CONTENTS

REGULARITY OF BRAIN BIOELECTRIC ACTIVITY REACTION AT HARMONIC SOUND INFLUENCE

Grigorieva E.A., Pevzner A.A., Diakonov A.L.

Yaroslavl State Medical Academy;
K.D. Ushinskiy Yaroslavl State Pedagogical University, Yaroslavl, e-mail: alpevzner@yandex.ru

The unknown before common regularity of the human being brain reaction under the influence of harmonic sound signals of various frequencies has been found. The synchronization of bioelectrical brain activity occurs under the sound influence at the frequency equal to extreme maximum of the baseline EEG spectrum, and desynchronization of bioelectrical brain activity occurs under the sound influence at the frequency equal to the extreme minimum of the baseline EEG spectrum. Mentioned brain reactions occur in both multiple rise and multiple fall of sound frequency (if multiple ration is equal to 2^n).

Keywords: brain bioelectric, harmonic sound influence

Human's organism reacts to musical (harmonic) sounds differently. In the works [3] there is a description of method and program, titled as «Music of the Brain» suggested by Ya.I. Levin. The experience has been accumulated concerning insomnia, depression and inquietude treatment as well as increase of adaptation of healthy people to mental workload. However there is no information about the correlation of the particular biosignal spectrum frequencies and the harmonics frequencies activating the sounds.

R.A. Monroe's works are about biosignal resonance at the expense of beat frequency with the appropriate rhythmical delta, theta, alpha, beta ranges. However there is no information about the particular biosignal patient determination for binaural rhythm frequencies selection in order to provide for the appropriate biosignal reaction.

Objectives: to research the reaction of human being bioelectrical brain activity to harmonic sound of different frequencies, which depends on spectral composition of background EEG.

Materials and methods of research

The research included 86 humans (42 men and 53 women) at the age of 18-50 without serious somatic and mental pathology. Baseline EEG was registered (16 channels in accordance with the international standard) and baseline EEG spectral analysis was carried out with the help of the «Brainlog» software. Consequently the EEG spectrograms as a histogram for every deflection with the step 0,5 Hz have been fixed. Studying the baseline EEG spectrums histograms, the extreme harmonic frequencies were defined. Extreme maximum exceeded adjacent harmonics in amplitude and extreme minimum fell behind the adjacent harmonics in amplitude.

Then there was a harmonic sound influence, the frequency of which changed within the scope of the beginning intended frequency according to the linear law. Sound frequency variation was in different randes as with the frequency up and down. Thus the value of given frequency was defined by the period of the sounding, according to the formula

$$f_i = f_н \pm |f_к - f_н| t_i / t \qquad (1)$$

where $f_н$ – beginning frequency; $f_к$ –ending frequency; t – period of the sounding from $f_н$ to $f_к$ – frequency per a moment t_i

Simultaneously with the sound influence, the recording of bioelectric brain activity was made.

Analyzing the EEG the points in time of local synchronization and desynchronization of the biopotentials were recorded. For all the points in time of local synchronization and desynchronization according to (1) corresponding sound frequencies were defined.

Results of research and their discussion

Results of the research have shown that he synchronization of the bioelectric brain activity occurs under the sound influence with the frequency equal to the extreme maximum frequency of the baseline EEG and the desynchronization occurs under the sound influence with frequency equal to the extreme minimum of the baseline EEG.

The unknown before regular occurrence has been determined, it presupposes the regularity if the human being brain reaction at the harmonic sound influence and the matter is that during the harmonic sound signal influence with the frequency multiple of the extreme maximum frequency of that human being bioelectric signal spectral content obtained before the influence, and the synchronization of the bioelectrical brain activity occurs, and the multiplicity factor corresponds to the following formula $k = 2^n$.

Thus the frequency of harmonic sound influence, which stipulates the synchronization of bioelectrical activity, is calculated according to the formula:

$$F_{s.s} = f_{e\,max}\, k. \qquad (2)$$

When the harmonic sound signal influences the organism at the frequency multiple of extreme minimum of bioelectrical signal spectral composition of the human being, which is obtained before the influence, the desynchronization of bioelectrical brain activity occurs. And thereafter the frequency of harmonic sound influence, which stipulates the desynchronization of bioelectrical activity, is calculated acording to the formula [13, 14, 15]:

$$F_{so.d} = f_{e\,min}\, k. \qquad (3)$$

In the work, local synchronization and desynchronization reaction could be both short-term (fractions of second) and long-term (up to several seconds). It corresponds with the Ye.D. Homskaya research [19]. Besides, it is more appropriate to judge about the synchronization and desynchronization (activation and deactivation) not only by its duration as by direction of bioelectrical activity variation in comparison with the initial level [1, 17]. Thus, desynchronization was understood as the replacement of slower, time-ordered wave activity by the faster, less periodic oscillations, significant amplitude drop; synchronization is an opposite phenomenon.

In the dynamic systems of brain structures that provide mental function, every phase is marked with a key section, by impacting on which the integral function can be changed, what is considered to be «rigid link» of bioelectrical brain activity [1, 2]. Found regularity of the human reaction at harmonic sound influence provides the creation of the mechanism, which can rearrange bioelectrical brain activity for overcoming pathologically stable state.

Found regularity is characteristic for all 86 healthy humans, for all 16 deflections, but its higher expression is in the occipitle and upper temporal areas.

The table of results of one patient is given as an example. The values of sound frequencies, calculated according to the formula (2) for maximum and according to the formula (3) – or minimum extreme frequencies of EEG spectrum and corresponding to them sound frequencies, causing synchronization and desynchronization of bioelectrical brain activity. The table shows an evidence of the fact that the deflections of sound frequencies causing the synchronization and desynchronization of bioelectrical brain activity from the frequencies, calculated according to the extreme frequencies of the EEG spectrum, do not exceed 1 %.

George (occipute) 12.01.09

Number seriatim	$O_{1\ max}$			$O_{1\ min}$			$O_{2\ max}$			$O_{2\ min}$		
	1	2	3	4	5	6	7	8	9	10	11	12
	$f_{e\ max}\cdot 2^n$	$f_{so.s}$	mistake	$f_{e\ min}\cdot 2^n$	$f_{so.d}$	mistake	$f_{e\ max}\cdot 2^n$	$f_{so.s}$	mistake	$f_{e\ min}\cdot 2^n$	$f_{so.d}$	mistake
	Hz	Hz	%	Hz	Hz	%	Hz	Hz	%	Hz	Hz	%
1	896	896	0,0	912	915	0,4	896	902	0,7	880	880	0,0
2	960	960	0,0	928	937	1,0	944	944	0,0	912	915	0,4
3	1024	1034	1,0	960	968	0,8	1024	1034	1,0	960	968	0,8
4	1184	1184	0,0	976	986	1,0	1056	1056	0,0	992	992	0,0
5	1280	1280	0,0	1024	1024	0,0	1280	1280	0,0	1024	1024	0,0
6	1472	1465	0,5	1152	1162	0,8	1472	1461	0,8	1152	1152	0,0
7	1536	1544	0,5	1216	1216	0,0	1536	1536	0,0	1216	1216	0,0
8	1568	1562	0,4	1408	1408	0,0	1632	1632	0,0	1248	1248	0,0
9	1600	1600	0,0	1536	1536	0,0	1696	1696	0,0	1408	1408	0,0
10	1792	1792	0,0	1664	1664	0,0	1792	1792	0,0	1600	1593	0,5
11	1888	1888	0,0	1824	1824	0,0	1888	1888	0,0	1664	1664	0,0
12	1920	1923	0,1	1856	1856	0,0	2048	2042	0,3	1760	1764	0,3
13	2048	2048	0,0	1920	1910	0,5	2112	2116	0,2	1824	1835	0,6
14	2368	2368	0,0	1952	1958	0,3	2560	2560	0,0	1920	1910	0,5
15	2560	2560	0,0	2048	2048	0,0	2944	2944	0,0	1984	1980	0,2
16	2944	2944	0,0	2304	2310	0,3	3072	3072	0,0	2048	2048	0,0
17	3072	3072	0,0	2432	2438	0,2	3264	3264	0,0	2304	2301	0,1
18	3136	3159	0,7	2816	2816	0,0	3392	3397	0,1	2432	2442	0,4
19	3200	3200	0,0	3072	3076	0,1				2496	2504	0,3
20				3328	3322	0,2				2816	2816	0,0
21										3200	3194	0,2
22										3328	3328	0,0

Conclusions

1. Unknown before common reaction regularity of human brain under the influence of harmonic sound signals of different frequencies has been found. The frequencies values of harmonic sound influence, under which the synchronization and desynchronization of brain biopotentials occurs, have been determined by the initial EEG (before the sound influence) of every person as consistent with the extreme frequencies of spectral EEG content.

2. Synchronization of the bioelectrical brain activity occurs under the sound influence at the frequency equal to the extreme maximum of the baseline EEG spectrum, and desynchronization of bioelectrical brain activity occurs under the sound influence at the frequency equal to the extreme minimum of the baseline EEG spectrum.

3. Under the sound influence at the frequency exceeding maximal frequency of the EEG spectrum, synchronization of the bioelectrical brain activity occurs at multiple exceeding by the sound frequency of the extreme maximum frequency of the baseline EEG spectrum, and desynchronization occurs at multiple exceeding by the sound frequency of the extreme minimum frequency.

4. It has been determined that the exceeding multiplication factor by the sound frequency of the relevant extreme baseline EEG spectrum is equal to 2^n.

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ELECTRON MICROSCOPY OF SPERMATOZOA IN CHLAMYDIA

Vaisov I.A., Baibekov I.M.

Republican purpose-built is scientific-practical centre of obstetrics and gynecology, Tashkent, e-mail: umidatashkenbaeva@mail.ru

Spermatozoa of individuals with normospermia and of those diagnosed with chlamydia have been studied using scanning electron microscopy (SEM). Chlamydia causes deformation of the tails of spermatozoa, their bifurcation and scalloped appearance. There also take place deformation of the head of spermatozoa in the shape of hourglass, the appearance of sphere-shaped heads with grooves and inclusions on their surfaces.

Keywords: spermatozoa, scanning electron microscopy, chlamydia

Despite the fact that various techniques of electron microscopy, including transmission and scanning types were used for studying biological objects for more than half a century, the assessment of functional morphology of the spermatozoa have been used recently [2, 5-10]. Implementation of these techniques in practical andrology contributed to accumulation of sufficient knowledge of normal functional sperm morphology. It was found that spermatozoa are not a homogeneous population of cells. A considerable part of them contain certain abnormalities. At least 30% of the spermatozoa in the ejaculate of fertile men should be morphologically normal [3, 4, 9]. Morphological changes in spermatozoa can be caused by many factors, including the effect of high temperature [1].

Chlamydia has marked effect on male fertility, which is conditioned in the first place by the direct effect of infection on sperm cells [11].

However, the impact of chlamydia on the condition of the spermatozoa in ejaculate, especially on their morphology, was not studied with the use of scanning electron microscopy (SEM).

Materials and methods of research

In order to study spermatozoa with SEM, we used a modified method of SEM tissue processing. After receiving semen into clean bottles by masturbation, the sperm was kept at room temperature for 30-40 min for liquefaction of the ejaculate. Then 5-fold volume (usually, the volume of ejaculate did not exceed 2 mL) of 2,5% solution of glutaraldehyde with phosphate buffer was added to ejaculate in bottles. Such, the quantity of fixative averaged to 10 ml. After fixation for 1,5 hours, the ejaculates were placed in centrifuge tubes and centrifuged at 5000 rpm for 5 min. After removal of the supernatant volume of fixative the sediment was rinsed with phosphate buffer twice. Then, 1% solution of osmium tetroxide with same buffer was added for fixation for 1 h. After careful pouring of the fixator out, the sediment was rinsed with cold 50% alcohol and filled in with the same concentration alcohol for 10 minutes. After that, the samples were dehydrated with alcohol and acetone according to conventional methods. After dehydration in the last portion of acetone, the precipitate was fragmented into pieces that were afterwards placed into containers and dried by the transition through critical point, in the apparatus HCP-2. Then the dried pieces were mounted on foil plates with current-conducting adhesive and sputtered with gold in the apparatus of IB-3.

Samples were studied under microscope «Hitachi S-405A»; photographs were obtained from the display screen of the microscope with digital camera Canon. Photomicrographs were processed with computer software «Computech», OS Windows XP.

The studied ejaculate was of 18 patients with diagnosed chlamydia infection and of eight individuals without a pathology of the genital organs (control).

Results of research and their discussion

In normospermia, the majority of spermatozoa have a regular oval shape. The contours of the head, neck and tail were even. Small cytoplasmic droplets were sometimes defined in the neck. The ratio of length to width of head by SEM samples comprised 1,5:1,75. Head length ranges within 4-5 microns, width – 2,5-3,5 microns. As a rule, the tail is straight or slightly curved. Its length reaches 45 microns. It is possible to see the flatness of head with SEM (Fig. 1).

Substantial changes occur to the spermatozoa of patients diagnosed with chlamydia. The surface of their tails and heads becomes uneven; indentations and inclusion can be seen (Fig. 2, 3). Spermatozoa with twin tails and deformed heads are detected quite often (Fig. 3, 4). There are bulging places alternating with constricted on the surface of tails. They acquire a scalloped appearance (Fig. 3, 7). There are also tails with curled tips (Fig. 5). There are spermatozoa that appear to have tails thick and bifurcating in the distal part (Fig. 3) and others, having two thin, extending from one head; the bifurcation of tails is sometimes seen in case of thin tails also (Fig. 4). Quite often spermatozoa have deformed in the form of an hourglass heads, (Fig. 6) or ball-shaped with indentations (Fig. 7).

The surfaces of the tails and mainly the heads contain discrete circular formations, 0,2-0,3 microns in diameter, coinciding with the size of chlamydia (Fig. 8).

Hereby, the conducted studies suggest that chlamydia causes significant changes in the shape of spermatozoa; it leads to appearance of deformed heads, doubled and deformed tails in spermatozoa.

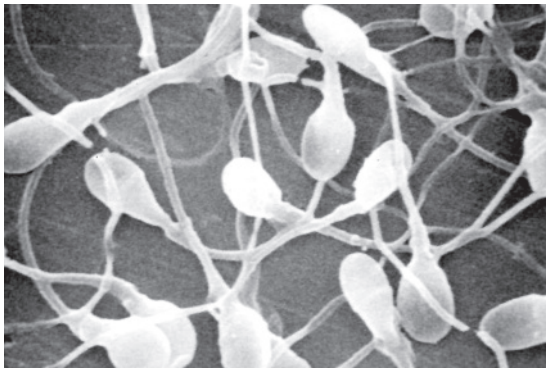

Fig. 1. Spermatozoa with regularly shaped heads and tails in normospermia. SEM x2000

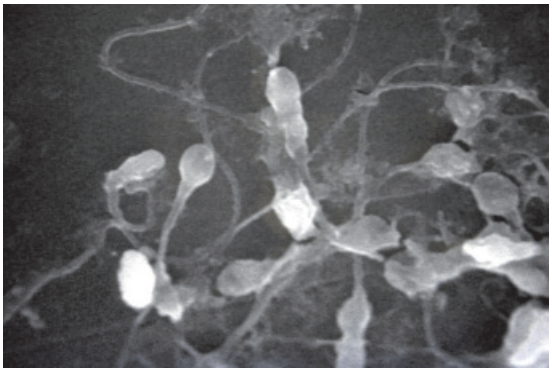

Fig 2. Spermatozoa, of patients with Chlamydia, have deformed heads and bifurcated tails. SEM x 2000

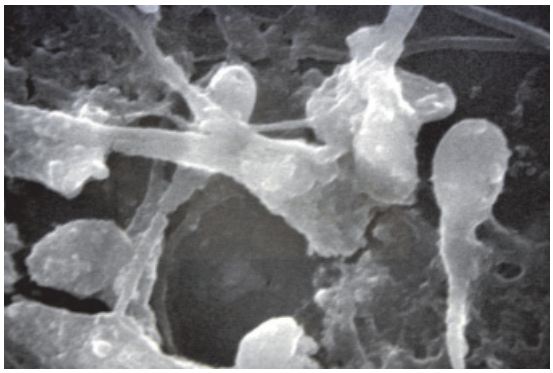

Fig. 3. Bifurcated tails and deformed heads in spermatozoa, taken from patients with chlamydia. SEM x200

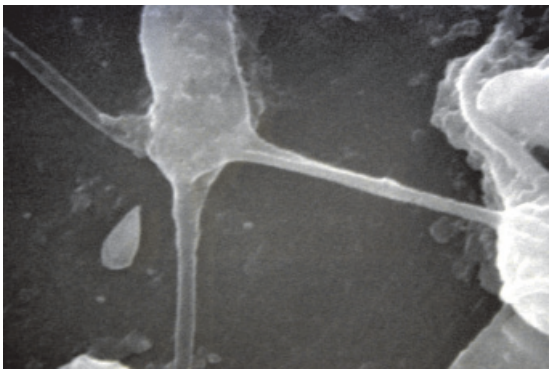

Fig. 4. Spermatozoon with bifurcated tail. SEM x 4000

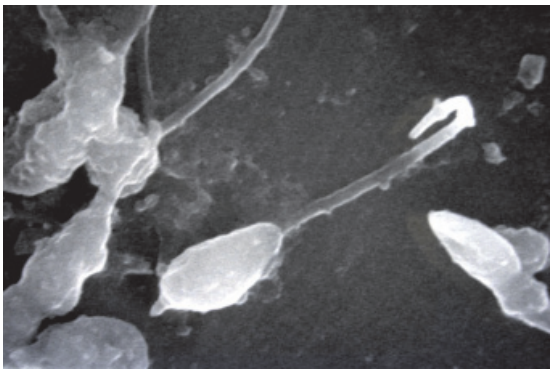

Fig. 5. Spermatozoon with curled tip of the tail. SEM x 4000

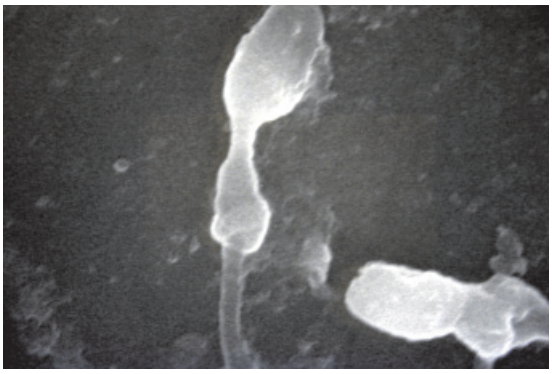

Fig. 6. Spermatozoon with the hourglass-shaped head. SEM x 4000

The discrete formations on the surface of tails and especially the heads correspond to the chlamydiae as by size as well as by shape.

