

Medical sciences

Article

- STUDY OF CHRONIC TOXICITY OF DRY EXTRACT
ON THE ARTICHOKE PRICKLY BASIS
Mirrahimova T.A., Unushodjaev A.H., Aliiev H.U., Saidov S.A. 4
- CHARACTERISTICS OF THE LOCAL INFLAMMATORY PROCESS AND IMMUNE RESPONSE
IN CASE OF ALLERGIC DISEASES OF THE EYE IN CHILDREN
Nazirova Z.R., Buzrukov B.T., Khodjimetrov A.A. 9

Materials of Conferences

- THE ACTIVITY OF ANTI-OXIDANTS ENZYMES IN ERYTHROCYTES
IS AN INDICATOR OF FATIGUE IN TRAINING
Chigrinski E.A., Sosnin M.I., Conway V.D., Metrinski J.J., Efremenko E.S. 12
- THE CLINICAL AND MORPHOLOGICAL CHARACTERISTICS OF THE STOMACH
AND DUODENAL ULCER BY THE OPIUM NARCOMANIA
Guseinova Z.K., Tayzhanova D.Z., Toleuova A.S., Beysembekova Z.A., Tauesheva Z.B. 13
- PERSON'S FETUS PAROTID SALIVARY GLANDS AGE FEATURES
*Opravina A.S., Ulyanovskaya S.A., Golubovich A.V., Khachatryan A.V.,
Margaryan A.A., Teterina E.V., Kondratenko E.A.* 14
- TO THE ASSESSMENT OF ORGANISM AEROBIC RESERVES IN CONNECTION
WITH MIGRATION
Safronova N.S., Fomenko A.V. 15
- THE CONTROL OF OXYGEN TENSION IN MUSCLE TISSUE USING BIOEFFECTIVE
PULSE-FREQUENCY GENERATOR NEYROTON-01
Shaov M.T., Pshikova O.V. 15
- ESTIMATION OF RISK FACTORS OF RESTENOSIS AFTER CORONARY
REVASCULARISATION
Taizhanova D.Z., Visternichan O.A., Zhunusov E.S., Tauesheva Z.B. 18
- LUNGS FUNCTION BY THE OPIUM INTOXICATION
Tayzhanova D.Z., Toleuova A.S., Bekmagambetova Z.B. 19
- THE OPIOMANIACS' INFECTION WITH THE HEPATITIS VIRUSES B AND C
Tayzhanova D.Z., Toleuova A.S., Guseinova Z.K., Bekmagambetova Z.B. 20
- NONSPECIFIC ULCERATIVE COLITIS IN COMBINATION WITH RHEUMATOID ARTHRITIS
Toleuova A.S., Beysembekova Z.A., Tayzhanova D.Z. 20
- PECULIARITIES OF STRUCTURE FETAL PANCREAS CONGENITAL MALFORMATIONS
OF ORGANS AND SYSTEM
Ulyanovskaya S.A., Bolduev V.A., Basova L.A., Dolbanenko V.S., Khvorostinina T.S. 22

Biological sciences

Article

- SELENORGANIC COMPOUND 1,5-DI-(M-NITROPHENYL)-3-SELENAPENTADION-1,5
EFFECT ON CLINICAL STRAINS OF PSEUDOMONAS AERUGINOSA
Rusetskaya N.Y., Borodulin V.B. 23

Materials of Conferences

- CEREBELLUM INBRED ALBINO RATS DURING EARLY ONTOGENY
Sheyan D.N., Tereshchenko A.A., Lutenko M.A., Kastornova Y.I. 26

Chemical sciences

Article

- SIMULATION APPROACH TO THE ANALYSIS
OF COPOLYMERIZATION PROCESSES
Berzina D.V., Mikhailova T.A., Miftakhov E.N., Mustafina S.A. 28

IDENTIFICATION OF A MATHEMATICAL MODEL OF THE REDUCED SCHEME
OF A-METHYLSTYRENE DIMERIZATION REACTION

Vaytiev V.A., Stepashina E.V., Mustafina S.A.

30

Economic sciences
Article

ANALYSING SALES VOLUME OF INSULIN-CONTAINING MEDICATIONS

Aripov S.T., Saidov S.A., Zainutdinov K.S.

33

Materials of Conferences

INTELLECTUAL CAPITAL EVALUATION METHODS AND ANALYSIS

Alimbaiyev A.A., Salzhanova Z.A., Ulybyshev D.N., Dzhusupov K.S., Zhanyshbayeva L.S.

37

THE INDUSTRIAL PRODUCTION VOLUME MODELING IN THE WEST KAZAKHSTAN
REGION WITH THE PRODUCTION FUNCTIONS USING

Gizatov E.H., Zhanysova A.B., Zhantasova K.H., Rakhmetova T.M., Abdrakhmanova D.J.

39

METHODICAL APPROACH TOWARDS EVALUATING LEVEL OF INNOVATIVE
DEVELOPMENT OF A REGION

Minakova I.V.

45

GOUT IN THE REPUBLIC OF SAKHA: AGE DISTRIBUTION, RISK FACTORS,
AND COMORBIDITIES

Petrova M.N.

46

BUSINESS ACTIVITY AS A CHANGE AGENT OF COMPETITIVENESS
OF THE COMPANY IN THE STOCK MARKET

Sembiyeva L.M., Ibragimova N.A.

49

Short Reports

THE SUPPLEMENTARY VOCATIONAL TRAINING AS THE FACTOR OF DEVELOPING
THE INNOVATIONAL POTENTIAL OF THE SPECIALISTS FOR THE AGRO-INDUSTRIAL
COMPLEX IN OMSK REGION

Shumakova O.V., Kovalenko E.V., Mozzherina T.G.

53

Pedagogical sciences
Article

TECHNOLOGY OF THE LEGAL EDUCATION YOUNGER PUPILS

Abdullaeva M.D.

55

INTELLECTUAL DEVELOPMENT OF PUPILS' PERSONALITIES
IN THE CONDITIONS OF EDUCATION INFORMATION

Andasbaev Y., Yessengabylov I.Z., Aldabergenova A.O., Zhiyembayev Z.T.

57

PARTICULARITIES OF THE BUILDING AND UNDERTAKING
INTEGRATED LESSON IN INITIAL CLASS WITH RUSSIAN
LANGUAGE OF THE EDUCATION

Eshpulatov S.N.

59

SPECIFICS OF ACADEMIC DISCIPLINES INTEGRATION IN CONDITIONS OF THE CREDIT
TECHNOLOGY APPLIED IN HIGHER EDUCATIONAL INSTITUTIONS
OF THE REPUBLIC OF KAZAKHSTAN

Tleuberdiev B., Shvaikovskiy A., Makulbek A.

62

Materials of Conferences

PROBLEMS FACING TECHNICAL EDUCATION

Sklyarova E., Erofeeva G., Lider A.

66

Philosophy
Article

ORTHODOX UNDERSTANDING OF SOCIETY IN THE MIDDLE AGES

Chelyshev P.V.

68

Short Reports

- BIBLICAL PARADIGM OF GLOBALIZATION IN «THE REVELATION» OF ST. JOHAN
Chelyshev P.V. 71

*Ecological and conservancy
 Materials of Conferences*

- DEVELOPMENT OF THE CONCEPT OF THE GEOLOGICAL SAFETY OF PERM CITY
Kopylov I.S. 73

Short Reports

- THE NATURE AND ENVIRONMENTAL PROBLEMS IN TRANSBOUNDARY
 TERRITORY OF RUSSIA AND MONGOLIA
Plyusnin V.M., Belozertseva I.A., Shekhovtsov A.I. 74

*Geological and Mineralogical sciences
 Materials of Conferences*

- CONSOLIDATION OF TENSILE-CREEPING HETEROGENEOUS EARTH FOUNDATIONS
Dasibekov A., Yunusov A.A., Yunusova A.A., Abylkasimova E.A., Mavlankhozhayev R.B. 76

*Historical sciences
 Materials of Conferences*

- FROM THE HISTORY OF THE URAL – EMBA OIL REGION IN THE EARLY 20TH CENTURY
Berdyguzhin L.B., Mehdizereev K.B., Bozakhayeva G.K. 78

*Technical sciences
 Materials of Conferences*

- AM WAVEFORM AN UNMODULATED CARRIER SIGNAL UNDERGOES
 THE PROCESS OF MODULATION
Khajishvili M.R., Jabnidge I.N., Gomidze N.K. 80
- STUDY WETTING ACTIVITY SILICONES IN THE PRESENCE OF SURFACTANTS
Tyukanko V.Y., Dyuryagina A.N., Ostrovnoy K.A., Demyanenko A.V. 82
- CHARACTERES OF TWO COMPONENT CRYSTALOPTICAL SYSTEMS
Umbetov A.U. 82

Short Reports

- REGIONAL OIL AND GAS BEARING STRATIGRAPHIC COMPLEXES AND FORMATIONAL
 ANALYSIS DATA FOR TERRITORY OF THE YURYUZANO-SYLVINSKAYA DEPRESSION
Ozhgibesov V.P., Kudiyarov A.G. 87

STUDY OF CHRONIC TOXICITY OF DRY EXTRACT ON THE ARTICHOKE PRICKLY BASIS

Mirrahimova T.A., Unushodjaev A.H., Aliev H.U., Saidov S.A.

Tashkent Pharmaceutical Institute, Tashkent, e-mail: altirar@mail.ru

In medical practice at treatment of diseases of liver and biliary tract preparations on the basis of an artichoke prickly (*Cynara scolymus* L.) take a special place. Preparations on the basis of an artichoke are successfully applied as effective bile-expelling and hyapatoprotector remedies. Pharmacological activity of an artichoke prickly is defined by complex action oxycoric acids, flavonoids, vitamins, tannins, macro-and microcells, polysaccharides and aminoacids. Artichoke preparations possess good shipping and practically full absence of side-effects.

Keywords: diseases of liver, artichoke, biologic active substances

In support of the organism's homeostasis liver plays a great role because in pathological conditions it has the leading place not only in metabolism but in rendering harmless of endogenous and exogenous toxic substances. Liver plays a role of universal metabolic barrier in the interaction process of a man with environment [1]. Liver diseases for today are one of actual problems of medicine as the liver, carrying out the functions, plays the important role in ability to live of an organism [2]. The purpose of this work is study of chronic toxicity of dry extract on the artichoke prickly basis grown up in Uzbekistan.

Materials and research methods

The study of dry extract chronic toxicity on the artichoke prickly basis was conducted in experiments on 40 white non-thorough-bred rats – males with mass of 150–185 gr. The preparation was daily brought into stomach in doses of 50, 250, 500 mg/kg during 2 months. Every dose was tested on 10 rats. In similar conditions

to the control group of animals the solution (water) was brought in. All experimental and control animals were in the same conditions and usual ration.

During the experiment animals were under every day control; their total state, behavior, having food and water, hair cover, mucous membranes were recorded. Animals were weighed once a week. The morphological and biochemical analysis of peripheral blood was conducted. After the experiment animals were decapitated, their macroscopic examination was conducted, the coefficient of internal organs mass was determined. Parts of internal organs and the brain were fixed in 10% neutral formalin for the further histological research.

Results of research and their discussion

The conducted results have demonstrated that prolonged per oral use of dry extract in doses of 50, 250, 500 mg/kg is tolerated well by the experimental animals. All experimental animals didn't differ from control rats in state, behavior, increasing body mass (Table 1) and in hematological parameters (Table 2).

Table 1

Increasing body mass of rats taking the extract in chronic experiment ($M \pm m$)

Introduction time	Control	50 mg/kg	250 mg/kg	500 mg/kg
Initial	161 ± 11,6	160 ± 14,0	165 ± 11,8	168 ± 12,3
After 1 month	234 ± 20,0	232 ± 15,0	235 ± 16,4	238 ± 14,5
After 2 months	282 ± 14,0	280 ± 16,4	277 ± 15,6	282 ± 16,8

Note. Statistically there are no reliable differences ($P > 0,05$).

According to biochemical parameters the decrease of urine, β -lipoproteides, cholesterol and lipids have been recorded (Table 3).

In macroscopic examination of internal organs and the brain of experimental rats during the prolonged 60 days use of preparation in the above-mentioned doses there have not been the considerable changes in comparison with the control group of animals (Table 4).

Results of macroscopical and microscopical morphological researches of organs and tissues at introduction of dry extract have not revealed visible changes. Results of the gen-

eral survey of the animals who have received a dry extract, have shown absence of visually distinguished deviations relatively the control group. All animals have a correct constitution, a tidy look, a brilliant woollen cover, the centres of growing bold or ulcers have not been revealed. Visible mucous membranes are damp, of light pink colour, shining and smooth by sight. Chest glands of females are without tumour formations and consolidations, in regular intervals soft to the touch. External genitals of males have no visible deformations or deviations from the control group.

Table 2

Picture of peripheral blood of rats taking the extract in chronic experiment

After 10 days of beginning the experiment				
Parameters	Control	50 mg/kg	250 mg/kg	500 mg/kg
Haemoglobin, g/l	130 ± 8,8	130 ± 10,8	123 ± 11,1	125 ± 9,8
Leukocytes, th/mkl	11,8 ± 1,3	11,4 ± 1,3	12,0 ± 1,15	12,2 ± 1,0
Erythrocytes, mln/mkl	6,8 ± 0,52	6,31 ± 0,71	6,34 ± 0,59	6,41 ± 0,66
Lymphocytes, %	64,0 ± 1,8	56 ± 2,1	60,0 ± 2,0	58,0 ± 2,15
Monocytes, %	4,0 ± 0,3	5,0 ± 0,3	4,5 ± 0,4	6,0 ± 0,2
Eosynophyls, %	2,5 ± 0,2	2,5 ± 0,2	3,0 ± 0,2	2,0 ± 0,3
Segment-nuclear neutrons, %	27,5 ± 1,8	30,5 ± 1,7	29,5 ± 1,8	31,0 ± 1,5
Bacillas-nuclear neutrophyls, %	2,5 ± 0,4	5,0 ± 0,5	3,0 ± 0,3	3,0 ± 0,3
After 30 days of beginning the experiment				
Haemoglobin, g/l	132 ± 8,5	130 ± 9,5	128 ± 10,2	131 ± 9,6
Leukocytes, th/mkl	10,9 ± 1,2	11,6 ± 1,07	11,1 ± 1,0	11,9 ± 1,1
Erythrocytes, mln/mkl	6,59 ± 0,61	7,45 ± 0,66	7,16 ± 0,49	6,84 ± 0,56
Lymphocytes, %	58,0 ± 1,8	56,0 ± 2,0	60,0 ± 1,6	61,0 ± 1,6
Monocytes, %	5,0 ± 0,3	5,0 ± 0,2	4,0 ± 0,3	6,0 ± 0,2
Eosynophyls, %	2,0 ± 0,2	2,0 ± 0,2	2,0 ± 0,2	1,0 ± 0,1
Segment-nuclear neutrons, %	29,0 ± 1,8	31,0 ± 1,6	30,0 ± 1,7	28,0 ± 1,9
Bacillas-nuclear neutrophyls, %	5,0 ± 0,3	5,0 ± 0,3	4,0 ± 0,4	6,0 ± 0,2
After 60 days of beginning the experiment				
Haemoglobin, g/l	130 ± 8,9	133 ± 8,8	135 ± 9,5	132 ± 7,7
Leukocytes, th/mkl	12,5 ± 0,9	12,7 ± 1,2	12,6 ± 0,9	12,7 ± 1,1
Erythrocytes, mln/mkl	6,8 ± 0,2	6,4 ± 0,4	6,7 ± 0,4	6,5 ± 0,4
Lymphocytes, %	60,8 ± 1,6	61,0 ± 1,6	62,0 ± 1,5	58,1 ± 1,8
Monocytes, %	4,2 ± 0,22	4,2 ± 0,22	4,8 ± 0,25	5,0 ± 0,2
Eosynophyls, %	2,8 ± 0,2	2,5 ± 0,3	2,7 ± 0,25	2,2 ± 0,24
Segment-nuclear neutrophyls, %	27,7 ± 1,8	27,6 ± 2,0	26,5 ± 2,2	29,1 ± 1,6

Note. Blood picture is in physiological norm. The difference in comparison with the control group is not reliable. ($P > 0,05$).

Table 3

Biochemical data of blood serum of rats taking the extract in chronic experiment
(the data after the end of experiment)

Parameters	Control	50 mg/kg	250 mg/kg	500 mg/kg
AlAT, mmole/	1,46 ± 0,08	1,14 ± 0,14	1,3 ± 0,12	1,5 ± 0,19
AsAT, mmole/	3,16 ± 0,09	3,17 ± 0,14	3,6 ± 0,18	3,2 ± 0,16
Glucose, mmole/l	5,15 ± 0,57	5,11 ± 0,82	4,9 ± 0,63	4,9 ± 0,76
Total protein, g/l	78,0 ± 1,8	77,0 ± 2,4	76,0 ± 1,9	79,0 ± 1,7
Urine, mmole/l	5,9 ± 0,61	5,3 ± 0,63	4,7 ± 0,61	4,1 ± 0,54*
Lipoproteids, g/l	0,67 ± 0,03	0,52 ± 0,03*	0,56 ± 0,02*	0,55 ± 0,02*
Cholesterol, mg %	69,4 ± 4,6	62,5 ± 4,9	57,9 ± 4,1*	54,4 ± 4,6*
Lipids, g/l	2,08 ± 0,16	1,77 ± 0,23	1,42 ± 0,2*	1,11 ± 0,2*

Note. * $P < 0,05$ in comparison with the control.

In a thorax – visceral and parietal leaves of pleura and bodies of a thorax are without visible changes. Lungs are of light pink colour, airy, without consolidations or destructive

changes. Heart is of usual size, without signs of ischemia or hypertrophy. The aorta and pulmonary arteries are smooth, anomalies of development or aneurysms have not been found

out. In heart cavities the small amount of liquid blood contained. Muscles of a myocardium are of brownish colouring, turgor is kept.

In a belly cavity – the liver is not increased in size, of usual form, has a soft consistence and a smooth surface. Glissonic capsule is thin, transparent, not strained. On a cut – histoarchitectonics of liver is not changed, parenchyma is moderately sanguineous. A stomach, a pancreas, loops of thin and thick intestines are without visible pathological changes. Kidneys are of usual size and shape, of brown colour and dense at palpation. On a cut of kidneys there are distinct-

ly differentiated covering and brain substances, nephritic cups and tubs are without stones and pathological changes. Thimus, a thyroid gland and adrenal glands have no macroscopical differences from corresponding organs of control animals. At cranium opening – a brain is of greyish-white colour, damp, without signs of the expressed hypostasis. The soft brain cover densely lies to substance of a brain, in some places is observed moderate expansion and full blood of venules and small veins. Ventricles of brain are not increased in size, contain moderate quantity of transparent, colourless liquor.

Table 4

Mass coefficient of internal organs of rats taking the extract in chronic experiment

Organs	Control	50 mg/kg	250 mg/kg	500 mg/kg
Brain	6,14 ± 0,38	6,54 ± 0,39	6,22 ± 0,28	6,75 ± 0,25
Heart	3,40 ± 0,3	3,22 ± 0,2	3,81 ± 0,22	3,15 ± 0,25
Lungs	5,66 ± 0,26	5,52 ± 0,34	5,42 ± 0,28	5,9 ± 0,22
Liver	30,4 ± 2,4	30,9 ± 1,9	33,2 ± 2,2	31,6 ± 1,7
Kidneys	7,7 ± 0,23	6,8 ± 0,32	7,1 ± 0,29	7,42 ± 0,3
Spleen	3,9 ± 0,31	4,0 ± 0,45	3,65 ± 0,4	3,82 ± 0,4
Adrenal glands	0,14 ± 0,0026	0,17 ± 0,002	0,15 ± 0,002	0,16 ± 0,0018

Note. Statistically there are no reliable differences $P > 0,05$.

Photo optic microscopic research of internal organs and brain of all groups of animals, irrespective of a dose of the examined preparation, has shown the development of the same changes.

In brain tissues in some cases were observed moderated local microcircular frustration of vessels of a soft brain cover in the form of arterioles spasm, expansions of venous capillary with blood stasis in them. Inter-cellular substance of the big hemispheres bark and a cerebellum places are with signs of a small hypostasis. Cytoarchitectonics of barks of big hemispheres and a cerebellum is well kept, arrangement density of neurons and thickness of separate layers of a bark have no distinctive features in comparison with the control. Neurocytes of the big hemispheres barks as a whole are painted in regular intervals, some cells are a little increased in volume. Cytoplasm of neurocytes is basically fine-grained, with various distribution of chromatophilic Nissle substance. Kernels of neurocytes are of the roundish form, hyperchrome, with accurately expressed, intensively basophilic painted kernel. In some neurocytes the moderate swelling of kernels is noted. Often round the vessels, pyramid and basket cerebellum cells were found out narrow semi-moon-shaped unpainted sites. Neurons of brain kernels, pear-shaped Purkinje cells of a cerebellum, and also glyo-

cytes of brain grey substance as a whole had characteristic structure for them. It is noted as well any pathological changes from structural components of hematoencephalitic barrier.

In tissues of experimental groups of animals was kept usual histoarchitectonics. Signs of pathological changes of inflammatory or destructive character is not revealed. The wall of intrapulmonary bronchial tubes consists of the corresponding tissue components inherent in the big, average and small bronchial tubes. Respiratory bronchioles and alveolar courses are without pathological changes. Alveolar epitheliocytes of I and II types have characteristic for them structure and tinctorial properties. An interalveolar connecting tissue is without pathological changes, in it and in a gleam of alveoluses come to light individual macrophages with characteristic dense inclusions in cytoplasm. As a whole, the microscopic structure of all departments of a lung has no essential differences from the control.

Heart – at experimental groups of animals the same as at control, accurately differ endocardial, miocardial and epicardial heart covers. Endothelium covering of endocardium is not broken, in some places come to light bulked up and increased in size endotheliocytes. The myocardium contains cardiomyocytes which form the focused muscular fibres. Fibres are

in regular intervals painted, their cross-section drawness is well kept. Kernels of cardiomyocytes are oval or extended, hyperchrome also have the central localisation. Inserted disks between cardiomyocytes are defined distinctly enough. Signs of hypoxia and a myocardium ischemia have not been revealed. As well as in the control, between muscular fibres the set of blood capillaries settles down. Morphological signs of pathological changes in epicardium and a pericardium have not been defined.

Liver – at experimental animals in a tissue of liver the expressed pathohistological changes have not been revealed. The liver capsule is not thickened, contains the longitudinal focused bunches of collagenic fibres. Parenchyma of liver is formed by the classical hepatic segments consisting of hepatic plates radially focused to the central vein or beams. Interlobed connecting tissue is developed poorly, signs of inflammatory infiltration and fibrosis of liver have not been found out. Hepatocytes are of polygonal form, with central located kernel, that is quite often defined. Two-nuclear hepatocytes are often met. Tinctorial properties of hepatocytes are not broken, hepatocytes with signs of fatty or albuminous dystrophy are not found out. Sinusoid capillaries are of usual size, in a gleam are defined individual erythrocytes and leukocytes. In sinusoid haemocapillaries walls and in spaces of Disse, at the big increases, the individual Kupfer cells, having intact structure, come to light. In some cases moderate expansion and blood filling of sinusoid haemocapillaries, central and sublobed veins is noted. Endothelium covering is without destructive changes, in some places are marked bulked up endotheliocytes with hyperchrome kernels. Structure of cholangioles and interlobed biliary channels is without pathological changes. All this specifies that the studied preparation does not render considerable negative influence on microscopic structures of liver.

Histoarchitectonics of kidneys at experimental animals are without changes. A capsule is thin, without signs of hypostasis and destruction. In covering substance numerous nephritic little bodies are defined. Vascular balls contain basically capillary loops of open type. The cavity of Shumljansky capsule is of usual size, does not contain uniform elements of blood or any other pathological precipitations. Individual nephritic little bodies with the expanded cavities of a capsule and moderated blood filling capillaries balls are marked. Epithelium of proximal, thin and distal departments of nephron has characteristic structure for these departments, without signs of destructive changes. Epithelium of collective tubules is presented by the main and inserted cells in a usual parity. In gleams of nephron

channels and collective tubules are not found out precipitates or other pathological precipitation. A connecting tissue of covering and brain substance of a kidney is gentle, without signs of hypostasis and inflammatory infiltrates. Microscopic changes of kidneys in comparison with the control are not revealed.

Spleen – a capsule and trabeculas are well developed, contain powerful enough bunches of smooth – muscular cells. In parenchyma red and white pulps which have a usual parity, characteristic for adult animals are distinctly differentiated. The white pulp is presented by lymphatic follicles of the various sizes on which periphery the central artery is defined. Structural zones of a white pulp are differentiated enough, the part of lymphatic follicles contains herminative or the jet centre. In the jet centres are often found out the cells which are at various stages of mytotic fission. The red pulp is rich in erythrocytes, in the same place come to light macrophages the cytoplasm of which contain the pigment – hemocyderin. Pathological changes of a spleen as a whole are not revealed.

Pancreas – a capsule is thin, in parenchyma cuts of segments of the various sizes are accurately differentiated. The basic part of segments occupy asinuses, consisting of asinar cells. Homogeneous and zymogenous zones of acinocytes are accurately distinguishable. In each segment the Langergans islet is defined, the size and topography of which varies in enough wide limits. Islets basically are presented by basophilic cells and the blood vessels located between them. The interlobed connecting tissue contains exit channels and blood vessels. The pancreas of experimental animals as a whole has no essential distinctions in comparison with the control group.

The thyroid gland has a lobular structure, is surrounded by a capsule from a dense fibrous connecting tissue. Its parenchyma is formed by follicles, the sizes and colourability of those are within norm.

Structure of goitre glands at experimental animals is normal: the accurate border between covering and brain substance is distinguishable. The covering substance is presented with densely located lymphocytes, brain – with reticuloepithelium with an impurity lymphocytes and presence of thymic little bodies of Gassal.

On histologic cuts of adrenal glands the body capsule is not changed. Dystrophic changes in ferruteros cells of covering and brain substance of adrenal glands are absent. The typical parity of ball, fascicled and reticular zones is completely kept. In brain part of an adrenal gland chromaffin cells keep characteristic structure and sizes. Venous sines are not changed or slightly expanded.

Integumentary epithelium of stomach it is covered by a slime layer in which are defined extrusive cells. In own plate are found out separate lymphocytes, plasmatic cells, lymphoid follicles. Stomach glands have a usual tubular structure, without signs of destruction and disorganisation. Vessels are moderately sanguineous.

Fibers of a thin gut are covered with single-layered prismatic epithelium, among cells of which there are in a considerable quantity glass-shaped cells. In own plate of a mucous membrane meet lymphocytes and plasmatic cells, and also lymphoid follicles. It is marked moderately expressed sanguineous of vessels.

Thick gut is without any pathological features. Crypts are of the enough correct form, settle down densely. The parity of prismatic and glass-shaped cells on a surface of crypts corresponds to. In some places of submucous layer meet lymphoid systems. Blood vessels are filled with blood, were marked perivascular hypostases. Thus, on a condition of mucous and submucous covers architectonics the gastrointestinal tract of experimental animals essentially does not differ from control animals.

Endometrium is covered with single-layered prismatic epithelium. Well differs functional and basal layers of endothelium. Meet various length uterus glands, some of them are expanded, epithelium glands are low cylindrical, cytoplasm is basophilic. Kernels are of the extended form, occupy the most part of cells, they are painted intensively and homogeneous. Mitoses are absent. Strom is rich in cells and argyrophil fibres. The mucous membrane passes in submucous layer of a muscular cover after which follows vascular and above-vessel layers. Cover and brain substances of ovaries are well identified. The brain substance is presented by the fibrous connecting fabric containing the main vessels and nerves. In covering parts of ovary settle down primordial follicles, and also follicles at different stages of maturing up to mature graaphic bubbles. Degenerate changes are noted. Hemorrhages and an atrophy are not present. Growing follicles of different degree of a maturity are without pathological changes. In a brain part of ovary the connecting tissue with main vessels and nerves, sclerosis signs, collagenisation and fragmentations are not marked.

The tissue microscopy of ovaries of rats receiving a preparation has not revealed any pathological changes in channels and strome. In testicles the curved channels contain epithe-

lium of all spermatogenesis stages. Spermatogony, spermocytes of 1 and 11 order, prespermatides and spermatides are well differentiated, and also in a considerable quantity formed spermatozoons at various stages of maturing. Basal membranes are thin. Follicular Sertoli cells and interstitial Leudigue cells are without degeneration signs, their quantity corresponds to the control. Internal diameter seed channels is not reduced, sclerosis and ischemia signs are not noted. Curved channels as at the control animals receiving in similar conditions solvent are covered with multinuclear epithelium, including spermatocytes of the first, second order and spermatides. Dystrophic changes in cytoplasm epithelium of cells are not noted. Sertoli cells are met in a small amount in thickness spermatogenic epithelium. Their number is approximately identical in all investigated cases. Interstitial Leudigue cells are visible in the form of continuous group near to capillaries. The last are expanded and filled with blood [3].

Conclusion

In the result of conducted researches it has been demonstrated that the prolonged per oral use of dry extract in doses of 50, 250, 500 mg/kg is well tolerated by the experimental animals and they didn't differ from the control rats. As to the biochemical parameters the decreasing of urine, β -lipoproteids, cholesterol and lipids has been noted. It should be noted that there have not been revealed dystrophic, necrobiotic and inflammatory changes in experimental animals and also reliable differences in structure of internal organs among experimental and control groups. The noted structural peculiarities of the investigated tissues show normal functional activity of internal organs. On the basis of comparative macro and microscopical research it can be concluded that the prolonged introduction of sufficiently large doses of dry extract on the artichoke prickly basis haven't revealed the considerable pathological changes in organs and tissues of experimental animals.

References

1. Khakimov Z.Z., Mirzakhidov Kh.A., Tsoy I.V., Khakimova D.Z. The investigation of *Convolvulus arvensis* dry extract to some parameters of liver in experimental acute toxic hepatitis. – T.: Pharmaceutical journal. – 2008. – P. 59.
2. Samedinov R. S., Bagdasarova S.E., Aliev H.U. Research of action bile-expelling gathering on the bile-secretory function of a liver. – T.: Pharmaceutical journal. – 2010. – № 2. – P. 65–67.
3. Razhapov A.Z., Asabaev C.A., Azimov K.M., Aliev H.U. Chronic toxicity of new medicinal collection of antianemia action. – T.: Pharmaceutical journal. – 2004. – № 4. – P. 63–65.

CHARACTERISTICS OF THE LOCAL INFLAMMATORY PROCESS AND IMMUNE RESPONSE IN CASE OF ALLERGIC DISEASES OF THE EYE IN CHILDREN

Nazirova Z.R., Buzrukov B.T., Khodjimetov A.A.

*Tashkent pediatric medical institute,
Tashkent, e-mail: mbshakur@mail.ru*

In the World Health Organization report on allergy (WHO, 2005) it was underlined that allergy morbidity is increasing in the whole world [1, 5, 15]. People suffering allergy have 80-90% damage of eyes and recently the spread of allergy grew 2-3 times. That growth corresponds with the changes both in environment and people's style of life. The progress of viral, bacterial, fungous and parasite eye infection is often complicated by allergic reaction [6, 14, 8, 13].

Keywords: allergy, immune system, children, eyes

In spite of numerous measures taken, every year number of children suffering allergic and immune inflammatory diseases is increasing. There are many reasons of that, but the result is always the same: immature immune system. As a rule, it is provoked by immature digestive system, helminthes invasion and disbacteriosis [4, 12].

Isolate laboratory data mostly do not let us evaluate the functional status of protective systems of visual organs characterized by the markers contained in lachrymal liquid and appearing in case of increased permeability of hem ophthalmic barrier. On the basis of these data it is possible to reveal the symptoms of immunologic deficiency [7, 9].

In relation with that the application of diagnostic and prognostic abilities of the calculation indexes nowadays gain significance, as certain combinations of the values of hemogram reflect integral characteristics of homeostatic systems of organism which form non-specific adaptation reactions. [2, 3, 10, 11].

All the aforesaid let us formulate the aim of this research: to study peculiarities of the local inflammatory process and immune response in children with allergic diseases of the eye.

Material and the methods of the research

76 sick children with allergic diseases of eyes aged from 3 to 5 years old were examined in the TashPMI children clinics facilities. Among them there were 53 (69,7%) boys and 23 (30,3%) girls.

The sick children with allergic diseases of eyes were divided to 2 groups. The first group included 34 children with allergic alterations on the surface of eyes and the second group – 42 sick children with infectious alterations. The control group included 12 healthy children under 6 years old without clinical-functional and laboratory symptoms of allergic diseases.

Criteria of exclusion from the research in all groups were taking of antihistamine and hormonal agents. All sick children had standard ophthalmologic examinations.

All children had analysis of hematologic values with the calculation of leukocyte index of intoxication (LII), allergization index (AI), lymphocyte and eosinophile correlation index, leukocyte shift index based on the correla-

tion of the number of blood cells proposed by Chistyakova T.N. and co-authors (2005).

The choice of the checked local and systemic immunologic and biochemical parameters was determined by the following: self-descriptiveness, availability of the research methods for blood and lachrymal liquid, and the most important – prognostic significance and differentiated approach in the study of the allergic diseases of eyes associated with an infection, allergic components and change of the infectious disease to infectious-allergic form which is hardly diagnosed causing difficulties in choosing the tactics of the therapy and care of that category of patients.

0,5 ml of lachrymal liquid for the research was taken by means of micro tube from the lower conjunctive fornix of the eye into a dry hermetic test tube.

We performed the study of the concentration of circulating immune complexes (CIC) in tears by means of the precipitation method using 7,5% solution of polyethylene glucocle – 6000 on borate buffer. The research was performed on SF-16 spectro meter with the wave length 450 nm. The amount of CIC was expressed in reference units (ref.un). concentration of C-reactive protein, complement component, C₃, G₂M and A class immunoglobulin, alfa-2-macro globulin, seruplasmin and lactate dehydrogenase were checked by means of the immune enzyme analysis (IEA) using the reactant kits by «Human». The amount of immunoglobulin E in serum and immunoglobulin A in lachrymal liquid was studied by IEA method using kits by «Monolind» and «Immunodiagnostic», supplied by BioChimMac company (Russia) and the values were expressed in IU/ml.

Results of research and their discussion

Children of the 1st group with infectious alterations had noted rise of intoxication index and acuity of inflammation 3,2 times ($P < 0,05$) in comparison with the control group. The rise of LII is interrelated with the decrease of percentage of nuclear forms of leukocytes and lymphocyte number. Appearance of young and immature neutrophils in the blood of the children proves the tension of compensatory processes providing detoxication. That group of children had double increase of leukocyte shift index (LSI) indicating activation of the inflammatory process and disorder of immunologic reactivity (Table 1).

Table 1

The values of blood and lachrymal liquid
of the patients with allergic diseases of eyes

Values	Healthy individuals (control)	Patients with allergic diseases of eyes	
		Infectious alterations	Allergic alterations
Leukocyte intoxication index (LII)	0,37 ± 0,04	1,21 ± 0,12*	0,07 ± 0,01*
Leukocyte shift index (LSI)	1,12 ± 0,13	2,01 ± 0,17*	0,76 ± 0,09
Lymphocyte and eosinophiles correlation index (LECI)	23,0 ± 1,72	30,0 ± 2,01*	6,2 ± 0,56*
Allergization index	0,92 ± 0,11	0,45 ± 0,04*	1,9 ± 0,22*
C-reactant protein in LL, mkg/ml	5,45 ± 0,82	184,2 ± 11,01*	54,6 ± 4,53*
Activity of LDG in LL U/l	11,9 ± 0,92	16,4 ± 1,44*	12,6 ± 1,11

Note. * – reliable difference $p < 0,05$ in comparison with the control group; LL-lachrymal liquid.

The allergization index was decreased average 2 times. Activation of inflammatory process was also proved by 30-times increase of the level of C-reactant protein not only in blood but also in lachrymal liquid ($P < 0,05$).

Thus, on the basis of the study of integral hematologic values and the level of C-reactant protein we confirmed the nature of the allergic diseases of the eye – that is inflammatory nature.

Definition of the activity of lactate dehydrogenase (LDG) and the complement components in lachrymal liquid has great importance in the

diagnosis of inflammatory diseases. As it is seen in the achieved results, activity of LDG in LL increased 1,4 times, the level of complement component 1,8 times indicating the so-called alternative mode activation of the complement.

One of the factors of complement system alternative mode activation is increase of the level of micro organism liposaccharides and A class immunoglobulins causing increase of vascular wall permeability with developing edema, which in its turn has hemotoxic and damaging effect (Table 2).

Table 2

The values of blood and lachrymal liquid
of patients with allergic diseases of the eye

Values	Healthy individuals (control)	Patients with allergic diseases of the eye	
		Infectious alterations	Allergic alterations
IgE in blood serum, IU/ml	127,6 ± 2,11	112,4 ± 4,91	342,3 ± 11,2*
SigA in LL, g/l	0,34 ± 0,03	0,16 ± 0,01*	0,26 ± 0,01*
CIC in LL (ref.un)	13,9 ± 2,11	18,9 ± 1,71	72,6 ± 1,92*
Complement component C ₃ in LL, mol/l	0,81 ± 0,13	1,43 ± 0,14*	1,74 ± 0,15*
Amount of Ig A in LL, g/l	1,02 ± 0,13	1,18 ± 0,05	0,68 ± 0,07*
Amount of Ig M in LL, g/l	0,019 ± 0,01	0,016 ± 0,01	0,043 ± 0,002*
Amount of Ig G in LL, g/l	0,24 ± 0,03	0,41 ± 0,05*	0,85 ± 0,09*

Note: * – reliable difference $p < 0,05$ in comparison with the control group; LL-lachrymal liquid.

Thus, in case of allergic diseases of the eye with infectious alterations, on the basis of the study of hematologic indexes we can observe hypersensitivity slow type allergic damage of eyes linked, as a rule, with bacterial and fungal infection.

In case of bacterial form allergic character a child has a lot of pus excreted at night. Most of the children complain about adhesion of lids after sleeping, strong aching in eyes, feeling of

alien substance in the eye, photophobia, hyperemia of mucous membranes.

On the aforesaid background physical factors become allergens. Allergic reactions, which can be specific and non-specific, develop as a response to allergen penetration into organism and promote production of antibodies and lymphocytes able to interact to that allergen. Since that moment the stage of mediator forming starts and the mediators (histamine, serotonin) damage tissue cells.

The children with allergic alterations (2nd group) examined by us had average 2 times growth of allergization index (AI) ($P < 0,05$), while the other integral values of blood showed decrease of the indexes such as LII (5 times), LSI (1,5 times) and LECI (3,8 times).

According to the reference data the value of LII is diminished in case of the decrease of the level of endogenic intoxication and increase of eosinophiles amount. 3.8 times diminishing of the lymphocytes and eosinophiles correlation index of the children of that group must be determined by immediate type hyper sensitivity and disorder of immunologic reactivity of organism.

Usually immediate type hyper sensitivity reactions develop within 30 minutes starting from the moment of allergen impact. Immediate conjunctive reactions are caused by releasing of biologically active mediators from the granules of mastocytes to conjunctive at the time of their activation and degranulation. The released mediators cause itching of eye-lids, photophobia, epiphora, edema and hyperemia of the mucous membrane.

Immediate type allergic reaction is inter-related with formation of IgE class antibodies which fix on mastocytes and promote secretion of histamine, heparin, etc. apparently the increase of eosinophiles in number in the checked individuals is determined by the presence of histaminose and heparinose in these cells and these substances neutralize biogenic amines and heparin. In its turn, it should be noted that histamine is hem toxic to eosinophiles.

In that type of reactions in the organisms of the children of the 2nd group there can be formed antibodies to the cells of eye tissue – mostly IgG and IgM.

The analysis of the achieved results indicated the growth of the level of M antibodies 2,3 times and G class 3,6 times ($p < 0,05$). These antibodies are called precipitating because of their ability to form precipitate by means of joining to corresponding antigen. As it is seen from the results of the research that kind of immune complexes precipitate 2,5 times exceeded the original values ($p < 0,05$). That leads to the classic mode activation of complement system and it is displayed in 1,6 times rise of complement level in lachrymal liquid ($p < 0,05$) in comparison with the control group.

New formed immune complexes are phagocytes by eosinophiles causing activation of proteolysis in the places of immune complexes accumulation. As a result there is damage of cells and tissues and subsequent activation of the local inflammation process. The latter is proved by average 10 times rise of C-reactive protein level in lachrymal liquid ($p < 0,05$).

The activation of the inflammatory process with the background activation of C₃ component leads to the increase of vascular wall permeability with development of edema and intensification of hem taxis of eosinophiles to lachrymal liquid.

Thus the children with allergic diseases of the eye associated with allergic alterations have the rise of allergization index and IgE in blood, level of C-reactive protein, CIC, C₃ complement and amount of IgM and G in lachrymal liquid. That enables us to conclude, that application of integral indexes of blood and values of immune-protection system makes it possible to differentiate the presence of inflammation and allergization process relevant to it.

References

1. Belyamova A.F. Some aspects of the allergic reactivity and possibilities of its correction in patients with «dry eye» syndrome: Abstract ...DisCMS. – St. Petersburg, 2011. – P. 21.
2. Berejnova I.A. and others. Complex evaluation of trachea and bronchial content in gerontologic practice // Clinical laboratory diagnosis. – 2005. – № 12. – P. 34–35.
3. Kobets T.V., Nekrasov V.N., Motrich A.K. The role of leukocyte indexes in the estimation of adaptation-compensatory abilities of Chukchi children with recurrent bronchitis at the stage of sanatorium- resort therapy // Bulletin of physiotherapy and resortology. – 2003. – P. 47–48
4. Kozlova A.V., Kozlova S.A., Ternikov P.P. The dynamics of cytokines level in lachrymal liquid in case of long-lasting wearing of soft contact lenses // Medical academic journal. – 2012. – № 1. – P. 50–52.
5. Kurbacheva O.M. Modern aspects of diagnosis and therapy of allergic diseases// Collection of conference thesis. – M., 2009 – P. 31–37.
6. Maychuk U.F. Allergic conjunctivitis. The modern view on clinical forms and diagnosis // Refraction surgery and ophthalmology. – 2010. – Vol. 10. – № 2. – P. 46–49.
7. Ostrovski V.K., Mashenko A.V., Yangolenko D/V., Makarov S.V. The values of blood and leukocyte index of intoxication in the estimation of severity and definition of the prognosis in case of inflammatory, purulent and destructive diseases // Clin. lab. diagnostics. – 2006. – № 6. – P. 50–53.
8. Simonova M.S. The diagnostics and therapy of various clinical-immunologic forms of allergic conjunctivitis in children: Abstract ...Diss. CMS. – M., 2009. – 21 p.
9. Speranski I.I. Samoylenko G.I., Lobacheva M.V. Common analysis of blood – do we use all possibilities? Integral indexes of intoxication as a criteria of severity evaluation for endogenic intoxication, complications and efficiency of the therapy // Ukraine health. – 2009. – № 6 (19). – P. 51–57.
10. Sukhorukov V.P. and oth. Integral hematologic indexes as criteria of severity and efficiency of preeclampsia therapy // Clinical laboratory diagnosis. – 2007. – № 11. – P. 47–50.
11. Chistyakova G.N. and oth. Application of integral hematologic indexes for estimation of organism autointoxication degree in case of pregnancy complicated by hestosis // Clinical laboratory diagnosis. – 2005. – № 12. – P. 35–37.
12. Shaimova V.A. The role of pro-inflammatory cytanics for eye diseases // Ophthalmology and therapy. – 2004. – Vol. 4. – № 3. – P. 30–32.
13. Abelson M.B. Allergic diseases of the eye // Philadelphia. – 2001.
14. Bielory Z. Allergic diseases of the eye // Med Clin N. Am. – 2006. – Vol. 90. – P. 129–148.
15. Johansson S.G.O., Haahtela T. World allergy organization. Manual for prophylactics of allergy and allergic asthma // Allergy and immunology – 2005. – № 1 – P. 81–91.

