Medical sciences

Article

Materials of Conferences

CONTENTS

IMMUNE STATUS IN PRESCHOOL CHILDREN WITH CELIAC DISEASE IN UZBEK POPULATION

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In 16 children with typical (n = 11) and atypical form (n = 5) of celiac disease aged between 4–6 years old, there were studied parameters of cellular immunity, phenotype of immune-competent cells (CD8, CD25, CD95), cytokines, serum and secretory immunoglobulin A (IgA). Studies showed that in children with celiac disease is marked T-cell immune deficiency against the background of hyperactivation of B-lymphocytes. More pronounced this manifests itself in children with atypical form of celiac disease, causing an increase in both serum and, in particular, secretory immunoglobulins. At the same time, subpopulations of T-lymphocytes are changed: reduction of helpers, increase of cytotoxic lymphocytes and killer cells. Contents of CD markers of apoptosis and, in particular, IL-2 receptor increases, which coincides with high levels of cytokines, especially IL-4.

Keywords: pediatric gastroenterology, celiac disease, immunity, serum and secretory immunoglobulin A, cytokines, interleukin, tumor necrosis factor-α

Celiac disease is a chronic, genetically determined disease which is characterized by persistent intolerance to gluten with the development of hyperregeneratory atrophy of small intestinal mucosa and associated malabsorption syndrome. Progress in the immunological diagnosis has led to increased detection rate of this disease in 10–20 times in patients with asymptomatic or atypical course, and at risk groups – hundreds of times more likely than in general population. The exact frequency of this pathology in the population can be established, apparently, only due to large-scale screening studies. The disease is triggered by eating gluten-containing products from wheat, rye, barley and oats. According to recent studies conducted by Revnova et al. (2000), these peptides play a key role in the pathogenesis of celiac disease [4].

Studying the variety of manifestations of the disease, we can conclude that celiac disease is a systemic illness that involves many organs and exceeds a border of isolated food intolerance to gluten.

Among the unresolved problems for celiac disease so far a priority remains the identification of immunological status, determination of phenotypic characteristics of children with celiac disease.

The purpose of study was to study the basic parameters of immunity in preschool children with celiac disease in Uzbek population, which determine the processes of proliferation and autoimmunization.

Material and methods

We examined 16 children with celiac disease aged from 4 to 6 years who were hospitalized in the department of gastroenterology. The diagnosis was verified based on the criteria of the European Association of Pediatric Gastroenterologists (1999). The diagnosis was made in the presence of communication of manifestation of the disease with the introduction into nutrition of gluten-containing products, based on the results of histological examination of biopsy samples of the mucous of duodenum bulb-out part, high levels of antigliadin antibodies IgG and IgA, clinical effect of gluten-free diet, improving of absorption and morphology of the small intestine in exclusion of gluten from the diet. Stage of gluten enteropathy established in accordance with the classification of M. Marsh (1995). The severity of the pathological process and the period of disease were assessed comprehensively including all major clinical symptoms of bowel impairment, frequency and expressiveness of syndromes of extraintestinal manifestations of disease.

16 patients with celiac disease were divided into 2 groups depending on the disease phenotype. 11 (68,7%) children were making a diagnosis with typical form of celiac disease, the main symptoms of which were abundant, offensive, light or colored, soft, foam or clay, poorly laundered stool three or more times per day, chronic diarrhea, increased abdominal circumference, abdominal pain, decreased appetite, retarded body weight, impaired emotional status (irritability, aggressive behavior, restless sleep). Atypical form of celiac disease diagnosed in 5 (31,3%) patients. They had severe secondary metabolic disorders that masked the symptoms of main disease. Most often, these were disorders of phosphorus-calcium metabolism with the development of severe rachitis-like syndrome, bone deformities, pain in legs, short height, and anemia.

Prolonged treatment with a gluten-free diet leads to restoration of normal structure of the mucosa, improving absorption and recovery of most patients. In other part of patients, the piles remain partly atrophied, but the epithelium becomes highly differentiated, malabsorption symptoms become less pronounced. Among the patients examined were children who kept a gluten-free diet, but clinical improvement was not observed. We reviewed the clinical symptoms of the disease by dividing the children into 2 groups: with refractory and non-refractory.

Immunological studies were performed at the Institute of Immunology, Academy of Sciences of the Republic of Uzbekistan. As a control, we used data from the Institute of Immunology obtained by Aripova et al. (2004) [2]. We studied parameters of cellular immunity: the contents of leukocytes, lymphocytes, total amount of T-lymphocytes (CD3), T-helpers/inductors (CD4) and T-suppressors/cytotoxic lymphocytes (CD8), ratio of CD4/CD8 (immune-regulatory index – IRI), B-lymphocytes (CD20), natural killer cells (CD16), and activation markers of lymphocytes bearing a receptor for

IL-2 (CD25) and apoptotic factor (CD95). Phenotype of immune-competent cells (CD8, SD25, SD95) was determined using monoclonal antibodies to differentiation markers (product of the Institute of Immunology of Russian Academy of Medical Sciences, Moscow, Russia) in the reaction of indirect rosette-forming by Zalyalieva-Prokhorova's method [8].

In blood serum of patients we also determined the contents of cytokines: interleukin-4 (IL-4), tumor necrosis factor-α (TNF-α) by immune-fermentative method. Test-systems for the determination of the cytokines (made by «Cytokine» Ltd., St. Petersburg, Russia) based on the «sandwich» method of hard-phase immune-fermentative analysis with the usage of horseradish peroxidase as an indicator enzyme. Also, we determined the contents of serum and secretory immunoglobulin A (IgA). Secretory one (sIgA) was identified in the saliva used dilution 1/2000. For his purpose we used set of A-8668 IgA-secretory test-system (IFA-BEST «Vector-Best» Ltd).

Digital material is processed by variational statistics.

Results and discussion

The data are shown in the table. The total number of leukocytes in children with typical and atypical celiac disease remained within normal limits, so no significant differences between groups were revealed. Study of total lymphocytes amount showed their decrease in non-refractory form and a tendency to increase in other forms of celiac disease. If the level of B-lymphocytes tended to increase with non-refractory form of celiac disease, then in refractory form and, especially, in atypical one their level significantly exceeded the values of control group of children in 1,58 and 1,72 times, indicating that the expression of the development of autoimmune processes in children. This is confirmed also by studies of Aruin (2000), Allahverdiyeva (2004) [1,3]. The level of T-lymphocytes decreased, more pronounced in atypical form of the disease.

