of a decrease in precipitation and a sharp increase in air temperature in the summer season, there is a noticeable decrease in the moisture reserve in all layers of the soil.

By the time of sowing of winter wheat crops (October 25, 2015), the moisture content of the arable soil layer was recorded on average by 4.3–5.4% (105.8–133.1 m^3/ha), and in layers 0–160 cm the total The moisture reserve is 5.8–8.32% (1209.0–1636.2 m^3/ha).

At study of moisture distribution in experimental variants, its content in control plots in the arable layer was 5.2–13.4% (133.1–1309.9 m^3/ha), in deep layers of soil (120–160 cm) 5, 7–13.6% (331.1–775.4 cm^3/ha), these parameters in the variants with the supply of phosphorus and potassium fertilizers with the calculation of 40 kg/ha, 20 and 40 kg of polymeric absorbent hydrogel for a new arable land were in arable beds 13.6–13.8% (331.8–336.8 m^3/ha), and in layers 0–160 cm the total moisture content was 14.2–14.5% (3058.5–3099.7 m^3/ha) (20.05.2015).

By the sowing season of winter wheat seeds (25.10.2015) in variants with a hydrogel absorbent soil moisture in 0–160 cm soil layers compared to the control variant of the experiment was higher by 145.0 m^3/ha.

It should be noted that in the variants with feed of 40 kg/ha of phosphorus and potassium fertilizers and 10 t/ha of local fertilizer depths of 0–160 cm of soil, the moisture reserve was much higher compared to other options. The moisture content in the deep soil layers (0–160 cm) of this variant during the season was 8.5–15.2% (455.6–833.0 m^3/ha), and in the 0–160 cm layers, 8.2–15.0% (1620.1–3177.3%).

As it was shown by conducted analyzes, from the raising of new arable land to the sowing of winter wheat, the content of physically evaporated moisture from the soil was 6.6–8.4% or 1317.0–1720.5%. The content of lost moisture from new arable land due to physical evaporation was 48.1–56.8% compared to its initial content.

Summarizing, it can be said that more than half of the natural moisture of the new arable land, accumulated because of precipitation in the rainfed fields, is lost through evaporation.

In October, 2015, as a result of an increase in precipitation by 53.1 compared to the multiyear averages, it was possible to carry out high-quality sowing in the arable layer of the soil (0–20 cm). Seeds of winter "Bahmal-97" variety suddenly green in November and warm winter days.

The moisture content in the arable layer of the soil in the experimental variants before the sowing of winter wheat (1.11.2015) was 9.7–11.2%, the moisture reserve of 0–160 cm was 7.6–9.6% or 2075.6–2346.2 m^3/ha.

Before the raising of new arable land (29.05.2015) against the background of $P_{40}K_{40}$ with 40 kg/ha of "Hydrogel" absorbent and 10 t/ha of manure, the total moisture content in 0–160 cm averaged 9.2–9.6% or 2304.6–2346.6 m^3/ha.

These indicators in the control variant without the supply of fertilizers and absorbents were 8.7% (1813.4 m^3/ha). In these variants, the content of accumulated moisture compared to the control was greater by 0.5–1.2% or 491.2–532.8 m^3/ha.

To the stage of ovary formation of winter wheat vegetation (23.04.2016) due to the increase in moisture as compared with the long-term norm by 21.6 mm, the moisture content in 0–20 cm of soil was 15.1–18.5%, in deep layers 0–100 cm was 10.5–11.3% (2276.9–2460.7 m^3/ha), and in 120–160 cm was 5.8–8.0% (315.2–428.8 m^3/ha).

At the stage of earwaxing of winter wheat of the "Bahmal-97" variety (06.05.2016) in all experimental variants, the moisture content began to decrease significantly and by the time of complete maturation in 0–20 cm soil layers was 3.9–6.8%, in 0–160 cm moisture content of 6.4–7.5% or 1353.1–1604.8 m^3/ha. By the end of the vegetation, the residual moisture in the control variants of 0–160 cm of soil was 6.8% (1451.0 m3 / ha), and in the cases with mineral fertilizers, polymeric absorbents and with 10 t/ha manure, this index was 7.5% (1604.8 m^3/ha).

At this stage in 0–160 cm soil layers the moisture reserve in variants with polymeric absorbents and manure showed the highest index in comparison with other variants.

Based on the results of the study of the distribution of soil moisture in 2015, the inter wheat "Bahmal-97" variety after the new arable during the vegetation in versions with 40 kg/ha of phosphorus and potassium fertilizers, as well as 10 t/ha of manure in comparison with the control options without fertilizers accumulated an average of 136–172.4 m^3/ha more moisture.

In field experiments in the phase of plant compounding in the control variant, their number averaged 203 pcs/m^2, against the background of $P_{40}K_{40}$ under the influence of 10 t/ha of fresh manure under new arable land increased by 25.4 pcs/m^2 compared to the control.

In the control variant of field experiments, i.e. in the variant without fertilizers and absorbents, the average grain yield was 9.8 centner per hectare. At the beginning of the spring growing season of winter wheat with feed of 40 kg/ha of phosphorus and potassium fertilizers for a new arable land, nutrient with carbamide nitrogen fertilizer, taking into account 40 kg/ha, the additional yield per hectare was 3.9 quintals or 139.7%.

Together with the simultaneous supply of phosphorus and potassium fertilizers to the new arable land and the absorbents "hydrogel" and "Aquasorb", taking into account 20 kg/ha and arable land with the simultaneous application of 40 kg of nitrogen fertilizer, yields increased by 3.9–5.1 c (139.7–152%). The use of organic fertilizers with increasing the soil fertility of rainfed fields and improving their chemical and water-physical properties is of great importance. According to the results of the current year's experiments, the additional

yield due to application of 10 t/ha of manure increased by 6.3 c/ha. This indicator was 164.3% compared with the control.

During the spikes formation of winter wheat, plowing the arable land with simultaneous application of biologically active preparation "Bioazot" through the leaves with the calculation of 1 liter per hectare, the yield was further increased by 4.2 c, and in the variants with "Bioazot" and "Micro-O'stirgich" preparation with a calculation of 1.5 l/ha yield increased by 5.1 c.

It should be specially noted that the abundant precipitation of the spring months of this year compared with the long-term average rate, high air humidity leads to a severe infection of winter wheat with various diseases. And this, in turn, leads to a decrease in the effectiveness of mineral fertilizers introduced under a new arable land.

Conclusion

At headed grain and grain crops cultivation in a crop rotation system, the use of 10 tons of local fertilizer every three years, the annual application of $P_{40}K_{40}N_{40}$ together with the water-absorbing absorbents "Hydrogel" and "Aquasorb" (20 kg/ha) for a new arable land create the conditions for effective assimilation of natural moisture and nutrients and serves to increase net profit derived from farm land.

References:

1. Dospekhov B. A. "Field Works Methodology".– Moscow.– 1985.– 350 p.
2. Lavronov G. A. Rainfed lands of Uzbekistan. Mekhnat".– T.– 1975.– 455 p.
3. National report of the Republic of Uzbekistan on the state of Land resources.– Tashkent.– 2012.– 10 p.
4. Eshmirzayev K., Yusupov Kh. Factors of abundant yield obtaining from wheat (agro technical recommendations). Tashkent. "Mekhnat" – 1995.– 66 p.
5. Yunusov M. Agrochemical properties of typical dry gray desert soils and food regime of wheat on different precusors. Dissertation of candidate of agricultural sciences. Gallaaral.– 1973.– 120 p.
6. Yusupov Kh., Gaybullaev S. Lalmikor erlarda dehqonchilik mo'l va ekologik toza mahsulot etishtirish omili // O'zbekiston qishloq ho'jaligi jurnali, Toshkent,– 2014.– No. 2.– B4.
7. Yusupov H., Abduhaliqova B. Haydarov B. G'alla-shudgor almashlab ekish tizimida tuproqdagi gumus miqdorining o'zgarishi. "O'zbekistonda g'allachilikning yaratilgan ilmiy asoslari" halqaro ilmiy-amaliy konferentsiyasi to'plami.Jizzah.– 2013. b.– P. 255–257.
8. Yusupov H. Umurzakov A. Muratkasimov A. Tipik lalmikor bo'z tuproqlar sharoitida bug'doyni barg orqali oziqlantirish samaradorligi. "Atrof-muhit o'zgarishi sharoitida yer resurslarini muhofaza qilish va ulardan samarali foydalanish masalalari" mavzusidagi ilmiy-amaliy seminar. Toshkent – 2016. b.– P. 350–353.

Mukhammadiev Bakhtiyor Kurbanmuratovich,
Tashkent State Agrarian University,
University, Tashkent, Uzbekistan
E-mail: mukhammadiev68@mail.ru
Djumaniyazova Gulnara Ismailovna,
Academy of Sciences Republic
of Uzbekistan Institute of Microbiology,
Tashkent, Uzbekistan
E-mail: gulnara 2559@mail.ru

CELLULOSE-DESTRUCTING SOIL MICROMYCETES OF UZBEKISTAN AND INFLUENCE OF SOME FACTORS ON CELLULOLYTIC ACTIVITY AND SACCHARIFYING ABILITY OF *TRICHODERMA HARZIANUM*

Abstract: Cellulose degradation by soil fungi can provide with valuable products such as sugar and proteins that can be used in husbandry or food industries. 1897 strains of soil fungi of 146 species belonging to 35 genera and four subkingdoms have been evaluated for cellulose degrading activity and sugar and protein synthesis. 45 species have expressed good abilities for that, and Trichoderma harzianum was the most active among them. Various plant raw materials (filter paper, residues of camel thorn, cotton leaves, corn stumps, wheat straw, rice straw and rise husks) have been evaluated as media for cultivation of T. harzianum, and the most appropriate one recognized was camel thorn residues. Dynamics of both cellulose degradation and saccharification of the substrata by the fungus has been determined; optimum temperature and reaction of media for growth of T. harzianum and maximum production of sugars have been identified.

Keywords: soil, micromycetes, enzymes, cellulose, cellulolytic activity, mineralization, proteins, biosynthesis, hydrolysis, hydrolyzate, sugars, growing microorganisms.

1. Introduction

Increasing crop's yields is dependent on improving of metabolism in plants, and the latter, in its turn, is significantly conditioned by the mineralizing of plant residues in the soil. These residues mainly consisted of cellulose. Ability to degrade it is found in many species of fungi, bacteria, including thallobacteria (formerly actinomycetes). Having miscellaneous enzymes soil micromycetes can use various substrata as a food, and this could be one of reasons of their wide occurrence in natural habitats [1]. There are plenty of data in the scientific literature on distribution of cellulose-degrading fungi that live in various soil types and in different numbers [5]. In Uzbekistan cellulose-degrading soil micromycetes have been a subject of investigations carried out by M. Sh. Sagdullaeva [7] a.o. At the same time many of these investigations were occasional as a part of studies of soil mycobiotas. Metabolic processes in microorganisms, biosynthesis of biologically active substances and cellulase in particular are influenced by growing conditions and content of nutritional media [2]. Various organic and mineral sources of nitrogen can be used for growing microorganisms that are cellulase producers [3].

Purpose of our investigations was to identify species composition of soil micromycetes that are active producers of cellulose-degrading enzymes and proteins. We have studied some features of cellulase biosynthesis by *Trichoderma harzianum* Rifai and its saccharifying ability.

2. Materials and methods

Common mycological methods of isolation of micromycetes have been used in our investigations.Cellulolytic activity of fungi has been studied in laboratory and field conditions in accordance with methods described by A. A. Imshenetzky. Their ability to degrade

cellulose was determined by the filter paper method in the Mandel's medium [4]. *Trichoderma harzianum* has been grown in 250 ml Erlenmeyer flasks containing 50 ml of Mandel's nutrition broth with pH 5.5, on shakers, using a method of the submerged cultivation, during 72 to 96 hours, at 30°C. Cellulase activity of *Trichoderma harzianum* has been determined on the base of increasing concentration of sugars in the reaction mixture after hydrolysis of the substrate (cotton lint overgrown with fungal mycelium) comparing with the check treatment (cotton lint without mycelium) [1].

Saccharifying ability of fungi has been determined on the base of production of reducing sugars under influence of enzymes of the culture fluid in hydrolyzates of plant residues after Somogyi [6].

3. Results and Discussion

1897 strains of micromycetes belonging to 146 species, 35 genera and four subkingdoms of fungi have been isolated in total from three soil types, namely old-arable soils irrigated during long times (i), and soils that were recently introduced in agriculture (ii), and typical serozem soils (iii). From these 45species of the genera *Aspergillus, Chaetomium* (anamorph stage *Botryotrichum*), *Fusarium, Penicillium* and *Trichoderma* have had a notable ability to degrade cellulose. Table 1 shows dynamics of cellulose biosynthesis by one of these species, namely *Trichoderma harzianum*.The following species have been selected for further and more detailed investigations as the most active producers of cellulolytic enzymes and proteins: *Alternaria alternate* (Fr.) Keissl. (syn. *A. tenuis* Nees), *Aspergillus flavus* Lk., *Cladosporium herbarum* Lk., *Fusarium* sp. (as *F. moniliformes*.l., nom. ill.), *Trichoderma harzianum* and *T. viride* (Fr.) Pers. (syn. *T. lignorum* Harz.). Among these species *Trichoderma harzianum* has had the highest ability to degrade cellulose and it has been used in further investigations.Results of investigations on determining of cellulose biosynthesis dynamics on two media, namely pure cellulose (filter paper) and plant residues (camel thorn – *Alhagicamelorum* Fisch.) have shown that intensity of cellulase accumulation in the culture fluid has been the most intensive during first 3 to 4 days of cultivation, then intensity of the process has decreased. Such a decrease of biosynthesis intensity has been noted in both of substrates; however cellulolytic activity of the fungus has been slightly higher on camel thorn residues comparing with filter paper (Table 1).

Table 1.– Dynamics of cellulose biosynthesis by Trichoderma harzianum

Material containing cellulose	Cellulolytic activity, unit/ml, after cultivation during hours					
	24	48	72	96	120	144
Filter paper	0.10	0.20	0.50	0.70	0.76	0.84
Camel thorn	0.20	0.40	0.63	0.81	0.90	0.97

It has been found that slightly acidic or neutral reaction of the original nutrition medium has favoured synthesis of cellulase. Activity of enzymes has been on the same level between pH 5.0 and pH 7.0. Decreasing pH till 4.5 has affected negatively on growth and activity of the producer-fungus, and its growth has stopped at pH 4.0. It has been supposed that various types of this enzyme with different pH optimums have existed in the camel thorn medium while maximum activity on the filter paper medium has been observed at pH 5.5. Culture of the fungus has revealed sensitivity to the temperature during cultivation. So, the least biosynthetic activity and weak growth have been registered at 25°C to 27°C, and increasing it till 30°C to 32°C has raised biosynthetic activity of the fungus 2–3 times and fungal growth has been profuse as a dense suspension. Modifications of Mandel's medium have been tested as well, where one of its ingredients has been excluded in each of two media used in our investigations. Elimination from the media of the most important ingredient – source of the cellulose in the form of the filter paper or plant residue, has led to zero-activity of the cellulolytic activity. Then, replacing of the source of cellulose with easy for assimilation product as glucose has led to the suppression of biosynthesis. This apparently can evidence that process of biosynthesis of cellulase by *Trichoderma harzianum* has an inducible character. Further, elimination from the medium of the nitrogen source in the form of $(NH_2)_2HPO_4$ has resulted in decreasing cellulolytic activity 2–3 times, comparing with a full-medium. Other mineral ingredients of the medium have effected on the fungal activity variously depending on the source of cellulose.The highest cellulolytic activity on the 3rd day of cultivation has been determined, except camel thorn residues, on wheat straw. So,

it has been found, that, in relation to needs of production, inexpensive and simple nutrition media containing various sources of cellulose can be used with this purpose. Further investigations have been carried out for evaluation of saccharifying ability of *Trichoderma harzianum* on different waste materials containing cellulose. Firstly, substrata have been cut using knife-mill into pieces with length 0.2 to 0.5 mm. Then these dry materials have been undergone to processing with an active culture fluid of the fungus with pH 5.5 in ratio 1:15. It has been cultivated in shaker at 180–200 rpm during six hours at 30°C, and then content of sugars in hydrolyzate has been determined.Results have shown that the highest concentrations of sugars have been registered after enzymatic hydrolysis of the camel thorn residues and corn stumps (Table 2). Evidently, this can be explained by the availability of these products for cellulases and xylanases of *Trichoderma harzianum*.Degrees of conversion of these products have been 30% to 50%. This parameter has been much lesser for rice husks (10%), apparently because of solid association of these crystalline polymers with hemicellulose and/or lignin.

Table 2.– Dynamics of saccharification of cellulose-containing raw materials by cellulolytic enzymes of Trichoderma harzianum

Material containing cellulose (plant residues)	**Amount of sugars (mg/ml) in hydrolyzates, after cultivation during hours**					
	1	**2**	**3**	**4**	**5**	**6**
Cotton leaves	1.5	1.7	2.4	2.7	2.6	2.4
Corn stumps	2.3	2.8	3.04	3.2	3.0	2.7
Wheat straw	1.86	2.3	2.7	2.9	3.0	2.7
Camel thorn	2.4	2.8	3.4	3.6	3.7	3.4
Rice straw	1.3	1.7	1.9	2.1	2.4	2.2
Rise husks	0.4	0.6	0.7	0.9	1.1	1.0

Hydrolysis of cellulose-containing substrata has been the most intensive during the first hours of the trial. Then, decreasing amount of the enzyme has led to slowing of the cellulolytic action of the culture fluid and, respectively, to decrease of producing sugars.

References:

1. Mukhammadiev B., Baibaev B. The influence of some factors on cellulolitic activity and saccharifying ability of Trichoderma harzianum fungi. Print Modern agricultural science: current problems and prospects of the century in conditions of globalization 22–24 september – 2014. Ganja, Azerbaijan,– P. 124–125.
2. Mukhammadiev B. Growth of mycelial celluloza decomposing fungi Fusarium solani and Trichoderma harzianum in deep culture. Vestnik of the Precaspian,– No. 4 (15).– 2016.– P. 37–40.
3. Mukhammadiev B. Studying of microbiological and biochemical processes in the fermented silo from wheaten straw. Vestnik of the AS Turon,– 2016.– No. 4.– P. 225–230.
4. Dydka I. A., Vasser S. P., Ellansky I. A. Methods of experimental mycology. Kiev: "Naukova Dumka",– 1982.– 551 p. (in Russian).
5. Tashpulatov J., Baibaev B. G., Shylman T. S., Abdyllaev T., Mukhammadiev B. Influence of nutrition source on biomass accumulation, protein content and cellulolytic enzyme formation in Trichoderma harzianum-22 and Fusarium solani v. argillaceum-9. Uzbek boil. jor.– 1996.– No. 1–2.– P. 26–30.
6. Somogyi M. Determination of reducing sugars. Science of Biol. Chem.,– 1952.– Vol. 195.– P. 19–28.
7. Khamidova S. Kh. Micromycetes of Tashkent region and their role in degradation of plant residues (flora, systematics, biochemistry and growing). Abstract of the thesis for Candidate of biol. sci. degree. Tashkent,– 1990.– 28 p. (in Russian).

Seyidaliev Nizami Yaqub,
doctor of agricultural sciences, professor,
Azerbaijan State Agrarian University
E-mail: n.seyid55@gmail.com
Hasanova Aynur Oruch,
doctor, of philosophy of agrarian sciences,
associate professor,
Azerbaijan State Agrarian University
E-mail: hasanovaaynur77@mail.rumailto; n.seyid55@gmail.com
Mamedova Mina Zaman,
senior teacher,
Azerbaijan State Agrarian University
E-mail: vmns@mail.ru

EFFECT OF INTEGRATED AGRONOMIC PRACTICES ON THE GROWTH AND DEVELOPMENT OF COTTON

Abstract: In the conditions of Milsky steppes for reception of high and stablecrops of a clap-raw with good technological properties of a fibreit is necessary to adhere to level of preirrigation humidity of 70–70–65% HB and annual norm of mineral fertilizers $N_{250}P_{200}K_{75}$. At lowered (65–65–60% HB) the annual norm of fertilizersunder a cotton should not exceed $N_{200}P_{150}K_{50}$.

Keywords: a fibre, a clap, potassium, number of watering's, density of standing, norm of fertilizers, agro technical receptions.

In the economic and social development of the Republic of Azerbaijan cotton production is of particular importance. Cotton is a valuable technical culture strategic purpose.

The most important objective of cotton production is to improve the culture of agriculture and an increase in cotton yield, improve the quality of its products.

One of the most important problems of agricultural production is to find new techniques and methods aimed at increasing the yield of crops. Cotton is one of the main branches of agricultural productivity of Azerbaijan and its development in the future, it is very important for our state. Increased production of raw cotton and increasing its crop capacity is a major problem of agriculture of the Republic. Currently we have trampoline the area under cotton compared to other crops is negligible. You have to grow it as a monoculture, and in this regard, the harvest of raw cotton is 21–23 kg/ha, and in some years is even lower. Increased production of raw cotton and the increase of its yield is a important part of a problem of agriculture of the Republic.

Given the importance of the development of cotton growing in the Republic adopted the "Law on cotton growing" (may 11, 2010). As key points the act provides for the production and processing of raw cotton; cooperation in the system of cotton production; controls and quality control of raw cotton; state support for the development and financing of cotton production [1].

One of the main factors of increasing the yield of cotton, along with the introduction of high-yielding, more disease resistant varieties with good quality, measures fibre, is the establishment of rational methods of farming, which include, primarily, the use of the optimal norms of fertilizers, irrigation regime and density of the plant state.

Increase of productivity lies in the development of science-based systems land-regalia, the introduction of intensive technologies of cultivation of agricultural Kul-Tur, including cotton, continuous improvement of equipment and production technology.

With a small supply of phosphorus in the soil and excess nitrogen the plants can be good growth, but will give fewer bolls and lower quality fibre, shrivelled seeds.

Plants have a dwarf species with small dark green leaves. A lack of phosphorus nitrogen fertilization has no effect.

The use of fertilizers that meet the requirements of today requires carefully and balanced approach given the removal of nutrients with the plant and the consumption of their cotton. Only then you can install the rational fertilizer rates, most fully makes up for the lack of nutrients without causing negative consequences in the form of environmental pollution of the natural environment.

One of the factors determining the growth and development of plants and high yield, is to obtain early, friendly and full shoots. Uniform distribution of seedlings throughout the planting area provides a more complete use of the plants of water and nutrients [2].

The speed of emergence and completeness of germination depends on many factors, including the quality of seeds, temperature and soil moisture etc.

The difference between the germination of cotton is not more than 1–2 days is not a significant difference.

The effect of doses of fertilizers, irrigation regime and plant density on the height of the main stem of cotton is given in (table 1). As is clear from these tables the height of the main stem of the cotton depends on irrigation regime and doses of fertilizers and plant density. For example, if 4 watering with plain water the height of the main stem is made up in Beylagan region in 2016 in phases of budding and 33.4 cm; flowering-82.4 sm and maturation-101.9 sm. in 5 irrigation this figure reached respectively: 34.1; at 82.8 and 105.7 sm

Another large difference is observed in variants that received different fertilizer rates. So. if at 4 watering with plain water when making $N_{200}P_{175}K_{50}$ the height of the main stem in the phase of budding was equal to 33.4 sm 82.4 sm flowering and ripening 101.9 sm. with increasing norms of nitrogen up to 250 kg. these figures increased respectively to 32.7 sm 83.4 sm 104.2 sm

Irrigation for cotton minichannel water had a greater effect on the height of the main stem of the cotton plant. When watering minichannel water height of stem increased and reached. respectively 35.9; and 85.5107.5. on the Karabakh region – 34.8; 66.7; 106.6 sm

As can be seen from the data tables (Mil region) number of sympodial branches from the effect of agronomic practices vary in large ranges. Most sympodial branches were formed in the variants have received large rate of fertilizer and number of irrigations.

So. if at 4 is usually irrigation water on the background $N_{200}P_{175}K_{50}$ and plant density of 100 thousand plants/ha the number of sympodial branches was in 2015 in the flowering stage of 8.8 pieces. the maturation – 15.2; in 2016 to 8.8 and 14.8 pieces and 2017 is 8.9 and 14.9 pieces, with 5-year watering was in 2015 9,6; 16,2; pieces, 2016 9,6;15, 8 and 2017 of 9.3; the 15.6 – pieces.

The effect of magnetized irrigation water on reducing the toxicity of ions of natural irrigation waters, as well as twice accelerates washing of salts from the soil than watering is a common method

Holding a watering magnetized water, the number of sympodial branches increased especially in 5 irrigation [5, 6].

With the increase in plant density decreases and the number of the sympodial branches. A similar pattern was seen in experiments conducted in the Karabakh region.

Cotton under favorable conditions, may continue growing period until late autumn and form a huge number of planelement. However, not all podargoni can stay on the Bush until the end of the growing season and yield a harvest. Depending on the biological peculiarities of the plants and the adverse effects of external factors, primarily soil moisture nutrients and plant density of a certain part of them fall off. Sometimes due to poor farming subsidence is 60 percent or more.

For example, if 100 thousand/rust. on 1 hectare in the first embodiment, the number of obrazovavshimsya of podorvanov amounted to 13.4 pieces, then the thickness 166 thousand, it decreased and reached to 6.6 pieces. However, as can be seen from the data that not all the amount of the formed of podorvanov is maintained until the end of the growing season on bushes of cotton. In our experience, almost half of the formed podorvanov left before the end of the growing season. The largest number of fallen podorvanov discovered in the third embodiment, where the 5 waterings with plain water in the first embodiment, received $N_{250}P_{200}K_{75}$. And the least number of fallen fruit elements found in the embodiments, where the watering is conducted minichannel water. The same can be said of the experiments carried out in the Karabakh region [4].

The number of boxes is an economic indicator of the overall harvest. The more boxes in 1 bush, and the higher the yield and vice versa.

Table 1. – The effect norms of fertilizers, irrigation regime and density of standing of plants at the height of the main stem of cotton, sm

Options			Baylagan region			Agdgabedy region		
The irrigation scheme	The rate of fertilizer	The plant density, thousand ha	Budding	Flowering	Maturation	Budding	Flowering	Maturation
1–3–0 ordinary water	$N_{200}P_{175}K_{50}$	100	33.4	82.4	101.9	32.5	63.1	98.6
		160	31.5	79.2	101.2	32.1	62.9	97.5
	$N_{250}P_{200}K_{75}$	100	32.7	83.4	104.2	34.5	63.3	101.2
		160	31.6	81.1	103.1	33.1	60.9	100.9
1–3–0 manicina water	$N_{200}P_{175}K_{50}$	100	34.5	84.5	104.8	33.8	64.1	102.6
		160	33.2	83.6	103.5	32.2	63.2	100.2
	$N_{250}P_{200}K_{75}$	100	33.5	83.4	104.6	34.8	63.7	103.9
		160	32.9	82.4	103.4	34.7	64.1	104.1
1–4–0 ordinary water	$N_{200}P_{175}K_{50}$	100	34.1	82.8	105.7	34.9	63.6	103.1
		160	33.6	82.5	103.8	32.6	62.9	102.8
	$N_{250}P_{200}K_{75}$	100	34.5	84.2	105.9	35.6	64.3	105.6
		160	33.9	83.2	104.2	34.2	63.2	104.6
1–4–0 manicina water	$N_{200}P_{175}K_{50}$	100	35.4	85.2	104.2	35.9	65.9	103.3
		160	34.3	83.1	103.8	33.1	63.6	103.2
	$N_{250}P_{200}K_{75}$	100	35.9	85.5	107.5	34.9	66.7	106.6
		160	34.7	85.1	105.2	34.5	64.4	104.6

Table 2. – The effect norms of fertilizers, irrigation regime and plant density on the number of sympodial branches of cotton

Options			Mil region						Karabakh region					
			2015 year		2016 year		2017 year		2015 year		2016 year		2017 year	
The irrigation scheme	The rate of fertilizer	The plant density. thousand ha	Flowering	Maturation	Flowering	Maturation	Flowering	Maturation	Flowering	Maturation	Flowering	Maturation	Flowering	Maturation
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
1–3–0 ordinary water	$N_{200}P_{175}K_{50}$	100	8.8	15.2	8.8	14.8	8.9	14.9	8.8	13.7	8.7	13.7	9.7	14.7
		160	8.6	14.5	8.7	14.7	8.9	14.7	8.5	13.3	8.5	13.3	8.4	13.1
	$N_{250}P_{200}K_{75}$	100	9.7	15.4	9.2	15.1	9.6	15.4	8.9	13.7	8.9	13.9	9.7	14.7
		160	9.6	15.4	8.9	14.8	9.4	15.1	8.9	13.9	8.6	13.5	8.5	13.2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1–3–0 manicina water	$N_{200}P_{175}K_{50}$	100	9.6	15.8	9.4	15.3	9.6	15.9	9.2	15.9	8.9	14.8	9.8	14.5
		160	9.5	15.7	9.2	15.1	9.5	15.4	8.9	13.9	8.6	14.1	8.5	14.4
	$N_{250}P_{200}K_{75}$	100	9.9	15.9	9.8	15.7	7.6	15.8	9.5	15.2	9.5	14.7	9.9	14.6
		160	9.7	15.5	9.6	15.5	9.4	15.2	9.4	15.4	8.7	14.2	8.9	14.3
1–4–0 ordinary water	$N_{200}P_{175}K_{50}$	100	9.6	16.2	9.6	15.8	9.3	15.6	9.8	15.8	9.6	15.4	9.9	14.7
		160	9.5	15.5	9.6	15.6	9.1	15.1	9.4	15.4	9.7	14.5	8.2	14.5
	$N_{250}P_{200}K_{75}$	100	9.7	15.6	9.9	15.9	9.7	15.3	9.8	15.9	9.9	15.7	9.9	14.8
		160	9.5	15.5	9.7	15.7	9.3	14.9	9.7	15.6	8.9	14.7	8.8	14.3
1–4–0 manicina water	$N_{200}P_{175}K_{50}$	100	10.1	16.3	10.1	16.1	9.8	16.3	9.8	15.6	9.9	16.1	9.9	14.0
		160	9.2	15.7	9.6	15.8	9.4	15.6	9.9	16.1	9.9	14.9	8.9	14.7
	$N_{250}P_{200}K_{75}$	100	9.9	16.1	10.1	16.2	9.9	15.3	9.9	16.1	9.9	16.4	10.2	15.5
		160	9.7	15.8	9.6	15.9	9.5	15.9	9.7	15.7	9.9	15.1	9.9	14.7

Table 3. – The effect norms of fertilizers, number of irrigation and plant density on the number of boxes1 plant of cotton

Options			Mil region					Karabakh region				
The irrigation scheme	The rate of fertilizer	The plant density, thousand ha	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
1–3–0 ordinary water	$N_{200}P_{175}K_{50}$	100	10.4	11.1	10.3	9.4	11.5	10.4	10.3	9.2	9.5	8.3
		160	5.8	5.8	5.8	5.8	7.8	6.3	5.1	5.8	6.1	7.1
	$N_{250}P_{200}K_{75}$	100	10.8	11.2	9.5	9.7	10.6	10.8	10.7	9.6	9.6	8.5
		160	6.0	5.8	5.0	6.0	8.0	6.4	5.0	5.1	6.2	7.0
1–3–0 manicina water	$N_{200}P_{175}K_{50}$	100	11.0	12.7	11.0	10.1	10.6	11.1	10.8	10.1	9.6	9.2
		160	6.0	6.1	6.0	6.0	8.1	6.5	5.1	5.2	6.2	7.3
	$N_{250}P_{200}K_{75}$	100	13.5	12.87	10.0	10.5	10.5	11.8	10.8	11.7	9.7	9.5
		160	6.0	6.0	6.1	6.1	8.3	7.1	5.3	5.3	5.3	7.7
1–4–0 ordinary water	$N_{200}P_{175}K_{50}$	100	13.8	12.8	11.0	11.4	10.7	12.0	11.8	11.1	9.8	10.1
		160	8.7	6.1	6.1	6.2	8.4	7.1	6.3	5.0	5.3	7.9
	$N_{250}P_{200}K_{75}$	100	13.8	12.0	11.8	10.6	10.7	12.7	12.1	11.4	10.1	10.2
		160	7.7	6.5	6.3	6.4	8.3	7.4	6.8	5.5	5.4	7.9
1–4–0 manicina water	$N_{200}P_{175}K_{50}$	100	12.8	13.0	12.3	10.4	11.1	12.8	13.5	12.0	10.1	10.2
		160	6.7	6.8	6.8	6.4	7.8	7.8	7.3	5.8	5.5	7.8
	$N_{250}P_{200}K_{75}$	100	13.4	14.7	13.1	11.0	11.5	13.4	14.3	12.7	10.2	10.3
		160	6.6	12.3	7.2	6.4	8.2	8.0	7.8	6.1	5.6	7.5

The number of formed bolls on the plant depends primarily on the biological characteristics of varieties of cotton, however, agricultural practices can also have a positive impact on these indicators.The number of boxes in 1 bush, depending on the norms of fertilizers, number of irrigation and plant density are presented in (tables 3).