Early experiments to investigate the nature of any interaction between spermatozoa and C. trachomatis relied upon electron microscopy to examine the possibility of interaction between them [11]. However, although these experiments generated useful micrographs of bacteria closely associated with spermatozoa, the observations provide no information about the functional status of the spermatozoa, nor did they provide support for the argument that «piggy-backing» on spermatozoa was a mechanism by

which C. trachomatis was spread through the female reproductive tract (see above).

Our studies, performed with SEM revealed that a significant number of spermatozoa with deformed heads and tails appear in the ejaculate of individuals with chlamydia. The spherical discrete particles, detected on the surfaces of tails and especially heads, may represent chlamydia.

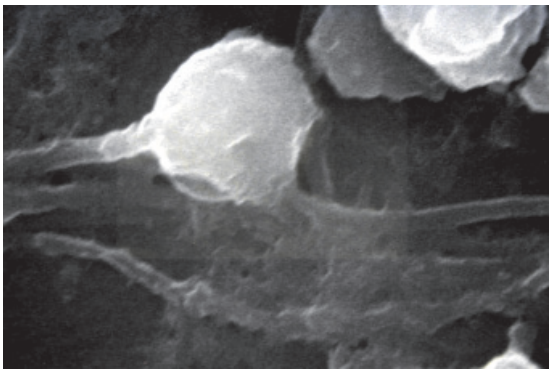

Fig. 7. Spermatozoon with spherical head. SEM x 4000

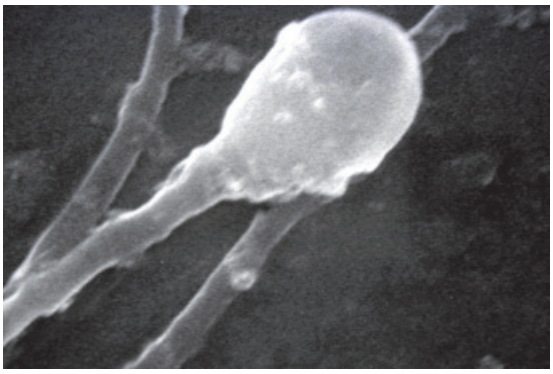

Fig. 8. Spermatozoon with inclusions on the surface of the head SEM x 10000

The question as to whether C. trachomatis infection leads to a reduction in semen quality has been difficult to answer until recently because the many studies ducted have often provided conflicting and confusing results.

The revealed by SEM abnormally changed forms of a significant part of spermatozoa, allows to side with the view that chlamydia, causing deformation of spermatozoa, may cause disturbances in sperm quality and contribute to infertility [10, 11, 13].

Conclusions

1. Chlamydia causes significant changes in the structure of spermatozoa.
2. The changes take place as in the heads, as well as in the tails; particularly diverse changes are found in the heads of spermatozoa.
3. Detected on the surface of spermatozoa discrete spherical formations correspond to chlamydiae in shape and size.

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Materials of Conferences

ULTRASTRUCTURAL CHANGES OF EXOCRINE PARENCHYMA IN EXPERIMENTAL PANCREATITIS

Andreeva S.D., Kirillovich A.S., Panfilov A.B.
FGBOU VPO «Vyatka State Agricultural Academy», Kirov, e-mail: a_s_d_16@bk.ru

Research purpose: to study in a dynamics (on the first, on the third, on the 7th are 14th days after an operation) the ultrastructural changes of pancreas of rats at experimental acute destructive pancreatitis and in number to estimate character of changes of exocrine parenchyma of pancreas of rats.

For research 40 not thoroughbred males of white rats served material by weight 180-200 g Experimental acute destructive pancreatitis reproduced by cooling of spleeny segment of pancreas of chlorethylium. For ultramicroscopic research the pieces of pancreas processed in obedience to the generally accepted methods and probed by the electronic microscope of JEM-100C (Japan). For the micrometric estimation of the functional state of acinocytes utilized analysis of images of Image Scope Color M (Leisa, Gmbx).

There was an edema of acinocytes at development of sharp destructive pancreatitis, kernels are dropsically and wrong form, have fine-grained chromatin which is localized on periphery. A nuclear-cytoplasm relation is increased on 6% as compared by intact animals. The granules of zymogene are diffusely dissipated in a protoplasm, have a high electronic closeness, their sizes was different. The mature granules of zymogene have the appearance of the dense rounded little bodies, along with them there are prezymogene and «light» immature granules. It testifies to the dystrophic processes, what be going on in acinocytes. The relative area of zymogene grains for certain is increased to 20,3% to the general area of cage. There is plenty of immature zymogene granules with a small diameter (19,3 ± 0,84 nm) and small area (393,0 ± 26,6 nm²).

It is set that at development sharp destructive pancreatitis takes a place a synchronization of secretary cycle with appearance of heterogenic acinocytes and diminishing of stake of zymogene granules, having insignificant sizes, their diameter makes 28,5 ± 1,56 nm, for intact rats – 42,6 ± 4,38 nm. Lytical destruction elements of parenchyma, accompanied an edema and necrosis of acini's cages that testifies to the decline of outside secretary function of organ and development of destructive defeats of pancreas.

The work is submitted to the International Scientific Conference «Priority areas of science, technology and engineering», Italy (Rome-Florence), 10-17 April 2012, came to the editorial office on 16.01.2012.

ACID PHOSPHATASE OF LEUKOCYTES – CYTOCHEMICAL TEST IN THE STUDY OF ACUTE DESTRUCTIVE PANCREATITIS

Andreeva S.D., Muhamatshina D.G., Mamarova M.A.
FGBOU VPO «Vyatka State Agricultural Academy», Kirov, e-mail: a_s_d_16@bk.ru

Inflammatory processes in the pancreas increase the permeability of cell membranes of acinar structures body, which causes an increase in enzyme levels in blood and urine, including acid phosphatase (AF). It formed in the endoplasmic reticulum of metabolically active cells, and includes a number of isoenzymes, with a common property – the ability to release phosphate from many alcoholic or phenolic phosphomonoaethyrof in acidic medium. We have performed cytochemical study using semi-quantitative method, which made it possible to identify changes in the content of AF in blood cells of rats with acute destructive pancreatitis (ADP).

In the experiment was used cryogenic model of acute pancreatitis. Experiments were set at 25 mongrel white male rats weighing 190-270 g (group 1). The second group ($n = 15$) consisted of animals that were subjected to median laparotomy and 1,5 – min exposure of splenical segment of the pancreas without influencing it chloraethilum. Control (intact) group consisted of 5 rats. AF was detected in the form of pellets red in the cytoplasm of neuthrophils and lymphocytes.

During the experiment the animals of experimental group with the development of acute destructive pancreatitis index content in neuthrophils of average cytochemical factor ranged from 0,99 ± 0,06 to 1,41 ± 0,09 ($p \leq 0,05$) and increased 2,1 times since the beginning of the experiment when compared with intact animals (0,66 ± 0,01). At laparotomy average cytochemical factor (CBFV) in granular white blood cells remained unchanged (0,42 ± 0,06), as well as at the beginning of the experiment (0,43 ± 0,12).

In the lymphocytes stained grain that signals the presence of acid phosphatase, located diffusely in the cytoplasm. In intact rats cytochemical factor was in average 0,18 ± 0,01. Since the beginning of the ADP (CBFV during the first day – 0,79 ± 0,1) increased 4,3 fold higher compared with intact animals, indicating an increase in phagocytes function and lysosomal activity agranulocytes. In animals with severe forms of development pancreatitis significantly risen in the cells of the blood content of acid phosphatase (a marker of lysosomal enzymes), reflecting a more pronounced and profound degree of destructive changes in the parenchyma of the pancreas prostate. Elevated AF in leukocytes indicates the metabolic activity and the ability of these cells for phagocytosis. The proposed technique

complements the classical cytochemical laboratory and immunological studies to identify cell surface markers and functional state of the organelles of blood cells in acute destructive pancreatitis.

The work is submitted to the International Scientific Conference «Modern Problems of Experimental and Clinical Medicine», Thailand, 20-28 February 2012, came to the editorial office on 13.01.2012.

ENDOTHELIAL DYSFUNCTIONS IN PATIENTS WITH DIABETIC ENCEPHALOPATHY

Parakhonsky A.P., Tertychnaja G.V.

Kuban medical institute, Regional hospital of veterans, Krasnodar, e-mail: para.path@mail.ru

Vascular endothelium damage is known as one of the major mechanisms in pathogenesis of chronic complications diabetes mellitus (DM). Encephalopathies of various genesis tend to be the most important problem of present medicine. Diabetic encephalopathy (DE) is commonly considered to be a variant of dyscirculatory encephalopathy. The indices of circulating desquamated endotheliocytes and endothelium-dependent vasodilatation (EDVD) of brachial artery were studied to detect the degree of endothelial dysfunction in patients with DE in comparison with patients that suffer from discirculatory encephalopathy of non-diabetic genesis. The aim of our study was to study differential peculiarities of EDVD in patients with diabetic and non-diabetic encephalopathy. EDVD was evaluated according to Celermayer-Sorensen's test. The study demonstrated, that dyscirculatory encephalopathy was followed by reliably significant ($P < 0,001$) decrease of EDVD rate (5,6 ± 0,21 %) as compared with controls (10,8 ± 0,51 %). In case of DE the rate of EDVD was more than two times decreased (4,9 ± 0,23 %) as compared with control rate ($P < 0,001$). EDVD was more affected in type 2 DM (4,5 ± 0,29 %, $P < 0,05$), than in type 1 (5,5 ± 0,31 %), that indicated more severe damage of vascular endothelium in case of non-insulin-dependent DM. It is necessary to mention, that changes of EDVD in DE were reliably more evident as compared with patients suffering from non-diabetic dyscirculatory encephalopathy (6,4 ± 0,29 %). This is explained, as we concluded, by the direct toxic influence of increased glucose concentration on vascular endothelial cells. This toxicity may lower the endothelium-dependent vasodilatation, elevate the vasoconstriction, and stimulate the hyperplasia of smooth muscles cells, lead to vascular remodeling and development of atherosclerosis. Endothelial cells line the entire circulatory system, from the heart to the smallest capillary. These cells reduce friction of the flow of blood allowing the fluid to be pumped further. Circulating endothelial cells might be used as a surrogate non-invasive marker for the study of vascular alterations. findings demonstrated, that endothelial desquamation was observed in the group of healthy individuals as well as in the group of patients, suffering from DE. In healthy individuals blood level of desquamated endotheliocytes accounted $3,2 \pm 0,36 \cdot 10^4$/l. In patients with stage I DE this index reached $12,8 \pm 0,64 \cdot 10^4$/l, stage II DE – $16,5 \pm 0,58 \cdot 10^4$/l, stage III DE – $19,2 \pm 0,71 \cdot 10^4$/l. Statistically significant changes were found between groups of patients with stage I and stage I DE ($P < 0,001$), and with stage II and stage III DE ($p < 0,01$). Consequently, the progression of DE was followed by proportional augmentation of the blood concentration of desquamated endothelioin cytes. The index of endotheliocytemia was reliably higher in type 2 DM as compared with type 1 diabetics ($P < 0,05$), that indicated more significant implication of vascular endothelium damages in the pathogenesis of non-insulin-dependent DM. The role of endothelial dysfunction in type 2 diabetes is more complicated than that for type 1. The effects of aging, hyperlipidemia, hypertension, and other factors add to the complexity of the problem.

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APPLICATION OF ENZYMES IN COMPLEX TREATMENT ODONTOGENIC INFECTIONS

Parakhonsky A.P., Sveshnikov G.G.

Kuban medical institute, Regional stomatologic polyclinic, Krasnodar, e-mail: para.path@mail.ru

Despite improvements in treatment of inflammatory diseases of the maxillofacial region, the problem of purulent infection continues to actual. Reduced effectiveness of antibiotics, delayed clearance of necrotic purulent cavities of the masses, which are a kind of barrier to the penetration of drugs into the inflammatory focus, dictate the necessity of finding new treatments for odontogenic inflammatory diseases. Of surgeons for a long time drew attention of idea of ability to influence a course of rebellious processes with biologically active pharmaceutical enzymes. The aim of the work was to study the histomorphological changes of the skin from underlying dermis using the drug «Wobenzym» and its influence on the healing of the wound. The material of our observations was the 35 patients with acute odontogenic purulent processes of the soft tissues of the maxillofacial area in age from 20 to 60 years (12 women, 23 men). Admission and in the dynamics of the disease were carried out clinical and laboratory research. Morphological study of skin exposed to the underlying dermis. In the initial period, sides and bottom of the wounds were presented purulent-necrotic masses, the thickness of which depended on the extent of tissue damage. Detritus was closely associated with develop-

ing granulation tissue. Lumen of blood vessels, the underlying tissues was extended, indicating that the congestion in the area of the inflammatory process, a constant output of neutrophils, macrophages, and fibrin. Along with an inflammatory erythema resulting at mikrotromboz due to the progression of inflammation, foci of necrosis were observed. In the area of diffusely infiltrated by neutrophils subcutaneous noted the presence of microabscesses and microphlegmon, which were isolated from the main defect of the wound and remained incomplete after surgical treatment. The use of «Vobenzim» led to the sequestration of necrotic foci of active soft tissue dissection and readjustment of micro abscesses and micro phlegmon, reducing infiltration and edema of the border areas and the elimination of secondary necrosis of soft tissues. According to pathological studies in the treatment of wounds shortened the period of purification for 2-3 days, compared with the control group. The use of «Vobenzim» eliminated major manifestations of acute inflammation in the wound at the time of its purification from necrotic masses and led to the wound cavity filled with granulation tissue at 4-5 days of treatment. Analysis of the individual dynamics of wound healing process with abscesses and purulent processes and comparison of these data show that regardless of the stage of wound healing, in which treatment is started, inflammation subsided under the influence «Vobenzim» is an average of 5 days of starting treatment, whereas in the comparison group to the same result occurs in 7-9 days or more. Filling the wound defect was carried out by young granulation, to be emanating from a more mature granulation tissue, which appeared in populations secreting glikozoaminoglikanes fibroblasts. Thus, the results indicate a high efficacy of systemic enzyme therapy.

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EAR OF THE RAT AS A MODEL IN INVESTIGATION OF INFLUENCE OF DIFFERENT DRUGS (PRO UNGUENTA) UPON THE SKIN IN BIOLOGY AND MEDICINE

Pavlovich E.R., Prosvirnin A.V., Naumov Y.I.

MBF of Pirogov Medical University, Institute experimental cardiology RCSPC and center of theoretical problems of physico-chemical pharmacology of RAS, Moscow, e-mail: erp114@rambler.ru

In many studies of medicinal activity of preparations on biological models a skin is used as an indicator for intradermal introduction of a medication. Thereby a skin from an animal's back or stomach is used. Such impact often requires a careful shaving of a local skin area that disturbs skin and stresses an animal. As an alternative model of studying intradermal impacts of medical and cosmetic agents we suggest studying ear skin of small laboratory rodents (rats, mice) that do not have that much hair on ears, compared to their back or stomach. Ear ski is relatively thin and is located over two surfaces that allows us to use one of them as a control. Besides, as an animal has two ears, we can receive another control organ or use it for another dose of the same agent as well as to study an impact of another preparation. In our work we used grown mature male rats of weight 250 grammes. The preparation was introduced as an ointment over one side of an ear. An animal was slaughtered under Nembutal narcosis, then an ear was removed and placed into 4% paraformaldehyde for no less than a day under the temperature of 4 °C. Spirituous conducting of material and its placing into epoxide gum Araldite was carried out as in our previous publication [Pavlovich, 2008]. A cutting of mid-thin cuts (thickness of 1 mkm) of a rat's ear perpendicularly to its surface. Cuts were colored by a water solution of toluidine blue. It was shown that in the control an ear consisted of two skin plates that were separated by a thin layer of fat. The skin was represented by a multilayer flat cornific epithelium and nearby connective tissue that was relatively undeveloped, compared to human skin. The skin had a lot of hair that was differently directed in relation to the ear surface. Cornific skin layer was displayed unevenly along the epidermis. Hair follicles were found in hypoderm and cut on different levels, and fat glands. Microvascular channel in the studied material was presented moderately. Possibilities to use ear skin of small rodents as on object of impact of medical preparations in pharmacology and toxicology (as ointments or solutions for cutaneous and intradermal introduction), and also in cosmetology are discussed. The model allows us to reveal and remove possible allergic reactions and pathological impact of some preparations over skin. Thereby, animals of different sex and age can be used that allows us to carry out correct pre-clinical studies of preparations and cosmetic agents.