Materials of Conferences

**THE ACTIVITY OF ANTI-OXIDANTS
ENZYMES IN ERYTHROCYTES
IS AN INDICATOR OF FATIGUE
IN TRAINING**

¹Chigrinski E.A., ¹Sosnin M.I., ²Conway V.D.,
¹Metirinski J.J., ¹Efremenko E.S.

¹Omsk State Medical Academy, Omsk;

²Omsk State Agrarian University, Omsk,

e-mail: chigrinski@list.ru, chigrinski@dr.com

Professional sports training is often accompanied by excessive exercise, which often leads to the development of fatigue. Fatigue can cause a decrease in the organism's performance and its resistance towards adverse conditions. Existing methods of the diagnosis of fatigue are not always effective, which impedes the appropriate correction of the developed metabolic abnormalities.

There is a lot of data in scientific literature reporting that an elevation in the levels of creatinine, urea, lactic, β -hydroxybutyric acid, and triglycerides was observed in the athlete's blood during excessive exercise. However, the concentrations of these metabolites rise in the early stages of the athlete's training, thus making it impossible to use them as fatigue markers. Therefore, the search for biochemical parameters, which are not affected by the optimal level of exercise but are significantly altered during excessive exercise, is very important. The enzymatic activity of the antioxidant system in erythrocytes could be such a parameter.

Erythrocytes are easy to isolate from the athlete's blood specimen, taken at any stage of preparation. The activity of enzymes is less affected by the sample preparation, which is often delayed. An increase in the period between taking the blood sample and its analysis could lead to the accumulation of metabolites or to the decrease of its concentration which could eventually lead to an incorrect conclusion. Therefore, the detection of the enzyme's activity is more preferable.

For our study we've chosen the enzymes of the antioxidant system since, as it well known, any exercise is a strong activation factor of free radical processes. From this point of view, the most interesting enzymes are super oxide dismutase (SOD) and catalase (CAT). These enzymes belong to the first level of antioxidant defence and as such interact with reactive oxygen species directly.

The aim of this study was: to establish the connection between the intensity of the exercising and the activity of the enzymes of the antioxidant system and to explore the possibility to use such enzymes as markers of fatigue.

The experiments were performed on 30 Wistar rats, which were separated into 3 groups. The first

group was a control group (group C). The second group comprised of the animals with an optimal exercise regime (OE). During the experiment, which lasted for five weeks, these rats were swimming with a load, constituting 10% of their body weight, until tired every other day. This swimming regime provided the maximum physical activity for the rats without over-training. The third group comprised of rats with an excessive exercise regime (E group). The animals in this group were swimming with the same load until tired every other day for the first three weeks and then the rats were swimming every day for the last two weeks, which led to the development of fatigue. During the experiment, the time of effective swimming was taken into the account (TES). After the completion of the experiment the concentrations of creatinine, lactic acid, β -hydroxybutyric acid were measured in the rats' blood. The total protein concentration and the activities of superoxide dismutase (SOD; ECEC 1.15.1.1) and catalase (CAT; ECEC 1.11.1.6) were determined in hemolysate. The statistical analysis of the data was performed using *t* Student criterion.

The results obtained revealed that in the OE group changes among the biochemical parameters, which are normally tested in sports medicine, were observed. For example, the concentration of lactic acid in rats of the OE group increased by 20% ($P=0,029$) compared to the control group. During the optimal exercising regime a pattern of increase of β -hydroxybutyric acid concentration (by 22% n. s.) was observed. The creatinine concentration was increased by 19% ($P=0,032$) in the OE group compared to the control.

In the blood of rats in the excessive exercise group a sharp increase of lactic acid concentration was observed, which was 82% ($P<0,001$) and 52% ($P<0,001$) as compared to the C and OE groups, respectively. This could be due to the enhancement of anaerobic glycolysis, caused by oxygen deficiency in tissues. The concentration of β -hydroxybutyric acid in the blood of rats in the EE group was higher than its concentration in the animals of the C and OE groups by 68% ($P=0,041$) and 38% ($P=0,028$) respectively. This could be due to the enhanced oxidation of fatty acids, which compensates for insufficient ATP production under the excessive exercise condition, and also due to the slower oxidation of the acetyl-CoA from formed in ketone bodies in Krebs cycle reactions. In turn, this leads to the development of ketoacidosis in tissues, which, as well as lactic acidosis, changes the activity of the enzymes.

The changes in the enzyme activity during exercise of any intensity had a different pattern than

the changes in the conventionally used parameters. SOD and CAT activities in rats in the OE and control groups were not statistically significant. The SOD activity in erythrocytes in rats of the E group decreased (by 45% ($P < 0,001$) and 41% ($P < 0,001$) compared to the similar parameter in groups C and OE, respectively), while CAT activity decreased by 57% ($P < 0,001$) and 50% ($P = 0,001$).

During the optimal exercising regime, the experimental animals increased TES, which indicates that the ratio between time spent in training and recovery periods were adequate. In the EE group a decrease in TES was observed, which suggests the development of fatigue in animals. We considered that the best parameters to use for the indication of the development of fatigue would be the parameters which are not affected during the optimal training regime but rapidly change during the excessive exercise regime. According to our results, such indicators could be the enzyme of the antioxidant system of erythrocytes, i.e. the activity of the enzymes SOD and CAT. Unlike the parameters which are conventionally used in sports medicine, these parameters are not affected during the optimal training regime. Therefore, the activity of the enzymes SOD and CAT could be used as effective markers of fatigue.

The concentrations of creatinine, lactic acid and β -hydroxybutyric, which depend on the rate of the accumulation of these metabolites, on the rate of their degradation and re-utilisation, are more variable. The statistically significant increase in the concentrations of these metabolites in the OE group allows the use of these parameters as markers of tiredness during the optimal exercises, rather than as markers of fatigue. Further investigations, which required the participation of athletes from various kinds of sports, could confirm or dispute the results.

Conclusion. Optimal exercise led to a moderate increase in the concentration of lactate and creatinine in the blood of rats, while excessive exercise was accompanied by a substantial increase of creatinine, lactic and β -hydroxybutyric acids. During the optimal exercise regime, the activity of superoxide dismutase and catalase in erythrocytes was not affected, while the excessive exercise regime led to steep decay in the activity of these enzymes. The data obtained revealed changes in the parameters, which are conventionally used in sports medicine, which proves them to be inefficient indicators of fatigue. We consider that the enzymes of the antioxidant system in erythrocytes could be effective markers of the fatigue.

The work is submitted to the International Scientific Conference «Actual problems of science and education», Germany, (Dusseldorf-Cologne), November, 8-15, 2013, came to the editorial office on 19.11.2013.

THE CLINICAL AND MORPHOLOGICAL CHARACTERISTICS OF THE STOMACH AND DUODENAL ULCER BY THE OPIUM NARCOMANIA

Guseinova Z.K., Tayzhanova D.Z., Toleuova A.S., Beysembekova Z.A., Tauesheva Z.B.

Karaganda State Medical University, Karaganda,
e-mail: aliyatoleuova@yahoo.com

According to WHO data in the world more than 200 million people use narcotics [1]. Usage of narcotic drugs affects the somatic pathology character and demands pathogenic treatment development. The Altai cleared mummy is applied at the disturbance of acidic production damage (hypo, hyper antacid conditions) at the stomach and duodenum ulcer. It is used as a preparation rendering protective and antitoxic effect that allows recommending it for treatment of patients with the specified stomach pathology and drug addiction.

The purpose of our research was clinical-morphological justification of the possibility of Altai mummy preparation in complex treatment of the patients with drug addiction who has stomach and a duodenum ulcer.

Material and research methods. In clinical conditions it was surveyed 70 patients, who has distributed in two groups: the I group (main) were 40 patients with drug addiction had stomach and duodenum pathology aged from 18 till 40 years. Usage duration of opium group psychoactive agents composed from 1 to 10 years. The average daily dose of psychoactive agent was 2,0–3,0 grams. The II group (comparisons) composed 30 patients with stomach and duodenum pathology without drug addiction.

At the detailed poll in the anamnesis of both group patients (I and the II groups) are found the following risk factors as systematic food intake disturbances and diet regimen damage (at 70% patients), long psychoemotional loads (64%) and adverse heredity by the ulcerative disease (32%). For the purpose HP eradication in the I group of patients is prescribed antibacterial therapy with amoxicillin 500 mg \times 2 times a day, clarithromycin 500 mg \times 2 once a day, a vegetative cytoprotector as mummy 0,2 g by 1 tablet \times 2 times in a day, proton pump inhibitor Omeprazol 20 mg 1 \times 2 times a day within the 14 days.

The biopsy materials of the stomach and duodenum were taken on endoscopy, fixed at 10% of formalin solution, filled with paraffin. Paraffin sections painted with hematoxylin and Eosin, methylene blue and looked through a light microscope. Contamination of a stomach mucosa with *Helicobacter pylori* (Hp) determined by stomach biopsy materials and urease express-test and morphologically by the coloring methylene blue [2].

Investigation results and discussion. The microscopic picture of the stomach and duodenum ulcers in both investigated groups had a morphological variety of processes, the inherent is long developing wavier pathological process with exac-

erbation and remission phase changes. Zones of exudation and destruction, fibrinoid necrosis, young and mature granulated and scar tissue, alternate with sites of necrotic mass sloughing and with epithelium growing up under it. At the bottom of ulcerative defects is visible necrosis zone sequestration and the replacement of them with leukocytes and mononuclear cells. On the background of an angiogenesis sites and the scar formation are observed different degree expression of lymphoplasmatic cellular infiltration and fibrosclerosis. On the border with destructed stomach and duodenum wall muscular elements are visible sites with the prolonged chronic inflammation, growth of granulated tissue and scar formation.

The detail comparative morphological investigation showed the inflammation processes intensity in the background of sequencing ulceration and regeneration processes, consists some mosaic picture and more meeting at the long duration opium addicts. Those processes are presented as intestinal metaplasia of duodenum to the stomach epithelium.

At the border with the stomach mucous ulcerative defect is visible a small on depth forces and a regenerating glandular epithelium. In that patients' intramural nervous plexuses and ganglions is noted the cytoplasm vacuolation, a nodules pyknosis of the ganglionic cells and the expressed lymphoid cell infiltration.

Another feature of a peptic ulcer on the drug addiction background is the increased infiltration of a scar formatting ulcerative stroma with lymphocytes, plasmocytes with an admixture of neutrophil granulocytes and mast cells. In a granulation tissue of an ulcer wall in group of comparison cellular infiltration is more weak, neutrophils are single, lymphocytes and plasmocytes are prevailing. Here is finding the capillaries, set and unripe glands of the pseudopyloric type.

The hypersecretion reason, which found in part of the main group patients, is the parietal cell hyperplasia. It, allegedly, can be bound tone uroregulatory secretion mechanisms disturbance, probably taking place, as additional Exo–endogenic factor of opium narcotic influence.

Thus, it is possible to assume, that in pathogenetic mechanisms of opium narcomania influence on the duodenal ulcer morphogenesis there is elements influence as an «aggression» and «protection» factors. However, they have expressed opposite character.

References

1. Medical newspaper for all. Hygiene. – 2005. – № 2. – P. 1–2.
2. Aruin L.I., Kapuller L.L., Iskakov V.A. Morphological diagnosis of diseases of the stomach and intestines. – M.: Triad-X, 1998. – 496 p.

The work is submitted to the International Scientific Conference «Quality life of patients with different nosological forms», Mauritius, February, 17–24, 2014, came to the editorial office on 06.02.2014.

PERSON'S FETUS PAROTID SALIVARY GLANDS AGE FEATURES

Opravin A.S., Ulyanovskaya S.A.,
Golubovich A.V., Khachatryan A.V.,
Margaryan A.A., Teterina E.V.,
Kondratenko E.A.

Northern state medical university, Arkhangelsk,
e-mail: usarambler78@rambler.ru

Purpose. To study fetal parotid salivary glands age features.

Materials and methods. Research is done on the material received from 40 fetuses (10–24 weeks of development) during 2012–2013, died in delivery rooms (maternity homes) of Arkhangelsk, delivery room and city hospital № 1 of Severodvinsk. Material distribution according to age: 10 weeks of $n = 2$, 13 weeks of $n = 6$, 14 weeks of $n = 2$, 16 weeks of $n = 4$, 17 weeks of $n = 4$, 18 weeks of $n = 8$, 19 weeks of $n = 2$, 20 weeks of $n = 4$, 21 weeks of $n = 4$, 24th week of $n = 4$. The fetal death causes were particular conditions in the perinatal period ($n = 70\%$) and congenital anomalies ($n = 30\%$) were causes of fetuses death. The autopsy material was gathered within 24 hours after death and was fixed within 24 hours in 10% solution of neutral formalin. Macro- and microscopic preparation of separation of parotid salivary glands was carried out. The gland mass (mg), volume (cm^3), length, width, thickness (mm), the area (mm^2) were measured. Various forms of glands in its contour were studied. All stages were photographed by the Nikon D7000 Kit camera.

Results. In the pre-natal period the parotid gland is in a deep hollow behind a branch of the mandible, in retro mandibular fossa. The gland has a gray-yellow color similar in color of hypodermic-fatty cellulose. In this age period gland form nearly corresponds to the walls of a bed and has an irregular form. There are variants of gland form: oval (32%), triangular (13%), quadrangular (9,6%), prismatic (22,8%), ellipsoid (9,6%) and pyramidal (9,6%). The volume of gland is variable. Average organ mass was $184,2 \pm 128,31$, volume $0,2 \pm 0,1$, length $11,9 \pm 4,22$, width $7,6 \pm 2,95$, thickness $3,3 \pm 1,34$, area $91,2 \pm 45,02$.

Conclusions. While studying age dynamics of body measuring values of fetal parotid glands, the dependence of weight, length of glands and head circumference of a fetus (Kruskala-Wallace's criterion 19,541 (9) 0,021; 20,219 (9) 0,017) from gestational age was revealed. When comparing the body measuring values of the right and left glands statistically significant differences were not revealed ($p > 0,05$).

The work is submitted to the International Scientific Conference «Topical issues of pediatrics and pediatric surgery», Mauritius, February, 17–24, 2014, came to the editorial office on 27.01.2014.

TO THE ASSESSMENT OF ORGANISM AEROBIC RESERVES IN CONNECTION WITH MIGRATION

Safronova N.S., Fomenko A.V.

*Taurida National V.I. Vernadsky University,
Simferopol, e-mail: tnu-fr@rambler.ru*

Within the research of human adaptation to a change of permanent residence the assessment of migration impact on the migrants' health and aerobic organism reserves is of special interest. According to modern concepts the figure of maximal oxygen consumption (MOC) is an objective characteristic of human aerobic capacity. However, direct measurement of this parameter is quite time-consuming and not expedient. Moreover, during the physical working capacity test «to refusal» untrained people rarely reach the level of MOC and stop testing much earlier at the so-called symptom-limited MOC (SL-MOC). At the same time there are a number of methods that allow indirectly and quite accurately determine this figure, for example, by calculating PWC₁₇₀ test results. Therefore, the ratio of oxygen (O₂) consumption speed at the level of individual maximum endurable testing capacity, i.e. SL-MOC, to calculated value of MOC may act as one of the characteristics of aerobic organism reserves. Obviously, the higher the index is, the higher the individual reserves and capabilities to achieve aerobic maximum are. In this context, the determined aim of this paper is to conduct a comparative analysis of organism aerobic reserves in groups of Crimean Tatars migrated to the Crimea and the ones have been living there since birth.

The research involved 45 Crimean Tatars aged 18–21. The first group consisted of 24 people, born and residing in the Crimea, the second one comprised of the ones who migrated to the peninsula at least 15–20 years. Research methods include working capacity testing, spirometry, Gas analyzer research. The results of the research showed that migrants' organism aerobic reserves, according to the ratio of MOC to SL-MOC, were more than 6% ($p < 0,05$) reduced in comparison with the second group of examined. It is also interesting to note that the actual values of SL-MOC and MOC was also 16% ($p < 0,05$) and 8% ($p < 0,05$) accordingly reduced. Thus, there is a reason to believe that the impact of migration negatively affected aerobic reserves of examined. The results of the research can be further used in the diagnostics of health and in the development of individual health-preserving technologies for people who have changed their residence.

The work is submitted to the International Scientific Conference «Ecology and human health», Mauritius, February, 17–24, 2014, came to the editorial office on 07.02.2014.

THE CONTROL OF OXYGEN TENSION IN MUSCLE TISSUE USING BIOEFFECTIVE PULSE-FREQUENCY GENERATOR NEYROTON-01

Shaov M.T., Pshikova O.V.

*Kh.M. Berbekov Kabardino-Balkar State University,
Nalchik, e-mail: olgapshikova@mail.ru*

The article discusses the results of studying remote (non-invasive) control of oxygen tension in muscles of experimental animals using bioeffective pulse-frequency generator Neyroton-01 – a model of acoustic-electromagnetic continuum adapted to the impulse hypoxia of nerve cells. We suggest a hypothesis on the quantum mechanical (quantum theory of multiparticle and multielectron systems) nature of the «phenomenon of adaptation» encoding in the system of neuron oscillators. It was established that under the influence of the test technology, the level of pO₂ in the muscles of experimental animals decreases prior to the onset of tissue hypoxia, and then, as part of the aftereffect, there is a significant increase of pO₂ up to the level of physiological hyperoxia, which, according to the literature, is a sign of adaptation. Therefore, we can assume that we found a new and efficient method of forming the state of adaptation in the body other than the already known methods, such as high-altitude acclimatization, altitude-stepwise, barophysical and normobaric adaptations, exhausting physical exercises, etc. Results of this work suggest the real possibility of a non-invasive control of pO₂ levels in body tissues, which may be important for health care, mountaineering, physical culture and sports, space missions, as well as for the creation of new bioeffective pulse-frequency generators.

As shown by long-term studies (M.T. Shaov, 1981; O.V. Pshikova, M.T. Shaov, T.Sh. Khapazhev, 1995; M.T. Shaov, O.V. Pshikova, Kh.M. Kaskulov, 2002; O.V. Pshikova, I.S. Abazova, 2011), reduced frequency of impulse electrical activity (IEA) and increase in oxygen tension (pO₂) in experimental animals are indicative of the adaptation of their cerebral cortex nerve cells to impulse hypoxia caused by barophysiological appliances or high altitude conditions.

As a rule, the IEA frequency decreases from $10,0 \pm 0,43$ to $5,17 \pm 0,45$ pulses/s on the average, whereas pO₂ usually increases from $24,0 \pm 1,40$ to $33,4 \pm 2,20$ mm Hg. This implies that the dynamics of IEA and pO₂ is carried out within the famous Synergetic rule of Verhulst, according to which, indicator fluctuations (pO₂ and IEA) must not exceed the level of their initial value by large values (I.A. Eryukhin, 2000).

In another series of experiments it was found that at low-frequency IEA (< 10 Hz), nerve cells effectively control the cardiac activity (Z.A. Shidov, O.V. Pshikova and others, 1995) and adaptive capacity (O.V. Pshikova, 1999) of experimental animals' body: at normal (normoxic) frequency in the

range of $10,0 \pm 0,43$ Hz at height of 10 km (pressure chamber), ECG was recorded (4,30 beats / min) in only one animal out of seven, whereas at the adaptive frequency of IEA, making on the average $5,17 \pm 0,45$ Hz, ECG was recorded (20 beats/min) in five animals. Under the control of the low-frequency IEA, the critical threshold of rats' resistance to altitude (CTAR is an indicator of adaptive capacity in animals) of nerve cells increased by 2,5 km (O.V. Pshikova, 1999).

The basis for this are information links under the laws of quantum mechanics of multiparticle and multielectron systems formed between oxygenated sessions of impulse hypoxia by the acousto-electromagnetic continuum of neuron and pO_2 in the tissues of the body.

Based on the results of these studies, with the aid of radio engineering (pulse technique) means and modern computer technologies, we created bioeffective pulse-frequency generators Neyroton 01 and 02, which reproduce IEA frequencies adapted to neuron hypoxia and are able to remotely control physiological functions of the human body (M.T. Shaov, D.A. Khashkhozhcheva, O.V. Pshikova, 2008; M.T. Shaov, O.V. Pshikova, Z.A. Shaova, 2010), being in direct proportion to the oxygen regime in cells and tissues. This is explained by the fact that deoxygenation (hypoxia) and oxygenation (hyperoxia) processes triggered by pulse hypoxia potentiate and perpetuate the «phenomenon of adaptation» in oscillators (K^+ , Na^+ , Cl^- , I^-/I^+ , CO_2 , O_2 and ROS, RNA and others) of the neuron quantum field. As a result, communications between the oscillators caused synchronized oscillations of electric, acoustic and electromagnetic signals, i.e. data carriers, to arise in the system of acoustic-electromagnetic continuum of a neural cell; these signals are characterized by their own frequencies and propagating waves. These questions relate to the

fundamental problems of biophysics and the new quantum-wave physiology (M.T. Shaov, O.V. Pshikova, 2010). Now, the fact that the low-frequency (< 10 Hz) IEA neuron oscillations are the translators of information about «the phenomenon of adaptation» (M.T. Shaov, Kh.A. Kurdanov, O.V. Pshikova, 2010) is of considerable interest; by means of these oscillations, we can create an imprinting technology for non-invasive management of physiological processes in cells and tissues of the body.

However, it is known that oxygen tension is the most important indicator of the physiological state of individual cells and organ tissues (V.A. Berezovskiy, 1975; M.T. Shaov, 1981). In this context, to find out whether it is possible to remotely control the pO_2 level by means of Neyroton technology, we conducted a series of studies on experimental animals.

Methods and objects. The gastrocnemius of a lake frog and Wistar white rats served as the object of study. Oxygen tension was recorded using high-speed highly sensitive polarograph by the method of pO_2 level determination in cells of plants and animals proposed by M.T. Shaov (1968, 1981). Polarographic platinum ultramicroelectrode was introduced into the target tissue using a special stereotactic technique. Animal's body was exposed to low-frequency IEA model adapted to impulse hypoxia of Neyroton-01 neuron.

These experiments were performed on 50 frogs and 35 rats. The results of experiments were processed using a conventional biometric method. Neyroton duration – 10 minutes, the distance to the animal – 2,5 meters. Since its frequencies are in the infrared range, Neyroton-01 influence can be extended to greater distances.

Results and discussion. The pO_2 dynamics in the gastrocnemius muscle of experimental animals under the influence of Neyroton-01 is shown in Fig. 1.

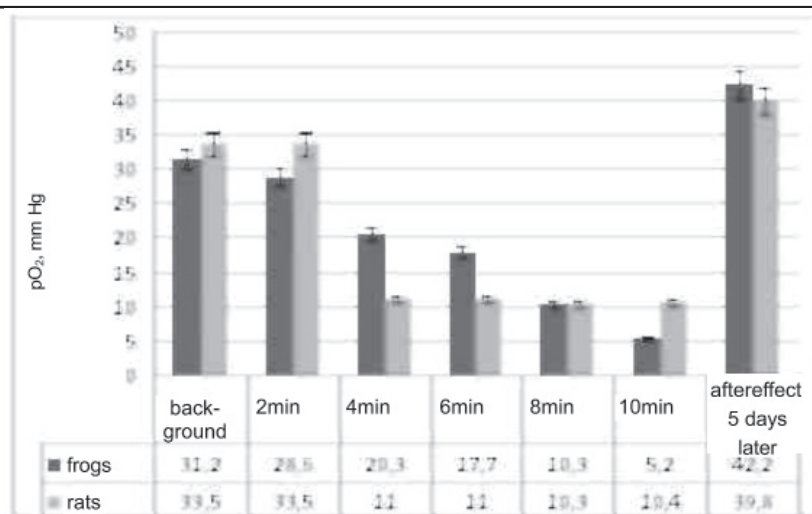


Fig. 1. pO_2 level change in muscle in experimental animals under the influence of pulse-frequency generator «Neyroton-01»

Fragments of differential oscillo- and polarograms of oxygen in the tissues are shown in Fig. 2 and 3. The background value of pO_2 in the gastrocnemius muscle of the frog was equal to the average of $31,2 \pm 1,10$ mm Hg; in that of a rat – $33,5 \pm 1,07$ mm Hg. Approximately the same data under the background conditions were obtained in the earlier studies (V.A. Berezovskiy, 1975; O.V. Pshikova, 1999 and others) during the registration of pO_2 in the muscle tissue of intact frogs and albino rats.

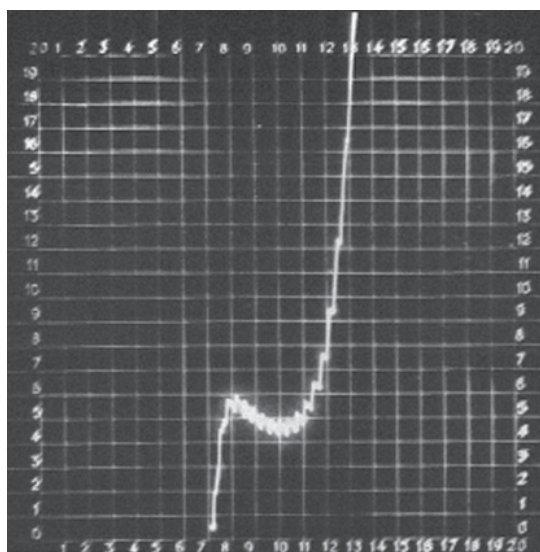


Fig. 2. Polarogram of oxygen registered in the gastrocnemius muscle of the frog prior to the impact of «Neyroton-01»; height (h) is proportional to pO_2 , $h = 5$ cm

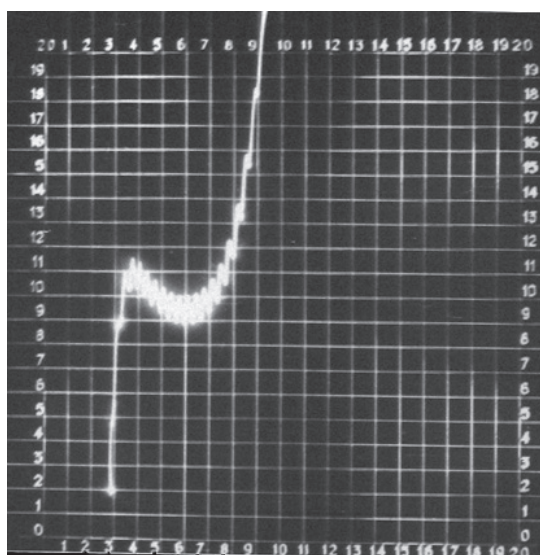


Fig. 3. Polarogram of oxygen registered in gastrocnemius muscle in frog after 10 minutes of exposure to «Neyroton-01», height (h) is proportional to pO_2 , $h = 8,2$ cm

Under the influence of Neyroton-01, there was a gradual (stepwise) decrease in pO_2 level from $31,2 \pm 1,10$ to $5,20 \pm 1,11$ mm Hg ($p < 0,05$) in the gastrocnemius muscle of the frog. The dynamics of pO_2 in the gastrocnemius muscle of white rats was different: first (at minute 4), there was a significant drop from $33,5 \pm 1,07$ to $11,0 \pm 1,16$ mm Hg; at minute 6, 8 and 10, pO_2 level stabilized – fluctuations occurred within 0,5 mm Hg.

In conditions of the aftereffect (5 days after the experiment) pO_2 level in muscle tissue significantly increased: in frogs – from $31,2 \pm 1,10$ (background) up to $42,2 \pm 1,11$ mm Hg, in white rats – from $33,5 \pm 1,07$ (background) to $39,8 \pm 0,87$ mm Hg. Such pO_2 changes are indicative of an already formed state of adaptation.

Consequently, the frequencies of the model of acousto-electromagnetic properties of a nerve cell may carry the information about the «phenomenon of adaptation».

The pO_2 level change in the muscle of experimental animals that were exposed to Neyroton-01 suggests that critical oxygen tension in living tissue depends on the animal's position in the tree of evolution – for frogs, it is $5,20 \pm 1,11$ mm Hg, and for warm-blooded animals (such as white rats) – 10–11 mm Hg. E.A. Kovalenko attached great importance to the definition of the critical level of pO_2 in cells and tissues for solving important problems in the pathophysiology and general hypoxicology. Furthermore, as follows from the results of this study, the kinetics of pO_2 can be indicators of adaptive reserve of an organism: the nature of pO_2 reduction in the muscle of the lake frog is logical, since it (the frog) is able to adapt to impulse hypoxia and hyperoxia (hypoxia dominates in water, whereas hyperoxia is common on land). White rat on the land does not have such an opportunity, as it is constantly exposed to ambient air that contains 145 mm Hg of pO_2 (pO_2 level for Nalchik). It is known that the constant factor cannot form a state of adaptation in the body at the molecular and cellular level (A.M. Gerasimov, N.V. Delenyan, M.T. Shaov, 1998; O.V. Pshikova, 1999). Apparently, for these reasons, the frog is able to quickly mobilize antihypoxic mechanisms and gradually reduce the level of pO_2 , whereas the white rat launches its protective mechanisms somewhat later.

The overall direction of pO_2 dynamics in «cell-tissue» system is an increase of its level up to moderate hyperoxic state with small (9–10 mm Hg) excess of the initial (normoxic) values. This sudden change in pO_2 level is crucial, because in physiological conditions of hyperoxia, the tissues activate ADS, i.e. antioxidant defense system (A.M. Gerasimov, N.V. Delenyan, M.T. Shaov, 1998) and establish the oxygen regime in cells and tissues, under which the occurrence of diseases (cancer, hypertension, stroke, etc.) becomes almost unlikely, since the basis of their pathogenesis is hypoxia.

Thus, the results of these series of experiments suggest the actual possibility of remote (non-invasive) control of pO_2 level in tissues of the body,

which may have important implications for health care systems, physical education and sports, mountaineering, flights to the stratosphere and space, and creation of new areas of production in the field of Instrument Engineering, such as the release of bioeffective pulse-frequency generators based on quantum wave properties of nerve cells.

References

1. Shaov M.T. Dynamics of oxygen tension and electrical activity of brain cells in normal and hypoxic state // *Pathological Physiology and Experimental Therapy*. – M.: Meditsina, 1981. – P. 22–26.
2. Shaov M.T., Pshikova O.V., Kaskulov Kh.M. Mechanisms for protecting the brain from malignant tumors using pulsed-hypoxic adaptation // *Hypoxia in medicine*. – M., 2002. – P. 52–55.
3. Pshikova O.V., Shaov M.T., Khapazhev T.Sh. Change in oxygen tension and bioelectric activity of neurons of the sensorimotor cortex of the brain under the influence of interval-rhythmic hypoxia and sea buckthorn // *Actual problems of hypoxia: Collection of scientific papers*. – M. – Nalchik, 1995. – P. 46–56.
4. Pshikova O.V., Abazova I.S. Determination of the reliability of cerebral cortex neurons adapted to the high altitude and impulse hypoxia under hypobaric altitude chamber hypoxia // *Kubanskiy nauchniy meditsinskiy vestnik*. – 2011. – № 4 (127). – P. 156–159.
5. Eryukhin I.A. Ideological legacy of I.P. Pavlov in the medicine of extreme situations // *Vestnik rossiyskoy voenno-meditsinskoy akademii*. – № 1. – 2000. – P. 14–22.
6. Shidov Z.A., Pshikova O.V., Zhilyasova A.A. Changes in the heart rate of animals at hypobaric interval-rhythmic hypoxia // *Actual problems of hypoxia: Collection of scientific papers*. – M. – Nalchik, 1995. – P. 97–101.
7. Pshikova O.V. Rapid adaptation to hypoxia and its functional mechanisms. – Rostov-on-Don, 1999. – 233 p.
8. Shaov M.T., Khashkhozheva D.A., Pshikova O.V. Management of physiological functions of the human body in terms of mountain ecology through the «voice of neuron» – i.e. electroacoustic impulses of a nerve cell // *Problemy regionalnoy ekologii*. – 2008. – № 4. – P. 205–209.
9. Shaov M.T., Pshikova O.V., Shaova Z.A. Remote control of human health by means of quantum-wave physiological technology (quantum wave physiology) // *Uspekhi sovremennogo estestvoznaniya*. – 2010. – № 5. – P. 21–28.
10. Shaov M.T. Dynamics of intracellular oxygen tension in the excitation of nitella flexilis // *Biologicheskie nauki*. – 1968. – P. 129–131.
11. Kovalenko E.A. Modern problems of hypoxia pathogenesis // *Actual problems of hypoxia: Collection of scientific papers*. – M. – Nalchik, 1995. – P. 12–19.
12. Gerasimov A.M., Delenyan N.V., Shaov M.T. Formation of anti-oxygen protection of the body. – M., 1998. – 187p.
13. Shaov M.T., Pshikova O.V. Neuroinformation technology of the new quantum-wave physiology // *Abstracts of Reports from the 21st Congress of the Physiological Society dedicated to I.P. Pavlov*. – M. – Kaluga, 2010. – P. 684–685.
14. Shaov M.T., Kurdanov Kh.A., Pshikova O.V. Oxygen-dependent electrophysiological and energy-informational mechanisms of nerve cells' adaptation to hypoxia. – Voronezh: Nauchnaya kniga, 2010. – 196 p.
15. Berezovskiy V.A. Oxygen tension in the tissues of animals and humans. – Kiev, 1975. – 277 p.

The work is submitted to the International Scientific Conference «Present-day problems of science and education», Russia (Moscow), February, 25–27, 2014, came to the editorial office on 03.02.2014.

ESTIMATION OF RISK FACTORS OF RESTENOSIS AFTER CORONARY REVASCULARISATION

Taizhanova D.Z., Visternichan O.A.,
Zhunusov E.S., Tauesheva Z.B.

Karaganda State Medical University, Karaganda,
e-mail: taizhanova_kgma@mail.ru

Coronary heart disease continuous to take the leading position in the world as the cause of death and early disablement of persons able to work, in spite of active introduction of modern methods of diagnostics and treatment.

Now a days in the treatment of coronary heart disease actual problem is both surgical and endovascular revascularization. Stents introduction with drug covering allows to show the priority of endovascular surgery in the chose of the methods of the coronary artery passage restoration.

In spite of the endovascular surgery progress high percents of complication stays after percutaneous coronary angioplasty.

The most often restenose of coronary arteries is takes place, which according to the statistics is developed during first 6 month after percutaneous coronary angioplasty in 20–40% of patients [1–3], and in complicated injuries of coronary arteries it reaches 60% [4].

The aim of the research: the estimation of coagulative factors influence and factors of inflammation on the risk elevation of restenosis.

Materials and methods of the research.

100 males of Karaganda region who unevened the procedure of stenting of coronary arteries in connection with acute myocardial infarction were examined.

Questionnaire of the patients was made paying attention to finding of risk factors of coronary heart disease: smoking, arterial hypertension and hereditary factors of cardiovascular pathology. Biochemical findings of lipid specter, coagulogramms, C-reactive protein and changing of thrombocyte level were estimated.

All the patients were divided to two groups: 50 persons each. The 1st group consisted the patients with restenosis of coronary arteries determined by coronarography during 1 year after stenting in connection with the repeated episode of acute coronary syndrome; the 2nd group consisted with the patients without the signs of restenosis.

Results of research and their discussion. According to the questionnaire it was determined, that in the 1st group there were 44% of smokers, but in the 2nd group the factor of smoking was only in 17%. Hereditary factors to coronary heart disease was higher in the 1st group (64%) in comparison with the 2nd group (50%). Special attention was payed to that the arterial hypertension was more often in the 1st group too (64%).

The signs of hypercoagulation were seen in 36% in the 1st group, but in the 2nd group there were only 20% of cases. Moderate level of thrombocytosis

was seen in each 2nd patients of the 1st group and in each 4th patients of the 2nd group.

It necessary to mark that in the 1st group in 100% of patients the elevation of C-reactive protein was registrated. At the same time in the 2nd group no one case with signs of inflammatory syndrome were marked by clinical and laboratory examinations.

Conclusions

1. Clinico-biochemical prognostic factor of possible development of restenosis of coronary arteries may be the elevation of C-reactive protein, hypercholesterinemia, hypertriglyceridemia, hyperlipoproteidemia and inclination to hypercoagulation.

2. The elevation of thrombocyte level may also be possible factor, as intervention of thrombocyte aggregation, including stenting zone.

3. Marked clinical and laboratory damages are to be seen as indications for making of coronarography for the diagnosis of possible restenosing.

References

1. Kuznecov V.A., Zyranov G.V., Kolunin G.V. and others. Thesis of reports of Russian national Cardiologists Congress «Russian cardiology: from the center to regions». – Tomsk; 2004. – 264 p.
2. Puretski M.B., Abugov S.A., Saakan U.M. Herald of roentgenologist. 2003; 2: 25–31.
3. Myler R.K., Shaw R.E., Sterizer S.H. et al. J. Am. Coll. Cardiol. 1992; 19: 1641–1652.
4. Fischman D.L., Leon M.B., Bain D.S. et al N. Engl. J. Med. 1994; 331: 496–501.

The work is submitted to the International Scientific Conference «Quality life of patients with different nosological forms», Mauritius, February, 17–24, 2014, came to the editorial office on 22.01.2014.

LUNGS FUNCTION BY THE OPIUM INTOXICATION

Tayzhanova D.Z., Toleuova A.S.,
Bekmagambetova Z.B.

Karaganda State Medical University, Karaganda,
e-mail: aliyatoleuova@yahoo.com

The research aims. Assessments of the lung function at opium consumers depending on intoxication duration.

Material and research methods. There are observed 70 narcomaniacs consuming opium daily in a number of 2,0–3,0 grams. Middle age of opium narcomans was 26,5 years old. Depending on the narcotic consumption, duration the observed patients are distributed in two groups: I – 2–3 years lasting of intoxication, II – a narcotization within the 4–5 and more years. The control group was 20 almost healthy men comparable on age. By the assessment of the lung function condition of the observed patients defined the following indicators: vital capacity (VC), forced vital capacity (FVC), forced exhalation volume for 1 Sec. (FEV1), Tiffno's index (FEV1/FVC), the maximum exhalation

volume rates at the lung volumes 25, 50 and 75% of FVC (MEF25, MEF50, MEF75), average maximum expiratory flow at the lung capacities from 25 to 75% of FVC, the peak expiratory flow (PEF). The lung function researched conducted on the spirometry computer «Pneumos 300» of Car-diette firm (Italy).

Research results. By the lung function analysis of the I group changes from pulmonary volumes and capacities it isn't found. So, VC in the I group was $98,4 \pm 1,91\%$, FVC – $102,35 \pm 2,10\%$ that significantly didn't differ from the control group measurements ($99,6 \pm 3,71\%$ and $103,1 \pm 2,79\%$). Air flow studying on a bronchial tree allowed to note that in the I group FEV1 decreased in 7,2%, and Tiffno's index – at 8,6%. More significant deviations were outlined from MEF and MMEF reflecting of a bronchial tree proximal and distal departments permeability condition.

So, in the I group is noted the MEF25 and MEF50 decrease on 12,8% and 10,1% ($p < 0,05$) though MEF75 decrease (on 5%) didn't differ from control measurement. MMEF25-75 were 9,2% lower, than at almost healthy ($p < 0,05$). PEF also decreased to 14% ($p < 0,05$). When testing with berotec for identification of respiration mechanics disturbance by bronchi smooth muscles fibers tonus increase of 69.2% of the I group persons tests was positive and at the other – negative. In other words, in most of the cases the obstruction was reversible.

The lung function analysis in the II group testifies about the progression of pulmonary ventilation disturbances. So, high-speed indicators are authentically lowered: OFV1 on 16,1%, Tiffno's index – on 15,1%. The bronchial permeability disturbances, mainly central respiratory tracts are confirmed by more expressed decrease of MEF25 ($77,5 \pm 2,48\%$) in the II group in comparison with a similar indicator in the I group ($102,9 \pm 4,73$). PEF decreases to $81,4 \pm 2,30\%$ (also to $84,7 \pm 3,02\%$ in the I group). The special attention is drawn to the dynamic characteristics decrease at the level of distal bronchi, making 11,3% for MEF75 ($p < 0,05$) and 16,1% for MEF50 ($p < 0,001$). At more long opium intoxication MMEF25-75 decreases by 9,5% also. The VC and FVC in the II group tended to decrease, however the difference from comparing groups was not reliable. At observed patients of the II groups 47,7% a pharmacological test was positive, at 50% – negative, at 1 patient – paradoxical.

Thus, in process of opium intoxication duration augmentation high-speed indicators of air flow on a bronchial tree are aggravated. The obstruction of the periphery respiratory tracts recorded the express progressing decrease of MEF50 and MEF75. With the augmentation of intoxication term the reversible component of bronchial obstruction decreases. The diagnosed rejections of high-speed characteristics of air flow a bronchial tree can be surveyed as an early (preclinical) stage of chronic obstructive

illnesses of the lungs. In the other words the systematic narcotization within the 4–5 and more years should be regarded as a condition of prebronchitis.

The work is submitted to the International Scientific Conference «Quality life of patients with different nosological forms», Mauritius, February, 17–24, 2014, came to the editorial office on 27.01.2014.

THE OPIOMANIACS' INFECTION WITH THE HEPATITIS VIRUSES B AND C

Tayzhanova D.Z., Toleuova A.S., Guseinova Z.K., Bekmagambetova Z.B.

Karaganda State Medical University, Karaganda,
e-mail: aliyatoleuova@yahoo.com

Patients with a narcomania are a group of high risk of hepatitis B (HBV) and hepatitis C (HCV) development. They are consisting a peculiar tank for the diffusion of narcotic and virus epidemic [1]. The toxic influence of narcotic preparations, infection by hepatitis B and C viruses or their combination, of narcotics intravenous administration promotes pathological process in a liver. The hepatitis C virus has the highest chroniogenic potential and is the main reason of all groups of a chronic liver disease formation— chronic hepatitis, cirrhosis, hepatocellular carcinoma [2].

Research aim is the assessment of hepatotropic viruses (B and C) infection degree in groups with high risk where finding injection narcomaniacs.

Materials and research methods. We are observed 113 narcomaniacs consuming opium intravenously in a number of 2,0–3,0 grams daily. Middle age of opiomaniacs is $24,6 \pm 1,6$ years old (from 19 to 39 years). The majority of observed were males (85,1%), only 14,9% – female.

It was used diagnostic immune enzyme test-system. It is a set of the components the basis of which was recombinant antigens of the hepatitis C virus, corresponding to the HCV genome proteins coded sites. For identification of a hepatitis B virus antibodies and antigens applied also a reagent set. The principle of it was consisted in the interaction of antibodies to HCV with the antigens immobilized in the small cavities of a polystyrene tablet. Formation of an antigen antibody complex was discovered by the serum immune enzyme conjugate which yielded primary positive results. Then repeatedly was checked in a confirming test strip. The immune enzyme analysis, it was spent on a Sanoti Paster spectrophotometer.

Results and discussions. The analysis of HCV and HBV infection of frequency testifies to their high prevalence among injection narcomaniacs: HBsAg – 18%, HBeAg-6%, anti-HBcIgM – 17,6%, anti-HBe – 45%, anti-HBs – 43%, and anti-HBcIgG – 19,6%. It should be noted at the 6% of narcomaniacs with chronic hepatitis was found anti-HBcIgM and HBsAg combination that testified about the condi-

tion of HBV replication. Anti-HBcIgG is defined at the 19,6% of narcomaniacs and it was criterion of the acute virus hepatitis transferring. Expressed frequency (45%) anti-HBV at opium consumers excluded of HBV replication activity practically at a half of patients. Thus, it wasn't excluded infected by a mutant form of a virus.

