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IMAGE ANALYSIS OF THE STRESS-RELATED CHANGES IN THE FOLLICLES OF THE THYROID GLAND

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Khlebnikov Yu.V., Smirnova T.S., Kapitonova M.Yu.

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Morphometric indices of thyroid follicles of the experimental animals (rats) chronically exposed to a mild stressor were assessed using digital analysis. Age-related modulation of adaptational changes was revealed in the follicular compartment of the thyroid gland under mild chronic stress conditions.

Keywords: thyroid gland, follicles, thyrocytes, colloid, chronic stress, image analysis

Introduction

Recently evidence was provided that a thyroid gland as a link of the hypothalamo-pituitary-thyroid axis contributes to the neuroendocrine adaptational changes initiated by the hypothalamo-pituitary-adrenocortical axis under stress conditions. It was demonstrated that stress provoked fluctuation of the thyroid hormones level and structural changes in the follicular compartment of the thyroid gland [1,5]. It was also shown that stress might produce prominent and irreversible changes in the thyroid gland including development of the autoimmune thyroid pathology [6] but age-related aspects of the problem remained underestimated. In rats development of a thyroid gland continues during the first three weeks of postnatal development, and after that it enters its maturation phase during weaning period [3]. Development of the thyroid gland in rats of pre-weaning age is influenced by a surge of sex steroids in blood which effects its maturation either directly or by implication through the thyroid stimulating hormone [2], which provides complicated interaction between hypothalamo-pituitary-adrenal and thyroid axes in stress reactions of the growing body.

Objective

The objective of the present investigation was to evaluate age-related modulation of the microscopic changes in the follicular compartment of the thyroid gland under mild chronic stress conditions.

Total of 48 Sprague Dawley rats aged 14, 21 and 30 days after birth were involved

in this research, with 16 animals per age group, out of which 8 animals were exposed to the mild chronic (restraint) stress [8] in a plastic box for 5 hours a day continuously for 7 days, while the other 8 rats served as an age-matched control. Animals were kept in the standard animal house conditions with access to water and food ad libitum.

Thyroid gland of the control and experimental animals was sampled, fixed in formalin, embedded in paraffin. According to the recommendations [5] serial histological sections were stained with hematoxylin-eosin, and those with the largest section area were selected for image analysis. Five random microscopic fields were taken for evaluation under 10x objective. Captured images of the thyroid gland were saved under .tiff extension, recorded for blind evaluation by the two investigators and quantified by image analysis. The contours of the follicles were outlined, images were calibrated and measurements of the area, perimeter and diameters (maximal and minimal) of the follicles and the height of the follicular epithelial cells were performed using Leica QWin software (Leica imaging systems, Cambridge, UK). The measurements were transported to the Excel software with subsequent estimation of the circularity index of the follicles, area of the follicular epithelium and thyroid activation index [1]. The significance of the differences in these parameters in control and experimental animals were assessed by the Student's test. The level of significance was set at $p < 0.05$.

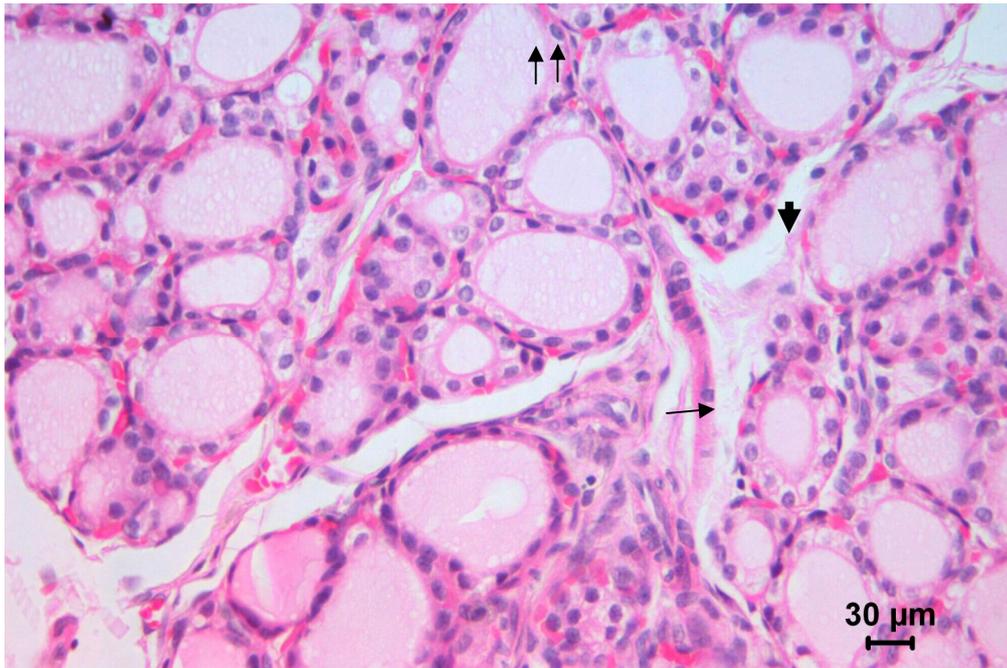


Figure 1. Thyroid gland of a 30-day old control rat. Middle-sized follicles dominate. Epithelial lining is cuboidal or low columnar with nuclei in the basal part of the cells (arrow). Apical pole of some thyrocytes is protruding in the follicular lumen (arrowhead). Parafollicular cells are visible in the epithelial lining of the follicles (double arrow). Microphotograph, hematoxylin-eosin staining.

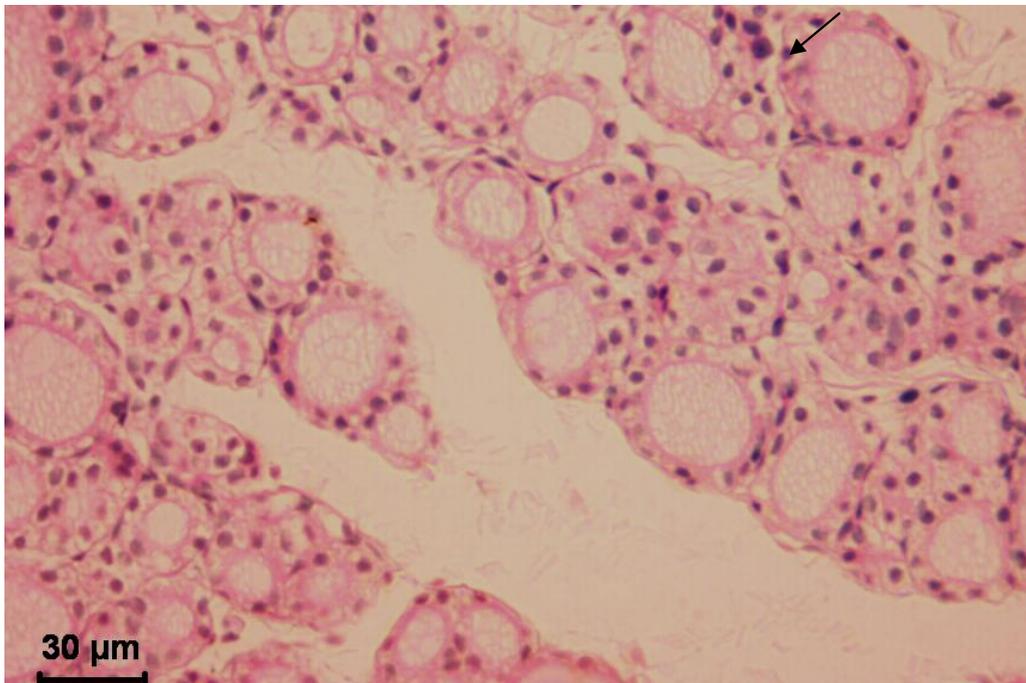


Figure 2. Thyroid gland of the 30-day old rat after mild chronic stress. Small follicles are dominating with low columnar and cuboidal lining. Colloid is light oxyphilic and foamy, resorption vacuoles are numerous (arrow). Interfollicular tissue volume is increased. Microphotograph, hematoxylin-eosin staining.

Results

In preweaning and weaning control animals follicular compartment of the thyroid gland is filled with small and middle-sized follicles lined mostly with cuboidal epithelium. In some of the follicles epithelial lining was low columnar or squamous. Smaller follicles with higher epithelium were concentrated in the center of the section while larger follicles with lower thyrocytes were located mainly at the periphery. Large follicles were not typical for this age group. Follicles are filled with homogenous light oxyphilic colloid. Resorption vacuoles were common in both small and middle-sized follicles. Apical protrusions of the epithelium were not seen. In infant rats the follicles looked larger while the

large follicles were observed mainly at the periphery of the gland. Resorption vacuoles were present in the follicles of different size. In this age group the follicles were more heterogenous in size and contained more colloid.

Exposure to chronic stress resulted in lower body weight, thymic involution and adrenal hyperplasia in the experimental animals of all the age groups. In the thyroid gland stromal proliferation and microcirculatory lesions could be seen. The follicles of the thyroid gland demonstrated heterogeneity in size and shape. The follicular epithelium remained mainly cuboidal or low columnar with persisting resorption vacuoles in all the age groups.

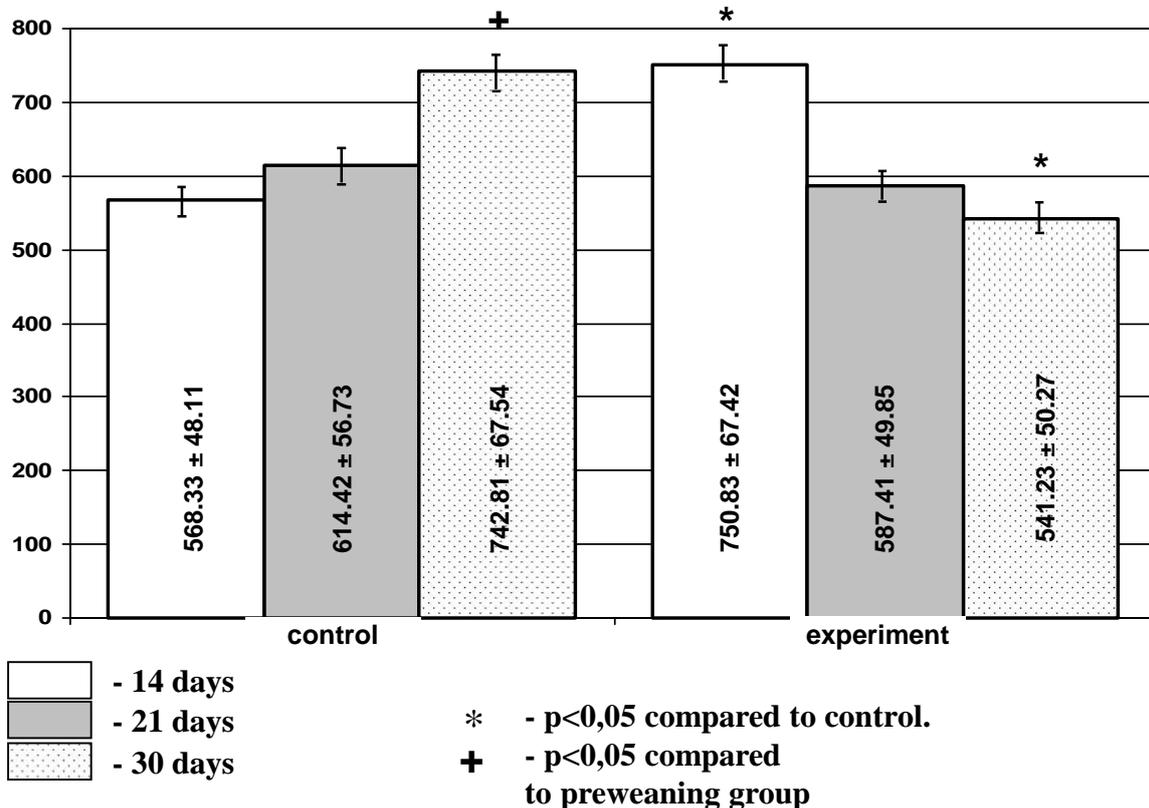


Diagram 1. Area of colloid in the thyroid follicles in chronic stress (mcm^2), $M \pm m$.

Morphometric investigation demonstrated that under chronic stress conditions the area of follicles of the weaning and infant rats showed 14,2% and 11,4% decrease in experimental rats accordingly compared to the age-matched control. In preweaning rats the follicular area increase under stress expo-

sure comprised 6,7%, though this difference did not reach level of significance. Under stress conditions height of the follicular epithelium was decreased insignificantly in preweaning and weaning animals (21,2% and 7,2% accordingly) and was increased (9,4%) in the infant animals. Area of colloid was

significantly higher in the preweaning stressed rats and significantly lower in the infant animals ($p < 0.05$) (diagram 1) while in the weaning animals the decrease in colloid area was not meaningful. Activation index of the thyroid gland was decreased in the weaning ($p > 0.05$), and preweaning ($p < 0.05$)

stressed rats. It was significantly increased in the infant experimental animals ($p < 0.05$). Thus among the selected morphometric parameters of the thyroid gland mean area of the colloid and the thyroid activation index proved to be the most informative.

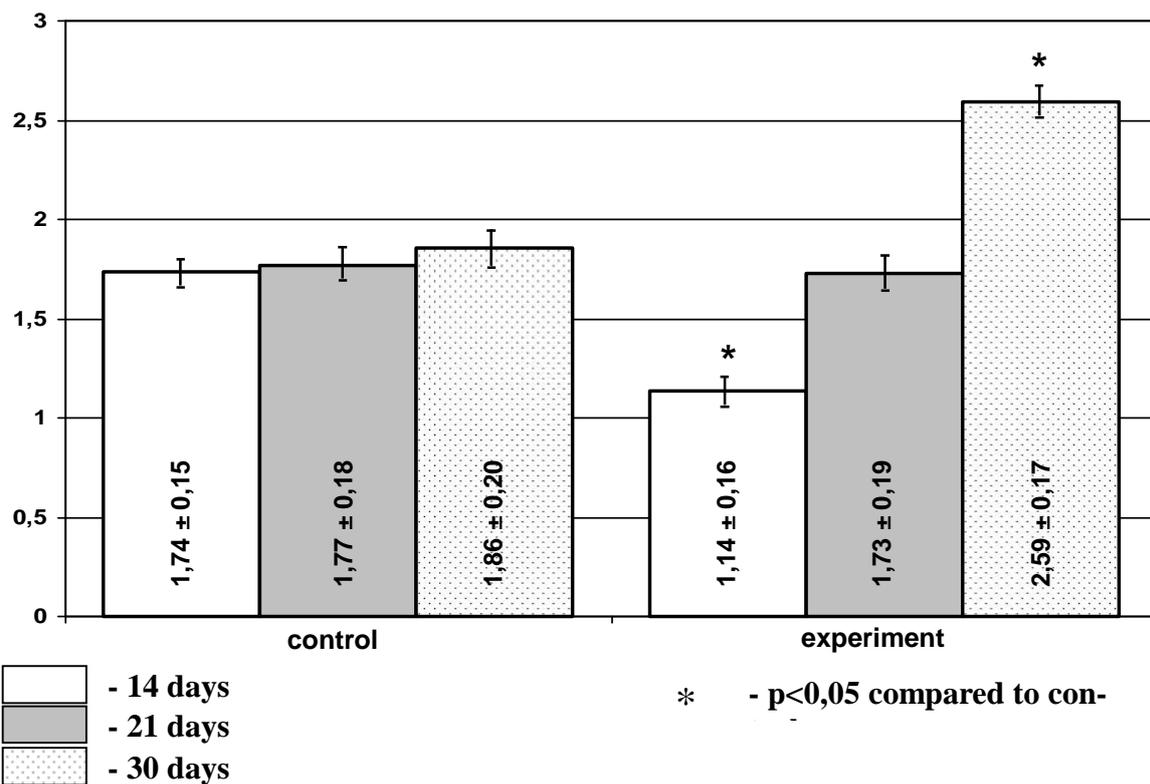


Diagram 2. Activation index of thyroid gland in chronic stress, M+/-m

Discussion and conclusion

Contradictory data regarding inhibitory or stimulator effect of stress on the thyroid gland and its follicular compartment were reported in some of the recent papers [4,7]. Quantitative evaluation of the follicular compartment of the thyroid gland in the present investigation demonstrated a distinct age-related pattern of the microstructural changes in the thyroid follicles under mild chronic stress conditions. These changes revealed inhibition of the functional activity of the thyroid gland in preweaning rats, its stimulation in the infant rats and a trend towards increased functional activity in the weaning rats. The data obtained provide evidence that

responsiveness of the hypothalamo-hypophyseal-thyroid axis reveals distinct ontogenetic dynamics in the growing body of the experimental animals.

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MORPHOTYPES OF NEUTROPHIL'S LYSATES OF BLOOD OF PATIENTS WITH KIDNEY DISEASES

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The research of morphotypes of teziograms of neutrophil's lysates received from blood of 43 patients with chronic kidney diseases (interstitial nephritis, chronic pyelonephritis and glomerulonephritis) was carried out.

Significant differences of structural organization of neutrophil's lysates of blood at the patients were described, as from the control, so and in the subordination from prevailing type of damage of kidney tissue.

Keywords: neutrophils, chronic diseases of kidneys, theziography

Actuality

Up-to-day the role of neutrophils in mechanisms of development of kidney pathology is discussed [1, 2, 3]. In this aspect the great interest represents the research of metabolic status of neutrophils in the blood of patients with chronic diseases of kidneys (CDK). Teziography is one of the methods, which can help getting the integrated characteristic of metabolic processes.

The purpose of the real research was studying of morphotypes of leucocyte's lysates received from blood of patients with chronic diseases of kidneys.

PATIENTS AND METHODS: 43 patients (29 females and 14 males, age 17-52 years) were examined; they divided in to three groups. In first group were patients with tubulopathy (TP) like chronic pyelonephritis in remission (without urinal infection). At patients of this group at ultrasonic investigation were observed the deformation of pyelocaliceal system of kidneys. Clinically the pyelonephritis proceeded with a small amount of signs. The patients with interstitial kidney pathology were included in second group. In the anamnesis at these patients was long use of medicines or toxicants. In urine tests on concentration was marked the decrease of relative density. Third group included the patients with glomerulopathy. Presence of glomerulonephritis is verified by characteristic urinary sediment and pathomorphologic picture at the nephrobiopsy.

Leucocytes were excreted from peripheral blood, using a method, offered by M.Z. Fedorova and N.V. Levin [4]. Leucocytes were destroyed by triple freezing and thawing. Volume of lysate (100 mkl) was put on the pure and fat-free slide plate. After drying the received facias were scanned and analyzed.

RESULTS AND DISCUSSION:

The typical theziogram of leucocyte's lysates of healthy persons is represented on fig. 1.

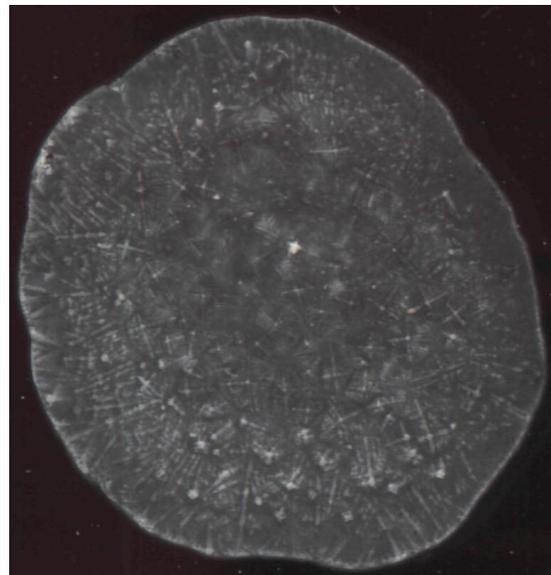


Figure 1. Theziogram of leucocyte's lysates of healthy person

Crosswise pseudo-crystalline structures of medium dimensions were observed in the central zone of leucocyte facias of healthy donors. Intermediate zone has been presented by long crystals located radially,

crosswise crystals and small crystals with abnormal form. In fringe zone there were single long crystals.

The typical theziogram of leucocyte's lysates of the patient with interstitial nephritis (IN) is represented on fig. 2.

The theziograms of leucocyte's lysates of patients with IN were characterized by presence of long crystals located in intermediate zone of facia with direction of crystal growth from centre to periphery. In direction to fringe zone the crystals were branched, forming the crystals of 2-nd and 3-rd orders. In the central zone of facia was observed a small region with pseudo-crystals located in type of scutal formations and generated in type of cruciate structures.

The typical theziogram of leucocyte's lysates of patient with a chronic pyelonephritis (CPN) is represented on fig. 3.

The theziograms of leucocyte's lysates of patients with CPN were characterized by presence of large scutal structures, formed by crystals, growing crosswisely. These structures were present in the most part of the facias, where was free only fringe zone. Fringe zone was characterized by presence of less amount of chaotically located small crystals. The typical theziogram of leucocyte's lysates of patient with glomerulonephritis (GN) is represented on fig. 4.

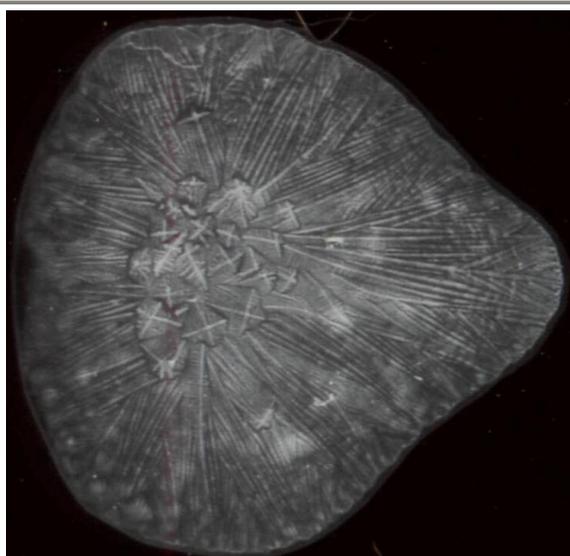


Figure 2. Theziogram of leucocyte's lysates of the patient with IN



Figure 3. Theziogram of leucocyte's lysates of patient with CPN.

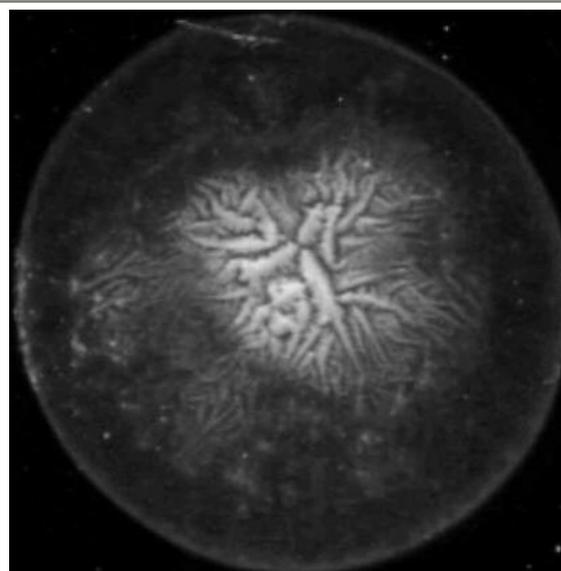


Figure 4. Theziogram of leucocyte's lysates of patient with GN

The theziograms of leucocyte's lysates of patients with GN were characterized by presence of small dendrite crystalline structures located in the central zone of facia. The intermediate zone of facia was transparent, with rare small crystals. Crystalline growth in the fringe zone of facia was not observed.

According to our researches the structure-forming properties of neutrophils of patients with CDK are characterized by expressed metabolic infringements. The metabolic infringements directly depend on prevailing type of damage of kidney tissue. Neu-

trophil's lysates of patients with glomerulonephritis has more elementary architectonic of theziographic structures than at patients with pyelonephritis the teziogramms of which are less organized. All three groups have general tendency in development of pathological process, what is characteristic for CDK, but each of them has peculiarities in of neutrophil's metabolism. In our opinion, these peculiarities significantly can influence on behavior of leucocytes in the conditions of chronic inflammatory process, de-

fining their contribution in progressing of irreversible changes in kidney tissue.