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THE NECROTIZING ENTEROCOLITIS TREATMENT EXPERIENCE OF NEW-BORNERS WITH THE INCREASED INTRA-ABDOMINAL PRESSURE

Pisklakov A.V., Fedorov D.A., Novikov B.M.

Omsk State Medical Academy, Omsk Region Children's Clinical Hospital, Omsk, e-mail: Fedorov72@rambler.ru

Measuring of intraperitoneal pressure (IPP) among babies with necrotizing enterocolitis (NEC) in carried out in the clinic of children's surgery since 2007. Pressure monitoring was carried out

among 46 newborns, treated in Omsk regional children's clinical hospital (OCCH). Among those 15 with the 2nd, and 31 – with the 3rd and 4th stage if NEC. The measure of IPP among babies with the II stage of NEC was carried out in accordance with recommendations of Worldwide society of studying intraperitoneal hypertension (WSACS) through measuring pressure in bladder and stomach with a low-pressure monometer «Triton IiND 500/75» (Russia). For babies with the 3rd and the 4th stage of NEC that were treated with laparocentesis, we additionally used the direct method of measuring intraperitoneal pressure.

For all patients intraperitoneal pressure was measured every 4 hours. An IPP that exceeded 12 mm of mercury was considered pathological. In all cases indexes of IPP exceeded normal values and oscillated between 15 to 51 mm of mercury. All babies with the 2nd stage of NEC were treated conservatively. IPP within this group of patients equaled 20,1 ± 1,9 mm of mercury during the first day, 17,3 ± 2,1 mm of mercury on the second day, and reliably lower than 15 mm of mercury on the third day of treatment.

Four babies with the 3rd stage of NEC were treated conservatively. Constant direct intraperitoneal pressure monitoring and laparocentesis was implemented for them. During the first day of treatment IPP equaled an average of 22,3 ± 5,1 mm od mercury, on the second day, due to the treatment in lowered to 19,2 ± 4,1 mm of mercury, and on the third day in equaled 15,3 ± 2,6 mm of mercury. By this time their condition improved, bowels motor functions started to restore, intoxication symptoms decreased, peritonitis signs were removed.

From the group of patients with NEC whose IPP was monitored, 27 children were operated. 4 patients were with the 3rd stage of the pathology, and the rest 23 – NEC with a perforation of genitals. All babies were treated with laparocentesis and direct measure of IPP prior to surgery. Initial pressure among these patients exceeded a value of 40 mm of mercury and equaled an average of 45,3 ± 2,2 mm of mercury. During the preparations that didn't exceed 3 hours, IPP never lowered down to 30 mm of mercury at least. Of all operated children 11 died. Their IPP didn't come lower than 30 mm of mercury. Among the rest patients IPP decreased reliably.

From 2010 all children with the 2nd and higher stage of NEC are treated with caudal anaesthesia that decreases the time of removing NEC symptoms, including showings of intraperitoneal hypertension. Thus, of 5 babies with the 2nd stage of NEC who were treated in 2011, negative dynamics was never observed, and a decrease in IPP lower than 15 mm of mercury was registered on the second day after surgery.

So, we see a clear dependence of IPP value from the condition of pathological process in abdominal cavity, therefore opportune diagnostics and correct treatment, considering possible correction of intraperitoneal hypertension syndrome is the foundation for successful therapy under such conditions.

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THE ROLE OF CELLS OF MONOCYTES-MACROPHAGES SYSTEM IN PATHOGENESIS OF ENTEROVIRUSES INFECTION

[1,2]Plekhova N.G., [2]Somova L.M., [3]Sabynych V.A.

[1]Institute of Epidemiology and Microbiology, Siberian Branch of the Russian Academy of Medical Sciences, Vladivostok, e-mail: pl_nat@hotmail.com;
[2]Far Eastern Federal University, Vladivostok;
[3]Vladivostok State Medical University, Vladivostok

The *Picornaviridae* family includes RNA-containing viruses with diameters of 22–30 nm. The viruses of this family are exciters of acute infections, e.g., the poliovirus attacks the neurones of the spinal cord, Coxsackie viruses of group V infect the central nervous system, Type 71 enteroviruses cause conjunctivitis, and Echo viruses cause intestinal infections [5]. In the enteroviruses infection pathogenesis study the discovery of the reproductions viruses foci at initial period of the disease fall into important and for this moment to undecided question. The role of the mononuclear and macrophages systems cells in pathogenesis these of infection has an especial meaning, escalated fact of the ubiquitous spreading of these cells in organism of the person. It is known that integrins (glycoproteins, consisting of various combinations of α- and β-chains) are involved in the adhesion of different types of viruses, and these receptors are also present in the membranes of macrophages [4].

The primary breeding of enteroviruses occurs in the tissues of the respiratory and intestinal channels. This process ensues from a primary viral infection of the blood and there is evidence that the enteroviruses may be isolated from mononuclear cells of the peripheric blood of infected people [1, 2]. Based on the abovementioned facts, the purpose of the present research is to define the probability of adhesion and penetration of an enterovirus into resident macrophages.

Materials and methods of research. Vaccines of the poliovirus strain, enterovirus Type 71, the Karimov strain of Echo11, and a Coxsackie viral strain from group B1 that is virulent for newborn white mice were used for the infection of primary culture of macrophages. In our experiments, we used a supernatant virus-containing cultural liquid that contained no less than 5 units multiplicity of infection on macrophage for a Type 71 enterovirus, Echo11, and Coxsackie B1 and at a low 3 MOI for poliovirus. The contact of virus with cells was for 60 min and then unadsorbed viral particles were

washed thrice by serum-free RPMI and monolayer of cells was incubated to 4 days post infection (pi).

An estimate of the dynamic accumulation of viral antigens in cells by indirect method of fluorescent antibodies was used (iMFA). The cells were stained with indicated antibodies to viral proteins followed by Alexafluore 546 conjugated secondary antibodies. Slides were examined by a LSM-510META multiphoton confocal laser scanning microscope (Carl Zeiss, Germany). Alexa-488 immunostain was excited using 488 nm light from a Krypton-Argon laser and the Alexa-546 dye was excited.

The detection of virus RNA was performed with the help of PCR, using a test – system «Ampli Sens Enteroviruses». For quantitative identification of enteroviruses proteins in macrophages immunoenzyme test-system was used.

Electron Microscopy: The monolayer of macrophages was prefixed in 1% glutaraldehyde in 0,1 mol/L cacodylate buffer for 18 hours at room temperature, then was postfixed for one hour in 1% OsO_4 in same buffer, dehydrated in a graded series of ethanols and embedded in epon-araldite medium. Thin sections unstained or stained with lead citrate were examined in Jeol 100 S electron microscope.

Results of research and their discussion. The macrophages were detected with enterovirus of the cytoplasm after a 15-min post-infection. After that, the specific antigen was found out also and in perinuclear space of macrophage cytoplasm. The quantity of antigen-containing cells depended on the terms of incubation. Thus, after 1 h of joint incubation with enteroviruses, the quantity of antigen-containing cells ranged from 26,7 ± 3,5% (during infection with poliovirus) to 68,3 ± 4,6% (during infection with Coxsackie B1 virus) and, after 3 h, from 48,3 ± 2,8 to 39,0 ± 2,07% accordingly. Within 24 h, the quantity of the antigen-containing cells was reduced to 12,0 ± 1,6% (polioviruses) and 26,4 ± 1,7% (Coxsackie B1 virus); at the end of observation term (48 hours), they were not found.

The evaluation of the quantity of RNA and by the PCR methods and specific antigen proteins immunoenzyme test-system in macrophage cells during definite periods has revealed the presence of viral components. These results indicated on ability of enteroviruses in penetration in macrophages. The reproduction of virus was defined only in ECHO11 infection and the permission was revealed in Coxsackie B1 infection.

The morphological examination of the cell culture infected by enteroviruses revealed the features of the cytopathic action of this virus on macrophages. The activated cells with typical morphology (big nucleus and rounded cytoplasma) were observed after 1 hour post ECHO11 infection. The stimulation of cells absence was noted in poliovirus infection, and the cytopathic action this virus was defined at 18 hours post-infection. In this period, macrophages with karyorrhexis were detected.

During the study of macrophages infected by Type 71 enterovirus and Coxsackie B1 virus, it was detected that the viruses are capable of adhering to a macrophage surface within the first minutes of contact. During the initial stage of virus penetration the invagination of macrophagic plasmalemma was seen. The endocytoplasmatic vacuoles were formed after 15 min p.i. enterovirus type 71 and Coxsackie B1 infection (Figure, a). These vacuoles were identified as caveolae, as their diameters were 70–100 nm.

The adhesion of poliovirus to a macrophage surface was detected within the first minutes following the infection of the cellular culture (Figure, b). Later on, we observed the penetration of poliovirus into the cytoplasm of macrophages through caveolae, as well as by the local lysis of plasmolemma (Figure, c). Later on, in macrophages infected by this virus, the formation of numerous pseudopodia was observed.

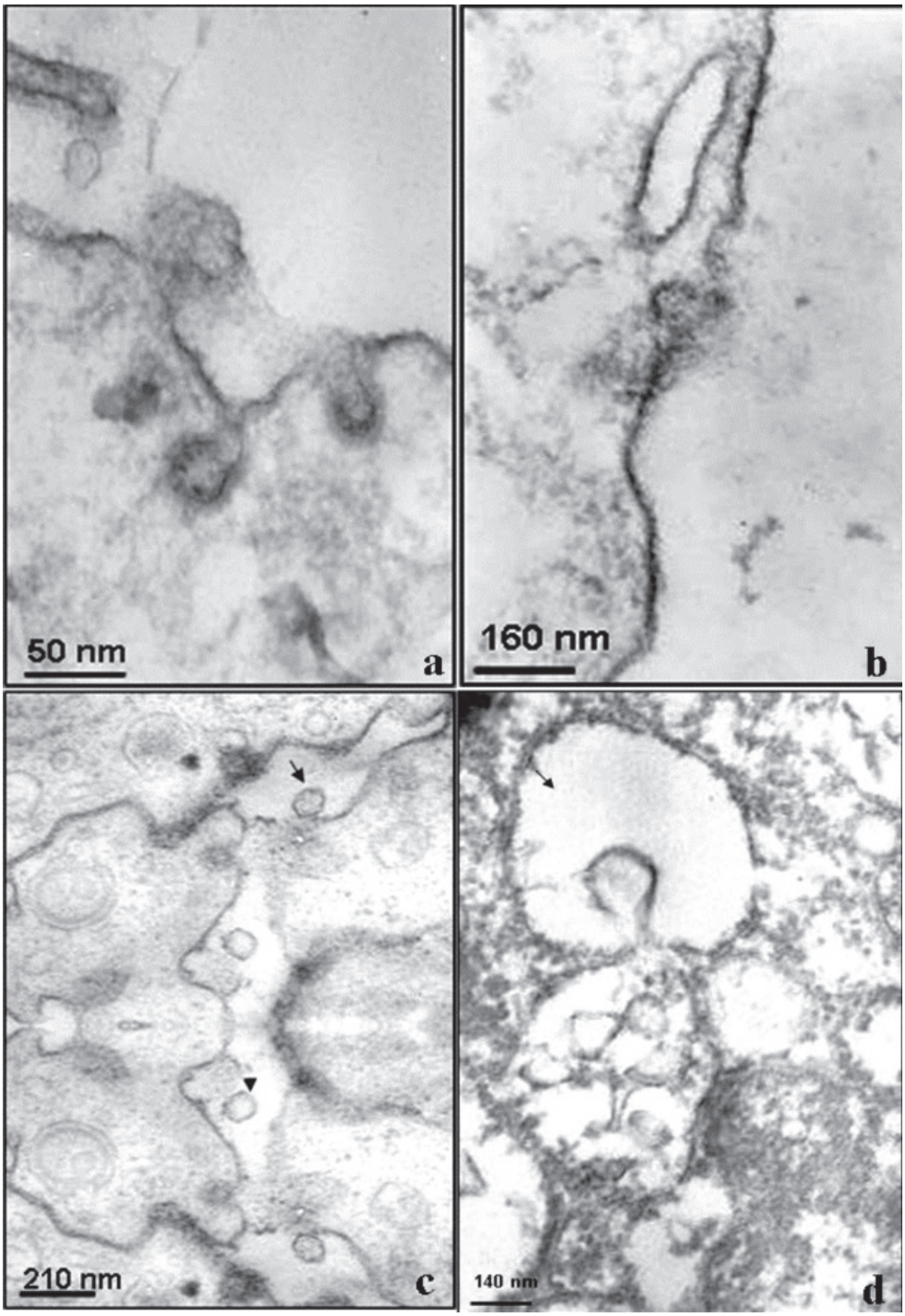
The Echo11 enterovirus enters into cytoplasm of macrophages through the local lysis of their plasmolemma. Aside the enterovirus Echo11 penetrated in macrophages by mechanism the formation of endocytic vacuoles that included viral particles after 15 min post-infection (Figure, d). It is necessary to note the presence of the specific activation of macrophages in response to infection by viruses Echo11; the formation on the surface of phagocytes of valve-shaped pseudopodia containing electron-dense granular actuations testifies to this.

The intracellular localization of virus Echo 11 and site of viral synthesis in macrophages were studied by using electron microscopy. The viral particles were observed within the cytoplasm and mainly were localized beside on the granular endoplasmic reticulum compartments and in the perinuclear region cytoplasm of infected cells. In this period the sizes of the viral particles nucleotides were increased, and thin capside was noted. After 4 hours post-infection, the formation of virus-inducted structures in perinuclear area of macrophages cytoplasm were observed. This is a lamellar structure and the concourses of multiple varied microfilaments: tubular and filaments. The filaments morphologically were differed on long filaments and ribonucleic thrends, which had mace-like bulge on the ends.

Together with appearance of virus-specific and virus-induction structures, the brightening of in cytoplasm peripheral in result transference of cell organelles in perinuclear area was fined in the macrophages in this time (4 h p.i.). Here the concourses of ribosomes, microfilaments and different vacuoles were determinated. Also the formation of phagosome-like structures and extended compartments of endoplasmic reticulum and increase of free ribosomes were fined in these cells.

The signs of cytoplasm desorganization in macrophages infected by poliovirus were noted after 5 h post-infection. This was expressed in appearance of the large vacuoles in result of merging

compartments endoplasmic reticulum. At the same time, in result des-aggregation and re-aggregation of membrane-including organelles formed the multilayers myelin-like structures occupied all cytoplasm of macrophages. In these cells the nucleus had sign of degradation: extended perinuclear area and fragmentation of chromatin. The outputs of newly formed viral particles in extracellular space were realized by way of separating on the phagocyte surface after 4 h post-infection.



The enterovirus enters into cytoplasm of macrophages:
a – the endocytoplasmatic vacuoles were formed after 15 min p.i. enterovirus type 71; b – the adhesion of poliovirus to a macrophage surface within the first minutes; c – the caveolae and enter of poliovirus by the local lysis of plasmolemma; d – the endocytic vacuoles after 15 min p.i. of Echo11

The adhesion on the macrophages surface and penetration with reproduction in this cells of enterovirus from virus-included liquid was determined by virological and morphological methods. The type of macrophages infection belongs to isolated system, because the activity of EV genome and reproduction of viruses were in cell cytoplasm. The present in macrophages of the product acute fatal infection were conducted by appearance in process of the reproductions full-function virus ECHO 11 with expressed cytopatic action on swine embryo kidney cells culture, also the formation of virus-specific and virus-induction organelles in cytoplasm toxically and mechanically caused cells destruction.

According to recent literature distinguishes 6 types of viruses to cells [3]: macropinocytosis, three types of endocytosis, with the formation of caveolae and similar last mechanism dependent on dynamin. The method used in this study allowed us to reveal tree difference routs of virus family *Picornoviridae* enter into macrophage, exclusive of macropinocytosis. Herewith the specific route of macrophages plasma membrane penetration was determined for each genus of its viruses.

ECHO11 virus and was able to traverse the lipid bilayer surrounding the macrophage, without killing the cell. Herewith EV penetrated inside of cell and disassembled itself in such. In result its genetic information and any associated enzymes remained intact and the viral RNA and associated enzymes were directed to the appropriate cellular compartment. Consequently, in the absence of denominated destructive changes mononuclear phagocytes can act as the long source of virus and take certain part in process of ECHO11 virus dissemination in enteroviruse infection.

Thus enteroviruses resists to monocytes/macrophages influence and capable to intracellular reproductions in them, overcoming, thereby, biological barrier, protecting from infection high-sensitivity cells of the central nervous system and parenchymatous organs and preventing spreading the agents from primary foci of infections.