It is noted high HCV infection of the injection narcomaniacs. So, anti-HCV – positive observed patients appeared 83,1%. Thus, the frequency of HCV depended on opium consumption, duration: at narcomaniacs lasting narcomania of 1 year – anti-HCV – positivity is revealed at 33,3%, with the term of opium intoxication 2–3 years – at 41,4% and lasting 4–5 and more than years – at 83,9%. There are data that the average duration of the chronic hepatitis C formation after an initial infection deviates from $10,0 \pm 11,3$ to $13,7 \pm 10,9$ years and in 20 years at 20% of such patients develops cirrhosis and a hepatocellular carcinoma [3].

Thus, the special attention is deserved by the fact of high frequency of circulation of virus hepatitis B and C markers at narcomaniacs of young age, and extent of HCV infection directly depends on of a narcotization experience and is progressively enlarged in process of narcotic intoxication time elongation.

References

1. Loginov A.S., Ilchenko L.U., Caregorodcev T.M. The narcomaniacs' liver // Therapeut. Archive. – 1999. – № 9. – P. 39–44.
2. Yastrebova O.N. Hepatitis C / Method. Rec., Novosibirsk. – 1998. – P. 26.
3. Mayer K.P. The natural flow and diagnosis of viral hepatitis C // Russian journal of gastroenterology, hepatology and coloproctology. – 2000. – № 4. – P. 21–23.

The work is submitted to the International Scientific Conference «Quality life of patients with different nosological forms», Mauritius, February, 17–24, 2014, came to the editorial office on 27.01.2014.

NONSPECIFIC ULCERATIVE COLITIS IN COMBINATION WITH RHEUMATOID ARTHRITIS

Toleuova A.S., Beysenbekova Z.A.,
Tayzhanova D.Z.

Karaganda state medical university, Karaganda,
e-mail: aliyatoleuova@yahoo.com

Introduction. Rheumatoid arthritis, in the structure of rheumatologic diseases, consists about the 10% and is one of the most widespread inflammatory joint diseases. According to different authors mention [1] joints damage often meets at nonspecific ulcerative colitis, but a separate combination of rheumatoid arthritis and nonspecific ulcerative colitis is rare. In our clinical case of the patient with long-term rheumatoid arthritis with the expressed joints deformation and full disability

were observed and in the subsequent at the patient nonspecific ulcerative colitis with its complications developed.

Case description. Patient N. is 66 years old, hospitalized in the surgery department of № 1 city hospital of the Karaganda city from 23.09.2013 till 09.10.2013 with the following diagnosis:

Nonspecific Ulcerative Colitis. Sigmoid colon phlegmon. Diffuse purulent peritonitis.

IHD. MI (2000, 2008). Aortic atherosclerosis. Arterial hypertension III degree, risk 4. Chronic Heart Failure I degree, Functional Class I.

Rheumatoid arthritis. Seropositive, late stage, I stage of activity, with systemic manifestations (rheumatoid nodules and arthropathy). Functional Damage III degree.

Anemia I degree, on the background of rheumatoid arthritis and gastrointestinal pathology. DIC syndrome, IV stage.

Complaints: abdominal pains, meteorism, nausea, repeated vomiting with the gastric contents, liquid stool, dryness in a mouth, weakness.

Anamnesis morbi: Within the last 8 years she noted pains at first in knee joints with gradual transition to ankle joints. There were rheumatoid small nodules around the 4 years ago. Because of joint pains incidentally, she accepted nonsteroid anti-inflammatory drugs. The last deterioration within a day when for no apparent reason began abdominal pains. At once she didn't ask for medical care, in dynamics pain began to grow. She accepted laxatives, without positive effect. Due to her condition deteriorated, she called «ambulance» and was hospitalized in the surgical department of the 1st city hospital.

Other anamnestic data: In 1996 she had a cholecystectomy. In 2000 and 2008 she had myocardial infarction. Within 10 years she suffered from arterial hypertension her BP was 180/110 mm Hg. She accepted hypotensive drugs by situation.

The Allergic anamnesis isn't burdened.

Objective data: patient condition is heavy, because of pain and intoxication syndromes, and accompanying pathology. Her consciousness is adequate. Integuments are usually colored. Peripheral lymph nodes aren't increased. The thorax is correct form, participates in the breath act. On auscultation in the lungs is listened rigid breath on all fields, crepitations aren't present. The respiratory rate is 19 per min. Heart sounds are muffled, rhythm is correct. BP is 140/90 mm Hg, pulse is satisfactory properties, 90 beats per min. The tongue is dryish, has a white cover. The abdomen has the correct form, is evenly blown up. There is a postoperative scar without inflammation signs in epigastria. On palpation abdomen is painfulness. On percussion: tympanic sound, the peristaltic movement is weakened in all departments. The Blumberg's symptom is positive. The liver isn't increased. The spleen isn't palpated. Gases don't leave. The stool is absent. Pasternatsky symptom is negative from both sides. Urination is free, painless.

Perrectum: The perianal area isn't changed. The tonus of a sphincter is kept. Rectum walls overhang isn't present. On glove excrement traces is usually colored.

Laboratory diagnostic tests: in blood – leucocytosis, ESR acceleration; in urine analyses – a moderate proteinuria; in coagulogram PTI is decreased (60%), soluble fibrin monomer complexes are positive; in biochemical analyses – without changes; histologically intestines biopsy research showed – sharp erosive and ulcerative colitis with vessel thrombosis; on ECG – a sinus rhythm, HR is 80 per minute, electric axis is deviated to the left.

Treatment: In clinic the patient received conservative treatment. On the conservative therapy background, abdominal pains are remained. There were peritonitis symptoms. She was operated. Intra operatively was found sigmoid colon phlegmon. It was made: left hemicolectomy, with one opening colostomy, sanitation and drainage of an abdominal cavity.

In the postoperative period the patient was in reanimation department, received the appointed treatment: tramadol 2,0 IM, № 3; ceftriaxone 1,0×3 times per day IV, № 4; glucose 5% – 400,0, № 4; 0,9% physiological saline solution – 1200 l, № 4; 1% morphine solution – 1,0 IV, № 3, metrogyl 500 – 100,0 IV, № 4, dimedrol 1,0×1 per day IM, № 3; ketotop 2,0 IM, № 1; prednisolonum 60,0 IV, № 4; humulin 4 UN IV; clexane 0,4 PC № 4, hemotransfusion 209,0 ml, № 122012110042061, 290,0 ml, № 122062110044152.

After condition stabilization the patient is transferred to surgical department where continued to receive the appointed treatment: 0.9% physiological saline solution – 800,0 IV, № 11; xefocam 2,0 IM, № 8; Glucose solution 5% – 500 + potassium chloride 7,4% – 20,0 + insulin 4UN IV, № 7; Amiclav 1,2×3 times per day IM, № 11; metrogyl 100×2 times per day IV, № 10; fraxiparine 0,4 PC, № 11, morphine 1,0 IM, № 2; fercayl 2,0 IM, № 11, tramadol 2,0 IM, № 3, nexium 40 mg, № 3; Prednisolonum 60,0 mg IV, № 9, bandagings, colostoma care.

The postoperative period proceeded hard, due to accompanying pathology.

On the 6th day of the postoperative period the control drainage is removed. Postoperative wound without inflammation signs, healing by primary tension. Seams are removed. Colostoma functions. The patient independently eats, stool is regular through colostoma.

Patient's condition at the moment of the hospital leaving: She is in a satisfactory condition on the further out-patient management.

Discussion. Further treatment of this patient, first of all, is connected with reconstructive operation. Use of immunosuppressive therapy before new operation can call infectious complications. Only after the recovery operation, it is possible to speak about treatment, both nonspecific ulcer colitis, and rheumatoid arthritis.

According to some authors [2, 3] it is possible to use the following scheme of treatment: (sulfasalazine 4–6 g per day, mesalazine 3–4,8 g per day) – per os and mesalazine 2–4 g per day per rectum or corticosteroids – Prednisolonum 20–30 mg per day or a hydrocortisone 125–250 mg per day in the form of enemas. In the absence of effect Prednisolonum 1 mg on 1 kg per day in combination with rectal introduction of corticosteroids and mesalazine (Prednisolonum 20–30 mg per day or hydrocortisone 125–250 mg or mesalazine 2–4 g per day).

Conclusions. Thus, treatment of this patient remains in discussion and depends, first of all, from the patient's condition during the postoperative period, from the progression of nonspecific ulcerative colitis and rheumatoid arthritis.

References

1. Kovalenko V.M. Diseases of the circulatory system and dynamics analysis and / V.M. Kovalenko, V.N. Kornatsky // Analytical and statistical manual. – 2008. – P. 66–79.
2. Cruz V.A., Yamaguchi L., Ribeiro C.N., Magalhães V.deO., Rego J., Silva N.A. Ulcerative colitis and rheumatoid arthritis: a rare association--case report. *Rev Bras Reumatol.* 2012 Aug;52(4):648–50.
3. Smolen J.S. EULAR recommendations for the management of rheumatoid arthritis with synthetic and biological disease-modifying antirheumatic drugs / J.S. Smolen, R. Landewé, F.C. Breedveld // *Ann Rheum Dis.* – 2011. – Vol. 70. – P. 1519.

The work is submitted to the International Scientific Conference «Quality life of patients with different nosological forms», Mauritius, February, 17–24, 2014, came to the editorial office on 06.02.2014.

PECULIARITIES OF STRUCTURE FETAL PANCREAS CONGENITAL MALFORMATIONS OF ORGANS AND SYSTEM

Ulyanovskaya S.A., Bolduev V.A., Basova L.A.,
Dolbanenko V.S., Khvorostinina T.S.

*Northern State Medical University,
Arkhangelsk, e-mail: usarambler78@rambler.ru*

The study of the pancreas in the process of ontogenesis is very important in connection with the increase of pathology among children and plenty of congenital anomalies. The purpose of re-

search – to reveal the peculiarities of the structure of the pancreas fetuses with congenital malformations organs and systems. The study was carry out on autopsy material (pancreas of 139 fetuses from 16 to 40 weeks of growth). Causes of death 139 fetuses were different conditions appearing in the perinatal period ($n = 91$; 65,5%) and congenital anomalies ($n = 48$; 34,5%). Autopsy material was climbed in one day after death and fixed in 10% solution of the neutral formalin. And then we carried out morphometry (measured mass of the pancreas (gr), examined versions of pancreas to its contour, determined the shape of the tail and head of the pancreas). Paraffin blocks were prepared according to the standard technique, histological sections were stained with hematoxylin and eosin. Using ocular test systems we determined the following characteristics: the volume of nuclei cells of the pancreas, nuclear-cytoplasmic index, specific gravity (Aai) of stroma, exocrine and endocrine components of gland, Aai of large islets. Were compared obtained data with mid latitude standards and the results of earlier studies. The data were statistically processed using SPSS software, version 19,0. The critical level of statistical significance was accepted 0,05 (p).

Peculiarities of the structure of the pancreas fetuses with congenital malformations of organs and systems can be considered:

1. Prevalence of glands curved shape with cut tail and quadrangular head.
2. Dependence on the age of the mass of the pancreas, perimeter, length, volume and width in the area of head, body and tail, thickness in three departments ($p = 0,0001$).
3. Dependence on causes of death the form of segments in the head and body of a gland, specific density of organ, stroma ($p = 0,0001$).

The obtained data dictate the need for further detailed study of the morphology of the pancreas and its structural components depending on the cause of death of the fetus.

The work is submitted to the International Scientific Conference «Modern Problems of Experimental and Clinical Medicine», Thailand, February, 19–27, 2014, came to the editorial office on 23.01.2014.

SELENORGANIC COMPOUND 1,5-DI-(M-NITROPHENYL)-3-SELENAPENTADION-1,5 EFFECT ON CLINICAL STRAINS OF PSEUDOMONAS AERUGINOSA

Rusetskaya N.Y., Borodulin V.B.

Saratov State Medical University n.a. V.I. Razumovsky, Saratov, e-mail: rusetskayanu@yandex.ru

In work was studied the action of selenorganic compound 1,5-di-(m-nitrophenyl)-3-selenapentadion-1,5 on clinical strains of *Pseudomonas aeruginosa* extracted from patients with suppurative complications of traumatology and orthopedic hospital. Incubation (30–150 minutes) of *P. aeruginosa* with 1,5-di-(m-nitrophenyl)-3-selenapentadion-1,5 in concentration 0,01 mg/ml has led to inhibition of bacterial colonies growth on 34–57%; 0,1 mg/ml – on 70–99% and 1 mg/ml – on 92–100% in comparison with control. It is possible that antibacterial activity of the investigated compound is caused by the presence of lateral nitro-groups in its structure.

Keywords: selenium, selenorganic compound, *Pseudomonas aeruginosa*, antibacterial action

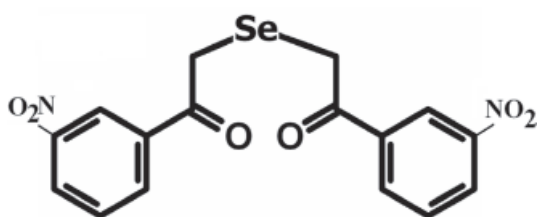
Now significant amount bacterial strains, resistant to antibiotics of a wide spectrum of action are appeared. Therefore the synthesis of new antibacterial compounds and studying of their action mechanisms are pressing question. Throughout several last years antimicrobial activity of organic compounds of selenium is established [3, 4, 8]. For example, selenorganic compound ebselen (2-phenyl-1,2-benzisoselenazol-3(2H)-on) possesses antimicrobial activity on Gram-positive and Gram-negative bacteria in low concentration (MIC = 0,2–1,5 mkg/ml) [1, 5, 6, 9]. Antimicrobial activity of ebselen is comparable to activity of some nitrofurans compounds. It is known that antibacterial activity of nitrofurans derivatives is caused by nitro-group presence in their structure [2].

Besides, earlier it was informed about antimicrobial activity of selenorganic compounds 1,5-di-phenyl-3-selenapentadion-1,5 (diacetophenonyl-selenide – DAPS-25) and its derivatives on clinical strains of *Pseudomonas aeruginosa* [7].

The aim of the study: to analyze antimicrobial activity of selenorganic compound 1,5-di – (m-nitrophenyl)-3-selenapentadion-1,5 (nitro-derivative of DAPS-25) on clinical strains of *Pseudomonas aeruginosa* extracted from patients with suppurative complications of traumatology-orthopedic hospital.

Materials and methods of research

In this work we used selenorganic compound 1,5-di – (m-nitrophenyl)-3-selenapentadion-1,5, kindly given by a professor B.I. Drevko:



Experiment was carried out on 10 taxonomic identical clinical strains of *Pseudomonas aeruginosa* (*P. aeruginosa*) extracted from patients with suppurative complications which are on treatment in a traumatology and orthopedic hospital of the Saratov scientific research institute of traumatology and orthopedics. Generic identification of strains has carried out on the basis of studying phene. Bacteria had resistance to five and more structural antibiotics. Suspension of bacteria prepared with use the turbidity standard of the State scientific research institute of standardization and the control of medical biological preparations n.a. L.A. Tarasevich, by consecutive cultivations to final concentration of bacteria – $3 \cdot 10^5$ cells in 1 ml.

For investigation of antibacterial action we prepared 4 dilutions of selenorganic compound in concentrations 0,001–1 mg/ml. The mix of dimethylformamide (DMFA) in 0,9% solution NaCl in the relation 1:10 is used as a solvent. Aliquot of 100 µl of final suspension of microorganisms was added in test tubes with diluted compound and incubated for 30, 60, 90, 120 and 150 minutes at a room temperature. As the control group used the same quantities of bacterial suspension dissolved in similar proportions with the solvent (DMFA in 0,9% solution NaCl) and incubated for the same time interval. Then aliquot of 100 µl of bacterial suspensions from each test tube inoculated and spread on nutrient meat-peptonic agar which was incubated for 24 hours at 37°C. Counting of colonies was made next day.

Statistical analysis of finding carried out by means of software package Statistica 6.0. We checked hypotheses about a kind of distributions (Shapiro-Wilk's criterion). A lot of findings did not fit of distribution law. For comparison of values the U-Mann-Whitney's criterion, Z – Fisher's criterion and a p-value were determined. A critical significance of p-value in this research accepted equal 0,05.

Results of research and their discussion

The results depicted in Table 1 show strong activity of selenorganic compound 1,5-di – (m-nitrophenyl)-3-selenapentadion-1,5 against clinical strains of *P. aeruginosa*. This compound in concentration 0,01 mg/ml inhibited the bacterial colonies growth on 34% (30 minutes), 38% (60 minutes), 51% (90 minutes), 36% (120 minutes) ($p < 0,001$) and 57% (150 minutes) correspondingly ($p < 0,05$) in comparison with the control.

The compound in concentration 0,1 mg/ml has led to inhibition of bacterial colonies

growth on 70% (30 minutes), 73% (60 minutes), 82% (90 minutes), 92% (120 minutes) and 99% (150 minutes) ($p < 0,001$) correspondingly in comparison with the control.

The compound 1,5-di-(m-nitrophenyl)-3-selenapentadion-1,5 in concentration 1 mg/ml demonstrated the greatest antibacterial activity. The incubation of *P. aeruginosa* with this

compound in concentration 1 mg/ml during 30, 60 and 90 minutes led to reduction of bacterial colonies quantity on 92, 93 and 99% correspondingly in comparison with control ($p < 0,001$). The growth of bacterial colonies was inhibited completely after 120 and 150 minutes incubation of *P. aeruginosa* with 1,5-di-(m-nitrophenyl)-3-selenapentadion-1,5.

Table 1

Antibacterial effect of 1,5-di – (m-nitrophenyl)-3-selenapentadion-1,5 on clinical strains of *Pseudomonas aeruginosa*

			The quantity of colonies on nutrient agar				
			Control group	Experimental groups, concentration of compound, mg/ml			
				1	0,1	0,01	0,001
Time of incubation, minutes	30	1002 (967; 1107)	83(67; 178) $Z_k = 3,77$; $p_k = 0,000157$	298(256; 348) $Z_k = 3,77$; $p_k = 0,000157$	661(563; 781) $Z_k = 3,55$; $p_k = 0,000377$	975(896; 1176) $Z_k = 0,22$; $p_k = 0,227206$	
	60	1034 (867; 1143)	76(43; 153) $Z_k = 3,77$; $p_k = 0,000157$	278(229; 395) $Z_k = 3,77$; $p_k = 0,000157$	641(508; 765) $Z_k = 3,36$; $p_k = 0,000765$	1016(947; 1078) $Z_k = 0,30$; $p_k = 0,762369$	
	90	947 (805; 993)	9(0; 81) $Z_k = 3,77$; $p_k = 0,000157$	170(104; 197) $Z_k = 3,77$; $p_k = 0,000157$	462(405; 765) $Z_k = 2,94$; $p_k = 0,003197$	894(856; 956) $Z_k = 0,68$; $p_k = 0,496292$	
	120	977 (894; 1171)	0(0; 0) $Z_k = 3,77$; $p_k = 0,000157$	74(27; 183) $Z_k = 3,77$; $p_k = 0,000157$	627(408; 680) $Z_k = 3,77$; $p_k = 0,000157$	762(654; 905) $Z_k = 2,60$; $p_k = 0,009109$	
	150	885 (764; 937)	0(0; 0) $Z_k = 3,77$; $p_k = 0,000157$	6(0; 81) $Z_k = 3,77$; $p_k = 0,000157$	378(128; 645) $Z_k = 3,25$; $p_k = 0,001152$	803(549; 874) $Z_k = 1,51$; $p_k = 0,130571$	

Notes: In each case is given median value, lower and top quartiles (25; 75%). Z_k , p_k – differences in comparison with control group.

Thus, selenorganic compound 1,5-di – (m-nitrophenyl)-3-selenapentadion-1,5 in concentrations 0,01–1 mg/ml demonstrated strong activity on clinical strains of *P. aeruginosa*. However low concentration 0,001 mg/ml of this compound slightly decreased bacterial colonies quantity (on 22% after incubation 120 minutes). At other incubation time intervals it was not observed authentic antibacterial effect of the compound.

Finally, we assume that compound action is caused by presence of two nitro-groups in its structure. It allows drawing an analogy with antibacterial action of nitrofurans. It is known, that nitrofurans get antibacterial activity after reduction of nitro-groups by flavin-dependent nitro-reductases, localized in bacteria, protozoa

and tissues of organism. Intermediate products of consecutive one-or two-electronic stages of reduction are highly reactive, especially nitro-radical anion, thanks to which nitrofurans get antibacterial activity [2].

In this connection, it is possible to assume, that antibacterial activity of 1,5-di – (m-nitrophenyl)-3-selenapentadion-1,5 is caused the presence in its structure of two nitro-groups which, being treated by bacterial enzymes action, show the cytotoxic activity concerning clinical strains of *Pseudomonas aeruginosa*.

Conclusion. Findings allow suggesting the perspectives of using of 1,5-di – (m-nitrophenyl)-3-selenapentadion-1,5 as antibacterial compound against antibiotic-resistant bacterial strains of *Pseudomonas aeruginosa*.

References

1. Chan G., Hardej D., Santoro M., Lau-Cam C., Billack B. Evaluation of the antimicrobial activity of ebselen: role of the yeast plasma membrane H⁺-ATPase // *J Biochem. Mol. Toxicol.* – 2007. – Vol. 21. – № 5. – P. 252–264.
2. Glybochko P.V., Svistunov A.A., Borodulin V.B., Rusetskaya N.Y. Nitrofuranes: chemical structure and biological activity. – Saratov: Publishing house of the Saratov medical university, 2010. – 199 p.
3. Holl V., Coelho D., Silbernagel L., Keyser J.F., Waltinger C., Dufour P., Bischoff P.L. Prevention of nitrogen mustard-induced apoptosis in normal and transformed lymphocytes by ebselen // *Biochem. Pharmacol.* – 2000. – Vol. 60. – № 11. – P. 1565–1577.
4. Lindenblatt N., Schareck W., Belusa L., Nickels R.M., Menger M.D., Vollmar B. Anti-oxidant ebselen delays microvascular thrombus formation in the rat cremaster muscle by inhibiting platelet P-selectin expression // *Thromb. Haemost.* – 2003. – Vol. 90. – № 5. – P. 882–892.
5. Nozawa R., Yokota T., Fujimoto T. Susceptibility of methicillin-resistant *Staphylococcus aureus* to the selenium-containing compound 2-phenyl-1,2-benzisoxselenazol-3(2H)-one (PZ51) // *Antimicrob. Agents Chemother.* – 1989. – Vol. 33. – № 8. – P. 1388–1390.
6. Pietka-Ottlik M., Wójtowicz-Młochowska H., Kołodziejczyk K., Piasecki E., Młochowski J. New organoselenium compounds active against pathogenic bacteria, fungi and viruses // *Chem Pharm Bull (Tokyo)*. – 2008. – Vol. 56. – № 10. – P. 1423–1427.
7. Rusetskaya N.Y., Goroshinskaya I.A., Borodulin V.B., Dimidov D.P., Borodulin Y.V. Antibacterial activity of selenorganic compound diacetophenonylselenid and its chloride-derivative on the clinic strains of *Pseudomonas aeruginosa* // *News of higher educational institutions. The North Caucasian region. Natural sciences.* – 2012. – № 4. – P. 69–72.
8. Sakurai T., Kanayama M., Shibata T., Itoh K., Kobayashi A., Yamamoto M., Uchida K. Ebselen, a seleno-organic antioxidant, as an electrophile // *Chem. Res. Toxicol.* – 2006. – Vol. 19. – № 9. – P. 1196–1204.
9. Wójtowicz H., Kloc K., Maliszewska I., Młochowski J., Pietka M., Piasecki E. Azaanalogues of ebselen as antimicrobial and antiviral agents: synthesis and properties // *Farmaco.* – 2004. – Vol. 59. – № 11. – P. 863–868.

*Materials of Conferences***CEREBELLUM INBRED ALBINO RATS
DURING EARLY ONTOGENY**

Sheyan D.N., Tereshchenko A.A., Lutenko M.A.,
Kastornova Y.I.

*Kharkiv National Medical University, Kharkiv,
e-mail: den.doctor@rambler.ru*

This study was performed in accordance with the thematic plan of research Kharkiv National Medical University, Ministry of Health of Ukraine in the framework of research project: Department of Human Anatomy «Morfological peculiarities endocrine system, nervous and vascular system under normal conditions and under influence some factors» (state number registration 0108U007050). The author is responsible for the investigation of the central nervous system.

Introduction. In studies of age-related changes of physiological systems of the human body in recent years there has been increased interest in the earliest stages of postnatal ontogenesis. This is due to several reasons, medical and social nature: demography, ecology and, above all, children with a history of fertility status – prematurity, functional immaturity, congenital disorders of physiological systems of various origins (genetic, infectious, etc.).

The object of research at the preclinical stage are laboratory animals, and in many cases – these white rats.

According to the physiological state of the newborn animals white rats are immature (immaturantnym) [3–5]. Man under normal harboring also born immature. According to the degree of immaturity of newborn baby rat closer to premature babies. However, just one month accelerated development of the animal becomes an independent individual. In humans, the longest period of immaturity of all mammals [1, 2]. However, both infants – a child, and the experimental animal characterized by incomplete formation – maturation of the central nervous system at the stage of embryonic development [4]. The most immature at birth, even in normal children are matured by the cerebellum and the cerebral cortex [7]. In connection with this motor activity is characterized by their lack of spontaneity and coordination. Premature infants have low physical activity, muscular hypotonia, hyporeflexia, tremors, ocular nystagmus. If these features are characterized by three weeks old, we can assume the presence of diseases associated with the pathology of the nervous system. [6]. The newborn albino rats on the overall assessment of the development there is a significant incompleteness: they blind, outer does not open the ear, they do not detect elements of motor activity.

Objective: to study the morphological features of the development of the cerebellum inbred albino rats during early ontogeny.

Material and methods. Observations carried out in 10 broods of albino rats born to 10 female and 3 male rats of the same species in individual cage. Each broods of 9 to 12 rats. Total number of animals in the experiment was 98. The animals were kept under standard vivarium conditions KhNMU.

Methods: morphometric, time-study, macroscopic-microscopic, gistotopographical, histological (hematoxylin and eosin, by Niss'l), statistical.

Results and discussion. The animals were divided into two groups be called «observation» and «morphological» where the object of study is the brain and the cerebellum of the white rat during early ontogeny. In the «observation» group consisted of rats in an amount of 14. In the «morphological» group consisted of rats in an amount of 84. The research work was divided into two phases. At the first stage monitors and time-study of development of motor activity of albino rats from the first day and during the first month of postnatal life, as determined by body weight and linear dimensions of rats. At the second stage of the work we measured morphometric parameters of the brain and cerebellum (their linear dimensions, mass determination). Weigh conducted twice daily (9:00 and 19:00). To determine the linear dimensions of the body of a white rat baby laid out on graph paper and it marks the point of the distance from tip of nose to tip of tail rectified. Extracted whole brain was laid out on a square cut filter paper (pre-weighed on an analytical balance), and organs were weighed on the same scale. Brain moved on graph paper laid on her ruler with a scale of 1 mm. and photographed with a digital camera to visualize the actual size of the body in the photo. Linear dimensions (length, width, height) of the whole brain and cerebellum were measured electronic caliper – Miotl accuracy of 0,01 mm. After measurement of the brain as a whole, separated from the cerebellum and brain stem was carried out to weigh it and determine linear dimensions. This study shows that during the entire period of observation weight of growing animals increased relatively evenly. By day 22, it increased almost 4 times as compared to newborn animals. Linear dimensions of the body of rats also grew about the same rate during most of the observation period, excluding the time between 7 and 9 in the afternoon, where there was an accelerated growth rate. Studying the increase in brain mass in growing animals have shown that the most intense of his growth was 7 to 12 days of postnatal life albino rats. By day 22, this index increased 2,6 times compared with newborn animals. At the same time the mass of the cerebellum increased with relatively equal rate throughout the period of observation. By day 22 the mass of the cerebellum increased 3,5 times compared with newborn animals. By evaluating the results of changes in brain

size in growing animals we have found that 3 to 5 days there was an increase growth of the brain, other days the rate of increase of this index remained approximately the same. Also no significant changes were identified based on the weight of the cerebellum on the weight of the brain during the first 22 days of life compared with newborn animals. This may indicate that 22 days of postnatal life, the growth rate as the brain and cerebellum of albino rats are high and close to the growth rate. However, by day 22 of their mass ratios remain at the level of indicators of newborn animals. Evaluating the development of the structural organization of the cerebellum according **gistotopographical** sections, it has been found that folding of the first signs appear on day 3, the development in the central part of the cerebellum, and then the process of forming the lobes extend to the caudal part. By 9–12 day in the rostral part is also detected the presence of lobules. By day 22 rat cerebellar development sufficiently formed 10 portions, which are characteristic of the cerebellum of these animals in a mature state.

Conclusions

We studied the morphological features of cerebellar development inbred albino rats during early ontogeny.

1. During the first 22 days of postnatal life, inbred albino rat brain mass growth rate increased from 7 to 12 days, and the weight of the cerebellum is stored uniformly throughout the observation period.

2. By day 22, the relative weight of the brain and cerebellum remains at level of newborn animals, and the forming of the folding of the cerebellar cortex is finished.

3. Found that by day 22 a mature state of motor activity reached characteristic of this type of animal.

We studied the morphological features of the development of the cerebellum inbred white rats during early ontogenesis. The observations were made in 10 broods white rats were born to 10 female and 3 male rats of the same species in individual cells. Each brood there was from 9 to 12 pups. The total number of animals in the experiment was 98. Number of techniques were used: morphomet-

ric, time studying, macro-microscopic, **histotopographical**, histological (**hematoxylin** and eosin stain, by **Nissl**), statistical. In studies of age changes of the physiological systems of the human body in recent years there has been increased interest in the earliest stages of postnatal ontogenesis. We found that during the first 22 days of postnatal life, brain mass inbred white rat growth rate increased from 7 to 12 days, and the masses of the cerebellum remains same throughout the observation period. By the 22nd day of the relative weight of the brain and cerebellum remains at indicators of newborn animals and finishes the forming of the folding of the cerebellar cortex. It found that mature state of physical activity, which characteristic for this type of animals, is reached by 22 day.

References

1. A. Blank, I. Hard and K. Larson. The ontogenetic development of orientation behavior in rats // *J. Comp. Physiol. Psych.* – 1967. – Vol. 63. – P. 327–328.
2. Broca P. Anatomie compare des circonvolutions cerebrales. Le grand lobe limbique et la scissure limbique dans la serie des mammiferes. – *Rev. Anthropol.*, 1978.
3. Cavaglia Marco, Dombrowski Stephen M., Drazba Judith, Vasanji Amit, Bokesch Paula M., Janigro Damir. Regional variation in brain capillary density and vascular response to ischemia // *Brain Res.* – 2001. – Vol. 910, № 21–2. – P. 81–93.
4. Conradi N.G., Engvall J, Wolff JR. Angioarchitectonics of rat cerebellar cortex during pre- and postnatal development // *Acta Neuropathol (Berl.)*. – 1980. – № 50, 2. – P. 131–8.
5. Eds. H. Brain maps: structure of rat brain. Amsterdam, 1992. Szentagothai J. Woolsey C. N. Organization of somatic sensory and motor areas of the cerebral cortex // *Biological and biochemical bases of behavior* / Eds. H., F. Harlow, C.N. Woolsey. Madison, Wisconsin. – 1958. – Vol. 24. – P. 123–125.
6. Mugnaini E. Organisation of cerebellar cortex // *Exp. Brain Res. Suppl.* – 1976. – Vol. 1. – P. 8–19.
7. Smith E.M., Calhoun M.L. The microscopic anatomy of the white rat. A photographic atlas. Ames. – Iowa, 1968 – Vol. 5. – Suppl. 5. – P. 155.

The work is submitted to the International Scientific Conference «Modern Problems of Experimental and Clinical Medicine», Thailand, February 19–27, 2014, came to the editorial office on 05.12.2013.

SIMULATION APPROACH TO THE ANALYSIS OF COPOLYMERIZATION PROCESSES

¹Berzina D.V., ¹Mikhailova T.A., ²Miftakhov E.N., ¹Mustafina S.A.

¹Bashkir State University, Ufa;

²Ufa State Aviation Technical University, Ufa, e-mail: t.a.mikhailova@yandex.ru

This paper presents a simulation approach to modeling the copolymerization processes. For its realization, we used the method proposed by the American physicist Gillespie. Mentioned algorithm considered for the example of emulsion copolymerization of butadiene with styrene.

Keywords: copolymerization, mathematical simulation, butadiene-styrene rubber

The production of polymeric materials occupies one of the leading positions in today's chemical industry. The production of polymeric products relies on the process of repeated addition of monomer molecules to the active sites of a growing chain. If two or more monomers are used as starting compounds, the process is referred to as copolymerization. In particular, synthetic rubber is produced by this mechanism. In view of the fast development of computers and extensive industrial use of polymerization processes, the issues of their mathematical simulation are of current interest. Building a mathematical model allows one not only to predict the properties of a product but also optimize the production process [1].

In describing the mathematical model of the copolymerization processes of under the understanding of chemical characteristics of conventionally are two approaches: kinetic and statistical. Kinetic approach is classical in solving problems of chemical kinetics and has successfully established itself not only in the study of physical and chemical phenomena, but also in the optimization of technological processes in the chemical industry. The basis of this method is the preparation and the numerical solution of kinetic equations for the concentrations of all types of particles involved in the process. These equations are derived from the conditions of the material balance for each component reactions involving the law of mass action, which determines the rate of formation and disappearance of this component.

As the number of monomer molecules can reach tens of thousands, the kinetic scheme, which includes all the main reaction occurring in the system is reduced to an almost infinite system of differential equations. Directly to solve such a system is not possible, so when you write the model equations, it is converted to moments of the molecular weight distribution [2]. Using such a simplification of the system allows us to calculate the average molecular characteristics of the resulting product [4], as well as under conditions of uncertainty of the rate constants of some elementary reactions successfully formulate and solve the in-

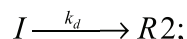
verse problem [3]. However, to get the picture changes the molecular weight distribution and study the composition of the product obtained in this approach is no longer possible.

A statistical approach based on the fact that the set of polymer molecules in a given sample it explicitly assigned a statistically equivalent set of realizations of a random process. That is, each molecule explicitly or implicitly treated as a separate realization of specific random process conditioned movement along the polymer molecules, and the probability of this realization is considered appropriate to her equal share of all the other molecules in the reaction system.

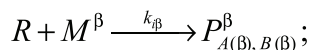
For realization a simulation modeling approach copolymerization process we apply the method proposed in 1977 by the American physicist Gillespie [4]. Describe the algorithm of the following sequence of steps.

1. For build a model of butadiene-styrene copolymerization, let us assume that the reactivity of the active center at the end of a growing chain is determined by the nature of the terminal unit. Then the kinetic scheme of butadiene-styrene copolymerization can be described by the following steps:

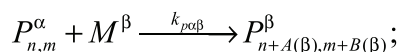
initiator decay



initiation of active centers



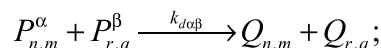
chain growth



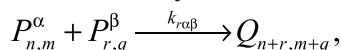
chain transfer



chain termination by disproportionation



chain termination by recombination



where $\alpha, \beta = 1, 2$; M^1, M^2 are the monomers of the first and second type; $P_{n,m}$ and $Q_{n,m}$ are the

active and inactive polymer chains with length $m + n$, comprising m units of the M^1 monomer and n units of the M^2 monomer, respectively; k_i , k_p , k_{reg} , k_d , k_r are the reaction rate constants of initiation, growth, chain propagation, disproportionation, and recombination elementary stages, respectively; $A(\beta) = \{1, \text{if } \beta = 1; \text{else } 0\}$; $B(\beta) = \{1, \text{if } \beta = 2; \text{else } 0\}$.

2. Transform the experimental rate constant of elementary reactions to stochastic rate constants according to the following equations:

$\tilde{k} = k$ for first order reactions;

$\tilde{k} = \frac{k}{V \cdot N_A}$ for bimolecular reactions be-

tween different species (V is the reaction volume, N_A is the Avogadro's number).

3. Then calculate the reaction rate for every reaction according to the equation:

$$R_i = \tilde{k}_i \cdot X_A \cdot X_B, \quad (1)$$

where \tilde{k}_i is the rate constant of the i -th reaction in which reagents A and B participate; X_A , X_B are the numbers of reagent's molecules.

The total reaction rate is then calculated as the summation of the individual reaction rates:

$$R_{sum} = R_1 + R_2 + \dots + R_n, \quad (2)$$

where n is the number of elementary reactions forming kinetic scheme of the copolymerization process.

4. Then the probability of any reaction taking place at a given time is calculated by the following equation:

$$p_i = \frac{R_i}{R_{sum}}, \quad i=1\dots n. \quad (3)$$

It is apparent that $p_1 + p_2 + \dots + p_n = 1$.

5. Generate a random number r uniformly distributed between 0 and 1 and pick up such value k that the inequality took place:

$$\sum_{i=1}^{k-1} p_i < r < \sum_{i=1}^k p_i. \quad (4)$$

Consequently, reaction under an index k has to result from an imitating choice.

6. Continuing reasoning similarly we will build all scheme of carrying out reaction.

Algorithm has been tested for the process conditions emulsion copolymerization of butadiene and styrene. The obtained number-average and mass-average molecular masses showed a satisfactory agreement with the results from the kinetic model of the process.

References

1. Podval'nyi S.L. Simulation of Industrial Polymerization Processes – M.: Chemistry, 1979. – 256 p.
2. Miftakhov E.N. Simulation of Butadiene-Styrene Emulsion Copolymerization Process / E.N. Miftakhov, I.Sh. Nasyrov, S.A. Mustafina // Bashkir Chemistry Journal. – Ufa, 2011. – Vol. 18, № 1. – P. 21–24.
3. Miftakhov E.N. Simulation of Butadiene-styrene Free Radical Copolymerization Process in the Production of Emulsion Type Rubbers / E.N. Miftakhov, S.A. Mustafina, I.Sh. Nasyrov // Herald KTU. – Kazan, 2012. – № 24. – P. 78–82.
4. D. Gillespie Exact Stochastic Simulation of Coupled Chemical Reactions // The Journal of Physical Chemistry. – 1977. – № 81(25). – P. 2340–2361.

IDENTIFICATION OF A MATHEMATICAL MODEL OF THE REDUCED SCHEME OF α -METHYLSTYRENE DIMERIZATION REACTION

Vaytiev V.A., Stepashina E.V., Mustafina S.A.

Bashkir State University, Ufa, e-mail: stepashinaev@ya.ru

Identification of a mathematical model of the reduced scheme of α -methylstyrene dimerization reaction has been held. The constants of rate stages and the values of activation energies have been defined. The obtained kinetic parameters allow to describe the dynamics of concentrations of target substances reaction scheme of a smaller dimension.

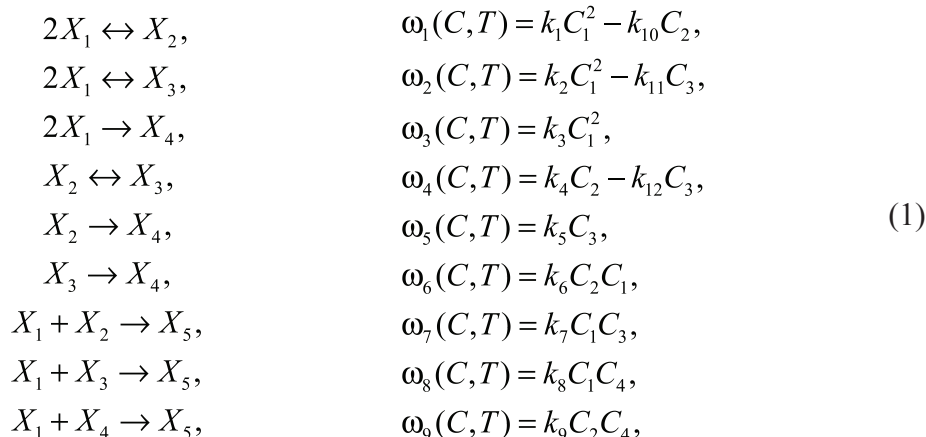
Keywords: an inverse problem, reduction of the kinetic schemes, reaction mechanism

Kinetic models based on the detailed mechanisms of complex chemical reactions, represent a systems of differential equations. In these systems the number of the unknowns equals the number of substances involved in the reaction. Hypothetical schemes of complex chemical reactions contain a large number of substances and reactions between them. However, direct measurement is available only for some of these substances. Precise description of the behavior of only a few substances are required for the analysis of the reaction mechanism. In this connection there is a need to replace an original system with a system of a smaller dimension, preserving the dynamics of concentrations of the selected substances. As a result of the reduction of the kinetic mechanism of the reaction scheme there would be defined by an equivalent

scheme containing less substances and stages than an original one. Therefore, the construction of mathematical models of reduced reaction schemes results in solving the problem of an identification of a mathematical model of the reaction, i.e, solving the inverse problem of chemical kinetics.

Kinetic model of the reduced scheme of α -methylstyrene dimerization reaction

Let's construct the kinetic model of the reduced scheme of α -methylstyrene dimerization reaction. The products of this reaction (the linear and cyclic dimers) have been in practical use as plasticizers, polymer modifiers, rubber in the manufacture of synthetic lubricants, etc. A number of chemical reactions describing the same reaction, and the corresponding kinetic equations are as like [1]:



where the following designations were entered X_1 – α -methylstyrene; X_2 – α -dimer; X_3 – β - dimer; X_4 – cyclic dimer; X_5 – trimers, where $\omega_i(t, x)$ – velocity of the i -th stage (kmol/(m³·h)) ($i = 1, \dots, 9$); $C = (C_1, \dots, C_5)$ – vector of concentration of the components (kmol/m³); $k = (k_1, \dots, k_{12})$ – vector of kinetic rate constants of the j -th reaction (m³/(kmol·h)) ($j = 1, \dots, 12$).

The values of the kinetic constants and activation energies are shown in Table 1. The rate constant of the j -th reaction is calculated with the use of the selected basic temperature $T_{\text{base}} = 373$ K defined by the formula

$$k_j(T) = k_j(T_{\text{on}}) \exp \left(\frac{E_j}{RT_{\text{on}}} \left(1 - \frac{T_{\text{on}}}{T} \right) \right).$$

Table 1

Kinetic parameters of the process of α -methylstyrene dimerization in the presence of a catalyst NaHY of at a temperature 373 K

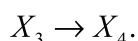
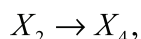
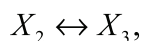
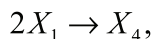
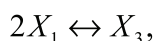
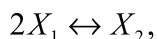
Number	$k_i(373 \text{ K}), \text{ m}^3/(\text{kg}_{\text{cat}} \cdot \text{h})$	$E_p, \text{ kJ/mol}$	Number	$k_i(373 \text{ K}), \text{ m}^3/(\text{kg}_{\text{cat}} \cdot \text{h})$	$E_p, \text{ kJ/mol}$
1	61,357	196	7	0,019308	247
2	8,9534	263	8	41,556	194
3	7,7916	259	9	0,03662	115
4	1,1693	238	10	0,04547	279
5	0,11922	275	11	0,0995	204
6	0,12041	127	12	0,05132	138

Kinetic model of α -methylstyrene dimerization with the changes in the number of moles in the course of a chemical reaction is a system [1]:

$$\frac{dx_i}{dt} = \frac{F_i(x, T) - x_i F_m(x, T)}{N};$$

$$F_i = \sum_{k=1}^9 v_{ik} W_k; \quad \frac{dN}{dt} = F_n(x, T);$$

$$F_n = \sum_{j=1}^9 W_j \sum_{i=1}^5 v_{ij},$$



with initial conditions: $x_i(0) = x_i^0$, $i = 1, \dots, 5$, $N(0) = 1$, where x_i – concentration of i -th component (mole fraction); $N = C/C_0$ – concentration of i -th component (mole fraction); C_0 – initial total concentration of reactants (kmol/m^3); (v_{ik}) – matrix of stoichiometric coefficients, $W_j = \omega_j/C_0$ – values of the chemical reaction rate ($j = 1, \dots, 9$) (1/h).