The study of the contents of subpopulation of T-lymphocytes showed a progressive decrease in the levels of T-helpers/inductors in 1,18, 1,14 and 1,28 times in groups with non-refractory and refractory forms of typical celiac disease, as well as in atypical one, respectively, in comparison with the normative values in children at the similar age. At the same time, the content of T-cytotoxic lymphocytes had a tendency to increase with non-refractory form of celiac disease and to decrease – in other forms. This led to reduce of immunoregulatory index in all groups of children, especially in non-refractory form of typical celiac disease (in 1,46 times, $P < 0,05$). The content of natural killer cells significantly increased in 1,84, 1,64 and 1,31 times, respectively, compared to normative values, more pronounced in children with non-refractory from of typical celiac disease.

The level of CD25+ in blood serum of children with atypical form of celiac disease was significantly reduced in 1,3 times, to a lesser extent – in typical refractory form, and was not changed in non-refractory typical form of celiac disease.

From previous studies is known the role of APO-I/Fas (CD95+) receptor in the process of apoptosis, and the degree of its expression reflects the level of lymphocyte apoptosis [5, 6, 7]. On the other hand, the processes of programmed cell death can also be implemented through specific receptors, whose main function is to induce apoptosis. From this it follows that the determination of the number of cells, expressing CD95+, may also reflect the state of cells and their willingness to apoptosis. In children with celiac disease this index tended to decrease, more pronounced in atypical form of celiac disease. Apparently, the reduction of CD95+ level conditioned deceleration of apoptosis and, as a consequence, an increase in their content (autosensitization of organism) [5, 6].

Indeed, the study of humoral protection factors revealed a significant decrease of serum IgA (in 1,12 times) in children with non-refractory typical form of celiac disease and increase in groups with refractory typical and, especially, atypical forms of the disease in 1,39 and 1,51 times, respectively. At the same time, the level of secretory IgA in all groups of children was increased: in 2,42, 2,44 and 2,2 times in non-refractory and refractory forms of typical celiac disease, as well as in atypical form, respectively.

Probably, a decrease in the level of T-lymphocytes is realized through specific receptors. The study of serum cytokine IL-4 in children with celiac disease showed an increase in its content in 1,37; 1,77 and 1,85 times in groups with non-refractory and refractory forms of typical celiac disease, as well as in atypical form, respectively, in comparison with the values of control group. The amount of TNF-α increased to a lesser extent, more pronounced in refractory form of typical celiac disease.

Thus, the analysis of immunological parameters in children with celiac disease revealed more profound immune disorders in refractory typical and, especially, atypical forms of the disease.

Conclusions

1. In children with celiac disease is marked T-cell immune deficiency against the background of hyperactivation of B-lymphocytes. More pronounced this manifests itself in children with atypical form of celiac disease, causing an increase in both serum and, in particular, secretory immunoglobulins.

2. In children with celiac disease are changed subpopulations of T-lymphocytes: reduction of helpers, increase of cytotoxic lymphocytes and killer cells.

3. Contents of CD markers of apoptosis and, in particular, IL-2 receptor increases, which coincides with high levels of cytokines, especially IL-4.

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COMPLEX TREATMENT OF CLINICAL AND NEUROLOGIC MANIFESTATIONS OF METASTATIC TUMORS OF VERTEBRAE BODIES COMPLICATED BY COMPRESSION OF SPINAL CORD

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«Collopan» is the most effective remedy in conducting plastic surgery on spine, it increases support ability of the affected spine, decreases pain syndrome, recovers neurologic symptomatology and improves life quality of the patients.

Surgery allows to quickly reduce or cut off the pain syndrome thereby increasing of motor activity, improving of life quality and beginning of special treatment within short term.

Keywords: metastatic tumors, vertebrae bodies, spinal cord

Under cancer metastases in spine or spinal canals at any localization of lesions, initially conduction symptomatology often becomes apparent as sluggish aspastic paraparesis and paraplegia caused by quick development of cerebral compression and toxic effect on it. Later on, spasticity and pain emerge [1].

Clinical symptoms, observed under metastatic tumors of spine, are caused not only by tumors that lead to direct compression of roots and spinal cord, but are a consequence of toxic effects of tumors on spinal cord, compression of tumors on roots and anterior spinal artery with development of ischemic vascular abnormalities in spinal cord. In these cases, there may be discrepancy between a sensitivity disorder level and tumor site [1, 2, 3, 4, 5].

Materials and research methods

We observed 40 patients with the spine tumors at the age of 22 to 52. Among them were 25 men (62,5%) and 15 women (37,5%). Prescription of disease was from 1 to 3 years. Spineplasty was done with «Collapan».

Results and their discussion

We collected and scrutinized neurologic disorders of 40 patients with metastatic lesion of the spine with exophytic growth of tumor and pathologic compression fracture of vertebrae bodies. Intensity of neurologic disorders depended on degree of spinal cord compression and its roots as well as on localization level of pathologic process.

Neurologic disorders were composed of the following:

– Sensitivity disorders were observed among almost all examined patients. Sensitivity abnormalities often have conduction nature to be expressed in the form of hypesthesia or anaesthesia of below localization level of pathologic process. In some cases, paresthesia was observed (feeling creepy all over, sense of electric current passing and others).

– Motor disorders were also observed among all patients in the form of paresis and paralyses (central or peripheral type). Spastic contractions of muscles of extremities were observed. Reflexes caused by extremities are revived with expansion of reflexogenic zone (under central type) or vice versa depressed (under peripheral type). When location of pathologic process is high, pathologic reflexes emerge (Babinsky, Rossolimo).

In clinical practice, lesion of spine with malignant tumor could be observed, which is a result of metastatic disease or progressive growth of viscera tumor with invasion to backbone. Vertebrae bodies have good blood supply and ramified vasculature, therefore, cancer cells could move with a blood flow and be sunk in vessels of vertebrae. If after this, cancer cells grow and propagate, metastasis is formed in vertebra body, which gradually destroys bone tissue and could lead to compression of nervous roots and spinal cord.

Most frequently localization of primary lesion was observed in mammary gland – 32,5%, in kidney – 22,5%, in lungs – 20,0% and in sigmoid colon – 25,0%.

Metastases were mainly localized at lumbar level – 25 patients (62,5%) and thoracic level – 15 patients (37,5%). 10 patients (45%) had solitary lesion of spine and 3 patients (14%) – single lesion of spine. 9 patients (41%) had multiple metastases invaded in spine. 14 patients (64%) had visceral metastases.