As shown by the data presented in the tables of the studied agricultural practices positively affect appears in both regions the number of boxes in 1 bush [3, 7, 8, 9]. Here the increase in bolls per Bush at Beylagan region ranged from norms of fertilizers at 4 watering with plain water and a plant density of 100 thousand plants 0,1

pieces magni-cluded water of 0.1 units and in the 5 irrigation respectively 0 … 0,6 pieces.

Approximately, the same pattern was observed in experiments carried out in the Karabakh region. Weight of raw cotton in one boll is an economic indicator that determines the level of harvest and assess the variety. The higher weight of raw cotton in one boll, the higher total yield and the more valuable cotton species. The mass of cotton in one boll is a biological feature of the variety, but it may be affected by external factors, primarily nutrient and water regimes and plant density [10].

A lot of cotton wool in one of the boxes depending on fertilizer, irrigation and plant density are presented in (tables 3).

The table shows that as fertilizer and plant density effect on the mass of cotton in one boll in a different way. For example, if the high rate of fertilizer and a large number of irrigation contribute to the increase in the mass of cotton in one boll, the thickening of crops, on the contrary, decreases the weight of raw. In experiments conducted in both regions in the next five years, the best option was the option which was made $N_{250}P_{200}K_{75}$ when the background density of 160 thousand plants/ha and 5 watering magnetized water.

Insights. Development and establishment of the rational fertilization, irrigation regime and plant density for different soil differences contributes to obtaining high and stable yields of raw cotton with good technological qualities of the fiber.

Fertilizing, watering and plant density are beneficial to the formation of boxes, a lot of cotton wool in one box and significantly reduces the percentage of the drop of the fruit bodies.

References:

1. Aliyev İ.G. "Cotton Growing The Law", – Baku, – 2010.
2. Saidaliev N. I. The efficiency of fertilizer application on yield pop-jatnika in Azerbaijan J.,"agricultural Science Bulletin of Uzbekistan" No. 3–4 (41–42). – Tashkent, – 2010. – P. 7–10.
3. Seyidaliyev N. Y. The Influence of norms of fertilizers, irrigation regime and plant density on the growth and development of cotton. The journal "agrarian science" No. 7. – Moscow. – 2010. – P. 14–17.
4. Seyidaliyev N. Y. The growth and development of cotton under different plant density and fertilizer application Journal "Fertility" No. 5 (56). – 2010. – P. 13–14.
5. Seyidaliyev N. Y. The Effects of fertilizers on the productivity of clap-jatnika. 1st International scientific-practical conference: applied Sciences in Europe trends of modern development Stuttgart, Germany, April 21, – 2013. – P. 129–131.
6. Seyidaliyev N. Y. Komple tarımsal önlemlerin pamuq bitkisinde esas gövdənin uzama ve gelişmesine etkisi. Türk dünyası araştırmaları Uluslararası bilmlir akademisi //IV uluslararası sempozyum bildirileri II cild Bioloji ve Ziraat Bilmleri Ankara – Türkiye. – 2012. – P. 57–62.
7. Seyidaliyev N. Y. The influence of various doses of mutagens on productivity of various grades of cotton. 3rd In International scientific conference "Applied Sciences and Technologies in the United States and Europe: common challenges and scientific findings" November 11–12, – 2013. – Nev York, – P. 114–115.
8. Seyidaliyev N. Y. The technologıcal propertıes and output fibres ın accordance wıth the norms of fertılızers, irrigatıon and plant stand densıty, 7th International Scientific and Practical Conference "Science and Society" 23–30 March, – 2015. – London.
9. Seyidaliyev N. Y. The content of nitrogen, phosphorus and potassium in the bodies of cotton in Accordance withthe norms of fertilizers, irrigation regime and density of standing of plants. Science, Technology and Higher

Education Materials of the IV international Research and practice conference – Vol. II January 30th, Westwood, Canada – 2014. – P. 19–22.

10. Seitkuliev H. P, Dyuzhev G. A. Effectiveness of fertilizers in cotton growing. Probl. soil science and ways of increase of fertility of irrigated soils of Turkmenistan, – 2002. – P. 103–111.

Section 11. Technical science

Bobojanov Maksud Kalandarovich,
Tashkent State Technical University, Power faculty,
Department of Power Supply, Professor,
Usmanov Eldar Ganievich,
Tashkent State Technical University, Power faculty,
Department of Electric Power Supply, Associate Professor
Abduraimov Erkin Hamidovich,
Tashkent State Technical University, Power faculty,
Department of Electrical Engineering, Associate Professor
Karimov Rakhmatillo Chorievich,
Tashkent state technical university, Power faculty,
"Power supply" chair, senior teacher,
E-mail: raxmatillo82@mail.ru

RESISTIVE TIME DELAY SWITCHES

Abstract: Transient processes with the solution of differential equations of state by the numerical method of the proposed non-contact high-speed time relay.

Keywords: optocoupler, photodiode, diode, resistance, capacitor, thyristor, time relay.

At present, due to the extensive automation of production processes, the introduction of automatic control systems, the requirements to reliability, speed, and longevity of electrical appliances and apparatus have significantly increased. These requirements are largely met by devices based on the use of properties and phenomena inherent in nonlinear resistive circuits. In the future, a significant expansion of the scope of applications of nonlinear circuits is expected as instruments and apparatus with new qualitative properties. At present, semiconductor circuits are generally used as power switches for switching, regulating and converting devices. On the basis of theoretical analysis and experimental research of nonlinear resistive circuits, it is established that to provide high-quality power supply to consumers it is necessary to use such circuits as power contactless switching devices. The circuits on the basis of non-linear resistive circuits make it possible to switch the power loads under the best dynamic conditions, namely, when the sinusoidal current passes through zero, which provides an improvement in the mode of the transient process [1].

Sometimes with circuit solutions, such as relay protection and automation, parallel operation of thyristors, etc. it is necessary to delay the control pulses in time. Therefore, the creation of small-sized, high-speed, non-contact time relays is relevant.

This article discusses the creation of such relays based on resistive circuits. When creating and developing new technology, there are questions of calculation and analysis of such circuits. Non-autonomous nonlinear dynamic circuits with a diode, active resistance and capacitance are widely used. When developing control systems for automation devices, various circuit solutions can be used [2].

Let's perform a theoretical analysis of the circuit shown in (Fig. 1), where the active resistance (R_1), the diode (VD) and capacitance (C) are connected in series, the active resistor (R_2) and the photodiode of the optocoupler (VU).

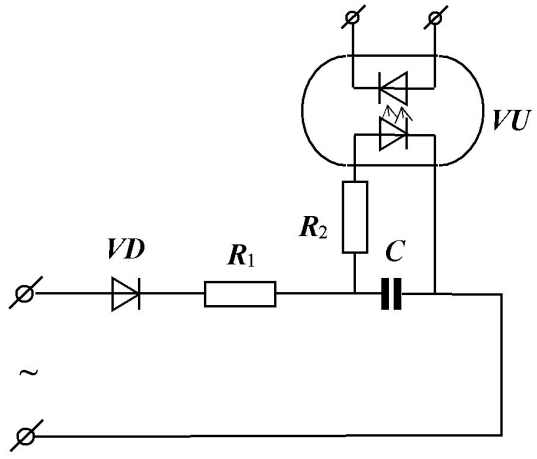


Figure 1.

To analyze this chain, we propose to use the numerical solution of the equation of state of the chain [3].

Let us consider the transient processes during the periods of the open state of the diode *VD*, the voltage across the capacitance is described by the following equation:

$$U_C = U_m \cdot \frac{R_2}{R_1 + R_2}\left(1 - e^{-\frac{R_1+R_2}{R_1 \cdot R_2 \cdot C}t}\right) \qquad (1)$$

here, U_m – rated mains voltage.

At present, various methods of analyzing such chains are widely used. We propose to use the numerical solution of the chain state equations by the Euler method. In this case, on an interval, it is necessary to determine an approximate solution of equation:

$$\frac{dy}{dt} = f(t, y) \qquad (2)$$

We take the characteristic of the diode to be ideal and assume that $u = U_m Sin\omega t$. Then, from the moment $t = 0$ to t_1, the diode is open, and the equation of the circuit has the following form:

$$U_m \sin \omega t = R_1\left(C\frac{dU_C}{dt} + \frac{U_C}{R_2}\right) + U_C$$

or

$$\frac{dU_C}{dt} = \frac{1}{R_1 C}\left[U_m \sin \omega t - U_C\left(1 + \frac{R_1}{R_2}\right)\right] \qquad (3)$$

where, U_C – capacitance voltage.

The solution of Euler's equation (3) is as follows:

$$U_{C(k+1)} = U_{Ck} + f(U_{Ck}, t_k) \cdot h \qquad (4)$$

Here

$$f(U_{Ck}, t_k) = \frac{1}{R_1 C}\left[U_m \sin \omega t - U_C\left(1 + \frac{R_1}{R_2}\right)\right] \qquad (5)$$

k=0, 1, 2, …, n.; h – step of integration.

From the moment $t = 0$ to $t = t_1$, the voltage on the capacitance is determined by (4) with zero initial condition. From the moment $t = t_1$, the diode switches to the closed state and the voltage at the capacitance is determined as:

$$C\frac{dU_C}{dt} = -\frac{U_C}{R_2} \text{ or } \frac{dU_C}{dt} = -\frac{U_C}{CR_2} \qquad (6)$$

From the moment $t = t_3$, the diode again switches to an open state and the voltage on the capacitance is again described by the dependence (4), only with the initial conditions corresponding to the time $t = t_2$.

(Fig. 2. a), shows the characteristics of the function $U_c = f(t)$. These characteristics are constructed for different values of the resistance R_1. Moreover, R_2 and C remain constant. Curve 1 at $R_2 = 3000\ \Omega$; 2 – $R_2 = 2000\ \Omega$; 3 – $R_2 = 1000\ \Omega$; 4 – $R_2 = 500\ \Omega$; 5 – $R_2 = 250\ \Omega$; $C = 10$ μF and $R_1 = 300\ \Omega$.

(Fig. 2. b), shows the characteristics of the dependence $U_c = f(t)$. These characteristics are constructed for different resistances R_2. In this case, R_1 and C remain constant. Curve 1 with $R_1 = 300\ \Omega$; 2 – $R_1 = 500\ \Omega$; 3 – R_1=800 Ω; 4 – R_1=1000 Ω; 5 – R_1=1200 Ω; C=10 μF and R_2=3000 Ω.

(Fig. 2. c), shows the characteristics of the dependence $U_c = f(t)$. These characteristics are constructed for different values of the resistance R_1. Moreover, C and R_2 remain constant. Curve 1 at $C = 10\ \mu F$; 2 – $C = 20\ \mu F$; 3 – $C = 30\ \mu F$; 4 – $C = 40\ \mu F$; $R_1 = 1200\ \Omega$ and $R_2 = 3000\ \Omega$.

From these dependences it is evident that by changing the parameters of the circuit it is possible to regulate the time of full charging of the capacitor.

The proposed contactless relay was investigated in the laboratory of the Energy Department of the Tashkent State Technical University [2, 3].

It can be seen from (Fig. 2) that the change in the parameter R_2 has almost no effect on the charging time of the capacitor C, and the variation of the parameters R_1 and C significantly changes the charging time of the capacitor, hence the operating time of the optocoupler.

Based on the above, you can draw the following conclusions:

Using the circuit shown in (Fig. 1), it is possible to create a contactless, high-speed and time relay, changing the parameters of the active resistance R_1 or capacitance C.

In conclusion, it can also be noted that the analysis of the dynamic circuit shown in (Fig. 1), where the active

resistance, diode and capacitance are connected in series, and the resistor and photodiode of the optocoupler are connected in parallel to the capacitance, can be performed by numerical solution of the chain state equations.

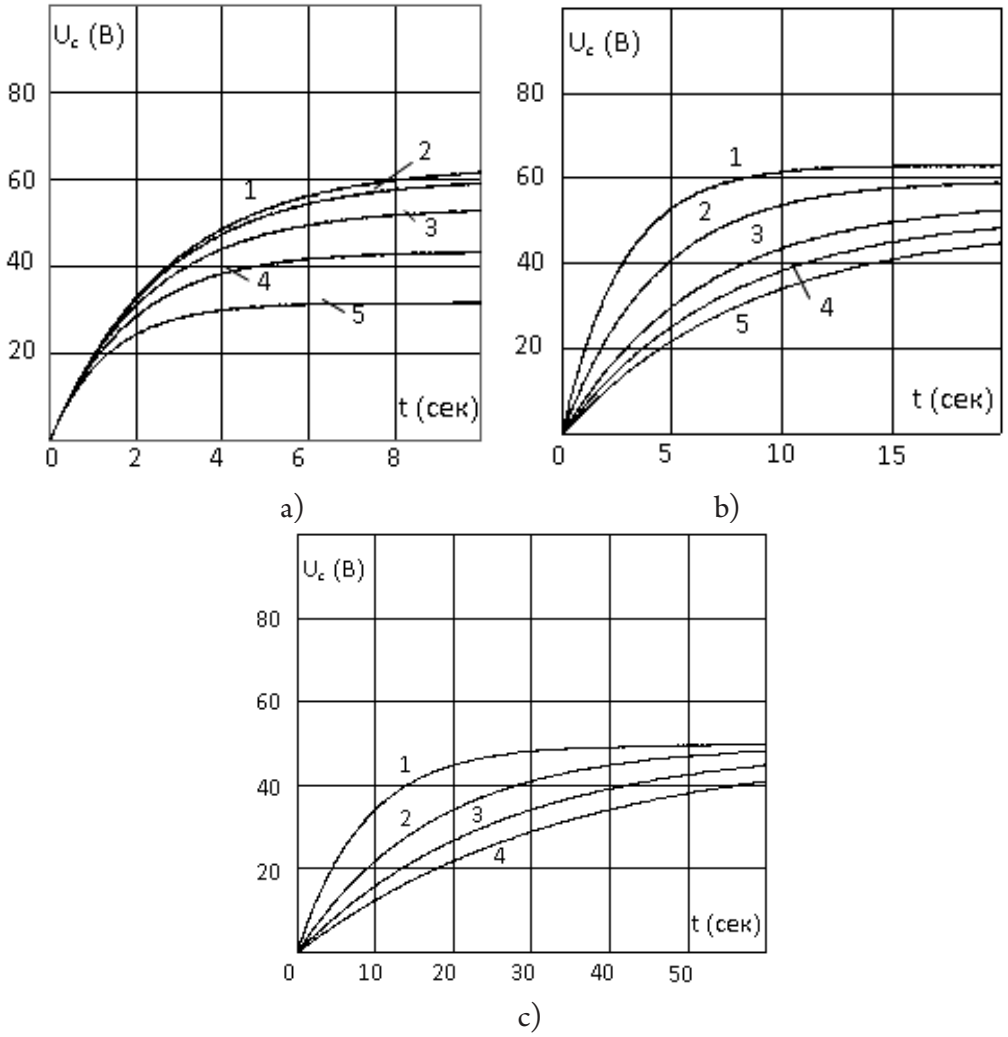


Figure 2. Shows the voltage versus capacity curves versus time for various parameters of the circuit elements

The proposed technique makes it possible to produce a qualitative analysis of steady-state regimes and transient processes of chains with various parameter variations [4].

References:

1. Усманов Э. Г., Абдураимов Э. Х., Каримов Р. Ч. Нелинейная динамическая цепь с тиристором // Журнал «Проблемы информатики и энергетики».– Ташкент,– 2006.– № 2–3.– С. 37–41.
2. Rasulov A. N., Karimov R. Ch. Operating mode of the stabilizer of current on active and inductive loading // Scientific journal «European Science review» Austria, Vienna,– 2015.– No. 9–10. September–October.– P. 140–143.
3. Karimov R. Ch., Karimov I. Ch. Research of diode resistive chains in power supply systems // Scientific journal "Young scientist USA". Auburn, Washington,– 2016.– No. 5.– P. 106–109. URL: http://www.YoungScientistUSA.com
4. Rasulov A. N., Karimov R. Ch. The Contactless Relay of Tension in System of Power Supply // Scientific journal "Eastern European". Germany, Dusseldorf,– 2015.– No. 4. Ausgabe.– P. 174–178. URL: http://www.Auris–Verlag.de

Muxammadiev Ashraf,
Chief Researcher of State
Unitary Enterprise "Scientific and Technical Information"
E-mail: ashiraf@mail.ru,
Bozorov Elmurod,
senior lecturer, of the department "Automation and management of technological processes and productions"
Tashkent institute of irrigation and agricultural mechanization engineers (TIIAME), Uzbekistan
E-mail: bozorov_e@mail.ru

PARAMETERS OF ELECTROIMPULSE PROCESSING FOR DESTRUCTION OF ILLNESSES NEMATODA

Abstract: In this work given measures on struggle with illnesses нематода in root systems of a tomato and cucumbers grows closed ground and sowing areas of Republic, with the help of installation of the electrical pulse categories are considered, the parameters of processing.

Keywords: Agriculture, electro-impulse, nematode illness, enclosed grounds, crop production, land quality, lay eggs.

The yield of agricultural crops is estimated by the amount produced on the crop areas of the produce. The increase in yield depends on the land quality, the right choice and placement of available varieties and plant species that are immune to natural influences and diseases, the creation and cultivation of new hybrid plant cultures, and the development and introduction of new advanced technological methods.

There are a number of objective and subjective measures to achieve this growth the destruction of weeds and the diseases spread by them is one of them. According to experts, cultivated plants are now seriously harmed by weeds and pathogens living on these weeds and spreading diseases. Therefore, at the present time, one of the topical problems of crop production is, cleaning of cultivated areas from weeds and diseases spread by them.

The main objective of the complex of technical measures carried out in the sown areas with the help of advanced machinery and technical means is the timely processing of sown areas at the required level to achieve high yields. This complex is aimed at centralized provision of agricultural machinery and equipment, efficient use of machinery, timely and high-quality technological processing of crops and further increase in yield Nevertheless, this problem has not yet been solved, since this is adversely affected by the high cost of rent of machines and mechanisms, a sharp increase in the cost of fuels and lubricants.

In open and closed (greenhouses) cultivated areas occupied by cotton, cereals and vegetables – melons and gourds in farmed farms of the republic, there are various diseases. In recent years, serious damage has been caused from nematode sickness of crop yields [1, 2, 3, 4, 8]. Particularly serious damage is caused to crops of vegetables, melons and crops in enclosed grounds (greenhouses).

Tomatoes and cucumbers are the most used food products, and in terms of production volumes, they occupy the second place in the republic after potatoes. The reason for the increased consumption of tomatoes and cucumbers is the presence in them of vitamins and trace elements necessary for human beings, as well as their simple canning. The nematode developing in the roots of plants hinder the cultivation of these products. On the sown areas of the republic, the following species of nematodes often occur: nematode nematodes of northern Meloidogyne hapla Chitw, members of Meloidogyne Goel ground, nematodes of southern Meloidogyne incagnita Kof et White, nematodes of Javanese Meloidogyne javanica Treual and sand or nut nematodes Meloidogyne arenaria Neal.

Typically, viruses that are in the infected soil, are introduced into the root system of the plant, lay eggs and develop, feeding on nutrients of plant roots [6].

The aforementioned negative effects of the nematode, in addition to the damage caused by the infection of plants, still lead to a decrease in yields. Nematodes cause very great damage to agriculture, for example for potatoes this damage is 80%, for greenhouse tomatoes and cucumbers – 60%. To eliminate the consequences of nematode infection, 30% of the costs in agriculture are accounted for.

On the basis of many years research, in the Tashkent Institute of Irrigation and Agricultural Mechanization Engineers developed a new technology for controlling the nematode, as well as an electric pulse installation for its implementation [1, 4, 7]. The proposed technology is characterized by the fact that it is economical, environmentally safe, effective in the implementation of existing methods of processing plants. The application of this technique does not affect the value of the crop and, most importantly, has no dangerous consequences. It is applied in the summer after harvesting or in the autumn processing of the land.

Rich in mineral fertilizers, root crops of tomatoes and cucumbers are a source of nematode nutrition, which has the property of rapidly developing and destroying the structure of root cells, creating cavities and uneven ribbed nodes in them. In the III–IV periods of development of the body of mature females, the nematodes in the root system of the plants become round and bulbous. Mature female nematodes lay between 100 and 1500 larvae. The number of larvae deposited by developed females of nematodes can reach 3500 pieces. In the cultivated areas of vegetables in Central Asia and the Caucasus, the nematode female lays eggs of larvae from 3 to 7 times a year [4].

Experimental studies on use of electro-impulse discharges to control the vector of the nematode virus were carried out at pilot sites in the cooperative economy of Gulistan Kagan district of the Bukhara region. Field experiments on the electro-pulse treatment of the vectors of the virus were conducted with the participation of the entomologist of the cooperative economy [4].

In Fig. 1 shows the scheme of the effect of electro-impulse discharges on a plant infected with nematode worms.

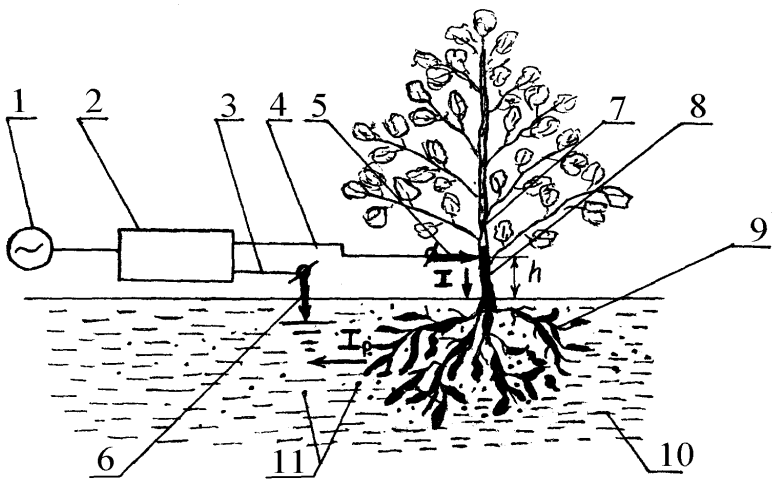


Figure1. Scheme of treatment with electric pulse discharges infected plan

1 – power supply; 2 – high-voltage device; 3–4 – high-voltage electrical cables; 5–6 – electrodes; 7 – stalk of plants; 8 – infected plant roots; 9 – earth (clay); 10–11 – nematode larvae

The order of operation according to the scheme Fig. 1: the positive electrode is fed to the lower part of the stem, the negative electrode is connected to the ground. After connecting the device to the power source, an electric current begins to flow between the plant stem and roots. High-voltage discharges of electric current pass through nematodes, infected plant roots and disease-spreading microorganisms. Current pulses act on the membrane of plant cells and the surface of the nematode virus, which leads to the destruction and destruction of the root system and membrane of the nematode viruses. This method is used after harvesting infected

plants. (Table 1) and Figures 1 and 2 show the results of experimental studies of the treatment of disease-causing plants of tomatoes and cucumbers by an electro-impulse current discharge.

Table 1.– The results of experimental studies of the treatment of pathogenic plants of tomatoes and cucumbers by an electroimpulse current discharge

No. P.	Experiment	Voltage, V.	Processing time, sec.	The energy of the pulse, J.	Degree of neutralization,%
Tomato					
1.	1	1000	0.2	0.0010	35
2.	2	2000	0.2	0.0020	49
3.	3	3000	0.2	0.0045	60
Cucumbers					
4.	1	1000	0.2	0.0010	35
5.	2	2000	0.2	0.0020	40
6.	3	3000	0.2	0.0045	59

Dependencies of the degree of neutralization on the voltage of the pulse $U = f(Q)$ and the momentum energy $P = f(Q)$ for tomatoes and cucumbers are given on the characteristics of (Figures 2, 3).

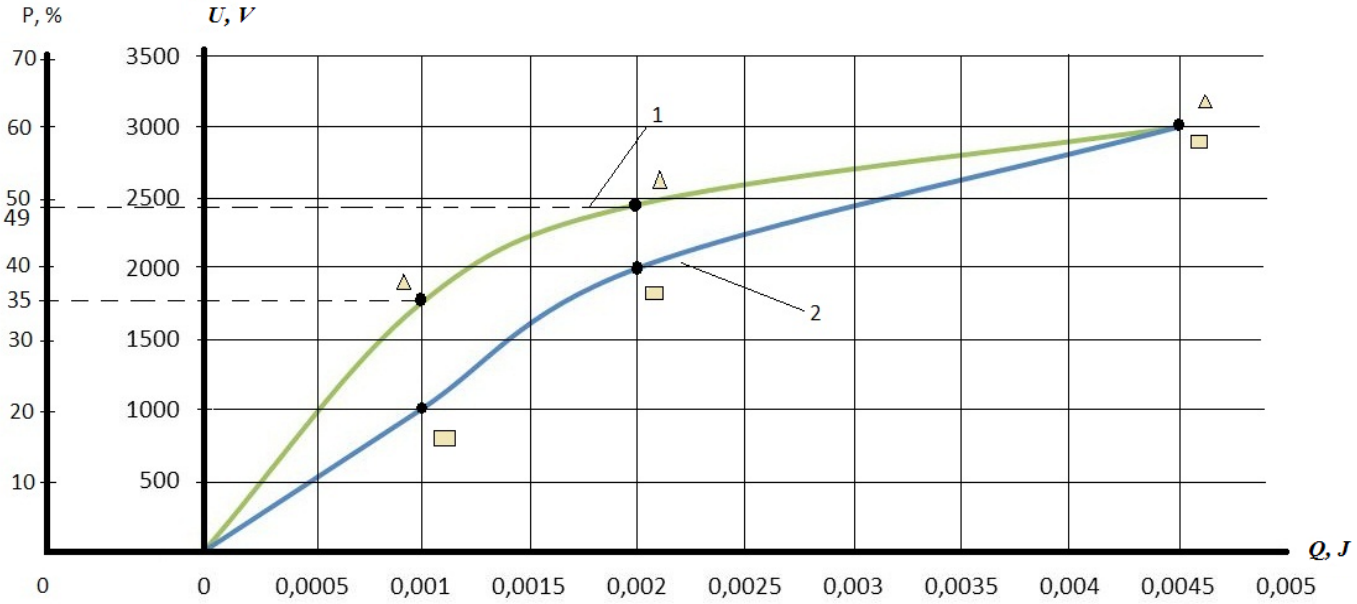


Figure 2. Graph of the change in the magnitude of the voltage from the time of pulses by an electric pulse current discharge for tomatoes

The results of the studies showed that the nematode virus was destroyed at 60% of the infected plants with the following parameters of the electropulse treatment: discharge voltage Up = 3 kV, current flow time τp = 0.2 s, discharge energy Wp = 0.0045 J. Taking into account the above, it can be concluded that the method of electropulse treatment effectively fights the vectors of the disease with worms [4, 7]. Electro-impulse discharges act on the upper layers of the soil, where the main root system of the plant is located, to lower layers, in which inactive (sleeping) larvae of nematode discharges may be located to a lesser extent.

If in areas without a crop rotation, and without detoxifying measures, after 2–3 years to sow the same culture again, the number of nematodes can grow up to 1 billion per 1 m^2 of land. Some plants increase the species of nematodes and especially nematodes with parasitic properties. The increase in the number of nematodes in the soil strongly damages crop yields.

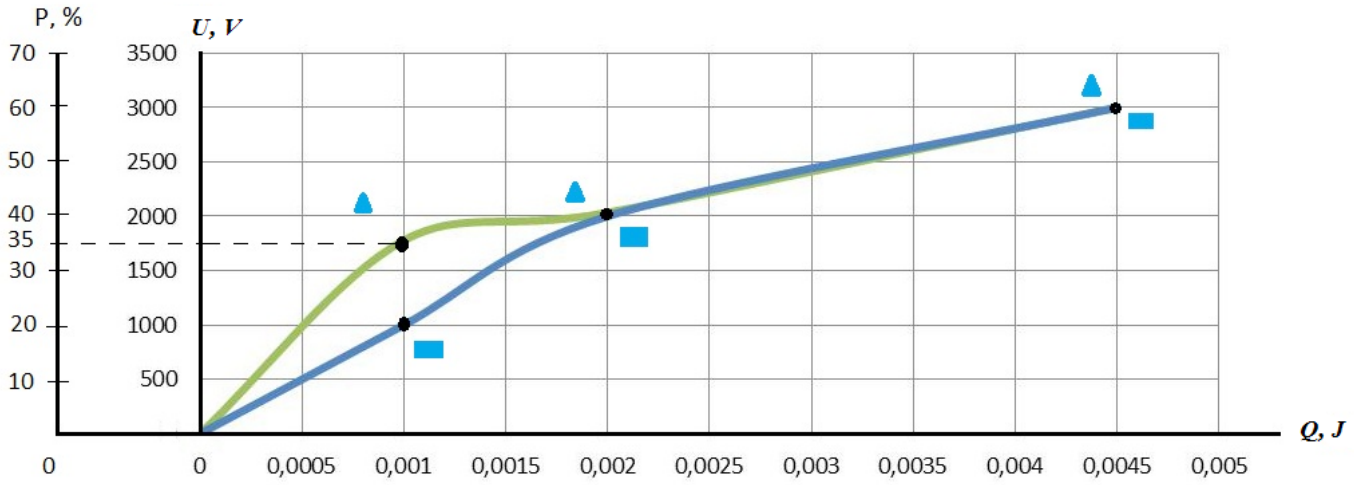


Figure 3. Changes in the magnitude of the voltage from the time of pulses by an electric pulse current discharge for cucumbers

Inputs and Suggestions

Experimental studies of the application of the proposed device show a reduction in the amount of the virus of the nematode and larvae in the ground treated with electropulse discharges, compared to the untreated areas by 65–68%. Based on the results of repeated inspections, the number of nematode larvae before sowing the second vegetation period of plants was 15%.

Experimental studies of the treatment of pathogenic plants of tomato and cucumber by an electric pulse current discharge have shown their effectiveness at parameters of electropulse processing: discharge voltage Up = 3 kV, current flow time τp = 0.2 s, discharge energy Wp = 0.0045 J.

References:

1. Toshpolatov N. T., Baizakov T. M., Bozorov E. O. Preliminary patent "Method of harvesting plants" No. 3456 nod. 505 reg. In the state. The Register of Inventions, Industrial Designs and Utility Models of the Republic of Uzbekistan.– 1996.
2. Mukhammadiev A. On some results on the disinfection of cotton remnants infected with wilt and the destruction of weeds by electric current. Theses of reports conf. on problems of mechanization and electrification c.–x. TIIIMSH, Tashkent: – 1997.– 16 p.
3. Mukhammadiev A., Jabarov N.G., Totanov U. K. Post–harvest electrospark processing. (Abstracts of the II All–Union Scientific Technical Conference "Electrosaving electrical equipment for automatic transmissions" October, 1990, Moscow). Informelectro,– Moscow: – 1990.
4. Bozorov E. O. Electroimpuls treatment in diseases of Nematode. Problems of energy efficiency in agro–industrial complex. Republican scientific–practical conference. Tashkent.– 2003.
5. Tarushkin V. I. Technological complex of dielectric separating devices // Mechanization and electrification of agriculture,– 1983.– No. 4.
6. Kondakova E. I., Ignatova S. I. Possibility of destruction of nematode–resistant tomatoes by species of the genus Meloidogyne. The WIGIS Bulletin.– M.– 1985. Issue 141.
7. Toshpolatov N. T., Bozorov E. O. and others. Method of electroimpulse treatment of plants. A patent for an invention. Application IAP – 20030429 02.04.2003.
8. Mukhammadiev A., Jabarov N.G., Baizakov T.M., Denmukhammadiev A.M., Totanov U. K. Development of technology using electric spark discharges. Abstracts All–Union Technical Seminar "Non–traditional Electrotechnologies in Agricultural Production and Life in the Village" (November, 1991, Katsiveli–Crimea). VIESH.– M.: – 1991.

Daniyarov Bektosh Bakhadirovich,
Assistant,
Laysheva Elvira Talgatovna,
Senior Lecturer,
Alimbayev Erkin Sharipovich,
Professor, Candidate, of Technical Sciences
Tashkent Institute of Textile and Light Industry
E-mail: ismoil27089@mail.ru

COMPARATIVE RESEARCH PRODUCTIVITY OF EQUIPMENT VARIOUS FOUNDATION TECHNOLOGY

Abstract: A comparative analysis the productivity of equipment various methods of preparation the basis. A methodology for calculating the productivity of a sizing-back aggregate, "SMH" (Zukker-Müller-Hakoba), Germany and "BEN-FELATEK" ("BENNINGER", Switzerland).