The reduced scheme of this reaction, obtained in [2, 3] based on the combined algorithm of reduction of the reaction scheme in the time and temperature range of the reaction course, and its kinetic equations have the following form:

$$\begin{aligned} \omega_1(C, T) &= k_1 C_1^2 - k_7 C_2, \\ \omega_2(C, T) &= k_2 C_1^2 - k_8 C_3, \\ \omega_3(C, T) &= k_3 C_1^2, \\ \omega_4(C, T) &= k_4 C_2 - k_9 C_3, \\ \omega_5(C, T) &= k_5 C_2, \\ \omega_6(C, T) &= k_6 C_3, \end{aligned} \quad (2)$$

where $C = (C_1, C_2, C_3, C_4)$ – vector of concentration of components, $k = (k_1, \dots, k_9)$ – vector of kinetic rate constants of the reaction stages (2).

Solution of the inverse kinetic problem for the reduced reaction scheme

An inverse kinetic problem is a problem of minimizing the functional deviations between the calculated and experimental data:

$$Q = \sum_{i=1}^l \sum_{j=1}^n |x_{ij}^P - x_{ij}^E| \rightarrow \min, \quad (3)$$

where x_{ij}^P, x_{ij}^E – calculated and experimental values for substances respectively; l – number of measurements; n – number of substances.

To solve the problem of identification of a mathematical model of the reduced reaction

scheme it is necessary to calculate the values of kinetic constants k_{0j} , minimizing the functional (3), and the values of activation energies E_j .

With the application of the algorithm for solving the inverse problem of chemical kinetics, constructed in [2] on the basis of Hooke-Jeeves' method, kinetic parameters of the reduced scheme of α -methylstyrene dimerization reaction have been calculated (Table 2).

Results and Discussion

As a result of solving the inverse kinetic problem the values of activation energies E_j and kinetic constants k_{0j} ($j = 1, \dots, 9$) for the reduced scheme of α -methylstyrene dimerization reaction have been calculated. On the basis of the obtained values a direct kinetic problem has been solved. The relative difference between the calculated and experimen-

tal values of the concentration of substances has been more than 11 %, which is within the measurement error in the experiment. The reduction of the reaction scheme (1) has not changed the overall dynamics of changes in the concentrations of substances with time. Relative error vectors concentrations of substances X_1, X_2, X_3, X_4 for the reduced scheme of α -methylstyrene dimerization reaction amounted: $\delta(x'_1) = 1,35 \%$, $\delta(x'_2) = 1,68 \%$,

$\delta(x'_3) = 10,24 \%$, $\delta(x'_4) = 7,93 \%$. This shows that the accuracy of the description of the dynamics of concentrations of target substances of the reduced scheme of α -methylstyrene dimerization reaction is within the error limits of quantitative analysis. Therefore, the reduced scheme of α -methylstyrene dimerization reaction (2) can be used to solve other problems based on the analysis of the kinetic model of the reaction scheme.

Table 2

Kinetic parameters of the reduced scheme of α -methylstyrene dimerization reaction in the presence of a catalyst NaHY at a temperature of 373 K

Number	$k_i(373 \text{ K}), \text{ m}^3/(\text{kg}_{\text{cat}} \cdot \text{h})$	$E_i, \text{ kJ/mol}$	Number	$k_i(373 \text{ K}), \text{ m}^3/(\text{kg}_{\text{cat}} \cdot \text{h})$	$E_i, \text{ kJ/mol}$
1	62,788	197,6	6	0,70168	320,9
2	6,037	231,4	7	0,00121	301,3
3	9,055	263,3	8	0,00847	242,4
4	1,092	311,9	9	0,00468	184,0
5	0,0012	573,3			

References

1. Mustafina S.A. Optimization of Catalytic Processes and Reactors / S.A. Mustafina, Yu.A. Valieva, R.S. Davletshin, A.V. Balaev, S.I. Spivak // Kinetics and Catalyses. – 2013. – Vol. 46, № 5. – P. 705–711.
2. Vaytiev V.A. Identification of Mathematical Models of Reduced Reaction Schemes / V.A. Vaytiev, E.V. Stepashina, S.A. Mustafina // Tomsk Polytechnic University News. – Tomsk, 2013. – Vol. 323, № 3. – P. 10–14.
3. Stepashina E.V. Graph-Theoretic Methods for the Reduction of Complex Kinetic Schemes / E.V. Stepashina, S.A. Mustafina – Sterlitamak: Sterlitamak Branch of Bashkir State University, 2013. – 97 p.
4. Stepashina E.V. Graph Approach for Modeling of Catalytic Processes with Varying Reaction Volume / E.V. Stepashina, S.A. Mustafina // Control Systems and Information Technology. – Voronezh, 2012. – Vol. 47, № 1. – P. 14–19.
5. Baytimerova A.I. Search for the Optimal Control in a Reactor Cascade Processes with Varying Reaction Volume / A.I. Baytimerova, S.A. Mustafina, S.I. Spivak // Control Systems and Information Technology. – Voronezh, 2008. – № 2 (32). – P. 38–42.
6. Vaytiev V.A. Numerical Research of Processes with Stable and Variable Reaction Volume in Uncertainty of Kinetic Data / V.A. Vaytiev, S.A. Mustafina // Bashkir Chemistry Journal. – Ufa, 2013. – Vol. 20, № 2. – P. 45–48.

ANALYSING SALES VOLUME OF INSULIN-CONTAINING MEDICATIONS

Aripov S.T., Saidov S.A., Zainutdinov K.S.

Tashkent pharmaceutical institute, Tashkent, e-mail: shuhrat-farm@mail.ru

Sugar diabetes is an actual problem, and its solution depends on numerous factors. Provision of insulin-containing medications to patients with sugar diabetes on affordable prices is among these factors. Volume and structure of insulin-containing preparations that are present at domestic pharmaceutical market has been studied. Analysis of the data according to sales volume has been carried out. «Insultard» that includes insulin groups of moderate impact duration, occupies the leading position among all insulin and insuloid medications of this group. The sales share of this group equaled 66,6% according to the total medication sales. The data of insuloid import by distributing companies has been carried out, and their place and significance in the area of providing population with insulin-containing preparations has been defined.

Keywords: sugar diabetes, insulin, medications, distributor, pharmaceutical market

Search for methods of rational usage of medications is extremely actual for the healthcare of a country. Rational management of medications, used for treating sugar diabetes, has a special social significance for the population [1].

Sugar diabetes, regardless of all efforts by scientists and doctors of all world and also enormous financial costs on carrying out researches and development of efficient methods of treatment, still remains an urgent and, in its origin, unsolved problem [2].

During recent decades the problem of SD with its early complications has obtained an epidemic nature in economically-developed countries, and also great social-economic significance due to the high disease, disability, and death rate in the most active age [3].

From the point of pharma-economic analysis, SD is a high-cost nosology for both patient and a state. In order to calculate financial losses of the state, one should embrace all possible expenses for diagnostics, treatment, prevention of complications. The set classification of SD is directly linked to sugar contents in blood. SD of the first type (SD-1) is linked to an absolute

insulin deficit and usually developed among young patients (under 40). The origin of SD of the second type (SD-2) lies in decrease in sensitivity of peripheric tissues to insulin in combination with a decrease in insulin secretion by beta-cells of pancreatic gland. Normally, it is spread among patients of older age [4].

Treating patients with SD is carried out according to treatment standards, accepted in Republic Uzbekistan. Insulin-containing medications (ICM) are included into standards of treating SD-1.

Research goal: studying volume and structure of ICM supply at pharmaceutical market of Republic Uzbekistan. Possibilities, provided by modern statistics allow us to use greater target groups in our analysis. In our case we have used registered ICM, used in treating SD-1 as such group. Analytic data of the base «Drug Audit 2013» for the period 2008-2012 has been used in the research. The analysis of this data has been carried out via means of table editor Microsoft Excel.

Table 1 uses results of the statistic selection with indication of medication group, trade marks, and sale sums for the period 2008–2012.

Table 1

General characteristic of medications, used for SD-1 and their sales volume for the period 2008–2012

Trade marks	Annual sales volume, USD.				
	2008	2009	2010	2011	2012
1	2	3	4	5	6
Group «Insulins of ultrashort impact»					
Novorapid Penfil	0	0	0	7 875,00	5 250,00
Humalog	1 064,00	0	0	4 266,50	0
Apidra	0	0	0	0	0
Total per group:	1 064,00	0	0	12 141,50	5 250,00
Group «Insulins of short impact»					
Humulin regular	852 788,40	0	0	30 727,20	18 115,00
Insuman rapid	0	11 583,00	0	0	0
Actrapid	1 147 980,00	0	0	98 400,00	450 183,25
Actrapid penfill	87 500,00	0	17 500,00	20 040,00	44 255,00

End of Table 1

1	2	3	4	5	6
Vosulin R	64 907,80	0	0	0	
Gensulin R	47 400,00	204 280,00	1 731 051,74	213 360,00	25 000,00
Gansulin R	13 000,00	0	0	0	59 400,00
Zhuslin R	0	0	0	0	0
Monoinsulin CR	0	0	0	0	0
Total per group:	2 213 576,20	215 863,00	1 748 551,74	362 527,20	596 923,25
Group «Insulins of moderate impact duration»					
Zhuslin N	0	0	0	0	0
Vosulin N	101 080,00	0	0	0	0
Gansulin N	13 000,00	0	0	0	59 400,00
Gensulin N	19 260,00	255 884,00	3 466 244,10	305 040,00	25 000,00
Insulatard	1 704 480,00	0	0	118 080,00	3 326 330,00
Insulatard Penfill	87 500,00	0	25 000,00	50 100,00	58 450,00
Insuman Bazal	0	41 504,40	0	0	0
Protamin-insulinCS	0	0	0	0	0
Humulin NPH	1 674 964,00	0	0	59 133,40	56 110,00
Total per group:	3 600 284,00	297 388,40	3 471 244,10	532 353,40	3 525 290,00
Group «Insulin of long impact»					
Levemir Penfill	0	0	0	10 500,00	10 500,00
Lantus	41 276,40	101 244,00	210 198,12	364 478,40	211 215,00
Total per group:	41 276,40	101 244,00	210 198,12	374 978,40	221 715,00
Group «insulin combinations»					
Novo mix 30 penfill	0	0	0	7 875,00	5 250,00
Mixtard 30 penfill	87 500,00	0	25 000,00	33 400,00	66 800,00
Humulin M3	326 284,00	0	0	79 520,00	56 110,00
Vosulin 30/70	245 115,70	0	0	0	0
Gansulin 30 R	13000,00	0	0	0	118 800,00
Gensulin M10	0	0	0	0	0
Gensulin M20	0	0	0	0	0
Gensulin M30	19 260	12 060,00	857 536,68	115 000,00	50 000,00
Gensulin M40	0	0	0	0	0
Gensulin M50	0	0	0	0	0
Zhuslin 30/70	0	0	0	0	0
Mixtard 30	581 340,00	0	0	135 300,00	643 330,00
Insuman comb. 25	0	0	19 200,00	72 000,00	0
Total per group:	1 272 499,70	12 060,00	901 736,68	443 095,00	940 290,00
Total:	7 128 700,30	626 555,40	6 351 730,64	1 725 075,50	5 289 498,25

Source. Database «Drug Audit 2013» produced by «Evro Farmis».

Thus, total sum of medication market in 2012 equaled 5289498,25 USD. At the same time, a certain decrease in dynamic sales growth during the period 2008-2012 has been registered. Medications of the group «Insulins of moderate impact duration» lead in total sum of realization (2008 – 3600284,00 USD or 50,5%; 2009 – 297388,40 USD or 47,5%; 2010 – 3471244,10 USD or 54,6%; 2011 – 532353,40 USD or 30,8%; 2012 – 3523590,00 USD or 66,6%). We should outline that the lowest sales volume of ICM, registered in 2009, equaled 626555,40 USD.

The second biggest part of the gross volume is occupied by «Insulins of short impact»: 2008 – 2213576,20 USD or 31,0%; 2009 – 215863,00 USD or 34,4%; 2010 – 1748551,74 USD or 27,5%; 2011 – 362527,20 USD or 21,0%; 2012 – 596923,25 USD or 11,3%.

An increase in sales volume is defined by increasingly active marketing of such medications as, first of all, Actrapid (NOVO NORDISK, Denmark). In 2012 it formed 450183,25 USD or 75,4% of total market share of preparation group «Insulins of short impact». The next medication is Gensulin R (BIOTON S.A.,

Poland), in 2010 total sales of the preparation equaled 1731051,74 USD or 98,9% of the total share of preparation group «Insulins of short impact», and 27,2% of total ICM sales in 2010. A trend to decrease in sales growth for the medication Hemulin regular, produced by ELY LILLY (USA) has been registered. At the same time, total sales volume has been relatively unstable: 2008 – 852788,40 USD (38,5%); 2012 – 18155,00 USD (2,5%) of gross sales of preparation group «Insulins of short impact».

The third place in total volume of sales is occupied by the 13 preparations of the group

«Insulin combinations». Their sales in 2008 equaled 1272499,70 USD (17,8%); in 2009 – 12060,00 USD (1,9%); in 2010 – 901736,68 USD (14,1%); in 2011 – 443095,00 USD (25,7%); in 2012 – 940290,00 USD (17,7%).

Sales leaders among medications are presented in Table 2. Medication Insulatard that contains insulin groups of moderate impact duration, occupies the leading position among all insulin and insulinoid preparations. Its share in total sales volume of preparation group «Insulins of moderate impact duration» equaled 66,6%.

Table 2

Sales of insulin-containing medication groups

Number	Pharmacological group	Share in total sales volume, %	Sales leader within group
1	Insulins of ultrashort impact	0,2	Novorapid Penfill
2	Insulins of short impact	11,3	Actrapid
3	Insulins of moderate impact duration	66,6	Insulatard
4	Insulins of long impact	4,2	Lantus
5	Insulin combinations	17,7	Mixtard 30

Source. Database «Drug Audit 2013» produced by «Evro Farmis».

Table 3 presents data on sales of medications (according to the number of packs), used for SD-1 by trade marks during 2012. Three leading positions by the end of 2012 belong to Insulatard (Novo Nordisk A/S, Denmark) – 1326000 packs or 76,7% of total ICM sales. It is followed by: Actrapid (Novo Nordisk A/S,

Denmark) – 165985 packs or 9,6% and Mixtard 30 (Novo Nordisk A/S, Denmark) – 159500 packs or 9,2%. Regrettably, local pharmaceutical market only provides products foreign origin as domestic pharmaceutical companies do not produce ICM, and all preparations are brought from foreign producers of pharmacy.

Table 3

Analysis of insulin-containing medications' sales volume during 2012 (by packs)

Number	Trade mark	Number of packs	Share in total insulin sales %
1	Actrapid	165 985	9,6
2	Actrapid penfill	2 650	0,15
3	Gensulin R	2 500	0,14
4	Gansulin R	11 000	0,63
5	Gansulin N	11 000	0,63
6	Gensulin N	2 500	0,14
7	Insulatard	1 326 000	76,7
8	Insulatard penfill	3500	0,20
9	Humulin NPH	3 500	0,20
10	Lantus	2 490	0,14
11	Mixtard 30 penfill	4 000	0,23
12	Humulin M30	3 500	0,20
13	Gansulin 30 R	22 000	1,3
14	Gensulin M30	5 000	0,29
15	Mixtard 30	159 500	9,2
16	Other insulins	1850	0,10
Total:		1 726 975	100

Source. Database «Drug Audit 2013» produced by «Evro Farmis».

Table 4 presents analysis of ICM sales at pharmaceutical market of Republic Uzbekistan in 2012 by distributors. During the data analysis we have discovered that Ministry

of Healthcare of Republic Uzbekistan is included into the list of distributors, though it doesn't take part in purchasing and realizing medications.

Table 4

Analyzing data of distributing companies
that realized ICM at pharmaceutical market of republic Uzbekistan in 2012

Number	Distributing companies	Sales volume, USD	Share in total sales volume, %
1	Ministry of Healthcare	3 777 863,25	71,4
2	SJSC Dori-Darmon	939 959,40	17,7
3	Neo Pharm	237 600,00	4,49
4	Medilife Pharma	130 335,00	2,46
5	CHR Apteka	100 000,00	1,90
	Other distributors	103 740,00	1,96
	Total sales volume in 2012	5 289 498,25	100

Source: database «Drug Audit 2013» produced by «Evro Farmis».

In 2012 Ministry of Healthcare imported ICM into pharmaceutical market in total sum of 3777863,25 USD, and it forms 71,1 % of gross sales volume of ICM. The imported medications have been distributed among patients with SD-1 through endocrinological hospitals, specialized clinics, and polyclinics.

The second place among ICM importers belongs to SJSC «Dori-Darmon» that imported medications of 939959,40 USD, and this sum formed 17,7 % of total sales volume.

These to importers are followed by companies «Neo Pharm» – 237600,00 USD or 4,49 %, «Medilife Pharma» – 130335,00 USD or 2,46 %, «CHR Apteka» – 100000,00 USD or 1,9 %.

Other distributors are: «Orion Pharm Medical Plus» – 56076,00 USD or 1,06 %, «Atm Partners» – 19626,60 USD or 0,4 %, «Pharmazone Trade» – 14019,00 USD or 0,2 %, «Kura-cio Pharm» – 14019,00 USD or 0,2 %.

Resume

Analysis of ICM realization during the period 2008–2012 has been carried out. The anal-

ysis results show that a great attention is paid to patients with SD-1 in Republic Uzbekistan. All ICM of the republic's pharmaceutical market are imported from foreign pharmaceutical producers for foreign currencies. Organizing production of ISM at domestic pharmaceutical enterprises is a global problem of the state, as it will provide for solution of the problem of providing medications to patients with sugar diabetes due to a decrease in market prices. A solution to the question of saving funds, allocated by the state, is also possible.

References

1. Aliyev S.U., Zainutunov K.S. Analyzing sales volume of medications, used for treating iodine-deficit diseases during the period 2004–2008 // Pharmaceutical messenger of Uzbekistan. – Tashkent, 2009. – № 3. – P. 23–26.
2. Chernysh P.P. The role of energetic exchange between cells in pathogenesis of sugar diabetes of the 2nd type // Medical magazine of Uzbekistan. – Tashkent. – № 1. – P. 72–79.
3. Yuldashev S.S. A successful treatment of sugar diabetes of the 1st type using Eastern pulse diagnostics // Medical magazine of Uzbekistan. – Tashkent, 2011. – № 4. – P. 109–110.
4. Kulikov A.Y. Sugar diabetes pharma-economic analysis of high-cost nosology // New Pharmacy. – Moscow, 2011, April. – P. 59–61.

*Materials of Conferences***INTELLECTUAL CAPITAL EVALUATION
METHODS AND ANALYSIS**¹Alimbaiyev A.A., ²Salzhanova Z.A.,¹Ulybyshev D.N., ¹Dzhusupov K.S.,²Zhanybayeva L.S.¹*Institute for Regional Development;*²*Karaganda Economic University of Kazpotreboysuz,
Karaganda, e-mail: Lyaz008@mail.ru*

In modern conditions, the rising cost of commercial organizations is largely determined by increments of intellectual capital, which is increasing every year. Therefore, the task of economic entities effective management of intellectual property, which they have, is one of the most important. This allows organizations to develop highly efficient and competitive economic activity.

Valuation of intellectual capital has its own features and complexity, since, first, it combines not only the knowledge of the people, but also their moral values, as well as the image of the organization, its structure, information systems, characteristics of the intellectual capital. All elements in the formation and development of intellectual capital interact with each other: the knowledge and ability of workers embodied in the organizational processes and communication with partners who, in turn, create the basis for sustainable and lasting relationships with clients, collaboration with customers and partners helps to gain experience, to develop the knowledge, the ability of workers to create a database, etc. Secondly, intellectual capital has an immaterial nature. While it is difficult to find reliable methods for assessing the collective knowledge of the organization's staff, their experience and intuition, intellectual property and assimilation of information, it is impossible to feel the knowledge or creative abilities of people, company image, moral values. It should be noted that intellectual property is not limited to the registration of rights to inventions, industrial designs, software designs and trademarks. This is just one of the first steps in that, depending on the scale of business followed by more numerous activities. Among them are:

- 1) to make product specific consumer characteristics;
- 2) providing technical production over the competition;
- 3) monopolization effective creative solutions used in business;
- 4) providing excess profits by monopolizing the main ideas of business;
- 5) business through socialization labeled products and advertising;
- 6) the formation of a special creative culture and taking care of business the staff;
- 7) to achieve a balance in the implementation of the above functions.

Methods for assessing intellectual capital can be comprehensive, including accounting, finance, valuation, etc. each method has its advantages and disadvantages. Thus, the methods of accounting for seldom applicable adequate evaluation of intellectual capital. For example, the accounting methods of valuation of the trademark view it as an asset loses its value with use, while in fact exactly the opposite is happening – the cost of ramping up. Patents, licenses are recorded in the accounting records in accordance with the cost of registration, and not the real value. In addition, there is an erroneous separation of investment and costs, such as training costs and advertising costs are considered, while in fact they are long-term investments.

The Tobit model is a statistical model proposed by James Tobin to describe the relationship between a non-negative dependent variable and an independent variable (or vector). The term Tobit was derived from Tobin's name by truncating and adding – it by analogy with the probit model. The high value of Tobin's pushing investors to invest more in solving this organization, as it becomes costly. Tobin reflects several variables, such as the carrying value of the assets of the organization and the «mood» of the market, expressed, for example, the opinion of analysts regarding the prospects of the organization or the various speculations as loud rumors.

The most important method of intellectual capital is the Cost expressing its economic value. At the same time we note that the cost-based approach has a number of areas, differing goals, objectives, types of cost and appropriate methods. There are two fundamentally different assessment methodologies – cost and forecast. In other words, intellectual capital is estimated either by value or by its preference over other objects. When using a valuation methodology determined by the market value of intellectual capital on the basis of the conditions for its effective use. Under such conditions is understood legal permissibility, physical feasibility. Financial security and maximum productivity of intellectual property.

The law «On valuation activities in the Republic of Kazakhstan» gives the following definition of market value [2]: «Market value – the most probable price at which the property could be alienated on the basis of the transaction in a competitive environment where the parties of the transaction are, having all of the available information on property assessment and not the transaction price does not reflect any extraordinary circumstances, when, one of the parties is not obliged to dispose of the property being valued, and the other side is not obligated to purchase, the transaction parties are knowledgeable about the subject of the transaction and act in their own interests».

The transaction price is the equivalent of cash consideration for the evaluation of the object, and

being forced to deal with the parties deal with someone else's hand was not. «This definition corresponds to the market value of this formulation in IVS-1 «as the basis of market value assessment» International Valuation Standards and definitions provided in legislation on appraisal activity in the Russian Federation, Ukraine and other CIS countries» [3].

Calculation of the cost parameters of some components of intellectual capital related to explicit intellectual funds represented in the form of intellectual property rights in industrial property and copyrights, in the literature reviewed in detail [4].

The composition of intellectual capital includes the cost of all identified and non-identified assets, goodwill is considered as a tangible, structured and identifiable asset class. In fact, the accounting value, expressed in the balance sheet at a given time, include the amount of investment in fixed assets (land, buildings, equipment, machinery, etc.) less accumulated depreciation. The market value of the company as defined in any given time, not only the cost of fixed assets, but also the cost of evaluation of goodwill, brand and many other factors (results of intellectual activity, competitiveness of products, its compliance with the trends of the world economy and etc. However, this indicator does not always objective from the inconstancy of market value. Therefore, a more objective assessment of the difference should not be considered, and the market value and the carrying amount, ie, to estimate the relative market value. This makes it possible to compare the same type of business.

Features organizational capital investment arising from the peculiarities of this type of intellectual capital: coding knowledge to save the «brand» of secrets that otherwise might be lost. When this criterion for evaluating investments in organizational capital can reduce the ability of the capital, for example, costs.

Similarly, workers in the system and information, companies need to invest in their consumers (clients). In fact, investments are made not so much the clients themselves, as in the relationship with these customers. Consumers do not belong to the organization, but investing in the future profits: the newly created value will be equally owned and shareholders and consumers. Ways to invest in customer capital abundance. This development, together with the consumer market new products, and giving consumers more than usual, the rights and individual approach to the customer, and various types of partnership with consumers.

In view of the above, you should consider these features, and this is possible at a more sustainable development of methods to assess human cost indicators, organizational and customer capital. This method allows carrying out the task of conveying to all parts of the organization and activity targets the organization's strategy.

Thus, the component of intellectual capital is convenient to estimate piecemeal. Thus, human capital is the sum of knowledge in the organization.

Its value at least equal to the costs of reconstruction and this knowledge can be evaluated on a number of factors: the total number of personnel and their gender composition, the expected probability of survival, education, the level of staff (headcount with higher education, its share in the total population); staff salaries, employee satisfaction.

In the economic literature considers various alternative approaches to monetary measurement of human capital. According to Russian scientists, the most reliable and productive of them recognized method of lifetime earnings, first presented in papers of Jorgenson D.W. and B. Fraumeni [4].

Organizational capital describes the ability of the organization to translate human capital and consumer goods or services. The higher the rate of the transformation, the higher capital cost of this category. Organizational capital can be analyzed and evaluated by indicators such as: information systems, their use, function, scale, profiles patent rights (inventions, utility models, industrial designs, trademarks, rationalization proposals); objects of copyright: all kinds of scientific literature, artistic results of the computer program, database and data banks, design and technological documentation, corporate culture, values, traditions and symbols.

Organizational capital is accumulated in the process of forming a positive corporate culture. Value of capital as a whole, is not determined by his presence, and the effectiveness of its use. He is also responsible for the way human capital is used in organizational systems, transforming information. Capital is more a property of the company and can be relatively independent object of sale.

In international practice, has formed a methodology for assessing organizational capital. In Kazakhstan assessment standards and other regulations that are used in assessing the performance of many organizational capital [5].

Particular importance for high performance in organizations in the process of competition, not only has the human component of intellectual capital, but its client component. Client capital reflects the value of the relationship between the organization and its customers. Client capital describes the ability of the organization to understand their customers and their changing needs and conditions. The cost of capital is equal to the costs of attracting new customers. The client component of intellectual capital also has a number of indicators to analyze and evaluate: the quantity and quality constant clientele organization, how long they are clients of the organization; profit per customer, the composition of clients due to them, their level of satisfaction, sales per customer; branding organization; brand; brand.

The task of such analysis to identify key market segments for the organization, as well as the factors and evaluate their effectiveness. These factors include: stability of customers, their satisfaction, profitability, loyalty to the company, the acquisition of new customers in targeted market segments. Consumer capital

formation is closely connected with the organization of interaction between the individual elements of the external structure. Such interaction is via customer databases, readers' conferences that suit, publishing meeting consumer consulting services companies.

The methods considered for evaluation and analysis of intellectual capital does not imply universality, but focused on the adaptation of assessment indicators for the individual approach in each case. This integrated approach financial and non-financial asset valuation, which enables long-term planning and development of the organization as a whole.

References

1. Tobin J. A General equilibrium approach to monetary theory. // Journal of Money credit and banking. – Vol. 1. – P. 35.
2. Jorgenson D.W., Fraumeni B.M., The Output of the Education Sector // Measurement in the Services sector. – Chicago: University of Chicago Press, 1999.
3. Law of the RK № 109-II «On Valuation Activities in the Republic of Kazakhstan». – Access mode: www.zakon.kz.
4. International Valuation standards IVS-2005 (record registration of state standard of the RK № 022/964 from 1.06.2006). – Almaty, 2007.
5. Novoselcev O.V. Intellectual property in the enterprise assets: documenting, evaluation, registration. – M.: Patent, 2006. – P. 70.
6. Bliznets Y.A., Leontiyev B.B., Mamadzhonov Kh.A. Methodological recommendations for inventory of rights to intellectual property in enterprises. – M.: Patent, 2006. – P. 58.
7. State standard of the RK 1127-2002. Property assessment system, «Terms and definitions». – Almaty, 2005.

The work is submitted to the International Scientific Conference «Economical sciences and modernity», Israel (Tel Aviv), February 20–27, 2014, came to the editorial office on 27.01.2014.

THE INDUSTRIAL PRODUCTION VOLUME MODELING IN THE WEST KAZAKHSTAN REGION WITH THE PRODUCTION FUNCTIONS USING

Gizatov E.H., Zhanysova A.B.,
Zhantasova K.H., Rakhmetova T.M.,
Abdrakhmanova D.J.

The Western-Kazakhstan Humanitarian Technical University, Uralsk, e-mail: didok05@mail.ru

*Essentially, all the models are wrong,
but some of them are useful.*

George Box

In the industry of the Republic of Kazakhstan to share-but-West Kazakhstan region is accounted for about 9 percent of the total volume of industrial production. Let us consider some types of models of production functions, the dynamics of shares of mining and manufacturing industries, the structure of the gross regional product, the coefficient of variation in output growth of the economy in relation to the industrial production of the Wes-Kazakhstan region. And the construction schedule of production functions is considered, where the actual and estimated values of the industrial production volume clearly have been shown.

The industrial production share (e.g. for 2005–2011) is made up about 50 per cent for in the gross regional product (GRP) structure of the Western-Kazakhstan Region. The share of the other major sectors (e.g. the agriculture, building, services' production) is accounted for the rest part of GRP (Fig. 1).

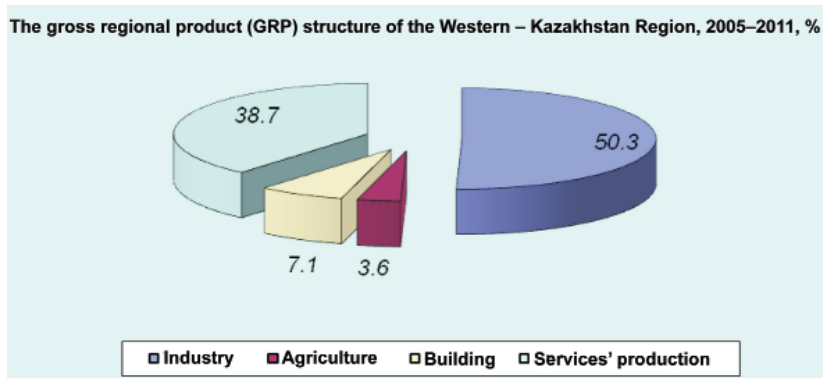


Fig. 1. The gross regional product (GRP) structure of the Western-Kazakhstan Region, (2005–2011)

About 9 per cent of the total industrial production volume is accounted on the share of the Western-Kazakhstan Region in the industry of Republic of Kazakhstan.

So, the industrial production volume in the Western-Kazakhstan Region for 1994–2011 years has been developed unevenly, which can be seen in the Fig. 2.

Thus, the sustainable industry development has been planned around since 2002.

As a part of the industrial production, the main share is accounted on the mining industry (e.g. about 90 per cent) and the manufacturing one. The manufacturing industry is approximately taken 8,5 per cent of the total industrial production volume.

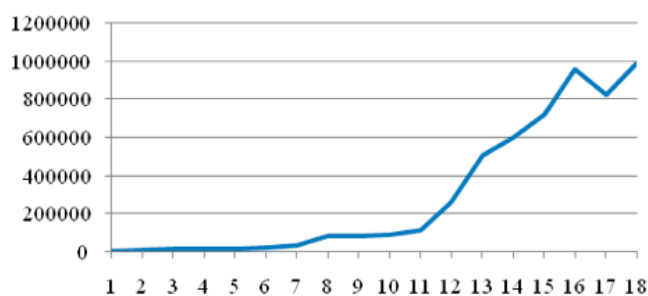


Fig. 2. The Industrial Production Volume in the Western-Kazakhstan Region (1994 – 2011), mln. tenge

The shares dynamics of the mining and the manufacturing industries in the structure of the industrial production (e.g. in per cent) have been given in the following Table 1.

Table 1

	Mining Industry	Manufacturing Industry
2006	90,3	7,9
2007	90,0	8,1
2008	89,6	8,7
2009	88,2	9,0
2010	89,0	8,4

The Region is rich in the fuel and energy resources types (e.g. the crude oil and the petroleum gas, the natural gas), and, in short term, the mining and the manufacturing industries will be remained the main branches of the Region's industrial production.

The variation coefficient of the volume industrial production for 2005–2011 years has been amounted 6,3 per cent. During the period of 2000–2011 years, the volume variation of the industrial production has been made up 38,9 per cent, while for the period of 1994–2011 years, the variation coefficient is amounted 50 per cent.

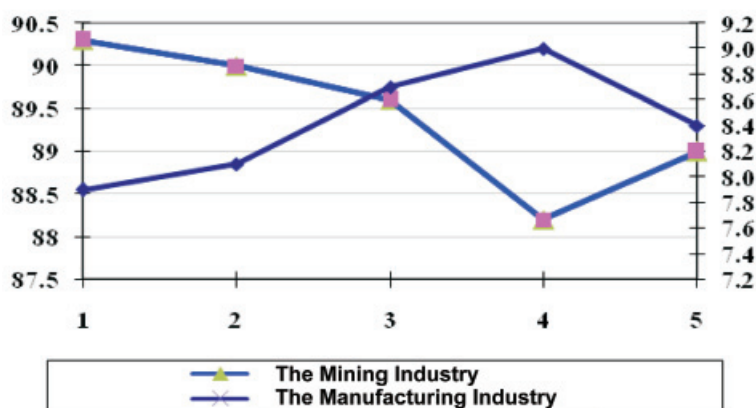


Fig. 3. The Structure of the Mining and Manufacturing Industries in the Industrial Production (e.g. 2006 – 2010 years), %

For the period of 1994–2011 years, the average annual growth rate of the volume industrial production has been made up 0,58 per cent.

The economic growth issues are the fundamental question of any economic system. The economic growth is defined and measured in two interrelated ways: it is the real GRP increase over some period of time, or it can be possible to be regarded, as the increase in some time period of the real GRP per capita.

There are two basic types of the economic growth: the extensive and the intensive ones.

The extensive economic growth is meant, that the production volume quantitative increase of the goods and the services is practically taken its place at the qualitative constancy of the production factors.

The intensive economic growth is connected to the fact that the goods and the services production increase is provided by the efficiency improving of the production factors. This production type is

led to be overcome the productive resources limitations, it is involved the technological process improvement, and its further introduction into the production process.

So, the extensive factors of the further economic growth are the following: the volume increase in the raw materials, materials, and fuel consumption; the employed workers increase; the investments volume increase with the technologies existing level.

The intensive factors of the further economic growth are the following: the use improving of the fixed and the circulating capitals; the workers skills development; the GDP acceleration (e.g. first of all, the new techniques and the technologies introduction, through the fixed assets renewal); the production organization further improvement.

In reality, the two opposite type of the economic growth can be interacted, and to be coexisted.

The economic theory has long been sufficiently to be investigated the economic growth challenges.

So, the production functions are being widely used for the mathematical description of the manufacturing process in the economic theory.

So, the production function – this is the mathematical – economically correlation, that is specified the link between the economic characteristics of the issue and the used economic resources (e.g. factors), or their shared volumes in the analytical form. The various economic units are described through the production function: the enterprises, the industries, national economy, as a whole. Thus, the production functions are used the most commonly of the type $Y = AK^\alpha L^\beta$, here Y – issue, K – the production assets, L – the labor, A , α , β – the coefficients, having determined by the statistical data processing.

The most common type of the production function – is the **Cobb–Douglas** function, having named after its creators. The American economist **Paul Douglas** has still noticed in 1927, that the national income distribution between the labor and the capital is practically being changed little over time, i.g. the production growth and the workers, and the capital owners are equally enjoyed by the benefits of the thriving economy. Before Douglas the task has been faced to be determined the causes of such constancy shares of the production factors. He had turned to the mathematician **Charles Cobb** that he found the function with the properties of the permanent shares of the production factors, having provided that the production factors are always received their marginal products. Such function has been derived the following expression:

$$Y = AK^\alpha L^\beta,$$

where A – is the proportionality factor; α , β – is the coefficient of elasticity of the goods output by the capital and the labor costs.

The given function is based on the assumption of the complete interchangeability of the labor and the capital, on the constant return of each unit of any factor.

The following application variants of the **Cobb – Douglas** function are quite possible:

- a) $\alpha + \beta = 1$ – the constant efficiency of the production factors;
- b) $\alpha + \beta > 1$ – the increasing efficiency of the production factors;
- c) $\alpha + \beta < 1$ – the falling efficiency of the production factors.

The further modification of the **Cobb – Douglas** production function is connected with it, having taken into account the impact of the technological and scientifically progress. The production function after Ya. Tinbergen – is one of the possible forms of these functions. He has removed the restriction on the exponents of the production functions, which are equal to one. So, in this case, the production function is acquired the following form:

$$Y = AK^\alpha L^\beta,$$

where α and β – the coefficients of elasticity of the production volume by the capital and the labor, respectively.

When $(\alpha + \beta) = 1$, this function is became the **Cobb – Douglas** production function with its advantages and disadvantages.

The coefficient of elasticity is shown the product's relative change, having expressed in the percentage, with the relative increase in the factor of one per cent. If the output elasticity by the capital α is more the output elasticity by the labor, then the economy has the labor – saving (e.g. intensive) growth. If the inequality is performed $\beta > \alpha$, then we have the asset – saving (e.g. extensive) growth of the econo-world. In this case, the labor force increase by one per cent is practically led to a greater increase in the production volume, than the same increase in the capital.

Another modification of the **Cobb–Douglas** production function is associated with the name of Robert Solow, who has proposed to be considered the technological – scientifically progress upon the economic growth, as the independent variable. So, in this case, the production function is acquired the following form:

$$Y = AK^\alpha L^{1-\alpha} e^{\lambda},$$

where λ – is the growth rate of the production total gross output, at the expense of the technological – scientifically progress.

So, the coefficient value λ is indicated the impact degree of the technological – scientifically progress upon the economic growth.

So, let us consider some models types of the production functions, with respect to the industrial production of the Western-Kazakhstan Region.

As the models, let us consider the following five types of the **Cobb – Douglas**, Ya. Tinbergen, R. Solow production functions; the function, when the information resource is considered, as the GDP par; and the information resource, as the separate factor of the production):

- $Y = AK^\alpha L^{1-\alpha}$;
- $Y = AK^\alpha L^\beta$;

- $Y = AK^\alpha L^{1-\beta} e^{\eta t}$;
- $Y = AK^\alpha L^{1-\beta} e^{\eta t}$;
- $Y = AK^\alpha L^{1-\beta} I^r$.

The model parameters have been calculated by the program PF lite v. 2.2 beta release (e.g. after the author N. Rykov), according to the Annex 2 data.

$$Y = 0,4986 \cdot K^{0,3482} \cdot L^{0,6518};$$

$$Y = 0,7021 \cdot K^{0,1866} \cdot L^{1,5766};$$

$$Y = 0,0889 \cdot K^{0,0035} \cdot L^{0,9965} \cdot e^{0,1679t};$$

$$Y = 0,2142 \cdot K^{0,4118} \cdot L^{0,5882} \cdot e^{0,8683I};$$

$$Y = 0,6987 \cdot K^{0,1771} \cdot L^{1,6025} \cdot I^{-0,0116}.$$

The average relative error of the approximation (e.g. it has been given in %).

The models 2 and 5 have been given the smallest relative error, i.e. the production function model after Ya. Tinbergen and PF, when the information resource is considered, as the separate factor.

Let us construct the graphs of the production functions for the actual and estimated values of the industrial production volume in the Western-Kazakhstan Region for the 1994–2011 years. These graphs have already been shown in Figs. 4 and 5.

Table 2

PF Cobb–Douglas	PF Ya. Tinbergen	PF R. Solow	PF Information resource as part of GRP	PF Information resource as part of separate factor
148	30	39	65	30

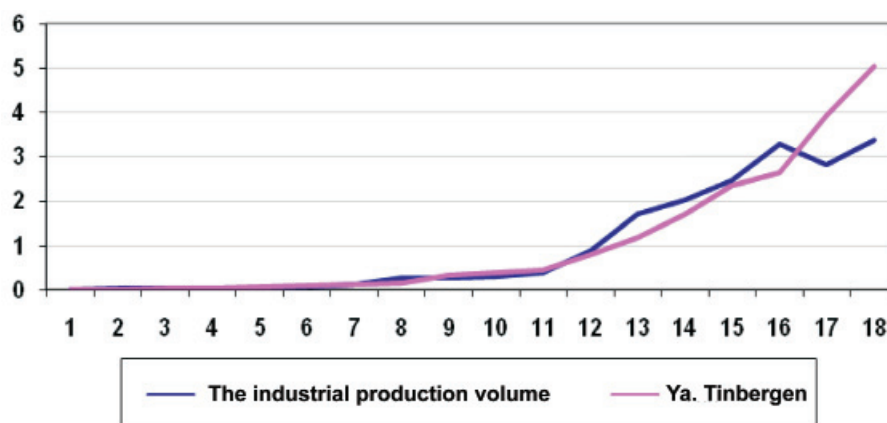


Fig. 4. The actual and estimated values of the industrial production volume in the Western-Kazakhstan Region (e.g.1994–2011)

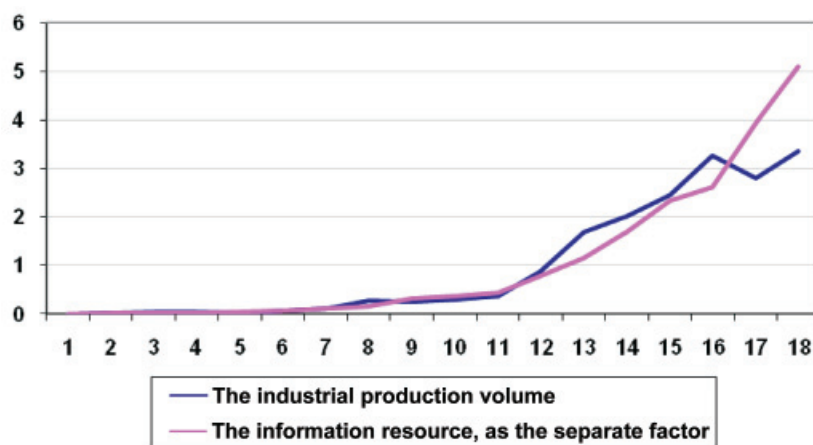


Fig. 5. The actual and estimated values of the industrial production volume in the Western-Kazakhstan Region (e.g.1994–2011)

So, the calculations have been shown, that the industrial production is being developed through the extensive way (e.g. $\beta = 1,5766 > \alpha = 0,1866$) in the Western-Kazakhstan Region, i.e. the workforce increase by one per cent is practically led to a greater increase of the industrial production volume, than the same increase by the capital.

And the model is shown the same situation, when the investments are considered, as the production separate factor, and, for this, this factor influence upon the industrial production volume is prac-

tically absent (e.g. $\gamma = -0,0116$). So, the economic growth in the Region by this model is also pointed to the extensive growth of the industrial production – $\beta = 1,6025 > 0,1771 = \alpha$.

Let us make the forecast of the industrial production volume by these models in the Western-Kazakhstan Region for the 2012 year. The ADAPTA program has been used for the forecasting purposes (e.g. after the author N. Rykov). The final results of the calculations by this program have been given in the subsequent Tables 3, 4.