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SEASONAL ALTERATIONS IN LYMPHOCYTE PHENOTYPE AMONG STUDENTS-SPORTSMEN WITH DIFFERENT LEVEL OF TRAINING IN DEPENDENCE ON SEX

Zaytseva I.

Yaroslavl state university of P.G. Demidov, Yaroslavl, e-mail: publicdp@uniyar.ac.ru

A condition of immune system is significantly affected by a number of indicators of a man's organism's reactivity, including sex and various factors of environment, including physical strain, their level, and season. However, no committed and systematic works in this direction have been carried out among students-sportsmen. Therefore, lymphocyte link of immunity has been studied among students-sportsmen depending on their level of training, sex, and season.

Lymphocyte phenotype (subpopulation of lymphocytes CD3, CD4, CD8, CD19) has been studied via indirect immune-luorescent method among 22 students-sportsmen who take sambo wrestling in novice group, 23 students who follow master programme, 18 female students who take basketball section following master programme, and 18 female students who take fitness-aerobics in a novice group. Blood for research has been taken in winter, summer, and autumn. The results have been processed via common methods of statistic analysis.

It has been found that, as a rule, a content of lymphocyte subpopulation among students-sportsmen did not depend on level of their sport qualification and sex. The exclusion was formed by male master students-sportsmen who showed higher numbers of lymphocytes CD3, CD4, CD19 than those among female novice sportsmen. The analysis of lymphocyte phenotype alterations among students-sportsmen of different qualification depending on season regarding sex showed us a reliable prevalence of number of CD3-lymphocytes among sambo masters in autumn, winter, and spring compared to the same indicators of novice sportsmen while no differences were registered between male groups according to cells CD4, CD8, CD19. The highest content of CD3-lymphocytes among novice sambo wrestlers was registered in autumn with the following reliable decrease in winter and especially spring; in summer the number of cells increased, however, it did not reach its initial autumn level. Similar data was received while studying the masters group, and it was supplemented by reliably

higher indicators of CD3-lymphocytes in winter, compared to spring and autumn ($p < 0,05$). The number of CD4 cells suffered seasonal alteration similar to CD3 cells in both groups of male sportsmen. No reliable seasonal alteration in number of CD8-lymphocytes among the sportsmen of both groups. The content of CD19 lymphocytes among novice sportsmen as well as among masters was reliably higher in autumn and decreased in winter and especially spring; a significant difference in higher autumn indexes compared to winter, autumn – to spring, autumn – to summer, winter – to spring. Lymphocyte phenotype among female sportsmen looked differently. Among basketball players of high qualification, compared to women who took fitness-aerobics a reliable increase in CD3-lymphocyte content was registered only in autumn, and CD19 – in autumn and winter. No difference was observed in content of CD4 and CD8 cells between both groups of women in different seasons of year. Among women novice the number of CD3 cells was significantly higher in autumn than in winter; other seasonal differences were unreliable in this group. Among basketball players of high qualification seasonal differences in content of CD3 lymphocytes were more expressed – their highest content was registered in autumn and winter with further reliable decrease in spring and staying at the same level in summer. A reliable difference in higher number of CD3 cells was registered in this group in autumn compared to spring, autumn – to summer, winter – to spring, winter – to summer ($p < 0,05$). Seasonal comparisons of indicators of cellular lymphocyte immunity in both women groups according to the data of CD4, CD8, CD19 cells did not show any statistically reliable differences. Statistical analysis in dependence on sex testified for reliably higher contents of CD3, CD4, CD8 –lymphocytes among male novice sportsmen and masters, compared to the same data of women groups that take novice fitness-aerobics classes and basketball as masters.

Thus, among students-sportsmen (both men and women), the most sensible to seasonal alterations is the index of content of CD3-lymphocytes. Their lowest number in spring defines the correction among students-sportsmen of both sexes and, first of all, novices, during the spring-summer period. The described alterations in their immune system should also be considered while carrying out training process among students-sportsmen with different level of sports training considering their sex.

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4D SEISMIC

Amirov K.M., Tusupbekova E.K., Portnov V.S., Tursunbayeva A.K., Maussymbayeva A.D.
The Karaganda state technical university, Karaganda e-mail: aliya_maussym@mail.ru

For successful implementation of the 4D seismic observations also contribute careful processing and tight integration of the subsurface disciplines. As the outcome time-lapse seismic was recognized as a powerful and effective technology for reservoir management.

Keywords: seismic observations, integration of the subsurface, time-lapse

Given paper is performed due to the double degree program realized between Karagandy State Technical University (Karagandy, Republic of Kazakhstan) and Politecnico di Torino (Turin, Italy).

According to Lumley et al., «4D seismic reservoir monitoring» is the process of repeating 3D seismic surveys over a reservoir in time-lapse mode to look for differences caused by production [1]. The changes is the principal effect that brings us a 4D seismic data, while monitoring hydrocarbons movement, fluid type in pores, and the effective pressure which is acting on a rock in combination with temperature increments affecting rock density. Moreover, taking into account seismic velocities changes, the method can predict fluid saturation and pressure changes in the reservoir.

New technologies are rapidly emerging helping to obtain optimal drainage of large reservoirs. In the past ten years, time-lapse (4D) seismic has evolved from an academic research topic to a standard way of monitoring reservoir performance, and seismic data are increasingly used as basic practice as reservoir management tool and to assist in field development planning. The use of time-lapse seismic data in conjunction with reservoir simulation models and well log data allow fluid changes within the reservoir to be qualitatively monitored. Time-lapse seismic might provide valuable information for identifying fluid movements, locating bypassed oil and well placement optimization to reduce uncertainties in reservoir development and production management.

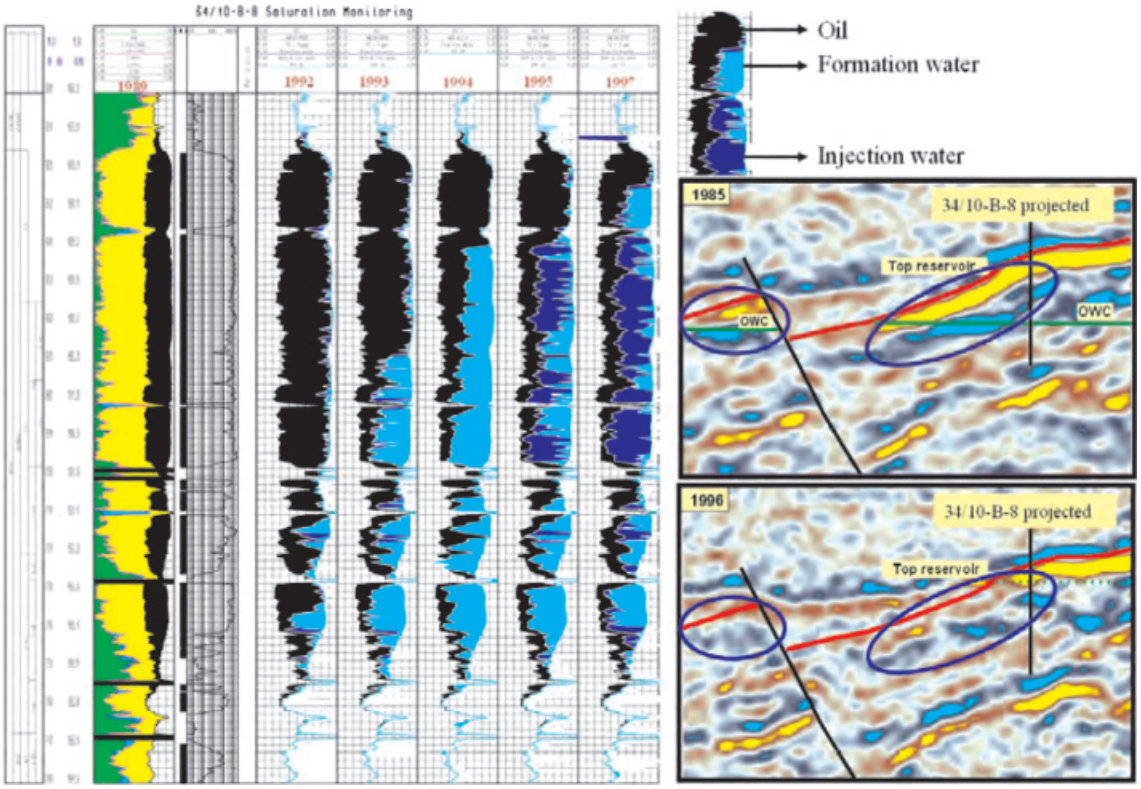
To understand this, let us review the seismic method, and then consider what advantages the time-lapse aspect of 4D seismic brings. In a single 3D seismic survey, seismic waves are generated by sources (dynamite, airguns, etc.) at or near the earth's surface or in the seawater. These generated seismic waves reflect off of subsurface seismic impedance contrasts, which are a function of rock and fluid compressibility, shear modulus and bulk density, and are recorded as they arrive back at the earth's surface. The recorded waves form the classic wiggle traces where high positive amplitude portions are often filled in on a black and white image enhance visual contrast and show lateral continuity. A processing workflow is then is applied to the recorded seismic signals to create 3D seismic images of the reservoir rock and fluid property (seismic impedance) contrasts. 4D seismic analysis simply involves repeating the 3D seismic surveys and analyzing images in time-lapse mode, to monitor time-varying fluid-flow processes during reservoir production. The main advantage of 4D approach is that the static properties of the reservoir remain unchanged and hence the differences between seismic parameters in time can be interpreted in terms of dynamic behavior of the field.

The first repeated 3D seismic surveys (known as 4D seismic now) were acquired in North Texas in 1982/1983 to monitor a combustion process around an injection well [2]. Due to the fact that this seismic study had been performed as the first in sui generis and it was ahead of its time the work results have not been approved economically. And now, nearly forty years after its first beginnings, 4D seismic monitoring is more and more recognizing as a proven technology. The technique has, at last, established itself as a valid and valuable reservoir management tool. By the words of Evans (2008) there are three main areas that will shape 4D's future – repeatability, quantifiable benefits and combined technologies [3]. If the industry solves those matters, and obviously they're interlinked, the market could be huge.

According to the heightened interest in 4D seismic the task of this work is to provide a review of recent applications of 4D seismic to different problems and in different regions. In particular the following issues have been analyzed:

1. Assessing zones of bypassed or undrained hydrocarbons;
2. Monitoring pressure change;
3. Monitoring fluid movement and assessing water injection sweep efficiency;
4. Monitoring geomechanical effects due to depletion and compaction within the reservoir (subsidence, sand production);
5. Assessing reservoir heterogeneities and lithologies.

As an example is provided seismic case study performed at Gullfaks oilfield in North Sea (Figure).



Calibrating time-lapse seismic interpretation with repeated saturation logs. A perfect match between the two data types can be observed. Consequently, time-lapse seismic data can with confidence be used to map the drainage pattern in between existing wells [4]

In this figure is presented time-lapse seismic interpretation with repeated saturation logs from Gullfaks field at which seismic study have been performed for assessing zones of remaining oil after water injection. On the right side of the figure is shown two seismic surveys acquired in 1985 and 1996. Observed changes in the seismic responses from the top reservoir and initial oil-water contact are marked with blue ellipses. The significant decrease in acoustic impedance was identified. On the left side is shown saturation logs acquired in 1992, 1993, 1994, 1995 and 1997. With a black colour is indicated fraction of the pores filled with oil, and blue colour means fraction of pores filled with water. Looking at the last two survey results in 1995 and 1997, we can observe that there is only remaining oil in the uppermost part of the reservoir. For full confidence was compared the seismic data acquired in 1996, and result was the same. The obtained data were the main source of information to build saturation maps that are then used as guidelines to drill infill wells and to perforate intervals with remaining oil. As the result were drilled 14 infill wells with estimated volumes corresponding to 56 million barrels [4].

In conclusion we can say that 4D seismic acquirement has a great contribution for optimizing reservoir management reflected in the following points:

- Optimizing well placement and reducing the risk of drilling into the swept areas of the reservoir;
- By means of seismic data interpretation providing information about the field reserves;
- Monitoring challenges induced by production and injection programs;
- Predicting future productivity of the reservoir by means of reservoir modeling.

It should be noted that for successful implementation of the 4D seismic observations also contribute careful processing and tight integration of the subsurface disciplines. As the outcome time-lapse seismic was recognized as a powerful and effective technology for reservoir management.

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BILATERAL ESTIMATES FOR PROBLEM OF TWO-PHASE FILTRATION OF NONCOMPRESSIBLEFLUID

Bukenov M.M., Portnov V.S., Jantassova D.D., Tursunbaeva A.K., Imanov M.O., Tatkeyeva G.G., Beiskhanova S.A.

The Karaganda state technical university, Karaganda, e-mail: aliya_maussym@mail.ru

Considering the using a method of fictitious area for the system of not evolutional type, which will be a model in filtering problem of two-phase incompressible fluid taking with capillary forces The received results allow simulating the processes of oil extraction with the use of production and forcing wells for water blockage of formation under test.

Keywords: two-phase filtration, processes of oil extraction

Let's consider the using a method of fictitious area for the system of not evolutional type, which will be a model for us in filtering problem of two-phase incompressible fluid taking with capillary forces.

Let D – a certain plain simply connected area with enough smooth interface. In the cylinder $D_T = \{D_x[0 < t \le T]\}$, with side surface $S = \{\gamma \times [0 < t \le T]\}$, there is being searched the solution of mixed Cauchy problem:

$$\begin{cases} \dfrac{\partial u_1}{\partial t} - \dfrac{\partial u_2}{\partial t} = div\left(k\lambda_1 gradu_1\right) + f_1; \\ -\dfrac{\partial u_1}{\partial t} + \dfrac{\partial u_2}{\partial t} = div\left(k\lambda_2 gradu_2\right) + f_2; \\ u_1(x,0) - u_2(x,0) = \psi(x), \quad x \in D, \quad u_{i/s} = 0, \ i = 1, 2. \end{cases} \tag{1}$$

In (1) $k = k(x) > 0, f_i = f_i(x, t), \lambda_i = \text{const} > 0$, and necessary for justification of the method of fictitious areas additional requirements for input data of the problem (1) will be specified in the process of explanation. First of all we mention that if

$$2R = u_1 - u_2,$$
$$P = \lambda_1 u_1 - \lambda_2 u_2 \tag{2}$$

The initial problem (1) is decomposed into two independent problems:

$$\text{div}(k\text{grand } P) + f_1 + f_2 = 0, \quad P_{|s} = 0 \tag{3}$$

and

$$\frac{\partial R}{\partial t} = div\left(k\frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}gradR\right) + \frac{\lambda_2 f_1 - \lambda_1 f_2}{2(\lambda_1+\lambda_2)},$$

$$2R(x, 0) = \psi(x), \quad R_{|s} = 0 \tag{4}$$

For all that the time t comes in the problem (3) as a parameter Therefore, justification of the method of fictitious areas at the differential level might be carried out for each of the problems (3), (4). Also, it is necessary to note that if in the initial problem (1) instead of uniform boundary condition of the first type there will be examined the uniform boundary condition of the second type, so instead of $P_{|s} = 0$ и $R_{|s} = 0$ in (3) and (4) accordingly we will have

$$\frac{\partial P}{\partial n_{|s}} = 0, \quad \frac{\partial R}{\partial n_{|s}} = 0. \tag{5}$$

For the problem (3), (4), if $k \in C\left(\bar{D}\right)$, $\psi \in \dot{W}_2^1(D)$, true estimates are:

$$\|P\|_{W_2^{2,1}(D_T)} \le C_1 \|f\|_{L_2(D_T)},$$
$$\|P\|_{W_2^{2,1}(D_T)} \le C_2\left(\|f\|_{L_2(D_T)} + \|\psi\|_{W_2^1(D)}\right). \tag{6}$$

In accordance with the method of fictitious areas, let's add the initial area D with a area D_1 up to the area $D_0 = D \cup D_1$, with boundary $\Gamma = \partial D_1 \cup \gamma$, $S^0 = \{\Gamma \times [0 < t \le T]\}$. In the compound area D_0 let's study additional problems:

$$div\left(k_\varepsilon gradP_\varepsilon\right) + f_1^\varepsilon + f_2^\varepsilon = 0, \ x \in D, \ \Delta P_\varepsilon = 0, \ x \in D_1;$$

$$P_\varepsilon = 0, \quad x \in S;$$

$$\frac{\partial R_\varepsilon}{\partial t} = div\left(k_\varepsilon \frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2} gradR_\varepsilon\right) + \frac{\lambda_2 f_1^\varepsilon - \lambda_1 f_2^\varepsilon}{2(\lambda_1+\lambda_2)}, \quad x \in D; \tag{7}$$

$$R_\varepsilon(x, 0) = 0{,}5\psi(x);$$

$$P_\varepsilon = 0, \quad x \in S^0;$$
$$\frac{\partial R_\varepsilon}{\partial t} - \Delta R_\varepsilon = 0; \qquad (8)$$
$$R_\varepsilon(x, 0) = 0, \quad x \in D_1;$$
$$R_\varepsilon(x, 0) = 0, \quad (x, t) \in S^0.$$

On the break curve S we lay down fitting conditions

$$[P_\varepsilon]_{|s} = 0, \ [R_\varepsilon]_{|s} = 0,$$
$$\frac{\partial R_\varepsilon}{\partial N_{|s^+}} = \frac{Q}{\varepsilon}\frac{\partial R_\varepsilon}{\partial n_{|s^-}}. \qquad (9)$$

$\varepsilon > 0$ – series expansion parameter, Q – parameter, possessing the value: $Q = 1$ or $Q = -1$,

$$k,\ f_i^\varepsilon = \begin{cases} k(x),\ f_i(x,t), x \in D \\ Q \cdot \varepsilon^\alpha, 0,\ x \in D_1 \end{cases} \qquad (10)$$

For the problem (3), (4) $\alpha < 0$, and for the same problems, but with boundary conditions (5) $\alpha > 0$. Through $\frac{\partial}{\partial N}$ the normal derivative has been represented. Further $[g]_{|s} = [g]_{|s^+} - [g]_{|s^-}$, and the signs of minus and plus mean that counterpart is a limiting value by the tending of x to γ inside or outside of D. The auxiliary problems (6)-(8) have the transparent physical sense. The absolute permeability is small ($\alpha > 0$) or big ($\alpha < 0$) depending on the type of boundary condition of the initial problem in fictitious area. As regards the input data in the fictitious area D_1, R is an analog of capillary pressure and that's why equality R to zero means that in the fictitious area there is not only displacing phase. The fitting condition in (6), (7) means that for the transfer through γ (γ – line of factors' break) phase pressures and phase rates are continuous.