Keywords: basis, sinking, sizing, sizing-relining aggregate, formulas, speed, coefficient of useful time, productivity.

Introduction

At present, there are three known methods for the partion technology of preparing the basis for weaving:

1. The winding of the calculated number of warp yarns on the reel rollers, then from the batch of reel rolls, the formation of the weaving bead on the sizing machine is widely used in weaving. This method has a number of significant drawbacks noted in numerous studies, among them in the works [1, 2, 3].

2. The formation of weaving beams according to the reduced technology of preparation of the bases on the re-sizing unit of the Ivanovo State Textile Academy design [4] is carried out by winding the threads from the bobbins of the creel and one reel roller. Essentially, with this technology there is a back-up machine, while the second part of the main threads on the weaving nava is winding directly from the bobbins mounted on the creel. This design eliminates the waste of soft ends that remain on the rollers and reduces the number of re-rolls produced on the back-up machine.

3. In the proposed by the well-known firms "SMH" (Zukker-Müller-Xakoba) Germany and "BEN-FELATEK" ("BENNINGER" Switzerland), the preparation of the substrate is carried out on a re-sizing machine and a distillation machine. The advantage of this technology, on waste output, is noted in the results of our studies [5].

A comparative analysis of the amount of waste with different methods of preparing the basis was carried out in [6]. The results of the analysis show that the least amount of waste is obtained on the re-sizing unit and the distillation machine.

To analyze the performance of equipment with different methods of preparing the basics, we consider machines of the type of packs being formed-a reel roller and weaving.

The productivity of the process of forming a reel roller is determined by the known formula:

$$П_{СВ} = \frac{V \cdot 60 \cdot T_o \cdot m_c}{10^6} \text{ КПВ} \qquad (1)$$

Where: V – linear speed of warping, m / min.

T_o – he linear density of the warp yarns, tex.

m_c – number of threads on the reel roller.

КПВ – coefficient of useful working time of the machine.

In formula (1), To and are set by the standard for each article of tissue. Therefore, the increase in productivity during the formation of the reel roller is possible at the expense of speed and КПВ.

A comparative analysis of reference-normative indicators of the process of the 50-year-old [7, 8, 9, 10], which are presented in (Table 1).

From the table 1 we see that the normalized value of the speed of navigation is in the range 600–800 m/min. The coefficient of useful time in recent years

is much lower. Thus, the existing technology of sleeping is not only the cause of the release of a large number of burns [6] in sizing, but also characterized by low productivity.

Table 1.

№	Years	T_o tex	m_c strands	L_c meter	V m / min	Discontinuity	КПВ	П kg / hr	A source
1.	1968	25	492	15000	100	2,5	0,42	245	[7]
2.	1979	25	531	19000	600	3	0,49	234	[8]
3.	1987	25	531	19500	600	3	0,49	234	[9]
4.	2010	18,5	578	23000	800	3	0,39	200	[10]
5.	2013	42	888	23000	800	3	0,2	200	[11]

In the system of preparation of the substrate with the use of the re-sizing aggregate IGTA [4] is essentially similar to the classical system.

Let us analyze the productivity of the formation of a reel roller on a sizing machine [10]. The input packages on this machine are conical bobbins mounted on a creel.

The productivity of the sizing machine is determined by the known formula:

$$П_ш = \frac{V \cdot 60 \cdot m_ш \cdot T_o \cdot m_ш}{10^6} КПВ \qquad (2)$$

where: V – speed of the warp threads on the sizing machine;

$m_ш$ – number of cohesive threads;

T_o – linear density of sizing yarns;

КПВ – coefficient of useful time.

When determining the rate of sizing, in contrast to the knitting, it is necessary to take into account the contact time of the yarns with the dressing solution and drying of the filaments in the drying chamber:

$$V = \frac{H \cdot 10^6}{a \cdot T_o \cdot m_ш \cdot 60} \text{ m / min}$$

where: H – evaporative capacity of the sizing machine kg / h.

When calculating the rate of sizing on a sizing-back aggregate, the rate of sizing is adopted according to the characteristics of the aggregate [10].

To determine the CPV of the "SMH", "BEN-FELATEK" grinding-back aggregate, we use (Table 2), which shows the operations performed with different substrate preparation technologies.

This table also shows the performance of CPV and the actual performance for the same tissue Calico Art 299 [4].

Table 2. – The list of operations to calculate the КПВ for various methods of preparing the basis

№	Name of works	Existing technology	Ivanovo State Textile Academy (ISTA) re-sizing aggregate	Shlichtovalno the overflow aggregate "SMH". "BEN-FELATEK"
1	*2*	*3*	*4*	*5*
1.	Change of bobbins (rates)	+	+	+
2.	Elimination of broken thread	+	+	+
3.	Change – output forging of the reel roller	+	+	–
4.	Wearing the machine when changing the output forging	+	+	+
2) Operations that do not depend on the number of overrun shafts (T1)				
5.	Stopping the machine and closing the steam	+	+	–
6.	Lifting of the rollers	+	+	–
7.	Cutting off warp threads from the shafts	+	–	–

1	*2*	*3*	*4*	*5*
8.	Binding of the ends of threads of old and new base	+	+	–
9.	Steam on and start-up	+	+	–
10.	Skipping nodes through the machine	+	+	+
3) Operations. depending on the number of overrunning shafts (T2)				
11.	Disengagement of the retarder braking system	+	+	–
12.	Ruffling of yarn remains from racks	+	–	–
13.	Removing the shaft from the racks	+	+	–
14.	Re-shaft installation	+	+	–
15.	Fixing and aligning the shafts	+	–	–
16.	Switching on the shaft braking system	+	+	–
17.	Connection of threads and skipping them between the reel roller	+	+	–
18.	Pulling out prices when refueling	+	+	–
19.	Laying prices when refueling a batch T3	+	+	–
4) Operation. depending on the number of weaving beams (T3)				
20.	Removal of used bead (roller)	+	+	+
21.	Filling of a new bead (roller)	+	+	+
22.	Laying of price cords when changing beams (6 price cords per navaya)	+	+	–
5) Operations. depending on the length of a single thread in a lot (T4)				
23.	Eliminating the break in the base	+	+	+
24.	Elimination of clamps	+	+	+
6) Operations. depending on the number of threads on the new (T5)				
25.	Folding operation in a row	+	+	+
26.	Formwork roller forming back	0.37	0.21	0.96
27.	Roller forming capacity. kg/h	646	247	293
28.	The formation of a weaving nerve	0.764	0.581	0.753
29.	Productivity of the formation of weaving beads. kg/h	405.6	173.1	660.75

In (table 2), the sign "+" denotes the presence of this operation, the "-" sign indicates the absence of a rewinding roller and weaving in the formation processes.

From the analysis of (Table 2), note the following:

The first group of operations (positions 1–4) for the existing technology and the re-sizing aggregate ISTA are identical and are performed on a back-up machine. When using the SMH and BEN-FELATEK grinding-back aggregate, positions 1–4 are present, which are performed when the threads are threaded and wound onto a reel roller.

In the second group of operations, which do not depend on the number of back-up rolls [11] (positions 5–10), unlike the existing technology in the ISTA unit, there is no 7-position – cutting off the remainders of the warp threads because this machine sets one roller and Threads from it are rolled up to the end.

On the unit "SMH", "BEN-FELATEK", from the second group of operations, there is a skipping of the knots through the sizing machine when finishing the yarns on the working reels and switching to spare ones, with a quiet car running, the remaining operations are absent. In the third group of operations, depending on the number of reel ridges, there is no operation with the ISTA aggregate, (position 12) – winding the remainders of the yarn from the overflow rollers when working on one roll from the batch.

The unit "SMH", "BEN-FELATEK" does not have all the operations of this group.

In the fourth group, the operations of the existing technology and on the IGTA unit are identical, the operation "Laying of price cords during the change of the waxes" is absent on the SMH and BEN-FELATEK grinding-back aggregate, since the new technology uses the final forging to create the re-rollers from which batch for installation on the rack of a distillation machine.

The fifth and sixth groups of operations are identical for all methods of preparation of the basis.

Operations that are absent on the sizing machine is taken into account in calculating the CPV and the productivity of the distillation machine on which the warp threads from the batch of overrun rollers are distilled to the weaving wire.

The CPV and the productivity of the equipment participating in the formation of the reel roller and weaving on three different technologies for the preparation of the substrate were determined using the example of the cloth of Byaz art. 128 [9].

Compliance with the following filling parameters: linear density of substrates

As a result of calculating forgings and weft tex; number of threads per 10 cm, by base and duck; filament / 10 cm, filament / 10 cm; working on the basis of 83%, duck 6.9%; number of threads at the base of 3378 threads, for the existing technology and the KMB unit; width of austerity 160 cm; for ISTA see, thread. was received; the number of rollers in the batch is –5, the number of threads in the bet is 675, with the capacity of the creel 720 [11]. Conjugation of the length of the base on the meter in meters, on the back roll meter, on the bobbin meter.

(Table 2) also shows the values of CPV and the productivity of the formation of the reel shaft and weaving for the existing technology [11], the aggregate IGTA [4] and for the sizing-back aggregate "SMH", "BEN-FELATEK" calculated by us. Analysis of КПВ and performance of various ways of preparing the basis, shows:

– КПВ process of formation of the reel roller on the unit "SMH", "BEN-FELATEK" has the highest value of 1.77 more than the existing method. The actual performance is also 2.6 times higher. Due to the greater number of scrolling threads, the capacity of the IGTA unit is somewhat higher.

The productivity and КПВ of the weaving process also has the best performance on the SMH, BEN-FELATEK.

References:

1. Zaitsev V. P. Investigation of the structure of the winding and the process of formation of the partion packs. Author's abstract. dis. … cand. tech. sciences.– Leningrad: Len.I.I.I.L., S. Kirov,– 1970.– 30 p.
2. Kutyin A. Yu. and others. The new technology is a non–waste technology for the formation of high quality weaving // Proceedings of universities.– Ivanovo,– 2005.– No. 3.– 43 p.
3. Donierov B. B., Kosimov D. N., Alimboev E. Sh. Home is already tedjamkor tanda tayerlash tekstisi taulili // Problems of textiles.– 2011.– No. 2.– 31 p.
4. Smirnova T. V., Mahover V. L. Determination of the operating modes and the number of coupled equipment in the preparation of bases using the ISTA re–sizing aggregates // Textile Industry.– 2013.– No. 1.– 70 p.
5. Donierov B. B., Alimboev E. Sh. Zamonavi tўқow will give the "lariga tanda tayerlashda chiқindilir miқdorini kamaitarishga oid" // "Rābatbardos māsulotlar" "hashba chiarishda innovating the role of the role" Republic of ilmiy–amaliy anzhumani materialari t.plami. 1–Kiem. Namangan – 2010 th.– P. 101–103 p.
6. Donierov B. Вю, Alimboev E. Sh. Tanda tayerlash tekhnaloliniring қyosiy taҳlili // "Importance of integrating science and solving current problems in the organization of production in textile industry enterprises" International Scientific and Technical Conference. Part 1 Margilan. July 27–28,– 2017.– FROM.– 342 p.
7. Borodin A. I. and other reference book on cotton–growing. Publishing house "Light Industry".– M.: – 1968.– 199 p.

8. Onikov E. A. Handbook of cotton–growing. Publishing house "Light Industry".– M.: – 1979.– 487 p.
9. Bukaev P. T., Onikov E. A. Cotton: Handbook.– Moscow: Legprombytizdat,– 1987.– 576 p.
10. Onikov E. A. Technology, equipment and profitability of weaving. "Practical Guidebook". Publishing house "Textile Industry" – M.: – 2003.– 221 p.
11. Onikov E. A., Nikolaev S. D. Designing of technological processes of weaving. Textbook for high schools.– M.: Inform–Knowledge,– 2010.– 320 p.

Duskulov Abdusattar Axadovich,
Associate Professor, department of Agricultural Machines,
Tashkent Institute of Irrigation and Mechanization Engineers,
(Republic of Uzbekistan)
E-mail: aduskulov_1946@vfil.ru

Makhmudov Khusanboy Sultonxojayevich,
Assistant, department of "Mechanization of irrigation and drainage works"
Tashkent Institute of Irrigation and Mechanization Engineers,
E-mail: husan_m@rambler.ru

Mamatov Farmon Murtozevich,
Karshi Engineering-Economics Institute, professor,
Head of the Department of scientific-applied researches and Innovation
E-mail: fmamatov50@mail.ru

POTATO PLANTER WITH DISCS

Abstract: To simplify the design and reduce the metal capacity of the machine, as well as improve the reliability of the technological process, a potato planting machine with disk operating elements is proposed. It is established that the potato planter with disk working organs provides a density of planting of 30 thousand pieces per hectare with a row spacing of 75 cm, while its performance corresponds to agrotechnical requirements.

Keywords: potato, potato plant, disk working body, soil, dosing unit, planting.

Introduction

In Uzbekistan, potatoes are grown in "dehkan" households (77.7%), farms (21.4%) and others (0.9%) mainly on land surfaces with an area of 0.3–5 hectares. As a rule, in these categories, manual labor predominates in the production of potatoes.

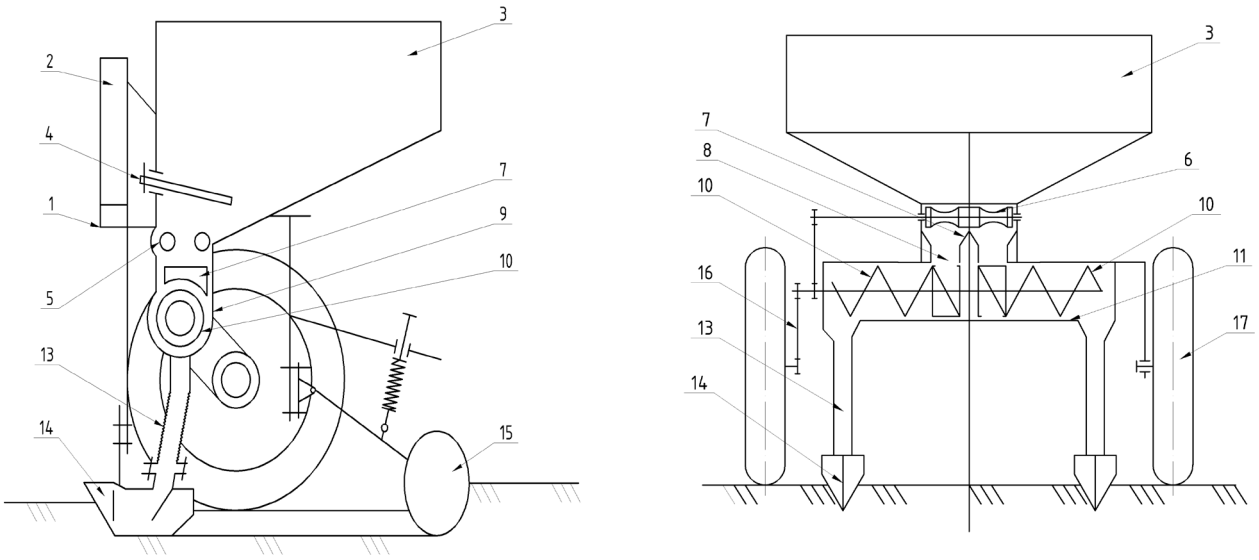
Among the technological operations for growing potatoes, the potato planting operation occupies an important place, which predetermines the future harvest.

The existing designs of potato planters are complex and metal-bearing [1, 36–72; 2, 43–82, 3, 12–21]. In addition, in Uzbekistan, the use of modern high-performance potato planters is hampered by the fact that they do not give the proper effect when using them in low-flow areas with specific mechanical and technological properties of soils.

Objects and methodology of research. The object of research is a potato planting machine with disk operating elements and the technological process that it implements.

The agrotechnical evaluation of the potato planter was determined according to TS00861251–020: 2014 "Combined aggregate for pre-plant soil preparation with simultaneous potato planting. Programs and methods of testing. "

The discussion of the results. At the Tashkent Institute of Agricultural Irrigation and Mechanization, the authors developed a new design for a potato planting machine with disc working bodies (Fig.1), which includes a common frame 1, an attachment 2, a hopper 3 with an inclined bottom and a shutter 4, a tuber feeder with rollers 5, having a profiled groove 6, a divider 7 separating the cavity beneath the rollers on the left and right windows 8. At the bottom of the feeder, a dosing mechanism with augers 10 is disposed in the outer cylindrical casing 9 with various direction turns. The augers 10 are closed with attached to them disk type 11 dispensers that have windows 12 at the first screw turns for passage of a single tuber into the screw cavity [4, 17].



a) b)

Figure 1. Scheme of the potato plant: *a*) – side view; *b*) – a view of *AA*

The ends of the outer casing 9 are made in the form of conical funnels connected to the jaws 13, which in turn are connected to the openers 14. Next, the machine is provided with furrow-closing discs 15 and a drive 16 of rollers and augers from the support wheel 17.

The potato planter works as follows. When the machine is moving, the planting tubers loaded into the hopper 3 when the damper 4 is opened by its own weight along the inclined surface of the bottom of the hopper enter the zone of action of the profiled rolls 5 of the feeding device by a continuous flow. Counter rotating profiled rolls 5 take tubers from the incoming stream in accordance with the size of the profiled grooves 6 thereon, and the sparger 7 distributes them to the left and right augers 10 of the dispensing mechanism, respectively. In this case, the tubers from the splitter 7 enter the left and right augers only when the windows 12 of the inner cylindrical casing 11 approach the guide windows 8 of the divider 7. Those from the windows 12 in the cavity, respectively, between the spiral turns of the left and right screws 10 and the inner cylindrical casing 11 of the tuber move horizontally and from the conical funnels of the outer cylindrical casing 9 enter the club holes 13, along which they roll down into their end part and from there enter the furrows, formed by left and right openers 14. Closure furrows planted with tubers of soil carried furrow-closing discs 15.

The drive 16 of the rollers 5 of the feeding device and the screws 10 of the dispensing mechanism is produced from the support wheel 17 by means of chain drives, by replacing the sprockets which match the rotation speed of the rolls and screws in accordance with the inter-nest seeding distance of the tubers.

The use of the proposed potato-planting machine simplifies the design and reduces the metal capacity of the machine, increasing the reliability of the technological process of feeding the tubers to the openers.

On the basis of theoretical studies, an experimental prototype of potato-planter with disk working organs was constructed.

Experimental studies of the prototype potato planter were carried out at the training and experimental station of TashSUA (Tashkent State University of Agriculture). The soil of the fields of the training and experimental station is loamy gray with an equal relief. The moisture content of the soil at a depth of 5–25 cm was 14.8–19.7%, the soil hardness was 0.38–0.97 MPa.

During the laboratory studies, the sorted potatoes of the variety "Zarafshan" were used, with an average length of 60.1 (V = 28.4%) cm, a width of 49.0 (V = 22.6%) cm and a thickness of 37.0 (V = 28, 4%). The average weight of the tuber was 68 (V = 68.6%) grams. Basically, tubers with a mass of 51–80 grams (92%) prevailed, with a mass of 30–50 grams being 3.5%, and weighing more than 81 grams being 4.5%.

In laboratory tests, the machine was adjusted to plant potatoes with a spacing between tubers of 25 cm, and the

depth of planting was set to 10 cm. The unit operated at an average working speed of 1.3 m/s.

With the installation distance between tubers 25 cm, the potato planting machine provided an actual average distance between the tubers of 26.4 cm, the depth of planting was 12.2 cm, the uniformity of tuber distribution was 64.8%. The share of omissions and twins is within the permissible limits and amounted to 1.8% and 1.6%, respectively. Damaged tubers consisted 1.8%. After the passage of the machine, the width of the main rows was 75.6 cm with a standard deviation of ± 1.2 cm, and a butt joint of 74.6 ± 0.64 cm.

The conclusion. Potato planter with disc working organs provides a density of planting of 30 thousand pieces per hectare with 75-cm rows, while its performance corresponds to agrotechnical requirements.

References:

1. Torbeev Z. S., Postnikov N. M. Potato planting machines.– Moskva: Mashgiz.– 1963.– 142 p.
2. Kann M. I. Turusov V. P., Makarov V. A. Trends in the development of machinery for planting potatoes / Overview information: Agricultural machines, units and assemblies.– Moskva: CRIITEI tractor-selhozmash,– 1978.– issue 11. – 48.3 p.
3. Postnikov N. M., Belyaev A. E., Kann M. I. Potato planting machines.– Moskva: – 1981.– 220 p.
4. Patent of Uzbekistan No. FAP 00690 РУз Potato planting machine / Duskulov A.A., Mirzaev B.S., Yuldashev Sh.U., Mahmudov H. S. / Bulletin.– 2016.– No. 6.– 17 p.

Ikramov Nazir Muminjonovich,
Senior lecturer at the department
"Using water energy and pumping stations",
Tashkent institute of irrigation and agricultural
mechanization engineers (TIIAME), Uzbekistan
E-mail: ikramov-1978@mail.ru

Majidov Takhir Shadmanovich,
Head of department
"Using water energy and pumping stations",
Tashkent institute of irrigation and agricultural
mechanization engineers (TIIAME), Uzbekistan
E-mail: suvchi2001@yahoo.com

Kamalov N. K.,
Tashkent institute of irrigation
and agricultural mechanization engineers

EFFECT OF BEDLOAD SEDIMENT HETEROGENEITY ON THE LENGTH, HEIGHT AND SHIFTING VELOCITY OF CHANNEL RIDGE FORMS

Abstract: The article discusses issues of determining of heterogeneous bedload sediment on the length, height and velocity of ridge movement. On the basis of laboratory data diagrams and relationships were obtained for ridge length, height and movement velocity vs. sediment hydraulic and geometric sizes.

Keywords: ridge shapes, bedload sediment, heterogeneous sediment composition, flow velocity, ridge length, height and movement velocity.

Periodical structures form on an erodible surface when it interacts with air or water flow. Such periodical structures can be seen on the bottom of all waterways and reservoirs, on snow surface, in hydro and pneumatic transport pipes. Data about wavelike movement of Karakum sands in shape of pocks, ridges and dunes are given in work [1]. Formation of ripples are observed even in the Pacific ocean under the action of deep current. Movement disperse medium under influence of turbulent flow in the form of periodical structures yield a huge loss to the humanity, since it deforms river and man-made waterway channels and carries sand and snow into the sites of national economy and etc. This has made people fight against the negative consequences of this phenomenon since olden times.

For the first time they have started to study sediment movement in China in the 15th century. Channel control works were required for rivers in China (for instance, Huang He), which carry huge amount of sediment.

Later, with the development of navigation, the science about sediment movement has started to develop in Europe. First DuBua and later Dikon have carried out their research in this area. DuBua observed bedload form creation and movement in laboratory conditions, and Baumgarten observed bedload form movement in field conditions for the first time and measured the parameters in Garonne river.

It is impossible to solve the problem, related with formation and realization of bedload periodical structural forms in turbulent flow by analytical methods, since the process depends on many factors. In present, such problems are solved by laboratory research and the accuracy of obtained results are estimated with field observations. Discrepancy in estimated and observed parameters of ridges is mainly related with bedload structure variation in space and time, imperfection of measuring technology and methods. As a result of laboratory and field research

until now huge amount of theoretical and empirical formulas have been obtained, which determine the connection of bedload form parameters to flow and sediment characteristics. Range of new tasks have been revealed, and their solution are yet to be obtained.

After Dikon and Engels's experimental research, in 1914 G. Jilbert's and E. Merfy's experimental work came out.

Some of the main works in development of science about sediment movement are V. N. Goncharov's and G. N. Lapshin's works.

B. F. Snishenko, Z. D. Kopaliani, G. V. Jeleznyakov, V. K. Debolskiy, Y. T. Borshevski, D. M. Kondep, R. I. Garde, S. Y. Pavlov, A. A. Stepanov, N. A. Kotlova, D. Saymons, E. Richardson, P. Sanghal, B. Singh, N. Y. Kondratyev and others have also brought in a huge contribution in studying bedload sediment movement.

T. Sh. Majidov have attempted to account sediment composition for qualitative and quantitative estimation of ridge characteristics in his works [3, 4]. He conducted experiments with three groups of disperse soils, each of which is one homogeneous and one heterogeneous material with equal mean diameters.

Experimental research allowed Majidov to obtain formulas for ridge parameters with the account of sediment size in the following form:

– for ridge form length:

$$\frac{l_r}{d} = 1{,}3 \cdot 10^4 \left(\frac{\omega^2}{g d_{50}} \right)^{2{,}2} exp\left(-1{,}58 \frac{\vartheta}{\vartheta_0} \right) \qquad (1)$$

where: ω – hydraulic size of particles with diameter d_{50};

– for ridge height:

$h_r = \frac{q_T (gH)^{1,5}}{0{,}0117 \vartheta^{4,0}}$ – for heterogeneous composition of sediment; (2)

$h_r = \frac{q_T (gH)^{1,15}}{0{,}0052 \vartheta^{3,8}}$ – for homogeneous composition of sediment; (3)

– for ridge movement velocity:

$$C_r = 4{,}0 \cdot 10^{-5} \left(\frac{\omega^2}{g d_{50}} \right)^{3{,}85} (\vartheta - \vartheta_0)^{2{,}25} \qquad (4)$$

All the above listed works lack consideration of impact of sediment natural composition change on the length, height and velocity of ridge movement, therefore we decided to conduct additional research in this area.

The goal of the research is to estimate the impact of the various types of heterogeneous sediment of constant size on the length, height and velocity of channel ridge form movement.

The following research tasks were set:

1. Improving methods for accounting varieties of heterogeneous soils.

2. Checking the applicability for the coefficient of heterogeneity of mixtures as $\varepsilon = d_m / d_i$, involving the existing data on grain-size distribution of bedload heterogeneous sediment.

3. Set up the following relationship of flow characteristics and ridge parameters with the coefficient of mixture heterogeneity:

$$H, I, \vartheta, \vartheta_0, q_т = f(\varepsilon = d_m / d_i) \qquad (5)$$

$$h_r, l_r, C_r = f(\varepsilon = d_{cp6} / d_i) \qquad (6)$$

4. Determining the impact of sediment mean size, composition and flow hydraulic characteristics on ridge parameters:

$$h_r, l_r, C_r = f(H, \vartheta, Q, I, \vartheta/\vartheta_0, d_m, d_{max}, d_m/d_i)$$

where: d_m – mean sediment diameter;

d_{max} – maximum sediment diameter;

d_i – particle sizes with corresponding probability (i = 5, 10, 15, 25, 35, 50, 60, 65, 70, 75, 85, 90, 95);

ϑ and ϑ_0 – mean and eroding flow velocity;

H – mean flow depth;

I – water surface slope;

$q_т$ – bedload sediment discharge;

ε – coefficient of sediment heterogeneity;

h_r, l_r, C_r – height, length and velocity of ridge movement, accordingly.

Since it is difficult to estimate the impact of heterogeneity of various types of natural sediment on the process of bedload ridge formation and movement in field conditions, main experiments were onducted in laboratory conditions. Experimental research was conducted on hydraulic channel in the laboratory, field observations of ridge movement for various sediment composition were done on canals and rivers of the republic.

Ridge length. Ridge length is one of the important ridge form characteristics. Almost in all the theoretical works, related with study of ridge formation mechanisms, ridge form lengths are studied. Since one of the goals of our research was to set the connection of ridge length of various sediment composition with constant mean particle size and relative flow velocity, from the obtained experimental data we created graphical relationships of – $\ell_r / d = f(\vartheta / \vartheta_0)$ (fig. 2).

Table 1.– Grain-size distribution of artificially made sediment

No.	Type of sediment	Grain–size distribution in% mass. for particle size in mm									d_m, мм	$\varepsilon = \frac{d_m}{d_{50}}$
		10÷7	7÷5	5÷3	3÷2	2÷1	1÷0.5	0.5÷0.25	0.25÷0.1	< 0.1		
1.	Edge fractioned	–	–	56.75	2.25	2.75	4.5	14.9	14.25	4.6	2.49	0.83
2.	Small fractioned	9.5	8.5	8.75	13.75	22.25	14.75	8.75	9.25	4.5	2.51	2.24
3.	Large fractioned	–	–	36.5	27	18	11.5	5.07	1.31	0.62	2.53	1.24
4.	Evenly fractioned	11.1	10.1	10.1	11.1	11.1	11.1	11.1	12.1	12.2	2.51	2.8
5.	Mean fractioned	–	14.4	14.8	15.3	32.7	18.6	2.2	1.25	0.75	2.48	1.88
6.	Homogeneous	–	–	–	100	–	–	–	–	–	2.50	1.0

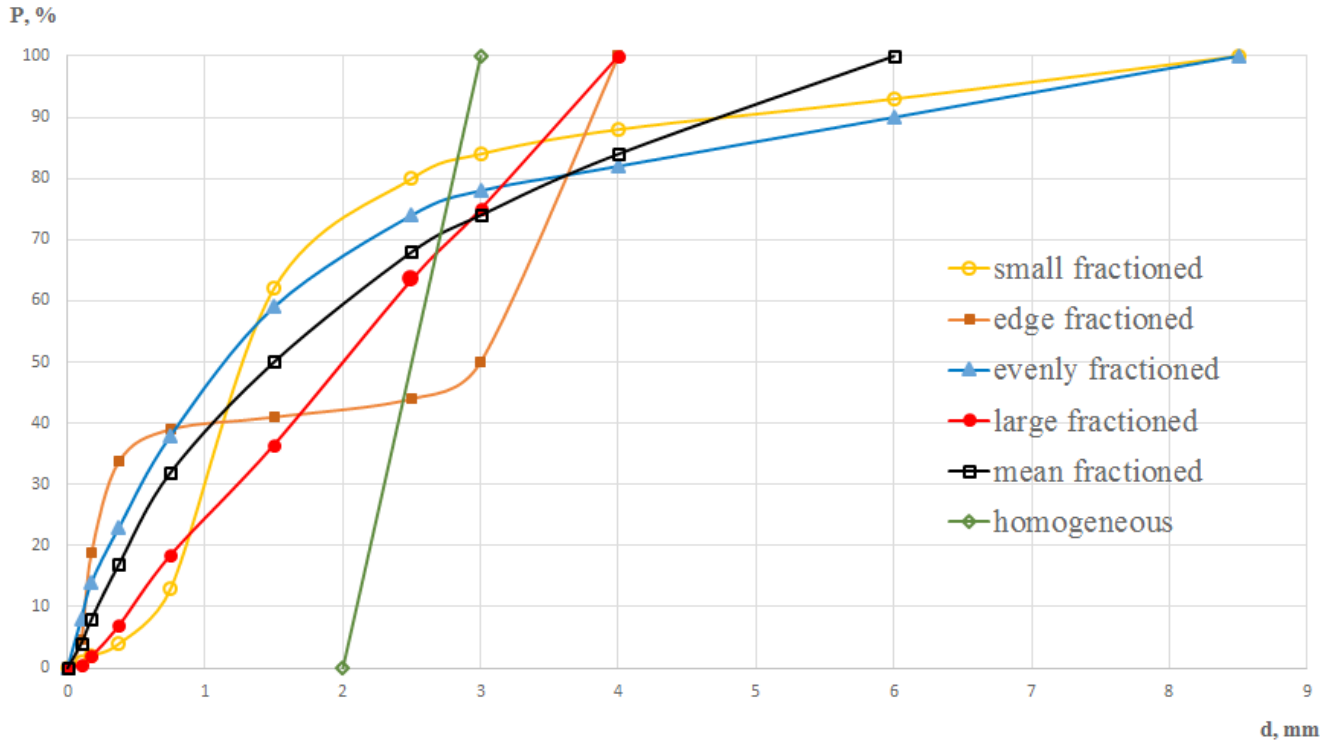


Figure 1. Grain-size distribution of experimented mixtures

The following design formula was obtained on the basis of analytic and graphical relationship with accuracy of 0,8÷0,95:

$$\frac{l_r}{d} = -\left(49{,}9\varepsilon^2 - 127{,}4\varepsilon + 594\right)\left(\frac{\vartheta}{\vartheta_0}\right) + \\ + 262{,}9\varepsilon^2 - 682{,}4\varepsilon + 1824 \qquad (7)$$

Ridge height. Determining ridge height in channel flow is necessary for estimating bed roughness in determining channel hydraulic resistance, bedload sediment discharge and channel deformation calculations, also for setting threshold height in water intake structures, installation depth for pump station exhaust pipes and etc.

In order to set the connection of ridge height of various sediment composition with constant mean particle size and relative flow velocity, from the obtained experimental data we created graphical relationships of - $h_r / d = f\left(\vartheta / \vartheta_0\right)$ (fig.3).