Table 3

Year	The industrial production volume, mln. tenge	HARMO_ Industrial production volume (after Ya. Tinbergen), mln. tenge	OOF_HARMO The average relative error of the approximation
1994	822,0968781	1003,79	0,22
1995	4266,457874	3970,78	0,07
1996	6620,668484	6874,13	0,04
1997	10342,67774	9820,37	0,05
1998	13328,17103	14133,33	0,06
1999	22874,29478	22196,99	0,03
2000	31785,31921	30418,10	0,04
2001	45057,02267	50346,39	0,12
2002	92295,05876	86941,77	0,06
2003	107896,5572	104686,29	0,03
2004	122617,7952	132310,62	0,08
2005	224999,9413	217621,57	0,03
2006	329113,2908	332884,46	0,01
2007	481838,901	487479,16	0,01
2008	662176,7574	634478,70	0,04
2009	747602,2014	786912,24	0,05
2010	1114155,519	1082326,11	0,03
2011	1430296,295	1438698,39	0,01
2012		1614147,52	The average relative error of the approximation OOF = 5,44 %

Table 4

Year	The industrial production volume, mln. tenge	HARMO_ Industrial production volume (e.g. Information resource, as the separate factor), mln. tenge	OOF_HARMO The average relative error of the approximation
1	2	3	4
1994	817,68	994,53	0,22
1995	4288,44	4001,12	0,07
1996	6698,07	6947,66	0,04
1997	10433,23	9924,89	0,05
1998	13388,00	14153,26	0,06
1999	22606,58	21963,46	0,03
2000	31358,55	29967,28	0,04
2001	44489,68	49769,30	0,12
2002	91888,54	86590,89	0,06
2003	108410,54	105299,31	0,03
2004	124268,84	133707,91	0,08
2005	225678,74	218473,47	0,03

End of Table 4

1	2	3	4
2006	328952,35	332577,39	0,01
2007	480096,65	485917,67	0,01
2008	659867,86	631752,21	0,04
2009	744243,89	783831,76	0,05
2010	1115284,31	1084086,00	0,03
2011	1442467,04	1449776,66	0,01
2012		1627518,08	The error of the approximation OOF = 5,44 %

Thus, the actual value of the industrial production value in the Western-Kazakhstan Region in 2012 has been amounted 1 480 715,8 tenge. The difference in the planned and the actual values of the GRP industry by the considered models are made up 9 and 9,9 per cent, which it can be considered to be the

good approximation to the original and the initial data.

The expected calculated volume of the industrial production in the Western-Kazakhstan Region for the 2013 year is made up 1 579 979,4 mln. tenge, with the average relative error of the made prediction is about $\pm 9,2$ per cent.

Table 5

The Origin Data on the Industry of the Western-Kazakhstan Region

Year	Y The industrial production volume, mln. tenge	K The fixed assets availability at the book value, mln. tenge	L The average wages in the industry, tenge	I The investments in the fixed assets in the industry, mln. tenge
1994	426,3	23344	2065	801,60
1995	7077,4	33692	5619	2240,00
1996	12271,6	39666	7283	1999,70
1997	11859,5	58039	9239	3199,30
1998	10381,8	59800	10813	6391,90
1999	19218,9	64622	15092	51263,30
2000	31560,3	63775	18623	96313,00
2001	80960,1	59711	23418	157610,00
2002	77842,4	68358	36318	184434,10
2003	88088,1	68171	40113	104712,00
2004	110818,8	74911	43020	53886,00
2005	260613,9	466671	50916	42875,80
2006	501689,9	664221	62154	67786,80
2007	596796,4	682715	78898	147908,00
2008	721135,3	853359	94010	180187,20
2009	961322,7	1016699	99448	193085,00
2010	825144,0	1227242	125264	172237,10
2011	990133,7	1358890	145009	115477,60

Table 6

The Origin Data on the Industry (in the Coefficients – Data Is Divided into the Average Values Indices)

Year	The industrial production volume	The fixed assets availability at the book value	The average wages in the industry	The investments in the fixed assets in the industry
1	2	3	4	5
1994	0,001446	0,0610399	0,042857	0,009118
1995	0,024003	0,0880979	0,116617	0,02548

End of Table 6

1	2	3	4	5
1996	0,041619	0,1037187	0,151152	0,022747
1997	0,040222	0,1517605	0,191746	0,036392
1998	0,03521	0,1563652	0,224413	0,072708
1999	0,065181	0,1689737	0,31322	0,583123
2000	0,107038	0,166759	0,386502	1,095567
2001	0,274579	0,1561325	0,486018	1,792824
2002	0,264005	0,1787426	0,753744	2,09795
2003	0,298753	0,1782537	0,832506	1,191106
2004	0,375845	0,1958774	0,892838	0,612957
2005	0,88388	1,2202523	1,056712	0,487715
2006	1,701496	1,7368065	1,289945	0,771079
2007	2,024052	1,7851647	1,63745	1,682463
2008	2,445751	2,231365	1,951085	2,049641
2009	3,260354	2,6584667	2,063945	2,196355
2010	2,7985	3,208995	2,599731	1,959208
2011	3,358067	3,5532285	3,009519	1,313565

References

1. The Industry of Kazakhstan and Its Regions / The Statistical Compendium / in the Kazakh and Russian languages. – P. 216.
2. The Kazakhstan for Independence Years / The Statistical Compendium / in the Russian language. – P. 194.
3. The Western-Kazakhstan Region in Figures / The Statistical Compendium. – 2009. – P. 168.
4. The Mathematical Economy on a Personal Computer: Trans. From Japan / M. Kuboniva; M. Tabata, S. Tabata, Yu. Hasebe; Under the editorship of M. Kuboniva; And with a foreword E.Z. Demidenko. – M.: Finance and Statistics, 1991. – P. 304: il.
5. Kundysheva E.S. The Mathematical Modeling in Economics: The Tutorial / Under the scientific Editorship of Prof. B.A. Suslakov. – M.: The Publishing and Trading Corporation «Dashkov and K0», 2004. – P. 352.
6. <http://monobit.ru/categories/nauchnye/products>.

The work is submitted to the International Scientific Conference «Current problems of education», Greece, October, 15–24, 2013, came to the editorial office on 27.01.2014.

METHODICAL APPROACH TOWARDS EVALUATING LEVEL OF INNOVATIVE DEVELOPMENT OF A REGION

Minakova I.V.

Southwestern State University, Kursk,
e-mail: irene19752000@mail.ru

The article justifies facilitation of Innovativity index of regional economy as an indicator of a region's innovative development level. We suggest a method of its evaluation, approbated on materials of Central federal district (CFD)

Dynamic and indefinite environment, exposed to swift qualitative alterations, sets new goals of managing innovative development. In order to evaluate innovative development level, the au-

thor suggests using Innovativity index of regional economy (*Ria*).

The following indexes are included into calculating rating of innovative activity of regions:

X1 – the volume of innovative production according to total GRP (%);

X2 – the part of employees, involved into development and researches according to the total number of employees (%);

X3 – internal expenses for researches and development according to GRP (%);

X4 – expenses for technological innovations according to GRP (%).

The data of all-federal and regional statistics, provided in ROSSTAT annual reports, have been used as informational basis.

Functional model of innovative activity rating is presented as:

$$Ria = \sum_{i=1}^4 K_i \cdot X_i, \quad (1)$$

where *Ria* is rating of innovative activity of regional economy; $K_1 = K_3 = 0,3$; $K_2 = K_4 = 0,2$ are coefficients that illustrate weight of economical-statistic indexes.

The procedure of evaluating innovative activity rating has been carried out along two basic directions: alteration of innovative activity rating value in dynamics; rating value in comparison to other regions of CFD. According to the first criterion, CFD form the following groups: intensively increasing (increase in rating more than 20%); steady increasing (increase in rating within limits of 15–20%); steady decreasing (decrease in rating within limits of 15–20%); intensively decreasing (decrease in rating more than 20%). According to innovative activity level, we can outline the following groups of regions: high rating (over 3); rating value higher than

generally in Russia; rating value lower than generally in Russia; low rating (less than 1). As a result of cal-

culations, rating of CFD regions' innovative activity for the period 2000–2008 has been defined (Table).

Rating evaluation of CFD regions' innovative activity

Region	Years					
	2000	2004	2005	2006	2007	2008
Russian Federation	1,698	1,818	1,694	1,850	1,830	1,743
Central federal district	2,169	1,868	1,654	1,720	1,800	1,721
Belgorod region	0,446	0,655	0,712	0,521	1,852	3,283
Bryansk region	0,586	1,792	2,315	2,160	2,667	2,640
Vladimir region	2,376	2,051	2,052	2,730	2,344	1,798
Voronezh region	1,573	1,728	2,441	1,984	3,096	2,249
Ivanovo region	0,780	0,705	0,729	0,747	1,424	1,204
Kaluga region	4,051	3,541	2,870	3,085	3,051	2,573
Kostroma region	0,558	1,699	1,317	0,577	0,540	0,756
Kursk region	1,210	0,775	1,049	1,591	1,356	0,849
Lipetsk region	0,751	1,811	1,581	1,188	1,632	2,009
Moscow region	3,733	3,994	3,476	3,687	3,734	3,381
Oryol region	1,957	1,251	0,979	1,633	1,470	1,784
Ryazan' region	1,840	1,221	1,134	0,825	1,260	1,388
Smolensk region	0,368	0,635	0,424	0,705	0,918	0,986
Tambov region	0,777	1,180	0,874	1,061	1,471	1,238
Tver region	2,654	1,535	1,689	2,720	1,465	2,873
Tula region	1,964	1,429	1,267	1,558	1,082	1,118
Jaroslav region	2,638	1,851	1,745	2,284	2,385	3,521

It has been established that Belgorod region has been increasing its innovative potential steadily due to opening new innovative productions: starting biogas stations within the program of developing replenishing sources of energy; deep processing of agricultural wastes and receiving nanoproductions; realizing project of creating production of asphalt-concrete modifier «Unirem» in volume of 4 thousand tons per year and utilization of worn-out tires in volume of 12 thousand tons per year; test output technology of receiving a new generation of medical implants at the basis of nanostructural and submicrocrystalline tital alloys; technology of receiving extremely solid carbon platings for micromechanics, alloyed by nitrous. Since 2010 five enterprises of the region commenced producing nanotechnological products: LLC «Belgorod plant of sapphires «Monocrystal», LLC «Plant «Paints KVIL», LLC «SKIF-M», LLC «Taxifolia», LLC «Techsapphire». At the same time, the part of highly-technological output in gross volume of industrial production remains insignificant (about 2,5%). We have outlined the following factors that restrain transition towards innovative type of economy in the region:

1) insufficient investment resources of economic subjects that can be directed to realizing innovative projects;

2) low level of commercializing innovative developments and scientific projects;

3) lack of motivation for producing innovative merchandise among enterprises;

4) insufficient development of structure of realizing and managing innovative projects;

5) lack of justified strategy of regional policy, aimed for activation of innovative processes.

Defining innovativity level of regional economy can serve as a basis for future improvement in practice of planning and carrying out innovative activity in a region, as level of regional economy is that what needs structural improvements most of all, as well as broaden reproduction at modern technological basis, refreshment of funds, and activation of scientific and innovative-investment activity.

The work was submitted to the International Scientific Conference «Science and education in contemporary Russia», Moscow, November, 13–15, 2013, came to the editorial office on 13.12.2013.

GOUT IN THE REPUBLIC OF SAKHA: AGE DISTRIBUTION, RISK FACTORS, AND COMORBIDITIES

Petrova M.N.

North-Eastern Federal University M.K. Ammosov,
Yakutsk, e-mail: mnpetrova@gmail.com

Gout is considered a metabolic disease and ranked among the diseases connected with obesity, such as an arterial hypertension, coronary artery disease, stroke, and type 2 diabetes mellitus. It has been proven that intake of a considerable quantity

of meat products is predictor of acute gouty arthritis. For this reason there is great interest in studying the prevalence of gout among inhabitants of the Republic of Sakha (Yakutia) where a lipid-protein diet prevails. Though it is reasonable to assume wide spread prevalence of gout, official data on gout in Yakutia are absent. Arterial hypertension was most common feature, followed by high triglycerides and obesity in gouty patients. Preobesity and 1st degree obesity are common.

Gout is a rheumatic disease resulting from deposition of monosodium urate crystals in tissues and fluids within the body. This process is caused by an overproduction or under excretion of uric acid. Certain common medications, alcohol, and dietary foods are known to be contributory factors. Acute gout will typically manifest itself as an acutely red, hot, and swollen joint with excruciating pain [9]. These acute gouty flare-ups respond well to treatment with oral anti-inflammatory medicines and may be prevented with medication and diet changes. Recurrent bouts of acute gout can lead to a degenerative form of chronic arthritis called gouty arthritis [10]. Gout is an ancient and common form of inflammatory arthritis, and is the most common inflammatory arthritis among men. Gout may remit for long periods, followed by flares for days to weeks, or can become chronic [11].

Gout is caused by an uncontrolled metabolic disorder, hyperuricemia, which leads to the deposition of uric acid crystals, a metabolic product resulting from the metabolism of purines, in tissue [1]. Hyperuricemia is caused by an imbalance in the production and excretion of urate, i.e., overproduction, underexcretion or both. Underexcretion is the most common cause, thought to account for 80–90% of hyperuricemia [2]. Hyperuricemia is not the same as gout. Asymptomatic hyperuricemia does not need to be treated.

Risk factors for gout include being overweight or obese, having hypertension, alcohol intake (beer and spirits more than wine), diuretic use, and a diet rich in meat and seafood. Weight loss lowers the risk for gout [4]. Gout is also associated with an increased risk of kidney stones.

It is proved that a predictor of acute gouty arthritis is eating huge quantities of meat products. In this connection it is of greatest interest to examine the prevalence of the disease among residents of Yakutia, where the predominant protein-lipid diet, and might have been expected high incidence of gout.

Currently gout seen as an important medical problem that is related to the data on the impact of hyperuricemia on progression of atherosclerotic vascular disease. Gout is a metabolic disease, and hyperuricemia – one of the most important components of the metabolic syndrome [6, 8]. Found a close relationship between human purine metabolism and hypertriglyceridemia [5] Link between hyperuricemia and insulin resistance is proven now. Hyperuricemia is an independent risk factor for car-

diovascular disease, so diagnosis and treatment of gout, hyperuricemia, as well as complications of the disease are the actual problem of therapy [7].

The purpose of the study. Explore contemporary gout in the Republic of Sakha (Yakutia).

Objectives. A research project has been initiated to determine the incidence and characteristics of gout in Yakutia from 2007–2012. Patients hospitalized in the department of rheumatology of Yakut City Hospital with gouty arthritis were studied.

Methods. Patients are being studied by means of a questionnaire developed by the Institute of Rheumatology (Moscow), which includes questions on anamnesis, form of gout, and specifics of treatment. Data also being collected include: laboratory measures (glucose, HDL-C, LDL-C, TC, TG, creatinine, urea, uric acid, TP, bilirubin, ALT, AST, GGTP, alkaline phosphatase, creatine kinase); urinalysis, on admission plus daily analysis of urine (creatinine, protein, uric acid); radiographic assessment of feet and wrists; ultrasound of kidneys.

Results. In 2006–2012 years 44 patients were registered. The majority of patients ($n = 35$) are inhabitants of Yakutsk City; the remaining 9 are from various other areas of the Republic.

Median age of the subjects is 56 years, with a range of 35–76 years; 4 patients are over 65. Secondary forms of gout and relapses of disease are common. Forms of arthritis include: acute in 3 patients, prolonged in 8 patients, chronic in 2 patients. The tophaceous form was observed at 10 patients.

Accompanying pathology includes: arterial hypertension (AH) in 22 patients, coronary artery disease (CAD) in 7 patient, type 2 diabetes mellitus (DM) in 4 patients, glucose intolerance + obesity in 1 patient, metabolic syndrome + obesity in 1 patient, uncomplicated obesity in 1 patient, metabolic syndrome without obesity in 1 patient, chronic renal insufficiency in 1 patient, and cardiovascular accidents in 3 patients (Fig. 2, 3). Nephrolithiasis in 9 (20%) patients only in patients with AH.

Median body mass index (BMI) of the patients is 32, 05 [24; 49]. Normal BMI (16%); preobesity (32%); 1st degree obesity (26%); 2nd degrees obesity (10%); morbid obesity (16%) (Fig. 4). Waist/hip ratio is 1,094 [0,9–1,46].

Metabolic syndrome (MS) features in patients with gout: obesity-50%; AH ($\geq 130/85$ mm. Hg) – 92%; TG ($\geq 1,7$ mmol/l) – 71%; Glucose ($> 6,1$ mmol/l) – 12,5% (HDL-C was unavailable) (Fig. 1).

Clinical case 1. Male, 57 years old with secondary gout, tophaceous form and CAD, atrial fibrillation, AH II was inspected in department of rheumatology of Yakut City Hospital. Patient has such risk factors of gout: alcohol (50 cl vodka/week), smoking, diuretic therapy (antiarrhythmic therapy also was admitted). Echocardiography data: Atriomegaly (LV 42 mm). LV hypertrophy. Unfortunately stroke occurs in age at 60 years old. Possible reasons of stroke are: gout pathogenesis leads to early

atherosclerosis, irregular antihypertension and antihyperuricemia therapy, non-compliance with diet, alcohol abuse.

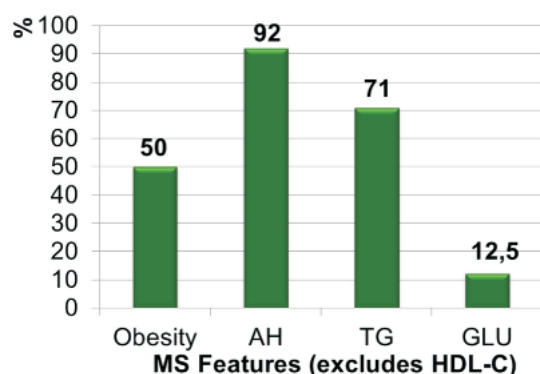


Fig. 1. Metabolic syndrome status

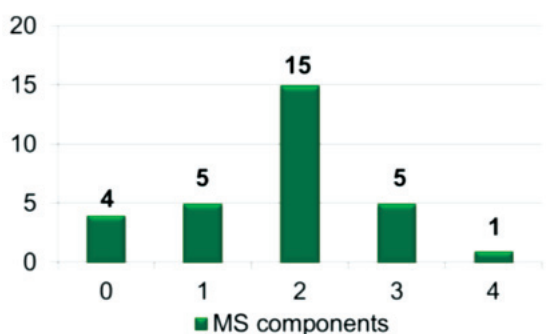


Fig. 2. Patients with MS components

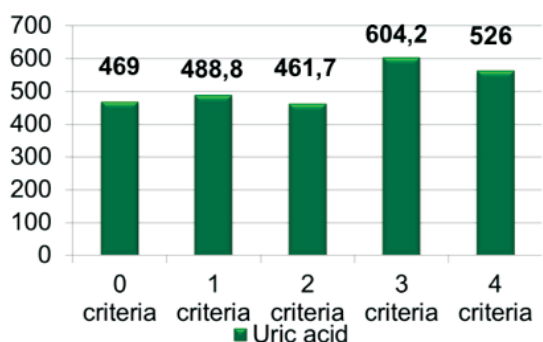


Fig. 3. Uric acid in patients with MS components

Clinical case 2. 35 year old man with secondary gout was included in the study in 2007. He had 5 episodes of acute arthritis during the year before his first hospitalization. His second hospitalization was in 2010. His father suffers from DM 2 type. This patient has multiple risk factors: obesity (BMI 44 kg/m²), waist/hip ratio 1,46, AH

with blood pressure 130/90 and 180/120 mmHg in 2007 and 2010, respectively. Also he has significant liver function elevation, chronic pancreatitis by ultrasound data, and left (59 mm) and right (35 mm) ventricular dilatation, atriomegaly (right atrium (RA) = 50x37 mm), and LV hypertrophy by echocardiography. During his second hospitalization type 2 DM was diagnosed (glucose ranging from 6,34 to 13,8 mmol/L) along with bilateral nephrolithiasis. Other laboratory data in 2007 and 2010 included: TC 3,6 and 5,03 mmol/L; uric acid 787 and 288–308 mkmol/L; ALT 40 and 94,1 IU/L; and AST 75,9 and 58,2 IU/L.

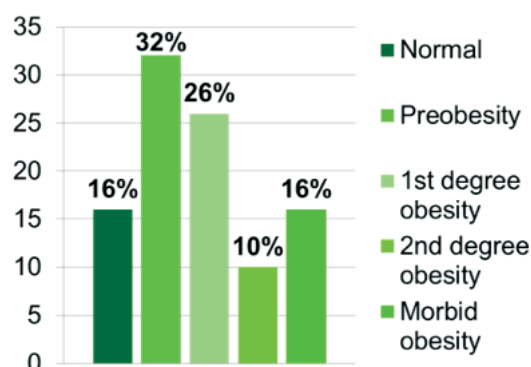


Fig. 4. Body mass index in patients with gout

Clinical case 3. Female, 60 years old with CAD, atrial fibrillation, AH II, HF III, Metabolic syndrome, obesity III, secondary hyperuricemia and gout, primary osteoarthritis. Antihypertensive, diuretic, antiischemic therapy was admitted.

Clinical case 4. Male, 51 years old with secondary gout, acute arthritis and CAD, atrial fibrillation, atriomegaly, heart failure (HF) III. Diuretic, antiarrhythmic, antiischemic therapy was admitted.

Conclusion. Thus, we observed gout in both elderly patients, predominately men, and some young men, among them there were repeated hospitalizations and multiple risk factors. Features of MS were common in patients with gout. AH was most common feature, followed by high TG and obesity. Preobesity and 1st degree obesity are common. This association suggests that lifestyle – diet, lack of regular exercise, obesity – may contribute to gout risk.

The research proceeds. Results will be used for characterization of the incidence and diagnostic features of gout in the Republic of Sakha (Yakutia) with the goal of standardizing guidelines for diagnosis and treatment of gout, assuring optimal care for these patients, especially among young patients with accompanying metabolic abnormalities.

Research is performed with use of «Grant of President of the Republic of Sakha (Yakutia) to the young scientist, experts and students on support of scientific researches».

References

1. Barskova V.G. Metabolic syndrome and cardiovascular disorders in gout. Doctoral dissertation. – Moscow, 2006. – 291 p.
2. Chen S.Y., Chen C.L., Shen M.L. et al. Trends in the manifestations of gout in Taiwan // *Rheumatology (Oxford)*. – 2003. – № 42. – P. 1529–1533;
3. Choi H., Atkinson K., Karlson E., Curhan G. Obesity, weight change, hypertension, diuretic use, and risk of gout in men // *Arch. Intern. Med.* – 2005. – № 165. – P. 742–748.
4. Choi H.K., Ford E.S., Li C., Curhan G. Prevalence of the Metabolic Syndrome in Patients With Gout: The Third National Health and Nutrition Examination Survey. *Arthritis Rheum.* – 2007. – № 57. – P. 109–115;
5. Dessein P., Shipton E., Stanwix A. et al. Beneficial effects of weight loss associated with moderate calorie/carbohydrate restriction, and increased proportional intake of protein and unsaturated fat on serum urate and lipoprotein levels in gout: a pilot study. *Ann. Rheum. Dis.* – 2000. – № 59. – P. 539–543.
6. Eliseev M.S., Barskova V.G., Nasonov E.L. etc. Features gout flowing with type 2 diabetes // *Clin. Gerontology*. – 2005. – № 4. – P. 7–13.
7. Eliseev M.S., Barskova V.G., Volkov A.V. et al. The efficacy and safety of metformin treatment in gouty patients with insulin resistance syndrome (pilot case control 6 -months study) // *Ann. Rheum. Dis.* – 2005. – № 64 (Suppl III). – P. 500.
8. Eliseev M.S., Barskova V.G., Nasonova V.A., Nasonov E.L. Insulin resistance syndrome in patients with gout and its influence on uric acid concentration and severity of arthritis. Abstracts // *Ann. Rheum. Dis.* – 2006. – № 65 (Suppl II). – P. 432.
9. Nasonova V.A., Barskova V.G. Early diagnosis and treatment of gout – scientifically justified demand to improve employment and life prognosis patients // *Scientific and Practical Rheumatology*. – 2004. – № 1. – P. 5–7.
10. Wallace K.L., Riedel A.A., Joseph-Ridge N., Wortmann R. Increasing prevalence of gout and hyperuricemia over 10 years among older adult in a managed care population // *J. Rheumatol.* – 2004. – № 31. – P. 1582–1587.
11. Zhang W., Doherty M., Bardin T. et al. Clinical Studies Including Therapeutics (ESCI-SIT) EULAR Standing Committee For International Part II: Management. Report of a task force of the EULAR evidence based recommendations for gout // *Ann. Rheum. Dis.* – 2006. – № 65. – P. 1312–1324.

The work is submitted to the International Scientific Conference «Modern Problems of Experimental and Clinical Medicine», Thailand, February, 19–27, 2014, came to the editorial office on 06.12.2013.

BUSINESS ACTIVITY AS A CHANGE AGENT OF COMPETITIVENESS OF THE COMPANY IN THE STOCK MARKET

Sembiyeva L.M., Ibragimova N.A.

*The Eurasian National University
named after L.N. Gumilev, Astana,
e-mail: nabira.ibragimova@gmail.com*

Attraction of relatively low-cost funds for enterprises remains its applicability in any phase of its development. As on date, one such source is the stock market which may allow them to build productive capacities and demonstrate transparency in their activities indicating the level of company development. As it is known, the stock market has a number of benefits which can include the following:

- Money attracted by placing of securities are the cheapest in the world.

- When placing securities, mortgage securities is not required.

- Placing of securities allows the company to know its value and its increment.

- Reduces the cost of financing in local banks.
- It gives the possibility to enter international markets, etc. [1].

However, the degree of use of all advantages of the stock market for the company's financial status shall be determined, as the financial position of the company shall be subject to careful attention of the potential investor that takes the decision about investing in the stock market. As Peter Lynch wrote in his article «The twenty golden rules»: «Never invest in a company if you don't know its financial condition. It is a company with a bad financial situation who led to record losses» [2]. Accordingly, one of the main indicators of the company competitiveness in the stock market is a business activity as it describes the economic situation and development of the enterprise. Today, there are many definitions of business activity, describing it from every side. To our opinion, the concept of business activity of the enterprise can be viewed as a set of indicators characterizing the results and effectiveness of the current production operation.

According to Kovalyev, quality criteria of these indicators shall be:

- Breadth of products sales markets.
- Availability of products for export.
- Goodwill of business which is expressed in reputation of clients using its services.

The quantitative criteria of business activity of the enterprise shall be:

- rate of plan delivery (fixed by the superior organization or self-fixed) for the main aspects;
- assurance of prescribed rate of their growth;
- level of resource efficiency at the enterprise [3].

According to T.I. Yurkov and S.V. Yurkov indicators of business activity enable determining the cost-effectiveness of resources used by the entity. Advantage of this definition is its brevity. However, this definition does not give a complete description of the analyzed category. An even more narrow concept of business activity of the enterprise was given by the financial economists A.D. Sheremet, R.S. Sayfulin and E.V. Negashev. In their view, it is characterized by only «the rate of current assets turnover of the entity».

The advantage of this definition is that it details the main factor of enterprise business activity.

Business activity is a complex and dynamic characteristic of entrepreneurial activities and the efficiency of resource use. Levels of business activity of a certain organization reflect the stages of its life (origin, development, growth, recession, crisis, depression) and show a degree of adaptation to rapidly changing market conditions, the quality of management. Business activity can be described as motivated macro- and micro-level of process management of sustainable economic organizations

activities aimed at ensuring its positive dynamics, increasing employment and effective utilization of resources in order to achieve market competitiveness.

Business activity of the organization in the financial aspect makes itself felt in the turnover of its means and their sources. Therefore, financial analysis of business activity is to study the dynamics of the turnover factors. The efficiency of organizations shall be characterized by turnover and profitability of sales tools and sources of their origin. Therefore, business activity indicators that measure the capital turnover shall be considered as indicators of business performance. Indicators of turnover are important for the following reasons:

Firstly, amount of the annual turnover depends on turnover speed;

Secondly, the relative size of semi-constant expenses relates to the size of turnover and, therefore, the turn – round: the faster the turnover, the lower expenses relates to each turnover;

Thirdly, accelerating of turnover at some stage of the cycling of resources entails acceleration of turnover at other stages.

The financial situation of the organization, its ability to pay depends on how quickly the funds invested in assets are transformed into real money.

Various external and internal factors have an influence on the duration of inventory in use. The external factors include: sector profile shall be determined based on predominant field of activity which in turn shall be determined based on ratio of income derived by an enterprise from different spheres of activity); the field of organization activities; the scale of organization activities; impact of inflationary processes; nature of business relationships with partners. The internal factors include: effectiveness of asset management strategy; pricing policy of the organization; methods of inventory evaluating.

As it was mentioned above, the financial situation of the organization depends directly on

how quickly funds invested in assets are transformed into real money. All funds have different speed of turnover that is largely determined by the internal conditions of enterprise activity, first of all, the effectiveness of the strategy for assets management.

According to N.E. Zimin and V.N. Solopova «Analysis and diagnosis of the financial and economic activity of the enterprise», business activity shall be characterized by indicators reflecting the efficiency of use of production goods, material and financial resources. A sign of business activity is a ratio called the «golden rule of enterprise economy». This ratio is as follows:

$$R_{gop} > R_{pp} > R_{ac} > 100\%, \quad (1)$$

where R_{gop} – is gross operational profit rate of change; R_{pp} – rate of change of profit proceeding; R_{ac} – rate of change of advanced capital.

This ratio reflects the widening economic potential of the enterprise. At that, proceeds from the sales are increasing faster that reflects the efficient use of resources and profit increases pointing at that to the relative cost reduction of production and trade.

«The golden rule of enterprise economy» reflects the final result which is also used to assess the business activity.

The business activity of the organization is apparent in the capital turnover rate when intensive use of capital turnover shows the growth of company business activity as a whole. Capital turnover rate affects the profitability of the enterprise and its liquidity, solvency and financial stability.

Capital turnover rate shall be determined by the following indicators:

- Turn – round rate
- Duration of one turnover.

Turn – round ratio shall be determined by the formula:

$$Rt - r = - \frac{\text{Sales proceeds}}{\text{Average capital sum for the reporting period}}. \quad (2)$$

Duration of one turnover:

$$Dt = - \frac{\text{Average capital sum for the reporting period} \times \text{number of calendar days for the analysed period}}{\text{Sales proceeds}}. \quad (3)$$

Let's review the business activity of «KazTransOil» JSC. «KazTransOil» JSC is the largest oil pipeline company of the Republic of Kazakhstan rendering the services on oil transportation in the domestic market and for export. It is also a member of the project «Public IPO» [4].

Let's study the financial condition of «KazTransOil» in terms of «the golden rule of enterprise» (Table 1).

According to Table 1 for all periods, «the golden rule of enterprise economy» has not been fulfilled. In most cases, the growth rate of gross operational

profit does not exceed the growth rate of sales proceeds which is affected by a large proportion of products prime cost. Since 2010 «the golden rule of enterprise economy» has not been almost completely fulfilled, except for the last ratio, i.e., the increase in proceeds was accompanied by significant increases in products prime cost. Thus, the business activity of «KazTransOil» JSC can be described as low.

Let's study the relative indicators of business activity of «KazTransOil» JSC which are able to fully describe the activities of the company (Table 2).

Table 1

Fulfillment of «golden rule of enterprise economy» condition

Period	Rgop	</>	Tpp	</>	Rac	</>	100%	Fulfilled/not fulfilled
2007	109	<	126	>	117	>	100	not fulfilled
2008	134	>	125	>	82	<	100	not fulfilled
2009	110	>	106	<	123	>	100	not fulfilled
2010	102	<	110	<	129	>	100	not fulfilled
2011	79	<	102	<	107	>	100	not fulfilled
2012	98	<	102	<	110	>	100	not fulfilled

Table 2

Indicators of total assets turnover of «KazTransOil» JSC

Period	Turn-round rate for total assets	Duration of one turnover
1	2	3
2007	0,32	1145
2008	0,41	900
2009	0,43	853
2010	0,37	982
2011	0,32	1129
2012	0,30	1207

According to Table 2 for the period from 2009 to 2012, the total assets turnover ratio of «K» JSC has been declining, as seen in on the chart 1, and by 2012, the company's business activity had fallen to

a level below the level of year of 2007 which is the indicator of effectiveness reduction in the use of all available resources by the enterprise.

Business activity is an important indicator in the study of the company's investment attractiveness.

Analysis of the company competitiveness in the stock market shall be accompanied by an assessment of its attractiveness as a set of objective evidence, properties, tools, and opportunities that drive potential effective investment demand. To assess the investment attractiveness we need a few indicators of the company's financial condition which include working capital ratio, business activity ratio, return on assets and EBITDA¹ margin. It should be noted that EBITDA margin shows headline earnings profitability of the company.

¹ EBITDA – (Earnings Before Interest, Dividend, Tax and Amortization) gross operational profit before deduction of accrued interests, dividends, taxes and amortization for fixed assets and intangible assets.

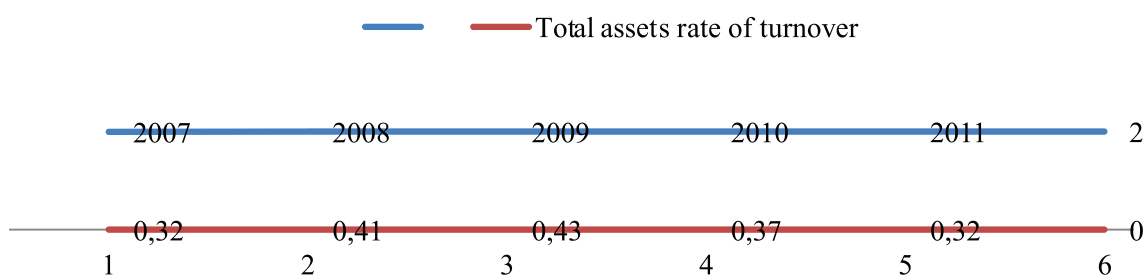


Fig. 1. Dynamics of change of a rate of assets turnover at «KazTransOil» JSC

Using all the above data let's us to calculate the summary indicator of investment attractiveness mark with one of the proposed distance methods, which looks as follows:

$$Ria = \sqrt{\sum_{i=1}^n \left(1 - \frac{X_i}{X_{iet}}\right)^2}, \quad (4)$$

where Ria is the summary indicator of investment attractiveness; n – number of financial ratios used in the calculation; X_i – the value of the financial ratio i ; X_{iet} – reference value of the financial ratio i .

If you calculate these ratios for the company «KazTransOil» we will get the following.

A lower value of investment attractiveness witnesses its high rate Investment attractiveness of «KazTransOil» JSC varied greatly during the monitoring period which clearly can be seen in Fig 2.

Over the period from 2007 to 2008, the company increased investment attractiveness as a result of increase in the working capital ratio, return on assets and business activities. However, in the period from 2008 to 2010 the company's financial position has been deteriorating that resulted from

a reduction in business activity, return on assets on EBITDA. Increase in working capital ratio reduced the decline in investment attractiveness of «KazTransOil» JSC. By 2012, the attractiveness of

«KazTransOil» increased for the potential investors, however, the decline in business activity rate reduced the increase in investment attractiveness of «KazTransOil» by 0,02.

Table 3

Calculation of investment attractiveness of «KazTransOil» JSC

Rate	2007	2008	2009	2010	2011	2012
Working capital ratio	1,54	1,75	1,39	2,11	2,22	2,26
Assets turnover ratio	0,32	0,41	0,43	0,37	0,32	0,30
Return on assets	0,05	0,07	0,10	0,05	0,06	0,07
EBITDA margin	0,53	0,40	0,40	0,36	0,48	0,50
Investment attractiveness	0,63	0,42	0,43	0,57	0,46	0,41

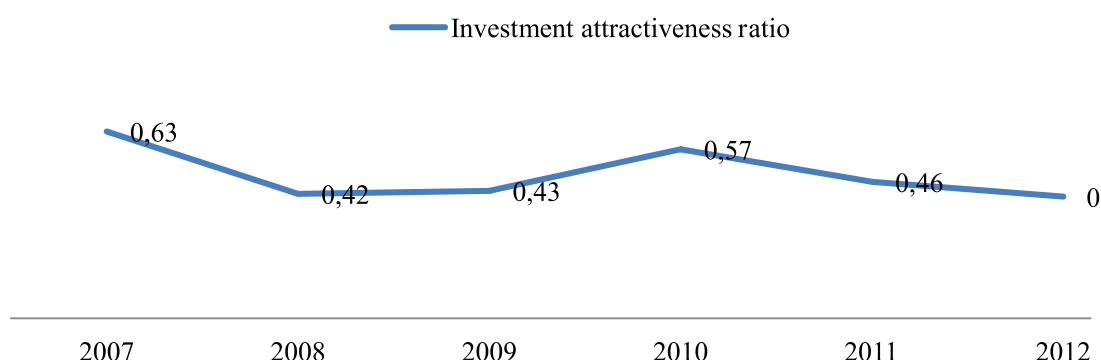


Fig. 2. Dynamics of investment attractiveness change of «KazTransOil» JSC over the period from 2007 to 2012

Having investigated the business activity of JSC «KazTransOil» we came to the conclusion that this rate of the company is not high that has adversely affected its investment attractiveness. In addition, the rate of change in gross operational profit below the rate of changes in sales proceeds reflecting the high cost in the company. «KazTransOil» JSC should conduct a more detailed analysis of its business activities and identify the sources of increase in the rate that will help to improve the management of their own assets, therefore, the investment attractiveness of the company in the stock market.

Thus, business activity plays an important role in assessing the financial position of any enterprise which is the object of attention of potential investors. Business activity is an indicator of the effective

management of enterprise asset which in turn has an impact on the competitiveness of the company in the stock market.

References

1. Gvardin S. Preimuschestva i nedostatki publichnogo razmescheniya akciy // Financial newspaper. – 2007. – № 4, available at: <http://www.lawmix.ru/bux/73241>.
2. Peter Lynch, Beating the Street, 2005. – 310–311 p.
3. Kovalev V.V., Volkova O.N. Analiz khozyastvennoy deyatelnosti predpriyatiya – 2002. – 174–178 p.
4. The official website of the «KazTransOil» JSC, available at: http://www.kaztransoil.kz/ru/o_kompanii.

The work is submitted to the International Scientific Conference «Economics and Management», Thailand, February, 19–27, 2014, came to the editorial office on 22.01.2014.

Short Reports

**THE SUPPLEMENTARY VOCATIONAL
TRAINING AS THE FACTOR
OF DEVELOPING THE INNOVATIONAL
POTENTIAL OF THE SPECIALISTS FOR
THE AGRO-INDUSTRIAL COMPLEX
IN OMSK REGION**

Shumakova O.V., Kovalenko E.V.,
Mozzherina T.G.

VPO «Omsk State Agrarian University. P.A. Stolypin»,
Omsk, e-mail: elenachebot@mail.ru

The transition of the agro-industrial complex to the innovational way of development requires new approaches to train employees: from the working force up to the management. To function in market conditions and to apply modern technology it is necessary to employ qualified personnel and specialists having corresponding training skills and practice. Nowadays agricultural production needs qualified personnel more than other industries. It is very difficult for the peasant to follow innovations, to understand their essence and to introduce them into production process because he is very busy and has poor relations with information systems [1].

Now we are going to survey the realization of the programs of the supplementary vocational training in agro-industrial complex of Omsk region.

Nine hundred and eighty-eight representatives took the improvement of qualifications in 2012. There were 41 managers, 483 specialists and 464 employees of the most popular professions in agricultural sphere of the region. In 2011 there were 985 people: 80 managers, 482 specialists and 423 workers of the most popular professions. In 2010 – 1638 learners improved their qualification: 138 managers, 532 specialists and 968 workers. Such dynamics results from the staff reduction in the agro-industrial complex of the region. So, in 2012 the number of employees decreased by 3581 people compared with 2010 year. Poor incentive of management and reduction in budget finance of the corresponding item of expenditure have a great influence.

Specialists of agriculture in Omsk region more often take the improvement of qualifications at the Institute of Vocational Training of Omsk State Agrarian University named after P.A. Stolypin (see IVT OmSAU named after P.A. Stolypin). As for the year 2010 – 896 learners took the courses of training and in 2011 among 985 people – 953 studied at the institute. By July 2013 seventy-six people had taken the training.

Let us survey the system of the supplementary vocational training with the help of SWOT-analysis (Table 1) that can determine strong and weak sides, perspectives and threats.

Table 1

SWOT analysis on the system of the supplementary vocational training
in agro-industrial complex of Omsk region

Strong sides	Weak sides
1) the incentive of staff to improve their qualification; 2) the availability of the specialized centre for the in agro-industrial complex (IVT OmSAU named after P.A. Stolypin); 3) the availability of MBB; 4) the availability of qualified staff to realize the programs of supplementary vocational training; 5) the number of educational institutions realizing the programs of SVT; 6) the marketing of educational services of SVT; 7) the application of innovational pedagogical technologies in the system of SVT	1) the absence of understanding and incentives of management at the enterprises in the supplementary vocational training of their staff and employees; 2) poor state support off the SVT programs; 3) unstable finance position of agricultural enterprises in Omsk region; 4) the absence of expensive and modern equipment; 5) poor use of possibilities in education without giving up work; 6) sectoral orientation of the SVT programs at the specialized centre in agro-industrial complex
Possibilities	Threats
1) co-operation with leading enterprises having innovative productive grounds («Semirechenskaya», «Karbyshvetskaya» supply bases); 2) the incentive of government to have qualified staff in agro-industrial complex; 3) the possibility to improve teaching staff; 4) realization of SVT programs with the help of innovative educational technologies; 5) employment of the remote education by means of the Internet communicative sites (on-line)	1) impossibility in timely modernization of equipment; 2) the reduction in demographic indicators in the agricultural sector; 3) the alteration in production technologies of agro-industrial complex; 4) unstable state regulation of SVT; 5) the hazard in impossibility to realize some SVT programs; 6) the increasing shortage in the quantity of learning people compared with the demands in the economy of the region; 7) the availability of competitors in the sphere of SVT programs, price policy

Carried out analysis allows to determine the directions in the development of SVT taking into consideration the demands of employers (Table 2).

Table 2

The direction in the development of SVT in agriculture of Omsk region

Type of the component	Content of the direction of development
Organizing	Organization of activity of educational institutions according to the demands of the market;
	Subdivisions, realizing SVT, should be included in the staff of higher educational institutions, scientific and productive organizations, secondary professional education;
	Marketing and management of educational services (career-guidance, enrolment);
	Incentive of management and employees;
	Improvement in organizing the realization of SVT programs (without giving up work, with giving up work partly and remotely);
	Monitoring the demand for the proposed programs;
	Professional competence and practical skills of staff;
	Modern innovative teaching and methodical equipment;
Technological	Realization of SVT programs should be carried out in co-operation with leading productive enterprises;
	Employment of the remote education;
	Use of modern information technologies;
	Interaction with innovative, scientific, productive organizations (moving lessons, round-table conference);
Economic	Investment in basic programs of SVT at the expense of federal and regional budget (social order);
	Finance of creative (individual) SVT programs at the expense of employers;
	Increase of professional competence of teaching staff suitable to the innovative economy;
Adjusting (controlling)	Making the effective state support of training and further training of staff at the regional level;
	Control and monitoring the quality of educational activity of SVT institutions;
	Monitoring the competitors and their price policy

According to the survey the development in the system of vocational training is one of the most perspective directions because the significance of supplementary training becomes higher. It increases professional skills of staff and results in their better adaptation to the changeable market conditions.

References

1. Modern tendencies and prospects to train specialists for innovative economy: collective scientific monograph / edited by E.A. Obodkova. – Yaroslavl': Publishing House of the Academy after Pastukhov, 2013. – 128 p.

TECHNOLOGY OF THE LEGAL EDUCATION YOUNGER PUPILS

Abdullaeva M.D.