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Materials of Conferences

**INFLUENCE OF 20 % SPIRIT EXTRACT
PRODUCED FROM DEAD BEES
ON THE LEVEL OF HEPATOCYTES'
PROLIFERATIVE AND APOPTOTICAL
ACTIVITY DURING A STRESS**

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Liver plays an important role in homeostasis maintenance. The organ takes part in its maintenance both in normal processes supporting a life, and in adaptation of an organism to any loadings and stresses. The morphological and functional condition of this organ can indirectly reflect a condition of an organism as a whole [5]. Any change of such parameters as the linear sizes of a cell nucleus and a number of hepatocytes is one of typical signs of adaptation process taking place as the sizes of a liver cell nucleus directly depend on the amount of DNA in it [7]. The excitation or damage condition of hepatocytes can be accompanied by more intensive protein synthesis. The same phenomenon is also observed at the increase of functional activity of an organism as a whole. Moreover, it is possible to estimate a functional condition of body according to the linear sizes of hepatocytes' nucleus. Besides, it's typical of a liver to have rather constant correlation of diploid, tetraploid and polyploid hepatocytes. Any change of this correlation shows some functional disorder in the organ which can be caused by various damaging factors. The total number of cells and a correlation of various cellular populations in a normal condition is supported by the interaction of mitosis, amitotic division and apoptosis mechanisms [1].

One of ways to increase the adaptation abilities of separate organs, their systems and those of an organism as a whole is to apply biologically active additives (BAA). BAA's supply (manufacture) is an important branch of modern biotechnology [3,4].

BAAs produced from dead bees take an important place among other additives made from other products of beekeeping. Dead bees continue to possess high biological activity that results from the components building their structure such as: chitin, melanin, heparoids and other biologically active substances (BAS). These preparations (BAAs) possess adaptogenic (adaptation-stimulating), immunomodulatory, hepatoprotective, recycling and antitoxic properties [6].

Proceeding from the above-stated, the research of the influence of an extract from dead bees on a liver during a chronic or sharp stress seemed to us quite promising.

Vistar rats, both male and female, at the age of 1,5 months were chosen to make a set of experiments. The first group of animals (n=20) was a control one, the second group (n=20) was an experimental one, in the latter group all rats received an extract of dead

bees with a drink, its amount being calculated according to a rat's weight, i.e. 0,1 g of an extract = 100 g of weight. Both groups were subdivided into 2 subgroups. All the animals were kept in the standard laboratory conditions.

Within three weeks a chronic stress was provided in one of the subgroups of each group. Two other subgroups were subject to an immobilization stress. A chronic stress consisted in using a test of forced swimming which was carried out by means of the standard technique [2]. The rats of a control and experimental groups were forced to swim until complete exhaustion once a week throughout 3 weeks, after that the sampling of liver cells for morphological and histochemical analysis was taken. The experiments on animals were carried on according to the regulations of protection of the vertebrate animals used in the scientific purposes (Regulations and recommendations for the European independent committees concerning ethics, Brussels, 1995, 1997; Recommendations to Committees on the ethics, making examination of biomedical research, Geneva, 2000).

An immobilization stress was simulated by fixing rats, with their paunches up, on a laboratory restraining chair for an hour, then the animals were put down.

Histologic research was carried out by the standard technique with samples dyed by hematoxylin and eosin, with the subsequent calculation of mitotic and apoptotic indices (MI and AI) being made. These indices were calculated according to a number of hepatocytes under mitosis or apoptosis conditions in 1000 cells.

As a result, it has been established that the signs of the initial stage of a granular dystrophy were observed in the liver of all rats in the control group. The micronecrosis process was registered. The hepatocyte borders were blurred, they could not be accurately distinguished. The joist (beam) structure was damaged in some places. The morphological analyses result of rats' liver in the experimental groups corresponded to the standard results under normal conditions.

MI for the rats in the control group subject to a chronic stress appeared to be the least one ($1,175 \pm 0,08 \%$) and evidently differed from the result (index) in the experimental group ($2,00 \pm 0,1 \%$) and from MI of the immobilized rats' liver in the control group ($2,23 \pm 0,12 \%$).

The similar tendency has been traced as far as AI is concerned: in the control group at a chronic stress AI was equal to $0,025 \pm 0,001 \%$; in the experimental group under a chronic stress it amounted to $0,04 \pm 0,005 \%$ that evidently differed from the previous result. In the control group subject to a sharp stress AI was equal to $0,2 \pm 0,06 \%$ that appeared to doubtfully be higher than in the experimental group – $0,17 \pm 0,03 \%$.

Karyogram of rats' hepatocytes in both control groups has clearly shown 3 peaks with the displace-

ment tendency to the right that is characteristic for stress reactions which is accompanied by the increase of hepatocytes. In a liver of the experimental rats the karyogram had a more smoothed character, with 2 peaks being distinguished without any doubt. In a whole, the karyogram was displaced to the left. It is necessary to mention also that the karyogram for both groups which were under the conditions of a chronic stress was displaced to the left as compared to the immobilized rats' karyogram.

The spirit extract produced from dead bees stimulates the process of regeneration of hepatocytes population by means of a mitosis under both chronic and sharp stresses. In addition, AI in liver of the rats that were given the dead bees extract proves to be higher alongside a better pathomorphological result. This can be explained by the fact that under some stressful factors hepatocytes originally perish due to apoptosis, and only after that one can see both monocellular and local necrosis in the organ[8]. Taking into account the above, we can come to the following conclusion that the spirit extract produced from dead bees possesses a certain activity stimulating stress adaptation processes in the liver.

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THE PRACTICALLY HEALTHY PEOPLE'S LARGE INTESTINE MICROBIAL FLORA COMPOSITION

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At present, the normal microflora is, practically, being considered, as the owner's human organism integral part, the original and the peculiar extracorporeal human organ, having involved just into the proper and also the allogenic and the foreign substances, just into the structure, which the first is, practically, being involved just into the absorption, and, through which the translocation is being proceeded on, as the useful, well as the potentially harmful agents, including the microbial origin [3].

The practically healthy people's at the age in the range from 3 up to 45 years microbial flora has been studied and thoroughly investigated by us. The microscopic and the culture methods use have been shown, that the protozoa infection has been made up 2,73 % (e.g. 3 persons) just in this group, and this, moreover, is, considerably, being lowered the people's with the gastrointestinal tract pathologies analogous index. So, in all these cases, the protozoa finding has been accompanied with the bowels microflora disbiotic changes, having, at the same time, the various degree of the manifestation.

The «normal» microflora notion has already been defined, as the large intestine bacterial dissemination average physiological value, having taken into consideration the received final results' oscillations.

All these investigations have been carried out, having defined the qualitative and the quantitative compositions of the bacterial communities with the following space structure identification and also the ecological groups' hierarchy.

The received final data analysis has been permitted to be identified the 390 microorganisms strain and also to be related them to the 11 deliveries.

The bowels microflora composition study and the thoroughly investigation had already been shown, that its composition was enough diverse and suffice various (table 1). The obligate – anaerobic flora analysis was been shown, that the bowels' colonization density by the obligate – anaerobic bacteria had been presented by the representatives' high level concentrations, having been studied and thoroughly investigated taxa. So, the bacteroides' values oscillations have been from 10^8 up to 10^{10} QEU/gr. The clostridia's dissemination lower bound has not been exceeded 10^5 QEU/gr. Thus, the healthy man's average colonization density by the obligate – anaerobic microorganisms has been defined, as 1gr. $10,3 \square 0,7$ QEU/gr.

Table 1. The Large Intestine's Microflora Main Representatives

Microorganisms	Abs.	%	1gr. QEU/gr., M□m
Lactobacteria	80	100,0	8,8□0,6
Bifidus bacteria	80	100,0	9,3□0,1
Escherichia	80	100,0	7,4□0,3
Bacteroides	52	65,0	10,3□0,1
Enterococcus	14	17,5	4,7□0,2
Enterobacteria (totally)	17	21,3	3,7□0,2
Protei	8	10,0	3,5□0,1
Клебсиеллы	6	7,5	3,4□0,7
Enterobacter	3	3,7	3,1□0,5
Staphylococci	16	20,0	4,1□0,4
Candida Fungi	22	27,5	3,3□0,1
Clostridia	5	6,2	6,0□0,8

So, the singled out microorganisms identification was shown, that the bacteroides were being occupied the dominating situation among the anaerobic flora, which were being made up the most numerous bacteria group, as by the character frequency, well as by their colonization density. Thus, the healthy people's average bacteroides' content just in the bowels has been equaled to 10,3□0,1 QEU/gr., and they have been discovered at the 65,0 % examined persons. The bacteroides – are the Gram – positive anaerobic bacilli, which are not being formed the spores; they give the following growth, just in the form of the whitish or the grayish colonies with the smooth edges, having had the 3 – 6 mm [1] just on the solid and nutrient medium.

By the authors' majority data, the clostridia are the Gram – positive, spore – forming, frequently movable, bacilliform bacteria, and the obligate anaerobes [4]. They are being related to the bowels' normal microflora optional part. But they are being found seldom, and, moreover, their quantity will not have to be exceeded 10^7 QEU/gr. just in the normal biocoenosis [2,5]. The clostridia have been found just at 5 persons, that has been made up 6,25 % in the carried out studies and thoroughly investigations, for all this, the dissemination density has been varied in the range from 10^5 up to 10^7 microbial bodies, having had the average value, which is equal to lgr. 6,0 □ 0,8 QEU/gr.

The aerobic microflora analysis has been shown, that the microorganisms' abundance is being dominated just in the healthy people's bowels. The biocoenosis' constant representatives have been the lactobacteria (e.g. 100,0 %), for all this, all these microbes have been found just in the titres in the range of 10^7 – 10^{10} QEU/gr. at the examined majority.

The bifidus bacteria have also, frequently, been discovered just in the microflora (e.g. 100,0 %), for all this, the dissemination average arithmetic value has been rather considerable (e.g. lgr. 9,3□0,1 QEU/gr.).

The considerable physiological role is being belonged to the bacteria bowels' group among the large intestine aerobic flora. The study and the thoroughly escherichia qualitative and the quantitative compositions investigation are being presented the quite reasonable ones for us. It has, moreover, been shown in this work, that the *E. coli* have been found at all the examined ones (e.g. 100 %) with the values fluctuations just in the range of from the 200 mln. up to 1 bln. microbial bodies in 1 gr. faeces, for all this, the dissemination value was equal to lg 7,4□0,3 QEU/gr.

The opportunistic pathogen enterobacteria (e.g. 21,25 %) have been sowed, quite often, just from the healthy people's faeces. The high microbial number has been fixed just for the protei – lgr. 3,5□0,1 QEU/gr. and also the клебсиелл – lgr. 3,4□0,7 QEU/gr., the enterobacteria (lgr. 3,1□0,5 QEU/gr.) have been discovered the less dissemination.

The staphylococci and the fungi sort of *Candida* have been met, enough frequently, among the opportunistic pathogen microorganisms. The representatives sort of *Staphylococcus* have been found at the 20,0 % persons, for all this the *S. epidermidis* (e.g. 15,0 %) has been sowed much more frequently, the *S. aureus* (e.g. 3,75 %) – considerably much infrequent, and 1,25 % has been fallen for the part of the rest sorts and types.

The yeast – like fungi sort of *Candida* (e.g. 27,5 %) have been registered, fairly often, at the healthy people's microflora. However, the dissemination has been rather insignificant by all these microorganisms, and the average arithmetic value has been made up lgr. 3,3□0,1 QEU/gr.

Thus, all these carried out studies and thoroughly investigations have been shown, that the healthy people's large intestine microflora is usually being characterized by the aerobic microorganisms' dominance. It should be noted, that this microorganism is quite able to be used, as the indicator one, at the microflora carried out study and thoroughly investiga-

tion, which is, as in the quite norm, well as at the pathology.

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BLOOD ERYTHROCYTE LIPIDS IN CONDITIONS OF ADAPTATION TO ALIMENTARY STRESS-FACTORS OF RATS

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Erythrocyte phospholipids (PL) and lipid fatty acids (FA) composition was investigated at different stages of exposure to high-caloric diet in male Wistar rats. Fat diet mainly included 2% of cholesterol and 19% of tallow of the total allowance. The animals were divided into 4 groups, 10 rats in each: control group comprising intact rats kept on the vivarium standard allowance; and groups comprising animals kept on experimental diet (30 days – group 1; 90 days – group 2; and 180 days – group 3). Lipids were extracted from erythrocytes by Bligh and Dyer method (1959). Quantitative analysis of certain phospholipids classes after thin layer chromatography was made according to V.E. Vaskovsky et al method (1972, 1975). FA methyl ethers were received by Carreau and Duback method (1978), analyzed on Shimadzu GC17A gas-liquid chromatographer equipped. Results were represented in relative percentage of total FA.

Separation of erythrocyte PL mixture of rats identified six components including phosphatidylcho-

line (PC), phosphatidylethanolamine (PE), phosphatidylserine (PS), sphingomyelin (SM), phosphatidylinositol (PI). Rats of group 1 demonstrated PL redistribution towards PS and PE accumulation and PI and PC share reduction. Onset of the deficit PI and PC, the PL which form outer monolayer of membrane lipid frame, indicate activation of specific phospholipases and intensification of lipoperoxidation processes contributing to plasma membrane destruction. Changes in erythrocyte membrane at PS, PC and PE level in rats kept on high-caloric diet for 90 days was of the same direction as in rats of test group 1. PC deficiency in outer layer of erythrocyte membranes was compensated by SM maintenance within the range pertinent to control group animals. Such condition can be described as a compensatory response of cell to long-term exposure to stress factors of alimentary nature. Moreover, due to the high saturation with PE cholesterol is hardly built into the inner monolayer. This helps to preserve hydrophil surrounding of cell membrane integral proteins and, therefore, their function. Depletion of erythrocyte PC which forms outer shell of cell lipid matrix was evidenced at a longer exposure to high-caloric diet (180 days) as well. PC reduction in group 3 was accompanied by reliable increase in PS and SM level as compared to control group, meaning that erythrocytic cell was structurally and functionally inadequate. Due to high saturation with SM, the clusters forming phospholipid in a membrane receive large quantity of cholesterol, and this results in lower permeability of cell membrane and interference in active metabolic processes. Thus, on the 180th day of the experiment cell membrane became unable to resist the continuous flow of alimentary stress factors, and the stage of cell compensatory protection depletion occurred that had been formed by the 90th day of high-caloric diet.

Analysis of the qualitative composition of FA of erythrocyte lipids showed that rats with dyslipidemia have considerable changes in FA composition as compared to control group. 14:0, 18:0, 17:0 FA share was observed to increase in group 1. Unsaturated FA demonstrated minor increase in relative level of 18:1n9, reliable accumulation of some n6 – 20:4n6, 22:4n6, 22:5n6 family FA and drop in 18:2n6. Share of polyunsaturated fatty acids (PUFA) of n3 family slightly reduced due to the identified decrease in 20:5 and 22:6. FA saturation index in rats of group 1 was low. Growing share of 22:4n6 and 22:5n6 in erythrocyte lipids can be deemed a compensatory response to the deficiency of 22:6n3. Blood erythrocytes of group 2 showed reduction of 12:0 and 15:0 share and increase in 16:0 and 18:0. On the contrary, rats of group 3 demonstrated growth of 12:0 level. Accumulation of saturated 14:0, 16:0 and 18:0 FA in erythrocyte lipids was more evident than in rats of group 2. Modification of n6 composition in PUFA was distinguished by reducing 18:2n6 share, reliable figures being obtained from rats of group 3; and growth of relative 20:2n6,

20:3n6, 20:4n6 and 22:4n6 content, more considerable in rat of group 2. Increase in 22:5n6 share was noticed for rats of group 3 only. Rats subject to long-term high-caloric diet demonstrated deficit of n3 PUFA – 20:5n3 and 22:6n3 FA. 20:3n9 compensatory synthesis from 18:1n9 FA was a natural consequence of n3 deficit in rats.

In a summary of the experiment results it can be stated that, regardless of the time of exposure, typical features of cell membrane lipids response to nutrient stress factor included PS accumulation, increase in saturated FA content and higher n6 FA share as compared to n3 FA. At the early stage of exposure to high-caloric diet (30 days) membrane appeared to be poorly accommodated for the changing environment. In order to preserve its structural and functional integrity, cell uses prompt stress response mechanisms described by strengthening phospholipid matrix of the inner membrane layer and intensified synthesis of long-chain n6 PUFA. Long-term (90 days) exposure to alimentary stress factors forms a compensatory response, which makes it possible to maintain membrane resistance to the damaging factors and to preserve SM level. Concurrent homeostasis of 18:2n6 and 22:6n3 functioning as body n3 and n6 FA markers helps to optimize cell adaptation to and survival in unfavorable conditions. However, on the 180th day of exposure to high-caloric diet accommodation failure and compensation source depletion were observed in the rats. These processes were evidenced by loss of phospholipid matrix asymmetry in erythrocyte membrane, lower essential n3 and n6 fatty acid share. Thus, modification of erythrocyte lipids composition revealed at different stage of exposure to high-caloric diet shows specific features of membrane response to alimentary stress factors manifested as cell compensatory protection mechanisms start on the 90th day and depletion by 180th day of the exposure, being risk factor of development of "illnesses of adaptation».

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LEVOCARNITINE IN CORRECTION OF METABOLIC DISTURBANCES UNDER CONDITION OF CHRONIC CHOLECYSTITIS

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Questions of metabolic therapy of a biliary pathology are of a great importance today. One of the metabolic preparations is levocarnitine, a synthetic analogue of the natural L-stereoisomer carnitine (L-3-

hydroxi-4-N-(3-methylammonium) butanoic acid). Its metabolic functions include fatty acid transport in mitochondrion, where they oxidize and emit adenosine triphosphate (ATP) energy; modulation of intercellular homeostasis of coenzyme A in mitochondrial matrix and a mediated effect on protein synthesis.

We aimed to study the influence of the levocarnitine-based pharmacological preparation on the lipid and protein metabolism at patients with non-calculous chronic cholecystitis.

Our test group consisted of patients with non-calculous chronic cholecystitis (n=47), control group included practically healthy persons (n=33). The study was conducted according to the Helsinki Declaration standards (2000), all the patients signed an informational agreement. All patients received 20%-levocarnitine solution per os during 21 days (preparation «Elcar», R№ LS-000184, 15.04.05 trademark certificate № 162966, LLC «PIK-PHARMA»). The following values of blood serum were determined: total cholesterol, high-density lipoprotein cholesterol, triglycerides, total protein and protein fractions, biochemical markers of biliary functional status. Very low- and low-density lipoprotein cholesterol was estimated by the Friedewald formula. The obtained data were evaluated by methods of the descriptive statistics using software Statistica 6.0. The difference reliability was assessed by the Student's t test. Differences were regarded as reliable when p<0,05.

65,9 % of the patients with non-calculous chronic cholecystitis had dislipidemia and 100 % of them had disproteinemia. In 42,5% of the patients were observed disturbances of liver function, caused by moderate cytolytic and cholestatic syndromes. These patients had stronger metabolic disturbances, than patients with a normally functioning liver.

The study results proved, that levocarnitine has a complex effect on lipid metabolism at patients with chronic cholecystitis. It had a lipidmodulating effect on the patients with dislipidemia, who did not any signs of a disturbed functional status of liver. After the treatment course, atherogenic fraction content in their blood reduced statistically reliably. The triglyceride level reduced two-fold, low-density lipoprotein cholesterol reduced by 22,4 %, total cholesterol - by 17,8 % and did not differ from the values in control group. Tendency to a higher content of high-density lipoprotein cholesterol and weaker atherogenic properties of blood serum was observed. Hypolipidemic effect of levocarnitine could possibly result in the intensified lipid utilization by means of enzymatic degradation and activation of fatty acid transport in mitochondrion, where they enter the β -oxidation cycle. Patients with dislipidemia and disturbed functional status of liver showed no definitive dynamics of blood lipid values. A possible reason for this could be the fact, that these patients had a more intense dislipidemia, and in order to achieve a hypolipidemic effect they probably need a longer treatment course. Among the positive results,

we could observe regressing cholestatic and cytolytic syndromes and a better biliary function. This was indicated by the activated hepatic protein synthetic function, which is proved by a statistically reliable grow of total protein and albumin fraction content, which increased by 15–17%.

To sum up, levocarnitine has a lipidmodulating effect under the conditions of non-calculous chronic cholecystitis with no disturbances of the biliary functional status; it improves liver function at patients with cytolytic and cholestatic syndromes. The obtained data prove, that levocarnitine is worth using for correction of the metabolic disturbances at patients with chronic cholecystitis.

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DOSE-DEPENDENT ANTI-INFLAMMATORY EFFECTS OF SYNTHETIC CANNABINOID-RECEPTOR LIGANDS

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The research was focused on the dose-dependent effect of synthetic cannabinoid-receptor ligands WIN 55,212-2 and anandamide on proinflammatory mediator expression by blood cells *in vitro*.

Aiming to study the dose-dependent effect of WIN 55,212-2 and anandamide (0,1; 1,0; 3,0 and 10,0 mcM) *in vitro*, blood probes were taken from 12 volunteers, whose level of proinflammatory mediators: cytokines (tumor necrosis factor (TNF- α), interleukin 8 (IL-8)) and eicosanoids (leukotriene B4 (LTB4), thromboxane B2 (TXB2)) did not exceed norms. Blood cells were stimulated by lipopolysaccharide (LPS) *Escherichia coli* in dose 10 mg/ml. Basal and LPS-stimulated cytokine and eicosanoid production in whole blood was measured by means of the immunoenzymometric assay.

It was shown, that a spontaneous level of proinflammatory mediators in the blood probes, obtained from the donors, did not exceed the following values: TNF- α - 80 pg/ml, IL-8 - 115 pg/ml, LTB4 - 110 pg/ml and TXB2 - 210 pg/ml. After the LPS-stimulation of the blood cells, the expression of mediators TNF- α increased 20-fold, IL-8 eight-fold, LTB4 12-fold and TXB2 two-fold. The experiment showed, that low concentrations of WIN 55,212-2 and anandamide did not change the mediator production by LPS-stimulated blood cells. In concentration of 3,0 mcM, anandamide and WIN 55,212-2 reduced the synthesis of TNF- α , IL-8 and LTB4. The strongest inhibiting effect on blood cells was achieved at concentration of 10,0 mcM. There were revealed no influence

of the studied substances in different doses on TXB2 synthesis.

To sum up, the research on the dose-dependent effect of cannabinoid substances on proinflammatory mediator expression by blood cells showed, that cannabinoid-receptor ligands WIN55,212-2 and anandamide have a unidirectional anti-inflammatory effect on TNF- α , IL-8 and LTB4 synthesis in human whole blood. The obtained data on the inhibiting effect of synthetic cannabinoids WIN55,212-2 and anandamide on proinflammatory mediator production could be used to develop new approaches to anti-inflammatory treatment.

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A MODEL OF EXAMINATION STRESS FOR THE DEVELOPMENT OF DETERMINED COLOURSTIMULATION ORIENTATED ON THE MODIFICATION OF THE FUNCTIONAL STATUS OF THE PATIENTS

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There is no other psychological term which is connected to our life as close as stress. Stress at home, in transport, at work and even during sport competitions. When stress mobilizes, for example sportsmen, it is positive factor. Otherwise, especially when it gets out of the control, it should be recognized as a destructive element of subsequent pathology formation. That includes people injured by nature-technological disasters.

Biocontrol is unique modern medical technology, which makes patient an active part of the medical-rehabilitation process.

Biocontrol is a complex of ideas, methods and computer technologies based on biofeedback, orientated on the development and perfection of physiological functions self-control mechanisms in normal condition or with a lot of pathologies. During the biocontrol procedure the information on different physiological functions will be given to the object by the external feedback arranged through a computer. It lets the examinee to learn how to control their physiological parameters and use this ability in daily life [1].

There is a problem commission on the hronobiologic and hronomedicine in Moscow (the chairman is academician F.I Komarov). The commission makes scientific researches orientated on practical use of biocontrolled colourstimulation and colourtherapy (the head is F.A. Pyatakovich).