The following design formula was obtained on the basis of the analysis of the graphical relationship with accuracy of 0,7÷0,9:

$$\frac{h_r}{d} = -4{,}38 \cdot e^{0{,}23\cdot\varepsilon} \cdot \left(\frac{\vartheta}{\vartheta_0}\right)^2 - \\ -\left(9{,}2\varepsilon^2 - 35{,}8\varepsilon - 12{,}7\right)\cdot\left(\frac{\vartheta}{\vartheta_0} - 1{,}1\right) \qquad (8)$$

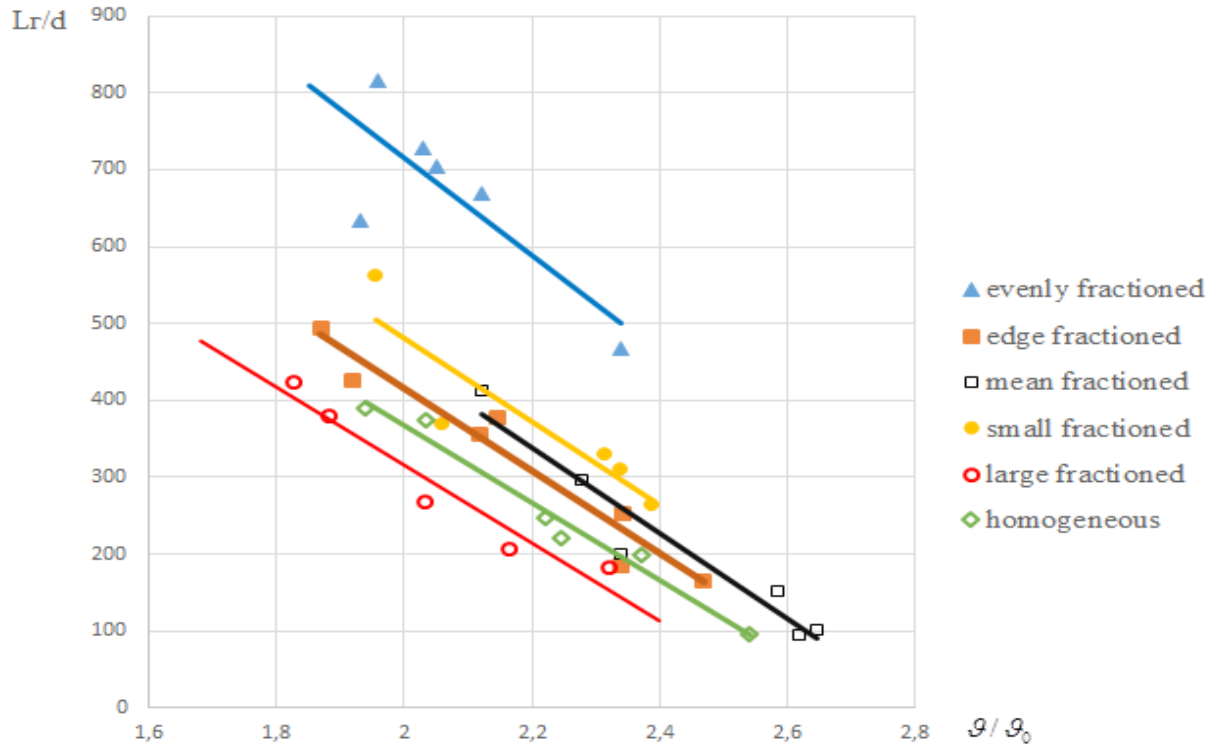


Figure 2. Plot of ridge length and sediment composition to the relative flow velocity.

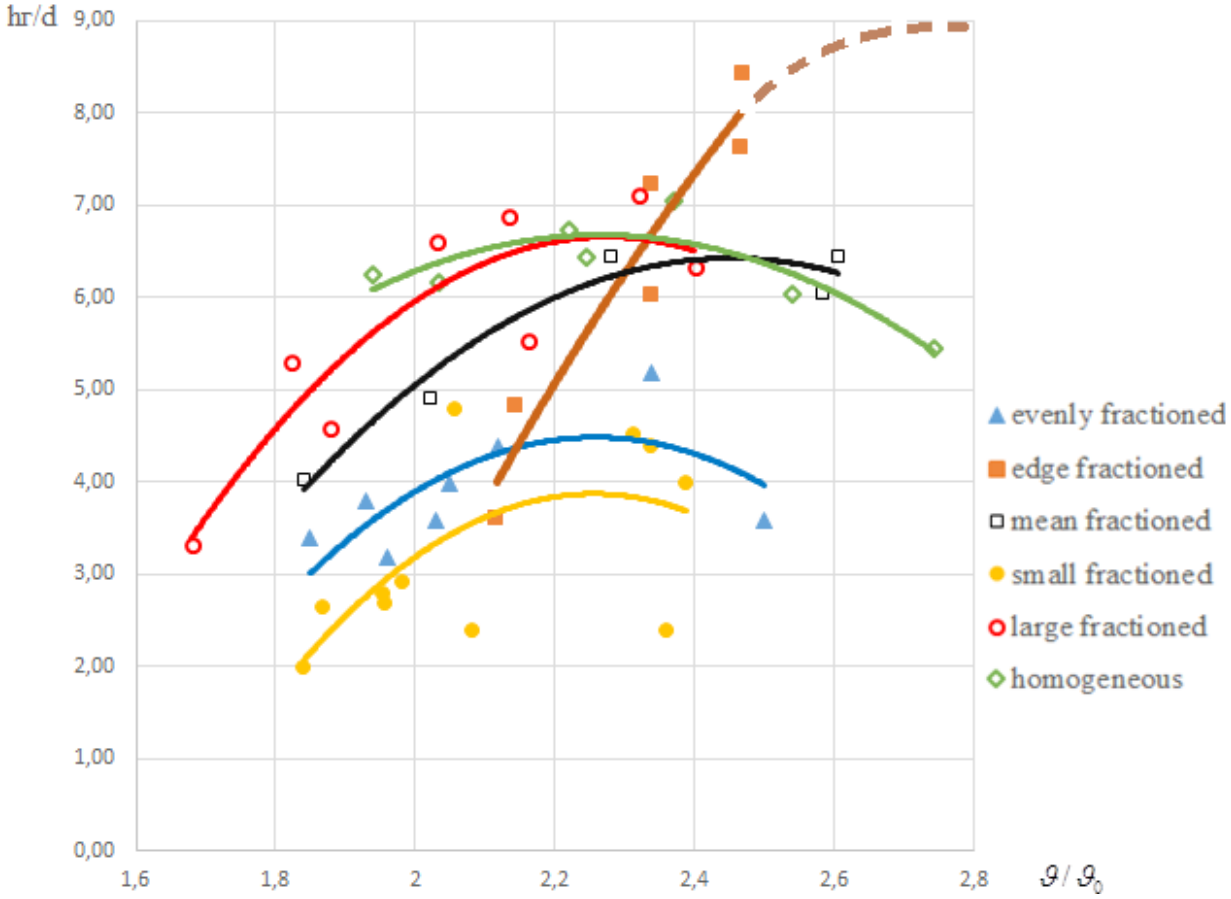


Figure 3. Plot of ridge height and sediment composition to the relative flow velocity

Ridge movement velocity. Ridge dynamic parameters, i.e. movement velocity is particularly important in designing channel deformation and bedload sediment discharge. Researchers have been studying these characteristics for almost two centuries.

In order to set the connection of ridge movement velocity of various sediment composition with constant mean particle size and mean/scouring flow velocity, from the obtained experimental data we created graphical relationships of – $C_r = f(\vartheta - \vartheta_0)$ (fig.4).

The following design formula was obtained on the basis of the analysis of the graphical relationship with accuracy of 0,75÷0,9:

$$C_r = \left(0{,}0026\varepsilon^2 - 0{,}0066\varepsilon + 0{,}033\right) \cdot \left(\vartheta - \vartheta_0\right) - 0{,}11\varepsilon^2 - 0{,}6 \quad (9)$$

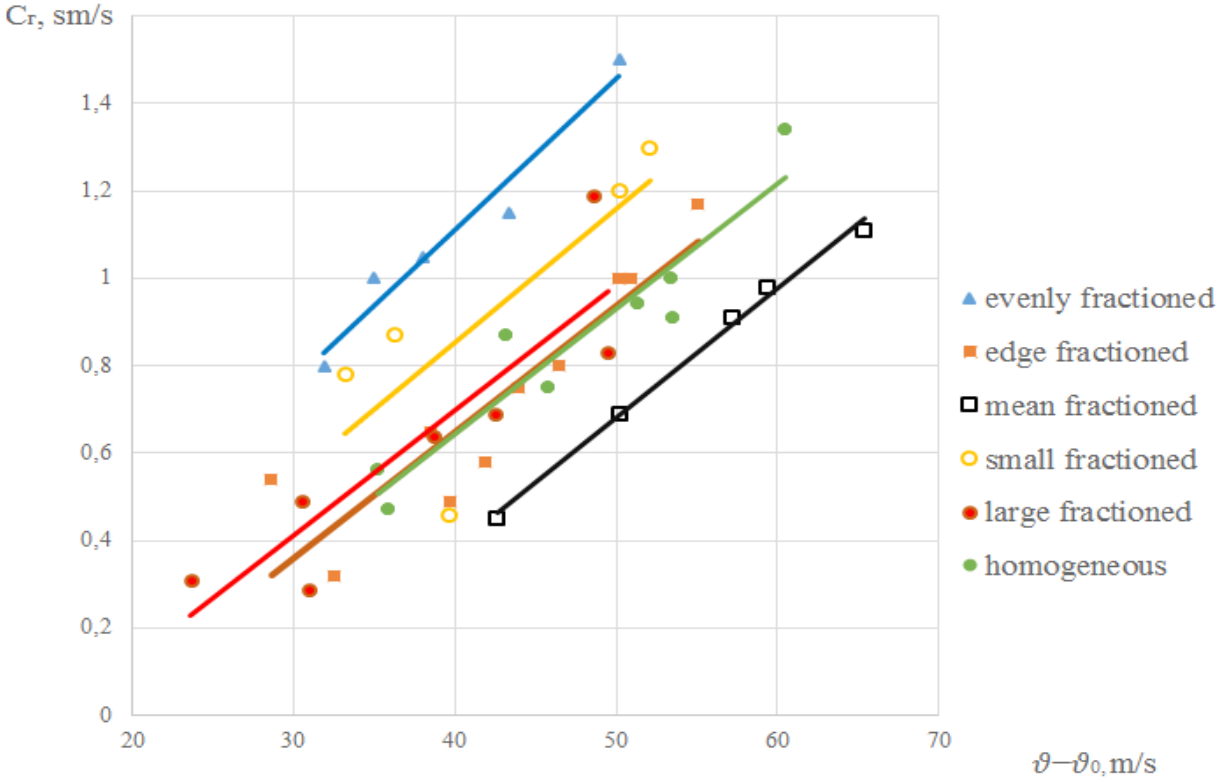


Figure 3. Plot of ridge movement velocity and sediment composition to the scouring flow velocity

The relationships (7, 8, 9) obtained from experimental data give more precise determination for ridge length, height and movement velocity change depending on sediment composition heterogeneity of waterways in valley and piedmont regions.

Conclusions:

1. Bedload sediment movement in waterways take place in form of ridges.

2. Geometric and dynamic bedload ridge characteristics depend on bedload sediment composition.

3. Relationships of heterogeneous bedload sediment ridge length, height, and moving velocity vs. flow relative velocity were obtained.

4. The obtained relationships show that sediment heterogeneity and flow relative velocity change has a direct effect on the bedload ridge form length, height and its moving velocity.

5. The increase of the relative flow velocity result in the decrease of ridge length.

6. The increase of the relative flow velocity up to 2,2÷2,4 result in the increase of ridge height at first, then in its decrease.

7. The increase of the difference between mean and scouring flow velocities result in the increase of ridge movement velocity from even to mean fracture composition.

8. The obtained relationships are applicable for waterways in valley and piedmont regions with more accuracy.

References:

1. Арнагельдиев А., Костюковский В. И. Пустыня Каракумы. Природа и человек.– М.: Наука,– 1985.– 164 с.
2. Лонгинов В. В. Что такое литодинамика.– Ж: Земля и вселенная,– 1980.– No. 6.– С. 36–41.
3. Мажидов Т. Ш. Расчетные гидравлические характеристики потоков и параметров песчано-гравийных гряд с учетом состава наносов. Автореферат диссертации на соискание ученой степени кандидата технических наук.– Л.,– 1984.– 16 с.
4. Snishenko B. F., Mukhamedov A. M., Majidov T.SH. Bedlam composition effect on dune shape parameters and on flow characteristics. International Association for Hydraulic Research. XXIII Congress, Ottawa,– 1989.– P. 105–112.
5. Гончаров В. Н. Движение наносов // – Л.– М.: ОНТИ,– 1938.– 312 с.

Karakhanov Asomidin,
Scientific research institute of mechanization and agriculture electrification (Republic of Uzbekistan), chief of laboratory
Ibragimov Abdirasuli Abdikarimovich,
Scientific research institute of mechanization and agriculture electrification (Republic of Uzbekistan), researcher
E-mail: abirasul_82@mail.ru

COMBINED AGGREGATE FOR SEWS OF GRAIN

Abstract: The article contains information on a combined unit developed at the Institute for the Simulation of Soil, for simultaneous cultivation of soil and ordinary sowing of cereals in the inter-row of cotton and in open areas.

Keywords: combined unit, inter-row soil cultivation, sowing, cereals, test results.

Караханов Асомидин,
научно-исследовательский институт механизации и электрификации сельского хозяйства (Республика Узбекистан), руководитель лаборатория
Ибрагимов Абдирасули Абдикаримович,
научно-исследовательский институт механизации и электрификации сельского хозяйства (Республика Узбекистан), научный сотрудник
E-mail: abirasul_82@mail.ru

КОМБИНИРОВАННЫЙ АГРЕГАТ ДЛЯ СЕВА ЗЕРНОВЫХ

Аннотация: В статье приведены сведения о комбинированном агрегате, разработанном в ИМЭСХ, для одновременной обработки почвы и рядового сева зерновых в междурядья хлопчатника и на открытых площадях.

Ключевые слова: комбинированный агрегат, междурядная обработка почвы, посев, зерновые культуры, результаты испытаний.

Growing of grain in our country is one of the main directions of agricultural production. At present, the bulk of grains in our country is being planted in the cotton fields. However, due to the lack of a special machine, NRU-0.5 type fertilizer utensils, customized cottonseed cultivators and other devices are used. In this case, the seeds are not sprouted and planted in a series of cotton fields, and are not buried in demand depths, that is, 25 to 30 percent of seed planted seeds fall below the set depth and 10 to 12 percent fall on the soil surface. Seeds falling deeper than demand are rotten, and birds eat on the surface. As a result, the number of seedlings in each hectare decreases by 20–25%. In addition, these operations are performed individually, although it may be possible to process the cotton fields and process wheat in one unit.

It is also important to note that the preparation of seeds for the sowing of cotton does not satisfy the requirements. When seeds are sown in well-grounded areas, seeds do not fall into the same depth. Secondly, 20 to 30 percent of the seeds will remain on the softened protective zone under the heifer. Thirdly, the seeds sown in rhizome areas are mixed with soil, not mixing with 30–40% of soil [1, 2].

To eliminate the above shortcomings, a combined aggregate has been developed by scientists of the Institute of Mechanization and Electrification of Agriculture to produce a single row of cotton in the range of cotton fields (Figure 1).

Combined aggregate consists of center, right and left front rack mounted on the front of the tractor and auger rack mounted on the mounting mechanism. The front rods of the aggregate include workgroups for processing cotton, forage bins, cork bins, rolling pallets, pushbuttons, seeders and sowing machines and disk drives.

In 2014, an experimental party of the aggregate aggregate was developed at the Agregat Plant joint stock company and was tested at a large scale and in 2016, the State Center for Agricultural Technology and Technology Certification and Testing in Uzbekistan [3]. The results of the tests are given in the table. Figure 2 shows the appearance of seedlings in the field planted with this aggregate.

Figure 1. Working appearance of a combined aggregate

Table 1.– Results of the first state tests of combined aggregate (Act No. 15–2016)

№	The name of the display	The value of the display		
		according to agrotech-nical require-ments	Experimental results	
			I-experience (open spaces)	II-experiment (be-tween cotton series)
1.	Planting time		15.10.2016 y.	26.10.2016 y.
2.	Aggregate speed, km / h	7–10 (5.4–7.2)*	5.7	7.8
3.	Sowing norm, kg / ha mounted in practice	60–260	233 217	
4.	Deterioration of the applied rate,%	no more than 10	6.8	
5.	Depth of planting seeds, cm: average sowing depth, cm, mean square quadrature, ± cm, Variation coeffi-cient,%	3–5 (2–6)*	 2.28 0.25 11	 4.68 0.26 5.56
6.	the specified planting depth and the amount of seeds found in the adjacent one centimeter,%	at least 80	100	100
7.	he thickness of seedlings in the 1 m^2 area, pcs		413	371
8.	nterval between lines, cm	(15 ± 2)*	14	14

** – according to the initial requirements to the combined aggregate with the sowing of cotton in one row and the grain*

Combined aggregate has been awarded the "Best Innovative Development in Agriculture" nomination at the VIII Republican Fair of Innovative Ideas, Technologies and Projects, held on May 19–21, 2015, and was awarded the "Certificate of Honor" by the Cabinet of Ministers of the Republic of Uzbekistan.

As can be seen from the information above, all indicators were tested at the initial level when the combined aggregate was tested between an open field and a row of cotton. That is, when the aggregate motion velocity in open areas is 5.7 km / h, the sowing depth of the seeds and their average squared elongation are 2.28 and 0.25 cm respectively, and the aggregate velocity of the seeds is 7.8 km / h The indicators were respectively 4.68 and 0.26 cm. The designated planting depth and the amount of seeds found in an area adjacent to it were 100 per cent between open pits and cotton fields.

Figure 2. The appearance of sown wheat seeds

Thanks to the application of a combined aggregate, the seedlings, fuel consumption and other costs are reduced, and the yield of the grain increases as a result of the sowing of the cotton seeds together and sowing the grain in the same depths. This combined aggregate is protected by patents of FAP № 00922 of the Intellectual Property Agency of the Republic of Uzbekistan, "Grain Batching Aggregation" and FAP № 01159 "Growing Aggregation for Cotton Fields".

References:

1. Siddikov R. Everyone has a handicraft // The Village Life newspaper.– Tashkent,– 2017.– No. 100 (8807).– 3 p.
2. Qorakhonov A., Ibragimov A. Combined aggregate grain harvesting unit // Uzbekistan Agriculture.– Tashkent,– 2015.– No. 10.– 37 p.
3. The test report of the combined unit SZH-3,6 for simultaneous processing and sowing of cereals in the inter–row cotton development of the Research Institute of Mechanization and Electrification of Agriculture // UzSCCTATT.– Gulbakhor,– 2016.– No. 15.– 2016.– 29 p.

Mamatov Farmon Murtozevich,
Karshi Engineering-Economics Institute, professor,
Head of the Department of scientific-applied researches and Innovation (Republic of Uzbekistan),
E-mail: fmamatov50@mail.ru

Shodmonov Golib Dustmurodovich,
Karshi Engineering-Economics Institute,
Senior research fellow-applicant (Republic of Uzbekistan)

Chuyanov Dustmurod Shodmonovich,
Karshi Engineering-Economics Institute,
assistent-professor (Republic of Uzbekistan)

Ergashov G'ayrat Khudoyorovich,
Karshi Engineering-Economics Institute,
assistent (Republic of Uzbekistan)

NEW TECHNOLOGY AND COMBINED MACHINE FOR PREPARING SOIL FOR SOWING GOURDS

Abstract: A soil-saving, energy-resource-saving technology for preparing soil for sowing gourds and a combined machine for its implementation are proposed. It is established that the use of a combined machine reduces labor costs by 48–51%, fuel consumption by 54–59% and operating costs by 62–67% compared to existing machines.

Keywords: technology, soil, melons, machine, deep loosener, rink, crest, fuel consumption.

Introduction. It is known that the priority direction of improving the means of mechanization of cultivation of tilled crops, including melons and gourds is the development and creation of combined machines [1, 27; 2, 32; 3, 86–88; 4, 125–126]. In melon growing, the number of operations that can be combined is processing and preparing the soil for sowing, fertilization and sowing.

However, the analysis of the design of combined machines for preparing soil for sowing melons has shown that they do not provide full implementation of agrotechnical requirements, energy-intensive, complex in design. Therefore, the improvement of technologies and combined ones, depending on the conditions of their functioning, is an actual task of great practical importance.

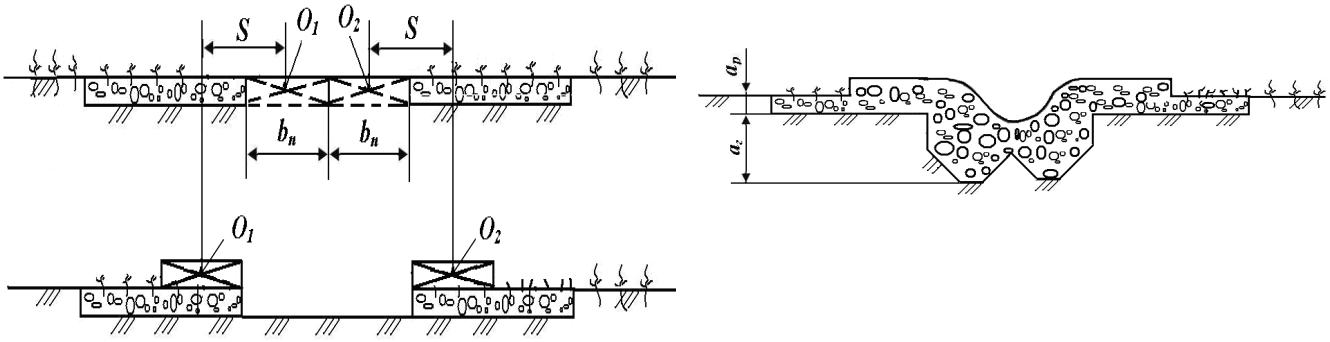
Objects and methods of research. The object of research is a combined machine for preparing soil for sowing gourds. The methods of system analysis and the rules of agricultural mechanics were used in the research.

Studies were conducted in 2017 in the Kashkadarya region of Uzbekistan. Stubble is a stubble of winter wheat. Type of soil – light gray. The average slope of the terrain 20. Humidity and hardness of the soil horizontally 0–10, 10–20, 20–30 cm was 8.5; 12.8; 13.7% and 2.41; 2.92; 3.23 MPa. Number of stubble residues 0,711 кг/м^2.

Results of the research. In the Karshi Engineering and Economics Institute, a new technology for preparing soil for sowing gourds has been developed, providing for the following technological operations in one pass of the machine [5, 23]: shallow surface loosening, cropping and rotation of the sowing zone, deep loosening, fertilization and formation of irrigation grooves (Fig. 1).

To implement the proposed technology, we have developed a combined machine (Fig. 2), which contains a frame 1, on which ripper-flat cutters 2 and 3 are successively installed, left and right-handing bodies 4 and 5, a deep plow 6 with an inclined support 7. The lower inclined part of the post 7 of the deep loosener 6 consists of two parts 8 and 9 that are diverted to the opposite sides with left-hand and right-hand knives 10 and

11 and bits 12 and 13. A furrower with left- and right-throwing dumps 14 and 15 is fastened on the straight part of the deep- 2 and 3 are installed at the same level *H* with left- and right-leaning corps 4 and 5 [6, 17].



а) б)

Figure 1. Profile of the cross-section of the field after loosening and rotation of beds (*a*); profile of the cross-section of the field after the passage of the aggregate (*b*)

The combined machine works as follows. Rippers 2 and 3 perform shallow surface loosening to the depth a_p of the right and left strips from the sowing zone with the width b_c, then the bodies 3 and 4 cut the strata with the thickness a_p and width b_k in the horizontal plane and wrapping them up from the friend stack on the loosened strip rippers 2 and 3. As a result, plant residues and their seeds and roots are completely removed from the seeding zone. In this case, the bodies shift the gravity center of the O_1 and O_2 layers by an amount greater than the width of the formation, i.e., $S > b_n$. After that the bit 12 and 13 of the deep loosener 6 penetrating into the subsoil layer, cleaves the soil. The resulting cracks extend to the soil surface at a certain angle. Moving forward with the speed of movement of the unit, each chisel 12 and 13 lifts a separate soil from the massif. At this point, the knives 10 and 11 of the struts 8 and 9 are inserted into the zone of the deformed soil with the chisels 12 and 13, respectively. Each inclined part of the rack with the knife is installed at an angle to the horizon, taking into account the zone of propagation of deformations and destruction of the soil. The soil, chipped off by each chisel and rising along them, enters the knives 10 and 11 and, accordingly, the legs 8 and 9. This causes bending and stretching of the shavings of the soil in the longitudinal and cross sections, as well as some displacement of the soil, which will lead to its intensive destruction. Loose soil enters the left- and right-leaning dumps 14 and 15 of the furrower. The milling cutters further loosen and form a furrow.

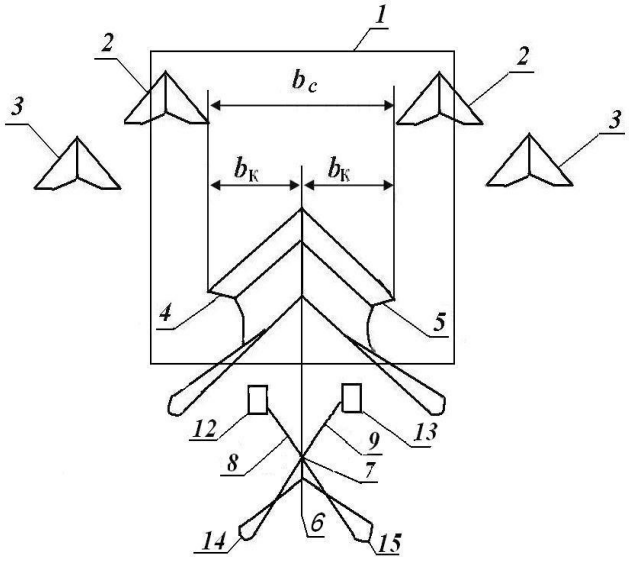


Figure 2. Scheme of a combined machine for preparing soil for sowing gourds (top view)

The depth of the treatment of the shell should be sufficient to remove under the stubble layer of the soil with the roots of the plants. Proceeding from this, we take a_p = 10–12 cm. The total capture width b_k of the shells 4 and 5 should be equal to the width of the sowing zone, i.e., $2b_к = B_c = B_м + b_2$. We take the depth of loosening a_2 from the condition for the destruction of the plow sole.

On the basis of theoretical and experimental studies, the following are defined: the width of the hull is b_k = 50 cm; the width of the sowing zone is Bc = 100 cm; distance between bits b_1 = 70 cm; the width of the capture of flat-cutting paw rippers b_p = 55 cm, the width of the chisel bit b_d = 6 cm. We made an experimental sample of a combined machine. The conducted laboratory-field studies showed that the experimental sample of the combined machine carried out a reliable technological process for preparing the soil from the winter wheat for sowing gourds. It satisfies the agrotechnical requirements for the main quality indicators: the depth of loosening of the sowing zone is 41.4 cm, the depth and width of the irrigation furrows are respectively 24.7 and 71.2 cm, the degree of crumbling of the soil is 87.6%.

Conclusion. The conducted tests and calculations showed that the use of a combined machine provides a qualitative preparation of the soil for sowing melons in a short time, helps to protect the soil from destruction and excessive compaction, reduces labor costs by 48 … 51%, fuel consumption by 54 … 59% and Operating costs – by 62 … 67% compared to existing machines.

References:

1. Маматов Ф. М., Мирзаев Б. С., Чуянов Д. Ш., Эргашев Г. Х. Агрегат для новой технология подготовки почвы под бахчевые культуры // Картофель и овощи.– Москва,– 2011.– № 1.– 27 с.
2. Маматов Ф. М., Мирзаев Б. С., Чуянов Д. Ш., Эргашев Г. Х. // Агрегат для предпосевной подготовки почвы // Сельский механизатор.–Москва,– 2011.– № 7.– 12 с.
3. Маматов Ф. М., Мирзаев Б. С., Авазов И. Ж. Агротехнические основы создания противоэрозионных влагосберегающих технических средств обработки почвы в условиях Узбекистана// Природообустройство.– Москва, – 2014.– № 4.– С. 86–88.
4. Mamatov F. M., Kodirov U. I. Energy-resourse machine for preparing soil for planting root crops on ridges // European Science Review.– Vienna,– 2016.– No. 11–12.– P. 125–126.
5. Patent of the Republic of Uzbekistan No. IAP 05360. Method of soil preparation and sowing / Mamatov MF, Mirzaev BS, Chuyanov D. Sh., Ergashov G. Kh., Shodmonov G. D., Toshtemirov S. Zh., Buranova S. U., Kuziev N. M. // Rusmiy ahborotnoma.– 2017.– No. 4.– 23 p.
6. Patent of the Republic of Uzbekistan No. FAP 01125. Combined tillage tool / Mamatov M. F., Mirzaev B. S., Chuyanov D. S., Ergashov G. Kh., Kodirov U. I., Toshtemirov S. Zh., Buranova Sh. U., Shodmonov G. D. // Rusmiy ahborotnoma.– 2016.– No. 6.– 17 p.

Mamatov Farmon Murtozevich,
Karshi Engineering-Economics Institute, professor,
Head of the Department of scientific-applied researches and Innovation
E-mail: fmamatov50@mail.ru
Berdimuratov Parakhat Tajimuratovich,
Turin polytechnic university Tashkent,
Senior research fellow-applicant (Republic of Uzbekistan)

IMPROVING THE COMBING TECHNOLOGY AND TOOL FOR SOWING THE COTTON

Abstract: For protection of sowing the cotton from rain and inclusions of formation of soil scabs, there is proposed the combing technology, providing the formation of combs simultaneously with the sowing of seeds. It is established that application of combing technology with simultaneous formation of combs shall increase the amount of raising of plants into 17.8% and raise the crop capacity of cotton to 8.3% in comparison with the traditional methods.

Keywords: cotton, sowing machine, technology, rake-forming machine, rain stream, seed bed, comb.

Introduction. It is known that available traditional technology of sowing the cotton on smooth field is very sensitive to climatic changes. In sowing the cotton on smooth field with abundant rain streams there happens the flood of seed bed, that causes the decrease of germination of seeds and scab forming [1, 25–28].

Now in our republic there widely spread the combing technology of sowing the tilled crops [2, 125–126; 3, 27]. At comb sowing there are created the favorable water and temperature conditions for fast and full raise of seeds. Therefore formation of combs along with sowing is a necessary operation.

Objects and methods of researches. Object of researches is a rake- former for formation of combs along with sowing the seeds of cotton and technological process realized by it.

Researches in laboratory and field conditions were conducted on O'z RH 63.06: 2001. "Tests of agricultural machinery. Sowing cars. Program and test methods".

Discussion of results. In the Tashkent state agricultural university of Uzbekistan there is developed a technology of sowing with simultaneous formation of combs [4, 15]. Offered technology is carried out as follows (fig.1): rake-former 1 moving across the field forms and condenses the comb, then runner-form ploughshare 2 going after him opens a groove on the middle combs, compactor 3 is condensed by its roller 4 after placement of seeds in a groove partially closes up it and condenses the soil. Coverer 5 close up seeds on established depth, and roller with a conic rim 6 condenses the soil.

Rake-former of comb 1 is executed in the form of a metal box in form of a isosceles trapeze with an open bottom and narrowed on length of side edges. The top basis of the former in output narrowed part is supplied with a mechanism of consolidation of soil of comb. Formation of comb with a necessary density is provided by design geometrical data of a box.

One of main requirements to parameters of comb is an opportunity to protect a seed bed from its flooding by rain streams and therefore to protect from a scab forming. It is known that when forming combs their sidewalls are showered at an angle natural slope. Therefore, when dumping the soil in the field there are formed a bed in form reminding the isosceles triangle. However for work of working bodies of seeders at top of such combs, it is necessary to have the platform which has to be with a width of 160–170 mm [1, 25–28]. For this purpose it is necessary to cut off its top, therefore, after it such a crest before crops turns into isosceles trapeze (fig. 2). A form by which it is assumed as a basis for carrying out the subsequent calculations.

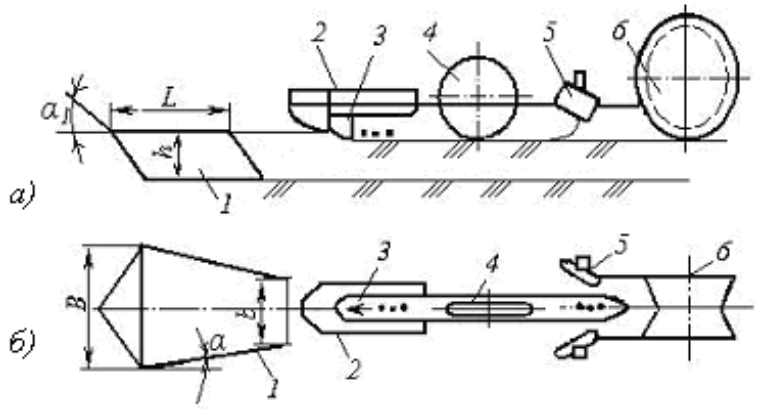


Figure 1. Technology of sowing with simultaneous forming the combs: *а* – from side; *б* – from up

From (fig. 2) it is seen that for ensuring protection of a seed box against flooding the cross-sectional area of a groove of a row-spacing of S_{CDKM} has to be more than cross-sectional area of rainfall in row-spacing during a day ($Q_s B_m$).