Tashkent state pedagogical university named after Hisami, Tashkent, e-mail: marina-20053@yandex.ru

In article is described technology of the legal education younger pupils, providing participations and interactions pupil, full cut-in them in process of the cognition. As a result pupils become the active researcher surrounding world together with teacher, rather than passive adopting experience of the adult person. The main receiving the education: play, helping raise understanding to situations and causes sufferings to turned out to be in her people, division by pairs and groups, using at utterance different ideas or that class speculated on one or another abstract ideas with standpoint of its own experience, verbal associations, using at the beginning initially studies of the subject for the reason clarifications that that pupils already know on her, as well as at the end by purpose of the clarification that that new have heard and etc.

Keywords: technology, legal education, younger pupils

The Formation and development legal state, in which dominant beginning gain the human right and value to personalities, hang, first of all, from education and learning of the young generation. So at present sharply costs need in use all education facilities in scholastic- education process schools for development pupil in spirit of the respect of the human rights, to liberty and human value.

Amongst of human valuables humanistic pedagogical brings forth on the first place of the person, his right, liberty and corresponding to him education and education. In the highlight progressive pedagogical concept of each folk always was a confession of the person high humanistic by value, respect to his personalities, his value, protection of his rights on liberty and development, statement democratic principle in his education and formation.

The great role of the school, which can do the a great deal that humanistic of value become not simply amount of the knowledge's for her alumnus, but also syntheses of the moral rates, defining behavior of the person. She can consolidate beside child feeling own value, ability to resist irritate, shallowness's, cruelty. So morally-legal education is one of the most important problems of the school Education to human rights – an education not only that that present itself human right, but also that that it is necessary to do in interest of the human right. The Purpose of the education to human rights consists in that to help to reach the pupil in its development such level, when they begin to understand, what is a human right, feel importance of the human rights and need to keep and protect their [1; s. 123]. The Occupations orientate on consequent production beside children not only knowledge's and skills, but also value of the installation, which will him necessary in the further life [3; s. 47].

The knowledge's: knowledge that that exist the documents on human rights, that, what right in they are bolted, that that these rights possess all people in the world and that integral [2; s. 67].

The Skills: listen others; conduct the analysis with standpoint morally-moral valuables. These skills help the children to analyses surrounding their world [4; s. 17].

Value: conviction in that that human right important that their it is necessary to respect and keep that interaction better, than conflict that we themselves have charge of our own actions [5; s. 12].

Technology of the education provides the participation and interaction pupil, full cut-in them in process of the cognition. They become the active researcher surrounding world together with teacher, rather than passive adopt the experience of the adult person.

The Main receiving the education:

Rolvaag play. Helps to raise understanding to situations and causes sufferings to turned out to be people in her.

Division by the pairs and groups. It is used, when it is necessary to were quickly voiced different ideas or that class speculated on one or another abstract ideas with standpoint of its own experience.

Verbal associations. Acceptance is used at the beginning initially studies of the subject for the reason clarifications that that pupils already know on her, as well as at the end by purpose of the clarification that that new have heard.

«Brainstorming. This acceptance is used for decision of the concrete problem or searching for of the answer to question. For instance, after «incident», connected with arising the conflict between pupil, ask the class to offer all possible variants of the decision of the conflict by peace way».

General debate in class. This acceptance enables to develop the skill to listen, speak by turns, as well as gain the skills important for upbringing the respect to rights of the other people.

Questions «open» type. They are used therefore that on them it is difficult to give uniquely correct answer.

1. The Hypothetical questions: «That you have done if?»

2. The Questions, spurring to cogitations: «As it were we could help to solve this problem?»

3. Encouraging/supporting questions: «This interesting, but that happened further?»

4. The Questions, revealing opinion: «That you think or feel on cause?..»

5. Zondiruyuschie questions: «Why you so think?»

6. Explaining questions: «Shall I rights if shall say that you think?»

«Projects. The Result of the study can be a report, exhibition, drawing, poem».

«General uproar». It is used, for change the rate of the lesson. Uchasrhiesya during five minutes speak your mind on cause right before told or shown «Drawing. Acceptance is used for the reason developments of the keenness's of observation, skill of collaboration, imaginations, feeling sufferings in respect of people on picture or to hear better their own classmates».

The generalizing lesson on total course in 4 classes with provision for aforesaid methods and acceptance. The subject: «On Olympus of the legal knowledge's». The purpose of the occupation: assistance free and conscious acceptance pupil key legal rates and notion; shaping analytical and communication competency (the development beside students skills to argue its choice, select the main, analyses the situation, combine individual and group forms of the work); upbringing the legal culture.

Coming, from name of the subject of the lesson pupil explain meaning «Olympus». Answer the question: «As you think, why subject of the lesson exactly such?»

The Actualization of the knowledge's. Recall, with what document we got acquainted and worked at our occupation? In what year they were accepted? Why appeared need in creation these document? To whom they are addressed? What is a «right», as you understand importance of this word?

«Brainstorm». Children was offered building to think and write their own right with births and before present moment. Discuss their own record in group, find that general in record, and arrange the answers to separate slip of paper

liver rights person of our country since moment of the birth. The totals of the work we have arranged on silhouette of the person.

Fresh work. The Following stage of the work was a work in vapors. Uchaschiesya you to discuss the important belongings and dispose them in order of importance for life. What «belongings» in list are absolutely necessary? That from these «things» has secondary importance? That you wanted to add in list of the necessary things? What need possible to refer to rights? Uchaschiesya draw a conclusion that these need and, not only they, are contributed in konvenciyyu.

Stating the problem-solving questions, which purpose is a production approach to analysis to real life situations on base of the got knowledge's within the framework of study of the course. «All boys in our class are in their own rights? But, regrettably, on our planet Land exist the hot points, where are broken right pupil. Let's get acquainted with tale your person of the same age and shall realize what rights were violated».

Lead total passed in playing form (the play «Is permitted – is forbidden»).

As home task pupil was offered to write the review about that that gave him course «I and my right».

Thereby, possible draw a conclusion that use given systems extracurricular occupation promotes increasing a level knowledge's about rights child, upbringing the legal culture younger schoolboy, realization itself as personalities, development of the interest to study of the legal questions.

References

1. Alekseev S.S. The Right: theory: experience of the complex study. – M., 1999. – 712 p.
2. Galiahmrtova R.N. The Development morally-legal culture pupil in condition innovation schools. Dis.kand. ped. sciences. KGPU. – Kazani, 2001. – 168 p.
3. Manylov Y.S. The axiomatic approach in education (the experience of the building // Methodology, theory and practice education systems: searching for lasts. – M., 1996.
4. Nyretdinova L.G. Gumanizaciya education space orphanage. Avtoref. dis. kand. ped. sciences, KGPU. – Kazani, 2001. – 24 p.

INTELLECTUAL DEVELOPMENT OF PUPILS' PERSONALITIES IN THE CONDITIONS OF EDUCATION INFORMATION

Andasbaev Y., Yessengabylov I.Z., Aldabergenova A.O., Zhiyembayev Z.T.

Zhetysu State University named after I. Zhansugurov, Taldykorgan, e-mail: Ilias_E@mail.ru

In the article necessity of intellectual development of pupils' personalities in the conditions of society information has been substantiated, didactic potential of information-communication technologies in development of intellectual abilities of schoolchildren has been discovered. On the basis of the analysis of the relevant information the conclusion was that intellectual skills are determined by the following components: ability to analyze, ability to select the main thing and the second, ability to systematize and classify, associativity of thinking, ability to generate ideas and to suggest hypotheses, criticality of thinking, development of reflexion, stability of attention, ability to use attention, developed imagination. In the course of the work we have made the analysis of didactic potential of information-communication technologies and have been determined the main blocks of the above-mentioned technologies, which use in pedagogical process is the purpose of increase of intellectual development of pupils' personalities.

Keywords: information, information-communication technologies, intellectual development, computer graphics and animation

Information of the society is reflected as the most important mechanism of forming competitiveness of national economy in the Message of the President of the Republic of Kazakhstan N.A. Nazarbayev «The Kazakhstan strategy of entering the list of 50 most competitive countries of the world. Kazakhstan on the threshold of a new breakthrough in its development».

Information of the society is realized in the framework of the concept of the National Information Infrastructure directed to creation of E-Government; making open information-communication systems; standardization and certification of information means and systems; providing access to the resources of local and global networks; expansion of application sphere of the state language in a digital field; maintenance of safety and protection of the state resources.

In an information society as opposed to the industrial one knowledge and intellect are produced and consumed. The main type of created products is an information product; erudition and intelligence are included into national riches. Naturally life in an information society demands from the members of society high intellectual level, information culture of a person and creative activity of rising generation. Its solution means working out efficient technologies of intellectual development based on modern theoretical approaches to the questions of intellect and creative work.

On the basis of analysis of corresponding literature we have come to the conclusion that intellectual abilities are determined by the following components: ability to analyze, ability to sort out the main thing and the secondary one, ability to systematize and classify, associativity of thinking, ability to generate ideas and to put forward hypotheses, criticality of thinking, development of reflexion, stability of attention, ability to distribute it, developed imagination.

Nowadays in order to realize successfully intellectual development of pupils' personalities in their educational activity it is necessary to look for modern teaching means and methods. As the experience of educational institutions of Kazakhstan shows it is use of information-communication technologies with their huge universal possibilities that will be one of these means. Besides, with development of modern information-communication technologies the system «a person and a computer» has quickly turned into a problem which concerns all the members of the society, but not just specialists, therefore communication of a person with a computer should be provided by school education. The earlier we will begin it, the faster our society will be developed because a modern information society demands work with computers. In this connection in Kazakhstan the beginning of studying computer science is transferred from the 10th form to the 7th form, and pupils of primary forms have a propaedeutic course, it is connected with the fact that information-communication technologies have a huge pedagogical and didactic potential. At the traditional organisation of the process of training with use of the newest technical means a pupil «keeps a position of listening explanation», and with using a computer in the training course «studying becomes active and is ruled by the child himself» [1]. Thus in the training course personal significant purposes are achieved, and the received knowledge assist in development of pupils' intellect as the work experience of Kazakhstan teachers shows.

According to the results of our experimental research development of intellectual abilities of schoolchildren by the means of information-communication technologies is a personal education expressed in a complex of knowledge, abilities, personal characteristics providing such interaction of the pupils at which optimal conditions for development

of a creative personality are created, that determines the level of intellectual development which is characterized not only by quality of learning the set content, but also by consideration it in different aspects, as well as provides putting forward hypotheses during the search of solution of theoretical and practical problems, as criticality to them, analysis and development of hypotheses of other participants is a necessary quality of a modern person.

D. Dewey whose works many psychologists and teachers who are supporters of humanistic pedagogics used, paying special attention to importance of development of intellectual abilities of schoolchildren and forming independence of thinking, at the same time emphasized that the point is not only necessity of mastering knowledge, by the approach itself to organisation of activity in mastering this knowledge [2, c. 52].

At present time information flows in different spheres of knowledge are so huge and grow so rapidly, that a modern educated person cannot keep all necessary facts in his memory. Besides fundamental knowledge within the limits of his speciality he should be able to work constantly with information not only in the particular field of activity, but also in adjacent spheres as the solution of the majority of the problems is at the joint of subject fields. In this connection ability to work with information actually becomes the key intellectual ability which is the basis of any professional and cultural competence. Therefore the key task of the modern education system must be the task of forming this ability. In many kinds of professional work visual information necessary for decision-making is if not unique but the basic one.

Information-communication technologies which are an objective reality of modern educational process can not only fit in organically with studying-research activity of pupils, but also be used at organization of problem training and studying specific ways of creative activity that in the final analysis will assist in intellectual development of pupils' personalities. For example, using of computer graphics and animation will allow pupils to do educational experimental-research activity and to carry out independent scientific research of different phenomena and processes. Realization of possibilities of artificial intellect systems in software products for education will enable to improve testing, diagnosing techniques of control and estimating the level of intellectual development due to the possibilities of self-checking, individual, differentiated approach to each trainee.

The content of technology which was developed in the Kazakhstan National Information Centre is modeling on the basis of «horizontal enrichment» which essence is in adding to the traditional curriculum special courses which qualitatively differ from the traditional content of school education and are directed straight to intellectual development of pupils.

It represents entirely intellect and integrates in itself some aspects of intellect development: cognitive, information and creative and accordingly has three basic directions (lines):

- Cognitive line provides enrichment of cognitive experience of a child as the basis of intellect.

- Information line is focused on forming conceptions about the information picture of the world and acquaintance to information processes, mastering cognition methods and provides first of all development of metacognitive experience.

- Creative line or development of creativity, ability to make up creates conditions for stimulation of intellect displays in a non-standard situation or an uncertain situation.

It is necessary to note that the developed program material is successfully interfaced with the general education content, not duplicating it, and can be used together with any programs of school education.

In conclusion we should note that on the basis of the analysis of didactic potential of information-communication technologies we have sorted out the main blocks of these technologies which use in pedagogical process is aimed at intellectual development of pupils' personalities:

- studying and use of general methods of efficient processing of information;

- use of programs of general purpose (text and graphic editors, tabular processors, control systems of databases);

- use of telecommunication software;

- use of special programs (tool environments, multimedia products used at studying of some subjects) for making subjectively new rational ways of information processing. From our point of view optimal combination of information-communication technologies will be joint use of special programs (studying and application of programming technologies) and studying and use of general methods of efficient processing of information, including the ways of solving heuristic problems.

References

1. Peipers S. Revolution in mind: children, computers and fruitful ideas. – M.: Pedagogics, 1989. – 221 p.
2. Dewey D. Psychology and pedagogy of thinking. – M., 1909. – 217 p.

PARTICULARITIES OF THE BUILDING AND UNDERTAKING INTEGRATED LESSON IN INITIAL CLASS WITH RUSSIAN LANGUAGE OF THE EDUCATION

Eshpulatov S.N.

Teacher of the Samarkand state university, Samarkand, e-mail: marina-20053@yandex.ru

This article is considered about possible variants of integration Russian language with the other subjects that studying in initial classes with language of the education.

Keywords: integration, differentiated knowledge, Russian language, development of speech

The Pedagogical system of each history epoch outlives essential change. However on all stage of the development society follows to spare emphases to qualitative preparing the younger generation to independent life. Pupils today have a high mental potential, but, well knowledge's, often cannot use them in practical activity. One of the efficient facilities of the decision given problems can become the integration of the contents of the formation, promoting shaping beside pupils initial classes of the belief about holistic picture of the world. Under integration in broad sense understand the process of the formation to wholeness. The Determination to integrations as process means not dissolution one in the other, but their unity that is to say conservation interacting systems and adjustment between them mutual contact [2]. With reference to system of the education notion «integration» can take two importance's: first, this creation beside schoolboy of the holistic belief about surrounding world; secondly, this finding of the general platform of the rapprochement of the subject knowledge's. The Integration as purpose of the education must give the pupil of that knowledge, which reflect relatedness of the separate parts of the world as systems, teach the child with the first step of the education to present the world as united integer, in which all elements interconnected. The realization to these purposes can begin in grade school already. The integration also – a facility of the reception of the new presentations on butting of the traditional subject knowledge's. In the first place she is called to fill the ignorance on butting already available differentiated knowledge's to install the existing relationship between them. She is directed on development of the eruditions training, on renovation existing narrow specialization in education. In ditto time integration must not change education classical scholastic subject, she must only connect the got knowledge's in united system [4].

In scholastic process notion to integrations different researcher is interpreted differently: S.I. Archangelsk pays attention to intercooling contents, methods and type of the education;

G.I. Baturina understands under integration creation holistic scholastic of the process and scientifically-motivated systems of goal-directed management process shaping to personalities; O.I. Bugaev integration of the contents of the formation explains need of the determination integration relationships for the reason shaping beside pupil holistic picture of the world I.D. Zverev for background sign of the integrations takes wholeness of the system of the education; V.R. Ilichenko confirms that integration of the knowledge's is a necessary condition of the shaping scientific pupil and is realized on base general for all subject given cycle of the fundamental regularities of the nature; L.M. Momot and V. Glomozda consider that in contents of the education integration is realized by merging in one synthesized subject, course, subject, element different scholastic subject on base broad integration scientific approach G.F. Fedorec sees the integration in varied relationship and dependency between structured component of the pedagogical system [1].

Resting in analysis integration processes in our understanding integration – a deep process of the internal interaction, scientific knowledge's, presenting scholastic subjects. The Practice confirms that subject change at realization of the integrations, structure, connected scholastic discipline, enlarge and problems, becomes on high level their notional-categorical device and methodological toolbox. The Practice confirms, due to integrations in consciousness pupil is formed more active and all-round picture of the world, boys begin actively to use their own knowledge's.

The integration allows teaching the child by itself to gain the knowledge's, develop the interest to teaching, and raise his intellectual level. In initial class she carries their own particularities and carries the collective nature i.e. «Little on all».

The children get acquainted with many phenomena's, notion, and subject on early stage of the education already, but have about them the most elementary presentations. On measure of the education they get all new and new knowledge's, renewing and increasing

already available. In this main difficulty integrated lesson since necessary to save the dynamic development of any subject from its introduction before fastening. In turn, these lessons allow the teacher to reduce the time of the study separate that, liquidate duplication of the material on miscellaneous subject, spare more attention that purpose, which teacher selects at present education.

The integrated lessons remove and overstrain pupil for count of the switching with one type of activity on another. However, as it was noted above, at the first two years of the education in school does not follow specifically to accent on integrations since beside child not yet big baggage of the knowledge's, did not grammatical, computing, technical skills.

The main by particularity of the integrated lesson, on our glance, is that such lesson is built on base of some one subject, in our event Russian language, which is a main. Rest, integral with him subjects, help broader to study his relationship, processes, deeper understand essence of the under study subject, understand the relationship with real life and possibility of the using the got knowledge's in practice.

Within the framework of given article we stop on relationship of the Russian language with the other subject. Bring fragments some integrated lesson, called on by us in practice. The Russian language as subject of the school formation – a phenomena, and contacts it with the other subject come to light in contents not only. The relationship between subject, what the scientist note, is expressed as well as in that, "that one subject serves as it were instrument at decision on a matter and problems in the other subject. Such subject for Russian language is, for instance, mathematics. The relationship of the Russian; the language and mathematicians are strictly fixed, locked. The realization it's particularly actual in those sections, material which easier whole yields to formalizations. So integration subject Russian language and mathematicians – very complex process, and in practice it's nearly do not realize. But if realize, that much seldom. For instance, we integrate the Russian language with mathematics at study of the subject «Orthography numeral» or «Quantitative and ordinal numbers» etc.

We shall note one more variant a contact, which are fixed between Russian language and the other subject in organizing – a methodical plan. There is in view of organizing forms of the education, typical of different school discipline, as the bases for spoken and written work on lesson of the Russian language: formation example, answers to questions, letter of the compositions on the personal impressions and etc. The most wide-spread is an integration of the Russian language with reading, graphic

arts, music. But in the same way these relationship can intertwine else, where are integrated not two subjects, but three and even more. Such lessons promote the deep penetration pupil in word, in the world of the paints and sound, help shaping literate spoken and written speech pupils students, its development and enrichment, develop the aesthetic taste, skill to understand and value the works of art, beauty and wealth of the native nature.

In initial class the most wide-spread integration native language with nature-study. In our practical person to subject Russian language is added one more – a graphic arts. Want to introduce with fragment of such lesson: Subject: Springtime on picture P. Konchalovskogo «Lilac».

The Lesson was built in such sequences:

1. «Before you reproduction of the picture P. Konchalovskogo «Lilac», – addresses the teacher to pupils, – not truth, on you immediately smell the springtime? Consider attentively picture. Pay attention to abundance color, expressed by artist. Was able he show that lilac fresh? As it is woke; waked its right before cut and brought in room? What color this splendid, splendid lilac? See, carefully draws the artist a petal, lilac?

2. Hereinafter on supporting wordless, recorded on board, children write their own tales or mini-compositions on picture «Lilac».

3. The acquaintance pupil with legend about appearance lilac: «Springtime, having disturbed rays sun and rainbows, became to throw them to the land. And there, where carions rays, becalmed flabby the flowers – orange, red, white, blue. The springtime went with south on north, generously spilling their own rays. When she reached the north, beside she remained one only mauve. From them-that and increased bushes lilac». There is else lilac from Percy. Four hundred years back lilac has brought to Vein, but from there she became to spread on the whole Europe».

Hereinafter we offer the children to execute the exercises on language on this text. About particularity of the integrations subject Russian language and music's. At first thought generality these subject can be shown more doubtful, but possibility of the association – unrealistic. So we try to show that unites these two subjects as in that material, which subjects to assimilation, so and in special ability, with the help of some is adopted material.

The Ithaca, on lesson of the Russian language pupils must adopt the Russian speech in all its aspect, but on lesson of the music under study material – a canto, music product, in which merge two poetries – music and speech. And on lesson of the Russian language, and on lesson of the music we must obtain the clear

pronunciation a sound, correct stating the body and heads during speech and chant, holdings by breathing and voice. «However relationship between speech and chant deeper, and root this relationship leave in depth ages, when, in the opinion of many scientist speech and chant met, in one poetry and when their base was not differentiated».

The Methodists past and modern researchers in the field of psychologists and methods stop its attention on the general in linguistically and music ability. So from all abilities at present possible such, as speech and ear for music. Exactly, this ability bests the basis of successful assimilation to matters of the language and chant.

The Ithaca, beside teachers of the Russian language and music's much general problems, which much more effectively can be solved joint effort. The Material of the language and music's in related and even differences can be used with methodical effect under skillful collation. The Integration lesson Russian language with music gives the efficient result, for instance, at study of some case forms and words with «difficult» graves. So, at verse or song students better master this subject. The Expected rhyme beforehand prepares the pupil to the following case ending. Learned some fragment or verses song, which are usually used as organized beginning on lesson of the Russian language, pupils remember the necessary words, expressions, integer to

thoughts, is improved pronunciation. The Music on lesson of the Russian language creates relaxed atmosphere, helps the pupil be deeper sunk in atmosphere everyday life, natures. «On such integrated lesson educational function of the music not less important, than educational». Since at bugging of some product on lesson, teacher most often reports and short given about author, and history of the making the product. This allows and promotes the expansion of the outlook pupils.

The Integration this subject plays the important role in development of the mental abilities, activations of the thinking, development of the spatial presentation, as well as in development speech and emotional child. Thereby, in given article were considered possible variants integration native language with the other subject. Were a brought synopsizes integrated lesson, but in some cases only their fragments.

References

1. Zorina L.Y. The Integrated subjects / Modern didactics: theory – a practical person / Under scientific editing I.Y. Lerner, I.K. Zhuravlyova. – M.: ITP and MI PARADISE. 2003. – P. 125–140.
2. Zhukova T.N. Integracionnye trends in education // Initial school. – 2001. – № 9. – P. 37–40.
3. Ivanova I.N. The Realization to ideas to integrations of the science in system of the base formation // Initial school. – 2003. – № 2. – P. 51–53.
4. Svetlovskaya N. About integrations as methodical phenomena and its possibility in initial education // Initial school. – 2000. – № 5. – P. 57–60.

SPECIFICS OF ACADEMIC DISCIPLINES INTEGRATION IN CONDITIONS OF THE CREDIT TECHNOLOGY APPLIED IN HIGHER EDUCATIONAL INSTITUTIONS OF THE REPUBLIC OF KAZAKHSTAN

Tleuberdiev B., Shvaikovskiy A., Makulbek A.

*South Kazakhstan State University im. M. Auezova, Shymkent,
e-mail: koncel@ukgu.kz srd-sksu@yandex.kz*

In the article the peculiarities of adoption of the credit educational technology in the Republic of Kazakhstan and the existing problems of its further realization are considered. The credit technology is a new technology for the educational system of the Republic of Kazakhstan. It helps to increase the levels of self-education and knowledge creative development on the basis of individualization, electiveness of the educational program within the framework of the regulated educational process and account of the knowledge volume in credits. The research leading idea consists in the use of the potential of intersubject relations in conditions of the credit technology as a means of reinforcing the integration processes stimulating the students' interest to cognitive activity, quality improvement of mastering the disciplines of the speciality curriculum. The establishment of the disciplines' prerequisites and postrequisites at organization of the credit technology assumes the further work on designing such training courses which are constructed on the integrated approach.

Keywords: credit technology, integration, individualization, method, innovation, modernization, key competences

The distinctive feature of higher education of the XXI century is the international cooperation. In the Republic of Kazakhstan the educational systems of the European countries are the subject of special attention. The integration into the European educational space is impossible without application of the international technologies. This is the reason of adoption of the credit technology in home higher institutions. On the way to integration with the European educational space there are some attempts to organize the whole education system according to the global requirements. The State program of education development in the Republic of Kazakhstan for 2011–2020 as one of the priority directions includes «... design of the effectively working educational system providing the broad cross-section of the population with educational standards (at a global level) of high quality» [1].

One of the basic aspects of reforming the modern education is reinforcing of the integration processes stimulating the students' interest to the knowledge of the essence and the world phenomena as complete objects. The tendencies of integration and differentiation in science and education are increasing nowadays.

Moving to modern socially-oriented market economy is one of the basic directions of the reforms carried out in the Republic of Kazakhstan. Adoption of the credit technology in the system of higher education of Kazakhstan became the consequence of the country's inclusion in Bologna process which basic purpose is creation of the united European educational space.

Tasks setting

The aim of the research: theoretical substantiation and revealing of the ways of realization of the disciplines integration in the higher school educational process in conditions of the credit technology.

The tasks of the research:

1. To study the theoretical bases of the intersubject relations realization.
2. To investigate the potential of the intersubject relations in conditions of the credit technology.
3. To work out methods of the intersubject relations realization in teaching and cognitive process of the higher school in conditions of the credit technology.
4. To test the worked out methods in the course of pedagogical experiment and to suggest scientific-methodical recommendations on the problem researched.

The methods of the research: study and analysis of scientific articles, didactic, methodical works on the problem researched; analysis of normative documentation (the state standards of education, typical curriculums, curricula, educational and methodical complexes of specialties and disciplines); observation; conversation with students; questionnaire of the participants of the educational process; the experimental work carrying out.

Results

A credit technology – an educational technology, allowing to reinforce the levels of self-education and knowledge creative mastering on the basis of individualization, electiveness of the educational program within the framework of the regulated educational process and account of the knowledge volume in credits.

The main principles of the given system consist, first of all, in freedom of the students' choice of the academic disciplines, special courses and even teachers. At the beginning of each course a student gets a course program with the whole complex of questions, tasks, tests for self-checking, etc. – the so-called syllabus. A teacher acts now only as a consultant directing and adjusting the students' work.

A student gets an opportunity to take at choice the obligatory subjects and disciplines pre-scheduled.

It is possible to judge about the perspective of the credit technology on the following parameters:

- achievement of the international “transparency” of the existing national educational systems (the aim – to enable people to get education at convenient locality);
- compatibility with any national educational system;
- applicability by all kinds of the programs and forms of higher education (full-time, part-time, distant);
- opportunity of the international test transfer;
- compatibility with the European diplomas.

In addition the credit system profitably represents the interests both of students and teachers:

- introduction of credits for estimation of the labor expenditures;
- personal participation of each student in formation of the individual curriculum;
- freedom of choice of the curriculum disciplines;
- use of the score system of academic progress.

A teacher's interests are submitted by the teaching technology. In the traditional system applied until recently all over the postsoviet space, a teacher acted as the transmitter of ready knowledge, and a student – as the passive perceiving party. In the credit system a teacher has become the organizer of cognitive-reflective activity and makes a student study during all his educational activity, not just in the higher school. A student becomes the active perceiving party, learning and getting experience of continuous self-education on the basis of initiative and independence.

However with introduction of the credit system in the Republic of Kazakhstan there was a number of problems, in particular, connected to very short terms of its introduction (2004-2005). In this connection, the students have not been timely provided with teaching and methodical materials as the teachers simply did not have time for material preparation for each student. Besides originally there were some problems with students' educational knowledge assessment on the new system. If earlier a lesson lasted 1,5 hours now it lasts only 50 minutes. Each discipline can have from one up to three credits, i.e. is designed for 45–135 hours, and into the structure of one credit are included: 15 hours of lectures, 15 hours of independent work with a teacher, 15 hours of students' self-independent work. If there is more than one credit it is possible to vary hours. For example, if there are three

credits for a subject (45 hours of lectures, 45 hours of independent work with a teacher, 45 hours of students' self-independent work) it is possible to conduct 15 lectures and 30 seminars or 30 lectures and 15 seminars (hours for independent work with a teacher and students' self-independent work are not varied).

But to get accustomed to all this both the students and teachers needed a period of adaptation. Thus, the teachers are interested now in making the subject interesting to students, otherwise they can be dismissed, if not enough of the educational groups will be formed.

Despite of all these difficulties, the credit system allows teachers and students to form the educational process and to determine the subjects which are necessary for the future professional work.

Besides students get opportunity to study the subjects not presented in the higher school programs, and to pass them in other higher schools under the programs of internal and external academic mobility. These disciplines are put on the diploma on the basis of the transfer system.

Thus, taking the way of reforming the higher education and approaching its standards to the European, Kazakhstan, first, gets opportunity to make the higher school diplomas liquid abroad. Besides the RK government hopes «to optimize» economically the educational sphere of the country and to make it attractive for the Europeans. In general the credit technology is progressive and can really organize the European educational space in the united integral system.

Within the framework of the given research the regulations on the credit technology, a theoretical material and the collected experience of activity of the higher educational institutions in the Republic of Kazakhstan on introduction of the credit technology have been investigated [2].

The analysis of the didactic material, curricula, programs, teaching and methodical complexes of various disciplines, seminars on introduction of the given educational system, show, that in conditions of the credit educational system undoubtedly there is an active process of integration of various branches of sciences. It influences the quality of mastering the subjects [3].

In view of the conducted research the working programs on various subjects of the specialties «Foreign language: two foreign languages», «Theory and practice of translation», «Foreign philology» and the syllabuses for students of the given specialties were analyzed.

In our opinion, the urgency of the problem of the disciplines integration in conditions of the credit system, its insufficient readiness in modern pedagogics has been increased.

The interpretation of the concept of intersubject relations in pedagogical science is ambiguous. Traditionally the intersubject

relations are considered as the mutual coordination of curriculums caused by the system of sciences and didactic purposes. At the same time comprehension of the intersubject relations as didactic condition providing the development of cognitive abilities is popularized. There is a tendency of the intersubject relations allocation in independent didactic principle.

Today in pedagogics they address more often to the concept of the disciplines integration. Integration means association in the whole of some parts or elements. Integration – the process of the sciences rapprochement and connection, occurring alongside with differentiation.

We consider the phenomena of intersubject relations and integration from the following positions. The didactic principle of the intersubject relations is characterized from our point of view as directive to organization of the pedagogical process in view of the common in the contents of subjects and approaches to their mastering. Such organization of the teaching process under influence of the purposeful realization of the intersubject relations positively affects its productivity. At their systematic and purposeful realization the whole educational process caused by a high level of integration is reconstructed.

Integration of the disciplines we consider as the pedagogical phenomenon determining the ways of developing the subject system of education and directed on deepening of interrelations and interdependence between the subjects. Integration as the pedagogical phenomenon has methodological substantiation and, not denying the subject system, in many respects it promotes solution of the common and adjacent problems at training the specialists with higher education. Integration of the subjects – one of the directions of active search of new pedagogical decisions promoting development of the creative potential of the teaching staff for more effective influence on independent cognitive activity of students, on the level of their activity in mastering the curriculum disciplines [4].

The important positive moment in the history of development and realization of the idea of intersubject relations is transfer of the higher school of the Republic of Kazakhstan to the credit system. The credit technology deduces the educational process on a new qualitative level and has a number of distinctive features.

As the monitoring has shown, in conditions of the credit technology the significant role in mastering the discipline material and organization of the educational process the intersubject relations have. The educational process in the integrated subjects is directed not only on maintenance of the learners with knowledge necessary for practical activities, but also on development of the skills to use this knowledge

creatively in new conditions, to analyze them, to choose the necessary and missing in the information stream, and also to plan independently, to carry out and supervise the activity. The important significance has formation of such common discipline skills which will provide the quality of independent cognitive activity of a student at higher school disciplines studying and will affect the development of the professional competence of the future specialists.

The credit technology is inconceivable without teaching and methodical maintenance of the cognitive process. The teaching and methodical maintenance of the discipline is directed on solution of the following specific tasks.

The efficiency of the intersubject relations at the credit technology lessons is proved by the following didactic conditions: concrete instruction on the discipline prerequisites and postrequisites in working programs (syllabuses); precise determination of the teaching material volume and contents, on the basis of which the intersubject relations are realized; their developed inclusion in the contents of lectures, in methodical design of practical classes, in calendar-thematic plans of teachers and plans for practical classes in students' syllabuses; concretization of the learning objectives from the point of view of the acquired adjacent concepts and skills; analysis of the concepts common for several subjects; development of the generalized world outlook categories; application of the generalized cognitive skills and methods; development of the common subject skills necessary for mastering all the higher school disciplines; application of various visual aids from the related disciplines; statement of the problem questions of the intersubject contents; application of the interactive methods of teaching; coordination of activity of teachers of different subjects.

The potential of the intersubject relations now as the research has shown, is extremely great. There is a necessity for development of conceptually new integrated approaches to mastering the higher school disciplines in conditions of the credit technology. The principle of the intersubject relations is traditionally connected to solution of didactic problems and regarded as one of the conditions of development of the teaching technology. The principle of the interbranch scientific integration in high degree is connected to the substantial component of the educational process probability. The theoretical research of the problem of integration allows to allocate such positive properties of the principle of organization of the intersubject relations as complete reflection of the world picture, the outlook formation promoting the depth and knowledge transparency; formation of the learners' cognitive interest, development of their productive activity, the common

discipline skills promoting qualitative mastering of the higher school program.

In the context of the common discipline skills formation the importance of the language disciplines affecting the quality of all subjects mastering is increasing. It makes teachers of the language disciplines use the great opportunities of the intersubject relations during classes for achievement of a high level of teaching and getting perfect results in learning. Both a teacher and a student should realize, that in all subjects the same speech skills are formed, but on different language material. Therefore the intersubject relations which consolidate, reinforce the developed skills are of paramount importance.

The priority direction of the research is the characteristic of the condition of organization of the intersubject relations both at language, and other kinds of lessons, revealing the potential of intersubject relations. The research was carried out by the analysis of working programs and syllabuses of some disciplines of the philological faculty of South Kazakhstan M. Auezov State University. It was carried out by oral interrogations and questioning, representing one of the most accessible and effective methods of studying the condition of the given problem and revealing the probable ways of the educational process development.

The analysis of the teaching and methodical complexes was of great importance for objective estimation of the condition, determination of the ways of development and designing the new strategy in realization of the intersubject relations in the higher school.

Conclusion

On the basis of theoretical propositions and the experimental research data we have come to the following conclusions:

1. The results of the carried out research convincingly testify that integration of the disciplines is the pedagogical phenomenon determining the ways of development of the subject system and directed on deepening of the disciplines interrelations and interdependence. The didactic principle of the intersubject relations is characterized as proposition, direction on organization of the pedagogical process in view of the principle of integration.

2. Transfer to the credit system, supposing among the ways of the educational process development one of the most effective – organization of a strong system of the higher school disciplines relations, has made urgent again the problem of the intersubject relations in the framework of designing the approaches to prerequisites and postrequisites application.

3. In conditions of the credit system it is extremely necessary: formation of the common discipline skills in view of the requirements of

the credit technology providing the material qualitative mastering; instruction on the disciplines prerequisites and postrequisites; use of opportunities of one of the main components of organization of the independent cognitive activity of a student – a syllabus.

4. The results of the experimental teaching have shown, that introduction of the new approach to realization of the intersubject relations substantially promoted:

- active use of the intersubject relations by students in the independent cognitive activity;
- adaptation of the former schoolchildren to the higher school system;
- students' mastering of the certain knowledge systems: philosophical, social, psychopedagogical, philological, ethical;
- formation of the system of common discipline skills: adaptable, cognitive, communicative, research, designing;
- formation of the system of common discipline skills of preparation of oral scientific message, written execution of the cognitive activity results, work with printed sources, reference to computer support;
- improvement of quality of mastering the subjects studied.

The carried out research and the results of the experimental work prove the urgency of the problem of the intersubject relations in conditions of the credit system. The urgency and many aspects of the given problem give opportunities for its research. Only in the aspect of the credit technology it is possible to allocate some directions in research of the potential of intersubject relations in the higher school: application of the credit technology mechanisms for coordination of teachers' work; activity of advisors in formation of an educational trajectory of students, designing the individual curricula in the aspect of the intersubject relations realization; working out and introduction of new integrated courses into the educational process of the higher school; improvement of the curricula in view of the principle of the intersubject relations.

These conclusions speak of the prospects of the further scientific researches devoted to the intersubject relations in the aspect of the higher school teaching.

References

1. State program of education development in the Republic of Kazakhstan for 2011–2020. – Astana: Akorda, № 1118, 7.12.2010.
2. Rules of educational process organization on the credit technology in the Republic of Kazakhstan. – Order №152, 20.04.2011.
3. Kolos E.A. Development of the system of higher education in Kazakhstan: innovations, experience and prospects. – Ust Kamenogorsk, 2008. – 207 p.
4. The instructive letter on organization of the educational process on credit technology in higher educational institutions of the RK, №U-01, 14.03.2008.

*Materials of Conferences***PROBLEMS FACING TECHNICAL EDUCATION**

Sklyarova E., Erofeeva G., Lider A.

*National Research Tomsk Polytechnic University, Tomsk,
e-mail: skea@tpu.ru*

The issues of educational process in secondary schools as well as tertiary educational institutions are being widely discussed in press, as noted in the number of high school graduates with the highest possible 100-point score in the physics state exam has increased 26-fold in 2013 [1, 2]. The mean score in physics has grown from 52,28 to 60,12. As the academic year has only started, it is hardly worth making judgements about how much the students' knowledge has actually improved.

The prevailing trend in today's education is in rapidly changing education technologies, which proves that Russian education is in the bifurcation point. Before now, people who had just completed their degrees were in high demand in industry, which was an incentive for applying to higher educational institutions to major in technical engineering, while at present degrees in law and economics are more popular.

The Russian Ministry of Education has increased the target figures for admission to engineering and science degrees, trying to fix the situation. However, applicants' preferences are still biased towards economics, state governing, advertising and public relations. Recently, there has also been an increasing interest in medical biochemistry, while the real economy sector demands specialists in engineering and innovative technologies.

In this situation it is difficult to predict the results of changes in the educational process according to the foresight studies by the Strategic Initiatives Agency [3]. It states the following key features of the future education:

1. Total transformation of the educational process.
2. Personal education. Everybody chooses their own education trajectory. "There is no place for the old school and university in the future world".
3. Achievement storage – the portfolio system – is one of the key characteristics of the educational process.
4. Organising universities by a set of majors which group students together.
5. Lifelong education.

Whereas the ideas of achievement storage and lifelong education can be agreed with, the other points appear highly problematic.

For a secondary school student choosing subjects to major in for further education in a modern university is a serious challenge. As for abandoning organised study in schools and universities, it is worth remembering Freud's words that a human being's desire to work is just a fantasy.

Even more questions arise with testing the abilities of those applying for jobs in serious spheres of activity demanding high responsibility. Apparently, the following requirements will remain eternal truths whatever change may take place:

1. Knowledge of the fundamental laws of natural sciences.
2. Skills in applying it in solving professional problems using mathematical techniques and up-to-date software instruments.
3. Experience of research work with up-to-date professional equipment.

The organisation of educational process in university and school may be subject to a lot of further discussion, but if it provides in a university all the three points mentioned above and employers readily admit university graduates which demonstrate career progress, this university's practices deserve studying and promoting, and this institution is in no need of immediate changes.

The competency-based approach, which is widespread in assessing the quality of training not only university, but secondary school students, implies formulating, developing and assessing the competencies. All the three positions have specific problems associated with them. Employers are not willing to make their requirements widely known, preferring to find out about potential employees during interviews and probation periods. So, educational program developers are facing the risky task of formulating competencies based on consultations with employers and market demands, further coordinating them with those interested. For the developing competencies, in addition to the items mentioned before, it is necessary to have a corresponding educational program, organizing the educational process, etc. But the most challenging task is assessing the level of competencies after the completion of the study. This work includes a suggestion that not only the student's achievements in learning, but also research activities and research works published are assessed [4].

The rector of Lomonosov Moscow State University V. Sadovnichy indicated in one of his speeches that the information contained in physics coursebooks is 50 years behind the modern state of science. As physics is the basis of technical education, the teaching and learning process in physics plays the leading role. Its importance reaches the highest degree if physics is the student's major. The bachelors' and masters' curricula for the physics major specializing in condensed state physics have been enriched with two new courses: the Modern Scientific Picture of the World, the world-view-related course, and the Basic Physics of Nanomaterials to form up-to-date scientific ideas. Besides, studying these courses will enable the graduates to

change their professional direction in the future. In the ancient time, all the scientific disciplines were studied within one – natural philosophy. The differentiation between the disciplines was historically justified, which was proved by the rapid development of physics, chemistry and biology in the 18th, 19th and especially 20th centuries. As a result of this differentiation, the research trajectories of these disciplines went in different directions: by studying physics, chemistry and biology separately, the laws of functioning in all chemical and biological systems are examined. But this leads to the disappearance of the idea of the world unity; the world is universal because it consists of the same elements (no other elements have been found in space), it is ruled by the same laws (the subdivision to mega-, macro and microworlds is relative, and their applicability limits should be taken into account, etc.).

This is a reason for teaching a new «natural philosophy» which presents a common scientific picture of the world based on the most recent achievements of natural sciences. The course also includes common issues of natural sciences: the symmetry and asymmetry, the curvature of space, self-organization, etc.

Due to the development of the nanomaterials and nanotechnologies area, quantum mechanics has found practical application [5]. Of special importance are quantum mechanics sections for students specializing in the Condensed State Physics program. We consider it reasonable to begin presenting the informational material of the Basic Physics of Nanomaterials course with revising the concepts of solid state physics and to point out that Brillouin zones indicate the values of wave vectors at which an electronic wave cannot spread in the solid body and this is the physical idea of the zones. As a result of the crystal lattice periodicity and the existence of Brillouin zones, allowed and forbidden states emerge in the crystal.

The application of Fourier expansion for vectors of the reciprocal lattice of the periodic function with the translational symmetry of crystals can be explained by Fourier series being a powerful instrument for solving a variety of tasks. A very important component of the information material is classical and quantum size effects [6–8], which appear in quantum dots, wires, and tubes. The physics of nanoparticles' self-organization in physics, chemistry, and biology are studied beginning from the ideas of self-organization, conditions of self-organization, etc., with which students are familiarized within the Modern Scientific Picture of the World course, as mentioned above. The basic physics of spintronics is studied [9, 10] as well as application for high-speed logic circuits.

John Amos Comenius, the founder of modern education, emphasized the highest importance of revision and assessment. The former of these has already been realized. Assessment is performed on a regular basis thanks to the developed test-based assessment system [11]. The software for it was developed by the General Physics Department of National Research Tomsk Polytechnic University. The state registration certificate was obtained.

The assessment system facilitates all kinds of assessment in the Modern Scientific Picture of the World and Basic Physics of Nanomaterials courses, process, analyse and interpret the data obtained from the testing. It includes all the necessary and sufficient tools to provide the students' knowledge assessment in the classroom as well as during the self-study. If the state of physics education in most higher education institutions in Russia does not change, hopes for higher production effectiveness will not come true. However, there is place for hope based on the rising interest for physics and technical degrees, as is seen from press [12].