Major difficulties occur under metastatic lesions of spine, when clinically apparent pain syndrome, compression of spinal cord and dysfunction of pelvic organs are observed. Spine surgery in combination with modern conditions of chemoradial and hormonotherapy allow to make new evaluation of prospects of this group of patients who had been incurable in the past. Due to complex approach in

treating metastatic spine tumors, most patients reach stable improvement of neurologic status, complete or partial recovery of dysfunctional pelvic organs and life quality improves. Main indication for plastic surgery on spine with the use of «Collopan» was neurologic disorders, strong pain syndrome and abnormalities in support ability of the body of affected vertebra. By nature of operation performed, the patients were divided into two groups. 17 patients of 1 group were performed arcotomiya, hemilaminectomy and insertion of «Collopan» into the bodies of affected vertebrae by an open method. 23 patients of 2 group were inserted «Collopan» in percutaneous way. Volume of the inserted «Collapan» was from 5 to 10 ml. Fixation time: 2–3 minutes. To determine a filling level of the affected vertebra, check standardized roentgenography was conducted. In postoperative period, all the operated patients with malignant tumors were prescribed radiation therapy on the area of affected segment of spine and chemotherapy.

Among 40 operated patients in postoperative period, in case of 18 patients (56,2%) – the pain syndrome completely disappeared, 21 patients (52,5%) – the pain significantly decreased and only 1 patient (2,5%) had the pain equal to presurgical level. Reduction of neurologic abnormalities in the nearest postoperative period was observed at 24 patients (60%) (sensitivity recovery, increasing volume of legs movement, recovery of pelvic organs functions). In the group of patients who were performed percutaneous plastic surgery on spine, disappearance of the pain syndrome and recovery of neurologic symptomatology were observed in early period. Therefore, this method has an advantage over the open method.

«Collapan» is the most effective remedy in conducting plastic surgery on spine, it increases support ability of the affected spine, decreases pain syndrome, recovers neurologic symptomatology and improves life quality of the patients.

Surgery allows to quickly reduce or cut off the pain syndrome thereby increasing of motor activity, improving of life quality and beginning of special treatment within short term.

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PLASTIC OPERATIONS UNDER METASTATIC TUMORS IN CERVICAL SPINE

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The main purpose of plastic operations under metastatic tumors in cervical spine is an improvement of life quality of the patients with metastatic tumors of the spine.

This work analyses the results of treatment of 104 patients. After decompression of spinal cord, their cervical vertebrae bodies were replaced with carbon implants and «CollopAn» materials. «CollopAn» does not have neurotoxic effects and has no impact on regress of myelopathy in postoperative period. The material has osteoinductive and osteoconductive nature and is a matrix for the newly formed bone. Due to the mentioned nature, in all cases, formation of bone-carbonic block was achieved without using osteoplasty. Reliability of bone – cartonic block was confirmed by long-term results of treatment of 49 patients with catamnesis for more than 5 years.

Keywords: metastatic tumors, spinal, decompression, CollopAn

Metastatic tumors in cervical spine are often observed among people at the age of over forty. Among those who suffer from breast and lung cancer, 76–85% of patients could have metastatic lesions of the spine, and among them 70–80% have pain syndrome which is difficult to treat and is one of the most important factors causing worsening of life's quality [2, 3, 8, 12].

Due to development of anterior approach, plastic operations have been widely adopted in treatment of cervical spine tumors. This approach provides broad exposure of vertebrae bodies, allows transcorporal decompression of spinal cord with a subsequent reconstruction of front backing column and solid spine fusion [1, 10, 12]. Osteoplastic method of cervical vertebrae replacement, whish has widely been used in practice, requires a long – term immobilization of neck in postoperative period before bone transplants restructuring is completed [2, 4, 8].

Early rehabilitation with permitted load on cervical spine for this method of reconstruction is fraught with migration or resolution of transplants with formation of kyphotic deformation of the spine. Application of metal structure in combination with an osteoplasty reduces a risk of the similar complications, but not rule them out, including a migration of retainer itself. Methods of reconstruction of vertebrae bodies with porous material (ceramics, nickelid-titan) are known. This material has abilities for germination in it of bone tissue [3, 5, 6, 7, 11, 13]. Since the process of germination of bone into implant is long, possible early rehabilitation of the patients with the use of mentioned implants is questionable. Besides, after extended resection of vertebrae bodies, the implant contacts with the bone mainly in butt segments, which also has negative effect on formation of block bone – implant.

Material and methods

Material for this study was clinical observations over 104 patients who had been under treatment in clinics from 1998 to 2008. The patients were performed surgery on front decompression of spinal cord with replacement of vertebrae bodies.

Indication for operation was an existence of metastatic tumor of cervical spine. Myelopathy was symptomatic in different degree, but mostly observations of pareses were prevailed ($n = 92$ patients). There were 12 paralysis – related cases and 7 patients had problems with malfunction of pelvic organs. According to Frankel classification, the patients of this group by severity of neurological status are divided into the following grades: A – 10, B – 37, C – 27, D – 30. The group under study includes the patients with decompression of spinal cord on two spinal segments with body replacement of one vertebra. Mobile segments (C4 – C5 and C5 – C6) of many patients were exposed to stabilization. We used the following method to replace the body of vertebra. Grooves were made in the bodies of stabilized vertebrae, which were filled with bone cement for 2/3 of volume. Then, carbon implant made of «Ostek» material was inserted into the grooves.

The implant functions as a fixer for operated vertebral segments and occupies a half of bone defect in the spine. Residual cavity is loosely tamponed by «CollopAn» granules. Front longitudinal ligament is tightly sutured to prevent granule migration. «CollopAna» material has osteoinductive and osteoconductive features, so we used it as a matrix one for a newly formed bone and forming of bone – carbonic block of stabilized vertebral segments. It is to be mentioned that we used domestically produced materials «Ostek» and «CollopAn» which have been developed by the research institute «Grafit» and «Intermedapatit» company, correspondingly. The used method of the spine body replacement meets the requirements of initially stable spinal fusion and allows an early rehabilitation of the patients in postoperative period, without ortez. We recommended our patients to use ortez when they use transport vehicle or when they are in situation with a risk of recurrent trauma of neck. In postoperative period, along with an assessment of neurologic status, X-raying has been done monthly. Besides, 42 patients have been observed to check the process of forming a newly formed bone with an assessment of bone tissue density by Hounsfield scale.

All the patients have been under regular medical check-up with monthly observation before bone – carbonic block was formed and regress of neurologic complications was developed. Long – term results (1 year after the operation) have been studied in respect of 95 patients. 9 patients were foreigners, so could not assess their

long – term results. When more than 5 years passed after the operation, the treatment results were observed in respect of 49 patients.