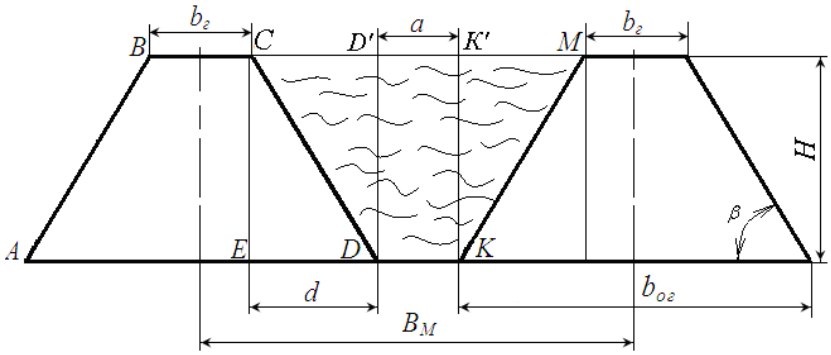


Figure 2. Scheme on definition of comb parameters

Proceeding from it, there is formed the following dependence for definition of minimal admissible height of comb

$$H = 0{,}5(B_M - b_г)tg\beta - \sqrt{[(B_M - b_г)tg\beta]^2 - 4Q_c B_M tg\beta}, \quad (1)$$

where β – is an angle of natural slope, hail; $b_г$ – width of height of comb, mm;

$B_м$ – width of row-spacing, mm; $Q_с$ – daily settling, mm.

It is known that under influence of rainfall the combs settle. Coefficient the considering soil Fig depending on height of a comb makes K_y = 0,85–0,90 [5, 102–115]. Actual height of bed also depends on size of height of roughness of a surface of the field h which is on average equal to 30–40 mm. Having substituted B_m = 900 mm and $Q_с$ = 34 mm and also values of $b_г$ parameters, and β = 32–41o [5, 12–14] in (1) we find that $H_{мах}$ = 49,5mm, $H_{мин}$ = 39,6mm. With account of shrinkage of the soil, actual minimum height of bed H_1 and width of bed on the basis of $b_г$ is determined by the following dependences

$$H_1 = \frac{H}{K_y} + h, \quad b_{oг} = 2H_1 ctg\beta + b_г. \quad (2)$$

Inserting into (2) the values of $H, b_г, \beta$ and h we will get: $H_1 \geq 100$ мм; $b_{oг} \geq 390$.

Taking into account comb parameters on the basis of calculations the rake- former parameters are determined: width of entrance edge of runner b = 150–180 mm, width of output edge of runner B = 288–323 mm, a tilt angle of side dump to direction of movement a = 16–17°, length of dump is L =203–215 mm, height of side dump h = 141–150 mm, angle of installation of side dump to horizon β_y = 42–45°.

We have made a prototype of rake-former to the cotton seeder and conducted the comparative laboratory field researches. Experiments were made in the following options: crops of cotton on the smooth field (control); crops on the combs, created along with crops of cotton.

By researches it is established that at crops rake-former provides formation of crests with the required parameters: height of crests was 10,1–10,7 cm, and after seal of seeds of coverer and roll-on – 12,0–13,0 cm. Observations have shown that at crops on crests hit of a rain stream in a seed bed is eliminated and emergence of shoots, development of plants accelerates, re-sowings of cotton is excluded.

At offered way of crops there are created favorable temperature, water and air conditions. Crops of cotton on combs, prepared along with crops provide the optimum temperature of soil at the beginning of April at depth of 4,0–5,0 cm in limits 12–14 °C at humidity of soil of 12–13% and density of soil within 1,04–1,16 gm/cm^3 that contributed to good development of plants. As a result of application of plants seeding offered and developed for it the seeder quantity productivity of cotton has risen to 9,9% in comparison of productivity of cotton seeded on the smooth field increases by 17,8%.

Conclusion. At crops of cotton seeds on combs with simultaneous formation of combs the rises of plants increases, and productivity of cotton increases in comparison with a smooth way of crops.

References:

1. Rudakov G. M. Technological bases of mechanization of cotton sowing.–Tashkent: Fan,– 1974.– 197 p.
2. Mamatov F. M., Kodirov U. Energy-resource saving machine for preparing soil for planting root crops on ridges // European Science Review.– Vienna,– 2016.– P. 125–126.
3. Mamatov F. M., Mirzayev B. S., Chuyanov D. Sh., Ergashev G. H. Unit for new technology of preparation of soil under melon cultures // Potatoes and vegetables.– Moscow,– 2011.– No. 1.– 27 p.
4. Patent of the RUz No. FAP 00473. Device for crops on combs / Sayfi E. H., Duskulov A. A., Isakov A. A., Berdimuratov P. T., Khalilov R. D., Urimbayev O. K. // Official bulletin.– 2009.– No. 7. – 99 p.
5. Ponomarev E. Justification of parameters of working bodies for forming the combs and beds under crops of cotton: Author's abstract. Thesis of candidate of technical sciences.– Tashkent: Yangiyul,– 1985.– 22 p.

Mukhtarov Jurabek Reyimberganovich,
researcher,
Tashkent Institute of Textile and Light Industry
Kulmetov Mirpolat,
Professor,
Tashkent Institute of Textile and Light Industry
E-mail: Sirojiddin0213@bk.ru

INFLUENCE POSITION OF FIBERS ON THE QUALITY OF PRODUCTION IN THE PROCESSES OF YARN PRODUCTION

Abstract: In this paper, the conditional density of cotton fiber bundle quality indicators, tapes and threads at the production stages of the yarn have studied. Research work was carried out at Beruny cotton cleaning plant and sealed fibers under different working pressure of fiber, threads of density 29.4 tex were spun in BD-320 pneumatic spinning machine of the Truetzschler brand. The physical and mechanical properties of the threads obtained as a result of the experiment were determined in testing laboratory "CentexUz".

Keywords: conditional density of pressing, processes, linear density, tape, working pressure force, yarn production.

The linear density of the production of textile industry, cotton fibers in Republic and Europe standards has a dimension in tex or millitex units, which depend on the length of the fiber type. According to modern standards, long-fiber cotton is divided into I–III types, and medium-fiber cotton into IV–VII types, that is, the linear density of the fiber changes in order of increasing type and the length, on the contrary decreases. If density or length of the fiber exceeds the established limits of norms, it goes to the type below as a result reduces the precocious sponge ability of yarn and low-quality products are produced.

Determination of a linear density of cotton fiber is a rather complicated procedure. In this connection, in America, the indicator of micronaire is introduced into the system of certification of cotton fiber, it is determined by the volume of the pribed air through a group of parallel fibers. The air resistance is proportional to the longitudinal section of the fiber. The fiber color according to the American standard is characterized by a degree of Rd (%) yellowness. One of the highest requirements is the color of cotton fiber has always been considered. Therefore, the reception of cotton fiber is carried out only in the day time, the laboratory technicians determine the fiber color by subjective, classroom way and by comparison with special samples.

As a result of increasing the specific density of cotton fiber in the pressing process, the specific tensile load and the shaving length has been decreased which causes an increase in the number of short fibers and mechanical damage of the fibers.

In this regard, the physical and mechanical properties of the products were determined in the HVI 900 SA system, which were degenerated in the processes of producing yarn from compacted fibers, at the enterprise of JSC "Beruni pakhta tozalash" from the baled I-variant 330 kg/m^3, sealed under different operating pressures, The II variant is 375 kg/m^3, the III variant is 425 kg/m^3, the IV variant is 470 kg/m^{3}and the V variant is 550 kg/m^3.

The results of the research work are given in Table-1.

From the analysis of obtained results of scientific research it is evident that with an increase of working pressure of the pressed cotton fiber that is the compressional density of compression, the relative breaking load decreases the upper average length, elongation at break, on the contrary the index of short fibers increases.

Recently as a result of special attention to small business and private entrepreneurship, a number of private enterprises has been increasing. These enterprises for their development and for their products to occupy a worthy place in the world market economy must manufacture their products in

accordance with the established norms. To produce yarn according to the requirements, in yarn production processes it is necessary to control the quality of semi-finished products during the technological process.

Table1.– Impact of the specific density pressing on the change of quality indicators of semi-finished product by the processes of yarn production

Spinning products	Mic Micro-neur	Str Comparative relative load, kg / text	Len Upper middle length dm	Unf The index of uniformity along the length, %	SFI Short fiber index	Elg Elongation at rupture %	Cnt The amount of impurities	Rd Reflection coefficient	+ b Degree of yellowness %
I-variant									
Fiber	4.4	27.9	1.04	82.6	3.9	6.3	17	77.8	8.4
Ribbon	4.4	27.2	1.08	83.1	5.8	5.7	13	78.5	8.3
II-variant									
Fiber	4.4	27.0	1.05	83.3	4.4	6.5	20	78.5	8.8
Ribbon	4.4	26.3	1.12	82.4	6.5	6.0	15	77.4	9.0
III-variant									
Fiber	4.4	26.5	1.03	83.0	4.7	6.4	19	78.9	8.6
Ribbon	4.4	26.0	1.06	82.7	6.4	5.5	16	79.0	8.8
IV-variant									
Fiber	4.4	24.7	1.06	83.5	4.7	6.3	18	75.4	9.1
Ribbon	4.4	23.5	1.03	83.5	6.9	5.1	17	76.2	9.0
V-variant									
Fiber	4.4	24.4	1.02	83.6	5.2	6.4	22	75.0	9.4
Ribbon	4.3	22.8	1.10	83.9	7.9	5.2	19	76.5	9.6

In spinning enterprises cotton bales are subjected to trephination by means of automatic tearing machines and transferred to the next process. In the process of shaking the heads of the bodies of trepation for cotton fibers are repeatedly strong mechanical effects of quality. Product indicators will improve if produced under the condition that the working pressure force is reduced while pressing the fiber and the spinning processes are reduced.

When spinning a high degree of loosening of fibrous products, high-quality yarn for the production of pure and loosened yarn is of great importance. One of the most difficult problems in spinning process of yarns is the task of leveling products by stretching. As a result of pulling the fiber moves in the form of sliding relative to each other and the spreading of their front and rear ends is ensured, which makes it possible to produce an even, strong yarn with a high degree of straightening and leveling the fibers relative to each other [2].

The greater the value of the flow, the better the fiber ends get straighten. In the carding belt the straightness of the fiber is 55%, in the tape from the tape-making machines the straightening is 71–75%, in the roving is 78–80%. The degree of straightening of fibers in the composition of products is influenced by the correct organization of spinning technology processes.

Joint venture "Berunium-teks" of cotton bales I-variant – 330 kg/m^3, II-variant – 375 kg/m^3, III-variant – 425 kg/m^3, IV variant – 470 kg/m^3, and also V-variant – 550 kg/m^3 in a pneumatic spinning machine of the brand BD-320 from the company "Truetzschler" was obtained yarns with a linear density of 29.4 tex. In order to determine the influence of the state of the

fibers on the quality of yarn in the processes of its production samples were taken.

In the processes of yarn production, the unevenness of carding tape and tape from tape-fed machines obtained from cotton fiber with bales of various density of pressing studied. The results of the scientific study are shown in the (table 2).

Table 2. – Effect of the density pressing on the index of the unevenness of tape in the processes of yarn production

№	Technological transition	Quadratic unevenness in linear density,%
I-variant		
1.	Carding process	3.71
2.	Belt Process	3.90
II-variant		
1.	Carding process	3.83
2.	Belt Process	3.95
III-variant		
1.	Carding process	4.70
2.	Belt Process	4.01
IV-variant		
1.	Carding process	4.81
2.	Belt Process	4.12
V-variant		
1.	Carding process	6.15
2.	Belt Process	5.12

From the analysis of obtained results it is seen that with increasing density of pressing of cotton fiber the quadratic non-uniformity in linear density also increases.

In conclusion it was found that with increasing density of pressing of cotton fiber, the quadratic non-uniformity of the tape along the linear density after the combing process increased from 3.71% to 6.15%, after the belt process from 3.90% to 5.12%.

In the process of spinning yarn the thickness of the fibers is of great importance. The properties of the resulting yarn depend on the thickness of the fiber. Fine fibers are obtained from thin fibers with a uniform, stronger yarn. Thin and light fabrics, knitted fabrics are produced from fine yarn. The thinner the fiber the more fibers in the cross section of the yarn of different thicknesses.

At the same time the contact area of the fibers increases with each other and the frictional force increases, as a result, the strength of the filaments becomes higher. Since the relative strength of yarn from thick fibers is low for a thin yarn this indicator is quite weighty.

To obtain normative and qualitative yarn proofers there must be a certain amount of fibers in the yarn cross section.

To obtain yarns with a minimum linear density the linear density of the fiber is crucial.

Hence, in the cross-section of the yarn section of minimum thickness, a number of minimal fibers can be variable. For fibers which thickness is too thin there are also negative sides. For example, during the spinning such fibers are more often entangled nodules are formed as a result of this the appearance and quality parameters of the yarn get worsen.

The most important factor in thickness of the unevenness is yarn. As a result of unevenness twists have been appeared and their appearance is disturbed. With the increase of yarn unevenness the use of the strength of fibers from yarn from tangled yarns is reduced as a result the mechanical properties of yarn deteriorate the discontinuity in the process of knitting and weaving has increased.

In yarn production the mechanical properties of cotton fibers are important in spinning process that is resistance to abrasion, compression, bending and convergence of fibers to each other.

Along with this in the production of high-quality yarn in spinning enterprises, the length, strength,

breaking load and linear density of the fibers are of great importance. The higher the quality of the fiber it is possible to produce yarn that meets the requirements and is in great demand. And for this it is necessary to choose the right raw materials and in cotton ginning enterprises store raw cotton in warehouses to create optimal conditions for drying, cleaning, separating fiber from seeds and cleaning the fiber.

Research work was carried out to produce a high-quality yarn in the market economy. For this purpose from fibers with a bale density: I-variant – 330 kg/m^3, II-variant – 375 kg/m^3, III-variant – 425 kg/m^3, IV variant – 470 kg/m^3, and V- option – 550 kg/m^3, a 29,4 tex yarn was obtained and their physical and mechanical properties were studied in the "CentexUz" laboratory.

The results of scientific research are given in (Table-3).

Table 3.– Effect density of pressing on physical and mechanicalproperties of yarn

The density of pressing, kg/m^3	Linear density of yarn, tex	Square unbalance by linear density,%	Number of twists 1 meter	Quadratic unevenness in the number of torsions, in%
330	24.9	2.4	566	4.6
375	24.5	3.2	642	6.7
425	24.9	3.6	574	6.8
470	24.8	4.8	588	8.4
550	24.9	6.7	622	10.4

In conclusion it was found that with an increase in the density of pressing of cotton fibers from 330 kg/m^3 to 550 kg/m^3 the quadratic unevenness of the tape along the linear density increases from 2.4% to 6.7%, quadratic unevenness by the number of twists from 4.6% to 10.4%.

Hence it was determined that with the increasing pressure force in the process of pressing cotton fiber, the density of pressing has increased resulting in increased quadratic unevenness in linear density and quadratic unevenness of the resulting yarn.

The significance of the difference in average indicators of the quality of the results study was estimated by the Student's test with a confidence level of $P_D = 0.95$.

The significance of the homogeneity of the variances of the results was btained on the basis of Fisher's criteria. For this an estimate of one and the same normal of the variance is. The hypothesis is checked against three competitive hypotheses; Taking into account the correspondence of the random variables U_1 and U_2 to the normal distribution law two variances were compared and evaluated by the criterion F (Fisher) [3].

A special case: $F = \frac{S_1^2}{S_2^2}$, a large dispersion of both in the figure.

Fisher distribution

$$F_R = \frac{S_1^2\{y\}}{S_2^2\{y\}} = \frac{\frac{1}{m_1 - 1}\sum\left(y_{2_1} - \overline{y_2}\right)^2}{\frac{1}{m_2 - 1}\sum\left(y_{2_1} - \overline{y_2}\right)^2}$$

Where: $F_T\{P_D = 1-\alpha; f_1 = m_1 - 1; f_2 = m_2 - 1\}$ was compared with the table value.

$F_R < F_T$ if, $\sigma_1^2 \neq \sigma_2^2$ was assessed by bilateral critical boundaries.

Conclusion

In conclusion we can say that: – that with the increasing pressure pressing the cotton fiber, i.e., a conventional density of pressing, relative load of the upper average length, the elongation at breakage has been reduced, and the index of short fibers on the contrary increased.

– that with the increasing density of pressing of cotton fiber, the quadratic irregularity of the tape along the linear density after the carding process increased from 3.71% to 6.15%, after tape process from 3.90% to 5.12%;

– with an increase in the density of pressing cotton fibers from 330 kg/m^3 to 550 kg/m^3, the quadratic irregularity of the tape along the linear density has increased from 2.4% to 6.7%, quadratic irregularity in the number of twists from 4.6% to 10.4%. The significance of the difference in the average quality indicators was estimated by the Student and Fisher criteria with the probability of reliability $P_D = 0.95$;

– Due to the fact that when the pressure force is increased in the process of pressing cotton fiber, the physical and mechanical properties of the resulting yarn has been deteriorating the optimal options for the density of pressing 470 kg/m^3 were recommended for production.

References:

1. Sengoz N. G., Arslan P. "Application and evaluation of some quality control methods to unevenness measurements of carding slivers" 12th International Conference – Standardization, Prototypes and Quality: A Means of Balkan Countries' Collaboration – 2015.– P. 443–451.
2. Ibragimov Kh. H., Jumaniyazov K. J., Matismailov S. L. and others. "Special spinning technology". Textbook,– Tashkent. Илм-зиё,– 2006.
3. Sevostyanov A. G. "Methods and Means for Investigating the Mechanical and Technological Processes of the Textile Industry – A Textbook for Textile Industry Institutes". Textbook,– M. MSTU them Kosygin,– 2007.– P. 72–75.

Rakhimov Shavkat Turdimurotovich,
Senior teacher,
Tashkent institute of Architecture and Civil Engineering
Tashkent, Uzbekistan
E-mail: raximov.12081979@mail.ru

RESOURCE-SAVING TECHNOLOGY IN MANUFACTURING OF LAYER MIXTURES BASED ON WASTE INDUSTRY

Abstract: the article presents optimal compositions and properties of filling mixes using sand of empty rock, waste processing of marble and slags of copper smelting production.

Keywords: filling mixtures; industrial wastes; sand of an empty rock; marble processing waste; fly ash; slags copper smelting production.

Introduction

Modern development of construction is closely connected with the development and implementation of energy and resource-saving technologies for the production of building materials for different purposes.

In recent years in the mining industry, interest in the problem of the development of ore deposits by systems with the laying of worked-out space has increased. The desire to increase the extraction of minerals from the subsoil, necessity to preserve in some cases the surface or overlying strata over aquifers, and to increase the intensity and safety of mining operations, were the reasons for the rapid development of systems with a laying on local and foreign mines [1, 35–37].

However, application area of the systems with the laying of the worked-out space is not limited only by technical necessity. There are certain mining and geological conditions for the exploitation of fields, in which even with the current level of technology and production technology, the systems with a laying are economically most profitable for the Republic of Uzbekistan.

In Russia, the Ukraine, Uzbekistan, Azerbaijan and other countries, the waste generated in the extraction of marble and granite slabs is used to produce crushed stone, rubble stone, marble chips and flour, artificial mosaic slabs, various wall materials, fine aggregate for mortars and concretes [2, 66–71].

In the production activity of Almalyk Mining and Metallurgical Plant waste is generated, which must be utilized of and created special dumps for their storage. Transportation of waste and their storage significantly affects the cost of mining of ore materials and finished products. At the same time, important issues concern the protection of the environment and the alienation of dozens of acres of arable land to create dumps.

The long-term scientific and technical cooperation of the Almalyk Mining and Metallurgical Plant with the Tashkent Institute of Architectural and Civil Engineering in resolving the issue of the rational use of the plant's waste for use in mortar mixes over two decades has made it possible to make significant progress in solving this problem. At present, in connection with the completion of the marble quarry, a problem has arisen to provide the plant with raw materials for the preparation of filling mixes [3, 10–14].

Objects and methods of research. For the development of new optimal compositions of filling mixtures, the following types of waste generated at the plant itself were selected and studied:

– sand of an empty rock, obtained at a crushing plant at the Kauldy mine after extraction of minerals. Limit size of sand is 5 mm;

– copper smelting waste;

– waste processing of marble formed from the activity of the marble workshop of the plant. This additive is used as a plasticizing and reducing abrasive properties of gritty sand, since transportation of filling mixes is carried out through pipes to the place of packing in the worked out space.

It should be noted that the sand of waste rock, copper smelting waste and marble processing waste do not require additional processing and are applied in a natural way.

Purpose of the task. The development of optimal mixtures of filling mixtures was carried out using the mathematical method of experiment planning, which was verified by the calculation and experimental method, with further refinement in the preparation of trial mixtures in laboratory conditions with the testing of the actual rheological and physico-mechanical characteristics of the filling mixtures and solidified samples [4, 232–242].

The test procedure for samples of cube-filling mixes on the basis of waste with dimensions of the faces of 7 and 10 cm corresponded to the requirements of the codes GOST 10180–2012 "Testing hardened concrete" required for ordinary mortars. The test period for the sample cubes was 28 days. Results of the study. The results of testing of filling mixtures using waste grit sand, marble processing waste and copper smelting slag are given in tables 1, 2 and 3.

Table 1.– Optimum compositions of filling mixes with application sand of an empty rock for the Kauldy mine

Composition numbers	Quantity of materials per 1 m^3 of the mixture, kg			Mobility of the mixture, sm	Average compressive strength, MPa
	Portland cement grade 400	Sand is an empty rock, 5mm or less	Water		
I	100	1400	280	14–16	2.5
II	150	1400	280	14–16	4.0
III	200	1400	280	14–16	8.8
IV	250	1400	280	14–16	9.7
V	300	1400	280	14–16	13.5

The most common waste for preparation of filling mixes in our republic can be considered as fly ash from electrostatic precipitators of thermal power stations, waste from marble quarries, sand of empty rocks and copper smelting slags.

The chemical composition of the marble waste used in the composition of the mortar mixes is represented by the content of oxides in% by mass: SiO_2–30.5; Al_2O_3–18.4; CaO – 18.3; Fe_2O_3–15.4; MgO – 4–1.5; $Na_2O + K_2O$ – 0.5; SO_3–3.8; PPP – 0.10; the insoluble residue is 0.32%.

Table 2.– Optimal compositions of filling mixes with the use of grit sand and marble waste for the Kauldy mine

Composition numbers	Quantity of materials per 1 m^3 of the mixture, kg				Mobility of the mixture, sm	Average compressive strength, MPa
	Portland-cement grade 400	Sand is an empty rock, 5mm or less	Waste processing of marble	Water		
I	100	1000	400	300	14–16	1.0
II	150	1000	400	300	14–16	1.5
III	200	1000	400	300	14–16	6.0
IV	250	1000	400	300	14–16	8.1
V	300	1000	400	300	14–16	11.5

Table 3.– Mixture composition

Components	Starting materials for 1m^3 of the mixture, kg			
	Compositions:			
Cement	500	450	400	375
Sand	1500	1500	1500	1500
Water	250	250	250	250
Copper-smelting slag	0	50	100	125
Average compressive strength, MPa	18.2	17.05	15.1	11.2
Average bending strength, MPa	3.02	4.45	3.93	3.63

Waste from the marble quarry after treatment on the classifier had the granulometric composition presented in (Table 4). The same table shows the grain composition of the mountain sand. When developing the technology of laying mixes in the developed space, two schemes for erecting artificial massifs were selected and tested:

– the introduction of artificial massifs using a homogeneous stowage with a different-strength (two-three-layer) filling mixture;

– the introduction of artificial massifs using a combined (rock-hardening) stowage.

Table 4. – Granulometric composition of waste from marble quarry and mountain sand

Name	Private balances on sieves,%						Passed through a sieve of 0.14 (%)	The amount of clay and dust particles, (%)	The size module
	5	2.5	1.25	0.65	0.315	0.14			
Waste from a marble quarry	0.15	15	15	25	16.5	18.5	9.5	07–09	1.7–1.9
Sand mountain	1.5	12.0	9.0	19.5	15.5	14.0	28.5	1.5	1.0–1.2

The essence of the technology for erecting a multifaceted lining array is as follows. In the cleaning chambers (shaft of the shaft), the lower part is first laid to a height of 1.5 to 3.0 m with the composition of the packing mixture, providing a standard strength of up to 1.0 MPa, the last layer (the third layer) is initially laid on the top layer to a height of at least 0, 5 m composition, providing a standard strength of 3–4.5 MPa. On average, the porosity of the filling mixtures is 18–21%.

The density of the hardening tab was determined by weighing standard samples of a cubic shape with the dimensions of the face of 7 and 10 cm. It was from 1750 kg/m^3 to 1830 kg /m^3. When mixing the components of the backing mixture, you should follow the sequence of introducing them into the mixer. Preliminarily prepare the cement – sand mixture by thoroughly mixing them with the addition of waste processing marble and slag copper smelting production. With continuous stirring, the mixture is moistened with an estimated amount of water, until the mobility is 14–16 cm.

This mobility ensures its transportability with a hydro-mass method of delivering the mixture through pipelines to the place of packing in the worked-out space.

Conclusions. The analysis of the obtained data allows us to draw conclusions about the expediency of further investigation of the plant's waste for filling mixes, as this expands the range of used wastes, reduces the cost of extracted ore and finished products, increases the strength of the mortar mixes, and improves the ecological situation in the region by eliminating dumps.

References:

1. Gaziev U. A., Rizaev H., Orujov U., Abdurazakov A. Resource saving in the preparation of filling mixes from industrial wastes // Materials of the Republican scientific and technical conference "Resource–saving technologies in construction",– Tashkent,–2006.– P. 35–37.
2. Gaziev U. A. Filling mixtures for filling the worked out space in the mines using industrial waste // International Scientific and Practical Conference "Innovation-2013",– Tashkent,– 2013.– P. 66–71.
3. Gaziev U. A., Shakirov T. T., Rakhimov Sh. T. Compositions, preparation, transportation and laying of filling mixes using sand of empty rock // Almalyk–Tashkent,– 2012.– P. 10–14.
4. Gaziev U. A. Waste industry in the production of building materials and products // Subject,– Tashkent,– 2015.– P. 232–242.

Siddikov Ilkhomjon,
d.t.s., professor, University in Tashkent information technology,
Abubakirov Azizjan,
Yuldashev Azimjon,
Babakhova Gulziba,
Assistants, Karakalpak State university in Nukus,
E-mail: aziz1306@mail.ru
Xonturaev I. M.,
Mirzoev N. N.,
University in Tashkent information technology

METHODOLOGY OF CALCULATION OF TECHNO-ECONOMIC INDICES OF APPLICATION OF SOURCES OF REACTIVE POWER

Abstract: At present, the sources of reactive power are widely used in telecommunication facilities that have windings (electric motors, transformers, etc.) in the design. To manage these sources, necessary to introduce new technical means and elements, including microprocessor blocks. Combined control of reactive power sources and voltage regulation with the help of a microprocessor-based unit of electric receivers of telecommunication objects turns out to be technical and economical not only for reactive power sources, but also for lowering transformers of the power supply system.

Keywords: telecommunications, electric motors, transformers, reactive power sources, microprocessor control units.

Сиддиков Илхомжон,
д.т.н. профессор, Ташкентский информационный технологический университет
Абубакиров Азизжан,
Юлдашев Азимжон,
Бабахова Гулзиба,
Ассистенты, Каракалпакский государственный университет
E-mail: aziz1306@mail.ru
Хонтураев И. М.,
Мирзоев Н. Н.,
Ташкентский информационный технологический университет

МЕТОДИКА РАСЧЕТА ТЕХНИКО-ЭКОНОМИЧЕСКИХ ПОКАЗАТЕЛЕЙ ПРИМЕНЕНИЯ ИСТОЧНИКОВ РЕАКТИВНОЙ МОЩНОСТИ

Аннотация: В настоящее время источники реактивной мощности широко используются в телекоммуникационных объектах с обмотками (электродвигателями, трансформаторами и т. Д.)

В конструкции. Чтобы управлять этими источниками, необходимо ввести новые технические средства и элементы, включая микропроцессорные блоки. Комбинированное управление источниками реактивной мощности и регулированием напряжения с помощью микропроцессорного блока электрических приемников телекоммуникационных объектов оказывается технически и экономичным не только для источников реактивной мощности, но и для снижения трансформаторов системы электропитания.

Ключевые слова: телекоммуникации, электродвигатели, трансформаторы, источники реактивной мощности, микропроцессорные блоки управления.

Introduction

Receivers and converters of electrical energy that have windings in their construction (power converters, transformers, electric motors, etc.) consume not only active power, but also reactive power. By the transmission of electricity through the electrical networks of the power supply system (PSS) of reactive power (RP), there are losses of active power in them, for which the consumer has to pay. An alternative to an additional payment for electricity is the installation of reactive power sources (RPS) [1, 2].

At most facilities with high-voltage electrical equipment, reactive loads are compensated by overexcitation of existing synchronous compensators (SC) with a high voltage (6–10 kV) or by placing in the electrical network of PSS capacitor units – RPS with high-power (HPC) and low (LPC) voltage [3].

According to carried out analysis, the loss of electricity in the SC, due to the generation of RP by them, is minimal in the operation of electric receivers with a small consumption of RP. The growth of RP output is accompanied by a sharp increase in electricity losses, primarily heating the SC. Studies have also shown that the use of any power, as well as high-voltage SCs with a power below 1600 kV, is uneconomical in low-voltage systems [3, 6, 7].

It should be noted that even with excess RP of high-power high-voltage SCs and generators that allows to observe contractual parameters with the electricity supplier, the consumer is not immune from unjustified losses of the latter. The remark is typical especially for electrical loads with extended high voltage electrical networks and a large number of reducing supply transformers (T) 10 (6)/0.4 kV of PSS objects.

Main part

As experience of operation of electric networks and electric receivers of objects of PSS has shown, cosine capacitor units are more widespread RPS for them. The power of a reactive power source is proportional to the square of the voltage, frequency and its capacitance [2, 4]:

$$Q_k = U^2 \cdot \omega \cdot C, \qquad (1)$$

where: Q_k – reactive power of the capacitor unit;

U^2 – voltage of the electrical network TK

ω – angular frequency;

C – capacity of the capacitor unit.

The use of embedded microcomputers in a block of microprocessor-based combined automatic control of reactive power sources makes it possible to reduce the breakdown damage of electric and electrical equipment and to improve the quality of generated electricity.

Connection of capacitor units for compensation of reactive power at different voltages of PSS objects is shown in (Fig. 1).

For an example (Fig. 2), we determine the additional losses of the active power ΔP in T and cable lines of PSS with a length of 400 m with a cross section of 50 mm^2.

Suppose, before the installation of the LPC at the PSS facility, there were loads:

$P = 700$ kV $Q_1 = 500$ кVAr $S_1 = 860$ kVA , load factor $K_{31} = 0{,}86$ maximum power loss time: $\tau = 5000$ h.