References

1. Sevostianova S. The Number of 100-point State Exam Results Increases Threefold // *Komsomolskaya Pravda*, 1 July – URL: <http://www.kp.ru/online/news/1475847> (viewed 01.07.2013).
2. Tutina Yu. Higher Devaluation. Is Russia Facing Excess of Specialists with Degrees? // URL: <http://www.aif.ru/society/education/45039> (viewed 10.07.2013).
3. Tarasevich G. No School Needed Tomorrow // *Russkiy Reporter*, Issue 34(312) URL: http://expert.ru/russian_reporter/2013/34/shkola-zavtra-nenuzhna/ (viewed 29.08.2013).
4. Erofeeva G.V., Sklyarova E.A., Chernov I.P. Enhancing Education in science based on information technology application // *European journal of natural history*. – 2011. – № 3. – P. 56–60.
5. Ajayan P.M., Schadler L.S., Braun P.V. *Nanocomposite Science and Technology* // Wiley, 2003. URL: http://femto.com.ua/articles/part_1/1570.html.
6. Gareeva Z.V., Zverdin A.K. *Phys. status solidi (RRL)*, 3, 79 (2009).
7. Fiebig M. et al., *Nature*, 419, 818 (2002).
8. Storchak V.G. et al., *Phys. Rev. Lett.* 101, 027202 (2008).
9. Maekawa S. (Ed) *Concepts in Spin Electronics*, 2006.
10. Qina D.H., Zhang H.L., Xua C.L. et al. Magnetic domain structure in small diameter magnetic nanowire array // *Applied Surface Science*. – 2005. – Vol. 239. – P. 279–284.
11. Comenius J.A. *Selected Works in Pedagogy* // A.I. Piskunov (ed.). – M.: Pedagogica, 1982. – P. 361–362.
12. Ivoylova I.A. Hundred Points for Diploma // *Rossiyskaya Gazeta* – Federal Issue 6123 (147). – URL: <http://www.rg.ru/2013/07/08/abiturienti-site.html> (viewed 08.07.2013).

The work is submitted to the International Scientific Conference «Modern science technology», Spain (Tenerife), November, 22–29, 2013, came to the editorial office on 22.10.2013.

ORTHODOX UNDERSTANDING OF SOCIETY IN THE MIDDLE AGES

Chelyshev P.V.

Moscow state mining university, Moscow, e-mail: simeon5@rambler.ru

In the XIX–XX centuries materialist philosophy (which is particularly true for Marxism) took serious and profound attempt to explain the process of social development, based mainly on objective economic factors. Therefore, in modern history and sociology the spirit of «economic prerequisites» prevailed everywhere for a long time in assessing the driving forces of society, and the psychological and spiritual elements that are so important for the rational activity of such a thinking being as a man were, to a considerable extent, missed. But in practice this concept proved to be a historical inconsistency. Life itself forced to change the vector of the search of the causes and patterns of development of the society from the primary analysis of the economic realities to the spiritual side of life. That is why we are considering St. Augustine and St. Symeon Christian concepts of historical development of society. However, in our times it requires a philosophical interpretation and explaining which we find in the works of theologians of the Middle Ages.

Keywords: «The City of God», «The City of Man», «Church», «Anti-church», «Morality»

St. Augustine (354–430). The western Father of the Church, philosopher and theologian St. Augustine was the first to suggest the idealistic interpretation of history. He from the standpoint of moral progress described the metaphysics of historical forces, in his famous book «The City of God», the idea that the «two cities» later became the archetypal for the Christian world. The idea is that in everyday life the «City of God» and «City of the man» confront each other as a system of values and anti-values. Their opposition is of the spiritual and moral character that defines all the other differences, including economic and political ones, and as well as the historical development of society. The human race, according to St. Augustine is divided into two categories – people who live for themselves and those who live for God.

Why do people join these two opposing camps and fight against each other, causing the dramatic nature of the historical process? There are dialectically both objective and subjective reasons for that. The Lord Jesus Christ in the parable of «the sower» refers to an objective factor. He explains that humanity is governed by the laws of divine providence, and is divided into two kinds. The primary cause of the formation of two human communities living together in a single field of life, is the activity of two sowers of the Good (God), sowing «good seed in his field», and the evil (the devil), the enemy of the human, sowing tares among the wheat [2, Mat. 13: 24–30].

St. Augustine develops this idea of the gospel. He sees the cause of the appearance of two Cities in the subjective moment in the presence of two kinds of love. He writes: «So, two Cities were created by two kinds of love – love for themselves, leading to the contempt of God and heavenly love, leading to the self-contempt» [1, p. 66].

Representatives of the «City of man» are trying to be maximally self-asserted. The be-

havior of these people is entirely determined by the thought of their own benefit. Individuals always put their interests above the interests of others and tend to dominate them. This explains the type of society where individualism flourishes.

The People of «City of God», see the foundation of their life in God, mutually serve one another in love. There appears a harmonious society of consensus and unanimity. The opposite social morality and spiritual aspirations of these communities lead to spiritual contradiction and conflict, for the first want by all means to get comfortable in this life, and the latter take the blessings of this life only what they need, patiently waiting for the future of eternal bliss.

St. Symeon the New Theologian (949–1022). In the XI century Byzantine ascetic, poet, philosopher, theologian and the greatest mystic of the Orthodox East Church St. Symeon the New Theologian adopted the idea of two Cities and developed it in his own way as a doctrine of the Church of Christ and the Church of Satan, or «the Church of evil-doers». He understands the Church as a community of people, the «sons of God», connected by the grace of the Holy Spirit, by faith, hope, and love in Christ in a living organism in the «body of Christ», and not just in some social, political or economic organization. In this mystical body Christ – «is the head of the body, of church», and people – parts of this body. Some people are in the rank of hands, others in the rank of shoulders, the chest, the heart, and leg and bones. Every person in the church, along with others perform their special mission. However, the main goal for everybody is the spiritual transformation of man and the whole world.

St. Simeon clearly understands that God (the second Person of the Trinity – God the Son or the Logos) became incarnate, became man, redeemed by suffering on the cross people's sins and made his Church. Thus He laid the

objective conditions of salvation on a cosmic scale. But these objective conditions of salvation must be supplemented by subjective efforts of people, for salvation is not automatic. All should be a synergy or the complementarity of God's grace and human activity. Based on the redemptive mission of Christ and on the conscious self-determination of man appears City of God, the Church of Saints

This City of God lives in history, goes through certain stages of development. Formation of the New Testament Church – the perfect society – began on the day of Pentecost, when the Holy Spirit in the form of tongues of fire descended upon the Apostles, ontologically changed them and spiritually united in a single divine-human organism. In this initial period, the members of the Church were unanimous. And the multitude of believers «were of one heart and one soul» [2, Acts 4: 32]. And therefore they «were together and had all things in common» [2, Acts 2: 44]. This period can be called «the Easter period in the Church». However, with the development of sin, the Church enters its second phase – Cross or persecution, suffering and martyrdom, which will end only with the help of God at the end of history during the Last Judgment.

However, the objective circumstances of life, a distinct set of social relations, moral indifference or free will can lead a person to the city, the ontological foundation of which is the former archangel Lucifer who rebelled against God and lost his angelic dignity, but not the mind, and strength. – «He is world holder and plays with the world like with a little bird» [3, Word 67, Cat. 23]. For «no one on earth is like him: He it is made without fear. He is king over all the children of pride» [2, Job 41: 25].

Because of the tyranny of the devil, its graceless kingdom is being created and is becoming stronger. As antipode to the City of God antichurch or «body of Satan» that connects people through a network of some kind of interpersonal relationships is being created. The basis of this relationship is lecherous and perverted love – the most massive and obvious enemies of the Holy Spirit. According to apostle Paul, «Do you not know that your bodies are member of Christ? Shall I then take the members of Christ and make them members of a harlot? Certainly not! Or do you not know he who is joined to a harlot is one body with her? For «The two», He says, «shall become one flesh». But he who is joined to the Lord is one spirit with Him» [2, I Cor. 6: 16–17].

So, if the Church's life is defined by Christ and filled with grace, love, light, joy, freedom, creativity, the antichurch is ruled by the fallen angel, Satan and by sins and passions perverting human life. Although in real life it is diffi-

cult to separate one community from the other, the clash between two communities is inevitable. Life turns into an endless spiritual warfare between the Church of Christ and the Church of Satan.

This spiritual warfare requires its philosophical interpretation. Therefore, demonology is given so much attention from theologians or philosophers who understand that there is no spiritual perfection and knowledge of God is impossible, if we don't taken into account the fact of this struggle. Christians in this war should understand with whom and how they fight. Ap. Paul explains that, «For we do not wrestle against flesh and blood, but against principalities, against powers, against the rulers of the darkness of this age, against spiritual hosts of wickedness in the heavenly places» [2, Eph 6: 12].

St. Symeon the New Theologian knows about this war not by hearsay. On the basis of his personal mystical experience, he points to the fact that this war can not be negotiated. It is eternal and uncompromising. The philosopher believes that the devil is cunning ancient warrior, fighting against people in different ways.

First of all, the tempter suggests the idea to people that he does not exist, that they always live by own will, then he is trying to impose on the people a false kind of world views (atheism, heresy, various philosophical systems) based on the wisdom of this world.

Satan also tempts by the apparent beauty of the human world, trying to replace the spiritual life by material, sensual.

Finally, the devil sometimes has a direct effect on people, he intimidates, suppresses their will, inspires lust, and induces insanity, because of which people lose their critical perception of life become sad, depressed, and degraded.

Through all of these tricks the devil, as a skillful hunter, catches people as a bird catcher birds, fisher fish with a net. This is a net of gluttony, avarice, lust, vanity, pride, and other passions. Sometimes people became devil warrior, master of evil.

As a result of sinful way of life, a person is deprived of divine grace, begins to change spiritually, changes his divine prototype to the image of a fallen spirit. In the process of spiritual degradation spiritual death is the end point of the moral fall of man. Thus, according to the St. Symeon the New Theologian, many people are dead before physical death. Their souls are in hell for a long time, and bodies drag out a miserable existence on earth. This theme will be developed later by Dante Alighieri. During a trip to the underworld where he meets his friend Alberigo, who in spring 1300 was still alive. There is a conversation between them from which the poet discovers that the soul of

his friend had long left his body, and his body on the earth is already occupied by the demon.

Summary. In this context, however, the question disturbing everybody arises: «Is our salvation ensured by the this real historic church»? Well, yes and no. The fact is that, according to St. Augustine and St. Symeon the New Theologian, not all people who are part of the Church in the Sacrament of Baptism for a variety of reasons, were not born to a new life and spiritually where not renewed. They are «abortions, not knowing who gave birth to them» [4, Himn 46, (50)]. And many people, even if they were born again thanks to Christening did not become real children of the Father. Therefore, in the historical Church one can meet the righteous and the wicked. Sins sometimes prevail even among Christian nations. St. Symeon the New Theologian assessed critically the moral conditions of the Christian society at the turn of the millennia

saying about the general decline of the spiritual and moral life of the Church. Now, in the XXI century, the situation became even more complicated and worse. The fact is that today the struggle between the two cities, between traditional and non-traditional moral values reached the maximum intensity and entered the final stage. Before our eyes, there appeared a special society, Babylon, which completes the historical process. St. Apostle and Evangelist John says about it in the Apocalypse [2].

References

1. Augustine, St. The City of God in four volumes. – M., 1994. – Vol. 3. – 282 p.
2. Holy Bible. New King James Version. – Tomas Nelson Publishers Nashville, 1990. – 1204 p.
3. Words of St. Simeon the New theologian. The creation in three volumes. – The Holy Trinity St. Sergius Lavra, 1993. – Vol. 2. – 571 p.
4. Divine hymns of St. Simeon the New theologian. The creation in three volumes. – The Holy Trinity St. Sergius Lavra, 1993. – Vol. 3 – 357 p.

Short Reports

**BIBLICAL PARADIGM
OF GLOBALIZATION
IN «THE REVELATION» OF ST. JOHAN**

Chelyshev P.V.

*Moscow state mining university,
Moscow, e-mail: simeon5@rambler.ru*

Bible solving a problem of man's soul regards world not as objectively and impartially as science but in the light of moral values and anti-values. Moral and spiritual way of thinking allows man to orient himself in private and social life and estimate historical events properly. To show historical events properly, birth development and death of world civilization one should use not scientific conceptions and categories but religious symbolic language which nowadays demands philosophical interpretation. In «The Revelation» of St. John the Devine the end of the global civilization is shown as the world-wide city, godless, global mediatory trade activity, show-business and erotomania. This civilization became a symbol of power, self-sufficiency and individual autonomy of man and at the same time his moral degradation and spiritual misery leading world-wide community to crisis and death.

Before our eyes, there appeared a special society, Babylon, that completes the historical process. St. Apostle and Evangelist John says about it in the Apocalypse. This apocalyptic Babylon is not just a city, but a «great city», which by replicating the prototype expands its influence in all the countries and peoples of the world. In other words, it is a modern global world civilization. Globalization facilitates the economic and political cooperation, promotes trade, capital flow, improves mutual understanding and communication between people. But it also imposes on the States and peoples single standard of life. This universal standard simplifies the national cultural identity of the peoples.

The dream of all globalists is people who have no connection with their homeland, cultural tradition, history, deprived of their national identity and indifferent to spiritual values. It is easy to control a man who is cut off from his roots. It is not difficult to make from such a man a «talking tool», it is easy to make him the ideal worker, standing for a penny at the machine tool, and consuming cheap products. However, the lack of freedom of development leads to a spiritual crisis. No wonder the Bible links the end of the world with unification, and total regulation of life: the lack of freedom makes human existence meaningless, turns it into a programmed creature.

The symbol of this city is the great harlot who sits on many waters. The essence of nature, the inner spiritual life, the true aspirations of the «great whore» are clearly expressed in her clothes and even painted on her forehead. But all this is mystery.

People look and do not see, listen and do not hear. «The woman was arrayed in purple and scarlet, and adorned with gold and precious stones and pearls, having in her hand a golden cup full of abominations and filthiness of her fornication: And on her forehead was a name written: Mystery, Babylon the great, the mother of harlots and of the abominations of the earth» [1, Revelation Apoc. 17: 4–5].

The Harlot means Babylon which corrupts all men in a special way of life. All people are drawn into its sphere of influence. Under whoredom is meant the spread of immoral customs, corrupting religion and the cult of the total decomposition of morals. In the modern language, this means, first of all, the sexual revolution, which has transformed sexual pleasure into one of the most important values of humanity, into pseudo-religion. The media and show business spread it among people.

In the world City, Babylon, the division of labor reaches its maximum development. That is why special power is needed to link all these activities into a coherent whole. Bankers and traders become such power. These «useless» (Plato) people are gaining immense economic power, exercising the mediation efforts and turning all things and relationships into a commodity. This also concerns a man who alienates from his own essence and becomes a living commodity, «a talking instrument», along with other things (Marx). In this society everything has a price – everything is weighed, measured, bought and sold. And money, acting as a universal mediator, becomes a special fetish, «golden calf», which supposedly is able to solve all human problems instead of God, like the philosopher's stone of medieval alchemists. All speak different languages, but they understand perfectly well, only one – the language of money. But we must remember that money (and that spiritual force that is behind them) is the main rival for supremacy of Christ in our lives.

The situation is aggravated by the fact that in these times dominated by the rider sitting on a black (black – a symbol of hell) horse and having a pair of scales in his hand. But this measure of labor is wrong. As it is written, «A quart of wheat for a denarius, and three quarts of barley for a denarius; and do not harm the oil and the wine» [1, Revelation Apoc. 6: 6]. Unfair wages lead to a sharp division of the population into very rich and the very poor. The first live in luxury, eat expensive food (wine and oil), and the latter can buy at a meager daily wage (a denarius), only a small measure of bread or three measures of barley, the cheapest cereals. This is the «mystery» of the modern global civilization that destroys human perspective of spiritual development through economic slavery, poverty and erotic dazzling stale.

But the problem is not only unjust economic and total erotic perverse system of social relations,

but also the fact that the vast majority of people are used to this social order and began to perceive it as something normal, natural, positive and attractive. Many people are well adapted to this slavery and do not want to be freed from it, in the blinding light of the pleasures of forgetting all sorts of anxiety and remorse.

You could even say that many people sincerely love this City of trade and corruption, have made it their religion, the meaning of life. That is why, the rulers, the bankers, and corrupt and lecherous show businessmen do not want to change spiritually, but, on the contrary, will be very sorrowful about the destruction of Babylon. They will sincerely cry and worry that their happy days of enrichment, pleasure, debauchery, political and economic power over the world, the bodies and souls of ordinary people ended.

«And the kings of the earth who committed fornication and lived luxuriously with her will weep and lament for her, when they see the smoke of her burning... And the merchants of the earth will weep and mourn over her, for no one buys their merchandise anymore: merchandise of gold and silver, precious stones and pearls, fine linen and purple, silk and scarlet, every kind of citron wood, every kind of object of ivory, every kind of object of most precious wood, bronze, iron, and marble; and cinnamon and incense, fragrant oil and frankincense, wine and oil, fine flour and wheat, cattle and sheep,

horses and chariots, and bodies and souls of men» [1, Revelation Apoc.18: 9–13].

This Babylon will be destroyed instantly. It will cease to exist, like a house of cards on a single click. Ap. John the Theologian symbolizes the destruction of this great City like this: «Then a mighty angel took up a stone like a great millstone and threw it into the sea, saying, “Thus with violence the great city Babylon shall be thrown down, and shall not be found anymore”». [1, Revelation Apoc. 18: 21].

Recently we all have witnessed the collapse of the stock market when the stock indexes in the U.S., Asian, Europe, and Russia crashed simultaneously. Following immediately after this a general crisis of the world economy began. Its cause is not only a commodity overproduction, over-accumulation of capital, problems in the marketing of goods, but, above all, a distortion of traditional spiritual values and moral degradation of society, of which the Bible and such saints of the Church, as St. Augustine and St. Symeon the New Theologian in his doctrine of the «Two cities»[2] speak.

References

1. Holy Bible. New King James Version. – Tomas Nelson Publishers Nashville, 1990. – 1204 p.
2. Chelyshev P.V. Idealistic understanding of history: the doctrine of «Two cities» in the philosophy of St. Augustine and the St. Simeon The New Theologian // Works of members of the Russian philosophical society. – Vol. 16. – M.: Russian philosophical society, 2009. – P. 158–172.

*Materials of Conferences***DEVELOPMENT OF THE CONCEPT
OF THE GEOLOGICAL SAFETY
OF PERM CITY**

Kopylov I.S.

*Natural-science institute of the Perm state national
research university, Perm, e-mail: georif@yandex.ru*

Perm is the largest industrial city of the Western Urals, with an area of 809 km². The Concept of geological safety of the City was developed in the Perm state university. The main goal of the Concept – formation of the system of geological safety in the complex development of the city, creation of a scientific system of the forecast geological hazards reduction of geological and other risks, the rational use of underground space, the decision of questions of ecology and geological safety, increase the level of protection of the population and engineering of the objects of various levels of responsibility the territory of geological hazards, creation of geologically safe environment for present and future generations of people. A set of base maps on the territory of Perm scale of 1:100 000: map of the actual material, the geological map with the main tectonic elements, map of quaternary deposits, geomorphology map, map of exogenous geological processes, map of tectonic fractures and geodynamic active zones [1–4]. A Program of geological study and mapping of the territory of the city for the period of 20 years with the program activities of theoretical, methodological, GIS, mapping and organizational bases of system of geological safety of Perm city.

The main tasks of the program:

1. Theoretical and organizational basis for creation of the system of geological safety: theoreti-

cal, legal and methodological support; cartographic support and creation of condition cartographic principles of geological environment; GIS software, creation and management of databases; examination and estimation of geological and natural-technogenic conditions and factors.

2. Large-scale complex engineering-geological and ecological mapping and research: large-scale engineering-geological and ecological mapping and research of scale of 50 000; large-scale engineering-geological and ecological mapping and studies of scale 25 000; large-scale complex engineering-geological and ecological mapping and studies of scale 10 000.

3. Monitoring of the state of subsurface area: organization of system of monitoring of the state of subsurface area sub – city level; monitoring within the existing industrial zones and sites of urban development (territorial and object level).

References

1. Kopylov I.S. Conceptual principles of the ensuring system the geological safety of the large cities // *European Journal of Natural History*. – 2012. – № 6. – C. 46.
2. Kopylov I.S. Geological-ecological problems of the large cities and the concept of the geological safety // *European Journal of Natural History*. – 2012. – № 6. – C. 46–47.
3. Kopylov I.S. Major geoecological problems of Perm region // *European Journal of Natural History*. – 2013. – № 2. – C. 66.
4. Likutov E.Yu., Kopylov I.S. Complex of methods for studying and estimation of geodynamic activity // *Tyumen State University Herald*. – 2013. – № 4. – C. 101–106.

The work is submitted to the International Scientific Conference «Ecology and environmental management», Israel (Tel Aviv), February, 20–27, 2014, came to the editorial office on 03.02.2014.

Short Reports

**THE NATURE AND ENVIRONMENTAL
PROBLEMS IN TRANSBOUNDARY
TERRITORY OF RUSSIA AND MONGOLIA**

Plyusnin V.M., Belozertseva I.A.,
Shekhovtsov A.I.

*V.B. Sochava Institute of Geography SB RAS, Irkutsk,
e-mail: plyusnin@irigs.irk.ru, belozia@mail.ru,
ashekhov@irigs.irk.ru*

We examine the characteristic features of the relief, surface waters, soils, vegetation and landscapes within the Onon river basin. An assessment is made of the present status of natural environment. Environmental problems faced by the region are revealed.

The Onon river is 1032 km in length (with 298 km corresponding to the territory of Mongolia), and the area of its drainage basin is 96 200 km². The river originates in Mongolia at the eastern slope of the Khentii Mountains at the junction of the Khentii-Nurui and Ikh-Khentii mountain ranges on the territory of the Khan-Khentii-Nurui National park; it flows on the Khentii-Chikoi Plateau (with islands in its channel); its lower reaches are between the Mogotui and Borshchovochny mountain ranges. At the confluence with the Ingoda, it produces the Shilka river. Within Zabaikalsky krai there is a broad floodplain of the Onon river. Its main tributaries are the Khurkh, Borzya and Unda (right), and the Baldzh-Gol, Agutsa, Kyra, Ilya and Aga (left). The main distinguishing feature of the climate across the territory is its sharp sentimentality. The unfavorable phenomena that cause damage to agriculture include frosts, draught, snowfall, dry wind, hail, floods, strong winds, and low and high temperatures.

In the physical-geographical regionalization scheme, the territory of the Onon river basin is at the junction of the two subcontinents of Northern and Central Asia. The southern and middle parts of the basin refer to the Onon-Khentii depression-mountain taiga province of the Southern-Siberian mountainous region, the northeastern part belongs in the Upper-Amur steppized-mountain taiga province of the Baikal-Dzhugdza mountain-taiga region of the North-Asian continent, and the eastern part refers to the Onon-Argun (Eastern-Mongolian) mountain-steppe and elevated plains of the Central-Asian subcontinent. The relief and climate of the territory, and the specific character of their combinations predetermined the characteristic features of the region's landscape structure. It is typified by a rich landscape diversity produced by a unique combination of mountain-taiga, mountain-steppe and steppe geosystems of the North-Asian and Central-Asian types.

A part of the territory of the Onon river basin is included in the Sokhondinsky State Nature Biosphere Reserve (Zapovednik). The protected drainage basin of the Onon river is given the name Onon Dauria in order to distinguish it from Argun Dauria and Ingoda

Dauria. Three portions of the Khentii-Chikoi Plateau form part of Onon Dauria, Ingoda Dauria and Selenga Dauria. The plant kingdom of Onon Dauria is typified by a great diversity. The zapovednik's territory includes the goletz belt and the forest belt of the Khentii Mountains. There are neither mountain steppe-prairies nor Daurian chaparral in the Sokhondinsky State Nature Biosphere Reserve. The Daurian prairie is a peculiar kind of forb and forb-grass Mongolian steppes which are grouped with a special type of vegetation. Kharganat (Daurian chaparral) is a highly peculiar kind of tree-shrub vegetation comprising xerophytic (dry-loving) tree and shrub species of plants with the inclusion of steppe grasses.

The subalpine belt begins at altitudes higher than 2100 m above the sea level, in which open stands of Siberian stone pine and larch alternate with dwarf mountain pine overgrowth and luxuriant nival meadows in small areas. In the vicinities to the southeastern limit of the geographical distribution of dwarf mountain pine there occur Siberian spruce, Siberian fir and bilberries which inhabit the subalpine belt and the upper part of the forest belt. In the forest-steppe belt (the belt of exposed steppe) there occur many plant species characterized here by the western limit of distribution. They include Siberian apricot, elms, lily of the valley species (*Convallaria keiskei*), and others. The northern and northwestern slopes of the mountains at the outcrops of granites and granite gneisses are most often clad in pine forests, whereas larch forests cover the areas at the outcrops of clay shales on the slopes of the same aspect.

At altitudes of 1500–2000 m above the sea level, the upper forest belt is formed by Siberian stone pine together with Daurian larch; Siberian stone pine disappears at lower altitudes. At 700–1500 m above the sea level, the near-northern slopes of the mountains are most often clad in larch, pine, birch, aspen and mixed forests, often with undergrowth of Daurian rhododendron. True feather-grass steppes occur rarely in Onon Dauria. They tend to occur at high sandy above-floodplain terraces of the Onon. They do not form part of the territory of the zapovednik.

A part of the tract of the Onon river valley was plowed up for cultivation of grain crops, but this area is abandoned today and used as pasture. Traditionally, pastoral livestock husbandry includes sheep, horses and cows. Pasture lands are represented by areas with a moderate and strong degree of disturbance of steppe landscapes because of their low resistance. Steppes are comprised of feather-grass-fescue-wormwood vegetation. The soil cover of pasture lands is largely represented by chernozem (about 33%) and chestnut soils (37%). Chestnut soils occur more widely in the Aginsky district (63%). The thickest layers of characteristic chernozems occur in the Mogotuisky district, more than 60%. The region's soils are highly sensitive to

anthropogenic impact because of their shallow layers, detrital character, light granulometric composition and shallow occurrence of permafrost. Unregulated utilization of grasslands as pastures with an excessive pasture load (more than 4 head/ha) may well lead to dramatic disturbances to the structure and productivity of plant communities, mechanical destruction of sod cover, erosion and compaction of the upper horizon of soils, and microterracing of slopes to the extent of the formation of barren sand soils.

The Onon river basin is home to relict, endemic and narrow-areal, directly threatened species of vegetation in small populations, such as an onion species, namely *Allium neriniflorum*. This species is in need of the protection of its habitats. Overgrazing must be excluded, and gathering of this species must be prohibited.

According to data of the regional Ministry of Agriculture of Transbaikalian edge from 2010, from last 13 years nine were droughty. Day time temperatures reached up to +40°C, and the soils got warm up to +61°C. Atmospheric and soil drought became the reason of decrease in a level of subsoil waters. Sites oppressed and completely destroyed forest stands owing to long-term droughts and forest fires are revealed. On positive forms of a relief we marked the dried out birch forests. In 2011, forest fires affected most of the forested territory within the Onon river basin. In 2010 has burned down 62 thousand hectare of a forest, and in 2011 – 185 thousand hectare. With a multiple recurrence of forest fires, when forest litter and the hu-

mus horizon are heavily burnt, there are taking place an enhancement in soil turfness, a lowering of the level of frozen ground, and an intensification of erosion processes. Destruction of the canopy layer leads to swamping. Steppization processes are observed in forest-steppe landscapes following complete burning of woody vegetation. Under the effect of forest fires there occurs a decrease in acidity of the upper horizons of soils due to the fact that they are enriched with alkaline-earth and alkaline elements arriving from ash of the burnt biota. Humans are the primary source of forest fires in Transbaikalia. The fire-hazardous situation is aggravated by strong winds during the spring-summer period, and by the predominance of forests with readily inflammable undergrowth and forest litter.

From Russia, the Ashinga river (the left tributary of the Onon-Gol river) transports to the territory of Mongolia turbid flows of drainage waters produced by the activity of the «Baldzha» artel specializing in gold mining (Kyrinsky district of Transbaikalia). Extraction of gold is conducted by the open hydro-mechanized way. Nowadays, the artel members are tripping and grinding tens of kilometers of river valleys leave behind them in the place of a living spring «rock gardens», with heaps of gravels many meters long, and the rivers are becoming separated into a network of ditches. Officially, the artel's annual output of gold amounts to 500 kg. For 20 years of the artel's operation, 70% of the rivers in the Kyrinsky district have been transformed beyond recognition.



Muddy drains of drainage waters in the upper reaches of the Baldzha

During the last two years, 70–80% of licenses have already been withdrawn from the ore mining and processing enterprises. However, turbid flows of drainage waters continued to flow toward on the Arshinga and from the mine in the upper reaches of the Baldzha river (Baldzh-Gol river) (Figure). The artels were granted for development and exploitation the territory of the plain of the Kirkun river (the left tributary of the Baldzh-Gol), one of the major

ivers within the Onon basin, flowing to Mongolia. Water of muddy drainage drains in the upper reaches of the Baldzha concern to a sulphatic class of group of calcium II of type and have a mineralization of 670 mg/dm³. Also the increased mineralization water of the Kirkun river differs (420 mg/dm³). She though concerns to a class hydrocarbonate waters of group of calcium II of type, but has higher contents of sulfates – ions concerning other rivers.

Materials of Conferences

CONSOLIDATION OF TENSILE-CREEPING HETEROGENEOUS EARTH FOUNDATIONS

¹Dasibekov A., ¹Yunussov A.A., ²Yunussova A.A.,¹Abylkasimova E.A., ³Mavlankhozhayev R.B.¹M. Auezov South Kazakhstan State University,
Shymkent, e-mail: Yunusov1951@mail.ru;²Kazakh academy of work and social relations, Almaty;³Nazarbayev Intellectual Schools of Physic and
Mathematics, Shymkent

Compaction of heterogeneous earth foundation having creeping property has been studied in the given work. The creeping property of compactible water-saturated heterogeneous soil is described by Maslov-Arutyunyan theory of tensile-creeping body in the interpretation of Florin V.A.

For theoretical research the process of soil compaction, its heterogeneity, are considered in the work by deformation module of the compactible mass. Mathematically it is expressed by power or exponential function which is changed by the depth of compactible soil body. Besides it is accepted here that for strongly compressible water-saturated heavy soil in the initial instant of time a part of load, suddenly applied load q to the soil, equal in value of structural compressive strength p_{str} is immediately taken by the soil skeleton, i.e. $p|_{t=\tau_1} = q - p_{str}$.

Mathematical statement of this problem comes to the determination in this soil body of distribution of pressure in the porous fluid $p(x, z, t)$, tension in the soil skeleton $\sigma(z, t)$, and vertical movement of points of the upper surface $S(t)$ (setting). Pressure in the porous fluid is identified by solution of integral-differential equation at the initial and boundary conditions.

An outer crust of earth is usually characterized by a large-scale heterogeneity of earth and rocks composing it. It is due to the sufficiently complex geological-tectonic structure of rocks, where one or another construction project is built. Dropping of heterogeneity of geological structure of the outer crust of earth may lead in the future to damage of engineering constructions, due to the settlement, development in the subfoundation. As is known, nonrigid properties of heterogeneous soils, actually, are changed together with point positions, and assumption about their homogeneity represents idealization of real conditions. Certainly, providing the heterogeneity, the mathematical problem is incomparably complex and, therefore, in such cases

we often apply for different simplification kinds of model, acceptable from one or another point of view. At that in one group of problems parameters characterizing properties of the material are sectionally constant. This means that the investigated body consists of several homogeneous bodies. In the other group of problems they represent continuous functions of point position. Moreover, the soil, which module of deformation continuously grows with a depth is called as a continuously heterogeneous. Such model of the soil was presented in the works of E.K. Klein [2] and Popov [3] for solution of some contact problems of the theory of elasticity. G.K. Klein at calculation of constructions laying on the solid base, for the module of deformation of the soil has following expression

$$E(z) = E_n z^n, \quad (1)$$

where E_n is the module of deformation of the soil at a depth $z = 1$; the figure n in most cases is in the limit of $0 < n < 2$. In the works of Popov at solution of similar problems the module of deformation of the soil is in the following form

$$E(z) = E_0 e^{\alpha z}, \quad (2)$$

where E_0, α are experimental data.

Furthermore, intrinsically the soils also relate to the rheologic bodies and deformations connected with creeping phenomenon, and find their reflection in compaction of the earth masses with rates which do not exceed several centimeters a year. Moreover the process of compaction of a construction foundation can be in a slow permanent motion without any features of its final stabilization. Notwithstanding such insignificant intensity of deformation, in some instances they can appear to be inadmissible for constructions located on the deformed foundation.

Mechanics of such soils under load and in time are usually described by rheologic equations of the soils state which connect between themselves its deformation, tension and their derivatives in time, and they had a form of linear differential equation. Later, integral relations were used for solution of the earth medium compaction problems. One of the first who used them for description of soil skeleton state was V.A. Florin [4]. At this, relationship between soil porosity factor $\varepsilon(t)$ and sum of the main tensions $\theta(t)$ in a skeleton of homogeneous soil can be presented as follows:

$$\varepsilon(t) = \varepsilon(\tau_1) - \frac{1}{1 + (n-1)\xi} \left[\theta(\tau_1) \delta(M, t, \tau_1) - \int_{\tau_1}^t \frac{\partial \theta}{\partial \tau} \delta(M, t, \tau) d\tau \right], \quad (3)$$

where $\varepsilon(\tau_1)$ and $\varepsilon(t)$ are relatively coefficients of porosity for initial and final time point; ξ is a coefficient of the lateral earth pressure; τ is a time of load application; t is a time for which creeping deforma-

tion is determined; n is a dimension of compaction which possesses values properly 1, 2, 3; $\delta(t, \tau)$ is a function throwing back changes in the soil porosity to the time point t from the unit load applied in

the time point τ . For heterogeneous soil we take it in the form:

$$\begin{aligned}\delta(M, t, \tau) &= \frac{1}{E(M)} + C(M, \tau, t); \\ C(M, \tau, t) &= C(\tau, t)E^{-1}(M); \\ C(\tau, t) &= a_1 [1 - e^{-\gamma_1(t-\tau)}].\end{aligned}\quad (4)$$

Here a_0 is a coefficient of instantaneous compaction; a_1 and γ_1 are parameters of creeping determined from tests. M is a point of compactible body; $C(\tau, t)$ is a measure of creeping for homogeneous soil subjected to the compaction.

Therefore, let compactible medium contain not only fluid filling soil pores, but also some entrapped air or other gas; a soil skeleton is heterogeneous on the structure, i.e. some features reflecting physical-mathematical properties are functions from space coordinates. Particularly, the soil deformation mod-

ule can be changed on the coordinate determining depth of the considered point position; in the large the soil can possess by ageing property; flow of a fluid filling soil pores is subject to the generalized filtration law of Darcy-Gersevanov; a soil skeleton is tensile-creeping porous medium is subject to the hereditary creep theory of G.N. Maslov – N.Kh. Arutyunyan [4]; in the initial instant of time a part of load, suddenly applied load q to the soil, equal in value of structural compressive strength p_{str} is immediately taken by the soil skeleton, i.e.

$p|_{t=\tau_1} = q - p_{str}$. At this, relationship between soil porosity factor and sum of the main tensions can be in the form (3); soil, according to impermeability soil is anisotropic. Therefore compaction of the earth masses taking into account (3), (4) relating to the pore pressure amounts to the study of following integral-differential equation with variable coefficients:

$$\begin{aligned}& [na_0 + \beta^1(1 + \varepsilon_{sr})][1 + (n-1)\zeta] \frac{\partial p}{\partial t} + a_1 \gamma_1 \phi(t) p(t) - a_1 \gamma_1 \int_{\tau_1}^t p(\tau) [\phi^1(\tau) + \gamma_1 \alpha(\tau)] \times \\ & \times e^{-\gamma_1(t-\tau)} d\tau = \frac{k(1 + \varepsilon_{sr})}{\gamma_b} \left[x^{-\alpha_1} \frac{\partial}{\partial x} \left(x^{\alpha_1} \frac{\partial p}{\partial x} \right) + \alpha_2 \frac{\partial^2 p}{\partial y^2} + \alpha_3 \frac{\partial^2 p}{\partial z^2} \right] + a_1 \gamma_1 \phi(t) n \cdot \left(\frac{\theta^*}{n} + p^* \right) + \\ & + na_1 \gamma_1 \cdot \int_{\tau_1}^t \left(\frac{\theta^*}{n} + p^* \right) \cdot [\phi^1(\tau) + \gamma_1 \phi(\tau)] \cdot e^{-\gamma_1(t-\tau)} d\tau.\end{aligned}\quad (5)$$

Initial condition of equation (5) has the following form:

$$p_0(x, y, \tau_1) = \frac{1}{\omega_0^1} \left[\frac{\theta^*(x, y)}{n} + p^*(x, y) \right], \quad (6)$$

where $\phi(t)$ is a function of ageing; θ^* , p^* are relatively sum of the main tensions and pore pressure for stabilized condition of compactible body; p is a pressure in porous fluid; ω_0^1 is a factor considering volume compression.

In the given work the equation (5) at (6) for cases (1) and (2) are solved for one dimensional compaction of heterogeneous soil having creeping property. These solutions reflect distribution of pressure in the porous fluid, tension in the soil skeleton, and vertical movement of points of the upper surface of compactible foundation soils. They have been received in the form of Bessel's functions combination, equations in the form (5) for heterogeneous boundary conditions have been solved in the works [5, 6].

References

1. Arutyunyan N.Kh. Some questions of a creep theory. – M.: Gostechizdat, 1952. – 323 p.
2. Klein E.K. Consideration of heterogeneity, discontinuity of deformations and other mechanical properties of soil at proportioning of structures on solid base // Works of V.V. Kuibyshev Moscow State Building Institute. – M., 1959. – P. 57–65.
3. Popov G.Ya. To the theory of flagstone bending on the elastic heterogeneous half-space // Cjnstructijn and architctbre. – 1959. – № 12. – P. 11–19.
4. Florin V.A. Fundamentals of soil engineering. – M.: Gostechizdat, 1959. – V.1, 2. – 357 p.; 1961. – 543 p.
5. Shirinulov T.T.Sh., Dasibekov A., Berdybayeva M.Zh. Two-dimensional compaction of tensile-creeping soils at their heterogeneous boundary conditions // Mechanics and modeling of engineering processes. – Taraz, 2006. – № 1. – P. 61–66.
6. Shirinulov T.T.Sh., Dasibekov A., Berdybayeva M.Zh. On three – dimensional compaction of tensile-creeping heterogeneous soils with their heterogeneous boundary conditions. // Mechanics and modeling of engineering processes. – Taraz, 2006. – № 1. – P. 30–35.

The work is submitted to the International Scientific Conference «Modern high technologies», Israel (Tel Aviv), April 25 – May 2, 2014. came to the editorial office on 27.01.2014.

Materials of Conferences

**FROM THE HISTORY
OF THE URAL – EMBA OIL REGION
IN THE EARLY 20TH CENTURY**

Berdyguzhin L.B., Mehdižereev K.B.,
Bozakhayeva G.K.

*Director of the Research Center of Humanities
im. H. Dosmuhamedova Atyrau State University, Atyrau,
e-mail: berdyguzhin@mail.ru*

The article discusses the history of the role of foreign experts in the development of Kazakhstan's oil industry and on training local people in technical competence 1910 – 1920 years.

The company, named the first oil partnership in Kazakhstan, was originally established in St. Petersburg under the leadership of Colonel A. Lehmann, and in the years 1898–1909 was called Guriev oil firm A. Lehmann [1, 19–10].

Prior to the establishment of a breakthrough in 1898 with 60 wells using manual drilling installations in Dossor, Eskene, Karachungule and Karaton. In early 1899 work of the institution it completely ruled AN Lehman, which made the work much progressed. In Karachungule in one of the wells to a depth of 38–75 m, namely the number of wells in the middle of 7 November 1899 on a 40-meter depth was discovered oil gusher. From the well, which offered 22–25 tons per day, was received 5,000 tons of oil. It was the first oil gusher in Kazakhstan [2, 11–12].

In 1910 A.N. Leman Russian government is seeking permission for foreign entrepreneurs and December 22, 1910 together with the citizens of the United Kingdom Edward Yum – Shvederem and Otto Adol'fovich sheets are created oil company «Ural-Caspian» [3, 167].

It was a great first step in bringing the English capital.

Company «Ural-Caspian» was given a special privilege to November 12, 1912 for razvedovaniya deposits and holding prey, and other works in the townships was Karabayly, Karashogyr, Embu, Embu – Arbat Kermekas, Akbas, Zhortyk Guriyevsky County Ural region.

At 12:00 am April 29, 1911 at bore number 3 in Dossor, where they spent their working Ural-Caspian society, from the depths to 732 pounds (1 pounds – 0,3048 m) broke gusher. From the fountain in the night to give 500 000–600 000 pounds of oil. (1, 86 pounds, 38 kg).

Fountain, constantly going for 30 hours, burned almost completely to 06.20 hours on April 30 weakens. May 1 to 15.30 days for the fountain cool, and the well was closed. The causes of delayed shut appear in the documents check the status of production from March 16, 1915. Drilling was carried out by Galicia, that is, have not previously been trained mine and conducted special pipe. Production well

operation began with the number 3 October 3, 1911 [4, 123].

In 1911, one of the wells on the Dossor gave 15,700 tons of oil. In 1912, the well number 3 gave 18,650 tons of oil. The number of wells in 1913 was 16, and they were extracted 117,640 tons of oil. In 1914, the same – 272,740 tons.

Foreigners working in oil and razvedovaniyu led off traditional ways of manual drilling and pulling. For the processing of oil in Dossor Rakusha pier on the shores of the Caspian Sea have been built two special plants for the crossing of oil, which produce 20 million pounds of kerosene. The first fruits of the plant gave in 1913 [5, 2–3 l].

In the development of the oil region scouting business district Makat doing 4 oil company: Ural-Caspian oil company since 1910 on a single shaft length of 649 m, Society «Emba» from 1913 on 4 wells 1,839,8 m, Emba-Caspian COMPANY 1913 at two wells at 824,3 meters, the company «Colchis» from 1913 on the same hole in the 750m. Results of hard work in the May 31, 1915 from a depth of 400 m, the well number 2, where the work led Emba-Caspian society was discovered oil gusher. Thus opened the historic page Makat oil field [6, 18–9].

Makati field day gave 150–170 tons. In this regard, for the storage and collection of crude oil were built 10 tanks up to 1,265 pounds each.

In the history of nftyanogo region, prior to the establishment of Soviet power in the early mining was carried out only in plants Dossor and Makat. In other oil fields: in Karachungule, Eskene, Karaton and others, scouting – drill work lasted only until 1916. Later of – the financial failure all the works were stopped.

In the formation of the oil industry in Kazakhstan occupies a special place labor of foreign experts. One of them – the name of the Polish mining engineer Michael Vikentyevich Bogush remembers the story of the Emba oil. M.V. Bogush was born in 1877 in the province of Grodno. In 1898, after graduating from The train school in Vilna, he served on the railroad town of Gatchina. In 1907 he entered the St. Petersburg Mining Institute of Engineering and after it is sent to the oil Embu. M.V. Bogush, who served as an assistant geologist in the society «Colchis», May 20, 1914 due to the lack of local control at work L.I. Stenrossa, on the basis of trust letter of the Director of the oil company «Nobel Brothers» by M. Belyakina was appointed manager [7, p. 1–2].

While local workers, professionals in the community were the head of the drilling – 1, the master driller – 1 assistant master driller – 2, key chains – 16, braked – 9, Oilers – 16 working drill settings – 35, the driver of the machine shop – 1, his assistant – 1,2 blacksmith, electrician – 1 repairman – 4, the driver – 4–33 laborers, watchmen – 8,

the control – 1, a geologist – 1–1 technician. They led M.V. Bogush.

In the difficult days of 1916–1920 years M.V. Bogush helped maintain production and material resources, the beneficial use of force workers who have returned from the war, helped the Workers' Council, was in the best places in the implementation of public aid to local schools.