Results and discussion

Adequate decompression of spinal cord and reliable stabilization of the operated vertebral segments with an active rehabilitation in nearest period of time after operation have promoted regress of myelopathy. Besides, in most cases, an early activation of the patients allowed to avoid hypodynamic complications in nearest postoperative period. Totally, in 0,5 % of observations (2 patients) hypoventilation pneumonia was confirmed. This complication was successfully treated and had no any effect on the results of the operation.

In one observation, we encountered an early bleeding and formation of haematoma in retropharyngeal space. This complication required surgical revision to remove haematoma. This complication had no any affect on the results of treatment. We did not find any specific local and general complications from application of «ColljpAn». Besides, no wound infection was observed, including the patients with nonspecific spondylitis. To a certain extent, we attributed an absence of wound infection to application of «CollopAn». The material was impregnated with a broad spectrum antibiotic, which is slowly absorbed and used as an depot antibiotic for 3 weeks. «CollopAn» does have neurotoxic action and has no impact on the regress of myelopathy. The regress of myelopathy begins in the nearest postoperative period, reaches the peak during 2 months and finishes, on average, after 3 months when the operation is done.

Formation of the bone – carbonic block of the operated vertebral segments was completed in all observations. Formation of the bone – carbonic block does not depend on a type of pathology of the cervical spine. Replacement of the bone tissue by «CollopAn» is done with the same intensity both in case of patients with injury and those who have inflammatory or cancer destruction of vertebrae bodies. An average period of formation of the bone – carbonic block in this group of patients was 10 weeks. We did not mention any features in the process of formation of new bone. By using X-ray examination, it was confirmed that formation of new bone was completed after 4 weeks of postoperative period. After 4 weeks of the operation on replacement of C6 vertebra body, formation of the bone – carbonic block was observed (Fig. 1) and after 10 weeks – completion of the bone – carbonic block formation was observed (Fig. 2).

However, it is confirmed by computer densitometry that density of the newly formed bone in this period is low. The density of the newly formed bone does not exceed 600 ± 3,5 H by Hounsfield scale and has 400 units less to reach the density of a spongy bone of the healthy vertebrae. With the course of time, the density of the newly formed bone rises and, on the average, in 10 weeks becomes equal to the density of healthy bone (Fig. 1, 2). Computer densitometry confirms the results of plan radiography, since the density of the newly formed bone almost equal to the healthy sections (–959 ± 3,5 H). It is to be mentioned that bone – carbonic block was formed under conditions when load on cervical spine was retained. We did not mention the correction loss of the broken statics of the spine. The achieved orthopedic effect of the operation promoted the regress of clinical presentations of myelopathy. In most cases, complete regress of motor, sensory and reflex disturbances was confirmed (72 patients). Partial regress of myelopathy was observed in case of 30 patients. Two patients with cervical osteochondrosis did not show positive dynamics of neurologic status, in spite of adequate decompression of spinal cord and formation of bone – carbonic block. Apparently, in these observations ischemic nature of the cervical myelopathy prevailed. Assessment of neurologic status of the patients by Franckel shows obvious results of the treatment: A – 2, B – 5, C – 10, Э – 7, E – 80 of the patients. So, after operation most patients (97 patients) recovered their health for an active life. And only 7 patients needed care. Reliability of the achieved effect of the treatment was assessed by the results of examination of 95 patients after 1 year of postoperative period. Analysis of the results showed that in all observations formation of bone – carbonic block was completed. No recurrence of kyphosis, destruction of healthy vertebrae or migration of carbon implant were observed. Overvalue of neurologic status was not mentioned. The treatment results of 49 patients have been observed with catamnesis for more than 5 years. Clinical and X-ray examination confirmed reliability of the proposed method of reconstruction of the vertebrae bodies.

By density, newly formed bone matches bone tissue of healthy vertebrae. Formation of bone – carbonic block is confirmed and there are no any signs of secondary kyphosis on the operated areas.

Conclusion

Analysis of the results of treatment shows that there is an ample opportunity for the use of «CollopAn» in plastic operations on cervical spine. «CollopAn» does not have neurotoxic effects and has no impact on regress of myelopathy after transcorporal decompression of spinal cord. If stable spine fusion is achieved by carbon implant due to osteoin-

ductive and osteoconductive nature of «CollopAn», the material is transformed into the bone tissue with formation of reliable bone-carbonic block. This block is being formed at the time when loading on the cervical spine is retained. Due to impregnation of the material with broad spectrum antibiotics, the risk of wound infection has been reduced, including the patients with nonspecific spondylitis. Long-term results of treatment confirm strength of the formed bone – cartonic block without secondary kyphotic deformation of the spine.

Fig. 1

Fig. 2

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THE NORMAL INTESTINAL MICROFLORA AND THE ANTIBODIES (THE ANTIBODIES STUDY TO THE OPPORTUNISTIC INTESTINAL ENTEROBACTERIA)

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The specific antibodies to the CPE antigens have been discovered at the 80,3 % examined and the studied children**.** So, the antibodies revealed titres to the CPE antigens at the adult persons have had the spread wide range, in average, from 13 up to 29 %. Then, it had also been revealed, that, at the early age children, the seronegative indices were in 2,5–3 times more, than the seropositive sera with all the examined and the studied CPE antigens. The specific immune level, in the form of the antimicrobial and the antibacterial antibodies is being reliably raised, with the examined children age, at their early age, following increase.

Keywords: microflora, bowels or intestines, antigens, antibodies, immunity, enterobacteria, opportunistic microflora

The significant role is being belonged to the intestine microflora in the immunological responsiveness and the human body tolerance maintaining [8, 9, 10]. The allogenic substances to the human body infinite number confrontation is constantly being taken its place approximately on the 200 square meters of the gastrointestinal tract surface. The scholars and the scientists are still trying to be comprehended the gastrointestinal tract immune system peculiarities and the special features and to be based the quite new medical treatment methods without the harmful and the unhealthy side effects [1, 4, 7].

The level peculiarities and the specific features and the specific antibodies spectrum are being presented the essential and the considerable interest, they have genetically been programmed, and they have been defined the macroorganism immune response force and also its susceptibility to the infectious diseases and the other illnesses [3, 9].

So, the antibodies formation reinforcement to their proper and their own tissues and to the human body microflora antigens is being taken its place against the background of the cell immunity and the humarol immunity moderate lowering inhibition [2; 6]. Just between the bacteria and the proper and their own tissues antigens, it is quite possible the autoimmune reactions development, and also the immune-pathological processes development, because of having had the common antigenic determinant. The antibodies titer to the human organism bacteria is one from the indicated signs.