After the installation of the LPC, the load of the PSS facility will have the following values:

$$Q_2 = 100 \text{ кVAr } S_2 = 707 \text{ kVA}, K_{32} = 0{,}707$$

The current flowing through the electrical networks of the PSS facility is determined as follows:

$$I_1 = \frac{S_1}{U\sqrt{3}} = \frac{860}{(10{,}5 \cdot 1{,}73)} = 47\,A; \qquad (2)$$

$$I_2 = \frac{S_2}{U\sqrt{3}} = \frac{707}{(10{,}5 \cdot 1{,}73)} = 39\,A. \qquad (3)$$

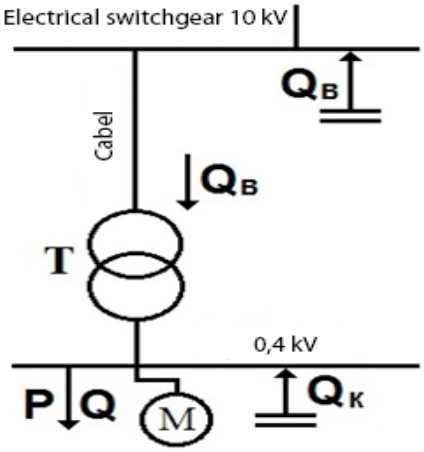


Figure 1. Scheme of capacitor units for compensation of reactive power at different voltage levels of electrical networks

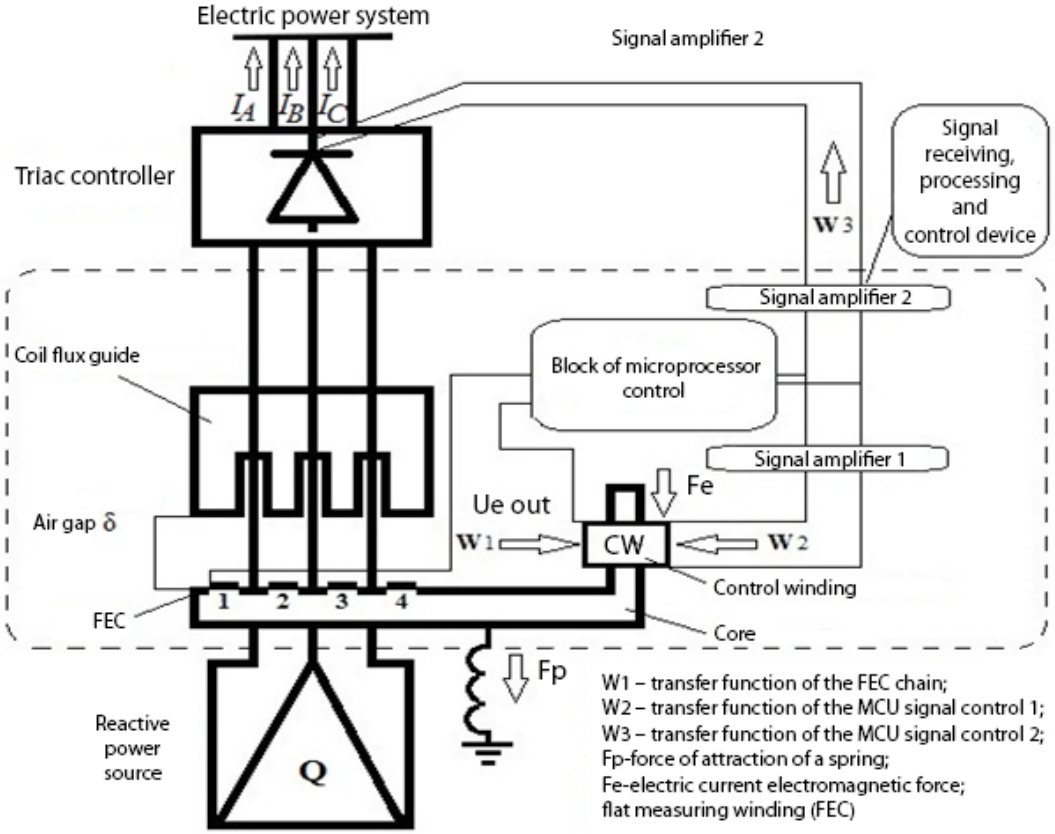


Figure 2. Scheme of connection of a microprocessor unit for combined control of reactive power sources

Additional power losses in the HV cable:

$$\Delta P_K = 3R_K\left(I_1^2 - I_2^2\right) = 3 \cdot 0{,}248(472 - 392) = 0{,}52 \text{ kV} \quad (4)$$

Additional power losses in T ΔP_T of PSS object depend on its load losses: (ΔP_{K3})

$$\Delta P_T = \Delta P_{K3}\left(K_{31}^2 - K_{32}^2\right) = 10{,}6(0{,}862 - 0{,}7072) = 2{,}54 \text{ kV} \quad (5)$$

Total power losses:

$$\Delta P = \Delta P_K + \Delta P_T = 0{,}52kV + 2{,}54kV = 3{,}06kV. \quad (6)$$

The energy savings for PSS facilities for the year will be:

$$\Delta Э = \Delta P \cdot \tau = 3{,}06 \cdot 5000 = 15300 \text{ kV} \cdot \text{h}. \quad (7)$$

The increase in the capacity of *T* and the cable lines of PSS objects can be taken into account with corresponding shares of their cost.

For power transformer *TS*:

$$\Delta K_T = K_T(S_1 - S_2)/S_1 = \\ = 500000 \cdot (860 - 707)/860 = 88953 \text{ in total.} \quad (8)$$

For cables with a long-lasting current:

$$I_Д = 130A$$

$$\Delta K_K = K_K(I_1 - I_2)/I_1 = 62000 \cdot (47 - 39)/130 = 3815 \quad (9)$$

Payback period of the LPC:

$$T_{OK} = \left(K_{KY} - \Delta K_T\right)/\left(C_{cp} \cdot \Delta Э\right) = \\ = \frac{\left(160000 - 88953 - 3815\right)}{\left(0{,}77 \cdot 15300\right)} = 5{,}7 \text{ years} \quad (10)$$

$$Indicatorofeffectivness = \left(\frac{T_{OK\,HOPM} - T_{OK}}{T_{OK\,HOPM}}\right) \cdot 100\% = \\ = \left(\frac{8 - 5{,}7}{8}\right) \cdot 100\% = 28{,}75\%. \quad (11)$$

The indicator of the effectiveness of this measure is determined as follows:

Ток норм – T current norm

Ток – Tok

The connection scheme of the microprocessor-based combined control unit (MBCCU) of the RPS is implemented on the basis of a microcomputer and is presented in (Fig. 2) [4–5].

The developed algorithm and methodology for calculating the technical and economic indicators of the application of the MCU in the RPS application schemes gives a pessimistic payback period for the use of RPS in PSS facilities.

The obtained value of the payback period, due to the improvement of the quality of electric power – ensuring the nominal voltage in the power consumption units of the PSS objects (i.e. increasing the service life of electrical equipment, reducing power losses in electrical networks, etc.), actually turns out to be less than its standard value ($T_{ок\ норм}$) = 8 years) [2, 6].

Conclusion

1. The specific value of the HPC is half that of the LPC. However, the constant component of costs for HPC is higher due to the greater cost of connecting them to the electrical networks of PSS objects.

2. The parameters of the regulated LPC – the number and power of the control stages, the power of the unregulated part – are determined by the daily schedule of RPS consumption by electric receivers.

3. Combined control of reactive power sources and voltage regulation with the help of RPS proves to be effective only for LPCs, included in the large inductive resistance of the step-down transformers of the PSS objects.

4. To change the voltage by one percent of the nominal value it is necessary behind the transformer 1000 kVA, change the RPS to 180 kVAr , behind the transformer 1600 kVA-240 kVAr , behind the cable line 0,38 kV , long 100 m- 240 kVAr , behind the cable line 10 kV 1000m 12500 kVAr long.

According to undertaken studies, the proposed method of selection and application of reactive power sources and microprocessor combined control allows them to reduce by 28.7% the payback period of the implemented technology and the elements of electricity consumption management and to increase the efficiency of energy saving measures implemented in the PSS objects.

References:

1. Allaev K. R.– Energy of the World and Uzbekistan-Tashkent: Molia – 2007.– 388 p.
2. Allaev K. R., Siddikov I. H., Holiddinov I. H., Abdumannonov A. A., Hasanov M. Y. Algorithm for calculation of excess technological power consumption // State Patent Office of RUz. Certificates Nr. 20140089, 17.12.2014.
3. Borodenko V. A. Resource-saving as the main principle of creating power automation devices // Vestnik NIA RK.– M.,– 2006.– No. 2. – 12 c.
4. Regulations on the order of organization of work on reactive power compensation // Teshabaev B. M., Youssoupaliev M. M., Saliev A. G., Siddikov I. H., Umarov F. U. / Appr. No.– 1864 от 10.10.2008. Ministry of Justice of Rep. Uz. Tashkent, SI Uzdavenergonazorat.– 2008.– 24 p.
5. Krontiris E., Hanitch R., Paralika M., Rampias I., Stathais E., Nabe A., Kadirov T. M., Siddikov I. Kh., Energy Management raining in Uzbekistan // Thefinalreport of the Project ECTJEP-10328–97. TU – Berlin (Germany), TEI-Athens (Athens, Greece), TashGTU (Tashkent, Uzbekistan),– 1997–2001.– 234 p.

Tillaev Mamjabbar Tillaevich,
Professor,
Yunusov Saloxiddin Zununovich,
Doctor, of Technical Sciences,
Eshmurodov Dilmurod Dusmurod o'g'li,
Researcher,
Tashkent Institute of Textile and Ligh
Industry Berdanov E. X.,
city. Tashkent. Uzbekistan
Sirojiddin0213@bk.ru

PECULIARITIES OF PROCESSING MEDIUM-FIBER RAW COTTON ON SAWED GINS OF A NEW FORM OF WORKING CHAMBER

Abstract: The article presents calculations of the choice of the shape of the working chamber for saw gin, for this purpose, a block diagram of the algorithm and a program for determining the tangential forces, as well as the interaction between the raw roller and the saw cylinder, and the dynamics of the movement of the raw roller in the working chamber of the gin saw.

Keywords: saw gin, working chamber, ginning, raw roller, saw cylinder.

Analytical studies of saw gin and the influence of the rotation speed and the force of interlayer pressure of the raw roller but qualitative and quantitative indicators of the ginning process are carried out. And they, in turn, depend on many factors: composition, mass, density, fibrousness and the number of exposed seeds of a raw roller. These factors largely depend on the shape of the working chamber [1].

To solve the pasted problem, it was necessary to study the structure of a raw roller. The material of the raw roller is a structural heterogeneous multiphase elastic medium consisting of raw cotton, partially gym fibers and seeds, as well as bare seeds and other small fractions.

In the bonding zone, the saw teeth of the saw cylinder interact with the pulp and a process takes place to capture and separate the fiber from the seeds. This zone is conditionally called the zone of contact between the saw cylinder and the raw roller. It can in turn be divided into zones: strong and weak contact, where the particles of the mass of the raw roller are hooked with the saw teeth of the saw cylinder and have the same speed with it. Further, the particle lags behind the speed of rotation of the saw cylinder by increasing the friction of the cotton against the walls of the working chamber.

On the basis of theoretical studies, a scheme of interaction between a raw roller and a saw cylinder is compiled according to the generalized mechanical-mathematical model of the dynamics of the movement of a raw roller in the working chamber of the saw gin (Fig. 1).

To find the distance "a" it is necessary to determine the chords at the intersection of two circles. For this, solving together the system of equations, we determine the coordinates of the intersection of circles.

$$x^2 + \gamma^2 = \tau^2$$

$$(x+138)^2 + (y-256)^2 = \tau_2^2$$

We introduce the following notation:

$$K_1 = \frac{512}{276} \quad K_2 = \frac{\tau_2^2 - \tau_1^2 - (138^2 + 256^2)}{276}$$

As a result we have:

$$x = K_1 y + K_2$$

$$\gamma_{1,2} = \frac{-K_1 K_2 \pm \sqrt{(K_1 K_2)^2 - (1+K_1^2)(K_2^2 - \tau_1^2)}}{1+K_1^2}$$

$$\gamma = \min(\gamma_1, \gamma_2)$$

$$\alpha = \frac{\pi}{2} - \arcsin\frac{y}{r_1}$$

$$a = \alpha\tau_1$$

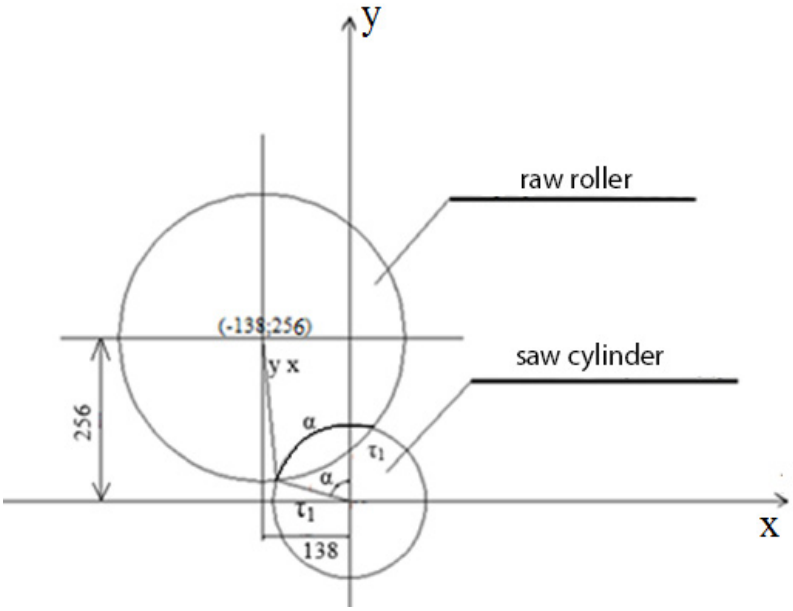


Figure 1. The coring of the raw roller

Based on the results obtained, the main parameters of the gin working chamber are determined, which ensure an increase in the speed of rotation of the raw roller. Where is the designation: – the angular velocity of the saw cylinder 1 rad/s; – angular velocity of a raw roller, m.rad/s; – radius of the inner surface of the mass of the raw roller, m; P is the force of pressing the raw roller against the saw cylinder, H; a-length of the contact arc, m; Qz is the tangential force, H; R is the reduced radius, m; Rb-radius of the saw cylinder, m; Rb is the radius of the raw roller, m; Ex-reduced elastic modulus, N/m^2; E1-modulus of elasticity of raw cotton, N/m^2; E2-modulus of elasticity of cotton seeds, N/m^2; $\nu 1$, $\nu 2$ – Poisson's ratio $(0 < \nu c < 0.5)$; q-distributed force, N/m; $p0$ is the initial distributed force of pressing the raw roller to the saw cylinder, N/m; N-power of the saw cylinder, W; n-frequency of rotation of the saw cylinder, min-1; ξx-relative slip, without dimension; V_B-speed of the raw roller, m s; Vb – speed of the saw cylinder, m/s; $f1$.– coefficient of friction, pi – pi, Kx – base modulus N/m, $K1$ = K2 – modulus of the basis of nahmolnogo compression, N/m; $K1 = K2$ – modulus of the base of tangential shear, N/m; x – contact zone of the saw cylinder and circe roller, m; d – capture area, m; c – prediction zone, m; ex is the unit vector; qx is the shear stress, N/m; m is the moment acting on the social cylinder of the saw cylinder on the circe roller, N/m; α is the angle between the vertical line of the saw cylinder and the radius, r_1, T_x ; – the atomic energy of the captured fiber, J; Based on the results of numerical studies, a graph is plotted (Fig. 2.) – the forces of pressing the raw roller to the saw cylinder and the working zone of the sawing arc, depending on the radius of the curvature of the working chamber [2].

It can be seen from the graph (Fig. 2) that with the growth of the radius of curvature of the working chamber, the working zone of the sawing arc "a" grows, and the force of pressing the "R" of the raw roller to the saw barrel decreases, which is associated with a decrease in the density of the raw roller and an increase in its elastic properties.

The change in the radius of the apron, the frontal bar and the opening of the working chamber by 185 mm, the radius of the upper part of the standard grate corresponding to this radius, and the distance between the vertical axis of the working chamber and the saw cylinder by 138 mm instead of 108 mm leads to a better grip of the saw tooth, the force from the side of the saw cylinder is better transmitted, thereby easily overcoming the rotation of the rotating mass of the raw roller, which in turn increases the speed of rotation of the raw roller and simultaneously reduces it density.

The modified version of the saw gin beats was installed at the Bukino cotton plant. At the Bukinsky cotton plant, there were 4 gin of the brand DPZ-180. One new genre of the working chamber was installed on one gin. Only the raw cotton of the breeding variety C-6524 was named in the plant, other raznovevinety was not cleaned according to the scheme for: $1/1 + V/3$ varieties

according to the following technological process: 2SB-10 + dryer + ТХЛ-6005 soft transportation + 1ХК cleaner + cotton + УХК cotton cleaner 1ХК cotton cleaner + СС-15А separator + ШПХ distribution auger + PD-feeder gin + ДП3-180 gin + 1VPU fiber cleaner + 5KV condenser + YES8237 pressed on the press fiber.

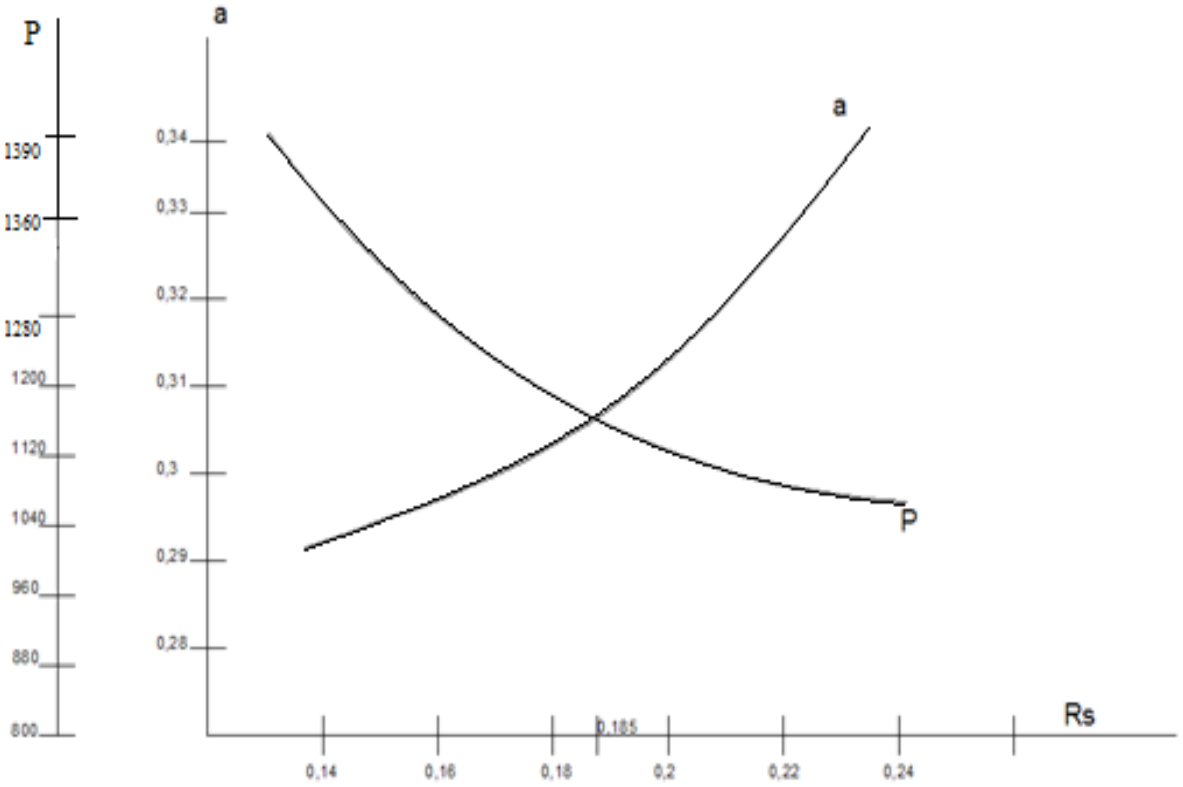


Figure 2. Radius of curvature of the working chamber

On both gins, an examination was carried out in 3 × repeaters and an average value was obtained. All equipment was both in production and worked without changing. The beams obtained shaped fibers and seeds of moisture and the amount of defects and other indicators.

The leveling of the two gin showed that the raw cotton of 1/1 grade showed. That the production of gins 10.6 kg of fiber per hour is 11.8 kg of fiber per hour, the grade and other items in the wire are 0.40% (abs) lower, the mechanical damage of seeds is 1.2% depended, the total fiber content depended on 0.1%.

The proposed working chamber has changed its configuration, the internal radius does not give a 1.5% increase in the speed of the raw fiber rotation.

References:

1. Tillaev M. T., Khodzhiev M. T. "Features of the saw jinning process". T. Fan,– 2005.– 156 p.
2. Tillaev M. T. "Examination of the working chamber of saw gin" // Zh.problemy textiles.– T; – 2012.

Uzbekov Mirsoli Odiljanovich,
Fergana Polytechnic Institute
Senior Researcher,
the Faculty of Energy
Abbasov Yorkin Sodikovich,
Fergana Polytechnic Institute
Doctor, of Technical Sciences,
the Faculty of Construction
Omonillayev Boburjon Ilxomjon o'g'li,
Student, the Faculty of Energy
E-mail: education.fer@mail.ru

THEORETICAL ANALYSIS OF THE CHARACTERISTICS OF THE AIR FLOW WHEN FLOWING METAL SHAVINGS IN THE SOLAR AIR HEATERS

Abstract: The article is devoted to the determination of the thermal and hydraulic characteristics of the airflow when flowing of metal shavings used as an absorber of a solar air heater. The thickness of the pulse loss for the angular distance $\frac{\pi}{4}$, the thickness of the displacement, the thickness of the boundary layer, the local frictional stress on the surface of the metal shavings are calculated.

Keywords: energy, renewable energy, solar energy, useful heat, solar air heater.

Given that in recent years, the development of the industry has led to a decrease in fuel and energy resources and the deterioration of the environmental situation throughout the world, there is a great demand for the use of renewable energy sources (RES) [1]. Among solar installations that convert solar radiation into useful heat, due to the simplicity of design, ease of operation and high efficiency, solar air heaters (SAH) are widely used for drying agricultural products and air conditioning systems [2].

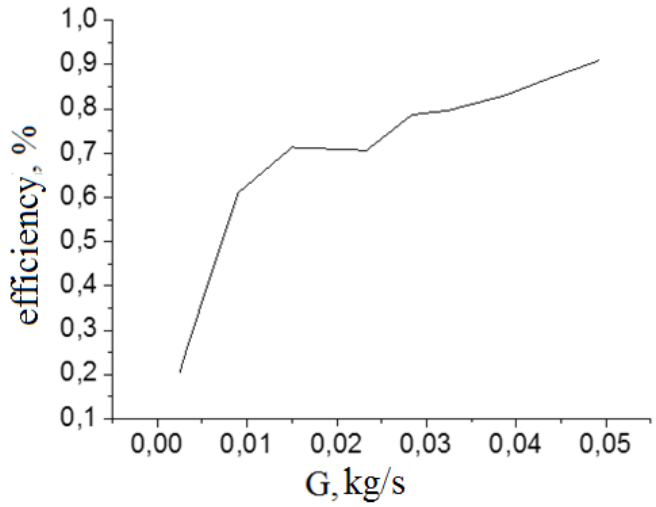


Figure 1. Dependence of efficiency on the mass airflow of the solar air heater with the absorber of metal shavings

At present, in many countries, in institutions such as the Indian Institute of Technology of Delhli, National Institute of Hamirpur, Tamkang University, University of Tanta, Universiti Kabangsaan Malaysia, Alternate Hydro Energy Centre, Xi'an jiaotong University, Shanghai jiao Tong University, King Mongkuts University of Technology Thonburi is conducting an active study to improve the efficiency of SIH indicators. A great contribution was made by such scientists as Beckmann, Duffy, Kazajan, Olimpiev, Avezov R. R. Avezova N. R. E. S. Abbasov, Garg H. P., Saini J. S., Sopian K., Umurzakova M.A [3].

In works [4] numerous designs of SAH consisting of absorbers by various materials are considered. Disadvantages of such solar collectors is a small area of contact of air with heated surfaces.

For example, in [5, 6], small metal shavings were used to heat the air flow. In addition, despite many experimental and theoretical studies [7], the thermal and hydraulic characteristics of the airflow remain uncharted when flowing over metal shavings.

In work [8], a high efficiency of a solar air heater was obtained: the body, a transparent coating, a V-shaped beam absorber, a metal mesh, an absorber of metal shavings, a tube for supply and removal of the coolant.

Experimental studies have shown that the transverse flow of metal shavings by air occurs analogously to the airflow of a cylinder (see Figure 2).

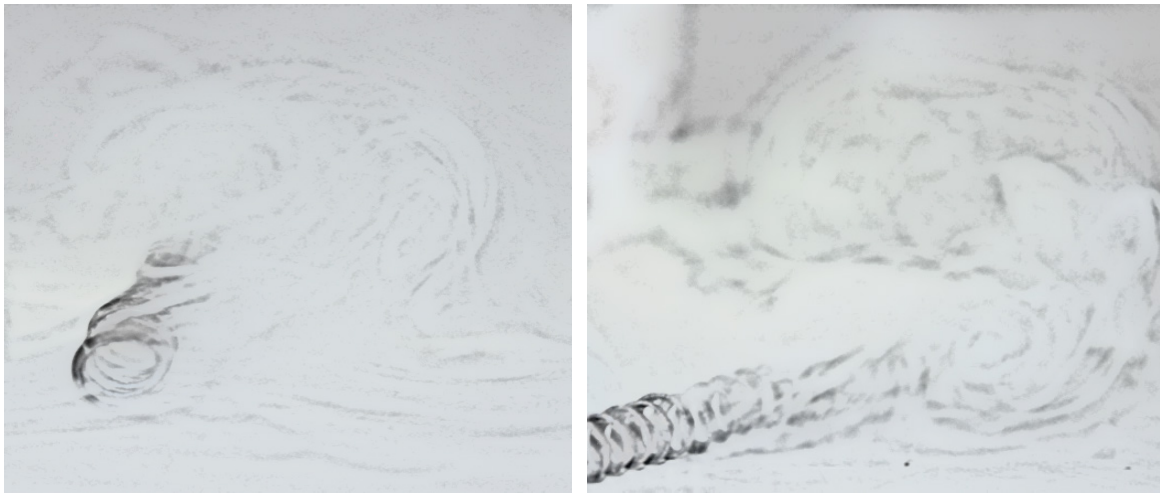


Figure 2. Visualization of the flow of airflow of metal shavings

Consequently, to calculate the thermal and hydraulic characteristics of the airflow in when flowing flow of metal shavings, we use the methods of boundary-layer theory [9].

Using experimental data [8] on the flow of metal shavings (See Table №. 1).

Table 1.– Experimental data of a solar air heater with an absorber from metal shavings

№	$G, kg/s$	t_{st}, °C	t', °C	t'', °C
1	*2*	*3*	*4*	*5*
1	0.0025	92	37	90
2	0.0033	91	37	88
3	0.0061	86	37	83
4	0.009	84	37	81
5	0.015	73	37	68
6	0.0233	63	37	58
7	0.0284	60	37	56
8	0.0323	57	37	53
9	0.0387	55	37	51

1	*2*	*3*	*4*	*5*
10	0.0438	53	37	50
11	0.0493	52	37	49

Thermophysical parameters of the airflow were determined by the following procedure

$$\frac{t'+t''}{2}=t_a \quad (1)$$

t_a – the airflow temperature was determined as the mean air temperature at the inlet t' and the outlet t''.

In addition, the temperature in the boundary layer on the shaving t_v was determined from the formula

$$\frac{t_a+t_{sh}}{2}=t_v \quad (2)$$

Where t_{sh} – is the shaving temperature.

Assume that the velocity of the potential flow varies according to the theoretical law

$$U=2u_0 sin\varphi \quad (3)$$

Taking into account the fact that the flow past the shaving is gradient, we use the Karman-Pollausen method developed for the hydrodynamic boundary layer.

1) Determine the value of the Reynolds criterion

$$Re_d=\frac{u_0 d}{v} \quad (4)$$

The physical constants here and below are selected from the book [9] on the temperature of the incoming air.

2) We compare the obtained value of the Reynolds criterion with the critical

$$Re_d < Re_{dup}=(2\div 3)\cdot 10^5 \quad (5)$$

Consequently, the boundary layer to the separation point and at the angular distance $\frac{\pi}{4}$ is laminar.

3) We determine the thickness of the momentum loss for the angular distance $\frac{\pi}{4}$ by the formula

$$\frac{(\delta^{**})^2}{v}=\frac{0,47}{U^6}\int_0^x U^5 dx=\frac{0,47}{(2u_0 sin\varphi)^6}\int_0^x (2u_0 sin\varphi)^5 dx \quad (6)$$

but the distance along the arc of the circle $x=R\cdot\varphi=R\cdot\frac{\pi}{4}$ (R is the radius of the metal shavings), therefore

$$\frac{(\delta^{**})^2}{v}=\frac{0,47(2u_0)^5}{(2u_0)(\sin\varphi)^6}\int_0^{\frac{\pi}{4}} sin^5\varphi d(R\varphi)= =\frac{0,47R}{(2u_0 sin\varphi)^6}\int_0^x sin^5\varphi d\varphi \quad (7)$$

We calculate the integral

$$\int_0^{\frac{\pi}{4}} sin^5\varphi d=\int_0^{\frac{\pi}{4}} sin^5\varphi d(sin\varphi d)=-\int_0^{\frac{\pi}{4}} sin^4\varphi d(cos\varphi)= =\int_0^{\frac{\pi}{4}}(1-cos^2\varphi)^2 d(cos\varphi)=2,67\cdot 10^{-2} \quad (8)$$

Then

$$\frac{(\delta^{**})^2}{v}=\frac{0,47R}{(2u_0 sin\varphi)^6} \quad (9)$$

Location

$$\delta^{**}=\sqrt{\frac{0,47R}{(2u_0 sin\varphi)^6}\cdot v} \quad (10)$$

4) We determine the second form of the Karman – Polgaouzon parameter by the formula

$$\aleph=\frac{(\delta^{**})^2}{v}\cdot\frac{dU}{dx}=\frac{(\delta^{**})^2}{v}\cdot\frac{d(2u_0 sin\varphi)}{d(R\varphi)}= =\frac{(\delta^{**})^2}{v}\cdot\frac{2u_0}{R}cos\varphi \quad (11)$$

5) We select from [9] the second form of the parameter $f_1(\aleph), f_2(\aleph)$ and the first form parameter. After integration, we have

$$\lambda=1;\ f_1(\aleph)=2,508;\ f_2(\aleph)=0,252.$$

6) Determine the thickness of displacement according to equation

$$\delta^{*}=\delta^{**}.\ f_1(\aleph)=\delta^{**}\cdot f_2(\aleph),\ m \quad (12)$$

7) Determine the local frictional stress on the surface according to equation

$$\tau_0(E)=\frac{\mu U f_2(\aleph)}{\delta^{**}}=\frac{\mu(2u_0 sin\varphi) f_2(\aleph)}{\delta^{**}},\ n/m^2 \quad (13)$$

8) We determine the thickness of the boundary layer from equations

$$H^{*}=\frac{\delta^{*}}{\delta}=\frac{3}{10}-\frac{\lambda}{120}=\frac{3}{10}-\frac{1}{120}=0,2917 \quad (14)$$

and

$$\delta=\frac{\delta^{*}}{H^{*}},m \quad (15)$$

Table 2. – Results of calculations

$u_0\ 10^{-4}$	Re_d	$\frac{(\delta^{**})^2}{\nu}\ 10^{-4}$	$\delta^{**}\ 10^{-4}$	$\aleph\ 10^{-4}$	$f_1(\aleph)\ 10^{-4}$	$\tau_0(E)\ 10^{-2}$	$\delta\ 10^{-4}$
440	293	100	3.88	124.43	9.73	0.0852	33.3
570	380	77	3.41	124.12	8.55	0.1256	29.3
1070	710	41	2.49	124.06	6.24	0.3230	21.4
1580	1580	28	2.05	124.89	5.14	0.5794	17.6
2630	1750	16	1.59	124.88	3.98	1.2436	13.6
4090	2720	10.8	1.27	124.92	3.19	2.4213	10.9
4980	3320	10.6	1.26	124.95	3.16	2.9716	10.8
5670	3780	7.8	1.08	124.91	2.71	3.9472	9.3
6790	4520	6.5	0.988	124.81	2.48	5.1670	8.5
7680	5120	5.75	0.929	124.88	2.33	6.2155	8
8650	5770	5.11	0.875	125	2.19	7.4325	7.5

Table 3. – Results of calculations

η	0	0.1	0.2	0.3	0.5	0.7	0.9	1
$\varphi(\eta)$	0	0.2105	0.4026	0.5712	0.823	0.9572	0.9982	1

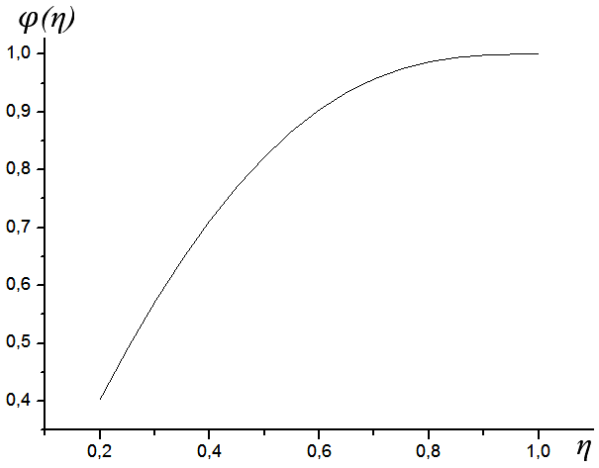


Figure 3. Dimensionless velocity profile

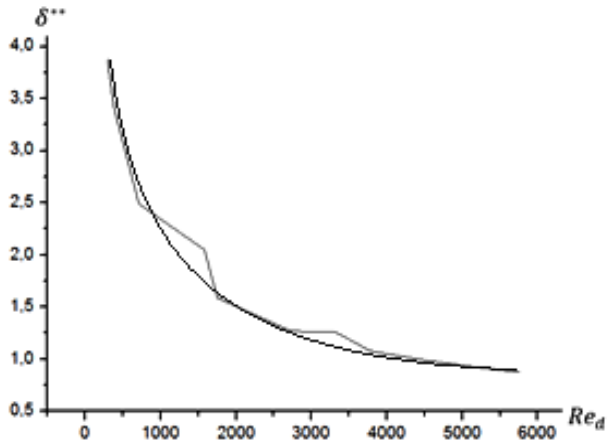


Figure 4. Dependence of the pulse loss thickness on the Reynolds number

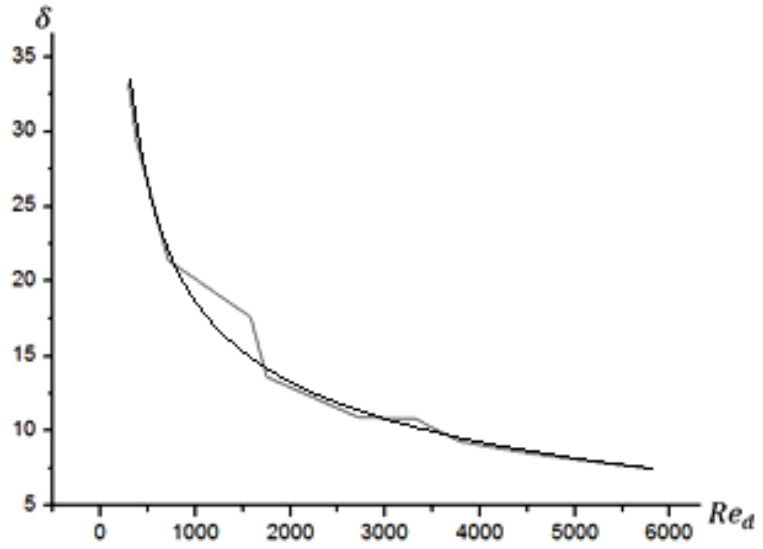


Figure 5. Dependence of the thickness of the boundary layer on the Reynolds number

9) Construction of a dimensionless velocity profile. Define a series of values of η and calculate the value of $\varphi(\eta)$ by the formula

$$\varphi(\eta) = 1 + (1-\eta)^3 \left(\frac{\lambda}{6}\eta - 1 - \eta \right) \qquad (16)$$

Conclusions:

1. The visualization of the transverse flow of metal shavings by the airflow is performed.

2. A model for the flow of metal shavings in the Reynolds number range was developed at which the high efficiency of SAH was observed.