For the latest information about M.V. Bogusz stated in a telegram to the head of Azerbaijan's oil industry Serebrovsky Emba oil company chief R.N. Fridmanu. The letter states that the February 11, 1922 in the hospital in Baku engineer M.V. Bogush died of fever [8, 1900].

In Emba society as a master drilling accepted Austrian Leonhard I. Longova and worked there until 1920 [9, 148].

On that day, the local enterprise company is accepted accounting clerk native of Riga Latvian Charles Y. Kalnin, 1890 birth. In characteristic indicates that he graduated from the Riga School of Commerce, which is fluent in Russian, French, German, and are in Baku, he worked in the Russian – French company [10, L. 54].

At the time, received a master of drilling in the year about 1800 rubles, 900 rubles scorekeeper.

1915–1922 years in the field Dossor served Finnish engineer Vladimir Ioganovich Lindvall. He is a graduate of Freiburg Mining Academy of Engineering in Germany.

His wife, Anna Moyseevna Lindvall worked as head of the school in Dossor [11, 21–32 l].

Made a major contribution to the hard work of oil production plants Large Rakusha, and in the process of local people new business manager of the plant, the Greek engineer Rafael Dominkanovich Fabiani. R.D. Fabiani was hired Sept. 2, 1915 as the assistant director of the production,

in 1916 he was appointed head of production [12, 15, 24].

At this time in Dossor worked master drill – Pole Jacob Verdak,

Head of the compressor station, a technician – German Hartmann technician – German Heinrich Laibach, Engineer – Englishman Alex Albertovich Etches and Mining Engineer – German Jan Bott [13, L. 32].

References

1. Central State Archive of the Republic of Kazakhstan. Fond-687, inventory-1, the point 24.
2. Central State Archive of the Republic of Kazakhstan. Fond-687, inventory-1, the point 25.
3. Central State Archive of the Republic of Kazakhstan. Fond-695, inventory-1-288 case.
4. Central State Archive of the Republic of Kazakhstan. Fond-695, inventory-1-288 case.
5. Economical Russian Federation Archive. Fond-6880, inventory-1, the point 27.
6. Central State Archive of the Republic of Kazakhstan. Fond-695, inventory-1. deal-343.
7. Central State Archive of the Republic of Kazakhstan. Fond-686, inventory-1, the point 29.
8. Atyrau Regional State Archive of the Republic of Kazakhstan. Fond-146, inventory-1, the point 89.
9. Central State Archive of the Republic of Kazakhstan. Fond-686, inventory-1, the case-7.
10. Central State Archive of the Republic of Kazakhstan. Fond-686, inventory-1, the case-7.
11. Central State Archive of the Republic of Kazakhstan. Fond-679, inventory-1, File-109.
12. Central State Archive of the Republic of Kazakhstan. Fond-681, inventory-1-85 deal.
13. Central State Archive of the Republic of Kazakhstan. Fond-679, inventory-1, File-109.

The work is submitted to the International Scientific Conference «Modern science technology», Spain, (Tenerife), November, 22–29, 2013, came to the editorial office on 28.11.2013.

Materials of Conferences

AM WAVEFORM AN UNMODULATED CARRIER SIGNAL UNDERGOES THE PROCESS OF MODULATION

Khajishvili M.R., Jabnidge I.N., Gomidze N.K.

Batumi Shota Rustaveli State University, Batumi,

e-mail: gomidze@bsu.edu.ge

Message signals are usually of a low-frequency. Generally, low frequency signals are not suitable for signal transmission. Thus, in communication systems require modulation for audio signals. Modulation is used to modulate a low frequency signal that carries the information signal with the appropriate frequency. Thus it is possible to solve the problems associated with the transmission and amplification of weak signals. Role modulation in radiocommunication systems is important. Modulation is used to modulate a low frequency signal source division multiplexing (FDM). If the signals are the same frequency band is transmitted on the same channel at the same time, they can easily interfere with each other and therefore so are first modulated on a different carrier so that multiple signals can be transmitted simultaneously. In the experimental part of this article uses the spectrum analyzer, which measures the characteristics of AM signals. These characteristics are of great importance to transmission FM and AM signals.

Introduction. Modulation is the process of moving a low-frequency signal to a high-frequency and then transmitted the high-frequency signal. Generally the low-frequency signal carrying the original information is called the modulating signal or baseband signal. The high-frequency is known as the carrier signal. After the carrier signal is modulated by the modulating signal, the resultant signal is called the modulated wave. There are three kinds of modulation methods that are used: AM (Amplitude Modulation), FM (Frequency Modulation) [1, 2] and PM (Phase Modulation) [3].

In this case we begin with AM to learn some modulation theory. AM uses the modulating signal to control the amplitude of the high-frequency carrier signal. The modulating signal is used to alter the amplitude of the carrier in proportion to the amplitude of the modulating signal. A high-frequency carrier signal that is amplitude modulated is called an AM wave. AM waves are divided into ordinary AM waves, double-sideband AM waves with suppressed carrier transmission and single-sideband AM waves with suppressed carrier transmission.

In order to pass any kind of information by transmitted, it is necessary to modulated wave.

Each transmitted process can be imagined as a result of modulation of harmonic signal:

$$u(t) = U(t) \cos[\omega(t) + \varphi(t)].$$

In paper [3] was reviewed by the PM-oscillations in quasi-stationary conditions, when was considered that the amplitude and frequency of oscillation were slowly evolution processes. Modulating $s(t)$ signal – was stationary Gaussian process:

$$\bar{s} = 0;$$

$$\overline{ss_\tau} = B_0(\tau) \equiv \sigma_0^2 R_0(\tau) = \int_{-\infty}^{\infty} G_0(\omega) e^{-i\omega\tau} d\omega.$$

It has been shown that in the given case of PM-signal will not be stationary random signal, because its statistical characteristics are the periodic function of time. Usually, spectral and correlation characteristics of the signals in practical terms is more interesting to determine the average time values, since the time averaged statistical quantities of devices are registered.

In papers [4, 5] was studies temporal variation of the amplitude of high-frequency pulse shape modulated signal propagation in the dispersion plasma layer. It is shown that the shape of the amplitude depends not only on the carrier signal frequency, but also on the degree of the AM. For this important experimentally study of AM signal and their spectra, since the degree of modulation affects the transmission.

Basic part. Consider the quasi-monochromatic oscillations with constant phase and randomly fluctuated amplitude. During the AM, the value of amplitude is proportional to the modulating $s(t)$ signal amplitude:

$$u(t) = U_m(t) \cos[\Omega t + \varphi] = k \cdot s(t) \cos[\Omega t + \varphi];$$

$$\varphi = \text{const}, \quad (1)$$

where k – is a proportionality coefficient, which determines the degree of modulation, so it can be described as modulation coefficient, and $s(t)$ modulating signal. Assuming that modulating signal is a sine wave of a single frequency $\Omega = 2\pi f$. Then the carrier signal is

$$u_0(t) = U_{0m}(t) \cos[\omega_0 t + \varphi_0]. \quad (2)$$

Because the carrier frequency remains unchanged after amplitude modulation and the amplitude of an AM wave is proportional to the modulating signal, therefore, the modulated wave can be expressed as below:

$$u_{AM}(t) = U_{AM}(t) \cos(\omega_0 t + \varphi_0) = U_{0m} (1 + m \cdot \cos(\Omega t + \varphi)) \cos(\omega_0 t + \varphi_0). \quad (3)$$

To simplify the analysis, we set the initial phase angle of both waveforms to zero. In formula (3), m is known as the degree of AM modulation or the AM modulation index. Namely:

$$m = \frac{k \cdot s(t)}{U_{0m}}. \quad (4)$$

This equation indicates to what degree the carrier amplitude is controlled by modulating signal. The constant k is a proportional constant determined by the modulation circuit. The AM modulation in-

dex should be less than or equal to 1. When the AM modulation index is greater than 1, it is called over modulation and will distort the modulated signal.

We can see from this that the AM wave also oscillates at a high frequency. Its amplitude varies regularly (envelope changes) and is proportional to the modulated signal. Therefore, the information in a modulating signal carried in the amplitude of an amplitude modulated wave. The following figure shows how a signal changes from a carrier signal.

Expand formula (3) to get the following formula:

$$u_{AM}(t) = U_{0m} \cos(\omega_0 t) + \frac{1}{2} m \cdot U_{0m} \cos[(\omega_0 + \Omega)t] + \frac{1}{2} m \cdot U_{0m} \cos[(\omega_0 - \Omega)t]. \quad (5)$$

As can be seen here, a single modulated audio signal consists of three high frequency components. In addition to the carrier, two new frequency components $(\omega_0 + \Omega)$ and $(\omega_0 - \Omega)$ are included. One is higher than ω_0 , known as the upper sideband, and the other is lower than ω_0 , known as the lower sideband.

Experimental part. In the experimental part we have carried out the work for measure the spectrum of the AM wave with different carrier frequencies and with modulating signals with different amplitudes. Spectrum analyzer GSP-930 and synthesizer GAF-130 by GW Instek were used. The experimental results shown in the following Fig. 1-3.

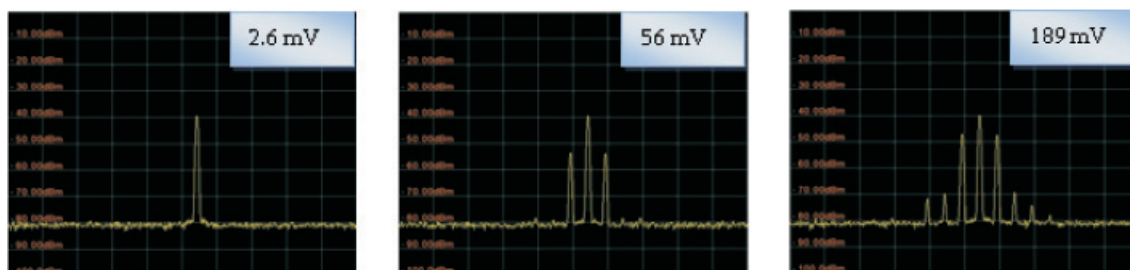


Fig. 1. Changing the modulating voltage. Frequency of modulating signal is 100 kHz, frequency of carrier signal 880 MHz

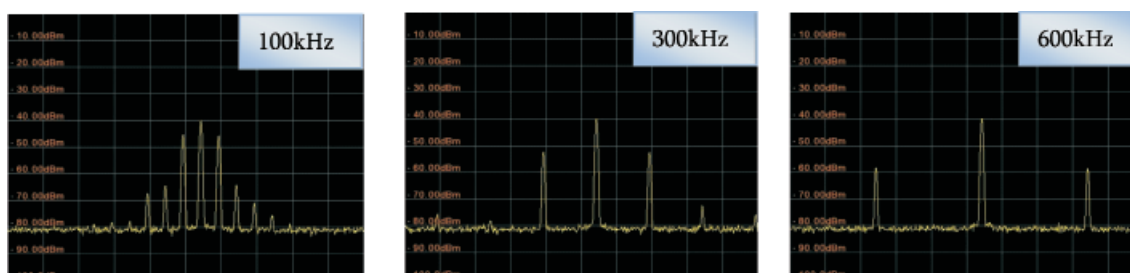


Fig. 2. Changing the modulating signal frequency. Modulating voltage is 250 mV, frequency of carrier signal 880 MHz

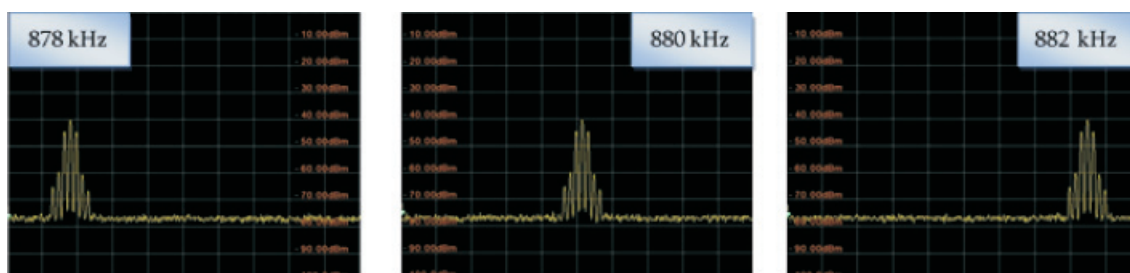


Fig. 3. Changing the carrier frequency. Frequency of modulating signal is 300 kHz, modulating voltage is 250 mV

Conclusion. From the above analysis, we can understand that amplitude modulation is a process of shifting a low frequency modulating signal into the sideband of a high frequency carrier. Obviously, in AM waves, the carrier does not contain any useful information. Information is only included in the sidebands.

Acknowledgment. Work it was spent within the limits of the scientific project «Radio Spectral Diagnostics of Media on the Basis Correlation between Signal and Dispersive Characteristics of Media» – RF/640/5-451 (№ 31/33. scientific supervisor Assistant Prof. IzoldaJabnidze, scientific co-supervisor Prof. NugzarGomidze), which financed by SRNCF (ShotaRustaveli National Scientific Found, Georgia).

References

1. Opalenov U.V., Potapov A.A. // Journal of communications technology & electronics. – 2000. – Vol. 45, № 12. – P. 1447.
2. Gomidze N.Kh., Khajishvili M.R., QoridzeL.: FM– Oscillations Modulated with Noise Signal.Works of 17thScientific Conferences Professor-Teachers and Students of TDAU.ISSN 1987–7722. – 2010. – P. 197–199.
3. Gomidze N., Khajishvili M., Makharadze K., Jabnidze I. Some Features of Radio-Spectral Diagnostics of Random Media via PM and PRM Oscillations // Journal of Applied Mechanics and Materials, ISSN: 1660-9336, publishedby Trans Tech Publicationsinc. Switzerland. – 2013. – Vol 420. – P. 305–310.
4. Gomidze N.Kh., Khajishvi M.R., JabnidzeI. N. About Change of Impulse Outskirts during Propagating in Dispersive Media // Journal of Physics Procedia. – 2012. – Vol. 25. – P. 401–406.
5. Gomidze N.Kh., Khajishvili M.R., Jabnidze I.N., Surmanidze Z.J. The Change Of Rectangular, Sinusoidal and Bi-exponential Impulse Outskirts During Propagatingin Dispersive Plasma. XXX URSI General Assembly, Istanbul, Turkey, August 13–20 (2011), CD file FP 2.5.

The work is submitted to the International Scientific Conference «Economical sciences and modernity», Israel (Tel Aviv), February, 20–27, 2014, came to the editorial office on 06.02.2014.

STUDY WETTING ACTIVITY SILICONES IN THE PRESENCE OF SURFACTANTS

Tyukanko V.Y., Dyuryagina A.N., Ostrovnoy K.A., Demyanenko A.V.

RST «North Kazakhstan State University
named after M. Kozymbaev», Petropavlovsk,
e-mail: vetal3333@mail.ru

The influence of surfactant (technical product «Dispersant Telaz D») on the wetting of metal substrates with a silicon solution. It is shown that the surfactant improves the wetting of the metallic substrate wetting ability, and silicone fluids are closely correlated with their dispersant activity.

Silicone lacquer paint materials historically occupy a significant market share of coatings. Their quality of coatings depends largely on the degree of dispersion of their component pigments. Effective process for dispersing pigments, a great importance is the ability of the pigmented particles wetted com-

ponents of the liquid dispersion medium. The purpose was to study the effect of surfactants (hereinafter SAS) wetting metallopigment. As the surfactant used technical condensation product of vegetable oils with diamines under the trademark «Dispersant Telaz D» (molecular weight – 2121 amu; amine number (HCl mg/g) – 32), the manufacturer of «Av-tononinvest», Russia.

It has been established that the layer was formed on an aluminum substrate with toluene at the boundary with the water is hydrophobic, the contact angle is equal to 116,3°. In contrast, the interfacial layer, which was formed in the presence of surfactants, had a completely different surface properties (possessed significantly lower hydrophobicity). Since the introduction of surfactant in toluene, water contact angles of metals decreased by 12–15°. With the introduction of surfactant in dilute solutions of resin content (10% silicones), water contact angles decreased by 8–12°. Change in the interaction with the surface of the pigment wetting liquid, as a result of adsorption of surfactants, can be determined by changing the values of «relative work of wetting». In assessing this parameter is set, that the introduction of surfactant is increased wetting of metal substrates solutions silicones. Established patterns of change in the wetting activity are closely correlated with changes in patterns of dispersion metallopigment.

The work is submitted to the International Scientific Conference «Modern high technologies», Israel (Tel Aviv), April 25 – May 2, 2014. came to the editorial office on 04.02.2014.

CHARACTERES OF TWO COMPONENT CRYSTALOPTICAL SYSTEMS

Umbetov A.U.

The Arkalyk state pedagogical institute
after I. Altynsarin, Kostanayskaya area, c. Arkalyk,
e-mail: umbetov.a@mail.ru

An analysis and synthesis of difficult optical elements from anisotropic crystals are of interest for the construction of laser measuring devices. Thus there is a task of development of methodology of calculation of such elements, that more precisely would describe their properties on passing and interference of hertzian waves. The co-version method of Ph. I (is known). Fyodor for the calculation of distribution of electro-magnetic waves in anisotropic environments. However this method results in difficult general expressions, and his use for ДКЭ is difficult. On the whole a task is not accessible to the strict analytical decision, thus basic difficulty is; in the necessity to take into account out-of-parallelism of wave vector to $k = 2\pi/\lambda$, describing transfer of phase of wave, and radial vector $\vec{s} = [\vec{E}, \vec{H}]$, describing transfer of energy of wave (λ – the length of wave, E, H – vectors of interesting of elliptic and magnetic fields).

The structural features of worked out DKE are below given: DP 1 (Fig. 1), BL (Fig. 2). The prisms of type of DPPUD differ in that at normal incidence-fission of wave on the exit of prism is absent, but here maximal sensitiveness of «doubling» between o- and e-waves is achieved in relation to angle of incidence. The first variant of prism (DPPUD-1) is presented on Fig. 1. The plane of optical axes is perpendicular an entrance and output to the verges of prism and parallel to the rib of prism.

$$\gamma_1 = \delta \frac{\sqrt{n_e^z - \sin^2 \alpha} \operatorname{tg} \alpha \sin \beta \operatorname{tg} \theta \sqrt{\sin^2 \alpha \cos^2 \beta + \cos^2 \alpha}}{\sin \alpha \cos \beta \operatorname{tg} \theta + \sqrt{n_e^z - \sin^2 \alpha}}; \quad (1)$$

$$x_1 = \delta \frac{\sqrt{n_e^z - \sin^2 \alpha} \sin \alpha \sin^2 \beta \operatorname{tg} \theta}{\sin \alpha \cos \beta \operatorname{tg} \theta + \sqrt{n_e^z - \sin^2 \alpha}}, \quad (2)$$

where δ – parameter of trifle $\left(\delta = \frac{n_o^2 - n_e^2}{n_o^2} \right)$; n , n_e – main indexes of refraction of o- and e-waves; θ –

deflectable angle of wedge of prism; β – azimuth angle, characterizing the turn of DPPUD about axis of z , the flat spreads along thatwave; α – angle of incidence on the entrance verge of prism, equal to the angle of turn of DPPUD around axis x .

The second variant of prism (DPPUD-2) is presented on a Fig. 1, 6. The plane of optical axes is perpendicular to an entrance and output to the verges, and also rib of prism. Here in this case we get:

$$\gamma_2 = \delta \frac{\sqrt{n_e^z - \sin^2 \alpha} \operatorname{tg} \alpha \operatorname{tg} \theta \cos \beta \sqrt{\cos^2 \alpha + \sin^2 \alpha \cos^2 \beta}}{\sin \alpha \cos \beta \operatorname{tg} \theta + \sqrt{n_e^z - \sin^2 \alpha}}; \quad (3)$$

$$x_2 = \delta \frac{\sqrt{n_e^z - \sin^2 \alpha} \sin \alpha \operatorname{tg} \theta \cos \beta \sin \beta}{\sin \alpha \cos \beta \operatorname{tg} \theta + \sqrt{n_e^z - \sin^2 \alpha}}. \quad (4)$$

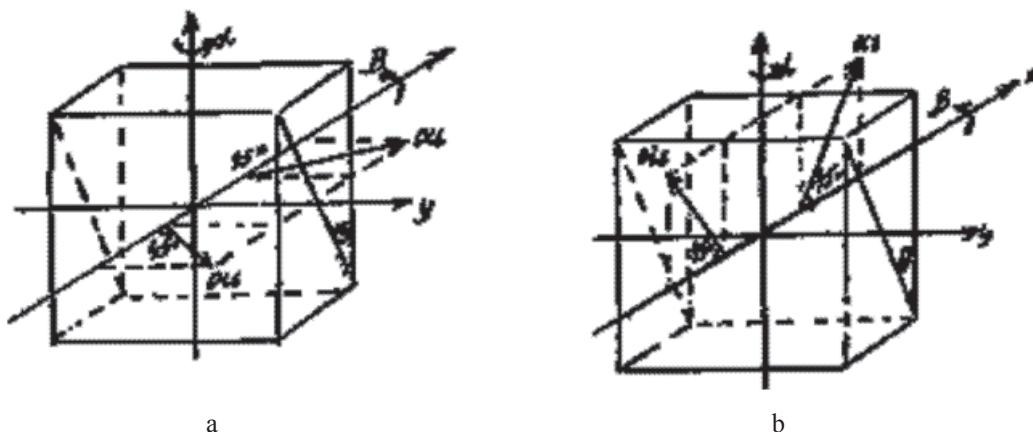


Fig. 1. Construction of двупремляющих prisms of variable angle of doubling of type of DPPUD – 1 (a) and DPPUD (b)

If a falling wave lies inplane optical axes at any angles of incidence, that takes place at ($\beta = 0$, then breaking (up «doubling») on an exit takes place in plane of incidence, i.e. $x_2 = 0$. If a wave falls in of, planes of optical axes, then breaking up is absent, as well as in case of DPPUD of Dependence of kind

(1)–(4) are in a good consent with experimental facts and can be used for drafting of algorithms for COMPUTER in the systems of operation of a laser ray.

Properties of other element (BL) are described in works. Calculation of DKE of type of B.L., conducted on methodology, and explained on Fig. 2, c.

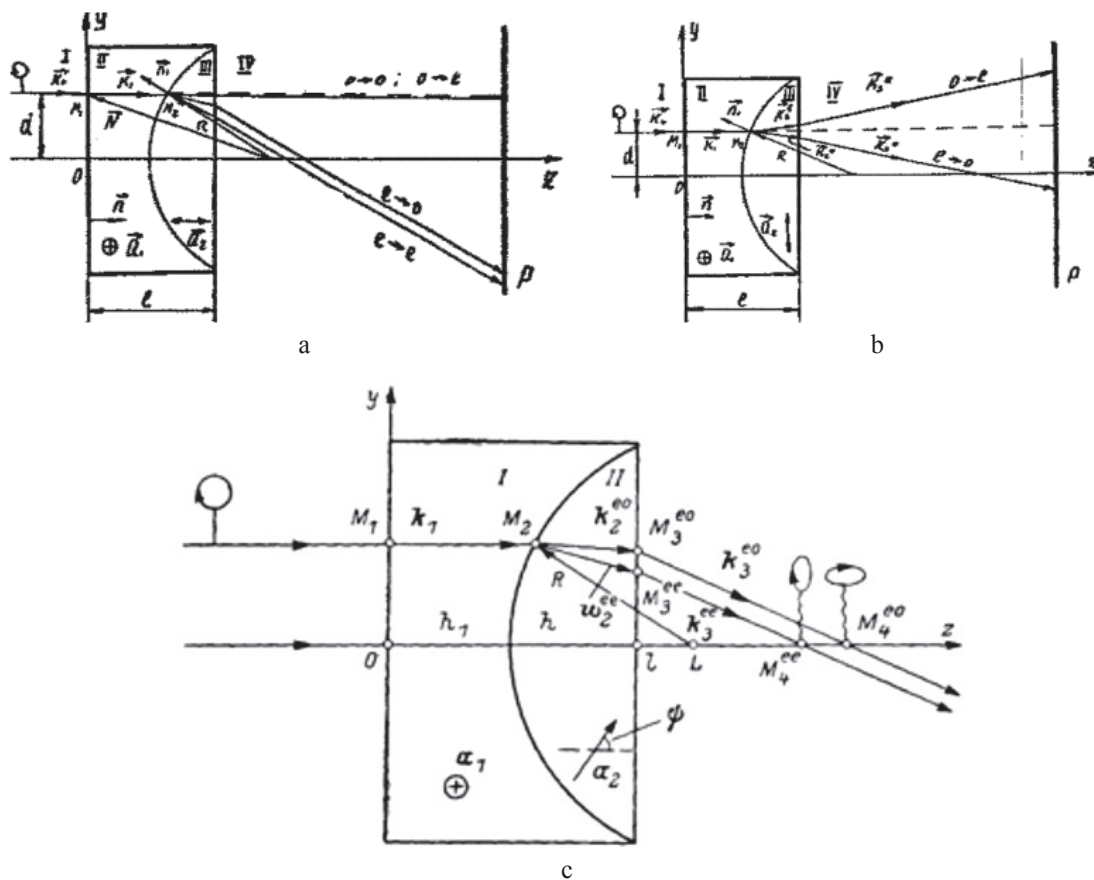


Fig. 2. Constructions of bifocal lenses of type BL-1 (a) and BL-2 (b) and chart of motion of rays in them (c)

Let in the circular polarized wave spreads in the direction of axis z . At such choice of the state of polarization of falling wave «attachment» of vector of polarization to the optical axis of crystal on the entrance of BL appears unimportant, that allows in future to unite the construction of theory for the lenses of type of BL-1 and BL-2. Let $z = 0$ және $z = \ell$ are left and right to the verge of BL accordingly, and spherical border is set with equation $x^2 + y^2 + \dots$, where $-$ distance from the beginning of the system of coordinates to the center of spherical surface of БЛ. Directions of optical axes in the areas of I and II are set by the unit vectors of $a_1 - (1, 0, 0)$ and $oh, = x^2 + y^2 + (z - \delta)^2 = R^2$, where δ – corner between BL and axis 2 (Fig. 2, c). Let (on the left verge of БЛ in the arbitrary point of M_1 the narrow parallel beam of light falls along an axis. The point of M_1 has coordinates of $d \cos \varphi, d \sin \varphi, 0$, where φ – angle between the axis of x and radius-vector, conducted from beginning of coordinates z to the point M . Will suppose $d \ll R$ To, where R – radius of curvature of spherical border of division of BL,

size $(d/R)^2$ is scorned small. The index of refraction for o-wave in the areas of I and II is identical and equal n_o , and for a e-wave depends on k_i ($i = 1, 2$) – single wavy vector in the areas of I and II accordingly. In area of K_1 , (1) coincides with direction of light ray. There is mutual transformation of o- and e-волн on the spherical border of division of БЛ. Wave vector \vec{k}_2 in area of. II lies in plane, passing through an axis z and determined by an angle φ : $\vec{k}_2 = (\sin \alpha_2 \cos \varphi, \sin \alpha_2 \sin \varphi, \cos \alpha_2)$, where α is an angle between \vec{k}_2 and by an axis z . On a spherical border in general case four waves must be considered and according to them four border conditions.

Thus the vector of \vec{k}_2 and angle of α_2 must add indexes (oo), (oe), (eo), meaning: (oo) and (ee) – keeping of type of polarization of wave; (oe) and (eo) transformation of falling o-wave in the refracted e-wave and vice versa. Thus $\alpha_2^{oo} = 0$, and angle α_2^{oe} can be found from the law of refraction on a spherical surface:

$$n_o^2 \cdot \left[1 - (\vec{k}_1, \vec{n}_1)^2 \right] = \frac{n_e^2}{\left[1 + \delta \left(\vec{k}_2^{oe}, d_2 \right)^2 \right]} \left[1 - (\vec{n}_1, \vec{k}_2^{oe})^2 \right], \quad (5)$$

where $\vec{n}_1 = \left(\frac{d}{R} \cos \varphi, \frac{d}{R} \sin \varphi, -\sqrt{1 - \frac{d^2}{R^2}} \right)$ – single vector of normality. Intersection shining with the spherical border of division has coordinates $(d \cos \varphi, d \sin \varphi, \sigma - \sqrt{R^2 - d^2})$. Putting in (5) values of vectors of $\vec{n}_1, \vec{k}_1, \vec{k}_2^{oe}$ and as we will get the angles of $\alpha_2^{oe}, \alpha_2^{eo}, \alpha_2^{ee}$.

Wave vector of ray going out from BL, we will write down in a kind $\vec{k}_3 = (\sin \alpha_3 \cos \phi \sin \alpha_3, \sin \phi \cos \alpha_3)$. Obviously, that $\alpha_3^{oo} = 0$ and law of refraction (eo) of wave on the border of $z = \ell$ will look like :

$$n_0^2 = [1 - (\vec{n}_1, \vec{k}_2^{eo})^2] = 1 - (\vec{n}_2, \vec{k}_3^{eo})^2, \quad (6)$$

where $\vec{n}_2 = (0, 0, 1)$ – is a normal to the plane of $z = e$. From (6) will we get angles $\alpha_3^{eo}, \alpha_3^{oe}, \alpha_3^{ee}$.

For being of e-ray in area of II it is required to consider single vector of group speed on correlation of $\vec{S} = \mu_1 \vec{\alpha}_2 + \mu_2 \vec{k}_2$, where μ_1, μ_2 – coefficients. It is necessary to angle between in an anisotropic environment. It is possible to show that expression for \vec{S} describing the trajectory of e-ray in BL, looks like

$$\vec{S} = \frac{(n_e^2 - n_0^2)(\vec{k}_2, \vec{\alpha}_2)\vec{d}_2 + n_0^2 \vec{k}_2}{\sqrt{n_e^4 (\vec{k}_2, \vec{\alpha}_2)^2 + n_0^4 [1 - (\vec{k}_2, \vec{\alpha}_2)^2]}}. \quad (7)$$

Case of $\psi = 0$ suits to element of type of BL-1 (Fig. 2, a), and $\psi = \frac{\pi}{2}$ – element of type BL-2 (Fig. 2, b). For the Icelandic spar $n_o > n_e$ and $\psi = \frac{\pi}{2}$ –

we have $\alpha_3^{oe} > 0$. This means that o-ray going to the environment of II on leaving from BL-2 walks away from the axis of Z; consequently, falling on BL-2 a parallel bunch with this polarization will be going (Fig. 2, c) away. For (eo) – and (ee) – rays at $\psi = 0$ (in BL-1) we have: $\alpha_3^{oe} > 0$ and $\alpha_3^{ee} < 0$.

Consequently, (eo) – and (ee) – rays will cross the axis of z in two different points corresponding to two focuses of F_{eo}, F_{ee} . Thus, by means of BL-1 the interesting case of SDM of flat wave will be realized on two spherical waves with divided along an axis by 2 focuses into a size $\Delta F = F_{eo} - F_{ee}$, depending on double-refracting properties of crystal and thickness of h of plane-convex lens (Fig. 2, a). This property of BL-1 can be used for a holographing in polarized light in subsequent bunches with the managed intensity.

The calculations given above allowed in theory to predict, and in and experimentally to find out a spatial uninvariance (to irreversibility of passing

of hertzian wave in relation to the axis of z) at the analysis of distribution of laser bunch through BL-1 in directions (+Z) (–Z). The invariance of the polarization linear optical systems is unobvious. On the contrary, there is a necessity to examine the location of elements of optical chart in a polarization optics. By the methods of matrix optics easily to prove, for example, that a result of passing of hertzian wave through a double-base polarizing element (polarization + $\lambda/4$) will be different on the state of polarization depending on that, from what part a wave falls on difficult element 2. DKE of type of BL-1 demonstrates an unique case in this sense, when not only the state of polarization but also amount of waves on an exit and picture of interference polarized waves are different for opposite directions of distribution of light. At falling of flat wave on BL-1 outside plane-convex lenses (Fig. 2, a) there is breaking up on four waves, from which waves that (oo) – and (oe) – I are: parallel to axes z , and (ee) and (eo) – waves are spherical waves with carrying (along an axis 2) focuses. In case of falling of flat wave on BL-1 from the side of plane – convex lens (area of III on a Fig. 2, a) on an exit formed one parallel and one converging astigmatic bunches with the orthogonal states of polarization. Unlike BL-1 DKE of type of BL-2 property of uninvariance does not possess. For BL-2 (Fig. 2, b) forming is characteristic converging (eo) and going (oe) away waves as a result of transformation of e-waves in o- waves and vice versa.

BP is two prisms from a monaxonic crystal as equal-side trapezoids (prisms of Dove), agglutinate with large grounds by the layer of glue, having an intermediate index of refraction of $n_e < n_k < n_o$. Optical axes in making prisms located in a plane perpendicular to the grounds of prisms parallel between then selves and form a angle 45° with the plane of gluing together. the choice of orientation of optical axes is comfortable during work with a laser source;-, to the vertical orientation of vector of E of laser radiation, (in parallel to the rib of falling normally on an entrance verge $A_1 C_1$ a laser ray is divided into o- and e-rays. thus o-ray tests a complete internal reflection from the layer of glue. At falling on a verge $A_1 B_1$ of the second laser ray (from an independent source or first ray) formed by an optical division e-ray passes without rejections along an axis Z In subsequent o- and e-buckles there is interference on the exit of BP.

At the turn of BP on a small angle and about axis parallel to the rib of BP, o- and e-burkes on the exit of BP have relative movement 3. The condition of existence of interference (photomixing) is переналожение (cross-correlation) o- and e-burcles at bringing their vibrations over to one plane by means of analyzer.

$$\alpha \leq \frac{rc \operatorname{tg} \theta}{\left\{ \left[e + 2\alpha \cos \theta \left(\frac{1}{n_e} - \frac{1}{n_0} \right) \right]^2 + \alpha^2 \sin^2 \theta \cos^2 \theta \frac{1}{n_e^2} \left(1 - \frac{n_e^2}{n_0^2} \right)^2 \right\}^{1/2}}. \quad (8)$$

Thus top limit of measureable angles of turn where r -radius of the mixed up bunches; $2a$, e , θ are parameters of BP: length of the general founding, length of lateral side, corner at founding. For making from the Icelandic spar of BP with $a = 12$ mm, $e = 11$ mm, $\theta = 65^\circ$ from (8) we get $\alpha \leq 3^\circ$ at the r of 3 mm.

References

1. Barsukov K.A., Osipov U.V., Popov V.N. Optics and spectroscopy. – 1980. – P. 605–61, 1981, P. 191–196.

2. Osipov U.V., Optico-mechanic industry. – 1973. – № 5. – P. 5; 1972, № 12, p. 1822.

3. Barsukov K.A., Osipov U.V., Umbetov A.U. Distribution electromagnetic bullock two-component lenses from monaxonic crystals. (Theory and experiment). 4260-83 of 01.08.83.

The work was submitted to International Scientific Conference «Problem of international integration of national education standards», France (Paris), December, 21–28, 2013, came to the editorial office on 28.11.2013.

Short Reports

**REGIONAL OIL AND GAS BEARING
STRATIGRAPHIC COMPLEXES
AND FORMATIONAL ANALYSIS
DATA FOR TERRITORY
OF THE YURYUZANO-SYLVINSKAYA
DEPRESSION**

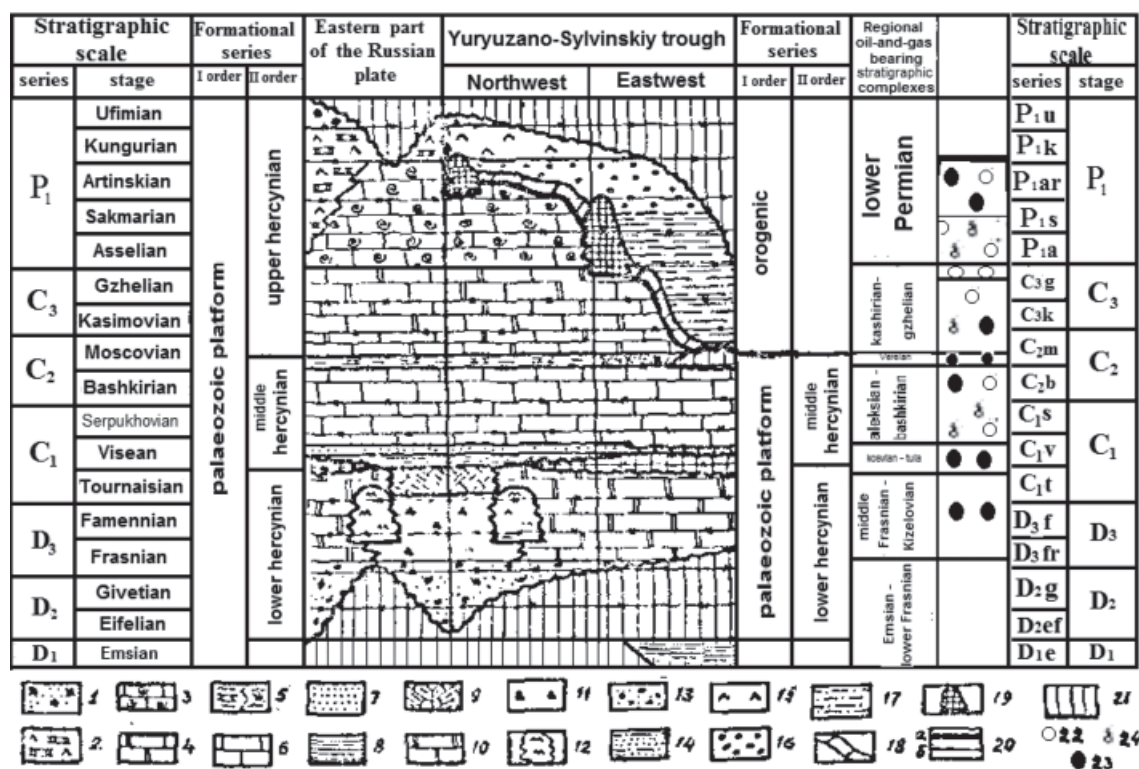
Ozhgibesov V.P., Kudiyarov A.G.

Perm State National Research University, Perm,
e-mail: ozhgibesov@psu.ru

The thickness of paleozoic sedimentary series in the Yuryuzano-Sylvinskaya depression of the Pre-Urals foredeep changes from 2,3 to 5,5 km. This series has heterogeneous facial and forma-

tional composition. The formational analysis has been used to study the oil and gas deposits related to the Yuryuzano-Sylvinskaya depression and to study the regularities of its structure. An attempt to create the system model of the structure this area of the Earth's crust by means of the formations, the tectonics and the predictive oil and gas content has been made.

There are seven regional oil-and-gas bearing stratigraphic complexes and eighteen formations making up three formational series such as the Caledonian preplatform, the Hercynian platform and orogenic in the sedimentary rock mass of the Palaeozoic (Figure).



The comparison of the palaeozoic formational series of the Yuryuzano-Sylvinskaya depression with the regional oil-and-gas bearing stratigraphic complexes (on S.N. Kalabin, 1994 with changes and additions of authors). The legend:

1–14 – platform formation: 1 – red carbonate-terrigenous; 2 – sulfate limestone dolomite; 3 – limestone; 4 – kashirian-gzhelian limestone-dolomitic; 5 – carbonate-clayey; 6 – viseian-bashkirian dolomitic-limestone; 7;8 – sandy clay; 9 – siliceous carbonate wedgeform; 10 – limestone-dolomitic middle frasnian-tournaisian; 11 – siliceous clayey carbonate domanic; 12 – carbonate reefogenic; 13 – clayey sand; 14 – sandy silt; 15–19 – orogenic formations: 15 – saliferous; 16 – upper marine molasse; 17 – lower marine molasse; 18 – carbonate-clayey depression; 19 – carbonate reef; 20 – boundaries; 21 – lack of accumulation; 22 – gas pool; 23 – oil pool; 24 – condensate

The territory of the Yuryuzano-Sylvinskaya depression (YSD) is characterized by various geological conditions of the oil-and-gas field distribu-

tion and different structures containing hydrocarbon accumulation. Most of the commercial oil and gas accumulations are found in the reservoir of the

Hercynian platform carbonate formations while the sandy shale formation, one of the main formations of the Russian Plate, has oil and gas content limited only by the western part of the YSD [1]. This is due to the considerable subsidence and heating and to the long term of rocks cooling of the sandy shale formation thus sandstones and siltstones lost their reservoir properties on the greater part of the YSD [1]. Among the carbonate formations the Visean-Baschkirien dolomite-limestone formation has the largest areal of oil-and-gas content. There is the tendency to section dislocation of oil and gas content upwards the depression formation (zonal-regional cap rock) in the rock mass of the Kashirskian-Gzhelskiy and Asseliaan-Artinskian carbonate formations. Oil and gas content in the eastern part of the YSD is related to the Upper Carboniferous «reefs». Oil-and-gas content in the northern part of the YSD is associated with the Asselian-Kungurian reef massif of the carbonate reef formation (Verkhnechusovskoe field). The carbonate-clay depression formation is replaced by lower molasse formation in the east. Gas and gas condensate production are associated with its terrigenous reservoirs [4]. Natural reservoirs of Kungurian salt and upper molasse formations have no prospects for oil and gas. In the north of the YSD the structures the Upper Devonian barrier reef of carbonate reef formation (Komarihinskoe field) and Tournaisian siliceous carbonate clinoforms (Verkhnechusovskoe field) are productive for oil and gas.

Original geological conditions of oil-and-gas field distribution let us consider the Yuryuzano-Sylvinskaya depression to be oil-and-gas bearing region of the Volgo-Ural oil-and-gas province [1].

Formational analysis of the territory of the YSD revealed the following regularities:

1) the main role of the oil-and-gas field distribution is associated with the reservoirs of Hercynian platform carbonate formations such as the Upper Visean-Baschkirien dolomite-limestone formation and limestone-dolomite Kashirian-Gzhelian formation that is not typical of the Perm krai;

2) relatively less importance in the oil-and-gas field distribution play the reservoirs of Vereian carbonate-terrigenous, Middle Frasnian-Tournaisian limestone-dolomite, Tournaisian siliceous-carbonate and Asseliaan-Artinskian limestone formations. Oil and gas content of platform terrigenous formations is restricted to the western part of the Kyzylbaevsko-Chusovskoy tectonic block. This is different from the Kosvinsko-Tula regional oil-and-gas bearing stratigraphic complex of Perm krai in the way that it has the largest identified and potential resources of hydrocarbons. In the eastern part of the YSD among orogenic formations lower marine molasse formation is gas-containing and in the north and east oil and gas content is confined to carbonate reef formation;

3) commercial oil and gas content is confined to low amplitude geological high complicating tectonic blocks; the crucial role of the gas content distribution is played by the high amplitude structures associated with thrust-faults;

4) Perspective regional oil-and-gas bearing stratigraphic complexes of the Permskiy Krai from the terrigenous Emsian-Lower Frasnian till the Kashirian-Gzhelian occur under the Urals thrust-folds and collapse forming anticlinal folds that is a precondition for prospecting and exploration for new deposits in the south-eastern part of the YSD.

References

1. Kalabin S.N. Structural-Formational precondition for prospecting for new oil and gas deposits of the Yuryuzano-Sylvinskaya depression. Abstract of a Diss. ... Dr. Geol.-Miner. Sci. – Perm, 1994. – 20 p.
2. Ozhgibesov V.P. General Stratigraphy. Selected stratigraphic schemes of the Eastern Part of Russian Plate and Ural: Devonian, Carboniferous, Permian, Quaternary. – Perm State University. – Perm, 2012. – 20 p.
3. Decisions of the Interdepartmental Stratigraphic Committee and its standing commissions. – 38 edition. – SPb., 2008. – 47 p.
4. Provorov V.M. Geological structure of Sylvinskaya depression and oil-and-gas content. Diss. ... Dr. Geol.-Miner. Sci. – Perm, 1970. – 251 p.
5. Stratigraphic code of Russia. Third edition. – SPb.: VSEGEI, 2006. – 96 p.