Thus, the present research and the study target has been the definition and the circulated antibodies level valuation to the opportunistic enterobacteria at the practically healthy adult people and the children, having taken into consideration the above – mentioned material.

The Materials and the methods

The children at the age from 4 months up to 14 years (e.g. 168 months) have already been examined by us for the set goals achievement. The III, IV – degree bowels dysbioz have been found at the 66 children among the examined children. After this, they have been included into the main group. The 30 practically healthy children of the same specific age – related composition have been consisted in the control group. Thus, the sera have been preserved in the soldered glass ampullae, in the frozen state in the low – temperature refrigerator car at – 45 °C up to the research and the study moment.

The conditionally pathogenic enterobacteria (CPE) antigens have been received by Boivin – the complex microbal antigen (e.g. Boivin A., Mesroblanu I., 1935), by means of the trichloracetic acid (TCA) microorganisms diurnal culture extraction. Thus, this kind of approach is being related to the antigen extraction chemical methods group, and that is why, it is widely being used in the laboratory practice.

So, the microorganisms cultures have already been received from «The Human Infections Microorganisms National Collection» of the MPH RUz Epidemiology, the Microbiology and the Infectious Diseases the Research Institute. The passports for the bacteria strains, having contained their main characteristics, have been received together with the cultures. The 7 types of the Gram – negative bacteria: E.coli – 004136, ATCC 25922; Proteus vulgaris – 003341, 7; Citrobacter freundii – 0028011, 27; Klebsiella pneumoniae – 000691, 691; Enterobacter aerogenes – 003696, 27-C; Enterobacter cloacae – 004339, B-048; Pseudomonas aeruginosae – 004135, ATCC 27853 have already been used in the work. The P.aeruginosae have been used side be side with the TCA for the reason, that this Gram – negative microorganism sufficiently is often colonized the bowels and the mucous membranes at the early age children.

The antibodies serum indication has been made in the immunoferment analysis (IFA) with the systems – test experimental series application, on the basis of the reagents from the commercial sets. The antigen sorption on the solid phase polystyrene, the flat – bottomed immunological plane tables have been made under the laboratory conditions in the optimal regime, having selected in the preliminary experiments. The IFA has been made, in accordance with the generally accepted methods and the generally used primary standards. The systems – test experimental series with the commercial sets components application for the IFA has already been prepared by us [7].

The already prepared complex bacterial antigens have been reduced to the 40 mkg/ml concentration, at the 9,6–9,8 medium pH. This kind of concentration has

been used for the solid phase – polystyrene plane tables sensitizing, by the «Medpolymer» production, RF. The studied blood sera, preliminarily, having titered in the beyond buffer physiological solution from 1:25 up to 1:6,400 have been carried into the small holes after the immunological plane tables sensitized antigens washing by the washing solution. They have been incubated 1 hour, they have been thoroughly washed, and the antibody commercial reagent has been carried into against the IgG human, having labelled by the horseradish peroxydase (HRP) (e.g. the conjugate), it has been washed in the thorough way, and the developing solutions – the commercial OFD and the perhydrol have been carried into the small holes. Then, the recording has been carried out visually by the solution staining in the small holes. Thus, the last serum dilution has been taken for the titre, having given the solution staining in the hole much more intensive, than in the control holes (e.g. the negative control).

Thus, the received data have statistically been processed with the calculation of the mean one – M, the error of the mean – *m*, the roof – mean – square deviation – δ, the Student criterion – *t* by Fisher – Student.

The Results

The received data had been given in the form of the Table, where the data by the antibodies frequency rate in the human blood serum to the 7 above – indicated CPE representatives were presented. The antibodies titres spread has been in the quantities wide range (see, Table 1). The sharply positive results (e.g. the antibodies titre 1:1,600 and more) have been, in average, within the limits from 13,0 ± 2,4 up to 18,0 ± 4,3 %. The sharply positive titres have not been determined for the Citrobacter freindii antigen. The positive titres have already been registered, in average, within the limits of the 18,0 ± 4,3 % – 24,0 ± 5,9 % observed ones. The weakly positive results by the antibodies titres to the 7 CPM studies have been noted, in average, at the 22,0 ± 5,5 % – 29,0 ± 6,6 % persons. The doubtful results (e.g. the 1:25–1:50 titre) have already been registered, in average, at the 13,0 ± 2,4 % – 29,0 ± 6,6 % observed ones. The antibodies to the CPM antigens have not been revealed (e.g. the negative result), in average, at the 13,0 ± 2,4 % – 24,0 ± 5,9 % blood sera observed ones.

Table 1

The IFA Results by the Antibodies Definition in the Blood Serum of the Practically Healthy Children against CPE Antigens and P.aeruginosae, in %

The Complex Microbial Antigen	The Blood Serum Titre				
	The Sharply Positive Ones	The Positive Ones	The Weakly Positive Ones	The Doubtful Ones	The Negative Ones
Escherichia coli	18,0 ± 4,3	24,0 ± 5,9	29,0 ± 6,6	13,0 ± 2,4	16,0 ± 3,5
Enterobacter aerogenes	15,5 ± 3,5	18,0 ± 4,3	27,0 ± 6,3	15,5 ± 3,5	24,0 ± 5,9
Enterobacter cloacae	15,5 ± 3,5	20,0 ± 5,0	24,0 ± 5,9	20,0 ± 5,0	20,0 ± 5,0
Citrobacter freundii	0	22,0 ± 5,5	22,0 ± 5,5	29,0 ± 6,6	18,0 ± 4,3
Klebsiella pneumoniae	15,5 ± 3,5	24,0 ± 5,9	27,0 ± 6,3	20,0 ± 5,0	15,5 ± 3,5
Proteus vulgaris	18,0 ± 4,3	20,0 ± 5,0	27,0 ± 6,3	22,0 ± 5,5	13,0 ± 2,4
Pseudomonas aeruginosae	13,0 ± 2,4	24,0 ± 5,9	29,0 ± 6,6	20,0 ± 5,0	13,0 ± 2,4

N o t e : the sharply positive – titre from 1: 1,600 and more;
the positive – titre from 1:400 up to 1:800;
the weakly positive – titre from 1:100 up to 1:200;
the doubtful – titre from 1:25 up to 1:50;
the negative – titre 0.

Thus, the differences by the serum antibodies the frequency rate in the human blood at the examined practically healthy children have been determined by the carried out studies and the researches. So, the antibodies revealed titres to the CPE antigens (e.g. Escherichia coli, Proteus vulgaris, Citrobacter freundii, Klebsiella pneumoniae, Enterobacter aerogenes, Enterobcter cloacae, Pseudomonas aeruginosae) have had the spread wide range, in average, from 13 up to 29 %. The examined and the studied groups carried out separation up to the 5 indices (e.g. the sharply positive, the positive, the weakly positive, the doubtful, and the negative ones), depending on the antibodies titres quantities of the healthy persons blood is being permitted to be carried out the relative rating.