3. Dependences of the thickness of the pulse loss and the thickness of the layer losses on the Reynolds numbers are obtained.

References:

1. Uzbekov M. O. Shermatov B. A. XXXVII International scientific and practical conference "European research: innovation in science, education and technology" February 7–8,– 2018. London, United Kingdom.– P. 21–26.
2. Uzbekov M. O., Nasretdinova F. N. International Scientific Review No. 1(43) / International Scientific Review of the Problems and Prospects of Modern Science and Education: XLI International Scientific and Practical Conference (Boston, USA – 30 January,– 2018).
3. URL: https://www.scopus.com/term/analyzer.uri
4. Raupov A. H., Tyukhov I. I. Differences of air solar collectors on the construction of heatabsorbing panels heat–return channels. Innovations in Agriculture,– 2015.– No. 2 (12).
5. Patent utility model SU1599627. F24 J 3/02, published – 1979.
6. Patent utility model SU No. 1474394, F24 J 2/281979.
7. Uzbekov M. O. and others. Efficiency of heat exchange of a solar air collector with a light–absorbing surface made of stainless steel shavings International Journal of Advanced Research in Science, Engineering and Technology.– Volume 5, Issue 2, February – 2018.
8. Uzbekov M. O., Abbasov Yo. S. Studies efficiency solar air collector // Austrian Journal of Technical and Natural Sciences,– 2016.– P. 7–8.
9. Kirpikov V. A., Shorin G. N. Introduction to boundary layer theory.– Moscow – 1974.

Sharipov Kungrat Avezimbetovich,
DSc., in technics, Rector of Turin
Tashkent Polytechnic University,
E-mail: K.sharipov@polito.uz
Khalikova Nargiza Abduvalievna,
Assistant, of the department "Tractors and cars"
Tashkent Institute of Irrigation and Agricultural Mechanization
(Republic of Uzbekistan)

ESTABLISHING PATTERNS OF FLOW OF A VISCOUS FLUID ON THE LATERAL SURFACE OF THE ROTATING CONE

Abstract: The article considers the movement of the mixture – the motor oil and the acetone. The velocity distribution of the mixture, the densities in the analytical form in the constant temperature are also given.

Keywords: rotary drum, distribution plate, mixture, the interaction of particles, interpenetration of particles, viscosity, turbulent flow, laminar flow, repulsive particles

Introduction. In this paper, the problem of a current of viscous liquid on the surface of a rotating cone is considered, dependences of a flow rate on technological parameters of tapered plates in a laminar and turbulent flow of liquid are established. The setup for receiving up to 83% of clarification of waste engine oil by a method of the selection clarification with acetone addition is developed. Regeneration of the used engine oil of farm vehicles is multi-stage process consisting of a filtration from different kind of impurity. Purification of the used oil can be carried out by manufacturer where the gathered liquid is obtained and at the small enterprises using small installations for cleaning. Quality of the cleared product and costs of process directly depend on a method and conditions of cleaning that should not be too complicated and high cost for realization of this process in the small enterprises. Therefore, the research of efficient ways of purification of the used oil is one of the urgent problems [1, 86, 88].

Results and discussion. In order to establish patterns of fluid flow we consider the flow of a viscous fluid on the surface of the rotating cone, simulating turning over a thin boundary layer of a viscous fluid. It is assumed that the flow axis of the symmetric and stationary, and the cone radius R_0 – located perpendicular to the axis – OZ.

The flow of the liquid jet is incident on the vertex of the cone and spread over the surface of a rotating surface with a constant angular speed, which is under the influence of centrifugal force moves along the lateral surface, forming a liquid film thickness $\delta(r)$ [2, 50, 51]. The height of the cone is: $h << R_0$.

Then the equation of motion of the fluid in the border zone has the form:

$$\frac{d\tau}{dz} + \rho_f r\omega^2 = 0 \qquad (1)$$

where, τ – the shear stress of laminar and turbulent viscosity of the mixture, which depend on the intensity of the flow coming from the surface roughness of the cone, and interaction forces dispersed phase mixture [3. 102,103].

ρ_f – density of fluid and ω is the angular speed.

The total shear stress of laminar or turbulent motion of the mixture can be written as:

$$\tau = \tau_l + \tau_t, \qquad (2)$$

$$\tau_l = \pm\mu_m \frac{dV_m}{dZ},\ \tau_t = \rho_m l^2 \left(\frac{dV_m}{dZ}\right)^2, \qquad (3)$$

where μ_m – the dynamic viscosity of the dispersed mixture;

ρ_m – the density of an incompressible fluid;

l – the mixing length of turbulent flow;

V_m – the average flow velocity of the particles.

To determine the distribution of the axial velocity, we have the following boundary conditions, taking into account changes in the Reynolds number:

$$\mathrm{Re} = \frac{R_0\omega}{\nu}$$

It should be noted that the flow can be incompressible laminar, turbulent-laminar (transition zone), and turbulent.

On a free surface at

$$z = \delta(r),\ \frac{dU_z}{dz} = 0,\ u_f(0) = 0,\ u_f(0) = 0. \qquad (4)$$

For laminar flow at $l = 0$, we have the equation for the velocity

$$\mu \frac{d^2V}{dz^2} + \rho r\omega^2 = 0.$$

The solution to this problem with initial and boundary conditions (4) has the form

$$V_f = \frac{\rho}{\mu}\omega^2\left(\delta^2(z) - \frac{z^2}{2}\right). \qquad (5)$$

Consumption of water with dissolved mixtures in the border zone in the laminar regime is determined by the formula:

$$Q = 2\pi \int_0^{\delta(r)} u dz = \frac{2\pi r^2\omega^2\delta^3(r)}{3\vartheta}$$

Hence, the expression is defined to determine the thickness of the boundary layer [1]:

$$\delta(r) = \sqrt[3]{\frac{3\vartheta Q}{2\pi R_0^5\omega^2}} \cdot r^{-\frac{2}{3}} \qquad (6)$$

The case of weak turbulized mode of motion between rotating propellers. The flow of the liquid jet is incident on the vertex of the cone and spread over the surface of a rotating surface with a constant angular velocity, which is under the influence of centrifugal force moves along the lateral surface, forming a liquid film thickness. The height of the cone $h << R_0$.

Flowing along the lateral surface of the cone and the propellers stir the turbulent zone is created. The length of the mixing can be identified by the Prandtl formula as follows:

$$l = \chi\left(\delta(r) - z\right) \qquad (7)$$

where $\delta(r)$ – the thickness of the border zone of the rotating cone

χ – coefficient of Karman, and defined by the formula:

$$\chi = K_0F_0 \text{ where } F_0 = \sqrt{\frac{f_1 + Sf_2\frac{q_2^2}{q_1^2}}{f_1 + f_2}}$$

Here q_1, q_2 – flow rate of incoming mixture into conical surface.

f_1, f_2 – the concentration of acetone and motor oil.

The equation of motion (1) taking into account the length of the mixing (7) can be written as.

$$\frac{d}{dz}\left[\chi^2\left(\delta(r) - z\right)^2\left(\frac{dV}{dz}\right)^2\right] + \omega^2 r = 0.$$

Integrating over and using the boundary conditions (4) we get:

$$\frac{dV}{dz} = \sqrt{\frac{\omega^2 r}{\chi^2} \cdot \frac{1}{\sqrt{\delta(r) - z}}}$$

Hence we have an expression for the velocity distribution of fluid flow:

$$V = 2\sqrt{\frac{\omega^2 r\delta(r)}{\chi^2}} - 2\sqrt{\frac{\omega^2 r}{\chi^2}\left(\delta(r) - z\right)} \qquad (8)$$

We define a second flow rate within the border zone with a thickness of b (r) from the equation:

$$Q = 2\pi r \int_0^{\delta(r)} V dz$$

Using the expression for the velocity and calculating the integral, we find the flow of the liquid mixture in the film:

$$Q = \frac{2l\pi}{3}\sqrt{\frac{\omega^2\left(r\delta(r)\right)^{3/2}}{\chi^2}} = \frac{2\pi l}{3}\sqrt{\frac{\omega^2 R_0^6}{\chi^2}};$$

$$Q_ж = \frac{2\pi l\omega R_0^3}{3\chi}\sqrt{r^3\delta^3(r)};\ Q = \left(\frac{3Q}{2\pi l\omega R_0^3}\right)^{2/3} = r\delta(r).$$

Find the thickness of the carnival of film:

$$\delta(r) = \frac{1}{r}\left(\frac{3Q_{см}\chi}{2\pi l\omega R_0^3}\right)^{2/3}. \qquad (9)$$

These expressions correspond to the transition zone from laminar to turbulent zone.

Consider a turbulent flow between the two propellers at high Reynolds numbers when $Re > 10^5$. The case of strong turbulized flow. Then, it is advisable to apply for a mixing-length formula L. A. Satkeevicha [3], ie:

$$l_r = \chi\sqrt{z}\left(\delta(r) - z\right).$$

Then we have the following expression for the shear stress at a given formula (2):

$$\tau = \rho\ \chi^2 z\left(\delta(r) - z\right)\left(\frac{dV}{dz}\right)^2.$$

And the equation of motion of the dispersed mixture will be:

$$\frac{d}{dz}\left[\rho\ \chi^2 z\left(\delta(r) - z\right)\left(\frac{dV}{dz}\right)^2\right] + \omega^2 r\rho_ж = 0.$$

Integrating with respect to the resulting equation with the boundary conditions (5) we obtain the expres-

sion for the velocity distribution in a strongly turbilizovannoy area and we have:

$$\frac{dV}{dz} = \pm\sqrt{\frac{R_0^2\omega^2}{V_{см}^2\chi^2}}\frac{\sqrt{r}}{\sqrt{z\cdot\left(\sigma\left(r\right)-z\right)}},$$

Where $z = \frac{z}{R_0}$; $V_{см} = \frac{V}{V^0}$ – the dimensionless parameters.

Also, integration by taking into account the boundary conditions we have:

$$V = \frac{2}{\pi}\frac{\vec{\omega}R_0}{\chi}\sqrt{r}arctg\sqrt{\frac{z}{\sigma\left(r\right)-z}} \qquad (10)$$

Now we define a flow rate of the mixture in the border area for the consideration of turbulent models:

$$Q = 2\pi r\int_0^{\sigma(r)}\frac{\vec{\omega}R_0\sqrt[2]{r}}{\chi}arctg\sqrt{\frac{z}{\sigma\left(r\right)-z}}z\cdot dz =$$

$$= \frac{2\pi R_0^3\vec{\omega}r\sqrt{r}}{\chi}\int_0^{\sigma(r)}arctg\sqrt{\frac{z}{\sigma\left(r\right)-z}}\cdot dz$$

Integrating the last equation by parts we obtain an expression for the mixture flow rate in the border zone:

$$\text{Where } Q = \frac{2\pi\vec{\omega}R_0^3}{\chi}r^{3/2}I_0\sigma\left(r\right);\ \text{где } I_0 = \pi. \qquad (11)$$

How do we find the change in surface tension of the liquid in the form:

$$\sigma\left(r\right) = \frac{\chi_0 QF}{4\pi^2\vec{\omega}\sqrt{R_0}}r^{-3/2} \qquad (12)$$

The equations obtained in the border zone of the surface at different flow regimes is the degree of compression of the surface tension in the form (12), $\sigma\left(r\right)\approx r^{-2/3}$, in the transition zone, $\sigma\left(r\right)\approx r^{-1}$, and in much turbulized zone surface tension has a value of: $\sigma\left(r\right)\approx r^{-3/2}$.

Calculations show that the laminar compression of the surface tension will be weaker than in the turbulent regime, so that the turbulence of the flow between the propellers significantly affects the process flow.

Conclusion

One of methods of refining oil from oxidizing products on places of utilization is application of the selective methods that can be used in economic conditions and without requirement of composite cars and mechanisms. At the same time, it is possible to use an acetone, a methanol and furfurol as a solvent material.

The analysis of oil refining technology showed that for cleaning oil with the PUOM-100 setup the selective solvents can be used at the final stage of refining.

References:

1. Ahmad Jonidi Jafari, Malek Hassanpour, Resources, Conservation and Recycling, 103, October – 2015.– P. 179–191.
2. Prudnikov A. P., Brichkov Yu. A., Marichev O. I. Integrals and series, Moscow, Nauka – 1985.– 800 p.
3. Khamidov A. A. Plane axially symmetric problem of stream flow ideal uncompressed liquid.– Tashkent: Fan,– 1978.
4. Khamidov A. A., Khudaykulov S. I. Stream theory of multiphase viscous fluid. Tashkent,– 2003.

Section 12. Physics

Rasulov Voxob Rustamovich,
Researcher, of Fergana State University
E-mail: r_rasulov51@mail.ru
Rasulov Rustam Yavkachovich,
Professor, of Fergana State University
Eshboltaev I. M.,
Resarcher, of Kokand State Pedagogical Institute
Mamadaliyeva N. Z.,
Graduate student of Kokand State Pedagogical Institute.

SURFACE PHOTOCONDUCTIVITY IN A MULTIVALLEY SEMICONDUCTOR

Abstract: The surface photoconductivity in a semi-infinite multivalley semiconductor theoretically researched. It is calculated by mirror reflection of electrons o'er the surface in the approximation of the Boltzmann kinetic equation.

Keywords: the surface photoconductivity, multivalley semiconductor, mirror reflection, electron, the surface, the Boltzmann kinetic equation.

Problems of the surface today are, one of the most interests of physicists. From a purely physical point of view, the study of the surface is fundamentally important. The surface is a two-dimensional system, and not only its structure, but also many of the phenomena look on it quite differently from the volume. In essence, the surface of a solid and its "interior" are two different forms of the same substance. Therefore, surface physics has become a new field of science on the structure of matter in a condensed state.

Below we theoretically research the surface photoconductivity in a semi-infinite multivalley semiconductor. It is calculated by mirror reflection of electrons about the surface in the approximation of the Boltzmann kinetic equation.

For convenience of further calculations, we choose the following geometry of the problem. By directing the x axis in the plane zz' (z' directed along the main axis of the ellipsoidal isoenergetic surface), and the axis y is normal to this plane, we write the energy spectrum in the form $\mathrm{E}=\sum_{\alpha,\beta} A_{\alpha\beta}\, v_\alpha\, v_\beta$ or $\mathrm{E}=\sum_{\alpha,\beta} B_{\alpha\beta}\, p_\alpha\, p_\beta$, where p_i and $v_i = \partial E / p_i$ are the i – components of momentum and velocity, respectively.

Now let us discuss about the electron distribution function, with which the photocurrent is determined. Suppose that a light wave with frequency ω is incident on a semiconductor plate with width $d\left(-d/2 \le z \le +d/2\right)$ perpendicular to the surface $z=+d/2$, and an electric field with a strength $\vec{\tilde{\varepsilon}} = 2\times \mathrm{Re}\,\vec{\varepsilon}\exp\left(-i\,\omega t\right)$ on the current carriers and a constant external magnetic field with a strength $\vec{H}$, where the z axis is directed along the inner normal to the surface $z=+d/2$, according to which, we assume that the electromagnetic wave propagates.

The nonequilibrium electron distribution function f satisfies the kinetic equation

$$\frac{\partial f}{\partial t} + \vec{v}\vec{\nabla}_{\vec{r}} f - e\left(\tilde{\varepsilon} + \left(\vec{v}\times\vec{H}\right)\right)\vec{\nabla}_{\vec{p}} f = -\frac{f - f_0}{\tau}, \quad (1)$$

which is solved in the τ – approximation (τ – is the momentum relaxation time) by the iteration method, where it is impossible to expand $f(\vec{r}, t)$ over the spherical functions by the parameter $l / \left|\vec{\nabla} f / t\right|$, because in the near-surface region f varies on the length (or $l/\omega\tau$)), where lis

the mean free path of an electron, ω is the frequency of the exciting light. For this reason we write the collision integral as $-(f-f_0)/\tau$, where f_0 – is the equilibrium distribution function of the electrons.

In the following we consider two mechanisms for the scattering of current carriers on a surface: mirror reflection (MR) and diffuse scattering (DS) with which the boundary conditions for the distribution function are determined. We assume that the energy spectrum of the carriers is spherical. Then for MR the tangential components of the momentum are conserved, and the normal component changes sign.

We will also take into account the spatial dependence of the electric field of the light wave, and also take into account that in semiconductors of cubic symmetry $\varepsilon_z = 0$.

To calculate the nonlinear electric field of the electromagnetic wave of photoconductivity ($\chi_{\alpha\beta\delta}$ and $\gamma_{\alpha\beta}$, where $\alpha,\beta,\delta = x,y,z$) a semi-infinite multivalued semiconductor, we will use the energy spectrum $\mathrm{E}=\sum_{\alpha,\beta} B_{\alpha\beta}\, p_\alpha\, p_\beta$ and the calculation method proposed in [2]. Further, we will use that when the mirror is reflected from the boundary of the surface of the semiconductor pate, we have $p_{y_2} = p_{y_1}$, $p_{x_2} = p_{x_1}$. And the interrelation of quantities p_{z_2} and p_{z_1} is determined from the law of conservation of energy, from which we have $p_{z2} + p_{z1} = -\frac{2\bar{D}}{\bar{A}} p_{x1} = \frac{2D}{B} p_{x1}$ or $p_{z2} = -p_{z1} + \frac{2D}{B} p_{x1}$. If we take into account that $V_y = \frac{\partial E}{\partial p_y} = 2\bar{A}(p_x - \frac{D}{B} p_z)$. Then $V_{x1} = 2\bar{B}(p_{x1} - \frac{D}{A} p_{z1})$, $V_{x2} = V_{x1} + 2\frac{D}{B} V_{z1}$ or $V_{x2} = V_{x1} + 2\frac{D}{B} V_{z1}$, also $p_{x2} = p_{x1}$, $p_{z2} = p_{z1} + 2\eta p_{x1}$, $V_{x2} = V_{x1} + 2\eta V_{z1}$, $V_{z2} = -V_{z1}$, где $\eta = \frac{D}{B} = \frac{m_{xz}}{m_{xx}}$.

Consequently, on the semiconductor surface for the distribution functions $f_-\left(V_x, V_y, V_z \langle 0\right)$ corresponding to the current carriers coming to the surface and $f_+\left(V_x, V_y, V_z \rangle 0\right)$ corresponding to the current carriers coming from the surface of the sample, we have

$$f_-\left(V_x, V_y, V_z; z=0\right) = f_+\left(V_x + 2\eta V_z, V_y, -V_z; z=0\right),$$
$$f_+\left(V_x, V_y, V_z; z=0\right) = f_-\left(V_x + 2\eta V_z, V_y, -V_z; z=0\right). \quad (2)$$

We will immediately assume that the electromagnetic field is transverse, i.e. $\vec{\varepsilon} = \vec{\varepsilon}(z)$ and the components $\varepsilon_x, \varepsilon_y$ are nonzero. The solution of the kinetic equation for $f_{11} = f_1(z;t)$ will beas

$$f_1 = f_1(z;t) = f_1(z) \times \exp(i\omega t) \quad (3)$$

Then

$$-i\omega f_1 + V_z \frac{\partial f_1}{\partial z} - e\left(\vec{\varepsilon}\cdot\vec{V}\right)\frac{\partial f_0}{\partial E} = -\frac{f_1}{\tau} \quad (4)$$

Here for the electron $e = |e|$, $\vec{F} = -e\vec{\varepsilon}$.

We seek the solution of the Boltzmann equation in the form

$$f_1(z) = e^{-\frac{\gamma z}{V_z}}\left[C_1 - \frac{e}{V_z}\int_z^\infty e^{-\frac{\gamma z'}{V_z}}\left(\vec{\varepsilon}\cdot\vec{V}\right)\frac{\partial f_0}{\partial E}dz'\right] \quad (5)$$

Then

$$f_1(z) = C_1 e^{-\frac{\gamma z}{V_z}} + \frac{e}{\gamma}\left(\vec{\varepsilon}\cdot\vec{V}\right)\frac{\partial f_0}{\partial E} = \\ = C_1 e^{-\frac{\gamma z}{V_z}} + \frac{ie}{\omega}\left(1 - \frac{i}{\omega\tau}\right)\left(\vec{\varepsilon}\cdot\vec{V}\right)\frac{\partial f_0}{\partial E} \quad (6)$$

Since $V_z \langle 0$ the distribution function $f_-\left(V_x, V_y, V_z; z\to\infty\right) = 0$, then $C_{1^-} = 0$

$$f_{1^-}(z) = \frac{ie}{\omega}\left(\vec{\varepsilon}\cdot\vec{V}\right)\frac{\partial f_0}{\partial E}\left(1 - \frac{i}{\omega\tau}\right) \Rightarrow \frac{e}{\gamma}\left(\vec{\varepsilon}\cdot\vec{V}\right)\frac{\partial f_0}{\partial E} \quad (7)$$

Then from condition (2) we find that for diffuse scattering (at $z = 0$)

$$f_{1^-} = \frac{ie}{\omega}\left(\vec{\varepsilon}\cdot\vec{V}\right)\frac{\partial f_0}{\partial E}\left(1 - \frac{i}{\omega\tau}\right) = \\ \frac{ie}{\omega}\left[\frac{\varepsilon_x b \sin\theta\sin\phi}{\left(1+\delta\sin(2\phi)\right)^{1/2}} + \varepsilon_y c\cos\theta\right] \times \\ \times\frac{\partial f_0}{\partial E}\left(1 - \frac{i}{\omega\tau}\right)\sqrt{E} \quad (8)$$

The same way

$$f_{1^+}(E) = \frac{ie}{\omega}\frac{\partial f_0}{\partial E}\left(1 - \frac{i}{\omega\tau}\right) \times \\ \times\left[\left(\vec{\varepsilon}\vec{V}\right)\left(1 - e^{-\frac{\gamma z}{V_z}}\right) + \frac{2}{3}\frac{\delta}{\left(1-\delta^2\right)^{1/2}} b\varepsilon_x\sqrt{E}\, e^{-\frac{\gamma z}{V_z}}\right] \quad (9)$$

The photoconductivity tensor is $\chi_{\alpha\beta\delta}$ determined by solving the Boltzmann kinetic equation [2]. In particular, for a semi-infinite multivalley semiconductor, the solution of the Boltzmann equation in the first in the electric field strength of an electromagnetic wave has the form

$$f_{1+}(z) = \frac{ie}{\omega}\frac{\partial f_0}{\partial E}\left(1 - \frac{i}{\omega\tau}\right) \times \\ \times\left[\left(2\eta\varepsilon_x V_z \exp(-\gamma z / V_z) + \vec{\varepsilon}\cdot\vec{V}\right)\right] \quad (10)$$

for mirror reflection,

$$f_{1+}(z)=\frac{ie}{\omega}\frac{\partial f_0}{\partial E}\left(1-\frac{i}{\omega\tau}\right)\times\left[\left(\vec{\varepsilon}\cdot\vec{V}\left(1-\exp(-{}^{\gamma z}/_{V_z})\right)\right)+\frac{2}{3}\frac{\delta}{\left(1-\delta^2\right)^{\frac{1}{2}}}\varepsilon_x b\sqrt{E}\exp(-{}^{\gamma z}/_{V_z})\right] \qquad (11)$$

for diffuse reflection of electrons about a surface.

The Boltzmann equation for the next iteration of the distribution function can be easily obtained in the form

$$f_{2^+}(0)=f_{2^-}(0)+8\frac{e^2}{\omega^2}\eta\left\{\varepsilon_x\varepsilon_\alpha^*\left[V_\alpha V_z\left(\frac{\partial^2 f_0}{\partial E^2}-\frac{\partial f_0}{\partial E}\frac{\partial\ln\tau}{\partial\ln E}\right)+\eta\left|\varepsilon_x\right|^2 V_z^2\left(\frac{\partial^2 f_0}{\partial E^2}-\frac{\partial f_0}{\partial E}\frac{\partial\ln\tau}{\partial\ln E}\right)\right]\right\}. \qquad (12)$$

$F_{20}(z)=-e\left(\vec{\varepsilon}_0\vec{\upsilon}\right)\frac{\partial f_0}{\partial E}=-e\varepsilon_0\vartheta_z\frac{\partial f_0}{\partial E}$ with using of which it is possible to determine the kinetic parameters, in particular the photoconductivity, of the sample, where $F_{20}(z)=-e\left(\vec{\varepsilon}_0\vec{\upsilon}\right)\frac{\partial f_0}{\partial E}=-e\varepsilon_0\vartheta_z\frac{\partial f_0}{\partial E}$.

It is not difficult to see that in order to determine the components of the tensor $\chi_{\alpha\beta\delta}$ and $\gamma_{\alpha\beta}$ for a semi-infinite multivalued semiconductor, we must calculate the following integral

$$\Im=-e\int_0^\infty dz\int d^3V\,f(V)V_\alpha=-eN\frac{\int_0^\infty dz\int d^3V\,f(V)V_\alpha}{\int d^3V\,f_0(V)}$$

or, in the case we are considering,

$$\Im=-eN\frac{\int_{V_z\rangle 0}^\infty C_2\tau V_z V_\alpha d^3V}{\int d^3V\,f_0(V)}=-\frac{3}{4\pi}\frac{\left(m_{\text{II}}m_\perp^2\right)^{1/2}}{\left(2E_F\right)^{3/2}}eN\int_{V_z\rangle 0}^\infty C_2\tau V_z V_\alpha d^3V.$$

$$\int f_0(V)d^3V=-\frac{3}{4\pi}\frac{\left(2E_F\right)^{3/2}}{\left(m_{\text{II}}m_\perp^2\right)^{1/2}}=-\frac{8\sqrt{2}}{3}\frac{1}{\left(m_{\text{II}}m_\perp m_\perp\right)^{1/2}}\int\frac{\partial f_0}{\partial E}E^{3/2}dE.$$

Then we have the following relations for the component of the tensor $\chi_{\alpha\beta\delta}$

$$\chi_{\alpha xx}=-\frac{3}{\pi}\frac{\left(m_{\text{II}}m_\perp^2\right)^{1/2}}{\left(2E_F\right)^{3/2}}e\frac{e^2}{\omega^2}N\eta\frac{1}{2}abc\int_{\cos\phi\rangle 0}^\infty\frac{\sqrt{E}dE}{1+\delta\sin 2\phi}\sin\theta\,d\theta\,d\phi$$

$$\chi_{\alpha xy}=-\frac{3}{\pi}\frac{\left(m_{\text{II}}m_\perp^2\right)^{1/2}}{\left(2E_F\right)^{3/2}}e\frac{e^2}{\omega^2}N\eta\frac{1}{2}abc\int_{\cos\phi\rangle 0}^\infty\frac{\sqrt{E}dE}{1+\delta\sin 2\phi}\sin\theta\,d\theta\,d\phi\times V_\alpha V_z\tau\left\{\left(\frac{\partial^2 f_0}{\partial E^2}-\frac{\partial f_0}{\partial E}\frac{\partial\ln\tau}{\partial\ln E}\right)V_y V\right\}.$$

We consider it appropriate to cestrict these results, because of the lack of experimental results of the spectral dependences on photoconductivity, wich is quadratic in $\vec{\varepsilon}=\left(\varepsilon_x,\varepsilon_y,\varepsilon_z\right)$ of semi-infinite many-valley semiconductor.

Thus, the theory of the photoconductivity of a multivalley semiconductor due to the scattering of current carriers on the crystal surface and dependent on the degree of polarization of light is developed. It is noted that: a) in the spherical approximation of the energy spectrum, in the sense of mutual compensation of the fluxes of electrons moving to and from the surface, the surfaces themselves are not really distinguished in any way; b) in the case of an ellipsoidal surface, the mutual compensation of the fluxes of electrons moving to and from the surface, both in mirror reflection and in diffuse scattering, depends on the spatial variation of the distribution function and the creation of a normal electric field.

References:

1. Green R. F. Transfer and scattering at the crystal surface. In the book: New in the study of a surface solid body.– M.: Mir.–1977.–P. 104–154.
2. Normantas E., Picus G. E. Surface photovoltaic effects in multivalley semiconductors // Phys. Sol. Stat.– 1986.– No. 6.– P. 1665–1679.
3. Ivchenko E. L., Pikus G. E. Superlattices and other Heterosructures. Symmetry and optical Phenomena // Springer Verlag. 1st ed.– 1995. 2nd ed.–1997.
4. Uchibori Yuki, Chuman Hiroki, Hayashi Hiromitsu. Piezoelectric photothermal and surface photo–voltage studies of carrier recombination mechanism at interface of Si p_–n junction // Jap. J. Appl. Phys.– 2008.–No. 7.– P. 13267–13271.
5. Shinji Tokudomi, Junpei Azuma, Kazutoshi Takahashi, and Masao Kamada. Ultrafast Time Dependence of Surface Photo–Voltage Effect on p–Type GaAs(100) Surface // J. Phys. Soc. Jap.– 2008.– No. 1.– P. 1678–1684.
6. Kavaliauskas J., Krivait G., Čechavičius B., Valušis G., Seliuta D., Sherliker B., Halsall M., Harrison P., Linfield E., Stee M. Differential surface photovoltage spectroscopy of δ–doped GaAs / AlAs multiple quantum wells below and close to Mott transition // Phys. Stat. Sol.B.– 2008.– No. 1.– P. 13654–13659.

Section 13. Chemistry

Shikhaliyev Karam Sefi,
Doctor, of technical sciences, Professor, academician EANS.
Professor, of Azerbaijan State University and oil Industry,
E-mail: kerem_shixaliyev@mail.ru

PLASTIFICATION OF THE BUTADIENE-NITRILE RUBBER WITH THE DICAPRILATHE ETHER OF DIPHENILOLPROPANE

Abstract: Dicaprilathe ether of diphenilolpropane was used for plastification of the butadiene nitrile rubber that this ether was the produced Balakhani fields. As the following, DEDE using norm should be 10% because more stiffness of SKN-40. In this case it plays of the role both plasticizer also filler. But, futher growth of plasticizer reduce resistance to getting longer and the friction of the vulcanizat.

Tensile stregth of the vulcanizat increasing 5 MPa when 5–10 crowd as DEDE used in the rubber compound and resistance of oil, acid and alkaline 5–10 times.