For the solution of the problem (8)-(10), (7), (9), (10) the true estimates are:

$$\left\| R - \frac{1}{2}\left(R_\varepsilon^+ + R_\varepsilon^-\right) \right\|_{W_2^{2,1}(D_T)} \le C\varepsilon^2; \qquad (11)$$

$$\left\| P - \frac{1}{2}\left(P_\varepsilon^+ + P_\varepsilon^-\right) \right\|_{W_2^{2,0}(D_T)} \le C\varepsilon^2. \qquad (12)$$

Where P_ε^+ и P_ε^-, R_ε^+ и R_ε^- correspond to the solution of the problems (8)-(10), (7), (9), (10) by $Q = 1$ and $Q = -1$. Further the problem (8)-(10) is called the problem I, problem (7), (9), (10) – II.

Now the solution of the problem I we will search in the form of power series on the parameter ε, $\alpha = -1$.

Let $B_1 = \sum_{m=0}^{\infty} \varepsilon^m V_m$ в D_T, $B_2 = \sum_{m=1}^{\infty} \varepsilon^m V_m$ в D_T^1.

Where we put $D_T^1 = \{D_1 \times [0 < t \le T]\}$ formally in the problem I, so then we will get the system relatively to V_m and W_m:

$$\begin{cases} \frac{\partial V_0}{\partial t} = div\left(k\frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2} grad V_k\right) + \frac{\lambda_2 f_1 - \lambda_1 f_2}{2(\lambda_1+\lambda_2)}, (x,t) \in D_T \\ V_0(x,0) = \psi(x), \ x \in D \\ V_0 = 0, \ (x,t) \in S \end{cases} \qquad (13)$$

$$\begin{cases} \frac{\partial W_1}{\partial t} - \Delta W_1 = 0, \ (x,t) \in D_T^1 \\ W_1(x,0) = 0, \ x \in D_1 \\ \frac{\partial W_1}{\partial n} = q\frac{\partial V_0}{\partial n}, \ (x,t) \in S \\ W_1 = 0, \ (x,t) \in S^0 \end{cases}$$

By $m \le 1$

$$\begin{cases} \frac{\partial V_m}{\partial t} = div\left(k\frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2} grad V_m\right) + \frac{\lambda_2 f_1 - \lambda_1 f_2}{2(\lambda_1+\lambda_2)}, (x,t) \in D_T \\ V_m(x,0) = \psi(x), \ x \in D \\ V_m = W_m, \ (x,t) \in S \end{cases}$$

$$\begin{cases} \dfrac{\partial W_{m+1}}{\partial t} - \Delta W_{m+1} = 0, \ (x,t) \in D_T^1 \\ W_{m+1}(x,0) = 0, \ x \in D_1 \\ \dfrac{\partial W_{m+1}}{\partial n} = q \dfrac{\partial V_m}{\partial n}, \ (x,t) \in S \\ W_{m+1} = 0, \ (x,t) \in S^0 \end{cases}$$

Let's suppose that functions in (13) are met the conditions of $V_m \in W_2^{2,1}(D_T)$, $k = 0, 1, ...,$ $W_m \in W_2^{2,1}(D_T^1)$, $k = 1, 2, ...,$ so the following theorem is right.

Theorem 1. Let $f \in L_2(D_T)$, $\psi \in \dot{W}_2^1(D)$, so then ε_0 will be found this $0 < \varepsilon < \varepsilon_0$, that series B_1 and B_2 are absolutely converging in $W_2^1(D_T)$ and $W_2^1(D_T^1)$ and so correspondently the equalities are true:

$$\begin{aligned} R_\varepsilon &= B_1; \ (x,t) \in D_T; \\ R_\varepsilon &= B_2; \ (x,t) \in D_T^1. \end{aligned} \qquad (14)$$

Where R_ε – solution of the problem I.

Theorem proving. From the theory of uniform boundary problems and conditions of matching we have

$$\|W_m\|_{W_2^{2,1}(D_T^1)} \le C_1 \left\| \frac{\partial W_m}{\partial n} \right\|_{W_2^{\frac{1}{2},1}(s)} = C_1 \left\| \frac{\partial V_{m-1}}{\partial N} \right\|_{W_2^{\frac{1}{2},1}(s)} \le C_1 C_2 \|\partial V_{m-1}\|_{W_2^{2,1}(D_T)}, \qquad (15)$$

where constants C_1, C_2 depend on areas D, D_1 and factors of initial problem and don't depend on ε.

Applying the theory of trails in Sobolev spaces W_1^p

$$\|V_m\|_{W_2^{2,1}(D_T)} \le C_3 \|V_m\|_{W_2^{\frac{3}{2},1}(s)} = C_3 \|W_m\|_{W_2^{\frac{3}{2},1}(s)} \le C_3 C_4 \|W_{m-1}\|_{W_2^{2,1}(D_T^1)}.$$

Then from (6) and (15) it follows

$$\|V_m\|_{W_2^{2,1}(D_T)} \le C_5 \|V_{m-1}\|_{W_2^{2,1}(D_T)}, \ m \ge 1;$$

$$\|V_0\|_{W_2^{2,1}(D_T)} \le C \left(\|f\|_{L_2(D_T)} + \|\psi\|_{W_2^1(D)} \right), \qquad (16)$$

where $C_5 = C_1 \cdot C_2 \cdot C_3 \cdot C_4$.

Let $\varepsilon < \varepsilon_0 = C_5^{-1}$, thenseries$B_1$is absolutely converging in $W_2^{2,1}(D_T)$. For getting equalities (14) we multiply (13) by ε^m and sum on m, we have:

$$\begin{aligned} LB_1 &= f, \ (x,t) \in D_T; \\ S_1(x,0) &= \psi(x); \\ B_1 &= B_2, \ (x,t) \in S; \\ \frac{\partial B_1}{\partial t} - \Delta B_2 &= 0, \ (x,t) \in D_T^1; \\ \frac{\partial B_2}{\partial n} &= Q\varepsilon \frac{\partial B_1}{\partial N}, \ (x,t) \in S; \\ B_2(x,0) &= 0, \ x \in D_1; \\ B_2(x,t) &= 0, \ (x,t) \in S_T^0. \end{aligned} \qquad (17)$$

L – operator in the left part (13)

Si it follows that $R_\varepsilon = B_1$ in D_T, $R_\varepsilon = B_2$ in D_T^1 by $0 < \varepsilon < \varepsilon_0$.

From the theorem it follows unique existence of the solution of the additional problems (13), and the estimates are:

$$\left\| R - R_\varepsilon^+ \right\|_{W_2^{2,1}(D_T)} \le C_6 \varepsilon \left(\|f\|_{L_2(D_T)} + \|\psi\|_{W_2^1(D)} \right);$$

$$\left\| R - R_\varepsilon^- \right\|_{W_2^{2,1}(D_T)} \le C_6' \varepsilon \left(\|f\|_{L_2(D_T)} + \|\psi\|_{W_2^1(D)} \right) ... (18)$$

Here it is $R_\varepsilon^+ = R_\varepsilon$ by $Q = 1$, $R_\varepsilon^- = R_\varepsilon$ by $Q = -1$, from absolute convergence of the series B_1 and B_2 it follows (11), let's bring it.

Theorem 2. If $0 < \varepsilon < \varepsilon_0$, so then the estimates are true

$$\left\| R - \frac{1}{2}\left(R_\varepsilon^+ + R_\varepsilon^- \right) \right\|_{W_2^{2,1}(D_T)} \le C_7 \varepsilon^2 \left(\|f\|_{L_2(D_T)} + \|\psi\|_{W_2^1(D)} \right). \qquad (19)$$

Where R – solution (4), R_ε^+, – solution (8) by $Q = 1$ and $Q = -1$, correspondently.

Theorem proving. From the theorem 1it follows the following expansion:

$$\begin{aligned} R_\varepsilon^+ &= \sum_{m=0}^{\infty} \varepsilon^m V_m^+, \ (x,t) \in D_T; \\ R_\varepsilon^+ &= \sum_{m=1}^{\infty} \varepsilon^m W_m^+, \ (x,t) \in D_T^1. \end{aligned} \qquad (20)$$

Here it is V_m^+, W_m^+ – solution (13) by $Q = 1$.

Applying the theorem 1 for R_ε^- it is true:

$$\begin{aligned} R_\varepsilon^- &= \sum_{m=0}^{\infty} \varepsilon^m V_m^-, \ (x,t) \in D_T; \\ R_\varepsilon^- &= \sum_{m=1}^{\infty} \varepsilon^m W_m^-, \ (x,t) \in D_T^1. \end{aligned} \qquad (21)$$

Here it is V_m^-, W_m^- – solution (13) by $Q = -1$, it is easy to see that $V_0^+ \equiv V_0^- \equiv R$ – solutions (4).

Let $\bar{W}_1 = W_1^+ + W_1^-$, so the function $\bar{W}_1$ satisfies the following problem:

$$\frac{\partial \bar{W}_1}{\partial t} - \Delta \bar{W}_1 = 0, \ (x,t) \in D_T^1;$$

$$\frac{\partial \bar{W}_1}{\partial n}_1 = 0, \ (x,t) \in S;$$

$$\bar{W}_1(x,0) = 0, \ (x,t) \in D_1;$$

$$\bar{W}_1 = 0, \ (x,t) \in S_T^0.$$

So from this we have

$$\bar{W}_1 = 0 \quad \text{or} \quad W_1^+ = -W_1^-.$$

Let's suppose that

$$\bar{V}_1 = V_1^+ + V_1^-,$$

so then the function $\bar{V}_1$ is the solution of the following problem:

$$L\bar{V}_1 = 0, \ (x,t) \in D_T;$$

$$\bar{V}_1(x,0) = 0, \ x \in D;$$

$$\bar{V}_1(x,t) = 0, \ (x,t) \in S.$$

From this we have

$$\bar{V}_1 = 0, \text{ then } V_1^+ = -V_1^-.$$

Even it supposes that

$$\bar{W}_2 = W_2^+ - W_2^-, \quad \bar{V}_2 = V_2^+ - V_2^-,$$

we will get

$$W_2^+ = W_2^-, \ V_2^+ = V_2^-.$$

Continuing this process by $m \geq 2$ we have:

$V_m^+ = V_m^-$, if m – even $V_m^+ = -V_m^-$, if m – uneven (22)

The from (21), using (19), (20), we will get in D_T

$$R_\varepsilon^+ = R + \varepsilon V_1^+ + \varepsilon^2 V_2^+ + \ldots;$$

$$R_\varepsilon^- = R - \varepsilon V_1^- + \varepsilon^2 V_2^- - \ldots \qquad (23)$$

Using the expansion (22) and estimates (17) we have come to (11):

$$\left\| R - \frac{1}{2}\left(R_\varepsilon^+ + R_\varepsilon^-\right) \right\| \leq \varepsilon^2 \left\| V_2^+ + \varepsilon^2 V_4^+ + \ldots \right\|_{W_2^{2,1}(D_T)} \leq C_8 \varepsilon^2 \left\| V_0^+ \right\|_{W_2^{2,1}(D_T)} \leq$$

$$\leq C_9 \varepsilon^2 \left(\|f\|_{L_2(D_T)} + \|\psi\|_{W_2^1(D_T)} \right).$$

Estimate (12) is got in much the same way.

Accuracy of received bilateral approximation in this case is limited by the estimate (11), (12). If only to get bilateral estimates R, P, with specified accuracy ε^p, we will use the idea of Richardson extrapolation.

Let's make extrapolated solutions $U_p^\pm$, being a linear combination $R_{\varepsilon_m}^\pm$, with some weight:

$$U_p^+ = \sum_{m=1}^{p} \beta_m R_{\varepsilon_m}^+;$$

$$U_p^- = \sum_{m=1}^{p} \beta_m R_{\varepsilon_m}^-, \ (x,t) \in D_T. \qquad (24)$$

Concrete view off coefficients β_m depends on choice of sequence $\varepsilon > \varepsilon_1 > \ldots > \varepsilon_p > 0$ and accuracy figure p. The more spread choice is:

$$\varepsilon_m = \frac{\varepsilon}{m}, \quad m = 1, \ldots, p. \qquad (25)$$

By which coefficients β_m are in the explicit form

$$\beta_m = \frac{(-1)^{p-m} m^p}{m!(p-m)!}, \quad m = 1, \ldots, p. \qquad (26)$$

And it satisfies the conditions

$$\sum_{m=1}^{p} \beta_m = 1;$$

$$\sum_{m=1}^{p} \frac{\beta_m}{m_j} = 0, \quad j = 1, \ldots, p-1.$$

By this way of the task ε_m, β_m we find that

$$U_p^+ = \sum_{m=1}^{p} \beta_m R_{\varepsilon_m}^+ = \sum_{m=1}^{p} \beta_m R + \sum_{m=1}^{p-1} \sum_{j=1}^{p} \beta_j \left(\frac{\varepsilon}{j}\right) V_m^+ + \sum_{m=1}^{p} \beta_m \left(\frac{\varepsilon}{m}\right)^p V_p^+ +$$

$$+ O\left(\varepsilon^{p+1}\right) = R \sum_{m=1}^{p} \beta_m + \sum_{m=1}^{p-1} \varepsilon^m V_m^+ \sum_{j=1}^{p} \beta_j \left(\frac{1}{j}\right)^m + \varepsilon^p V_p^+ \cdot \sum_{j=1}^{p} \beta_j \left(\frac{1}{j}\right)^m V_p^+ +$$

$$+ O\left(\varepsilon^{p+1}\right) = R + C_{10} \varepsilon^p V_p^+ + O\left(\varepsilon^{p+1}\right),$$

where $C_{10} = \sum_{j=1}^{p} \beta_j \left(\frac{1}{j}\right)^p$.

In much the same way it is

$$U_p^- = R - C_{10}\varepsilon^p V_p^+ + O\left(\varepsilon^{p+1}\right).$$

Let p – uneven, then $V_p^+ = -V_p^-$ and, it means,

$$U_p^+ = R + C_{10}\varepsilon^p V_p^+ + O\left(\varepsilon^{p+1}\right);$$
$$U_p^+ = R - C_{10}\varepsilon^p + O\left(\varepsilon^{p+1}\right). \quad (27)$$

With the help of this statement the theorem has been proved.

Theorem 3. Let $f \in L_2(D_T)$, R – solution (4), $R_\varepsilon^+, R_\varepsilon^-$ – solution (8) corresponds the choice $Q = 1$ и $Q = -1$. So then for all $(x, t) \in D_T$ and $0 < \varepsilon < \varepsilon_0$ it has a place the asymptotic point wise bilateral inequality:

$$O\left(\varepsilon^{p+1}\right) + \min\left\{U_p^+, U_p\right\} \le R \le \max\left\{U_p^+, U_p^-\right\} + O\left(\varepsilon^{p+1}\right). \quad (28)$$

Where p – uneven, and U_p^+, U_p^- are defined on the formula (26).

The same estimates are received for the function P, and power (2) for the functions u_1, u_2.

The received results allow simulating the processes of oil extraction with the use of production and forcing wells for water blockage of formation under test.

Materials of Conferences

FORMATION OF SYSTEM OF GEO-ECOLOGICAL STUDYING FOR ENVIRONMENTAL MANAGEMENT AND ECOLOGICAL SAFETY

Kopylov I.S.

Natural-science institute of the Perm state national research university, Perm, e-mail: georif@yandex.ru

The modern concept of environmental management and ecology assumes an effective utilization of natural resources at preservation of ecological balance and possibilities of restoration of natural resource potential. Their necessary condition is the information support realized within the limits of geo-ecological researches. The basic methodological problem is cartographical modeling of a condition of natural geological environment. The scheme of formation of system of geo-ecological researches consists of four blocks – subsystems which are also stages of its formation.

1. Formation of an information database on methods and objects. The basic methods are: geodynamic, geochemical, engineering-geological, hydro-geological, space geological, geomorphological, geophysical. The basic objects of studying – a lithosphere, a relief, landscapes, soils, hydrosphere, atmosphere, phytosphere, a technosphere.