It should be considered the indices complex by the CPE aetiological significance criterion, among which one from the most important – is the specific serum antibodies revealing to the assumed causative agent antigens. The false – positive results, owing to the crossed reactive antibodies in the agglutination reaction with

the autostrain are being observed not more, than at 5–10% healthy persons and the bearers, and, by the data of some authors, they are not exceeded 1: 10 – 1: 20 for the H – antigen, and 1:40 of the other authors. Then, it, moreover, should be especially emphasized that fact, that as the positive and the false – positive reactions are not quite observed at the early age healthy children, owing to the immune system imperfection and also the antigenic stimulation short – term period.

Having proceeded from the above – stated material, the circulated antibodies to the CPE level study and the examination and also the valuation at the children with the bowels disbioz has been our study and the researches next stage.

The antibodies medial geometrical titres, having expressed in the form of the negative logarithms with the 2 ($-\log_2$) basis have been calculated for the antibody formation intensity definition for the quite different and the various CPE antigens. The relative indices difference error in the percent had been calculated by the formula for the non – equivalent samplings at the difference reliability valuation between the indices, when the one comparative group quantity was exceeded the other quantity not less, than for 25% (e.g. Lakin M.F. 1980).

So, the specific and the peculiar antibodies to the CPE antigens have already been discovered at the human blood serum of the examined children overwhelming majority. Then, the positive result has been received at the 80,0 ± 2,6 %, though the human organism response immune reaction with the high level frequency has been discovered at the children with the CPE association – mixstautostrains of all the listed large intestines microflora representatives, than at the children, at whom mainly the monocultures have been isolated and have been taken.

The antibodies definition results to the 7 CPE representatives has been shown the comparable results for the Enterobacteriaceae family 6 representatives – the seronegative results have been in the range from 19,7 up to 30,3% (e.g. see, Table 2), the seropositive results have been from 69,7 up to 80,3%. So, the seropositive serahas been somewhat higher for the P.aeruginosa, but it is not significantly statistically, in comparison with the other antigens (e.g. the seronegative ones 15,2%, the seropositive ones 84,8%).

Table 2

The Blood Sera IFA Results with the CPE Antigens

The Microbal Antigen	The Seronegative Ones	The Seropositive Ones
Escherichia coli	19,7 ± 8,9	80,3 ± 8,9*
Enterobacter aerogenes	24,2 ± 9,7	75,8 ± 9,7*
Enterobacter cloacae	30,3 ± 10,2	69,7 ± 10,2*
Citrobacter freundii	19,7 ± 8,9	80,3 ± 8,9*
Klebsiella pneumoniae	30,3 ± 10,2	69,7 ± 10,2*
Proteus vulgaris	30,3 ± 10,2	69,7 ± 10,2*
Pseudomonas aeruginosae	15,2 ± 7,9	84,8 ± 7,9*

N o t e : * – the differences reliability.

However, the seropositive sera frequency rate has been reliably higher, than the seronegative ones (e.g. $p < 0,001$) by the all 7 antigens. Especially, it is concerned the E.coli (e.g. 80,0 ± 8,9%), the C.freindii (e.g.80,0 ± 8,9%) and the P.aeruginosae (e.g.85,0 ± 7,9%), the detectability percent of which has been higher, than the other microorganisms. Apparently, all these causative agents have already colonized the whole bowels, and they, moreover, have aggravated the large intestines disbioz at the children.

The antibody formation intensity study to the already studied CPE and the P.aeruginosae – all the examined children up to 2 years have already been divided into the following groups: the 1-st group: the children up to the 6 months; the 2-nd group: the 7–9 months children, the 3-rd group: at the age of the 10–13 months and, at last, the 4-th group: the 13–24 months old. So, the received results have been shown (e.g. Table 3), that specific immunity level in the form of the antimicrobial and the antibacterial antibodies is appropriately being increased from the 1-st group up to the 4-th group. The fact is being drawn its attention, that the higher antibodies titre has already been fixed in the 3-rd and the 4-th groups (e.g. $-\log_2$ 7,5 up to $-\log_2$ 4,3), than in the 1-st and the 2-nd groups – 4,0–4,2 (in $-\log_2$) – $p < 0,05$.

At the same time, we make the special emphasis, that the antibodies formation has been taken its place only against antigens, against the E.coli and the P.vulgaris. If to be taken into

consideration that moment, that the newborn immune system is not only completely developed, and the antibodies formation is not taken its place in the complete volume, then, apparently, all these antibodies are maternal, we are quite to be assumed, that the bowels disbioz of the Escherichia and the protein aetiology has been revealed also at the mother.

So, the very near to them results have been received and at the 2-nd group children. So, the whole antibody formation intensity has been in the complete volume and in the large quantities from the 10-th months old (e.g. the 3-rd and the 4-th groups), than at the 1-st and the 2-nd groups children (e.g. $p < 0,05$). It makes no difference, the antibodies titre has been left the high one to the Escherichia and the protein antigens at all these children, and apparently, they are the disbiozes reason at the children up to the 2 years old.

Thus, the specific antibodies to the CPE antigens have been discovered at the 80,3% examined and the studied children with the III-IV degree bowels disbioz, the human organism response immune reaction with the high level frequency has been discovered at the children with the CPE association. So, it had also been revealed, that the seronegative indices were in 2,5–3 times less, than the seropositive sera with all the examined and the studied CPE antigens, though the seropositive sera have been in somewhat higher for the P.aeroginosa, with respect to the CPE antigens (e.g. $p < 0,05$). The specific immune level, in the form of the antimicrobial and the antibacterial antibodies is being reliably raised, with the examined children age following increase (e.g. $p < 0,05$).

The Results' Discussion

The human digestive tract is being presented itself the opened system, by means of which is being carried out its contact with the outdoor and the external environment and the microbes' world, which is being populated it. At present, it is quite considered to be proved, that the qualitative and the quantitative composition of the colonized microflora are being controlled the natural resistance and the immunological protection factors. The existing contacts with the bacterial and the microbial antigens are being defined the immune system maturing, and the intestines microflora composition will have to be reflected indirectly the peculiarities and the special features of the physiological condition, as the protective, well as the human organism other systems in the quite different and the various its life period [9].