Keywords: butadiene-nitrile rubber(SKN-40), plasticizer, vulcanizat, filler, the resistance to oil-acid, synthesis, physico-mechanical properties, sulfur, accelerators, modification.

Introduction

The main purpose is to modify mechanical properties of polymers by addition of plastification to the rubber compound. Different plasticizer show various affects to the plasticity of polymers [1, 2].

A number of plasticizers used for mastication of SKN-40 rubber [2–4]. However, these plasticizers can not ensure equal distribution of the ingredients used in the rubber mixture based on the SKN-40 rubber, the purpose of this work is to synthesis a new plasticizer and eliminate the above-mentioned deficiency.

The following scientific research works been done for this purpose.

The initial materials used as natural and synthetic naphthenic acids essential for the purchase of the complex ethers. Synthetic naphthenic acids are synthesized in 220–250 ° C was a result of direct oxidation of oil concentrates[5–7]. Variable valences of metals(Mn and Co) was used as a catalyst for acidity [4–7].

Dicaprilat ether of the diphenilolprophane of naphtha and benzoic acids was used in plastification of the SKN-40 rubber.

Some properties of the practices used ethers(DEDE) shown in the (table 1).

Table 1.

№	Indicators	DEDE	Dioctylphathalathe
1.	Ignition temperature, ° C	206	205
2.	Numerical acid mq.KOH	0.5	0.10
3.	Density at 20 ° C, Kq/sm^3	959.4	975.0
4.	Numerical saponification, mq.KOH	290–300	280–290

Results

Rubber mixture produced on the basis of the SKN-40 rubber as plasticizer using the DEDE of the following recipes on laboratory vollers.

Table 2.

№	Name of ingredients	100 m.p. For the rubber m.p.	Weight%	Weight
1.	SKN-40	100.0	45.04	15
2.	Altaxs	2.0	0.90	0.30
3.	Kaptaxs	2.0	0.90	0.30
4.	Neozon D	2.0	0.90	0.34
5.	ZnO	5.0	2.26	0.73
6.	Dioctylphthalat	2.0	0.90	0.4
7.	Dibutylphthalat	5.0	0.90	1.00
8.	Sulfur	4.0	1.80	0.60
9.	Technical carbon P-324	20.0	9.00	3.0
10.	Okcyprophylene ether of the diphenilolprophane	1.0	0.45	0.15
11.	Dicaprylat ether of the diphenilolprophane	1.0	0.45	0.15

Rubber mixture has vulcanized in the 155 ° C temperature within 20 minutes. Physico-mechanical properties of the vulcanizat given in the (table 3).

Table 3.

Composition of the mixture							
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
SKN-40 DEDE	100	97.5 2.5	95 5	92.5 7.5	90 10	87.5 12.5	85 15
Properties of the vulcanizat							
Tensile strength level, MPa	20.7	21.5	22.9	22.1	20.2	19.2	17.6
Conditional tension in 100% extension, MPa	3.6	3.6	3.5	3.54	3.2	2.8	2.0
Conditional tension in 300% extension, MPa	13.6	13.7	14.0	14.0	13.3	12.1	11.7
Relative extension,%	380	450	475	470	470	450	410
Relative residue deformation,%	14.0	18.0	19.5	20.5	21.6	24.0	26.0
Breaking strength, kN/m	32.9	39.5	45.9	51.0	49.5	49.0	45.5
Elasticity,%	40.0	40.0	40.5	39.7	40.1	38.0	35.0
Hardness on TM-2, c.u.	70.0	70.0	69.0	69.0	69.5	70.0	71.0
Aging coefficient at 120 degrees, within 138 hours On Fp On εp	 0.76 0.41	 0.79 0.41	 0.81 0.40	 0.86 0.41	 0.89 0.42	 0.92 0.33	 0.97 0.24
Fatigue resistance in multi tension εdin = 200% V=250 rot/min	1.150	1.99	2.450	2.500	2.580	1.750	1.150

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Swelling degree at 23 ° C, within 120 hours Combustion time	114.0 × 292	115.0 × 300	115.0 × 320	117.0 × 390	120.0 × 97	125.0 × 60	139.0 × 35
Chemical resistance for the swelling degree at the room temperature, within 32 hours,%							
Thick	31.13	31.4	33.2	31.7	32.3	31.9	32.5
Thick	9.18	9.25	9.46	9.50	9.38	9.40	9.35
Thick	22.3	22.7	23.5	23.8	22.9	24.0	23.7
40% of solution	0.014	0.014	0.0199	0.013	0.0095	0.0105	0.095
Bond hardness with metal, MPa	1.45	1.48	1.52	1.65	1.99		1.58

Resistance to oil and petrol was studied of the made compositions and vulcanizat. The results are given in the (table 4).

Table 4.

№	Ingredients	Solve
1.	Transformer oil	It doesn't dissolve
2.	HCl	It doesn't dissolve
3.	Alkaline	It doesn't dissolve
4.	Petrol	It doesn't dissolve

References:

1. Zavodchikova N. N. way of getting filled with polyvinyl chloride – Noah compositions 1348355 a.s., USSR. Appl. 4.07.85., No. 3920946/23–05; Published by B.i.,– 1987.– No. 40. MKI with 08127/06, 08292/00.
2. Danilova L. study of rheological properties of filled com-positions based on PVC // New Products Gen chemistry and Probl., improved their quality: – 1986.– P. 16–28.
3. Pakina L.a. et al. Effect of titanium dioxide on defarmacionnye properties of rigid PVC // plastic.– 1987.– No. 4.– P. 38–39.
4. Pakhomova I. P. PVC calendering process optimization of compositions in the manufacture of various types of artificial leathers // ed. universities. Tech. easy industry.– 1987.– No. 4.– P. 35–40.
5. Ermakova Etc. Phase State of plasticised polyvinyl. Барамбойм Н. К. Механохимия высокомолекулярных соединений.– М.: Химия,– 1971.– 364 с.
6. Бутягин П. Ю. Кинетика и природа механохимических реакций. Успехи химии,– 1971.– Т. 11.– С. 1935–1959.
7. Кузьминский А. С. Некоторые актуальные проблемы химии эластомеров. Высокомолекулярных соединение,– 1971.– Т. 13.– № 2.– С. 384–394. «Достижении науки и технологии в области резины. Под ред. Зуева Ю. М.,– М.: Химия,– 1969.– 404 с.
8. Портянский А. Е., Абрахам Й., Ализаде Г. Л., Билалов Я. М. Исследование процесса механоинициированной модификации СКЕП с ПВХ. Азерб. Хим. журн.,– 1975.– № 4.– С. 80–85.
9. Билалов Я. М., Иванов А. В., Абрахам Й., Ализаде Г. Л. Исследование термической деструкции СКЕП с ПВХ. Азерб. Хим. журн.,– 1976.– № 1.– С. 74–77.
10. Алигулиев Р. М., Мартынова Г. С., Гасанов Х. А., Краткие очерки по теплофизическим исследованиям полимеров. Баку.– Элм.– 1994.– 136 с.
11. Регель В. Р., Поздняков О. Ф., Амелин Н. В. Исследование термо- и механодеструкции полимеров с применением масс-спектометров. Мех. полим.– 1975.– № 1.– С. 16–32.

12. Shixaliyev K. S Термодинамика и взаимное распределение макромолекул в системе хлор-хлорсодержащие полимеры International Scientific and Pzactical Confrence "WORLD SCIENCE" – № 4 (20).– Vol/5.– 2017.– С. 37–44.
13. Shixaliyev K. S Exelolted thermoplastics based compositions European science review. Scientific journal – № 5–6.– 2017.– Vienna.– P. 89–94.
14. Шыхалиев К. С., Мовлаев И. Г. Исследования совместимости полимеров, химических и других особенностей их смесей. Сб.статей победителей X международной научно-практической конфренции. Пенза Наука и просвещение».– 2017.– С. 31–35.
15. Барамбойм Н. К. Механохимия высокомолекулярных соединений Из. 3_ое перераб. и доп.– М.: Химия.– 1978.– 340 с.
16. Полимерные смеси (в двухтомах) Перевод с английского.– М.: – 1981.– Том 1.– 550 с.– Т. 2. – 453 с.
17. Моисиев Ю. В., Зайков Г. Е. Химическая стойкость полимеров в агрессивных средах. Химия.– М.: – 1979.– 228 с.
18. Аббасов А. М. «Стабилизация ПЭВП используемого в качестве высоко-и сверхвысокочастотных диэлектрик о-в»ю. Сб. Известий НАН АРГРНЦ.; – № 7.– 2003.– С. 28–35.
19. Мильман С. «Течениеполимеров» Мир – М.:– 1971.– 196 с. 6. Кулезнев В. Н., Смеси полимеров.– М.:– 1984.– 63 с. 7.Gesner B.D., Graft copolynerizaionon the structure of the Arafat phase and mechanirmqraftiog polybutadiene rubber. Rubb. Chem. Technol.– v. 38.20.1965.– P. 655–656.
20. Кошкаров А. М. Диэлектрическая релаксацие полиэтилена в широкой облости частот и температур. Пласт. массы. 4,– 1969.– С. 54–56.
21. Алигулиев Р. М., Аббасов А. М., Садыкова М. А. Влияние наполнения на энергию активации вязкого течение модификаторов ПЭВП. «Химия и нефтехимия»., 4.– Баку.: – 2002.– С. 35–40.
22. Принципы создания полимерных композиционных материалов. Ал. Бермен и др. «Химия» – М.: – 1980.– 240 с.
23. Бунят-заде., Сироткина В. А., Кузнецова Е. П., Аббасов А. М. Наполненный полиэтилен с улучшенными свойствами. Сб. научных трудов ОНПО «Пластполимер».,– Л.: – 1986.– С. 81–86.
24. Бунят-заде А. А. Аббасов А. М. Высоконаполненные композиционные материалы на основе различных сортов полиэтилена. «ЦниитЭнертехим», Сб. научных трудов.– М.: – 1991.– С. 8–17.

Section 14. Economy

Abuzjarova Maria Ivanovna,
Ph.D,. in Economics, associate professor,
Samara State University of Economics
Department of "Management"
E-mail: prekrasnova.v@mail.ru

FORMATION OF THE INSTITUTIONAL ENVIRONMENT IS THE KEY FACTOR FOR THE INNOVATIVE DEVELOPMENT OF THE COUNTRY

Abstract: The presented article deals with the formation of an institutional environment that determines the direction and speed of institutional changes, creates conditions and guidelines for selection of effective elements of the institutional structure from alternative forms of economic coordination. The emphasis is on turning the internal structure of the company into a network that will allow greater transparency in management and coordination, create greater openness of the company, lead to a decrease in transaction costs of an innovative nature.

Keywords: innovations, innovative development, technological changes, economic growth, competitiveness of the country.

Globalization has led to a change in the traditional nature of innovation processes.

The production and promotion of new products to world markets now require the construction of global networks, including specialized suppliers, major producers and consumers connected by a technological chain.

Innovations in the innovation economy are provided by the following most important conditions:

– the wide diffusion of scientific knowledge and information;

– development of innovative infrastructure, innovation networks and the formation of innovative clusters at both the regional, sectoral and interindustry levels;

– the development of human capital, which is receptive to new knowledge, including providing the conditions for training and professional development of workers throughout life.

Transition to an innovative economy is possible only on the basis of the corresponding institutional transformations that are consciously generated at all levels of state policy implementation and interaction between the state and civil society.

Since people and information are the main assets of an innovative economy, the transformation of institutions should be directed towards:

– development of people, growth of their creative potential, improvement of living conditions in society, stimulation of increase of implicit knowledge in the economy;

– creating conditions for accessibility for all, respect for the individual, human rights and privacy, transparency of public administration, social responsibility of private business.

There are different ways of allocating institutional levels. One of them is related to the power of the influence of certain institutions on other institutions, on the behavior of participants, on the development processes in general [1].

Another way is the possibility of making changes.

Institutions are implemented in changing the behavior of participants, but their influence depends on the fact that several of them are volatile.

Here we distinguish three levels, which include: formal rules; informal rules; cultural traditions and values.

As a result, any institutional system appears in the form of a kind of pyramid.

Institutions are changing rapidly, because:

– levels of the institutional system vary at different rates;

– instruments of targeted influence on different levels of the institutional system are also different.

Development institutions are specialized state corporations (companies) whose activities are aimed at eliminating "market failures" that hinder the economic and social development of the country.

The basic component of the institutional environment is the institution, which is understood as the human-created restrictive framework that organizes interactions between them.

Institutes are created in order to ensure predictability of the results of a certain set of activities, guaranteeing its freedom and security within certain limits and saving transactional costs. They are aimed at creating conditions for the timely conclusion of contracts, the prevalence of legal operations over illegal, that is, to positively influence the growth of productivity and investment.

The role and importance of the institutional environment is that:

– institutions regulate access to resources and options for their use;

– establish the boundaries of possible ways of actions and lines of conduct;

– form a system of incentives and the basis of rational behavior;

– affect the allocation of resources between market participants and the degree of following personal interests.

The components of the institutional environment are:

– a system of institutions of formal economy (formal rules);

– informal rules [2].

The author believes that the main provisions of the theory of institutional changes are key to understanding institutional changes.

In accordance with it, changes in institutions mean the process of modifying the rules and enforcement mechanisms for their enforcement in order to reduce transaction costs.

In the theory of institutional change, there is a concept that explains the mechanism of institutional changes through the microeconomic model of the institutional market, where it is hypothesized that the market of institutions (the institutional market) has elements of the classical market: demand, supply, price and competition.

Proceeding from the analysis of theoretical approaches in this direction, the author constructed the function of entrepreneurs' demand for a certain institution in the following form:

$$Q^d_I = f\{P_I, P^1_I, P^2_I, T, P_r, E, H, N, O\}, \qquad (1)$$

where:

Q^d_I – demand profile for the institute I;

P_I – price of use of the institute I;

P^1_I – the price of using substitute institutions;

P^2_I – the price of the use of compliment institutes;

T – preferences of entrepreneurs;

P_r – expected current benefits of using the institute I;

E – expectation of entrepreneurs regarding changes in the external environment;

H – characterization of the rule in comparison with other rules;

N – number of potential users of the institute I;

O – other factors affecting the demand profile.

A variety of ineffective rules are administrative barriers, which are formal institutions of a special kind. If the main function of institutions is to save transactional costs, then administrative barriers, unfortunately, perform the opposite function, namely cause an increase in transaction costs.

To reduce the probability of occurrence of ineffective rules, it is suggested to use the strategy of managing the pace of institutional construction, as well as to develop forecasts for the development of institutions (institutional changes) in order to prevent a non-optimal way of development of the projected institutions.

Institutional design is the process of developing ideal regulatory models of economic institutions that are deliberately and purposefully implanted in mass economic behavior.

A number of criteria are proposed for solving the method of institutional design:

– special importance of solving this problem;

– many profile and cross-sectoral nature of the problem;

– a significant degree of influence of the solution of the problem in a certain sector of the economy;

– high social significance of the results to be obtained as a result of the implantation of a new institution.

The goal of institutional design can be production:

– an institution aimed at providing potential advantages over competitors;

– an institution aimed at redistribution of economic opportunities;

– introduction of changes and additions to the acting institute with the purpose of increasing its effectiveness.

Predicting institutional changes is a scientific study of possible, expected prospects for the development of institutions.

Predicting the development of institutions can be carried out in the following:

– changes in the current system of relative property rights (institutional arrangements);

– changes in the current system of absolute property rights (institutional environment);

– forecasting the duration of the life cycle of the institute;

– making a forecast of changes in the properties of existing institutions.

Based on the analysis of institutional changes in the sphere, we arrive at the following conclusions:

– institutional changes were accompanied by the creation of a new institutional environment adequate to the requirements of a market economy.

– changes in the institutional structure of the state expanded the freedom of entrepreneurial activity.

All this shows that the institutional environment is still in the process of transformation.

One of the priorities of the current economic policy of the state is the reform of the institutional environment of business aimed at enhancing competition and encouraging entrepreneurial structures that enter or open new markets [3].

The institutional environment defines the main directions of the development of the economic system, as well as the guidelines, on the basis of which the production and selection of the most effective institutions is carried out.

It is necessary to carry out a set of works on the formation of a regional innovation system, where special attention should be paid to building an innovative infrastructure.

The leading goal of the regional innovation system should be the creation of scientific, technical, technological, socio-economic, legal conditions and mechanisms to ensure the sustainable development of all economic entities, increase the share of products with high added value in the gross regional product.

In accordance with this performance of this system, it is necessary:

– creation of conditions for the accelerated transition of the regional economy to an innovative type of development based on the application of domestic innovations and advanced foreign technologies;

– expansion of regional and interregional markets for innovative products and new technologies.

To promote the products of enterprises, it is necessary to organize work on the development of:

– special industry marketing programs to support exports to foreign markets;

– interactive mechanisms for promoting the products of local enterprises using modern methods of electronic business and information technology;

– virtual maps of regional needs in goods and services;

– development of an electronic logistics system for interregional commodity routes.

The need to search for new potential niches is dictated by the pressure of an ever expanding competitive environment.

The most promising areas of business development are the market of intellectual services and information technologies.

References:

1. Ivanov N. Social context of innovative development // World economy and international relations.– 2013.– No. 5.
2. Biryukov A. V. Inclusive development as a response to the challenge of globalization in American way / Proceedings of the international scientific conference «The geopolitics of the multipolar world». Issue 3.– Moscow.– 2012.
3. Commercialization of the results of scientific and technical activities: European experience, possible lessons for Russia.– Moscow: ZIPRAN RAS,– 2006.– 264 p.

Smagulova Nyailya Turarbekovna,
Kazakh Academy of Labor and Social Relations
D.e.s., Professor, Department of Economics and Business,
E-mail: smagulova.n.t@mail.ru
Alpysbayev Kaisar Serikuly,
National Research Nuclear University
"MEPhI", Ph D., student,
E-mail: kaisar2003@mail.ru

INTERACTION ANALYSIS OF SUSTAINABLE GROWTH, ECONOMIC SECURITY AND CORPORATE MANAGEMENT

Abstract: There were considered the ways of interaction designation between sustainable growth, economic security and corporate management features. The mechanism liability of these features was proved and operation algorithm was adduced.

Keywords: sustainable growth, economic security, corporate management, interaction mechanism.

Introduction. In the current circumstances to ensure the dynamic development of the enterprise appears a problem of need to research into interaction process of such features as sustainable growth, economic security and corporate management. It is only natural that success of economic growth ongoing programs of any country depends on impact of external and internal environment on the business operating. Exactly the interaction mechanism approach of the above mentioned features will allow to effectively ensure enterprise with improving competitiveness.

The results of the study. Let's consistently analyze the meaning correlation of terms "sustainable growth", "economic security" and "corporate management". The research showed that the definitions close to the adducible above mentioned terms were encountered in the literature.

Sustainable growth is a dynamic process where the economic features of the enterprise are being improved in any external and internal environment extensions. Sustainable growth is a highest level of development which provides the dynamic stability of the enterprise due to its attainment of the strategic competitive position. Sustainable growth means the continuous growth of all economic features for a long time [1]. The concept of the sustainable growth is always associated with the term of stability as it is determined as the system capability to keep operating rate in the specification limit even with the negative external interferences impact.

Certainly these features form the basis of the *sustainable* growth of every enterprise. By this way it is a state, based on the economic environment stability, on product adaptation to the market requirements where enterprise operates and also on providing protection against hazards and risks.

Probably, the implementation of the sustainable growth of the enterprise is based on its economic security. This interconnection is confirmed by its existing definitions in the literary sources. So, some scientists represent *economic security* as a system state which allows to dynamically and effectively develop in a various environmental condition and in spite of the influence nature on the company activities, the size and nature of endogenous changes. Similarly, economic security was defined as a system that creates complex terms of the possibilities for *growth, stability,* independence and economic interests [2, 3].

Consequently, in the suggested approach for the definition of economic security, it is possible to see the interaction with the process of the sustainable growth of the features which are naturally interrelated. Most of scientists economists agrees that economic security can be viewed as a state of corporate resources effective use in order to ensure the stable operation of the enterprise

and prevent threats, as well as the possibility of achieving goals within a market economy [4].

Continuous compliance with economic security is explained by the set objective task of each enterprise to ensure a stable and maximum effective operation at the present time and a high potential for the enterprises development and growth in the future.

On the basis of variety of enterprise economic security definitions, it is possible to identify internal structure elements – stability and sustainability. Stability and sustainability of the enterprise operation suggest the creation of reliable conditions and guarantees for entrepreneurial activity and deterrents, that are capable to destabilize the negative situation.

In addition, we can distinguish another element of the internal structure of the enterprise economic security – the capacity for self-development and progress, i.e. creating congenial investment and innovation climate, production modernization, proficiency enhancement, which are becoming indispensable conditions for the sustainability and the enterprise self-preservation [4]. Therefore, it is fair to say that economic security should be considered as the *corporate governance element* of the enterprise.

Obviously, an attempt to determine the enterprise economic security in this aspect confirms their mutual support, presented by one of the tasks of corporate governance – the formation of economic stability based on internal growth factors.

As is known, the corporate governance is created to solve the following problems: to ensure maximum corporate efficiency; to achieve financial sustainability of the corporate sector; to attract investment for entering new markets.

The practice of domestic enterprises (companies) shows that corporate governance (i.e. its function) is the engine of economic development now. Improvement of corporate governance is considered by potential investors as an important resource for increasing the competitiveness and investment attractiveness of the enterprise. Firstly, following the principles of corporate governance creates a positive image of the company for investors. Secondly, good corporate governance helps to attract funds for prospective production or innovation and thus reduces the investors risks. Exactly innovation leads to a high rate of renewal of the assortment, increasing the products competitiveness in the domestic and foreign markets.

If today we do not produce competitive products with a high degree of novelty and science intensity, using modern energy-efficient and resource-saving technologies, tomorrow it will be difficult to keep the achieved results and won market positions and also to ensure economic security.

Indeed, the sustainable growth of the enterprise requires a flexible response to changes in the market conditions of both the external and internal environment. Still, the content meaning of the "sustainable growth" is associated with the problem of financing sources and enabling the reaching of a new, qualitatively higher level of the enterprise development.

In these conditions, every enterprise should be viewed as a holistic integrated system where innovative components take an important place such as system technology of a new type, new technologies, a new job and industrial management and a new motivational system.

The research shows that, in view of the objective limitations of the available resources and opportunities for sustainable growth, the enterprise determines the strategy focus area. In particular, elaborating of measures to improve competitiveness, to attract investor funds for the prospective industry, to draft a program of the entering to a new sales market, etc. This tactic is a sufficiently complex process that requires consideration of the company operation features in the market environment. Then, any market develops so dynamically that for even one year its market balance does not remain the same. A special place today is given to the total assessment of the economic security crisis level, which can be the objective basis for the elaboration of measures to increase the sustainable growth and the enterprise operation [6].

Corporate governance contributes to the efficiency gains. Compliance with corporate governance standards helps to improve the decision-making process, that can have a significant impact on the company's activities results effectiveness. As a result of the improved corporate governance quality also the working mechanism of the enterprise was improved too. Company internal processes become normal and provide it the stability, operation, confidence in the future. That is, the corporate governance creates favorable conditions for planning

a sustainable long-term development of the enterprise (company).

Conclusion. In the context of globalization, compliance with the corporate governance standards is one of the company high competitiveness sources. Therefore, the strategy of economic security, corporate governance policy and enterprise growth tactics should interact with each other on a constant basis.

Regarding the priority setting of this interaction, in our opinion, priority should be given to the problems of ensuring the enterprise economic security. Firstly, due to the fact that it is possible to give an integrated assessment of the changes in the level of development and efficiency of the enterprise activities on the basis of the approach which is based on the principles of economic security. Secondly, exactly during the implementation of measures of ensuring economic security, prerequisites for a stable and harmonious economic growth are created, which, in turn, contributes to the enterprise competitiveness level increase and the effectiveness of corporate governance.

References:

1. Krivorotov V. S., Minbayeva L. F. Analisis and formation of the enterprise economic security mechanism.– M.,– 2006.
2. Belkin D. V. Basic approaches of the enterprise economic security research // Vestnik of Togliatti State University.– 2011.– No. 4.– P. 183–186.
3. Kleyner G. B. et al. Enterprise in the instable economic environment: treats, strategies, safety – M.: Economics,– 2007.
4. Gaponenko V. F. Enterprise economic security: approaches and foundations.– M.: Axe-89,– 2007.
5. Baranenko S. P., Shemetov V. V. Enterprise strategic stability.– M.,– 2014.
6. Andronov V. V. Corporate management in the current economic relations.– M.: Economics,– 2003.

Smagulova Nyailya,
Professor6 of the Department of Economic and Business
Kazakh Academy of Labor and Social Relations,
E-mail: smagulova.n.t@mail.ru

Saurukova Ainur,
Dean of the Faculty of Economics
Kazakh Academy of Labor and Social Relations,
E-mail: aina-908@mail.ru

Elshibekova Kuralay,
Senior Lecturer, Department of Economic and Business
Kazakh Academy of Labor and Social Relations,
E-mail: kuralai_e@mail.ru

THE INFLUENCE FACTORS ANALYSIS ON DEVELOPMENT OF KAZAKHSTAN INNOVATIVE INFRASTRUCTURE

Abstract: The factors of development of innovative infrastructure are examined. The positive and negative tendencies of their influence are educed on an infrastructure. Recommendations are given on effective development of innovative infrastructure.

Keywords: factors, methods of analysis, development, innovative infrastructure.

Introduction. One of the important directions of modernization of the country's economy is the development of innovative infrastructure. Therefore, when building an innovative infrastructure in Kazakhstan, it is necessary to pay attention to the socio-demographic and economic development conditions of the country. The scientific and technical level of the operating disparate subjects of innovative development and the introduction of a methodological base that is mandatory for all subjects of innovative infrastructure, regardless of ownership, branch specialization, the presence of foreign companies in the participants and other factors that affect its development term.

The results of the study. To study it is necessary to evaluate the factors that influence on development of the innovation infrastructure depending on the chosen development strategies. In practice, the PEST-analysis method is often used, where political, economic, social and technological factors of influence on the innovation infrastructure and its development are considered.

Analyzing the *political factors* of influence on the development of innovative infrastructure, this method yielded results that reflect the positive and negative trends in its development. We present the following results of the analysis for some political factors.

The *factor as integration processes in the European Union for innovative development and the involvement of Kazakhstan* in it allow access to international knowledge bases, inclusion in international consortia, increasing competitiveness, access to financing (up to 75% of R & D cost) for domestic innovators and consumers of innovations. Unfortunately, in the implementation of these processes, the intellectual elite is being evacuated to the developed countries through the "integration innovation corridor".

The next factor is the *political course for technological breakthrough – SPFIIDRK* (State Program on Forced Industrial and Innovative Development of the Republic of Kazakhstan). With the help of SPFIIDRK, the innovation process is coordinated and state order is placed. As a result, investments in R & D will be increased from 0,28% of GDP to 2% of GDP [1]. However, it allows the expansion of the corridor for abuse with one-sided policy measures for placing government contracts and subsidizing innovation. It also leads to layering and managerial helplessness of innovation development institutions.

Another factor is the actualization of preferences. Accurately adjusted dynamics of preferences will become one of the main levers for managing the development of innovative development. In this case, the course should be taken on the motivation of consumers of innovations in the first place. However, the fuzzy conditionality of preferences directly affect the abuse of both state servants and entrepreneurs.

Another group of factors is the economic factors influencing the development of innovation infrastructure. These *include following factors*.

The factor as a high need for deepening the degree of processing of domestic products will allow import substitution in the domestic market, it makes it possible to find niche specializations in regional foreign markets (Russia, Central Asia, Mongolia, China). However, at the same time, there will be a need for highly qualified personnel.

Another factor – the *dependence of the national economy* on imports 41,76% of GDP leads to non-competitiveness of domestic products and innovations, as well as strengthening of Russia's influence within the Customs Union. However, it represents the possibility of a broad field for importing substitution through contract production.

The factor as the *share of state purchases of goods and services on the domestic market,* 51%, leads to corruption in the public procurement system, and makes it possible to quickly place government contracts for the current needs of the public sector for several years.

The analyzed factor – *the regulatory dynamics of sectoral and territorial preferences and the investment climate* from the conditions of maximum favor to a gradual increase in the tax burden showed that this is the only effective mechanism for regulating the targeted development of the innovation infrastructure. In addition, the definition of rules will allow, in a non-directive order, to carry out a natural selection of "necessary" projects, and also provide a balance of motivation and constraints to achieve a measurable result at each stage of development. However, the lack of a methodological base and an independent qualification system will lead to irrational forecasting, investment and abuse.

The next economic factor is an increase in the *financing of research and development*, a gradual change in the ratio of 61%-39% in investment in research and development of R & D through a number of incentive measures) towards increasing the contribution of business (40% –60%). It showed no effectiveness of investment without creating a quality management system for innovation infrastructure. In addition, this factor confirmed the need for national security research in critical areas of engineering and technical sciences, and showed the formation of a sustainable reproductive, rapidly growing and capacious in terms of fundamental knowledge of human capital within the country for their country. It will allow to increase the country's technical self-sufficiency.

When analyzing *social factors* of influence on the development of *innovation infrastructure, such as the availability of highly qualified specialists in the country* and the increase of innovative activity of small and medium-sized businesses were noted. The first factor of influence showed that there is a lack of demand for innovation by the consumer in the domestic market, unwillingness to enter foreign markets, and a decrease in the effectiveness of investments in innovative development. However, it is necessary to attract the best domestic specialists, which will give impetus to the rapid development of education and R & D. The second factor of influence allows increasing the depth of processing and lengthening the chain of value added, in the production of domestic products.

From the *technological factors* of influence on the development of innovative infrastructure, the following were analyzed.

When analyzing the factor, both the constant development and diversification of the market and technologies was revealed by the positive moment that the finding of niche specializations for innovation occurs first on the interregional and then on the global markets. In addition, there is an inevitable process of passing through sharp fluctuations on the way to sustainable development.

Factor as sufficiency, continuity and cost of resource support of own production has revealed the possibility of determining cluster prospects for the development of infrastructure of material and technical supply of enterprises of the country. It also revealed that the high current cost of the means of production and communications leads to a high production cost, which in turn reduces its competitiveness – which is a negative point.

The next analyzed influence factor – *differentiated depending on imported technologies* – has shown that a longer period is required for the deployment of new production (from 18 to 60 months), which slows down the develop-

ment of innovation infrastructure. In addition, the concentration around the backbone enterprises of branch engineering and design production units and the development of a network of related industries in Kazakhstan will make it possible to intensify this development process.

The last factor of *influence under consideration* – the level of integration of education, applied science, production and the market, confirmed the need for creating pilot productions for student practice. In addition, it showed that the acceleration of innovative production processes "from the idea to the final consumer" would be due to a clear distribution of roles in the innovation infrastructure, aimed at both innovators and the market.

This analysis is made based on comparing the vision of specialists of various enterprises and organizations interested in innovative development with the aim of identifying common interests and ways of interaction. They are state bodies; state holdings and development institutions; active residents of FEZ and techno parks; current heads of various management structures of technology parks; potential participants in the innovation process in the business environment; potential participants in the innovation process among innovators; institutions of science and education [2; 3].

Conclusions. In accordance with the results of the risk analysis, the matrices of development strategies*, in our opinion, it is necessary to carry out the following tasks of building an effective innovative infrastructure of Kazakhstan:*

- Conducting large-scale information work with business, science, society on innovative development.
- Systematization of activities and subordination of strategies to a unified plan for innovative scientific and technological development.
- Creation of a national methodological base for innovative development and its validation at the international level.
- Establishment of a system of non-governmental independent evaluation with active involvement of recognized authoritative international certification, qualification and consulting centers.
- Establishment of a system for the protection of intellectual property, integrated into the international market for innovation and technology.
- Full restructuring of the country's innovation infrastructure.
- Creation of the coordinating platform "Innovation system without borders".
- Guaranteed volume of state orders and the formation of competitive project consortia for long-term state orders.
- Actualization of preferences for motivation of consumers of innovations.
- Development of a financial and economic feasibility study for a new innovative system in Kazakhstan.
- Development of feasibility study for each subject of innovation infrastructure.

Thus, the above measures will allow to activate the process of development of the republic's innovation infrastructure in modern conditions.

References:

1. Results of the assessment of industrial and innovative development of the regions of the Republic of Kazakhstan for – 2014–2016.– [Electronic resource].– Access mode: URL: http://www.economy.gov.kz
2. Annual report of JSC "National Agency for Technological Development" for – 2014.– Astana,– 2015. URL: http://natd.gov.kz/wp-content/uploads/2015/10/GO-2014–23.06.2015-rev-1-korrektsiya-07.07.2015.pdf
3. Kireyeva A. A. The problems of spatial modernization of the economy and new approaches to way out from crisis: Kazakhstan's experience / A. A. Kireyeva, N. K. Nurlanova // Journal Distribution of Science.– 2013.– № 11(3).– P. 39–48.

Contents