BFB-therapy for the clinical appendices is divided into: BFB-EEG- therapy, BFB-GRS- therapy

(Galvanic reaction of skin), BFB – beta/teta – therapy, BFB – training for non-clinical application sphere is related to use of BFB-technologies in the effective stress management, which lets to increase the parameters of efficiency in sport, art, and everything else what needs long efforts and big responsibility [2].

There are also some alternative approaches based on hronobiological biocontrol. In 1994 we had proved the recommendations on the development of biotechnical colourstimulation systems, in which the parameters of colour influence on intensity may be automatically coordinated with parameters of biological feedback by means of transducer (gauges) of pulse and breath [3].

The realization of these theoretical positions was carried out in the patented biotechnical colour-soundstimulation system, in which two ovals with cyclically changeable colour sequence coded as this or that EEG pattern were shown.

The researches have shown that use of all biocontrolled colourstimulation provides transformation

of EEG pattern on the basis of the mechanism of resonant capture of thrust frequencies and modification of patient's functional status.

It is known, that at breath with frequency 5-6 one minute, the variation of pulse reaches the greatest values. When breathing 6 times a minute the maximum of stimulation of a wandering nerve is observed as a result of respiratory heart's arrhythmia action [4].

This breath is also called metronomical breath or resonant, because the transfer function of pulse change has expressed functional resonance on frequency about 0,1Hz at breath [5].

That's why we have decided to use metronomical breath in a combination with a relaxing colourstimulation. Naturally for these purposes it was necessary to consider models of biocontrolled resonant breath.

The models of resonant breath formulas are submitted as tables set key parameters which are used for drawing up the algorithms and the program realization of the automated colourstimulation system.

Table 1. Parameters of the phases in the models of resonant breath formulas

Formula	Inhalation c	Pause c	Exhalation c	Pause c
Type 1	4	1	3	2
	4	0	4	2
	4	1	4	1
	5	0	5	0
Type 2	3	1	3	3
	3	1	4	2
	4	0	5	1
	5	0	5	0
Type 3	3	0	5	2
	4	1	4	1
	3	1	6	0
	3	0	7	0

The main parameters of respiratory cycle phases include duration: inhalation — pause — an exhalation — pause.

In the system biotechnic the resonant breath is synchronized with colourstimulation for amplifications of the influence on the central nervous system. The Active participation of the patient will turn the procedure of treatment into the rehabilitation action.

The posttraining condition of students was studied with the help of chronobiological tests. Thus the criteria of health were the reserves of cardiovascular functions, respiratory system, and also their relative parameters: the hronotropical reserve, inotropic reserve, the parameter of the reaction's quality, the parameter of oxygen debts, the definition of "individual minute" duration, estimations of situational and personal uneasiness (The Spielberg's test), the results of rhythmtesting. The parameter of an organism's stabil-

ity to oxygen debts basically depends on cardiovascular and respiratory systems.

The reduction of the parameter testifies the increase of the reserve. The increase of the parameter testifies the cardiovascular and respiratory systems functions reduction. If the natural breath delay after a superficial exhalation reaches 40-60 seconds, the ratio of oxygen and carbonic gas in organism is normal.

The parameter of oxygen debts is defined by formula: $POD = P_s \text{ bt in min} / \text{Apnoe in sec}$. Test is carried out in rest, thus the intimate reductions frequencies are counted up, then the examinee makes a breath and a superficial exhalation after which holds the breath until it becomes difficult, then the time of breath delay is counted up.

If the calculated attitude is:

1. $\leq 1,0$, it is excellent;
2. 1,1-1,5 it is good;
3. 1,6-2,2, it is well;

4. > 2,2, it is bad.

The stratifications of the parameter of organism's stability to oxygen debts differ with students in an initial condition before training and after training. If the outcome parameter of students oxygen debts was good and excellent only with 33% persons, after training it became good and excellent with 75% examinee.

Our researches have shown that the disposable procedure of the determined biocontrolled light-emitting diode colourstimulation did not render any influence on this parameter.

The distributions of the "individual minute" parameter of students in an initial condition in comparison with the period after training of control group were investigated.

From the data submitted in the table follows that the distributions of the "individual minute" parameter of students authentically differs from the initial data and the results received after the training course. During the initial period the "short minute"

appears in 1,6 times more often than after the training course.

That, first of all, confirms the well-known a priori nervous-emotional condition of this category of students.

The directive biocontrolled light-emitting diode colourstimulation has led to "lengthening" of the "individual minute", and due to that the share of students which were having "short minute" has authentically decreased for 19% ($p < 0,05$). The number of students having the "individual minute" has coincided increased 4 times. The number of students who's physical and "individual minute's" time has coincided has increased in 4 times.

Quantitative characteristics of sympathetic and parasympathetic nervous system prevalence at rhythm regulation of the intimate reductions can be received at studying information parameters of temporary pulse orderliness.

Table 2. The examination stress influence on the parameters of the variability of the heart's rhythm.

Regime of the mobilization microstructure of the pattern HRV	Period of examination				Module		
	Fone		Stress		2 – 3	4 – 5	2 – 4
	Tranq respir	Reson respir.	Tranq respir	Reson respir.			
1	2	3	4	5	6	7	8
Quasi harmonic	56	39	-	20	17	20	56
Quasi determination	4	-	14	2	4	12	10
Harmonic	2	-	67	59	2	8	65
Determination	1	-	19	-	1	19	18
Quasi stochastic	31	51	-	23	20	12	31
Stochastic	6	10	-	7	4	7	6
$\sum P\%$	100	100	100	100	-	-	-
$\sum P_{i1}-P_{i2} $	-	-	-	-	48	78	186
$D(x_i)\%$	-	-	-	-	24	39	93
Signification	-	-	-	-	$P < 0,05$	$P < 0,05$	$P < 0,05$

From the submitted data follows that the resonant breath allows to differentiate the influence on the heart rhythm regulation of the wandering nerve. The metronomic breath provides the contribution of the cholinergical influences (a wandering nerve) to the comparison with vagal inhibition influence adrenergical mechanisms (a sympathetic nerve) for the people which are having stress.

This means that the similar test also has independent medical influence, besides diagnostic. Thus,

summarizing the material submitted in the section, it is necessary to note, that in the period before course influence on a frequency spectrum the alpha-rhythm concerned to a range of low amplitude of 12-13 Hz.

After the carried out determined colourstimulation course, the structure of the rhythm has undergone essential changes: the density of high-frequency components has decreased because of the beta range. Also the densities low-frequency and highamplitude components in the alpha range has increased due to the

frequency of 10-11 Hz. The decrease of the θ/α also means that the influence succeeded.

The process of the reorganization of EEG pattern is carried out unidirectional with the reduction in the system of the disorder measure, random and increase of the reproduction function, which shows the increase of the system efficiency: the optimization parameters grow in 1,5 times in comparison with an outcome before treatment.

It's also necessary to mention that the biotropical EEG parameters reflect normalization of the neurodynamical processes of the brain activity, directed on amplification of the braking reaction.

The Conclusions

As a result of carried out science work we have got the following results, which are new for the science:

1. The model of the efficiency colourstimulating optimization influences at stress was investigated. The light structure of the model met to a pattern of an alpha-rhythm spindle. The alfa-spindle model was developed in such way that, that lightimpulse porosity decreased all over again up to peak of a spindle and then as smoothly increased up to the last lightimpulse.

2. The Formed model to optimization to efficiency of the influence to account of the reinforcement intersystemic relationships of the system of the regulation. For these purpose was released structure in the form of pattern "resonance of breath", including change the correlations to duration of the inhalation and exhalation under unchangeable period 10 seconds.

3. It is designed module biocontrolled of the system deterministic biocontrol, including possibility to independent realization of the synchronous influence by the method of the colour stimulation and resonance of breath.

4. Efficiency training of the colour stimulation beside student, having high neuroemotional load, was charaterized by change their functional condition in after training period to account of the transformations neurodynamic to activities of the brain.

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THE EFFECT OF THE CHANGE IN POPULATION QUALITY OF LIFE ON THE VALUES OF PREGNANCY LOSS AND FETUS DEVELOPMENT

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The fact of comparatively higher population quality of life and medical service in previous decades has been a distinction feature of Russia development dynamics for last 20 years [G.A. Komarov, 2009]. Slowing down the rate of economic development is considered as a main cause of direct material losses, missed benefit, non-expectancy to live till a certain number of years. The specific contribution of social loss is accepted to account for 81.6% of total loss, while that of ecological loss – 18.4% [N.I. Kozlova et al., 2002].

Despite the measures undertaken to stimulate birth rate, the before-existent level failed to be achieved, thereby confirming the notion of eventual character of demographic crisis. It should be noted that low values of birth rate are observed in European economically favourable countries as well, because the population urbanization with the change-over to health quasi-modern type is characteristic of industrial society. The most important causes, giving rise to different disorders of intrauterine development, include chronic malnutrition and improper nutrition of women before and during pregnancy [V.A. Shchurov et al., 2008]. In the countries undergone fascist occupation the baby development in mothers, who went hungry in war time, was accompanied by a number of disorders: increasing the incidence of spontaneous abortions, premature births, mortinatality [Yu.I. Novikov et al., 1981]. The children born grew weakened, they had more diseases and higher mortality rate. In countries with higher animal protein consumption the body size of younger-age children was relatively more [T.V. Volkova, 1988]. For example, in Bombay, where society caste structure still remains, the body mass of "the lowest" class newborns amounts to 79% of the value of "the highest" class children [R.K. Ignat'yeva, 1970]. In France the body length in the newborns of immigrants from South Africa is less in comparison with natives of Paris [F. Rovilli-Sausse, 1998]. In

21.6% of children from relatively poor Eastern Kentucky the body length is lower than 15th percentile, that is closely connected with education level and father's employment status [D.L. Crooks, 1999].

The aim of the present study was to analyze the effect of changing quality of life in the Kurgan Region population on the frequency of pregnancy loss, and that of fetus and newborn growth and development. The work is based on the analysis data of 2600 delivery and newborn histories within the period of 1989-2008, 95 fetuses of pregnancy loss, and that of studying the intellectual abilities of 445 children under school age.

After 1991 the Kurgan Region, economically successful before, changed into a region with the economy of depressive character, losing up to 1% of population every year, and a half of the region population found itself far from poverty boundaries. The region population has been observed to consume much less animal food products. 1/3 decrease of meat product consumption couldn't affect the growth and development of newborns, first of all, in those families where women are engaged in industry doing physical work. According to this, the birth rate has decreased from 20‰ in 1989 to 9‰ by 1997, and it still remains at the level of 10‰ at present. The process of body growth acceleration of Kurgan girls has lagged behind its tempo in other large towns. The mean values of girls' body growth have rested upon the level of 163±0,4 cm. The analysis made demonstrated that beginning from 170 cm the decrease of longitudinal body sizes of women in labor and their pelvis size is accompanied by not only the decrease of body sizes, but by that of newborn head as well. The decrease of head circumference from 36.1±0.1 to 34.5±0.1 cm has been revealed in newborns of different years after 1990.

The tendency towards systemic hypotension and anemia has been revealed for women in labor from unfortunate families. Pregnancy loss prevention remains the most important reserve of birth rate. In cases of pregnancy loss in women with special education from an economically more successful group this loss occurs in later periods. The degree of fetus maturity increases accordingly from 19% to 45%.

Within the period of 1990-1997 the incidence of the arrest of children intrauterine development increased from 2% to 16%, and by the present it has reached 6% of newborn number. The percentage of premature children has amounted to 2.9%, 8.4% and 4%, respectively. Under the conditions of economic crisis the values of Apgar-1 scale 8% decreased ($p \leq 0.001$). Besides, the dependence of this value on a district latitude disappeared, but the difference between urban and rural newborns remained.

Hence, in economically unfavourable families the retardation of newborn growth was observed, which affected head growth to a lesser extent. Under favourable conditions such children would compensate for developmental retardation in postnatal period.

This is not so in practice, because after their birth these children remain in the same families of insufficient material security. The coefficient of intellect in children under school age was found to be lower than age-related standards. Mother's level of education is of importance for the development of intellectual abilities in children, particularly in rural ones under school age. Family's material security plays more important role in the development of intellectual abilities in urban children, particularly in boys. In economically unfavourable families the coefficient of intellect in children under school age depends directly on the level of parents' income.

Early pregnancy, the absence of husband in a woman, as well as the absence of special education, work – these are considerably unfavourable factors, first of all those of economic aspect. Under the conditions of material sufficiency these factors just can't have a restraining effect on fetal growth and child's development.

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THROMBOSIS IN DIFFERENT LOCATIONS: CANDIDATE GENES AND THE FUNCTIONAL STATE OF THE HAEMOSTATIC SYSTEM

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Thrombotic diseases, such as ischemic disturbances of cerebral and coronary circulation and thrombotic diseases of the venous system, have spread widely in recent years. Many see the reasons of this pathology in disturbed hemostasis, hemorheology, as well as in the interaction of environmental factors and genetic predisposition [3, 4, 5, 8, 9].

Prevention, diagnostics and treatment of thrombotic conditions are the topical questions facing the modern medicine. At the same time, it has been proved, that the revealed markers of thrombinemia do not let identify the reason of predisposition to intravascular coagulation. Consequently, this method is not sufficient for selecting a pathogenetic therapy. In this regard, clinical practice focuses nowadays on tracking the causes of predisposition to recurrent thrombosis – finding «risk genes», responsible for the predisposition to multifactorial diseases, including the thrombotic ones [1, 6].

Aims and objectives

The aim of this study was to analyze the candidate genes in patients of the West Siberian region with a verified diagnose of thrombosis in different locations, and try to prove, that genetic tests give more diagnostic opportunities to cardiologists, phlebologists and other doctors in their everyday practice. We have

examined the venous blood, estimated the functional state of the haemostatic system and thrombophilia predisposition genes.

Materials and methods

We observed 64 patients from the West Siberian region (Novosibirsk and the Novosibirsk region) with different forms of thrombophilia, aged between 6 and 71 years old. Our test persons were divided into two groups: 22 patients with arterial thrombosis – ischemic stroke and cardiosclerosis after a heart attack, and 42 patients with deep venous thrombosis (DVT). We studied 19 candidate genes (25 allelic variants), whose products are involved in coagulation cascade, fibrinolysis system, sustaining of vascular tone and methionine metabolism (folat cycle genes).

Results

Analysis of changes in haemostatic values – platelet, coagulation and fibrinolysis - in patients with ischemic stroke and deep venous thrombosis showed, that AT III activity, content of protein C, fibrinogen and D-dimer had no statistically considerable differences from the normal values. At the same time, in 73% of all patients from the both groups, a higher level of soluble fibrin complex (SFC) could be seen, which points to hemostasis activation, i.e. intensification of thrombin and fibrin formation. In both groups of patients, a higher functional platelet activity was observed, but the frequency of induced platelet activity among the patients with ischemic stroke was higher, than in the patients with DVT. It should be mentioned, that the higher platelet functional activity in patients with the deep venous thrombosis was induced by collagen, in patients with the arterial thromboses – by ADP and adrenalin.

The main candidate genes, which take part in thrombophilia development in the examined patients are listed in the following table.

Frequency rate of genetic polymorphisms in patients with thrombosis in different locations

Gene	Gene name, (polymorphic substitution)	Frequency (%)	Homozygous variant (%)
PAI1	Plasminogen activator inhibitor (675 5G -> 4G)	80,6	38,4
$\alpha 2$ PLI	Plasminogen inhibitor	50,0	53,8
PLAT	Tissue plasminogen activator (7351 C -> T)	34,4	20,0
MTHFD	Methylenetetrahydrofolate Dehydrogenase 1 (1958 A- >G)	76,6	47,8
MTHFR	Methylenetetrahydrofolate Reductase (C677T)	58,0	5,5
MTHFR	Methylenetetrahydrofolate Reductase (A1298C)	58,2	33,3
MTRR	Methionine synthase reductase (66A > G)	70,0	40,9
MTR	Methionine synthase (2756 A- >G)	10,3	0
NSO3	Endothelial NO-synthase (VNTR)	18,5	60,0
NSO3	Endothelial NO-synthase C->T (Glu298Asp)	42,8	16,6
Gp Ia	Integrin-alpha-2, glycoprotein 1a of platelets (807C- > T)	50,0	0
GpIIIa	Platelet glycoprotein IIIA, integrin beta 3, (1565 T- C) (Leu33Pro)	45,2	21,4
Gp Iba	Platelet glycoprotein Iba (VNTR)	0	
FGB	Fibrinogen-beta-peptide (455 G ->A)	37,5	8,3
FV	Leiden factor (1691 G->A (R506Q)	14,0	0
FII	II coagulation factor (20210 G ->A)	6,0	

Analyzing gene Gp-Ia integrin-alpha-2, polymorphic variant T Gp-Ia was revealed in 50% of all cases. As for polymorphic variant T of this gene, we observed, that platelets adhere to vessel walls faster, which can increase the risk of thrombophilia. Our data let regard variant T as a marker for high risk of thrombus formation, especially, in combination with gene defects – markers of endothelial dysfunction and folat cycle enzyme genes. Comparative analysis of distribution of alleles and genotypes of this polymorphic marker in patients with arterial and venous thromboses revealed no reliable differences.

Platelet glycoprotein GPIIIa (integrin β_3) encodes amino acid sequence of platelet receptor subunits for fibrinogen and Willebrand factor. A leucine-to-proline substitution, determined by the substitution of T by C in exon 2 of gene GPIIIa at position 1565, is accompanied by a higher platelet predisposition to aggregation, which increases the risk of cardio-vascular diseases. Polymorphic substitution 1565 T- > C was found in 45,2% of the examined patients of the both groups. None of the examined patients had polymorphic variant Gp1ba (VNTR) – gene that encodes amino acid sequence 1beta – subunits of specialized platelet receptors, which organize interaction between platelets and the wall of a damaged vessel or damaged surface of a atherosclerotic plaque.

Polymorphic substitution 675 5G -> 4G of the plasminogen activator inhibitor gene (PAI-1) points at the predisposition to endothelial dysfunction. The gene encodes protein – plasminogen activator inhibitor, which is one of the main components of the blood anticoagulation system. Polymorphic variant 4G, which is accompanied with increased gene expression and causes higher PAI-1 level in blood, was found in 80,6 % of the patients, both with arterial and venous thromboses. It is well known, that in endothelial dysfunction, fibrinolytic activity is mainly inhibited by stronger endothelial synthesis and PAI-1 secretion [2]. 45% of patients had a combination of PAI-1 gene polymorphism with gene $\alpha 2$ PLI –plasminogen inhibitor, 34,8% had a polymorphic variant of tissue plasminogen activator (PLAT), polymorphic substitution 7351 C->T, which is a sign of falling expression of tissue plasminogen activator, leading to ineffective fibrinolysis.

We also estimated the predisposition for endothelial dysfunction analyzing mutation of genes, which regulate the vessel wall condition - NOS(e) endothelial NO-synthase, VNTR-polymorphism and polymorphic alternative C- T (Glu298Asp), as well as endothelin and hANP. Polymorphic variant of endothelial NO-synthase gene - NOS(e), VNTR-polymorphism and polymorphic substitution C -> T (Glu298 Asp) were registered in 42,8 and 18,5% of cases correspondingly, which could be a reason for reduced NO synthesis, and, as a result, growing vasoconstriction, lower vasodilation and higher predisposition to thrombus formation [9,10].

We studied the system of folat cycle genes, as they play an important pathogenetic role in thrombophilia development. Six folat cycle candidate genes (7 allelic variants) have been examined. Polymorphisms of genes MTHFD, MTRR and MTHFR were revealed frequently. The majority of homozygous variants were found in genes MTHFD and MTRR. It should be mentioned, that in most cases, we found combinations of several folat cycle gene polymorphisms. Three-genetic-polymorphism combination was observed in 45,2% of patients, homozygous variants of one or two polymorphisms were revealed in 81,2% of patients. Combination of four polymorphisms was found at 22,6% of the examined patients, and two polymorphisms – at 19,3%. Obviously, the polymorphic variant combination is a serious risk factor of functional disturbances in folat cycle enzymes, which leads to excessive homocysteine accumulation in blood and raises its thrombogenicity dramatically (1, 6).

Our research revealed a relatively low percent of mutations in factor Leiden and prothrombin gene (II coagulation factor (20210 G ->A) - 14% and 8% correspondingly.

Conclusion. To sum up, among the population of Novosibirsk and the Novosibirsk region, platelet glycoprotein and endothelial NO-synthase genes, as well as genes that encode endothelial proteins of fibrinolysis and folat cycle system, are the mostly frequent revealed thrombophilia-related polymorphic sites. The obtained data prove, that one of the key elements of thrombosis pathogenesis in different locations is the inhibition of fibrinolytic blood activity. Mutations in tissue plasminogen activator gene (PLAT) combined with mutations of the most important fibrinolysis inhibitors *PAI 1 u a 2* PLI, create serious conditions for a lower plasmin level in blood and cleaning the clogged blood vessels. Higher risk of thrombus formation and pulmonary embolism have PAI1-allele carriers, especially in combination with additional genetic defects – mutations in folat cycle genes (MTHFD, MTPP, MTHFR), platelet glycoprotein genes (GP III a, Gp-Ia) and genes, responsible for the vessel wall regulation.

Endothelial dysfunction, which determines the ineffective fibrinolysis, combined with the above mentioned risk genes of thrombophilia, can turn the predisposition into the pathology. Despite the fact, that arterial and venous thromboses develop differently, we found some syntrope genes involved in thrombophilia development, i.e. polymorphic genes responsible for both arterial and venous thromboses. We do not rule out the possibility, that the polymorphic gene frequency rate in patients with different forms of thrombophilia could change, if a larger number of people would be examined. As for the population of the West Siberian region – patients with pulmonary embolism, post-thrombotic disease, recurrent thrombosis, patients who need cava filter, testing of the above mentioned genes is getting more and more

important, as it lets determine a pathogenetically reasonable therapy and reduce the number of thrombosis recurrences. Besides, diagnostics of predisposition for thrombophilia lets considerably reduce the number of the post-operative thromboembolic venous complications, which are challenging for modern medicine and life threatening for patients after surgeries.

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THE CONJUNCTIVIS CYTOMORPHOLOGY UNDER THE SECONDARY «DRY EYE» CONDITIONS, HAVING ACCOMPANIED BY THE CHRONIC OCULAR ISCHEMIC SYNDROME

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The Aim

To study the conjunctivis cytomorphology at the secondary «dry eye» (SDE) patients under the chronic ocular ischemic syndrome (COIS) conditions.

Materials & Methods

The 64 moderately severe SDE patients (by Brzhevsky V.V., 2003), having had the COIS symptoms, and the 25 healthy volunteers at the age of $66,4 \pm 3,3$ years have been examined. They have defined in the conjunctivis imprints, having received by means of the original instrument use for the measured cellular material sampling (e.g. Yanchenko S.V. and co – authors 2008), and having stained by the May–Grunvald method: the epithelial cells average number with the alteration symptoms (EA) in the form of the karyopyknosis and the karyorrhesis, and the goblet cells (GC) average number in the one field of view (calculating on 100 random selected cytological objects). The tissular entropy factor (TEF) has been measured by the computer morphometry method by Avtandilov G.A. (1990), having permitted, objectively, to judge on the tissue structural irregularity level under the SDE conditions (e.g. Yanchenko S.V. and co – authors 2008). The 25 persons without the ophthalmopathy symptoms have been entered into the 1-st group, the 64 SDE patients with the COIS symptoms presence have been entered into the 2-nd group. All the results have been processed by the variation statistics methods.

Results

The singular epithelial cells presence with the alteration symptoms (e.g. $2,1 \pm 0,04$) have been registered in the conjunctivis imprints of the 1-st group. The GC quantity has been made up ($5 \pm 0,05$). The tissular entropy factor (TEF) has been equal to $1,3 \pm 0,002$ standard units. On the contrary, the EA average number at the 2 – nd group patients has been increased for 24% (e.g. $p < 0,001$), the GC quantity has been lowered for 20% (e.g. $p < 0,001$), the TEF has been made up $2,1 \pm 0,009$ (that is for 62% higher of the similar value under the standard conditions; e.g. $p < 0,001$).