2. The system analysis of a condition of geo-ecological conditions – geodynamic, geochemical, engineering-geological, hydro-geological, neotectonic, geomorphological, landscape, geophysical, medical-geological analyses.

3. Formation of geo-ecological information-cartographical model with application of geoinformation technologies: geo-ecological mapping; working out of criteria of an estimation of a condition of natural geological environment, division into districts and ranging of ecological conditions. A definitive variant of a geo-ecological map – three-sheet: a geo-ecological map card (on a landscape, geodynamic and geochemical basis), hydro- geo-ecological a map (on a hydro-geological and hydro-chemical basis) and a map of an ecological estimation of a condition of natural geological environment (on the basis of system of ecological norms on 4 classes: norm, risk, crisis, disaster).

4. Geo-ecological monitoring and mapping of a condition of natural geological environment for the purpose of the forecast of change of the geo-ecological conditions, dangerous processes and zones with the raised socially-ecological risk of probability of occurrence of emergency situations of natural and technogenic character and man-made disasters.

Finally all system is directed on main objective performance – geoinformation support by the spatial geo-ecological data for steady and safe development of territories and their environmental management.

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GLOBALIZATION AND REGIONALIZATION AS INTERACTION OF FORMAL AND INFORMAL INSTITUTIONS

Osik Y., Davletbaeva N.B.
Karaganda State Technical University, Karaganda, e-mail: marat3011@mail.ru

Gardener can decide what is good for carrots, but no one can decide for others what is good
Jean Sartre

In the lecture devoted to memory of Alfred Nobel, J. Stigler noted that the main task of empirical science of the economy – to give a general understanding of the events that take place in the world, and absolutely all its ideas and methods should be subordinated to this task. But this is not the same thing as saying that it must be responsive to contemporary conditions and problems of society, in which it is studying.

If the economic problems were varied and often dramatic, and were largely continuous in nature, then economics as a science would not have arisen. An important part of science is a general increase in knowledge. And this general pattern of growth would not have arisen if each generation of economists would be at fundamentally new challenges that require entirely new approaches [1]. One of the fundamental problems of economic theory is the focus of socio-economic dynamics and understanding of its driving force. In light of this methodological send us another attempt to consider processes for several decades, attracted the attention of the world's scientific and, in particular, economic thought – globalization and localization.

The subject of numerous scientific discussions ratio of globalization and regionalization emerged in the late XX – early XXI centuries. There is a point of view, justifying the main idea: globalization and regionalization – parts of one whole, and developing in parallel, mutually reinforcing. Many of the arguments and the other position – between these two processes there are serious contradictions. A third, compromise view expressed well-known formula: «Think globally but act locally». This approach makes it necessary to consider the thoroughness of these phenomena and processes such as conjugation and, very importantly, as politically motivated. It is getting obvious: the more globalization, the more important local specific is.

To refer to this dual process R. Robertson entered the name of «glocalization», which is defined as the transformation of the economic component of globalization on the local level. He argues that global and local trends «ultimately complementary and interpenetrate each other, although in specific situations may come into conflict» [2].

From the work of most researchers, it follows that the leading role in the process of glocalization is the interaction of economic and cultural component, and the role of the state decreases. We believe that it is appropriate to consider regulating and self-regulatory components of the process of glocalization. Culture and the resulting economic (market) factors can be attributed to the self-regulatory components, and public policy is as a regulatory component. Their attitude is treated uniquely, and is of interest of scientific interest.

In the previous operating conditions of autonomous, largely self-sufficient national economy (without defining the influence of a foreign environment) of the cultural and economic factors have historically harmonized: they complement each other, and bring them to a state of congruence is not required. In today's globalized export of new economic institutions have not always agreed with the functioning of cultural institutions violates the previously established harmonious relations. And in each case it happens in different ways.

On this basis, we believe that the processes occurring in the EEC (European Parliament and Euro currency appearance, etc.) improperly compared with the processes of integration in the post due to differences in the dynamics of economic and cultural components. In Europe, these processes are manifested in the leveling of the level of national economies in general, and most important macroeconomic indicators, in particular. Post-Soviet space is preserved or even enhanced the differentiation of these characteristics. In Europe, this stability is preserved under the existing cultural institutions. In several CIS countries undergoing radical change «Soviet» cultural institutions up to the destruction and restoration of a centuries-old «pre-Soviet» institutional controls.

Today the systematic study of glocalization is limited to two issues:

a) the level of stability and strength of cultural identity, as a consequence of the penetration of global brands in local markets;

b) the institutions of transnational governance, created in the process of mutual integration of the economies of various countries.

These problems are studied primarily in practical terms, that is, short-term responsive-

ness to contemporary conditions and problems of society. Economic aspects of glocalization do not receive adequate coverage in the context of the relationship with the vector of development of society and its social (formal and informal) structures. Thus, the emphasis is more on results and consequences of glocalization [3], and less on the creation of theoretical bases of this process and the establishment of its system «embeddedness» in the structure of society as a whole, and most importantly – in the definition of glocalization by the vector of social development.

For fairness's sake it should be noted that the study of problems of globalization are not limited to these two areas, but it attempts to trace cross-disciplinary consistency, interconnection, structural hierarchy of elements has little effect in the scientific literature. It seems that the theoretical aspects of glocalization, including philosophical, are no less interesting and relevant than the analysis of factual material.

So, glocalization changing our ideas about the relation of spatial representations and national boundaries, changes and vectors of economic development.

In the formation of ideas about space people come a long way from the perception of the territory of their residence, in particular the national territory, in the exceptional quality as the center of the universe, to the consciousness of it as not coming out of the total number of these, its neighboring worlds. (The isolation of the former Soviet Union from the rest of the world, especially from non-totalitarian, free states, led to the fact that own national-centric view of «post-Soviet» people persisted much longer than in democratic countries – until recently. The economy has been subject to policy, which represented the top of the hierarchy of socio-economic relations, including culture. Such radicalism outlook then was moved to free-market ideas, transformed now in the idealization and the inevitability of globalization.

Information boom and the emergence of new media, for whom national borders are no longer an obstacle, leading to a change in our understanding of the relationship between space and national boundaries. It turned out that space, being an objective reality that exists independently of the will of one person, group of people or even the whole state. Since the period of isolation was replaced by a global process of internationalization, which has resulted in a peculiar compression of space. Therefore, based on the ordinary view of globalization, as a rule, is the notion of uniting and integrating terrestrial civilization, covering its expansion in all terrestrial and near-Earth space and overcomes the effect of the various boundaries of cultures, nations, social and economic inequalities, as well as the distance in a purely physical sense.

Ideas of modernization and Westernization in non-Western societies are faced with cultural resistance and its differentiation: new values, from place to place, are perceived differently and ambiguously: on the categorical exclusion and rejection (Japan XVI-XIX cc.), To unconditional imitation (Turkey began in XX century.). The examples could be gone on, but for us the main question is about the root causes another divergence and differentiation of space.

Given that the influence on economic development is difficult to find a more powerful factors in contemporary culture than ethnic and religious factors in the border areas of economic science have been put forward two related propositions.

1. Institutional economics has resulted in strong evidence in favor of recognizing the primacy of culture over the market, the primacy of informal institutions to the formal. In other words, the economy is not governed by the market and supply and demand are derived from the organizational culture in the broadest sense (at the micro-, meso-, and macro-level social structures), and to a large extent – the derivatives of the complex religious and ethnic institutions.

2. Different socio-cultural systems (SCS) socio-economic development in general and economic development, in particular, has not received an unambiguous interpretation for the foreseeable future is unlikely to get it. Of the diversity and ambiguity of the existing SCS (different authors in different ways to differentiate: the East and West to the more detailed division into 8 SKS) West is the undisputed leader in the reflection on the historical changes and the expansion of their opinions and judgments on the rest of the world. The rest of the world continues to live and develop on its own internal laws, and the economy in varying degrees of trying to develop the western scenario. As noted in a monograph by M.N. Abisheva [4], it is important to understand that the western SCS – only one of the eight existing ones, has its own logic of development, the laws of the organization of space, time, society and economy that can not be extrapolated and other SCS. Single and comprehensive indicators of organizational culture in general, and ethnic and religious institutional controls, in particular, to date, can not offer an alternative to these specific indicators such as GDP per capita and HDI. But they can serve as a definition of magnitude difference of one SKS, and hence the socio-economic system from another. For the sustainable development of the mentioned systems may be more important than the identification of specific quantifiable

indicators. In economics known phenomenon of irrational behavior of agents of economic activity, but it is mostly limited to the consideration of induced consumption, which in general is investigated abstracted. Only in terms of national, ethnic and religious identity of these abstractions take shape.

Speeding up of globalization, its expansion, could radically change the socio-economic development. And last but not least because of the increasing localization, as the opposition, resistance to globalization. Since the localization of social structures is largely ethnic and religious components, general economic role of government is seen as the future strategic management of ethnic and religious institutions. Taking into account the recurrence of the processes occurring in the universe, and economic processes, in particular, one can assume that the processes of glocalization also have a cyclical nature. The task of national governments is to smooth the high amplitude vibrations in the direction of both globalization and localization.

The existing experience shows that the dominance of globalization has led to the creation of world economic expansionist structures with clearly expressed hierarchy of relations of type «commanding center» – the executive periphery [5]. The author referred to the monograph on problems of economic expansion B.N. Shaptalov says that regardless of the difference between treatments in the literature structures «center – periphery» in the global balance of forces due to the objectives of the study, the degree of coverage of the materials involved and the subjectivity of scientists, the existence of these structures – the objective reality and tool for creating two-tier world is the expansion. Expansionary economic center (EEcC), he regards as an investment controller, including the creation and distribution of world technological know-how. If a certain State has been able to fulfill this role, then it began to willingly cooperate those economic subjects who felt the need in its development, but did not have to do the right opportunities. Thus, the economic center was the impetus for the development of regional and conductor, and in case of sufficient power and global economic and innovative processes.

The state that claims to be the creator of the EEcC should have:

a) a strong non-oil export industry, nature;

b) the ability to initiate the creation of new technologies) to have under his control the financial system with the established mechanisms of reproduction and distribution of capital on an international scale;

c) have energy and organizational culture that is sufficient for long targeted expansion [5].

In the economic structure of the expansionist «center – periphery» (EEcC) is divided into four areas: EEcC (creators, owners), allies, satellites, and peripherals.

The first sphere – EEcC – represents an active and powerful state or alliance, defining standards of development, consumption and activity in other states and nations. By the force of impact EEcC divided into global and regional. The global EEcC include the U.S., EU and Far Eastern State. They account for the vast majority of venture development, manufacturing technically demanding high-tech products, international investment capital.

Note that the above mentioned author is not identified yet another dynamic EEcC in the face of China, which is holding sufficient regardless of the states, which he called the Far East, in recent decades, successfully competing for influence with the first two of the above points, including in their territories as well as providing training to the introduction of the national currency – the yuan – as a regional currency in South-East Asia.

On the role of regional leaders claimed in Asia – India and Brazil, Africa – South Africa.

The scope of the Allies are States fully share the expansionist ideology, lifestyle, foreign policy, having involved in the system EEcC economy on mutually beneficial terms. B.N. Shaptalov says that the Allies were separated and the culture of EEC.

We are confident that we can talk only about the individual elements of economic culture in the narrow sense of the word, not the organizational culture, and even less about the culture as a whole. Numerous facts indicate that culture, even within individual states that make up the collective EEcC – EEC (European Economic Community) differ significantly (Bavaria and the northern lands of Germany, north and south of Italy, etc.), not to mention the differences in manifestations of national cultures in the multiethnic and multinational organizations (G. Hofstede's research, performed by the example of IBM). Allies are in a positive depending on the center may be as capacity-building its own expansionist and development of methods for expansion to seize the initiative and come to the fore (Japan, South Korea, Taiwan).

Satellites include the countries included in the EEC system, are not subject to rules allies. Their systems are intrinsically alien to the EEcC and the political orientation can be objectively it is competitive, and maybe the same. At the same time they are needed EETS as a convenient tool in the fight against other players – expansionists.

K satellites imposed strict requirements:

a) opening the domestic market for foreign market players EEcC;

b) privatization of public sector and decentralization of the banking system (in the aggregate – the rejection of Keynesianism, which should, according to the IMF and World Bank is the prerogative of only the host countries);

c) the shift from import substitution policies for inclusion in the global division of labor in accordance with established market relations.

Relatively favorable (especially in the short and medium term) the position of satellites comes in when the hosts EEcC forge production and marketing of raw materials at favorable terms to both parties, which entails raising the standard of living and quality of economic management. But the position of the satellites is different from that of the Allies, that the latter, as EEcC, are not interested in the full development of productive forces.

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THE STRUCTURE OF MAKING A DECISION

Topchiy A.V., Trusova T.V.
South-Russia State University of Economics and Service, Shakhty, Rostov region, e-mail: trusovatv@mail.ru

In this article the author studies the process of making a decision, its construction, and generating the most optimal structure of this process that is convenient for its schematic construction and allows us to approach the improvement or creation of decision-making technologies in a more convenient way. The suggested structure can serve as a basis for young specialists who operate in various fields and directions while formatting or developing their own principles and technologies of decision-making.

Keywords: structure, process of making a decision

Making a decision is one of the most important and commonly-spread processes. It plays significant role in a man's life. Every day people have to make one or another decision, so it is one of the main components of a man's life circle, as, however of life of any organism. It is conditioned by the nature of decision-making that is in desire to carry out an action, aimed for achieving some goal.

Technologies of making decisions began to emerge practically with the very foundation of human society. But, at the initial stage of its development their character wasn't technological in itself. They stood more like as some experience. Through time this experience was concealed and used by certain groups of people in order to influence other members of those societies. However, concealing knowledge at earlier periods of life of the human society was a common practice. Nowadays such information cannot be hidden as effectively as earlier. Therefore technologies of making decisions are available as a multiplicity of other «management» technologies.

It is difficult to over-estimate their significance. The very fact that they improve the process of making a decision in a number of parameters speaks for itself. Thus, it becomes clear that companies that possess more developed technologies of making a decision are able to carry out this process in a significantly more effective way and, therefore, be competitive. Therefore, in modern world, and especially in modern economy a great attention is paid to problems of making decisions and improving its mechanisms.

We should also point out that in its essence it is an informational process and it includes everything that allow us to ease or completely realize the process of making a decision.

Therefore, we set an objective to comprehend the process of making decisions, understand, how it should be perceived, and what structure is the most convenient for its schematic presentation. It will allow us to improve the existing technologies of making decisions or create some absolutely new ones.

Perceiving making a decision as a single process is considered to be purposeless, especially if we have to model it. So it should be split into components that can most effectively describe the very process and serve for studying its mostly common cases.

We also shouldn't forget that an ideal scheme and principles of making decisions cannot exist, and it is conditioned by a subjectivity of perception and information usage, including that on making a decision. Therefore, we only speak of search for a relatively optimal structure to carry out this process.

As the most famous we can study a model in which we know incoming and outcoming flows. The very process of calculation is concealed or unknown. W.R. Ashby suggested calling this model «blackbox». Such model is appropriate for cases where it is unknown, how an action is carried out, and it is only important what we need and what we come up with [2].

The model of the «blackbox» is often used for areas of modern economic space where people prefer «ready-to-go» products. We can also see its usage in separate cases when a part of the model doesn't need to or can be presented in a structural form [2].

In its essence that model of the «blackbox» is quite effective, but it covers a limited number of possible events which is significantly less than one needs to model a process of making a decision. So, its further improvement is needed for a complete presentation of this process.

N.M. Amosov in his book «Algorithms of mind describes» making a decision as a consequence of cases: perception – evaluation – action, and he calls it a «functional act». He also thinks that it is unwise to place a functional act into three cases, and it is cost reasonable to put it into longer consequence that consists of five steps. The first step is perception, the second is analysis, the third is planning, the fourth is decision, and the fifth step is action. N.M. Amosov didn't limit himself even with five steps in a so-called functional act. He thought that we should analyse greater number of steps in order to see a real picture of decision-making process [1].

The position of N.M. Amosov has its defect. The more steps we study within the chain of making a decision, the fewer cases can be included. Thus, it becomes necessary to develop a more universal action chain.

For a more qualitative cases selection and constructing more universal chain of decision-making we have to use both theories: the one of the «blackbox» and the chin concept, introduced by N.M. Amosov.

The «blackbox» model consists of three components: an entrance – a concealed action, taken to achieve the goal – and the resulting action. As we combine this theory with the concept of N.M. Amosov, we can obtain a model similar to that of the «blackbox», but where three basic events will be present: an event – calculation – reaction. The received action chain reflects a making of decisions quite correctly and completely. Its difference from the chain of the «blackbox» is the perception of the activity part of the model as an uncovered one, in other words, participating in calculations. To reveal the calculation part we can use specific chains that are studied by N.M. Amosov [1].

In the received chain an «event» refers to anything that causes a need to make a decision, in other word, requires taking an action. In the general scheme an «event» stands as a motivating phenomenon that is similar in its essence to an «entrance» according to the theory of the «blackbox». An example of an «event» in reality can be a stock hike, a received report, chemical or physical reaction, etc. Thus, the number and variety of the examples of possible «events» is limited by specific requirements towards a system, to structure which we use the chain of making decisions.