Table 3

The Antibody Formation Intensity against the CPE Various Antigens

The Groups	The Specific Immunity Level to the Antigens from													
	E.coli		E.aerogenes		E.cloacae		C.freindii		P.vulgaris		K.pneumoniae		P.aeruginosae	
	max min	log2 m.g.t.	max min	log2 m.g.t.	max min	log2 m.g.t.	max min	log2 m.g.t.	max min	log2 m.g.t.	max min	log2 m.g.t.	max min	log2 m.g.t.
1	25	4,2	0	0	0	0	0	0	25	4,2	0	0	0	0
	25	25,0	0	0	0	0	0	0	25	25,0	0	0	0	0
2	25	4,2	0	0	0	0	0	0	25	4,0	0	0	25	4,2
	25	25,0	0	0	0	0	0	0	50	32,3	0	0	50	32,6
3	25	5,3	25	4,4	25	4,3	25	4,7	25	6,1	0	4,5	25	5,3
	50	36,3	25	25,0	25	25,0	50	30,4	100	68,8	25	20,0	50	37,5
4	25	7,5	25	4,0	25	4,0	25	7,2	25	7,0	25	7,3	25	6,1
	200	150,4	50	35,6	25	25,0	200	132,6	200	128,6	200	136,0	100	65,3

N o t e : in the numerator – (max) the antibodies maximum titre (e.g. the reverse titre);
in the denominator – (min) the antibodies minimum titre (the reverse titre);
in the numerator – (the $\log_2$ m.geom. titre) the negative log by the medial geometrical titre;
in the denominator – (m.geom. titre) the medial geometrical titre.

The normal microflora, the lymphoid tissue, having associated with the bowels mucous membrane, and also the cytokines, as the intercellular interaction factor, take their part in the immune mechanisms realization at the GIT level [10]. The circulating antibodies, the complement level, and also the white blood cells functional state have the special significance for the antibacterial and the antimicrobial significance immune.

So, the main and the basic elements, having formed the protection lines, are being singled

out in the bowels mucous membrane immunological protection. The immune exclusion is being restricted the epithelium colonization by the microorganisms and, it is also being controlled and restrained the allogenic soluble antigens further penetration.

The mucous membrane is being presented itself the human organism protection first line against the different and the various environmental pathogenic factors, such as the following: the bacterial, the microbial, the viral, the industrial and the chemical irritants and the pollution stimuli, and the contamination in the «external barriers» system [8].

The fixed and the established differences and the distinctions by the frequency rate of the serum antibodies in the blood of the examined and the studied healthy children have been shown the whole population heterogeneity, in the plan of the antibodies production to the bowels micriflore. Thus, the revealed and the exposed antibodies titres to the CPE antigens (e.g. the Escherichia coli, Proteus vulgaris, Citrobacter freundii, Klebsiella pneumoniae, Enterobacter aerogenes, Enterobcter cloacae, Pseudomonas aeruginosae) have had the spread wide range at the practically healthy adult people (e.g, in average, from 13 up to 29%).

The all received results, owing to the spread wide range, have been permitted to be conducted these indices conditional rating. So, the observed and the examined groups' separation, depending on the results quantities upon 5 indices (e.g. the sharply positive, the positive, the weakly positive, the doubtful, and also the negative ones), depending on the blood antibodies titre quantities of the healthy adult people is being permitted to be carried out the relative rating. So, the specific antibodies to the CPE antigens have been discovered at the 80,3% examined and the studied children. The metabolic products and the microorganisms' cellular elements, which are being lived in the human intestines, are quite able to be caused harm to the quite different and the various macroorganism systems.

The Conclusions

1. The differences have already been determined by the frequency rate of the serum antibodies in the blood at the examined and the studied practically healthy children. So, the antibodies revealed titres to the CPE antigens at the adult persons have had the spread wide range, in average, from 13 up to 29%. The examined and the studied groups carried out separation up to the 5 indices, depending on the antibodies titres quantities of the healthy persons blood is being permitted to be carried out the relative rating.

2. The specific antibodies to the CPE antigens have been discovered at the 80,3% examined and the studied children with the III-IV degree bowels disbioz, the human organism response immune reaction with the high level frequency has been discovered at the children with the CPE association. So, it had also been revealed, that, at the early age children, the seronegative indices were in 2,5–3 times less, than the seropositive sera with all the examined and the studied CPE antigens, though the seropositive sera have been in somewhat higher for the P.aeroginosa, with respect to the CPE antigens (e.g. $p < 0,05$).

3. The specific immune level, in the form of the antimicrobial and the antibacterial antibodies is being reliably raised, with the examined children age following increase (e.g. $p < 0,05$).

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CHARACTERIZATION OF LIPID PEROXIDATION IN PATIENTS WITH EARLY STROKE RECOVERY PERIOD AT THE STAGES OF COMPLEX REHABILITATION

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There were carried out biochemical testing methods in 20 invalids (13 men and 7 women) with the consequences of cerebral stroke in early recovery period. Analyses of blood antioxidant system of the patients in early stroke recovery period showed high level of accumulation of metabolites of lipid peroxidation in blood and reduction of activity of antioxidant system. The evidence confirms the need to add antioxidants into stroke complex rehabilitation therapy.

Keywords: consequences of stroke, lipid peroxidation, antioxidant system

Brain vascular diseases are the major causes of disability and mortality of the patients due to their high rates worldwide that are increasing because of the growth and aging of the population. Stroke is an acute and most dangerous form of cerebrovascular diseases that creates a serious medical and socioeconomic problem. Its significance especially grows in the patients, who have previously suffered from cerebral stroke (Balunov, 1994; Vereshchagin et al., 1999) [1, 5].

In recent years, no biochemical agents have been studied as intensively as system of lipid peroxidation (LP). Burlakova E.B. (1997), Ibragimov U.K. et al. (1998) considered that LP is one of the important regulatory systems involved in maintaining homeostasis, adaptation to adverse effects, and the regulation of metabolic cell processes. According to the authors, the most intensive and continuous free radical oxidation in the lipid layer of biological membranes is enhanced by brain hypoxia due to cerebrovascular accidents [3, 4]. As a result of LP and enhanced consumption of antioxidants increases the content of intermediate and final products of LP in blood, which significantly impairs the functioning of nerve cells (Burlakova E.B. et al., 1995) [2].

Despite advances in recent years in studies on physical rehabilitation of post-stroke patients, issues of antioxidant protection of brain during early stroke recovery period are generally not well studied.

The aim of the study was to investigate LP of blood at the consequences of stroke in early recovery period at the stages of complex rehabilitation.