Conclusion

It has been registered the cells number increase with the alteration symptoms and the GC average number lowering at the SDE patients under the COIS conditions, that is quite typical and for the other SDE clinical versions. These results are quite natural, as in spite of the factors variety, having promoted to the

SDE origin and progression, the epithelium cells are able to respond to these noci – influences by the limited methods quantity. At the same time, it should be noted, that the most significant appeared to be the TEF change. The TEF value can be served one of the objective criteria of the «dry eye» diagnosis making out.

The further researches' carrying out is actual by its valuation at the SDE different versions.

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MICROELECTRONIC CONTROLLING OF REALTIME COMPLICATED TECHNICAL SYSTEMS

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The very important parameter of high-speed realtime automation facilities is simplicity and reliability of control subsystems. For classical structure of Moore micro-programmed automatons (MPA), the operation algorithms are described as follows:

$$a(t+1) = F_1(a(t), \{\alpha\}) ; A(t) = F_2(a(t)) \quad (1)$$

where $a(t)$ and $a(t+1)$ are present (t) and following ($t+1$) state of the automaton; $\{\alpha\} - \alpha_1, \alpha_2, \dots, \alpha_q$ – logical preconditions; $A(t) - A_1, A_2, \dots, A_k$ – MPA output commands; F_1 and F_2 – Boolean function systems of MPA transitions and outputs.

Fig. 1 depicts a scheme of the automaton corresponding to equations (1); fig. 2 – control algorithm flow-graph (AFG) and fig. 3 – transition graph of Moore automaton. Algorithm of transition from AFG to the graph is presented in fig. 1. For simple MPA

with number of states ≤ 32 and number of logical preconditions $q \leq 5$, capacity of programmable read only memory (PROM) does not exceed 5 kbit. Memory capacity (V) required for realization of Boolean function systems of transitions F_1 shall be as $V(F) = m2^{m+q}$, where: m – length of representation code $a(t)$ and $a(t+1)$. When realizing more complicated automatons: with $m=5, q=10$, PROM=160kbit and $m=6, q=16$, PROM =24Mbit. Such memory capacity is too large for high-speed realtime automatons.

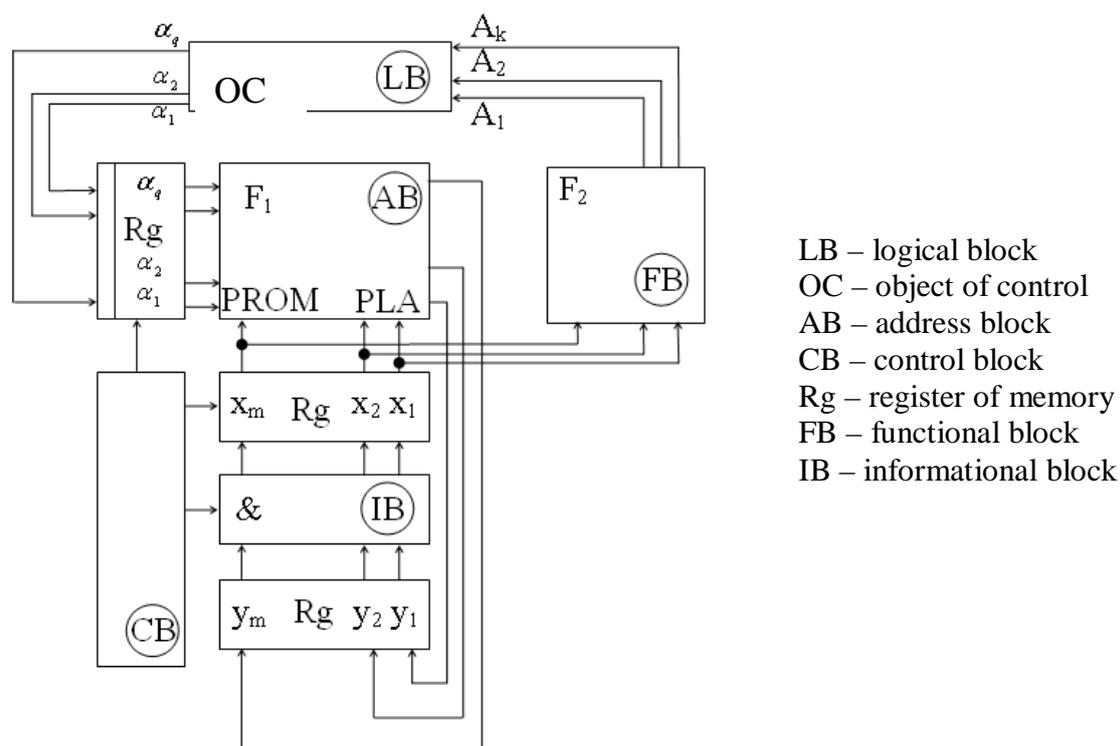


Figure 1. Structural scheme of Moore automaton

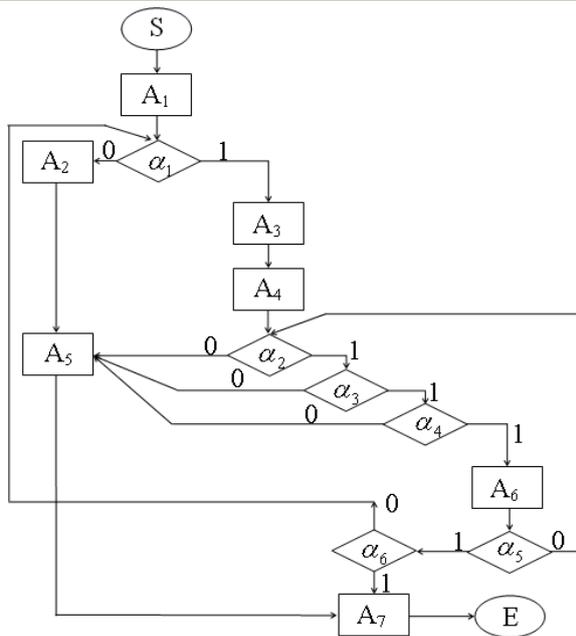


Figure 2. Flow-graph of control algorithm

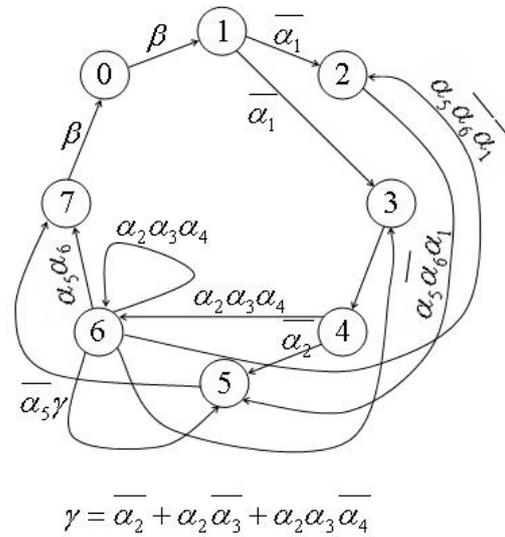


Figure 3. Graph turning Moore automaton

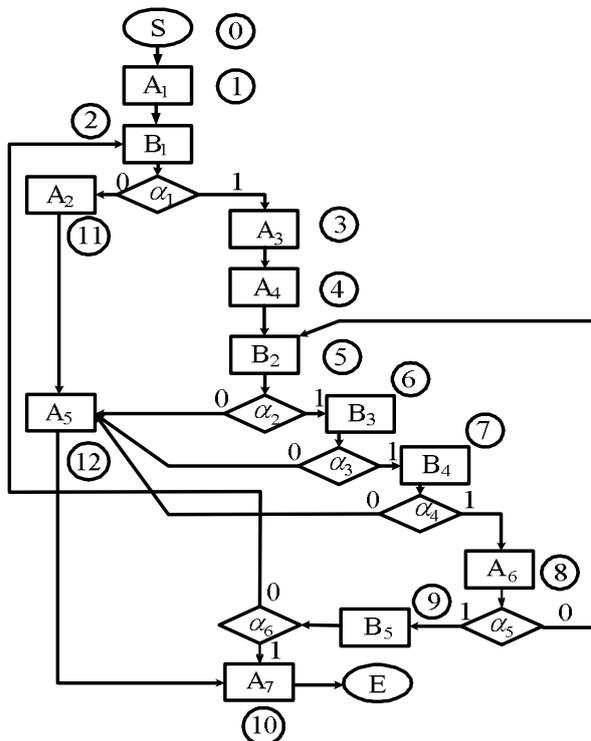


Figure 4. Flow-graph of new control algorithm

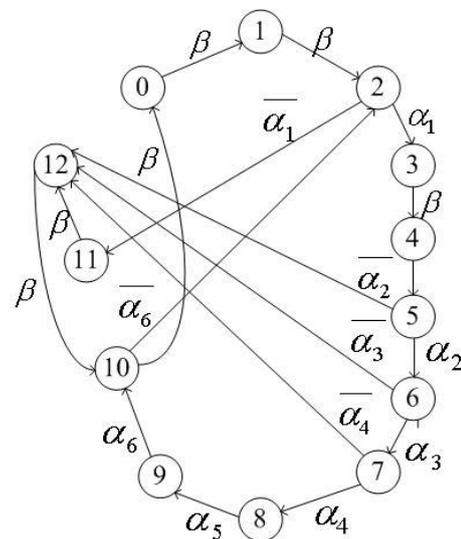


Figure 5. Graph-turning new automaton

To reduce complexity of F1 we may switch to realization by means of programmable logic arrays (PLA) or programmable

logic devices (PLD) applying science intensive arrangements to minimize Boolean functions (fig. 5, 6). However for complicated

automatons if $m=5$ and $q=10$ the effect from minimization is under 20% and approximates to only a few percents. The second way to structural optimization of PROM is applica-

tion of decomposition method i.e. partitioning of complicated automatons into a set of simple MPAs (fig. 4).

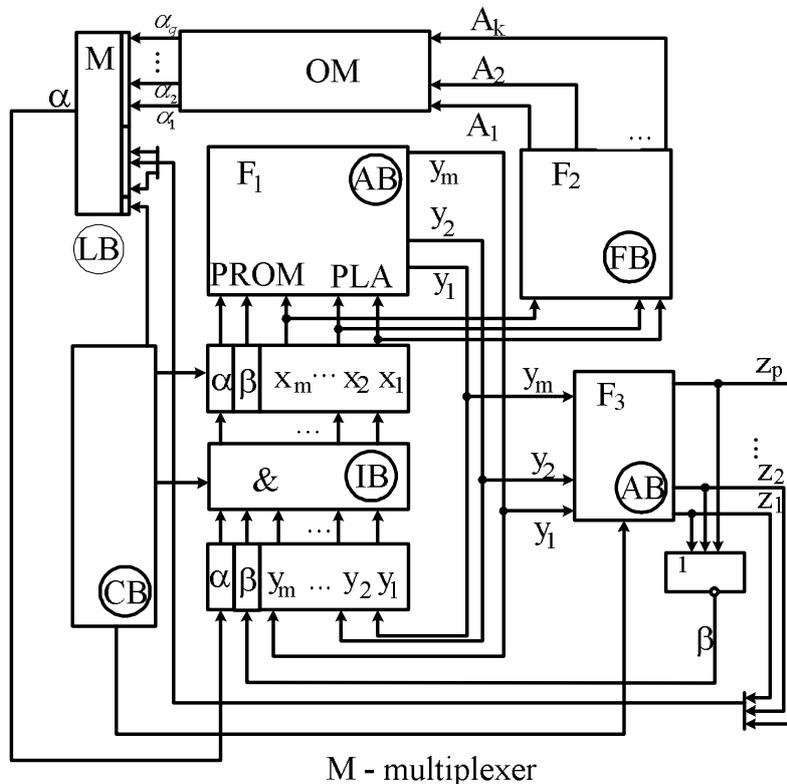


Figure 6. Structural scheme of new automaton

We introduce a new method of complicated MPAs synthesis (fig. 1, 2) which is based on transformation of the specified algorithm flow-graph (AFG). A void action operator A_{k+1} should be inserted after each logical operator α_i in case when output of this α_i is linked with the following α_j without intermediate operator A_p ($p - 1, 2, \dots, k$).

A void operator is also inserted before the α_i to which control is transferred from

several action operators. The modified AFG (fig. 4) allows us to get the transitions graph (fig. 5) in which there are two types of links of $a(t)$ and $a(t+1)$: unconditional β and conditional on single α_j , number (j) of which is completely specified by $a(t)$ code.

Formal description of the new MPA is made by the following equations:

$$a(t+1) = F_1^H(a(t), \beta, \alpha); A(t) = F_2(a(t)); j = F_3(a(t)); \text{ where "j" is number of "alpha"} \quad (2)$$

The length (p) of code z_1, z_2, \dots, z_p of representation "j" is defined as $p = \log_2 q$. The structural scheme of the MPA (fig. 3) corresponding to equations (2) is presented in fig. 6. As appears from (2), the new system of Boolean functions (F_1^H) of MPA address

part does not depend on number (q) of logical conditions, so $V(F_1^H) = m^{m+2}$. In case ($m=5, q=10$) we have $L = V(F_1^H) / V(F_1^H) = 256$; and for ($m=6, q=16$) we have $L = 2^{14} \approx 16,000$.

Modification of AFG does not break the automaton operation algorithms, but the realization is carried out by MPA structure with much less memory capacity of address part in some hundreds or even thousands times. It is significant that the new structure of MPA will be as efficient in case of realization by PLA or PLD since the number of input variables for F_1^H always equals $(m+2)$; and for practical even the most complicated AFG: $m+2 \leq 8$. As for systems that are not purposed for real-time information processing, instead of hardware realization of MPA by PROM, PLA and PLD we can switch to software realization by microcontroller. For classical structure with $(m+q) \geq 12$ this is problematic, but for the new structure of MPA applying $(m+q) \leq 8$, realization by eight-bit microcontroller is performed by direct reading method.

Thus the new method of MPA synthesis is a breakthrough in the problem of crea-

tion of reliable high-speed control facilities for complicated technical systems.

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Materials of Conferences

**INTEGRATION OF INNOVATION
TECHNOLOGIES IN THE PROCESS
OF FOREIGN LANGUAGES TEACHING
IN THE TECHNICAL UNIVERSITY**

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According to contemporary society demands, it is critical for an engineer to be capable of adapting to variable living conditions, analyzing situations, evaluating and finding solutions to problems and possessing communication skills. Due to formation of intercultural professionally oriented communicative competence in higher education establishments, future engineers are afforded an opportunity to tackle professional problems not only in the native language, but also in the foreign language (in our case in English). Thereupon, technical universities design multi-level educational programs, including both the level of communicative English and the one in the professional sphere.

Development of innovation techniques and computer technologies influences the ways of organizing future engineers' education. Computer-mediated communication (including the foreign language) is highly demanded in the society, which requires the skills of self-presentation, an effective deal with different information, critical evaluation of information recourses and successful handling computing devices.

Information community formation is accompanied by the development of the computer medium in business, scientific and everyday communication. Thus, when formulating objectives of training engineers, it is necessary to take into account changes in the professional field in computer mediated environment. Accordingly, newly designed courses in engineering professional-communicative teaching places a particular emphasis on implementation of such educational programs, which suggest application of teaching program combination based on the ideas of computer software training with other means of teaching. Information-communication technologies are connected with television, computers, projectors or text-, audio-, television- and computer environments.

One of the computing technologies fulfilled in practice is an interactive board. The introduction of new technical educational devices always evokes the sincere interest and enthusiastic discussion of their advantages and disadvantages. One of the main benefits of such devices over ordinary boards and projectors is that the attention of the students is centered which results in the possibility of keeping an eye-contact. The material of the lesson may be created in the digital version, which allows reducing the time for preparation and effectively using personal planning

and fulfilling the correction of the entire lesson material.

For successful work with interactive devices, it is required from the teacher to clearly be aware of their available technology and confident handling for creating a bright, vivid and active lesson of the foreign language. Interactive board combines possibilities of projective technologies and a sophisticated touch-sensitive device, which allows not simply displaying information, but also operating the process, i.e. adjust and correct the data, make notes and remarks. Thus, the following major facilities are realized in the interactive board: slide show, audio- and video-information representation, text and image edit and display, the Internet connection, teleconference, etc.

One of the important tools of the interactive board is a stylus, which makes it possible to input any information (like on the ordinary board by means of chalk or pen) and gain access to operating all the programs described above. Special programs are designed to turn the stylus into an "intelligent pen", which allows converting a hand-written text into a typed one, and to recognize graphic patterns and transform them into the ones with well-defined edges.

An interactive board helps achieve visualization and information feedback, the students are actively involved in the work, attention concentration and perception are increased and memorization is improved. If we take into account the ability of a contemporary student to handle computing machinery and applied software, individual work implementation with such an interactive board may turn into an interest stimulating means to the subject.

Consequently, initial engineering problems, encouraging creation of professional-communicative situations and meeting the current engineering demands to develop their communicative skills, win new bright and vivid sides. The educational program acquires a new language-teaching approach, which stimulates language motivation of future engineers, their creativity and independence.

Thus, application of a new computer technology – interactive board - as an integrated part of engineering curricula enhances the introduction of a new curriculum course. Original engineering problems can be challenging in designing professional-communicative situations and meet the needs of engineering students in the development of their communication skills.

The work is submitted to the International scientific conference "Innovative Technology in Higher and Vocational Education", Tenerife, Spain, November 20-27, 2009, came to the editorial office on 19.10.2009.

NEW SCIENTIFIC DIRECTION: METHODS OF OPERATIVE RATIONAL REINSURANCE OF ESPECIALLY SERIOUS RISK ON THE BASIS OF THE EVOLUTIONARY ALGORITHMS

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Various scientific directions are developed in the world. The new important directions of a science, technologies and engineering are formed in Russia and in other countries. Significant interest from the different positions represents: alive systems, information telecommunication systems, management of risk in technical and in socio-economic systems, economy of the resources and others.

for the first variant of reinsurance

$$SSO_c = f_{bc}(SSO_b), SSO_d = f_{cd}(SSO_c, SSO_b), SSO_e = f_{de}(SSO_d, SSO_c, SSO_b),$$

for the second variant of reinsurance

$$SSO_d = f_{bd}(SSO_b), SSO_e = f_{de}(SSO_d, SSO_b), \dots,$$

for the third variant of reinsurance

$$SSO_c = f_{bc}(SSO_b), SSO_e = f_{ce}(SSO_c, SSO_b), \dots,$$

and so on,

where $SSO_c, SSO_b, SSO_d, SSO_e$ are the sums of the planned insurance responsibility by reinsurers c, b, d, e accordingly,

$f_{bc}, f_{cd}, f_{de}, f_{bd}, f_{ce}$ are some functions reflecting "rating" of the reinsurers on the relation to each other and known for them.

The ratings of the reinsurers, expressed by the mentioned functions, can carry objective or subjective character.

It is important, that at the significant number of the members of insurance group the efficiency of acceptance of the decisions is rather urgent.

The considered difficult task can be shown to the modified traveling salesman problem having distinguished economic sense in view of a subject domain of reinsurance.

It is necessary to note, that total of variants of ways of detour in the classical traveling salesman

The aim of the scientific message is informing of a scientific public on the new scientific direction, based by the author. This direction leans on both to area of reinsurance, and to area of information technologies. It can be correctly named "the methods of the operative rational reinsurance of the especially serious risk based on the evolutionary algorithms".

Let's consider the following economic problem. Let, for example, an insurance group with reinsurer includes together five members. Let, in particular, a is insurer, b, c, d, e are reinsurers. Also, let SSO is a sum of the insurance responsibility of the every-one subsequent reinsurer, being a part of conditions of the insurance contract, depends on a "rating" of the previous reinsurers – in eyes of everyone subsequent reinsurer:

problem represents $n!$. And n is the number of points of the detour (number of towns).

From positions of the graph theory a classical traveling salesman problem is known as a task of search of the minimal length of the Hamilton cycle.

In particular, $10! = 3628800$; $12! = 479001600$. In case of a total search of variants at $n = 15$ and more points the given task is unsolvable even for one year (!) at computer calculations.

Also at the significant amount of towns frequently applies a method of branches and borders promoting reduction of amount of variants of the search. However, the given method does not guarantee, that during the decision of a task will not be made total search of variants.

The task, considered in the message, is characterized by distinguished criterion function

$$x_k^{safe} = \left(S - \sum_{q=1}^{n-1} SSO_q \right) \rightarrow \min,$$

where x_k^{safe} is the required acceptable sum of the insurance responsibility of the insurer,

S is the sum, on which is insured risk by the insurer a at the subsequent reinsurance,

q is the number of the edge according with the order of detour of the graph, in which the all n members of

the insurance group are represented by tops of the graph,

SSO_q is the sum of the insurance responsibility of the q -th member of the insurance group at approach of the insurance occasion, $k = \overline{1, (n-1)}$,

$q = \overline{1, (n-1)}$.

The using of this criterion is caused by characteristic situations, in which the insurance company not aspires to a significant prize at reinsurance of a serious risk so much, how many does not wish to go bankrupt owing to the insurance occasion.

It is represented to perspective exertion of evolutionary (genetic, ant algorithms and other) algorithms of functional optimization for the decision of similar tasks connected to operative search of rational variants of reinsurance of the especially serious risk. *Result is the creation of the new scientific direction on a joint of the realm of reinsurance and the realm of information technologies, namely: methods of operative rational reinsurance of especially serious risk on the basis of the evolutionary algorithms.*

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THE SIMILARLY CHARGED POLYELECTROLYTES' MULTICOMPONENT SYSTEMS AGGREGATE CAPABILITY

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The high – molecular compounds aggregate capability study, having resulted in the disperse phase sedimentationally unstable state, is being presented the obviously scientific and the practically real interest at the dispersions destabilization processes examination. The individual flocculants use just in the compound

multi – component dispersions is not being permitted to achieve the high level efficiency of the dispersions division in the majority of the cases. Therefore, the use bases development of the cationic polyelectrolytes composition is being presented the perspective direction just in this field of the researches.

The aggregate capability of the cationic polyelectrolytes compositions peculiarities finding, on the basis of the kinetic stability analysis of the model kaolin aqueous suspension and the activated sludge structure formation processes is the work's aim.

The industrially produced brands' cationic polyelectrolytes: CF – 91, VPC – 402, CF – 99 and Praestol – 650 have been used, as the flocculants' specimens. The flocculation kinetics have been investigated by the turbidimetric method on the model kaolin aqueous suspension (e.g. the KSD brand with the 18 mkm particles' average size) with the 0,8 mass % disperse phase concentration. The D optical density has been measured at the UNICO 1201 spectrophotometer.

The synergism effect has been discovered, in the result of the RE binary and the ternary mixtures aggregate capability investigation for the compositions' most part. The more polymers' differences by their chemical constitution, the more probable synergistic result display at such reagents use just in the mixture.

The final results of the carried out experimental – industrial tests on the compacted surplus activated sludge dehydration just at the biological treatment facilities in the city of Volgograd have been shown, that the received flocculants' binary mixtures introduction is, noticeably, being lowered just the structure formation critical concentration and also the suspended matters content just in the filtrate.

Thus, the correlation between the data on the kaolin suspension flocculation kinetics and the activated sludge's structural and mechanical characteristics just at the compositions from the cationic polyelectrolytes introduction has already been revealed.

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INTERACTION AS FUNDAMENTAL NATURAL-SCIENCE CONCEPT

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The problem of energy's definition in the educational process is discussed. Energy perception is suggested for one as the quantitative scalar characteristic of observable object interaction. Variants of physical interactions classification, taking into account the electroweak and substance-spatial interactions, are considered. Gravitational, kinetic, mass and entropy energies are interpreted as the special cases of substance-spatial interaction.

Educational standards of the some specialities got by students at universities of the Russian Federation provide discipline "the Concept of modern natural sciences» [1] and assume education of students in the spirit of high natural-science culture. The theme "Interaction" is one of obligatory themes in the course of its teaching. Thus, according to overwhelming amount of the educational literature, there are four fundamental physical interactions to which all are reduced the others: strong, electromagnetic, weak, gravitational (in decreasing order of force). Though the uniform theory of weak and electromagnetic interactions developed in the late sixties of the last century, and allowing quite authentically to speak only about three interactions: strong, electroweak and gravitational [2], by this time has become conventional theory, searches of new interactions traditionally are called as searches of the fifth interaction.