The next within the process of making decisions goes «calculation». This action is the fundamental one in this structure, and its inner part can be the biggest one. To model it we need to use structures by N.M. Amosov [1] that can significantly simplify the modeling and development of the inner part of mailing a decision. But under a more detailed look we have to accept the specific character of structures that we use to describe the system. However, it doesn't lessen the significance of the selected sequence of actions. If any system could be modeled as a multiplicity of subsystems than some of them could be studied according to the model of the «blackbox», and others could be analysed with various levels of deepening into so-called functional act. A special feature of such work is that it doesn't require unnecessary efforts and additional structuring to transfer from one scheme of making decisions to another. It can significantly ease the process of working with structures of making decisions that becomes important while studying and composing complex intellectual schemes.

A finalizing step in making a decision is a «reaction». It is a direct action, a response to an event that cased calculations. It is a natural result of any process of making a decision. A «reaction» is derivative action. Hence it received its name within the scheme of decision-making.

Thus, we come to a relatively simple structure of making a decision, components of which cover quite broad limits in possible situation of management process.

Let us study functional features of the structure. Within the process of making decision according to the selected structure a process starts with an «event» that happens and enters the system. The very process of receiving a signal of the beginning of making a decision is the «event». It can emerge in environment through different means and with usage different facilities that correspond to the objective, such as, for example, scanning devices, program modules of sensors of pressure, temperature, speed, etc., in other words everything that can create an event. As we outlined earlier, the main point is the very fact of entrance of any kind of information into the system. It allows our system to «know» that it is necessary to take an action.

After receiving an «event» there emerges a need to calculate that it is necessary to take an action. It is carried out within the process of «calculations» that includes all possible sequence of actions that could emerge within the process of making a decision. An example of possible action sequence can be a part of the decision-making structure that was presented by N.M. Amosov in his book «Algorithms of mind» [1]. The scheme itself consists of three actions: analysis – planning – action. Of course, in reality such system can grow wider because of the increase in the included actions, or deeper because of enriching of inner content of each process. It was underlined by N.M. Amosov himself [1] and is logically reasonable, since a search for solutions of even similar problems can have quite a number of differences and be unique. To realize this rather complex and responsible part of management system it is necessary to use program means that allow us to significantly increase the efficiency and speed of making a decision, but still don't have any personal perception, and their effectiveness is proved.

The finalizing process in making a decision is the «reaction». The name corresponds to the «outer» perception of this process. This character feature can be observed in a number of management decisions. The system itself can react either actively or passively. It is depend-

ent on the functional needs of the system. The results of making a decision can be reflected via any method that is only limited by situation or individual needs.

Within the process of operation of some systems of making decisions situation when it is unnecessary to take resulting actions are possible. In the logics of making a decision, in its very structure this lack of action that needs to be taken, doesn't affect the presence of the «reaction». It happens because that lack of need to take an action also has a resulting feature that can be considered as an output of the structure work.

Thus, the introduced structure of making decision is convenient for description of structural features of making a decision because of its simplicity. It allows us to simplify the process of modeling making of decisions. Such modeling can be used in development of decision-making systems and their presentation as reports. At the same time there is a possibility to present a process of making a decision through separate components that doesn't depend on each other. It can significantly simplify the process of development and further modernization. With sufficient documentation such structuring can multiply the speed of the development of the whole system and its separate elements that has a great importance because of the growth in competition that takes place on European and American market and gaits within Russian economic system.

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Short Reports

THE RESEARCH OF REGIONAL MARKETS OF LABOR FOR YOUTH WITH THE HELP OF COORDINATION METHOD

Vishnevskaya N.G.

The Bashkir institute of social technologies, branch OUP VPO «Academy of transactionses and social attitudes», Ufa

The article is devoted to questions of the regulation of regional youth labour markets. The necessity in the research of regional markets of labor for youth in the system of coordinate 'unemployment-tension'. The coordination method of typologisation of regional markets of labor for youth was offered.

The problems of youth employment, development of mechanisms for its regulation, both at federal and regional levels, assume ever greater importance in modern conditions. Taking into account the qualitative characteristics of young people, forming a special segment of the labour market, one can affirm that the problems of youth unemployment are different from the problems of unemployment of other groups of population. So, young people is, on the one hand the most mobile, able-bodied and promising, but on the other hand poorly socialized and under-productive part of the country's labour force.

In this regard, the prior task of state bodies and institutions is creating the optimal conditions for self-determination of every young citizen, which would provide him stability of social status, real chances to receive education and work, that meet his professional standards.

A special responsibility for the regulation of youth employment rests with the regional authorities, as each region has its own specific laborr market. In addition, this issue requires particular flexibility and control in the emergency response mode, which can be done especially effectively only in the provinces

Despite the large number of scientific works on youth employment and unemployment, a lot of theoretical and methodological aspects of this question are not well studied. Points of view on this problem require further study too. There are lots of programs, that touch the problem of youth unemployment in varying degrees, but the development practice of consolidated, comprehensive programs to promote youth employment has not yet become stable. As a consequence, it is also important to replenish the scientific tools of theoretical and practical research on the problem of regulation of regional labour markets of youth under present conditions.

Youth unemployment contributes to increasing of disparities in regional labour markets, which ultimately leads to a huge socio-economic differentiation of regions. Unfortunately, the programs conducted in the regions usually lack the proper system in the development and implementation, many of them do not have sufficient scientific basis, often have a declarative nature and do not reach their goals.

In this regard, the relevance of the further development of scientific bases of regulation of regional youth labour markets and practical tools of struggle with youth unemployment remains high.

Analysis of indicators of the youth labor market indicates that the condition of youth is far from optimal, and the development of specific measures to overcome youth unemployment is required. Moreover, regional specificities of youth labour markets must be taken into account in developing of directions to promote youth employment.

In order to develop measures aimed at promoting youth employment, we have distributed regions of the Russian Federation on the indicators of the youth unemployment level and the tension on the labour market (the number of unemployed per vacancy) in the system of coordinates. Point of origin corresponds to the average Russian level value of youth unemployment and the average value of a tension in the labour market.

Thus, the regions of the Russian Federation were distributed in four groups:

1) the low level of youth unemployment – the low level of the tension (the low type of youth labour market);

2) the low level of youth unemployment – the high level of tension (the mixed type by the tension of youth labour market);

3) the high level of youth unemployment – the low level of tension (the mixed type of unemployment of the youth labour market);

4) the high level of youth unemployment – the high level of tension (the high type of youth labour market).

The low type of youth labour market is regarded as the most favourable.

The mixed tension on the type of regional youth labour market is notable for limitedness of jobs.

The mixed type of unemployment of the youth labour market is characterized by a low tension on the labour market and by the high youth unemployment. This indicates that there are plenty of jobs, but for some reason the employer does not want to hire young people.

The higher type of the regional youth labour market is particularly complex and tense. To this type, first of all, belong the youth labour markets of the North Caucasus. The problem of youth unemployment in these regions, exacerbated by such events as drug addiction, shadow employment, ethnic conflicts, and the development of radical religious movements.

Typology of youth labor market by the coordinate method

Type of youth labour market	Region
Low	Belgorod Region, Kaluga Region, Moscow Region, Ryazan Region, Tver Region, Tula Region, Yaroslavl Region, Moscow, Leningrad Region, Novgorod Region, St. Petersburg, Krasnodar Territory, Nizhny Novgorod Region, Orenburg Region, Penza Region, Chukotka Autonomous District
Mixed by tension	Bryansk Region, Vladimir Region, Voronezh Region, Ivanovo Region, Kostroma Region, Lipetsk Region, Smolensk Region, Arkhangelsk Region, Vologda Region, Republic of Bashkortostan, Republic of Mordovia, Republic of Tatarstan, Kirov Region, Sverdlovsk Region, Samara Region, Ulyanovsk Region, Chelyabinsk Region , Krasnoyarsk Territory, Kemerovo Region
Mixed Unemployment	Kursk Region Tambov Region, Volgograd Region, Rostov Region, Republic of Mari El, Republic of Udmurtia, Saratov Region, Tyumen Region, Khanty-Mansi Autonomous District, Irkutsk Region, Novosibirsk Region, Tomsk Region, Kamchatk Territory, Primorye Territory, Amur Region, Sakhalin Region, Jewish Autonomous Region, Yamalo-Nenets Autonomous District
High	Orel Region, Republic of Karelia, Republic of Komi, Kaliningrad Region, Murmansk Region, Pskov Region, Republic of Adygea, Republic of Dagestan, Republic of Ingushetia, Republic of Kabardino-Balkaria, Republic of Kalmykia, Republic of Karachai-Cherkessia, Republic of North Ossetia – Alania, Chechen Republic, Stavropol Territory, Astrakhan Region, Chuvash Republic, Perm Territory, Kurgan Region, Republic of Altai, Republic of Buryatia, Republic of Tuva, Republic of Khakassia, Altai Territory, Transbaikalia Territory, Omsk Region, Republic of Sakha (Yakutia), Khabarovsk Territory, Magadan Region

To the high type belong also the majority of youth labour markets in subjects of the Siberian Federal District. The most serious situation is being formed in the northern areas, where difficult climatic conditions, inadequate transport links, high tariffs on transportation, great territory remoteness hinder the development of industry and, consequently, the job creation and labour mobility.

This method of typology of youth labour markets is called the coordinate one.

Thus, the analysis shows that the labour market, even against the background of low unemployment rates has a lot of problems. Being the most vulnerable group under any adverse changes in economic conditions, young people are able in the state of the long-term unemployment. And the present economic crisis confirms this conclusion. Therefore, the implementation of a thought-out public policy on regulation of youth employment is always urgent in the Russian society. The analysis shows that the most important thing in this issue is developing a regional policy on regulation of youth employment, proceeding from a location of the region in the coordinate system: unemployment – tension.

Materials of Conferences

EVALUATING THE ECOLOGICAL QUALITY OF NATURAL LANDSCAPES BY COMPUTER MODELING OF SONGBIRD POPULATION DYNAMICS

Podolsky A.L.

Saratov State Technical University, Saratov,
e-mail: Andrei.podolsky@yahoo.com

Strategies for protection and recovery of rare species of terrestrial vertebrate animals are often based on proper understanding of their population structure and dynamics along with their ecological requirements. Habitats suitable for breeding of a certain species alternate with unfavorable habitat patches. The common mistake of environmental managers is their assumption that the most effective protection of a declining species can be accomplished by protecting the best available patches of suitable pristine habitats for the species.

According to the theoretical *meta-population paradigm* [1], the regional population is composed of a number of local populations undergoing constant stochastic exchange of individuals between them. This pattern can lead to the extinction of local populations in selected landscape patches regardless of the habitat quality and conservation measures. According to the *source-sink concept* [2], habitat patches supporting population sources can produce a surplus of individuals to disperse to adjacent poor quality patches of sink habitats. Thus, besides giving high quality pristine landscapes an *a priori* protected status, an effective strategy for the protection of rare species at the regional level should also include an examination of the specifics of spatial and temporal dynamics of its populations and possible inclusion of the lower quality habitats in the regional network of protected areas. It could be even necessary to actively protect patches currently not inhabited by the species but which could be subsequently colonized as a result of the source-sink population dynamics.

The basic Pulliam's model [2] for calculating population growth rates (λ) implies that $\lambda = P_A + P_J F = 1$ for populations in a state of equilibrium, $\lambda > 1$ for growing («source») populations, and $\lambda < 1$ for declining ("sink") populations, where P_A and P_J are annual survival rates of adult and juvenile females, correspondingly, and F is an annual productivity. Choosing the Ovenbird, *Seiurus aurocapilla L.* (*Emberizidae*: *Parulinae*), as a model species based on its multiannual negative population trends in pristine landscapes in the Southern Appalachians, U.S.A. [3], I modified the model by specifying an average successful brood size (B) and adding probabilistic variables accounting for nesting success (p_s) *sensu* Mayfield [4], re-nesting rates after unsuccessful breeding (p_r), double-brooding rates (p_d), and assuming equal sex ratio among the breeding individuals [5]:

$$\lambda = P_A + P_J \frac{1}{2}\left[p_s B + p_s(1-p_s)p_r B + p_s p_d p_s B + p_s p_d p_s (1-p_s) p_r B \right] =$$

$$= P_A + P_J \frac{1}{2} B p_s \left[1 + p_r - p_s p_r + p_s p_d + p_s p_d (1-p_s) p_r \right].$$

I parameterized the above model through my field studies on 110 active nests and computer simulations. Ironically, the best pristine habitats of the Great Smoky Mountains National Park were not found to be ecologically significant sources for the Ovenbird ($\lambda = 0{,}97$). In fact, they were *ecological traps* [6] for this species that evaluates the quality of its breeding habitat primarily from visual cues. On the other hand, in some of the adjacent landscapes affected by human activities, breeding success and annual productivity of Ovenbirds were high. Such unpredictable meta-population dynamics was caused by the so-called *paradox of predation* [7]: high quality landscapes of the national park attracted, in addition to birds, a variety of mammalian and reptilian nest predators. Most of these predators were absent in low quality patches, where predation was caused mainly by relatively scarce *Corvidae*.

Therefore, an effective strategy for the recovery of the Ovenbird should include a wide network of habitat patches in both pristine landscapes and landscapes modified by human activities. In each particular case, some pilot studies identifying local population trends and meta-population dynamics would be very helpful.

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Materials of Conferences

THE MAIN DIRECTIONS OF VIRTUAL METHODOLOGICAL ASSOCIATION OF COMPUTER SCIENCE TEACHERS ACTIVITY UNDER THE CONDITIONS OF INTEGRATED INFORMATION EDUCATIONAL ENVIRONMENT

Fedorova G.A.

Omsk Pedagogical University, Omsk, e-mail: Fedorova_tmoi@rambler.ru

Modern level of computer telecommunications technology development broadens abilities of teachers in their professional training and creates conditions for accessible and open support of tutors directly at their workplace. Virtual methodical explanation (VME) is one of the forms of professional interaction between teachers [1]. VME activity among teachers of computers study in Omsk and its region realizes the following forms of methodical work (http://vmo.omskedu.ru): scientific-practical online conference, network seminar; creation of open banks, archives of methodical developments; thematic forum, remote consultative support; remote competitions of methodical works; informing union participants about new normative documents; virtual master-classes.

Effective VME activity is provided by the system of scientific-pedagogic and methodical support of teachers. Omsk state pedagogical university (OmSPU) is one of the biggest scientific and methodical centres that possess powerful educative resources that are based on headmost pedagogic technologies and modern information facilities that were developed by tutors, postgraduate students, masters, and students. These resources have a great theoretical and practical potential and are demanded from pedagogic society. They must be implemented by practising teachers.

An innovation project, aimed for creation of integrated information-communication educative environment (ICEE) «school-pedagogic institution». Participants of the innovative project are tutors, postgraduate students, masters, and students of OmSPU, teachers and pupils from schools of Omsk and the region. *The project objective* is to create the system of scientific-pedagogic and educative-methodical support of training process in educational institutions. Within the project an educational source «School» was created. It allows us to widen virtual presentation and some forms of teachers' work in VME. The source is allocated on the website of OmSPU (http://school.omgpu.ru) [2].

The creation of integrated informational educative environment of a pedagogic university or a school allows us to unite our information resources of the link «school – pedagogic institution» and organize centralized access to information resources, involve students, tutors, and teachers into joint scientific-research and creative activity that unite higher pedagogic and general school to provide for a permanent development.

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Short Reports

PRODUCTIVITY OF THE DRY STEPPES OF TUVA UNDER THE GRAZING PRESSURE

Sambuu A.D.

Tuvinian Institute for the exploration of natural resources SB RAS, Tuvinian state university Republic of Tuva, Kyzyl, e-mail: sambuu@mail.ru

Grassland resources are important on a worldwide basis. Intensified grazing is one of the main causes of ecological change of meadows and steppes. Almost all steppes are grazed and represent different stages of succession. Heavy grazing impact generally initiates a retrogressive succession (degradation) including a decrease in aboveground net primary production and phytomass as well as a change in species composition, especially in dominant structure. Removal of grazing pressure leads to a progressive succession (restoration) with an increase in phytomass and production and replacement of degraded pasture community by the original plant association. Stocking rate is one of the most important factors affected a stage of pasture succession. At the same time stocking rate is a powerful management tool allowing to regulate the amount of herbage available to animals (Gorshkova, 1954; Smith, Rushton, 1994; Wei et al., 1997; Titlyanova et al., 1999).

Study areas and Methods. The study was carried out on grasslands within Tuvinian steppes (on the Ubsunur hollow – 48-51 °N 91-99 °E) of Central Asia. The climate of this area is characterized by a rigorous cold and late spring. The yearly mean temperature is –5 °C (1975–1996). The coldest month is January with a mean temperature of -37^{0}C. July is the warmest month with 17 °C (Nosin, 1963). On the basis of definition of the growing season as the period over which the daily mean temperature remains above +5 °C, Ubsunur hollow has a growing season of 150 days (Experiment Uvsu-Nur, 1995).

Investigated steppes is located on the river terrace, another ones represent submountain steppes. Erzin steppe is linked to alluvial chestnut soil, submountain steppes to loamy sand chestnut soils. Their species composition is dependent on relief, soil and grazing.

The soil at the study sites have developed on chestnut with sand material. The humus profile is 10-20 cm deep and roots grow down to 50 cm.

Four sites were investigated:

1. Overgrazed site (OG), were after many years of very intensive cows and sheepgrazing, the steppe replaced by an anthropogenic open grassland community with different dominating.