In particular, many of scientists consider the fifth interaction by universal one, including four interactions, named above. Still A. Einstein has begun to search it within the limits of creation of the uniform field theory. Some of researchers consider such theory is already created by G.I. Shipov under the name «Theory of physical vacuum», and the fifth interaction represents a torsional field [3]. Others try to search for a certain new constant of uniform interaction from which all known nowadays fundamental physical constants [4] would follow. However nowadays theorists are disposed more favorable to the modern theory of superstrings, because they consider it's the most perspective approach to long-awaited great

unification — uniform description of a matter and all known interactions [5]. It is supposed that elementary particles represent vibrations of certain multidimensional formations — superstrings. According to its various variants there should be besides four accessible to us spatial dimensions, at least five-seven additional ones, curtailed into small areas in each point of space-time continuum. These areas render the influences comparable on force with usual gravitation and, according to some variants of the theory, can be found experimentally out on distances of an order of thousand shares of millimeter.

Besides, many of researchers are convinced of the existence of the fifth interaction which is not reduced to four classical ones. There is a point of view, for example, that the fifth interaction is observed in astronomical scales. Some astrophysical researches say that the Universe not simply extends, but extends with the acceleration, so astrophysicists suggest to return again to rejected some time ago A. Einstein's hypothesis about existence between masses not only forces of an attraction, but also forces of pushing away (dark energy). In 1986 the American physicists led by E. Fishbah even have declared experimental acknowledgement of this hypothesis [6]. Though by this time the touch of sensational nature of this message has already disappeared owing to ambiguity of the skilled data and was replaced by professional tone of discussion, however, activity of acknowledgement searches of dark energy existence does not fall down.

Behavior synchronism of the born together particles, having identical wave characteristics, also sometimes is classified as the

fifth interaction. Influence on one of them leads to simultaneous reaction of both, irrespective of distance between these particles. That is, interaction between such particles is carried out somehow with the speed exceeding a velocity of light.

There are messages devoted to discussion of possibility of the fifth interaction existence inside hadrons, between hypothetical partons which, according to tentative estimations, exceeds strong interaction approximately in 11 times [7].

The information also sometimes is considered as the fifth type of interaction. Some of the researchers believe that information is capable to be converted into the energy, generating mass in turn [8].

An attempt:

- to substantiate the expediency of substance–spatial interaction (between substance and space) recognition in the educational literature;

- to make more accurate the classification of fundamental physical interactions is undertaken in the present work.

First of all, it is offered to correct the definition of interaction that is to perceive interaction as the influence physical *objects* against each other, instead of traditional representation that it is influence of *bodies* against each other, leading to a change of their movement state. The offered definition expands a circle of subjects are perceived by the researcher as interacting ones, including in it not only bodies, but also physical fields, vacuum, space-time continuum. Nowadays anybody knows that the mass of any substance bends space surrounding it. However, talking about interaction between substance and space is considered incorrect because of the fact “the space not is a body”.

Really, the space not is a body. But it is bent under the influence of mass, that is, mass influence on space takes place. And,

$$dS = n(C \frac{dT}{T} + R \frac{dV}{V})$$

where:

- C – is the mole thermal capacity of a gas at constant volume,

according to some theorists, the mass grows out of a curvature of the same space-time continuum. Influence of objects against each other – substance and space interaction is available. Thus, gravitational interaction can be considered as a consequence of the substance-spatial interaction, leading to a mutual attraction of masses. However, it would have unlikely expedient to replace one interaction name (gravitational) on another (substance-spatial) if substance-spatial interaction had not been found out itself in other phenomena.

But if one agree that energy is not only a measure of work [9] or of the general quantitative measure of various matter movement forms [10] but, first of all, energy is the scalar quantitative characteristic of interaction of physical objects [11] he inevitably asks a question: about what object interactions there is a speech when we consider kinetic energy, mass-energy relation, entropy energy?

It is well known that kinetic energy is defined by mass and by speed of mass moving in space. So we have a right to maintain that kinetic energy, as well as gravitational energy, represents one of manifestation forms of substance-spatial interaction. Thus, temperature of macrobody, being a measure of molecule kinetic energy, also is the aspect of interaction between substance and space.

The space means four-dimensional continuum, including the fourth similar to time dimension. So energy of a rest mass can be perceived as the result of interaction of this mass with the specified fourth dimension of such space. That is, energy of a rest mass is one more special case of substance-spatial interaction.

And, at last, it is well known that entropy change (dS) is defined by:

- quantity of substance (n);
- temperature change (dT);
- volume change (dV):

- R – is the universal gas constant [10].

So entropy energy (TS) can be perceived as the result of interaction between

space and quantity of substance. Thus, all interactions are reduced to three the most fundamental ones: strong, electroweak and substance-spatial interaction. Thus:

- Strong interaction is manifested as energy of interaction between nucleons of an atom kernel;

- Electroweak interaction is perceived as electromagnetic energy and energy of weak interaction;

- Substance-spatial interaction is manifested as gravitational energy, kinetic energy, energy of mass and entropy energy.

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*Materials of a Conference***INNOVATION PROCESSES IN THE FORMATION: THE POTENTIAL OF INTELLECTUAL YOUNG PEOPLE IN THE REGIONS**

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By social the mobility of young people and innovation processes in the formation the achieved in the Russian society conversions specify new requirements for the specialists in the work with the young people: the high professional level, a creative turn of mind, tendency toward the innovations, the skill to accumulate energy and abilities of young people. To be the active subject of social changes - in this consist the social mission of young people, her public and historical destination. In Institute of Higher Education major portion of the creative intellectual elite of the country is concentrated, is embedded moral and intellectual potential, especially young people.

In the sociological literature it is possible to find the determination of innovation in the context of the systems approach: innovation - this goal-directed change in the functioning of system, moreover in the broad sense this there can be qualitative and (or) quantitative changes in different spheres and elements of system.

In connection with to education system by innovation count "the eventual result of innovation activity, which received the embodiment in the form of the new content, method, the forms of the organization of education and teaching process or the improvement of technical equipment for education, which using in the practical activity, or in the new approach to the social services in the region of formation" [1]. What it is necessary to make so that the innovation processes would become socially acknowledged, social and cultural models, finding new possibilities and assigning the new horizons in formation systems?

On its sociocultural level Tomsk on the boundary XIX - XX of centuries stood above all Sibe-

rian cities. Still in 1873 were opened Siberia's first bookshop and public library, then printing house. In the 90's no-load condition of the century through the Tomsk province Siberian railroad was laid. It is past south of Tomsk around the wooded and swampy sections. In 400 years Tomsk rose on its value, economic, social and cultural development to the level of the central Russia cities. Furthermore, Tosmk region among the Russian regions occupies the fourth place by the specific weight of those, who have the scientific degree of the doctor of sciences in the total number of instructors of Institute of Higher Education. Third place - (after Moscow and Saint Petersburg) according to the number of students in 10 thousand people in the population, third places on the scope of young people at the age of 17-26 years by the programs of the highest vocational education.

Educational strategies of young people of region reflect the specific character of their development; they indicate the specific connection with the ethnic belonging, i.e., is fixed the certain ethnic selectivity. Education - this is one of the factors of social stratification, the basic channel of the ascending upward social mobility and the important indicator of the steady development of society. Furthermore, education level renders influence on the social health of personality, degree of ethnic tolerance, and also estimation of interethnic relations. To higher education to the larger degree those young people, whose parents have high or special secondary education, occupy the leading posts, are oriented, it is predominantly occupied with the mental or highly skilled physical labor. Differences in the intentions are outlined on the material, territorial and ethnic factors (portion of urban senior pupils, who connect their selection after school with Institute of Higher Education, it is considerably more than rural; the higher the family incomes, the more graduates are oriented to Institute of Higher Education).

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PROBLEMS OF REFORMING RUSSIAN ACCOUNTING

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The official beginning of the process of accounting reformation in Russia is considered to be the approval of the government program of the Russian Federation transition to the accounting and statistics system, accepted in international practice in accordance with the requirements of market economy development. The program was approved by the decision of the RF Supreme Soviet of 23.10.92 № 3708-1. The goal of accounting reformation was defined in this document as bringing national accounting system in conformity with market economy requirements and international standards of financial accountability. This document also formulates tasks set for the achievement of this goal.

The concept of accounting in Russian market economy approved by the Methodological accounting council under the Ministry of Finance of the RF and by the Institute of professional accountants in Russia was developed in the course of implementing measures of the Reformation Program in December 1997. Approaches to the design of the Russian accounting system for the next 10-15 years were formulated in this concept on the basis of the conducted detailed analysis of the Russian and international practice and accounting development tendencies.

The significance of the Concept should not be underestimated. This statutory act hasn't lost its importance even for the present time. It can be explained by the fact that it was the first document developed in Russia that defined methodological basis of the accounting system created in our country. In spite of the significant work of the Ministry of Finance, the process of reformation was very slow. There were a lot of objective reasons to explain delays in the reformation such as: inflation, crisis of nonpayment, delays in development of the legislative framework, presence of evident contradictions in forming tax and account legislation.

Instability of tax legislation turned out to be a major hindrance to accounting reformation. Laws, instructions and constantly appearing amendments to them made the accountants trace every letter or instruction of the State Tax Inspection in order to find out their effects on taxes. Due to this fact optimization of taxation became the main aim of accounting, while the economic sense of business transactions was often ignored.

It became clear at beginning of 1998 that the Program of accounting reformation of 1994 requires changes and improvement. Therefore the Program of accounting reformation was accepted in accordance with international financial reporting standards. The purpose of this Program was bringing Russian accounting system into line with requirements of market economy and international financial reporting standards (IFRS).

The main task was creation of normal conditions of consistent, useful, rational and successful functioning of the accounting system in the concrete economic environment.

Main goals and tasks of the reform at this stage were:

- formation of the system of accounting and reporting standards, that is designed to provide users, mainly investors, with useful information;
- connection of the Russian accounting reform with main tendencies of harmonization of standards on the international level;
- rendering methodological assistance to different organizations in understanding and implementing the modified accounting model.

It was planned to carry out the reform in the following main directions:

- improvement of the normative legal regulation;
- formation of the regulatory system (standards);

- methodological support (instructions, methodological regulations, comments);
- staff assistance (formation of the accountant's profession, training and professional development of accounting specialists);
- international collaboration (membership and active work in international organizations);
- collaboration with national organizations responsible for development of accounting standards and regulation of this activity.

In order to fulfill these tasks the government was supposed to:

- make all the necessary changes and amendments to the Federal Law "On accounting" and compose other regulatory acts;
- in course of two years develop and approve propositions (standards) on accounting including the scope of requirements of international standards;
- revise the plan of bookkeeping accounts and instructions on its application;
- introduce the simplified accounting system for small business entities.

In accordance with the Program of accounting reformation 1998 main directions of accounting system development were elaborated up to the year 2010 by the Ministry of Finance of the Russian Federation. This document defined main directions and strategic tasks of development of the Russian accounting system:

- creation of the accounting system compatible with IFRS that would take into consideration needs of different enterprises depending on the form of ownership and amount of their work on the capital market;
- providing the opportunity to implement IFRS as the only permissible accounting format for issuers and other enterprises concerned;
- introduction of the accountant's profession as the active member of the process of regulating Russian accounting system.

This document also defines the stages of accounting development in our country: stage 1 – 2001–2003; stage 2 – 2004–2005; stage 3 – 2006–2010.

The peculiarity of this document is that it sets tasks for further accounting reformation with consideration of specific character of activity of different types of enterprises. All the enterprises in Russia are subdivided into 4 categories:

I. public (open joint-stock) companies and other enterprises having a high rating on the international capital markets and/or in Russian trade systems;

II. public (open joint-stock) companies having bad rating on the markets;

III. private companies and limited liability companies with the exception of small enterprises; this category should also include unitary (wholly state-owned) enterprises;

IV. small enterprises.

Some of the companies having a high rating on the markets and included into *the first category* already use IFRS (or GAAP USA) during the preparation of financial reports but still continue to follow national standards for Russian reporting. Other enterprises preparing financial reports use neither IFRS nor GAAP USA. Nevertheless, taking into account the necessity of Russian capital market development and its integration with international markets such enterprises should also start using IFRS in full. Consequently, taking into account the first category the main aim of the accounting reform was creation of the practical base for accounting and preparation of financial reports exclusively on the basis of IFRS without the use of Russian accounting standards (without presentation of reports composed according to the Russian norms).

Creation of the foundations for introduction and use of IFRS as the only format for accounting and financial reporting requires the following measures:

- developing and approving recommendations on introduction of IFRS as the single official regulatory act included into the Russian legislative system;
- developing and approving the regulatory act defining the way of transforming data of accounting and financial reporting in

compliance with IFRS for the purpose of tax accounting.

Preparing financial reports enterprises of *the second category* use Russian accounting standards. But these enterprises are also interested in creation of Russian accounting norms that would be compatible with IFRS. This fact is chiefly determined by the specific character of their owners (stockholders that need compatible financial information about issuers) and the opportunity of these enterprises getting to the capital market.

Consequently, taking into account the enterprises included into the second category *the main aim of the accounting reform* is development of the complex of Russian accounting norms compatible with IFRS, that requires the following measures:

- developing and approving new Russian accounting standards compatible with IFRS. These new standards should be in line with the main principles of IFRS in information disclosure and presentation, assessment and reflection in accounting facts of economical activity;
- revising the existing Russian accounting standards in order to ensure their compatibility with corresponding equivalents in the system of IFRS;
- developing and approving the regulatory act defining the way of transforming data of accounting and financial reporting for the purpose of tax accounting.

In this case Russia can use EU experience in bringing EU accounting directives into line with IFRS, planned within the framework of Financial reporting strategy developed by the European Commission. Besides, international experts, experts from the International centre of accounting reformation (ICAR) and other organizations are supposed to take an active part in this work.

Preparing financial reports enterprises of *the third category* also use Russian accounting standards. But considering the absence of the users interested in their financial reporting and limitations for some data disclosure their reporting can be regulated by less strict requirements to the presentation of

the detailed financial information. Consequently, if we take the enterprises included into the third category the *following problems* should be solved:

- assessment of the volume of information subjected to disclosure in financial reports;
- taking into account the results of this assessment while developing and revising Russian accounting standards.

Enterprises included into the fourth category are a special group of companies that should have the right to keep simplified accounting records and do the simplified reporting. The simplified accounting and reporting system should be organized in such a way that all the expenses connected with the transformation of financial accounting data in this format for the purpose of tax accounting should be minimized. Besides, this simplified system should guarantee full satisfaction of the needs of management in the sphere of accounting.

Consequently, *main aims of the accounting reform* for small enterprises are:

- creation of accounting and reporting system for small enterprises that would meet the demands of tax legislation in the sphere of tax base calculation and filing of tax returns;
- consideration of the requirements of small enterprises management in managerial accounting and in company reporting (cost control, etc.) while developing the simplified accounting and reporting system.

Russian accounting reform is a complicated and long process. It is impossible to define the date of the end of this reform, because the process of improving accounting system can not be "finished". By the year 2010 a whole range of new problems that require urgent action is sure to appear. But nevertheless, we come to the conclusion that the largest part of this work has already been done. IFRSs have already entered into the accounting practice and professional accountants have got accustomed to them. It means that we can talk not only about the reform but also about development and improvement of the accounting system in Russia.

THE HYDROCARBONS DEPOSITS PROGNOSTIFICATION ON THE BASIS OF THE GEOPHYSICAL AND GEOCHEMICAL METHODS COMPLEXIFICATION

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The oil and gas deposits direct searches idea with the high – precision devices and the technologies advent has already been real, and it has been focused and concentrated upon the predictive estimate reliability increase tasks of the oil and gas potential, having revealed and having prepared «structures» for the drilling. The presented integrated oil – and – gas presence prognostification field methodology and the diverse and the scalene geophysical and the geochemical data complex interpretation single technology have already been created for the oil – and – gas deposits direct prognostification reliability increasing, and they are included the light geophysical and the geochemical methods of the gravel – and the geomagnetic, the gas – solid, and the thermomagnetic surveys, and also the geoelectrochemical probings into the developed rational complex. The fund geological and the geophysical materials, including the seismic – and the electro – prospecting works are being enlisted and involved at the observations results interpretation stage. The oil – and – gas anomalies space distribution regularities on the basis of the one – method maps are being permitted to present the final results in the form of the single cartographical document.

The challenge on the prognostification validity has been come to the foreground at the oil and gas deposits prognostification task solution, by the geophysical methods, when the low amplitude anomalies are being analyzed, which are quite comparable with the observations errors. The fact of the matter is, that even the most «direct» geophysical indices of the section oil – and – gas presence, such as the pressure waves propagation velocity decrease, the seismic energy absorption increase decrement and the specific electrical resistance and the other aspects, are the indirect ones, that is, they are being needed in the geological interpretation, the transformation just in the proper geological indicators, which having had the type of the hydrocarbon saturation coefficients, the porosity ones and the rest ones. This, in its turn, is being resulted in the necessity to solve the inconsistent reverse Geophysics's tasks, and, somehow, to overcome the non – uniqueness challenges and also their solution instability. They usually resort to the methods complexification for the purpose of such overcoming. But even the complex maximum enlargement, at the expense of all the presenting geophysical methods using in the disposal, does not delete the item on the geological interpretations variability of the indirect geo-

physical anomalies. Therefore, only the methods inclusion in the complex, having permitted to receive the direct information on the oil – and – gas content (e.g. as the formational, and well as the fluidal ones), that is the geochemical and the boundary methods, having combined the indirect geophysical and the direct geochemical indices, is being permitted to be hoped for this item cardinal solution. All these diverse methods combination is quite able to be achieved and the necessary expenses minimization degree for the works production, if such «difficult» and the cost – based geophysical investigations methods to be excluded from the field stage, as the seismo – and the electrical exploration and to be replaced them by the efficient and the inexpensive non – deep and the shallow modifications. At the same time, the seismo – and the electrical and the exploration data are quite able to be claimed just from the fund sources at the materials processing and the interpretation stage. The gravel and magnetic surveys results of the last years are also quite able to be claimed just from the fund sources, which are necessary for the preliminary territory division into the districts by the geophysical fields' peculiarities and also the works results by the oil – and – gas presence regional prognostification. All these materi-

als are the basis for the tectonic and the geological – gas – oil areas division into the districts. Thus, the suggested approach to the task solution of the oil and gas deposits direct prognostification is, now, being structured, as the three – stepped one.

At the first stage, the investigations territories division into the districts is being carried out by the geophysical fields' peculiarities with the following parcellation, which are the most perspective for the field works arrangement by the inexpensive cost – based geophysical, the geochemical and the boundary methods. So, it is quite impossible to achieve the reliable particular tasks solution, having connected with the separate objects without such division into the districts that is at the integral presentation absence on the geophysical fields' distribution regularities and on the studied territory section structure (e.g. of the sedimentary basin, of the perspective – gas – oil region and the rest). All this work, as a whole, is being based on the fund materials usage. Such division into the districts technology the main elements have already been developed by the authors, and they have been covered in the number of the publications [1, 2].

At the second stage, the field observations are being carried out on the singled out and the most perspective parcels. The gravel – and the geomagnetic survey, the geoelectrochemistry, the gaso-geochemistry, the thermo-magnetometry methods are being included into the field complex. So, the above – mentioned and the listed methods are being realized, in the most part, in the authors' technologies [3,4].

The gas survey method is being consisted in the composition study and the hydrocarbon gases distribution on the studied area. All the gas survey varieties are being based on the maximum hydrocarbons micro-concentrations definition: the methane, the ethane, the propane, the butane, the pentane, the hexane, having contained just in the rocks and in the underground waters. It has been suggested to use the oil – and gas structures

exposure thermomagnetic method exposure in the combination with the gas survey [3].

The last one is based on the fine – dispersed authigenic minerals definition (e.g. the pyrite, and the siderite), the concentration and the grains dimensions of which are quite insufficient for their definition, by means of the optical or the X – ray photography and structural methods. Mediatly, this task is comparatively and simply being solved, by means of the test heating up to the temperatures range, which is equal to 450 – 500° C, and it is being directed to the pyrite and the siderite transformation just into the magnetite. Thus, the soils magnetic susceptibility is sharply being increased, at the expense of all these phase transformations that is easily being fixed by the every serial magnetic susceptibility measuring instrument.

The increase size is being defined by the χ_t/χ correlation, where χ – is the soil sample initial magnetic susceptibility, and χ_t – is its quantity after the heating. Hence, the experiment scheme is being followed: the soil magnetic susceptibility measurement up to its heating (χ) → the heating → the magnetic susceptibility measurement after its heating (χ_t) → the thermomagnetic coefficient (TMC) definition $d\chi = \chi_t/\chi$.

Empirically, it has been determined, that this correlation on the background parcels, having located out of the deposits UV influence zones, is not being exceeded the range of the 1.1 – 1.5 values, and it is seldom being reached the range of the 1.8 – 2. The DK is being varied in the range from 3 up to 30 and more units over the UV active migration zones from the oil and the gas deposits, depending on from the specific geological conditions.

It has been also determined at the practical application, that many thermomagnetic and the gas anomalies are being formed the annular or the semi – annular structures over the wings of the productive and the efficient anticline highs. So, the largest thermomagnetic effect is being observed at the structure peripheral part, as if, having repeated the oil – and – gas presence contours. The thermo-

magnetic minimum is being fixed directly over the deposits. So, such the thermomagnetic coefficient (TMC) anomalous values annular character is being explained by the intensive epigenetic mineral – formation in the most weaken zones, having been the UV migration ways.

The oil and gas accumulations place search geoelectrochemical method has been based on the overlaid in haloes exposure of the heavy metals microelements of the mobile forms (such as, Mn, Ni, Cu, Ti and so on and so forth), having formed in the rock under the migrating from the hydrocarbons deposits influence [4].

The weakly – fixed microelements exposure from the gross content is being carried out, at the expense of the geochemical process activization by the electrical current. So, it is being succeeded in sequentially to be extracted the microelements from the weakly – fixed ones up to the syngeneitcal ones, having changed the current intensity and the passing its time through the mountain rocks patterns.

For all this, the overlaid in haloes distribution examination is quite able to be carried out by the patterns, having selected in the soil by the same scheme, that is being used at the thermomagnetic method realization.

Thus, the investigations results are being presented in the form of the C_{out} microelements initial concentrations distribution schemes, and also their concentrations after the current passing – the Flowing. All these quantities are being permitted to be defined the U relative parameter, having calculated by the $U = \text{Flowing}/C_{out}$ formula and having reflected the geochemical processes activization degree in the mountain rocks patterns by the electrical current, and also, so called, the complex parameter:

$$C_p = U_{a_{mean}} \cdot U_{k_{mean}} ,$$

where $U_{a_{mean}}$ – is the relative parameter mean value by all the elements at the anode parcel; $U_{k_{mean}}$ – is the same at the cathode parcel. Only after this, all these parameters distribu-

tion maps by the investigated territory are being made up. The rocks epigenetic changes zones, having revealed by these maps, are quite able to be observed, as inside the oil – and – gas presence contour, well as outside of it, having formed the annular anomalies with the minimum over the deposit.

As it is also known, that the annular anomaly with its minimum in the center is the most universal geophysical oil – and – gas content indication in the gravitational and the magnetic fields, sufficient reliably having worked in the various situations [5]. Such conclusion has already been confirmed by the multileveled modeling results and also the by the numerous experimental data [6].

Thus, the similar anomalies distribution drawing, having diagnosed the deposit, has been discovered, by all the above – mentioned methods, having included into the field complex. The noted the similar oil – and – gas anomalies distribution drawing is being permitted to be presented the field stage results in the form of the single cartographical document, having received by the directed all the earlier made up one – methoded maps summing up after their preliminary normalization and, ipso facto, the dimension removal.

The large role from the point of view of the hydrocarbons deposits new diagnostic indications determination, the endogeneous micro – seismic waves, for the designation of which the «nano – earthquake» term has been suggested, are quite able to be played the passing through the deposit and the registering on the day time surface ones [7].

In general case, such micro – seismic waves have to be formed under the well – known phenomena and the processes influence: the reflections, the refractions, the dispersions, the diffractions, the polarizations and the others. Therefore, after the dissimilar geological medium passing, the wind noise and the ground unrest, having registered on the surface, are being borne the information on the physical and the geometrical section dissimilarities, in particular on the oil and the gas deposits. So, this circumstance is being

confirmed by the observations factual data on a number of the hydrocarbonic raw material deposits [8].

And the other phenomena are also well – known, which are able to be used at the section oil – and – gas presence prognostification, for example, the seismic and the electrical emission, the examination of which is being quite accessible by the small – deep and the shallow modifications of the seismo – and the electrical exploration and the prospecting. All this is being served the basis for these modifications field works inclusion into this suggested complex.

At the third stage, the comparison and the above – mentioned cartographical document coordination and the small – deep and the shallow seismo – electrical – exploratory investigation results is being carried out with the having fund geological and geophysical constructions, that is being given the possibility considerably to increase the hydrocarbonic accumulation places prognostification validity. Thus, the final stage of all the received materials complex interpretation is the coordinated physical and the geological models construction (e.g. PHGM) in the two – and the three – dimensional space.

The complexification considered model innovation potential is being defined by the large – scale diverse and the scalene information coverage, its receiving and the processing methods, having constructed in the single technological scheme. This is permitted maximum to narrow the freedom degrees number at the only correct solution choice from the great number of the equal rights in the mathematical relation, with what the geophysicists are constantly coming across at the inverse task solution. The conjugation in the framework of the oil and gas deposits prognostification indirect (e.g. geophysical) and direct (e.g. geochemical) meth-

ods single complex is also the innovative aspect, in essence. And at last, the suggested complex, in the full, is being met the rationality requirements, as far as the most efficient and the economical methods are usually being used at the most cost – based works field stage.

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THE GEOECOLOGICAL CHALLENGES OF THE MODERN SPACE ROCKET ACTIVITY

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Challenge Origin

As is generally known, at present the mass media are not passing by the catastrophic cataclysms, having become more frequent in the last decades, and having highlighted the blind forces of nature consequences. The ideologized mass media, having confronted sides during the «cold» war period, have not lost the smallest any natural calamity on the «enemy's» territory, but even all the countries' total reports up to the «space» age beginning have not contained such information, which is full of its content on the natural cataclysms, and which has also been the constant one just lately. So, for the first time, during the whole astronautics history, the cause – and – effect relation of the Space Vehicles launches with the natural cataclysms has been mentioned in the publications after S. Rybnikov [1]. Unfortunately, neither S. Rybnikov, nor anybody else to this global challenge has not returned anywhere, but only the fact of the cause – and – effect relation of the earthquakes and in 120 – 240 hours the minimum two additional cyclones in the Earth atmosphere appearance just after the Spacecraft launchings has been noted, but the earthquakes launching and the additional cyclones advent mechanism has not been explained in the above – mentioned S. Rybnikov's papers.

1. The Magnetodynamic Approach

After the substitution of the classical electrostatics of the non – adequate position in the fundamental system of the solutions, that $\operatorname{div} \vec{B} = 0$, (1) which is meant the sources absent of the magnetic field, for the principle, which is corresponding to the reality, that $\operatorname{div} \vec{T} = \mu_0 \mu i$ (2) it has been found to be possible not only to remove «the electromagnetic paradox», but and to solve many

theoretical challenges of the electrostatics and the practical tasks of the electrical engineering [2]. Thus, it is quite possible to hope for the analogous efficiency and at the consideration of some from the numerous aspects of the fundamental challenge of the stationary geomagnetism, among which its origin is quite presented, as the primary one, having taken into consideration the magnetodynamic view efficiency of the fundamental challenges of the physics and at the solution of the other theoretical [3] and the engineering [4] challenges.

2. The Magnetodynamic Model of the Geomagnetism Nature

To the present time, the geophysics has already been stored the great information on the Earth magnetism, the large part of which has already been obtained during the latest investigations period of the cosmic space by means of the direct instrumental investigations with the help of the space vehicles, but to create the universally recognized theory on the Earth magnetism origin it has not been succeeded still [5].

The factors comparison, having accompanied to the Earth magnetism and to the planets magnetism of the Solar System, is being revealed, as the indispensable ones the simultaneous atmosphere presence and the planet's noticeable diurnal rotation around its axis. So, for example, the Venus, having possessed by the powerful atmosphere, but it has not at all the noticeable magnetic field at the rotational velocity around its axis only a single revolution for its one solar year. At the same time, the Mercury, having had the rather rarefied helium atmosphere, but, having rotated around its axis, with the velocity only three revolutions for its two solar years, has permitted the «Mariner-10» Spaceship (in 1974) to discover its magnetism. Thus, all the collected information on the Earth magnetism and the planets of the Solar System is

permitted just from the magnetodynamic positions [6] to suppose the two geomagnetism formation mechanisms: the annular electrical currents, owing to the diurnal rotation of the

electric charges of the atmosphere and the charges just in the Earth interior [7], which it is necessary to be considered in more details.

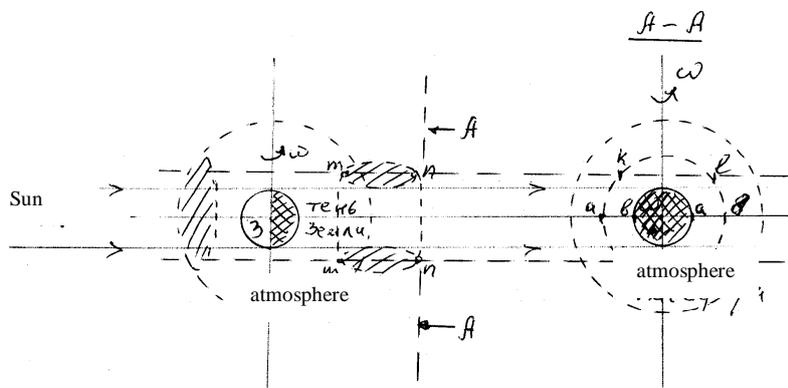


Figure 1

Figure 2

2-1. The Earth Magnetosphere

We shall present the described diagram Fig.1 and Fig.2, having permitted to see the electricity distribution in the electrified zones of the Earth ionosphere, in more details, here, not having reproduced the diagrams from the author's paper [8]. The side view on the Earth atmosphere with the electrified zone from the night-side around the Earth shadow has been shown in Fig.1, and the A – A side of the Fig.2 has been shown in Fig.2, that is the view at the Earth atmosphere just from the night-side. In these Fig.1 and Fig.2, they have been designated: E – the Earth, ω – the Earth rotation direction around its axis, m and n – the lower and upper limits of the electrified zone from the night-side, a and b – the internal and external limits of the electrified zone from the night-side, k and l – the external limits of the electrified zone from the night-side by the m–n cross-section. From these pictures in the Fig.1 and Fig.2 it is quite clear, that the electrified zone from the night-side of the Earth atmosphere is presented itself the ring around the Earth shadow cylinder, the sizes of which are quite able to be designated by the following quantities: the ring's width: $h = m - n$, the radial thickness of the ring's wall: $s = a - b$, the ring's wall thickness by the m – n cross-

section: $y = k - l$. As every cross-section displacement of this annular electrified zone relatively to the Earth rotation axis is defined by the linear velocity by: $V_i = \omega R_i(3)$, where R_i – the radius of the rotation of the given electrified zone cross-section, then it is quite possible to calculate the latitudinal current quantity of the given electrified zone

cross-section: As for $I_i = \frac{dQ_i}{dt}(4)$, then for

i annular electrified zone cross-section it is necessary to calculate the quantity of electricity $dQ_i = \rho \Delta z \Delta S_i(5)$, having rotated on the given latitude around the Earth rotation axis, where ρ - the electricity volume density in the electrified zone by the Δz thickness and the ΔS_i area i_cross-section, which is able to be expressed through the sizes above – accepted by us of the annular electrified zone from the Earth night – side atmosphere: $\Delta S_{ir} = \Delta S_{ab} = sh$ - for the radial cross-sections and $\Delta S_{ip} = \Delta S_{kl} = yh$ - for the peripheral annular zone cross-sections by m - n. Thus, the latitudinal ionospheric current quantity is able to be expressed just for every radial annular zone cross – section by a – b:

$$I_{ir} = \frac{d(\rho\Delta z\Delta S_{ir})}{dt} = \frac{d(\rho\Delta zsh)}{dt} \quad (6).$$

And the latitudinal ionospheric current quantity just for every peripheral annular zone cross – section is analogically expressed by:

$$I_{ip} = \frac{d(\rho\Delta z\Delta S_{ip})}{dt} = \frac{d(\rho\Delta zyh)}{dt} \quad (7).$$

As it is quite evidently from the Fig.1 and the Fig.2, that $2s$ – the two radial cross – sections (e.g. from the night – side and the morning – side of the Earth) of the ionosphere together, which are less every from y – the peripheral ionosphere cross – sections almost for the whole Earth diameter, then with due regard of the real sizes of the Earth magnetosphere, the quantity of electricity quantity by (5): $dQ_{iy} = \rho\Delta z\Delta S_{iy}$ of every sign of the peripheral zones $\Delta S_{ip} = \Delta S_{kl} = yh$ is exceeded the quantity of electricity quantity $dQ_{ir} = \rho\Delta z\Delta S_{ir}$ of the radial zones $\Delta S_{ir} = \Delta S_{as} = sh$ by many times. Thus, it is quite clear just from our diagrams in the Fig.1 and the Fig.2, that the radial annular electrified zone cross – section $s = a – b$ is always much less, than this zone peripheral cross – section $y = k – l$, therefore, the expressions (6) and (7) comparison will result in the unique and definite conclusion on the «two – humped»[5] graphic dependence of the $H(x, y)$ quantity – the magnetic intensity from the geomagnetic coordinates in the subtropical belts to understand of which it is quite impossible on the basis of the up-to-date geophysical presentations.

Moreover, it is quite possible also to be concluded just from the reduced valuation of the ionospheric zones electricity quantity of the different latitudes, that the two – evening and morning – ionospheric electrical currents are being flowed by every latitude, that is, they have been divided by time, therefore, their general magnetic field is less than their algebraic sum, that, in its turn, it is additionally explained not only our conclusion on the «two – humped» graphic

dependence of the $H(x, y)$ quantity – the magnetic intensity from the geomagnetic coordinates in the subtropical belts, but it is also explained the diurnal variations reasons of the magnetic field quantity just in the indicated latitudes belt [5].

2-2. The Earth Internal Geospheres

The seismological investigations have been permitted to make up the seismic anomalies maps for the different deep ones on our planet's levels by the longitudinal and the transverse seismic waves' methods in the last decades of the XX – th century. The fundamental works of the American seismologists at the head of Adam Dziewonski have been shown the seismic situation changes, having connected with the geosphere's deepness [9]. The differences in the geospheres' seismic behavior, having presented in the Fig.3, are being characterized the velocities differences of the seismic waves in the corresponding zones, in their turn, they are being reflected and these zones differences just in their physical properties, mineral composition, stresses distortion and so on. For the significances connection illustration of the seismic velocities in the mantle zones with the physical properties of the corresponding species, here, it is quite possible to mention a great number of the reliable facts just from the indicated fundamental work [9] and the others.

Now, having taken into consideration in connection with the above – mentioned and the other regularities of the structures normalization of the Earth mantle matter under the pressures influence on the different deep levels, it is quite possible to be concluded, that the positive (e.g. compression) and the negative (e.g. extension) electricity zones have been localized just in our planet interior on the different geospheres, in accordance with the seismic tomography conclusions. Thus, as the conclusion from all the above – listed circumstances just in the deep geospheres, here, it is quite reasonably possible to be concluded, that and all the electrified zones in its interior are constantly making the circular movements together with the

diurnal rotation of our planet, that is all the geospheres, independently from their radii, character and their anomalies intensities, are making the annular electrical currents systems of the different quantities and directions, which are usually defined by the specific values of the electricity quantity and the rotation trajectory radius of every electrified zone, every geosphere of all the Earth deep levels, having created the corresponding by

$$(2) \operatorname{div} \bar{T} = \mu_o \mu i \quad \text{the magnetic tension}$$

fields. Now, having combined this our conclusion with the one, which is above – mentioned by the 2.1 point on the latitudinal ionospheric electric currents, it is quite possible to be formulated our answer the question on the geomagnetism nature: the Earth magnetic field has been made, and it is being maintained just in the stationary state, owing to the both global annular electrical currents systems: the latitudinal one in the ionosphere and the geospheric one just in the planet interior.

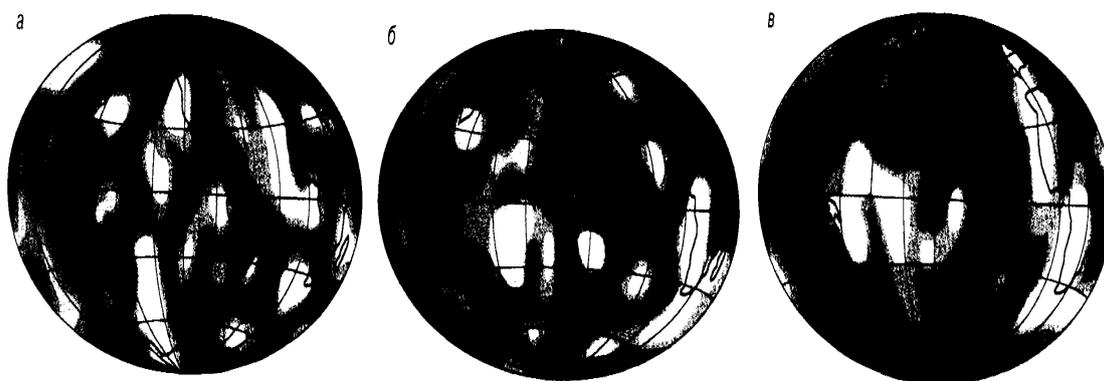


Figure 3. (Fig.5 by [9]). The velocity anomalies distribution examples in the Earth mantle by the seismic tomography results in the different depths: a – the 900 km deep level, b – 1,750 km, c – 2,600 km. The white and black areas on the positive are being corresponded to the seismic velocities changes from – 1,5 % up to +1,5 % with respect to the average values for the geosphere on the given deep level.

For all this, it is necessary to emphasize, that the electrified zones of the different signs in the ionosphere are constantly being displaced, concerning to the planet's surface in the opposite direction to the Earth rotation, and the geospheric electrified zones, having also had the different signs, are being moved along the general direction of the Earth rotation. As the magnetic fields directions of the electrical currents, having created by the negative and the positive electrical charges movement, are quite opposite, and the movements directions of the ionospheric and the latitudinal electrified zones are quite opposite too, then, having proceeded from the factual direction of the Earth magnetic field,

it is quite possible to note the primary contribution into our planet general magnetic field of the electrical currents at the expense of the latitudinal movements of the negatively electrified ionosphere zones and the positively electrified zones of the Earth geospheres. Our conclusions by 2 – 1 and 2 – 2 points have been confirmed and by the monitoring results of the meteorologists for the tornado formation just in the Northern America, under the surface of which the magnetic rocks in the form of the Cordilleras fundamental plates are being got nearer to the Earth surface, than in the other fields of the Earth spheroid, that is distinctly seen on the Fig.4 (the Fig.8 by [9]) and on the Fig.5(the Fig.21 by 9):

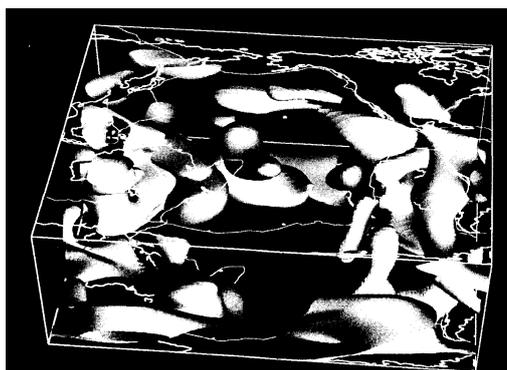


Figure 4 (Fig.8 by[9])

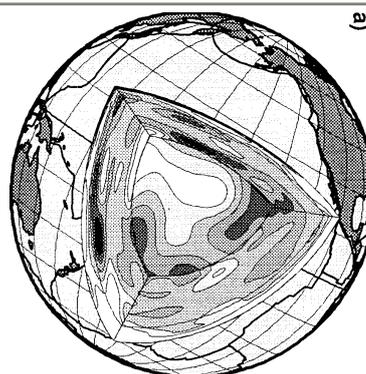


Figure 5 (Fig.21 by [9])

In other words, the Earth magnet is being rotated eccentrically, having had the rotation radius in the Northern America more, than the radius of rotation, for example, in Tibet and in the other Earth spheroid regions. In result of the investigation of such eccentricity of the Earth magnet rotation, the electrical field by $E = k_1 \omega RB$ (8) [3], which has been created by the magnet rotation around its axis, at $R_{Cordilleras} \succ R_{Tibet}$ has more intensity nearby the Northern Cordilleras, than at Tibet, having directly had an impact upon the origin conditions and also the tornado spreading. Thus, the magnetodynamical view upon the geomagnetism challenge has been permitted by us, here, not only to formulate the whole decade of the principally new conclusions and the statements on the geomagnetism nature, but and to indicate to its fundamental properties, which it would be impossibility to be seen on the basis of the old perceptions, having based on the dogma on the magnetism and electricity separate nature. And the noted circumstance confirms the magnetodynamical approach competence at the geomagnetism challenges investigation.

3. The Ecological Circumstances Geomagnetic Mechanisms of the Modern Space Rocket Activity

Here, having held the magnetodynamics conceptions and the definitions [2], it is

quite possible to be observed, that the $\bar{T}(\bar{r})$

vector – function of the magnetic fields tension of the ring currents, having created by the geospheric and ionospheric electrified zones movement in the process of the Earth diurnal rotation, has already been orientated normally to its currents, having appeared to be the magnetism «monopolies» by (2):

$div \bar{T} = \mu_o \mu i$. As a result of this situation and on the basis of the principle by:

$\bar{T} = -grad H(x, y, z)$ (8), in reality, the magnetic field intensity $H(x, y, z)$ is the scalar quantity, and its lines of force – these are the equipotential lines, which in the three – dimensional space are being formed the complex equipotential surfaces in the magnetic tension fields. It goes without saying, on the basis of one of the main dynamics principles of the d'Alamber – Lagrange systems, having meant, that the active forces and the reactions forces of the various relations, having acted on every point of the system, are completely compensated by the inertia

forces, that is: $\sum_{i=1}^n (F_i^a - m_i w_i) \delta r_i = 0$, (9),

where δr_i – the vectors of the possible movements of the system points, it is necessary to note, that the indispensable condition of the stationary state of the geomagnetic

field is this dynamics requirement (9) carrying out. Let us imagine ourselves the circumterrestrial outer space, as in the Fig.6, where the regions of the ionosphere electrified zones of every polarity we'll designate by the

white color, in order visually to imagine yourself the Circumterrestrial Outer Space with the active regions passing of the space vehicles launching trajectories

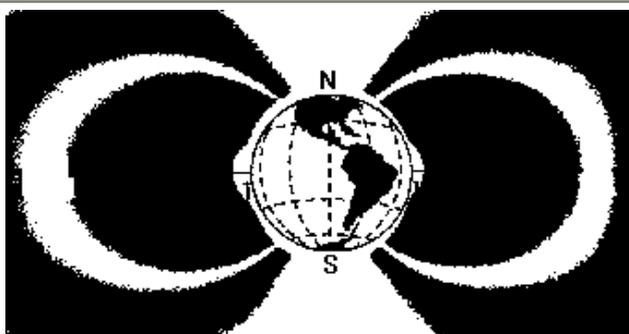


Figure 6. The Circumterrestrial Outer Space. just from the space launching cites (e.g. cosmodromes), having situated in the equatorial and the moderate latitudes.

Here, we'll remember, that all the national space launching cites (e.g. cosmodromes) [10]: Baikonur (e.g. 43° N.L., 80° E.L.), Kapustin Yar (e.g. 47° N.L., 32° E.L.), Plesetzka (e.g. 65° N.L., 40° E.L.), Svobodnyi (e.g. 50° N.L., 126° E.L.), Canaveral (e.g. 28° N.L., 82° W.L.), Vandenberg (e.g. 28° N.L., 128° W.L.), Shuangentzy (e.g. 41° N.L., 100° E.L.), Taiyuan (e.g. 38° N.L., 112° E.L.), Sichuan (e.g. 28° N.L., 102° E.L.), Kagasimo (e.g. 45° N.L.), Tanegasimo (e.g. 44° N.L.), Shrikhariota (e.g. 13° N.L., 80° E.L.), Cape York (e.g. 12° S.L.), Kuru (e.g. 5° N.L.) and even the movable space launching cites (e.g. cosmodromes) floating «Odysseys» and also the flying «Ruslans» are usually and preferably being based quite nearby to the equatorial latitudes.

3-1. The Ionosphere Electricity Quantity Changes Just After the Space Vehicles Launching

In order to evaluate the ΔQ_i electricity quantity change of the electrified zone, we'll schematically represent [6], as on the given – below Fig.7, where it has been designated: O – the space vehicle rocket carrier launching point on the Earth surface, O₁ – the space vehicle powered trajectory entrance point into the ionosphere from below, O₂ –

the space vehicle powered trajectory exit point from the ionosphere from above, AB and CD – the ionized gas channel regions around the space vehicle powered trajectory at the entrance and the exit just from the ionosphere, correspondingly, A₁B₁ и C₁D₁ – the AB and CD regions normal projections on the Earth surface, A₂B₂ – the region shadow projection of the a–b ionosphere upper layer on the

Earth surface through the AB region in the ionosphere lower layer. The ionosphere layers electricity signs have been shown, in accordance with the mentioned paper diagram [6]. For the evaluation of the ΔQ_i electricity quantity change of the electrified zone in the Fig.7, it is necessary to pay special attention to the channel cross-sectional area of the ionized gas around the space vehicle powered trajectory in the Earth ionosphere, which is being exceeded the jet stream cross-sectional area just from the space vehicle rocket carrier nozzles in many times, as the temperature and the pressure in the jet stream after its nozzles flow are being exceeded all these parameters in the ambient ionosphere for many orders. The ionosphere layers electricity signs have been shown, in accordance with the mentioned paper diagram [6].

layer has been paid the special attention in the Fig.7: from bellow to the upward (e.g. the space vehicle launching) or from above to downward (e.g. the space vehicle landing), as the jet streams of the gas mantle from the carrier rocket nozzle at the space vehicle launching, or from the jet engines' nozzles of the space vehicle' breaking at the landing are being broken the ionosphere layer, in an equal degree, having changed only the electrified regions formation order on the Earth surface just under this cylinder's foundations.

This final conclusion has factually been confirmed at the every space vehicle voyage, having had the "SPACE SHUTTLE" type, the last of which «The Discovery» № 35 has been launched into the orbit to the Intercontinental Space Station (ICSS) on May, 31, 2008 from the Cape Canaveral, and it has been landed there on June, 14, 2008. Here, I want only to remind the weather report information just from the <http://www.americanru.com/> Internet – site: after May, 12, 2008, the quietened earthquake in the province Sichuan (PRC) has suddenly been resumed on June, 03, 2008, having reached the corresponding magnitudes up to 7 – points one on June, 05, 2008. That has been testified on the Earth magnetosphere disturbances by the «The Discovery» № 35 launching, but the numerous weather report information on the unprecedented floods and inundations in the Missouri valley and also in the Eastern States of India just after the «The Discovery» № 35 landing have completely confirmed the two strong and powerful additional cyclones formation in the Earth atmosphere, that it is quite analogically to the hurricanes: «Catharina» in the USA on August, 31, 2008 and «The Butterfly» in Japan on September, 03, 2008.

Conclusions

1. It is quite to be concluded on the basis of the above – stated data, that the Earth planet with its magnetic field is being presented by itself the magnetodynamical machine in the stationary mode of operation, when all the electrical currents are being connected to each other on the various con-

tours by the electromagnetic interactions forces.