2. Moderately grazed site (MG) on chestnut soil. This site was heavily grazed by sheep, cows. Grazing was later gradually reduced and finally stopped in 1996.

3. Lightly grazed during 1 year.

4. Lightly grazed during 4 years.

We were investigated dry steppes with different grazing impact.

Ten 0,25 m^2 sample plots were laid out along a 50 m long transect at moderately grazed site and overgrazed site. 8 sample plots were chosen at random. The above-ground plant material was sorted into green phytomass and total standing dead biomass.

Soil monoliths with a surface area of 10 cm^2 were collected on each sample plot with a special steel cylinder to a depth of 10 cm^2. From each monolith one-fifth was cut off to analyzes the composition of the below-ground plant material. The monoliths were washed and below-ground plant material was collected on a 0,3 mm sieve. The soil samples were analyzed by generally used methods.

Definitions and symbols. The following variables of the plant biomass structure are used (Van der Maarel & Titlyanova 1989). NPP – net primary production; ANP – above-ground net primary production; BNP – below-ground net primary production.

Net primary production, NPP, was calculated as the sum of the above-ground production, ANP, and below-ground production, BNP. ANP and BNP were estimated using balance equations.

For above-ground plant biomass we have:

$$\Delta G_n = G_{n+1} - G_n + \Delta D_n;$$

$$\Delta D_n = D_{n+1} - D_n + \Delta L_n;$$

$$\Delta L_n = L_{n+1} - L_n + \Delta M_n.$$

For below-ground plant biomass we have:

$$\Delta B_n = B_{n+1} - B_n + \Delta V_n;$$

$$\Delta V_n = V_{n+1} - V_n + \Delta W_n,$$

where G_n, D_n, L_n, B_n and V_n are green biomass, standing dead, litter, living below-ground organs, and below-ground dead mass of the sample at occasion *n* respectively, and G_{n+1} etc. are the same variables at sampling occasion $n + 1$; ΔG_n is the green biomass production, ΔD_n the standing dead production, ΔL_n the litter production, ΔM_n, the litter mineralization; ΔB_n, and ΔV_n are the below-ground living and dead mass production respectively, and ΔW_n the below-ground dead mass mineralization, all for the period between sampling occasions n and $n + 1$ (Titlyanova, 1977).

Results. *Plant composition and biomass.* Species richness was the total number of vascular plant species occurring within the four plots per well location. Mean plant cover was calculated for each

well location. Spearman rank correlations among mean total biomass, species richness, mean plant cover, soil for each site.

Total aboveground biomass did not differ significantly among the dry steppe communities; however, the relative contribution of individual biomass components was indicative of community differences in species composition. This steppe communities are pure on cover, were composed with the dominant graminoids being *Stipa krylovii, Agropyron cristatum, Cleistogenes squarrosa*. In dry steppe communities, aboveground biomass was composed almost entirely of plant material from the dominant sedge species. The vertical distribution of belowground biomass was distinctive for each community, and significant differences in root, rhizome, and total belowground biomass with depth were observed for both sites

The storage of the soil organic matter have been determined by 3 principal factors: values of vegetable matter, entering to soil, the rate of the mineralization of the vegetable leavings and the mechanical structure of soil. The entrance of the carbon have been conditioned by values the net primary production.

Net primary production was calculated for three years in moderately grazed steppe and for one season in overgrazed and recovering steppes (Table).

Net primary production in steppes, g/m^2 dw. Below-ground production for 0–20 cm soil layer. OG – overgrazed, MG – moderately grazed, LG-1 = lightly grazed for 1 year, LG – 5 = lightly grazed for 5 years

Production	OG	MG			LG-1	LG-4
	1999	1996	1997	1999	1999	1999
Above-ground	70	220	288	80	77	110
Below-ground	630	1930	1425	494	352	2026
Total	700	2150	1713	574	429	2136

The NPP of moderately grazed steppe varies during three years from 574 to 2150 g/m^2 per year in dependent on weather conditions. The growing seasons in 1996 and 1997 were normally warm and dry while summer in 1998 was very hot and dry. The NPP value in 1996 and 1997 was very high (2150–1713 g/m^2) but in 1999 it decreased drastically. In this very dry season production process was not influenced by the grazing regime. Plants in overgrazed, moderately grazed and recovering for one year pastures produced modest quantity of biomass, moreover NPP is highest in overgrazed steppe. By the end of the fourth year of recovery a burst in the development of the community occurred. Shoots, rhizomes and roots of all species represented in the community had increased. An enormous flow of assimilates was going out of the above-ground into the below-ground phytomass. With a rapid root growth there was an increased death of roots and the standing crop of below-ground dead mass was high compared with dead mass of another pastures.

Conclusions

1. Difference between moderately grazed and overgrazed sites may arise mainly from the different factors that originate their xerophytic character: soil and climatic characteristics, respectively. Summers are very cool and the winters are hot and the soil with a low water storage capacity in the central Asia.

2. Moderately grazing of Tuvinian dry steppes is resulted in higher biomass values for the above- and below-ground production for 0–20 cm soil layer, entering of the vegetable leavings to the soil, the storage of the humus, carbon.

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CONSEQUENCE OF THE GRAZING IMPACT ON THE ORGANIC MATTER IN CHESTNUT SOIL OF TUVA

Sambuu A.D.

Tuvinian Institute for the exploration of natural resources SB RAS, Tuvinian state university Republic of Tuva, Kyzyl, e-mail: sambuu@mail.ru

The storage of the soil organic matter have been determined by 3 principal factors: values of vegetable matter, entering to soil, the rate of the mineralization of the vegetable leavings and the mechanical structure of soil. The entrance of the carbon have been conditioned by values the net primary production.

The paper has been considered the peculiarity of the accumulation phytomass and the entering to soil the vegetable leavings on the different sites of the dry steppes.

Grazing on the steppes of Tuva by domestic animals has occurred since the first centuries A.D. and this has contributed to maintain the characteristic openness of the landscape.

In this study we were particularly interested in comparing organic matter of the dry steppes, at different intensities of human impact, with those of true steppe vegetation. True steppes are characterized by small brunch grasses. The main part of the green phytomass is made up of species which are resistant to trampling and able to regenerate rapidly after being grazed.

Study areas. The study was carried out on grasslands within Tuvinian steppes (on the Ubsunur hollow – 48-51 °N 91-99 °E) of Central Asia. The climate of this area is characterized by a rigorous cold and late spring. The yearly mean temperature is –5 °C (1975-1996). The coldest month is January with a mean temperature of –37 °C. July is the warmest month with 17 °C (Nosin, 1963). On the basis of definition of the growing season as the period over which the daily mean temperature remains above +5 °C, Ubsunur hollow has a growing season of 150 days.

The mean yearly precipitation is 250 mm (at Erzin Meteorological Station for the period 1975-1986) with a wide annual variation. The lowest and highest values for this period are 120 and 380 mm (Experiment Ubsunur, 1995). The annual precipitation is recorded from July to August.

The soil at the study sites have developed on chestnut with sand material. The humus profile is 10-20 cm deep and roots grow down to 50 cm.

Two sites were investigated:

1. Moderately grazed site (**MG**) on chestnut soil. This site was heavily grazed by sheep, cows. Grazing was later gradually reduced and finally stopped in 1996.

2. Overgrazed site (**OG**), were after many years of very intensive cows and sheepgrazing, the steppe replaced by an anthropogenic open grassland community with different dominating.

Methods. Ten 0,25 m^2 sample plots were laid out along a 50 m long transect at moderately grazed site and overgrazed site. 8 sample plots were chosen at random. The above-ground plant material was sorted into green phytomass and total standing dead biomass.

Soil monoliths with a surface area of 10 cm^2 were collected on each sample plot with a special steel cylinder to a depth of 10 cm^2. From each monolith one-fifth was cut off to analyze the composition of the below-ground plant material. The monoliths were washed and below-ground plant material was collected on a 0,3 mm sieve.

The soil samples were analyzed by generally used methods.

Results. We established that the above-ground and below-ground plant material (the total biomass) in moderately grazed site are 30 t/he and in overgrazed site – 17 t/he (table).

Components	MG – 2000 y	OG – 2000 y
Above-ground biomass, t/he	250	180
Below-ground biomass, g/m^2	2800	1600
Entering of the vegetable leavings, t/he	11,5	4,3
Humus, % in the depth 0-10 cm	1,4	1,1
Carbon , t/he in the depth 0-50 cm	45	29

Table presents that the green biomass values of vascular plants were highest on the moderately grazed site and lowest on the overgrazed site. The amount of graminoid biomass decreased with increasing grazing intensity.

Differences of total green biomass values between the UG and OG sites were not statistically different but the value for the OG site was much lower.

Below-ground plant material consists of stembases and tubers? As well as roots of different length.

Total below-ground increases considerably from the moderately grazed site to overgrazed site.

The average from the season entering to soil of the vegetable leavings on the moderately grazed site – 11,5 t/he and on the overgrazed – 4,5 t/he.

The soil this sites differ by content humus. The humus horizon in the soil moderately grazed site contents 1,4 and 1,1 % – in overgrazed site. Accordingly the storage of the carbon in this sites differ. In the moderately grazed site the storage of the carbon in the depth 0-50 cm is 45 t/he. Therefor in this soil various intensity of the humusaccumulation. It being known that the soil of the moderately grazed site approximate to the manyhumus undertypes.

Discussion. Grazing has contributed to maintain the openness of the Ubsunur hollow's landscape. The values for all components of aboveground biomass are reduced when the community is overgrazed. This agrees with the results obtained for dry steppes in Europe (Bystriskaya&Osychnivk, 1975), Kazakhstan (Titlyanova et al, 1983) and central Siberia (Afanasiev&Rotova, 1986).

Results for the moderately grazed site did not agree entirely with those obtained from true steppes. The below-ground biomass values were highest at the moderately grazed site although differences with the overgrazed site were not significant.

Changes in the biomass structure of grasslands under different grazing intensity can be expressed as ratios.

With increasing grazing impact entering of the vegetable leavings to the soil and the storage of the humus, carbon decrease.

Conclusions. Difference between moderately grazed and overgrazed sites may arise mainly from the different factors that originate their xerophytic character: soil and climatic characteristics, respectively. Summers are very cool and the winters are hot and the soil with a low water storage capacity in the central Asia.

Moderately grazing of Tuvinian dry steppes is resulted in higher biomass values for the above- and below-ground phytomass, entering of the vegetable leavings to the soil, the storage of the humus, carbon.

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Short Reports

LARGE HADRON COLLIDER – FUNDAMENTALLY NEW NOTION

Brusin L., Brusin S.

Laureates of the International Science Foundation of Soros on basic researches, e-mail: brusins@mail.ru

The essence of processes in the Collider is shown, on the basis of which the further experiments regarding main objectives are inexpedient.

The main objectives of the Large Hadron Collider are the following:

1. To discover the primary matter of the Universe as a kind of a pre-particle – Higgs boson particle.

2. To reproduce a small-scale model of the «Big Bang».

In accordance with the modern doctrine the basis of the Universe structure is represented by means of an elementary particle the search of which has been performed since 20th century until now. However, in [1, 2] it is shown that the whole Universe is filled by the material medium – ether which density has unusually low values (15 times less than the density of water), and in [2, 3] it is shown that the ether is a primary matter; experimentally it proves to be true by means of a pair electron–positron formation from the ether. The search of any pre-particle is pointless.

Proton movement in the collider occurs in etheric media getting between the particles of the walls' material in the collider. At proton's movement with a great speed it drives the ether in front of it condensing it and increasing its moving mass m in accordance with a known ratio

$$m = m_0(1 - v^2/c^2)^{-1/2}. \quad (1)$$

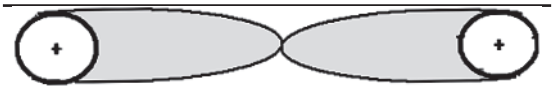
The proton's moving mass m corresponds to the enclosed energy of accelerator E which will be driven up to $7 \cdot 10^3$ gigaelectronvolt. Using the energy equivalent of the proton $E_p = m_p c^2 = 0{,}94$ gigaelectronvolt, it is possible to define the value of mass m in accordance with a proportion:

$$m/m_p = E/E_p. \quad (2)$$

Apparently

$$m = 7 \cdot 10^3/0{,}94 = 7447 m_p, \quad (3)$$

from Figure protons at first collide by means of their etheric masses received at dispersal. Part of these masses of ether is condensed that leads to formation of new observable particles from an ether (antihydrogen is already received); this is the experimental proof of that the ether is a primary matter. Protons reduce speed quickly, being released from other part of the ether received at dispersal. But they are not going to break and it will not be possible to reproduce the «Big Bang».



Collision of moving protons in the collider

We explained everything from the positions of classical physics and only used the formula (1) known from the relativistic physics as it is considered to be fair for high-speed mechanics. However the formation of the ratio (1) from the positions of classical physics is shown below.

Principle of classical mechanics for high speeds. Let's consider the movement of an elementary particle in the etheric media. The moving particle condenses the mass of etheric media in front of it, increasing its own mass in dm value and total energy in $dm \cdot c^2$ value at the expense of kinetic energy W_k. Let's define:

$$W_k = dm \cdot c^2. \quad (4)$$

Let's define the impulse p of the material point m with speed v

$$p = mv, \quad (5)$$

and force operating on this point, will make up:

$$F = dp/dt = m \cdot (dv/dt) + v \cdot (dm/dt). \quad (6)$$

Kinetic energy in time dt should be registered as:

$$W_k = F \cdot v \cdot dt. \quad (7)$$

Having substituted the values F from (6), we receive:

$$W_k = mv \cdot dv + v^2 \cdot dm. \quad (8)$$

Having substituted this value into (4) we receive a differential equation:

$$(dm/dv) \cdot (c^2 - v^2) - mv = 0. \quad (9)$$

Let's solve this equation, observing the entry condition: at $v = 0$ $m = m_0$

$$\int (dm/m) = \int v \cdot dv/(c^2 - v^2), \quad (10)$$

Further we receive:

$$m = (c^2 - v^2)^{-1/2} \cdot B. \quad (11)$$

From the entry condition the following will be defined: $B = m_0 c$.

So, we receive the solution of the equation (9):

$$m = m_0(1 - v^2/c^2)^{-1/2}. \quad (12)$$

We have received a ratio (1) from the positions of classical physics which confirms increase of particle's mass at its movement in ether.

Resume

1. The primary matter of the Universe in the form of ether was experimentally confirmed.

2. It is impossible to reproduce the «Big Bang» by means of protons' collision.

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SYSTEM OF NATURAL UNITS OF PHYSICAL QUANTITIES

Dubas L.G.

Dedovsk, e-mail: sudarih@gmail.com

Systems of natural units of mechanical quantities are expressed on three base microscopic units: mass, time and length. Appointments of the basic natural mass unit quantity with prime number 15089 multiplication to an electron's rest mass will be used.

It's a systems of natural units of physical quantities matter for representation of the physical phenomena in microscopic field of space [1, p. 3], with reference to physics of beams of charged particles. Appointments of the basic natural mass unit quantity multiple to an electron rest mass will be used. The multiplicity coefficient is defined by prime number **15089**. It is phenomenological combination of masses we will represent as a micro particle in rare electron-positron plasma without an electromagnetic interaction and any annihilation.

Let's consider some of physical natural units: R – the characteristic impedance of vacuum, u – the speed of light in vacuum, H – quantum unit of physical action, M equal to 15089 electron's masses, T – temperature equal to the rest energy for electron's mass.

$$R = 40 \cdot \mathrm{pi} \cdot 2{,}99792458 \text{ Ohm (defined)};$$

$$u = c = 2{,}99792458 \cdot 10^8 \text{ m/s (defined)};$$

$$H = 6{,}626 \cdot 10^{-34} \cdot J \cdot s;$$

$$M = 15089 \cdot m \text{ (defined)};$$

$$T = m \cdot \boldsymbol{c^2} \text{ (defined)},$$

where m – electron's mass; M – some boundary between easy and heavy particles.

For definition of unit of an electric voltage we will use the standard expression of energy in «electron-Volt» in microscopic units.

$$q \cdot V = M \cdot c^2;$$

$$e \cdot V = (\text{a.m.u.}) \cdot c^2;$$

$$V = 931{,}5 \text{ MV},$$

where q – charge's unit; e – module of an electron's charge; **(**a.m.u.**)** –atomic mass unit.

Let's consider the electrical current, which may be used as critical parameter at researches of extreme intensive ion beams. $I = V/R = 2{,}47$ MA.

Traditionally system of natural units of mechanical quantities is expressed on three base microscopic units: mass, time and length. Also we will consider units: temperature and impedance.

Except them, we will construct coherent units of physical quantities, depending on an integer j.

$$u_p = u \cdot 10^{-p};$$

$$H_n = F \cdot H \cdot 10^{n};$$

$$M_k = M \cdot 10^{k};$$

$$T_p = T \cdot 10^{-p};$$

$$R_j = R \cdot 10^{-j};$$

$$p = 3 \cdot j; \quad n = 11 \cdot j; \; k = 9 \cdot j,$$

where p, n, k, j – is integer parameters in sequence of coherent units of physical quantities; F – form-factor for alternative systems; $F = 1{,}0$; for base system; $j = 3$ – for practical system.

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