2. Our evaluation of the ΔQ_i electricity quantity change of the electrified zone by the Fig.5, in its turn, is meant, that at the magnetosphere disturbances just after the space vehicle launching, as a result of the changing for the ΔQ_i electricity quantity of the Q_i ionosphere electrified zone, through which the space vehicle carrier rocket powered trajectory is being lied, having caused the quantity change of the corresponding ring current and the Earth internal electric field quantity, and, at once, it results in the electrical forces change among the geospherical electrified zones, in order to provide the expression carrying out (9), thus, having started up the earthquakes mechanism for the system dynamics fundamental state conducting

$$\sum_{i=1}^n (F_i^a - m_i w_i) \delta r_i = 0.$$

3. Thus, the curvilinear cylindrical channel with the O_1O_2 axis, having had the length in several hundred or even thousand kilometres just after the space vehicle launching into the Earth ionosphere, depending on the specific conditions of the space vehicle launching, and this channel cross – section is also being calculated by the thousands square kilometers! It is also meant, that the ionosphere channel volume, in which the gas mantle ions recombination of the jet stream is being broken the electrical charges distribution uniformity for the considerably prolonged period of its restoration, owing to the photoionization and the light pressure, is being calculated by the millions of the cubic kilometers, by that, having provided the minimum two additional cyclones formation in the Earth atmosphere!

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THE FOREST RESOURCES FLOODING IN THE SIBERIAN HYDRO POWER STATIONS (HPS) RESERVOIRS BOTTOMS

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The hydro power station (HPS) building has the great significance in the energy provision structure of Russia. For all this, the larger part of the economically efficient hydro power potential has been concentrated in the Siberia.

So, such complex naturally – technical objects building, as the hydro power stations (HPSs), is being conjugated with the whole series of the challenges advent, the basis of which is the wood's considerable volumes flooding, having exerted its influence upon the aqueous medium.

The wood pulp pollution prognoses of the Boguchansky and the Motyginsky hydro power stations (HPSs) reservoirs, having presented in the present paper, are being given the possibility to evaluate the environmental impacts of the submerged and the floating wood upon the water quality.

The part of the hydro power stations (HPS) is being made up 22 %, the thermo-electric power stations (TEPS) – 67 %, the atomic electric power stations (AEPS) – 11 % in the energy provision structure of Russia. So, the economically – efficient hydro power potential is being related to the five river basins, such as: the Yeniseisky one – 34 %; the Lensky one – 27 %; the Obsky one – 11 %; the Amursky one – 7 %; the Volzhsky one – 7 %.

The Nizhneboguchansky and the Motyginsky hydro power stations on the Angara river, the Evenkiysky hydro power station on the Nizhyaya Tunguska river, and also the Nizhnekureisky hydro power station on the Kureika river, except the building Boguchansky hydro power station (HPS) now are being related to the number of the most perspective HPSs in the Krasnoyarsk Region [1].

The complex naturally – technical objects building, as the hydro power stations (HPSs), should be conducted, with due regard for the incipient challenges complex.

Thus, it is quite possible to be divided into the initial ones, the foreseen ones at the projecting stage, and also the second ones, having advented, as the hydraulic works and the reservoirs construction consequences, the challenges, having advented at the hydro power stations (HPSs) reservoirs designing,

the projecting, the construction and the maintenance.

Thus, we shall single out the main challenges just from the primary and the initial ones:

1) the water resources usage master plan choice;

2) the hydro electric generating complexes and the reservoirs optimal parameters validation;

3) the water, the land, and also the forest resources monitoring in the hydro electric generating complex construction zone;

4) the reservoir bottom preparation economically – ecological validation;

5) the engineering protection from the towns and cities, the human settlements, the separate enterprises flooding and the underflooding;

6) the agricultural holdings, instead of the submerged ones by the reservoir, restoration on the new place;

7) the reservoir fish economic activity mastering;

8) making the reservoir navigable;

9) the bottom sanitary preparation just before the flooding;

10) the hydro technical arrangements on the aqueous and the wind erosions prevention within the reservoirs zone;

11) the bottom forest report and the cleaning – forest just before the flooding, the afforestation planting on the new place.

The second challenges are more complex and interconnected, the consequences of which would be revealed throughout many years after the construction completion, in many cases, it is very difficult to predict them with the sufficient scientific validity and the soundness. So, many of all these challenges are being left quite unsolvable in the foreseeable future.

So, it is quite possible to subdivide the second challenges into, as the ecological, well as the social ones.

Thus, we shall mark out the main ecological challenges:

- the reservoirs coastline erosion, the banks and the shores, the bottom, the estuarine reaches of the rivers reforming, having fallen into the reservoirs, the sandbars formation;
- the drifting peat islands advent;
- the floating wood supply advent on the defined area of the reservoirs, owing to the bank erosion and the shore man – induced erosion;
- the wood, having received from the rivers, falling into the reservoir;
- the groundwater level changes;
- the body of water and the ambient environment temperature regime changes, the increased moisture, the intensive and the prolonged by their time mists advent;
- the additional water loss for the evaporation;
- the water qualitative composition changes in the reservoir;
- the vegetable and the animal worlds changes;
- the fish spawning grounds conditions violations;
- the Earth's crust vibrations provocations danger, in connection with the large hydro electric dams and the reservoirs construction;
- the contamination by the organic substances.

The reservoirs maintenance experience has been shown, that it is not enough to consider the denoted and the specified challenges at their designing and the mainte-

nance, and also their consequences only from the economic point of view. So, it is quite necessary the complex economically – ecological and the social assessment of the reservoirs construction consequences.

The Siberian hydro power stations (HPSs) reservoirs are being located in the forested – covering zones, having had the damp – growing forest average stock at the riverside edge up to 200 m³ per the forested – covering area hectare. There has not been the forest report conducting case in the complete scheduled volume at the stage of the reservoirs bottoms preparation. The refusal from the forest report and the cleaning – forest conducting in the Siberian hydro power stations (HPS) reservoirs bottoms in the scheduled volumes has been the flooding reason more than 22,69 mln. m³ wood [2].

The wood flooding reasons in the reservoirs bottoms are the following:

1. The large labor – intensiveness and, as the result of this, the works high value on the forest report and the cleaning – forest;
2. The wood – roads absence in the flooding zone, as the result of this, the wood removal high value to the consumers;
3. The forest – processing enterprises absence in the flooding zones and on the territories, which are adjacent to the reservoirs;
4. The local working human resources absence;
5. The non – overflow dams' construction, not having permitted to be passed the rafts and the floats by the transit into the downstream.

It is necessary to be mentioned, that more, than 4 mln. m³ wood pulp are being located at the Angara and Yeniseisky Region hydro power stations (HPSs) defined areas of the reservoirs water. Annually, about 300 thousand. m³ wood have been removed from the Bratsk defined area of the reservoir water, and, moreover, more, than 6 mln. m³ wood have been given to the Bratsk Forest – Processing Complex (FPC). But, the whole volume at its defined area of the reservoir water is not being decreased. The wood

stocks recovery non – stop process is being on.

The Ust – Ilimsky, Bratsky, Sayano – Shushensky, Krasnoyarsky hydro – power station (HPSs) reservoirs flooding zones investigations on the location have been permitted to determine the anthropogenic and the natural sources of the reservoirs contamination and their pollution by the wood pulp, and also their criterion, and the quantitative indicators and measures.

To the natural sources of the reservoirs contamination and their pollution are being related to the following ones:

- the trees falling into the water from the reservoirs waterside and the riverside, as a result of the banks washing out, the erosion and the banks falling;
- the partially or the completely falling away and breaking – away of the submerged forest and wood standing from the waves influence and the ice motions impact;
- the wood pulp removal from the rivers, having fallen into the reservoir;
- the natural disasters (e.g. the intensive wind – falling and the wind – blowing down, the flooding, the accidents at the wood – floating enterprises);
- the organic substances (e.g. the peat, the humus, the forest trees waste);

- the young undergrowth, having grown after the forest report and the cleaning – forest conducting.

For today, there are not the theoretical dependences, having defined the wood pulp total entering volumes into the reservoir, so, they are able to be defined only at the specific object in the process of the observation for it during the sufficiently large time of period.

The investigations, having conducted in the flooding zones, have been permitted to be worked out the main Methods of the hydro power stations (HPSs) reservoirs pollution and the contamination, and also the pollution prediction by the wood pulp and the organic substances [2].

These main Methods have been permitted to be worked out the pollution and the contamination prognosis by the wood pulp and the organic substances of the Boguchansky hydro power station (HPS) (Bo HPS), and also the designing Motyginsky hydro power station (HPS).

The pollution and the contamination prognosis by the wood pulp and the organic substances of the Boguchansky hydro power station (HPS) (Bo HPS) has been presented in the table 1.

Table 1. The shruberily – wood vegetation stock in the Bo HPS reservoir bottom after the flooding first year, under the forest report and the cleaning – forest conducting:

The Pollution & Contamination Sources	Volume, thnd. m ³
The systematic flooding volume	1431,1
The cutting remains from the forest report & the cleaning-forest conducting.	1534,8
The young undergrowth	1897,2
The dead wood and the fallen trees	552,0
The spreading wood pulp along the water's edge, the utility structures remains	19,2
The wood entering from the rivers	0,7
The wood losses from the forest floating and the timber enterprises activity	7,8
The natural and the unrecorded factors	11,0
Total: the wood resources	5453,8

The pollution and the contamination prognosis by the wood pulp of the Motyginsky hydro power station (HPS) (Mo HPS) has been presented in the table 2.

Table 2. The shruberily – wood vegetation stock in the Mo HPS reservoir bottom after the flooding first year, under the forest report and the cleaning – forest conducting:

The Pollution & Contamination Sources	Volume, thnd.m ³
The cutting remains from the forest report & the cleaning-forest conducting	317,1
The dead wood and the fallen trees	175,9
The wood removal from the rivers, having unused for the purpose of the timber - rafting	0,2
The spreading wood pulp along the water's edge	20,5
The losses from the natural factors	8,0
The unrecorded losses	3,0
The wood losses from the forest floating and the timber enterprises activity	7,3
The banks washing out and the erosion	47,0
Total: the wood resources	579,0

Without due regard for the root system and, having assumed, that the cutting remains from the forest report and the cleaning – forest conducting, as this the Sanitary – and – Epidemiological Inspection (SanEpinIn 3907–85) is demanding [4], will be utilized in the Boguchansky hydro power station (HPS) reservoir bottom, not less, than 4 mln. m³ the shruberily – wood vegetation will be submerged, in the Motyginsky hydro power station (HPS) reservoir bottom – not less, than 500,0 thousand m³.

In conclusion, it is quite possible to be noted the following. The Siberian hydro power stations (HPS) construction experience has been shown, that such construction is being resulted in the wood large volumes flooding. The prognoses of the Bo HPS and Mo HPS reservoirs contamination and their pollution by the wood pulp, having presented in the present paper, are given the possibility

to evaluate the submerged and the floating wood influence upon the waters quality.

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ON THE PRESENT CLIMATE WARMING AND THE FUTURE EXPECTED CLIMATE

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The Earth climate change regularities analysis has been given in the paper. The author's paleoclimatic reconstruction mathematical model of the atmospheric air temperature oscillations for the period of 100 thousand years ago has been presented, and the possible changeability forecast for the period of 100 thousand years for the moderate latitudes (e.g. 45–50 degrees of the northern latitude) has been given. The biggest climate fall of temperature was 23–18 thousand years ago, but the warming – took its place 5 - 4 thousand years ago. At present, the planet is being at the moderate fall of temperature stage just after the holocenic optimum (e.g. 4 – 5 thousand years ago) with the subsequent warming process.

The air temperature regular measurements at the Earth surface have been permitted to be found out the changes of its average zonal, the average ones by the hemispheres, and also the average ones, concerning the global values for the period from 1860 till 1990 years. The climate has already been grown warm for 0,5 – 0,6 degrees by C by the observations results for 130 years. The subsequent warming has been reached 1,0 – 1,5 by C in the high latitudes. So, the world ocean level has been raised up for 10 – 12 cm, at the expense of the thermal water widening and the snow thawing just for this period of time. Though, it was observed, that the total amount of precipitation had been decreased in the low latitudes, and it had been raised up – in the high latitudes.

Now, the climate, on the whole, is being defined by the physicochemical and also by the geographical factors, which are the following: the solar radiation flux, the Earth planet main characteristics, and the radioactive elements amount in its bowels, having defined the volcanic processes power, and also the carbonic acid velocity ingress of the gas into the atmosphere. The anthropogenic activity contribution into the Earth climate change is being made up no more, than 15%, and for the rest 85% is being fallen for the share of the global natural cycles, by the number of the Russian scientists' estimations. The most global space cyclone, having had the influence upon the Earth climate, is

the galactic one. The galactic cycle is being depended on the galactic year prolongation, by the well – known Soviet scientist P.P. Parenago's data.

The galactic year – this is the Solar system circulation time around the Galaxy center, which is being made up 212 mln. years (176 mln. years). The existing difference in millions years is being conditioned by the Sun's elliptical orbit with the perigalaxium – that is the moment of the most approaching with the Galaxy center, and with the apogalaxium – that is the moment of the most moving off. This orbit plane itself, as much as, is being rotated towards the Sun motion. On account of this, having left the perigalaxium, the Sun will enter into it again not through 212 mln. years, but much earlier, through 176 mln. years. (Fig.1).

The Sun with its planetary system is being appeared to be at the shortest distance up to the Galaxy center through every 176 mln. years. The «Sagittarius» constellation is our Galaxy center, the powerfulness of which is being made up 50 thousand solar masses.

At present, the Sun, having had the 240 km/sec. velocity, is being approached to the perigalaxium, and it is being reached it through 12 mln. years. As far as the further approaching to the Galaxy center, the Sun is being passed through the space with denser sector structure of the interplanetary magnetic field, the space which is being saturated with the sidereal substance and the cosmic

and the space rays. This is being stimulated the solar activity, as by the magnetic inversions frequency, well as the solar flares in-

tensity, that, in its return, it is being conditioned the Earth climate warming.

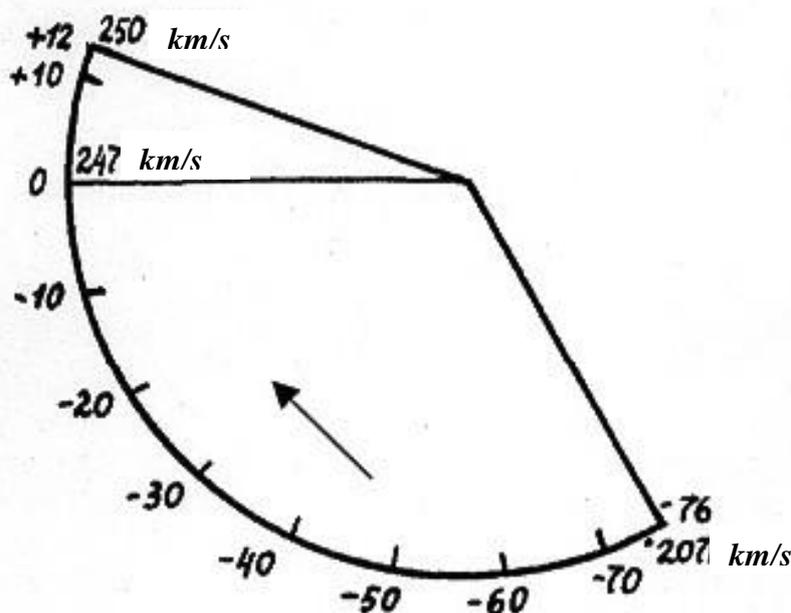


Figure 1. The Solar system way around the Galaxy center from the apogalaxium (it was passed 176 mln. years ago) up to the perigalaxium.

P.P. Parenago has divided into 4 galactic seasons the Sun rotation orbit around the galactic nucleus: spring, summer, fall, and winter. Each season is equal to 44 mln. years. So, the biggest climate warming on the planet is being registered in the years, when the Sun is being found itself just in the summer galactic season, and the biggest fall of the temperature is being revealed in the winter galactic season. The most severe fall of the temperature and the glaciation epochs are being related, exactly to the time of the galactic winter season, having registered by the paleogeographers in the past.

At present, the Solar system has been entered into the galactic summer, and the Earth climate will be appeared to be in the maximum warming state through 12 mln. years. This will be conditioned the corresponding consequences: the glaciers thawing at the Poles and in the highlands and the high mountains, the further world ocean level rise, and the volcanic activity activation. Then the warming process will not be smooth and the gradual one. It will be accompanied by

the temperatures variations, as the Earth planet climate is constantly being depended on the other factors of the local significance.

To all these factors, it is quite possible to be related *the Solar activity rhythms* with the 11, 22, 44, 88, 176 years period and so on and so forth, *the precessions* (the precession – this is the Earth slow motion by the circular cone with the 26 thousand years period), *of the Earth orbit excentricitetus* (the excentricitetus – this is the Earth orbit elongation degree, which is, periodically, being changed, now it is being increased, now it is being decreased with the 90 thousand years period) and *the ecliptic inclination* (the ecliptic – this is the Earth axis inclination in the range from 21 degrees 58 min. with respect to the axis vertical position up to 24 degrees 36 min. with the 40 thousand years period). The ecliptic inclination – this is celestial sphere section by the Earth orbit plane. So, the Earth orbit is quite able to be acquired the ellipse, the parabola, or the hyperbola form, depending on the excentricitetus quantity.

The registered factors are being made the considerable contribution into the atmospheric circulation processes, and they are also being exerted their influence upon the weather conditions formation on the planet. So, the Solar activity is being made its the biggest influence upon the Earth climate among all the above – mentioned and the above – listed factors. The Sun, having rotated by its galactic orbit, from time to time, is being appeared now in the positive sign, now in the negative one of the interstellar magnetic field.

This is being resulted in the signs change of the magnetic field at the Poles. The magnetic inversions are being conditioned by the Sun's impulse radiation with the defined and the specific cyclic recurrence: 11, 22, 44, 88, 176 and more years. The more solar flares powerfulness, the more solar activity influence upon, as the geo – and the biophysical Earth processes. The geomagnetic storms, the air masses circulation strengthening, the seismic activity, and the convex – concave deformation in the lithosphere advent are being connected with them.

M.V. Lomonosov (1711–1765) in the «On the Earth Strata» paper wrote: «The animal and the vegetable origin tracks and footprints had been preserved just in the Earth strata, having corresponded to the last and the passed geological epochs' climates».

The instrumental observations for the weather on our planet were begun, since the 16 – th century, when the thermometer and the barometer had been invented. So, the meteorological observations have been acquired the scientific character, since the 17 – th century. Thus, the first attempts of the concentricity century – long oscillations influence study, the longitude of the perihelion, and the ecliptic inclination on the air temperature regime in the atmosphere surface layers for the latitudes of the 50 degrees of the North latitude have been done by the English researchers, such as Meech, Winner (1877), Hargreaves (1896) in the 19 – th century. M.Milankovich (1920) has made up the mathematical model, having permitted to be

calculated the planetary air temperature, depending on the solar radiation quantity that or many points, according to its geographical latitude.

The palaeo – climatic reconstruction multi – dimensional mathematical model for the moderate latitudes (e.g. 45 – 50 degrees of the North latitude) for the last geological epochs and also for the weather forecast for the nearest future, with due regard for the temporal scale has been made up by us (e.g. Sverdlova L.I., 2004).), having based on the palae – ontological data, and also on the existing investigation in the field of the galactic seasons influence, the Earth orbit concentricity century – long oscillations, the ecliptic inclination, the precession period and the solar activity on the Earth climate.

The two models of the atmospheric air bottom layers temperature variations have been given, as the example on the 1:100 (e.g. the Fig.2) and the 1:10 (e.g. the Fig.3) scales. All these models have been made for the latitudes of the 45 – 50 degrees. The atmospheric air temperature oscillations for the 100 thousand years ago period have been presented, and the probable changeability weather forecast for the 100 thousand years forward has been given in the Fig. 2. The atmospheric air temperature oscillations for the 2 thousand years ago period, and also for the 1,8 thousand years forward from the present time (e.g. 2000) have been given in the Fig. 3.

The most climate fall of the temperature was 23 – 18 thousand years ago, and the warming took its place – 5 – 4 thousand years ago. At present, the planet is being found to be at the fall of the temperature stage just after the holocenic optimum (e.g. 5 – 4 thousand years ago) with the subsequent warming process.

The World Meteorological Organization (WMO) is being predicted, that in 100 years the world ocean level will be quite able to be raised almost for 100 cm. By our calculations, this phenomenon will be able to be taken its place in 2200, in connection with the climate warming.

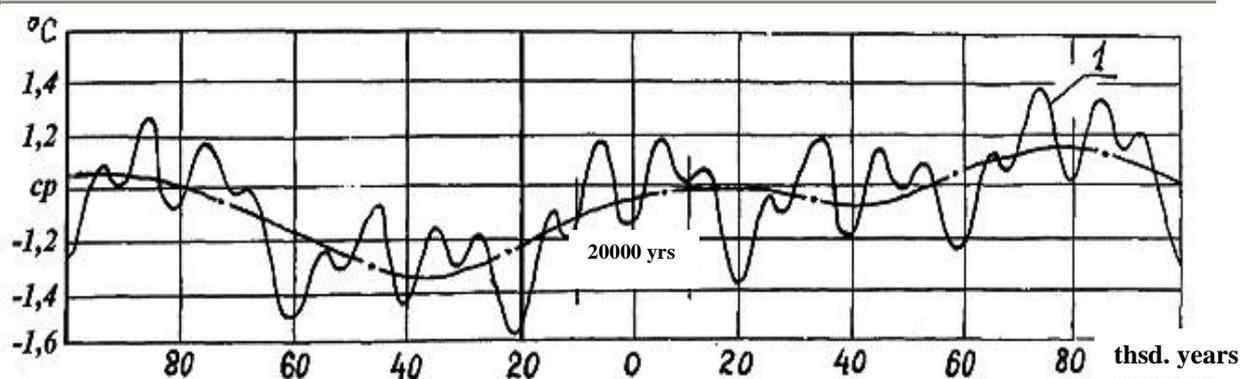


Figure 2. The atmospheric air temperature oscillations for the 90 thousand years ago period and the probable changeability weather forecast for the 90 thousand years forward has been given in this Figure.

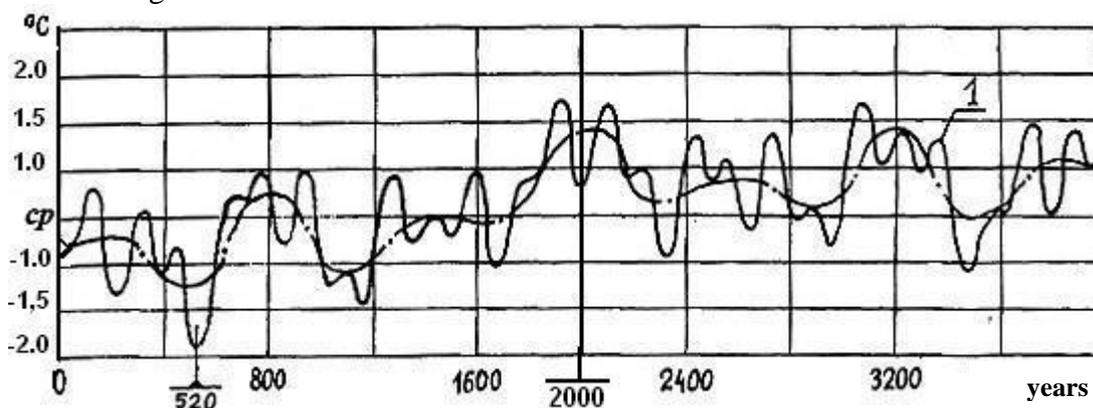


Figure 3. The atmospheric air temperature oscillations for the 2 thousand years ago period and for the 4,5 thousand years forward from the present time (e.g. 2000).

The subsequent fall of temperature will be reached its maximum in 2300, 2650, 2835 and 3400 years. The temperature fallings will be the most severe and intensive in the moderate latitudes in 2250 – 2350, 2600 – 2700, 2785 – 2885 and 3350 – 3450 years. So, it is necessary to be prepared already today to the probable and predictable falls of temperature, having carried out the energy – efficient policy.

This fall of temperature will be conditioned by the world ocean level lowering. Thus, the climate warming and the fall of temperature are always being accompanied by the world ocean level oscillations and the continents' coastline migration.

At the same time, the Earth climate oscillations processes are being closely con-

nected with the Earth's crust tectonic movements. The Earth's crust tectonic activity is usually being revealed in the form of the earthquakes, the volcanoes eruptions and the orogenic and the mountain – forming processes, which are being changed the continents' coastline architectonics in the world ocean level raise periods.

The world ocean level raise is being taken its place in the most eventful, dramatic and impressive climate warmings periods. In the result of all these phenomena, the Alaska is being separated from the Chukchi Peninsula by the Bering Straits, and the Sakhalin Island – from the continent by the Strait of Tartary. All these Straits are almost being disappeared in the deepest and the most severe temperature fallings periods.

*Materials of a Conference***RECYCLING OF OIL-AND-GAS COMPLEX
SOLID WASTES**

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The interest in the problem of waste utilization lies in its huge quantity. More than 30% of solid waste, that is about 10 million ton, apply to oil-and-gas complex. And enterprises often have to collect and keep them on the territory and pay for its storage. Waste accumulation can cause intensive pollution of letosphere, hydrosphere and atmospheric air. Consequently, problems of waste negative influence on the environment are actual ones and need for undelayable decisions.

Let pay attention to exhausted silica gel – gas industry waste on the stage of gas dehydration. During production cycle specific capacity of adsorbent is reducing and contaminations are formed on the silica-gel surface. Annually about 250 tons of exhausted silica gel are formed in a compressor station.

It is preferable to use wastes as secondary raw material. The most acceptable way of exhausted silica-gel recycling can be its use in manufacture of building materials, for example, in gypsum-cemento- pozzolanic binders (GCPB).

GCPB represent the compositions, consisting of gypsum binders, portland cement and pozzolanic admixture. As active mineral admixtures tripoli powder, flasks, diatomite, some active ashes, etc are usu-

ally used. Characteristics of silica-gel correspond to properties of pozzolanic admixtures. So a new receipt of GCPG was developed, in this case silica-gel at the same time should be preliminary crushed. For recycling of one ton of exhausted silica-gel it is needed 3,200 tons of gypsum; 1,600 tons of cement and 0,176 tons of supersoftener. According to offered receipt of GCPG some samples of concrete were made. Tests of samples with application of silica-gel show high strength properties with factor of water resistance, which is 0,8 (without addition silica-gel it is 0.34).

For the substantiation of the ecological safety of exhausted silica-gel recycling products it was analyzed the water extract of the samples. pH of water extract goes into an acceptable interval from 6,5 up to 8,5, it is also not observed the migration of contaminant in water, that testifies the creation of a non-polluted product of recycling.

Thus, we offer new receipt of GCPG with the use exhausted silica-gel, which has sufficient water resistance that allows using concrete on its basis not only in dry, but also in damp conditions (in contrast to gypsum binders). Essential advantage of the offered receipt is fast growth of durability that allows releasing products from the form in 2 hours without application power thermal processing.

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THE NECESSITY OF IMPLEMENTING THE QUALITY MANAGEMENT SYSTEM IN THE SYSTEM OF PENSION INSURANCE

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This article concerns the features of modern system of pension provision. The reform of pension scheme being held since 2002 has resulted in increasing the competitive activity in the market of pension services. One of the ways of surviving in the conditions of this tough competition is the implementation of the quality management system in the system of pension insurance. It has been found out that entirely new approaches should be implemented in the sphere of pension services.

The Pension Fund of the Russian Federation is one of the largest and most significant social institutions in Russia. More than thirty-eight million pensioners draw their pensions from the Pension Fund including retirement pensions, state-provided pensions, pensions for military men and their families, social pensions, pensions for public sector workers.

Unfavourable demographic trends connected with worldwide population ageing are vivid in many countries, including Russia. Statistically, the proportion of the pensioners to the employed is 1 to 1.5 – 2 people. However, this proportion will greatly change in 5 or 6 years because the people born in the result of the population increase during the post-war decade will retire. And in 15-20 years the proportion of the pensioners to the employed will be 1 to 1.

Therefore, in the post-industrial society the governments prove to be under twofold pressure: on the one hand, the tendency of population ageing and global tax competition force them to reduce or at least to restrict the level of social expenditures. On the other hand, unpopularity of these measures and objective difficulties cause serious obstacles to such restrictions [2]. Only the reform of pension scheme similar to that held in Russia in 2002 will help to relieve the tension of this situation.

There existed the unfunded pension scheme was in Russia till 2002. All money being paid for pension provision was transferred by the employer to the Pension Fund of the Russian Federation. Instead of being

invested, it was immediately distributed among the people who received pensions [3]. There were several drawbacks of the unfunded pension scheme. The first drawback of this scheme was that it did not create any motivation to make the pension savings as it ignored most employees' salary and the length of employment. Another drawback was that it did not encourage employers to pay taxes for their employees. All of these drawbacks became the reason for carrying out the reform of pension scheme.

In the process of implementing (carrying out) the reform of pension scheme the system of pension provision has undergone some major qualitative changes. The government offers to divide a sum of money paid for the pension provision. For example, the part of pensionable payments, the so-called funded component of retirement pension, is not paid to the whole fund, but to the pensioner's accumulation account [2].

Nowadays pensions consist of several parts and include base, insured, funded parts. The base part of the retirement pension is fixed and depends on a person's old age (if a person is eighty or more than eighty), on the physical disability (disabled people of group I), on the number of dependants. The insured component depends on the amount of pension savings of an insured person, taken into account from the day the insured person started to be paid. The funded component of the retirement pension depends on the amount of insurance payments, paid for the funded component of the pension, and also,

the income from the investment of this part of the retirement pension.

Therefore, having started to work, you have begun to make up your pension. That is the idea of the storage system of pension provision.

It is necessary to point out that new pension system gives people the number of opportunities. The first opportunity is to choose the management company which will invest pension savings. Another chance is to transfer the funded component of the pension from the state to non-state pension fund. It proves the fact that people have the opportunity to choose the pension fund which works effectively and is on good terms with its clients.

The participation of non-state pension funds predetermines the developing of competitiveness in the sphere of compulsory pension insurance and consequently, the improvement of the quality of pension service, the growth in pensioners' prosperity [5].

Therefore, the issue of pension provision services is considered to be very live. Today the number of non-state pension funds has already received the certificates of conformance of quality management system to the requirements ISO 9001-2000 which are the evidence of their reliability [6, 7].

Due to the fact that the work of the Pension Fund of the Russian Federation is more regulated by standard statutes than that of non-state pension funds, it has less "ranges of discretion" in managerial decisions. However, it doesn't mean that the management in the Pension Fund is simpler than in the non-state pension fund.

The management in profit – making organizations (commercial) greatly differs from that in state institutions in the feedback mechanism. In profit – making organizations (commercial) this feedback mechanism is very simple. It includes the following stages: the improvement of the management quality – the competitive growth of products – earnings growth – the investment of additional profit to the improving of the management

quality. And this process is repeated from the very beginning.

In state institutions, providing free services, the work of the feedback mechanism is not clear enough but it can be seen if we take the department of the Pension Fund as an example. As a result of the reform of pension scheme, the size of the pension depends on the rate of wages as well as the amount of insurance payments. The feedback, touching upon the budget, is the following: after the budget having been adopted, factual fulfillment contrasts with the planned one and necessary management decisions are taken. The feedback, touching upon the quality of service, can be seen through the series of consequent actions: the specifying of the quality standards (the average value of the pension fixed period and recomputation, the average number of pensioners' well-grounded claims, the average time of payout period), the control of the efficiency variance or stimulation if there is no efficiency variance, the analysis of sanctions, the development of administrative actions (the service change or the changes in the amount of the resources, the standards correction and so on). The feedback can be also seen through the other job performance standards: quality planning – the correlation of factual results with the plan – the recording of the quality of plan realization taking into account the sanctions or the stimulations of the employees and the heads of the departments of the Pension Fund– the drafting of a new plan.

According to the Pension Fund regulations, it has been formed with the aim of state financial management of the pension provision in the Russian Federation. Consequently, the service provided by the Pension Fund lies in management. The quality of this service should be of great importance. The Pension Fund dealing mainly with pensioners should pay a lot of attention to their client satisfaction.

Nowadays the Pension Fund tries to improve the quality of work taking a lot of actions. They are the following:

- the constant developing and the in-

roduction of new technologies in the work with pensioners, insured people and insurers;

- the set-up of client computer base in all the departments of the Pension Fund ;
- the organization of work focused on the conversion of the rights of pensioners who worked on the enterprises which haven't existed no more;
- the holding the contest for the best department of the Fund;
- the conducting the annual week of the quality with the aim of improving the quality of service in the work with pensioners, insured people and insurers [9, 10].

However, these actions can differ in different regional departments of the Pension Fund. Unfortunately, the quality management system for all departments hasn't been developed yet. Being in the intense reforming, the regional departments of the Pension Fund are in great necessity of the ways of quality improvement of corporate management. They can be a good place for implementing new technologies as well as taking different actions to quality management. Scientific research results in the field of quality management are mainly devoted to the for-profit business organizations. That's why the issues concerning the quality management assessment in state institutions which provide free

services need do carry out necessary researches.

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THE MAIN TENDENCIES IN THE SPHERE OF PRIMARY SCHOOL TEACHER PROFESSIONAL TRAINING

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Nowadays the change to social state government of education takes place. It widens the possibilities of a person to choose rights and freedom, makes a person not only an object of education, but also its active subject, independently building his own educational strategy. The need for specialists is quite distinctly expressed. Specialists should possess a high level of creative potential development, the ability to set and solve different tasks. Nowadays the state and the society set much higher requirements to communicative qualities of a teacher, his abilities to orient himself in the informative world, get more knowledge, possess competitiveness and mobility, solve non-standard tasks. This fact accentuates the task of communicative competence development of every educational process participant (a teacher and a student), which presupposes the need for qualitative changes in the system of high education, especially in educational establishments, such as Pedagogics.

One of the distinctive features of modern educational system is the change from state to public-state government of education. The main idea of social-state government of education is that efforts of state and society combine in the solution of educational problems, in other words more rights and freedom are given to teachers, students and parents in the choice of content, form and method of educational process organization. The choice of personality's rights and freedom makes a man not only the object of education but also its active subject, building his own educational strategy independently, being able to orient in the wide range of educational programs, educational establishments, types of social relations.

State character of educational system means first of all that the single state policy in the sphere of education is run, and fixed in the Law of Russian Federation "Concerning Education" which was approved in 1992. This law is built on the combination of state policy principles, such as:

- humanization character of education, the priority of human values, life and health of a man, free development of personality, upbringing of patriotism and love for Motherland;

- the combination of federal, cultural and educational environment, the educational system of national cultures and regional cultural traditions under conditions of international state;

- democratic, social-state character of education government and so on [1].

The main subject of educational process is protection and further development of social experience (system of knowledge, ways of activity, spiritual values). The notion "educational process is very often considered as a synonym of the notion "educational activity". The two interrelated, connected components are included into the content of these notions: pedagogical activity (the organization of social experience learning) and training (learning itself). Two kinds of activity: pedagogical and learning act as two sides of single educational process, its participants (a teacher and a student) are the subject of educational process. Education as a system represents itself as a complex of aim-directed pedagogical actions, influence the aim of which is to transfer the world knowledge, social experience, accumulated in the process of cultural historical development of the society to the young generation and also training of socially acceptable and socially approved forms of behavior. The creation of effective educational system with inclusion of new didactical means requires theoretical knowledge of laws, according to which the educational process runs [2].

Internal laws of educational process characterize its dependence on the external processes and conditions: social economical, political situation, level of culture, need of the society for the definite type of personality

and educational level in the given historical period. Connections between components of pedagogical process: aims, content, methods, means, forms – are released to the internal laws.

Educational structure is characterized by such components as: students' knowledge of experience, accumulated in the process of cultural historical development of the society, upbringing of socially acceptable and approved forms of behavior, intellectual and physical development. In this respect education is determined by the definite ideas of man's social functions, accepted in the society at the given moment. These structural elements determine the content of education, in other words that complex of socially valuable experience depends only on them, and the acquisition of this experience is necessary for the young generation for the effective functioning in the society.

The quickly growing informative field and completely new communicative technologist influence more and more the modern state of society development and human knowledge development. That's why nowadays the need for specialists, who possess a high level of creative potential development, the ability to put and solve systematically different tasks is distinctively evident.

So, education is not only the process, but the result of human acquisition of social cultural experience under conditions of personality development. The intelligence of a person is a result of summary influence of at least three components: aim-directed education and upbringing, self-education, chaotic influence of social and informative environment. However, the part of aim-directed education (school, high, professional) is the leading one, in the first place due to system and methods.

The analysis of historical aspect of educational system development and their creative realization shows that social historical context not only influenced the theory and practice of education but in many aspects determined and defined their development. The main sources, of such development are:

- pedagogical science, which allows not only to analyze and systemize the achievements of educational practice, but also theoretically forecast and model further development of pedagogical process;

- pedagogical practice, which reveals the efficiency of this or that pedagogical theories and models application;

- social order, requirements of state and society in the sphere of education.

The last source influence on the development of pedagogical process is very high. State is able to initiate and discredit this or that tendencies of pedagogical process through educational system. The society, developing, dictates the urgent need for the training of specialists, who will be required under new political and social economical conditions. This influences the form of educational and upbringing tasks, definition of educational process contents and choice of adequate methods and means [2].

Development and changing of these sources (modern achievements of psychological pedagogical sciences, innovative practice, new social order in the sphere of education) led to the appearance of new tendencies in the sphere of education both in the organization of pedagogical process itself in demands to its result.

The main tendency now is humanization of education, growing attention to the personality of a student as the highest value of the society, the tendency to form a citizen with high intellectual, moral and physical qualities. The principle of humanization was included in the didactical principles long ago, but only on the modern stage of Russian education development the real conditions of its realization appeared. Humanization of educational content is achieved by the maximum usage of the humanities possibilities, that's why the priority role nowadays is given to linguistic education, formation of communicative culture, which contributes to empathy, reflex, self-organization and self-regulation of man's behavior.

In the State educational standard of high professional education (2005) for the

specialists “Primary school pedagogies and methodology” great attention is paid to formation of primary school teacher’s communicative competence: a specialist should possess a developed ability of real communication with native speakers, with authentic sources of information and communicative ability to speak the given language, the nucleus of which is communicative competence.

Nowadays the society sets much higher demands to the communicative qualities of a teacher, his abilities to orient himself in the informative world, possess competitions and mobility, to solve non-standard tasks. This fact accentuates the task of communicative competence development. This concerns each participant of the educational process (a teacher and a student), which presupposes the necessity of qualitative changes in the system of high education, especially in educational establishments, which specialize in the humanism (pedagogies, for example).

All the programs of the humanistic upbringing for the future primary school teachers (Pedagogical faculty, Ulyanovsk State Pedagogical University) are aimed at the formation of the harmonic creative language personality, because “speaking, thinking and feeling person – is the main actor in the world... his understanding of the world, his attitude to other people are expressed in the language means which he selects for communication” [3, 108]. Thus, anthropocentrically approach in modern education leads to the fact that an ideal becomes human, it starts from the Biblical ethics, that’s why the urgent necessity of modern education and up-

bringing becomes the merging in one subject the features “homo sapiens” and “homo eloquens”.

Conclusions. Nowadays the change to social state government of education takes place. It widens the possibilities of a person to choose rights and freedom, makes a person not only an object of education, but also its active subject, independently building his own educational strategy. The need for specialists is quite distinctly expressed. Specialists should possess a high level of creative potential development, the ability to set and solve different tasks. Nowadays the state and the society set much higher requirements to communicative qualities of a teacher, his abilities to orient himself in the informative world, get more knowledge, possess competitiveness and mobility, solve non-standard tasks. This fact accentuates the task of communicative competence development of each educational process participant (a teacher and a student), which presupposes the need for qualitative changes in the system of high education, especially in educational establishments, such as Pedagogics.

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**CONCEPT AND METHODS OF
GEOECOLOGICAL EVALUATION
OF THE TERRITORY'S CLIMATE COMFORT
ON EXAMPLE OF THE SOUTH
FEDERAL DISTRICT**

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Comfort climatic conditions is an important environmental factor, that forms environmental, climatic and natural-resources potential of a region, which determines the life activities of its inhabitants and should be definitely taken into account.

Currently, almost all large-scale geographical studies focus on the already existing global and regional environmental problems, which became acute recently. Moreover, the majority of the researches study the anthropogenic effects on the environment, ignoring its natural processes and changes. Due to that fact, the existing concepts of environmental geographical researches are controversial, in other words, there are some contradictions between the content of the subject field in general and the outcoming information and its credibility.

Studies on the global environmental changes, which are based on a detailed analysis of the anthropogenic influence, without regarding the natural processes and specific regional conditions, especially when used to forecast long-term changes, are often unbalanced and, consequently, can lead to false conclusions. In order to solve the problem of the worsening environment, one should consider not only the anthropogenic effects, but also the whole range of interactions within the «environment – human – society» system.

Natural and anthropogenic geosystems should be regarded as natural-anthropogenic, where self-regulatory mechanisms are combined with the human

influence. This additional pressure causes transformations and disturbs the balance of the whole environmental climatic system on the Earth, also affecting other global ecosystems. Assessment of environmental developments and environmental geographical evaluation of a specific territory require the knowledge of development laws of the Earth's geographical sphere as a planet and its geographical space, which is connected with the solar activity and geomagnetic storms, as well as the main laws of the geographical zonality, involving solar radiation, humidity, temperatures, evaporation, rocks and tectonics.

Basing on the retrospective analysis and summary of scientific researches, and regarding the current status of the problem, terms and notions, related to the environmental geographical evaluation of the environmental natural component have been thoroughly selected. The chosen anthropocentric approach is determined by the aim of the study. Author's original concept emphasizes the determining role of the regional natural component, thus providing territorial fullness and integrity of the research and, as a result, higher objectiveness of the territorial analysis. Regional climate comfort is regarded as an integral characteristics of its climatic and bioclimatic conditions, which includes several bioclimatic indices and comprises an integral index of bioclimatic comfort (IIBC). Climatic comfort («comfort») is such a psycho-physiological condition, which is ideal for human life activities in areas of his constant or temporary inhabitancy. Sub-comfort climatic conditions («sub-comfort») mean slightly unpleasant environmental conditions, when a human adaptation mechanisms provide nearly optimal psycho-physiological state for a normal living. Discomfort climatic conditions («discomfort») mean rough environmental circumstances, when human adaptive mechanisms cannot provide an optimal psycho-physiological state and additional protective measures are required for a normal life activity.

Terms and notions of the concept	
Basic notions	Derived notions
Test territory	Geographical space
	Climatic comfort
Methods of climatic comfort evaluation	Comfort, sub-comfort, discomfort
	Bioclimatic indices
	Integral index of climatic comfort IICC
Medical bio-meteorological forecast	Neuro-network model, development and application methods

The concept of the environmental geographical research on a spatiotemporal structure of the climatic comfort, based on principles of geocentrism, anthropocentrism and chronological order, is shown on fig.1. Its unique character lies in the fact, that an objective environmental geographical evaluation requires a de-

tailed analysis of the environmental natural component and the effect of the bioclimatic component of the climate on a specific territory. The concept develops an idea and describes the stages of the research, covering the following aspects:

- Aim of the research;

- Current state analysis;
- Existing problems;
- Main and derived notions;
- Decision principles;
- Tasks;
- Criteria and indices;
- Research structure and methods.

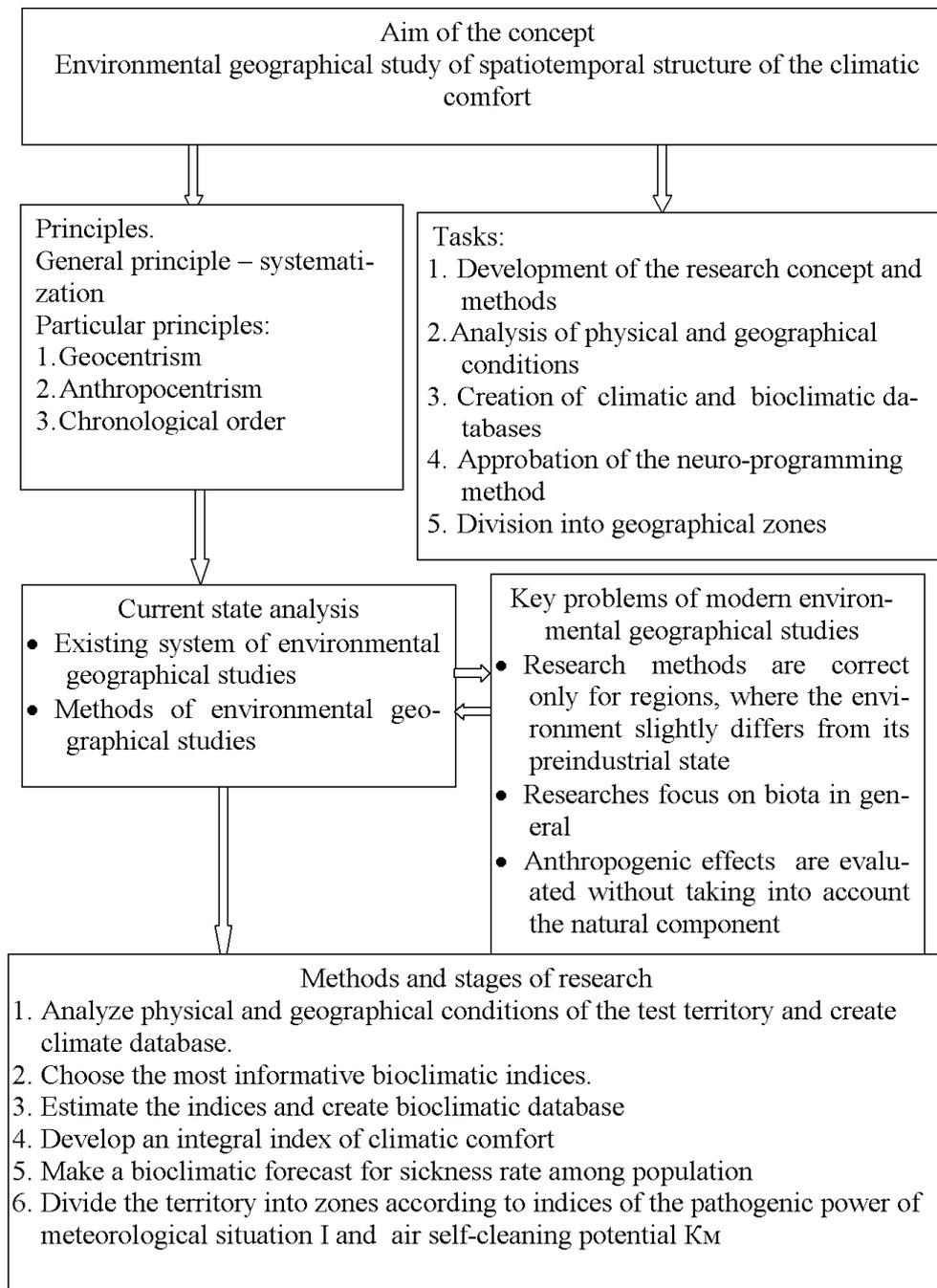


Figure 1. Concept structure

Every person has his individual ideal conditions, limited by stress zones and survival limits, which are determined by every single environmental factor (though environment is rarely influenced by only one factor). In most cases the environment experiences an influence of numerous factors, and their

influence cannot be measured by their simple summation. One should also consider the limiting factor law (Liebig's Law of the Minimum and Shelford's rule), which says, that even if one factor exceeds its optimum, it causes stress for an organism; its considerable excess can be fatal. Anthropogenic influences happen

on the natural background. Moreover, it is well known, that the nature can to some extent neutralize some contaminating elements, which, in their turn, interacting with each other and natural factors, are able to create new secondary, often even more harmful reactions, increasing their negative effects on the environment and living organisms (synergetic effect).

The proposed concept let receive maximally objective information about the region's favorability for human life activities, as well as provides for a better control over the anthropogenic influence.

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