Material and methods

There were studied 20 invalids of working-able age with the consequences of stroke in early recovery period: 13 (65%) male and 7 (35%) female. In 9 (45%) patients an ischemic lesion was located in the left hemisphere of brain, and in 11 (55%) patients – in the right one. According to the degree of disability, patients were divided into the following disability groups: I group – 1 (5%) patient with severe neurological status, II group – 15 (75%) patients with moderate deficiency of neurological symptoms, and III group – 4 (20%) patients with mild degree of neurological disorder. 5 patients with diseases of peripheral nervous system, with the similar gender and age formed the control group.

Common clinical, neurological, and such as paraclinical methods of investigation as Doppler ultrasound of brachycephalic arteries, transcranial dopplerography, electroencephalography (EEG) were used. For the study LP state, laboratory-biochemical blood investigations were performed. The blood samples were received from cubital vein in the morning on admission to the hospital and in 20 days after discharge (in mean of 30 days), and blood serum by centrifugation of whole blood, carefully preserved from hemolysis. The content of malon dialdehyde (MDA) in blood was determined by the method of I.D. Stalnaya, G.G. Garishvili (1977). Results were recalculated the amount of total protein by O.H. Lowry (1951). The level of hydroperoxides (HP) was determined by the method of V.V. Gavrilov et al. (1983) and counted in optical units of the number blood serum lipids. Catalase activity was determined by permanganametric method of S.M. Zubkova and A.N. Bach (1976), superoxide dismutase activity in blood – by the method of P.H. Mirsa and S. Fridrich (1972) [2].

Results and discussion

Biochemical methods were aimed to determine blood antioxidant system (AOS) parameters, particularly the state of free radical oxidation of lipids and activity of AOS enzymes. Studies of AOS in 20 patients with early stroke recovery period showed reduction of activity of AOS enzymes. Activity of catalase and superoxide dismutase in patients on admission day was lower in 1,43 and 1,4 times than in the control group, respectively. Studies of AOS parameters in this group of patients showed activation of free radical oxidation of lipids in several times to the control and reached 1,51 ± 0,14 nmol/mg protein per min. Also, the induced system has detected a similar pattern of enzyme-independent activation and enzyme-dependent inducible peroxidation to 6,77 ± 0,37 and 9,61 ± 0,32 nmol/mg, respectively. Along with this, there was showed an increased amount of HP to 5,94 ± 0,46 U/mg lipids.

Thus, as a result of the carried out investigation, there were revealed changes in AOS of patients with early stroke recovery period, which correlated to a certain extent with the clinic of cerebrovascular disease. In this connection, we suppose that the inclusion of antioxidants into complex drug therapy for stroke is proved and justified as they influence on links of pathogenesis of cerebrovascular pathology. Therefore, patients were divided into 2 subgroups of 10 patients for the comparative assessment of the effectiveness of antioxidant therapy. The first subgroup was subjected to complex rehabilitation without antioxidant therapy (traditional treatment), while the second subgroup additionally to the complex rehabilitation received tocopherol acetate in dosage 50 mg, one capsule 2 times daily for 2 months.

As noted above, the study of intensity of free radical oxidation in blood of patients and invalids in early stroke recovery period showed a high level of accumulation of thiobarbituric acid (TBA) active products in the spontaneous condition in 2,5 times higher the level of control, respectively. In dynamics of traditional treatment, intensity of spontaneous peroxidation in blood of patients in these groups decreased slightly, i.e. not statistically significant ($P > 0,05$). At the same time, the accumulation of TBA-active products in enzyme-independent and enzyme-dependent inducible systems of LP in blood was similar, being higher the parameters of control in 2,3 and 1,6 times, respectively. As a result of traditional therapy, the intensity of induced systems of LP decreased for ascorbate-dependent lipid peroxidation (ADLP) and nicotine amide adenine diphosphate-dependent lipid peroxidation (NDLP) 1,19 and 1,14 times, respectively. Also, there was noted reduction in the contents of HP in blood in 1.1 times in the patients and invalids due to traditional treatment in comparison with the initial levels (table 1).

Table 1

The level of lipid peroxidation in blood of patients in early rehabilitation period of stroke after traditional therapy

Group of patients	Parameters			HP (U/mg lipids)
	Spontaneous	ADLP	NDLP	
	(nmol/mg protein*min)			
Control ($n = 5$)	0,61 ± 0,11	2,9 ± 0,2	6,2 ± 0,2	1,46 ± 0,30
Before rehabilitation measures ($n = 10$)	1,51 ± 0,14	6,77 ± 0,37	9,61 ± 0,32	5,94 ± 0,46
After rehabilitation measures ($n = 10$)	1,41 ± 0,16	5,65 ± 0,29	8,43 ± 0,29	5,37 ± 0,29

Table 1 shows that in blood of patients in early stroke recovery period, who had received traditional therapy, marked LP activation on a background of accumulation of TBA-active products in spontaneous and induced systems, as well as the HP contents. The traditional therapy has decreased the contents of LP products in blood insignificantly, that suggest the necessity to include corrective antioxidant therapy. Status of the AOS was assessed also by activity of protective enzymes catalase and superoxide dismutase in blood (table 2).

Table 2

State of antioxidant system of blood in patients in early stroke recovery period after traditional therapy

Group of patients	Catalase, mmol $H_2O_2/10^9$ erythr. min/	Superoxide dismutase, nmol adrenalin / mg protein min
Control $n = 5$	42,6 ± 0,7	4,4 ± 0,4
Before rehabilitation measures ($n = 10$)	29,8 ± 0,62	3,22 ± 0,31
After rehabilitation measures ($n = 10$)	31,2 ± 0,71	3,28 ± 0,24

As a result of traditional therapy, the activity of catalase and superoxide dismutase remained virtually unchanged (differences are insignificant, $P > 0,05$).

Thus, the increase of LP intensity in blood of patients in early stroke recovery period was observed on a background of decreased activity of the enzymes of AOS. Traditional therapy had no positive effect on intensity of LP in blood and AOS status. We observed LP activation associated with decreased AOS capacity that indicates the long-term disintegrating effect of peroxidation metabolites on protein components of cells and tissues.

In blood of patients in the second subgroup in early stroke recovery period, there was also revealed the increase of accumulation of TBA-active products and reduction of enzymatic activity of AOS. Based on these data, it was recommended the inclusion of antioxidants into complex therapy of stroke. As a result of complex rehabilitation of the patients and invalids in early stroke recovery period with the inclusion of antioxidants, there was noted reduction of HP contents in blood by 1,43 times, compared with the initial level (table 3).

Table 3

The level of lipid peroxidation in blood of patients in early stroke recovery period during complex rehabilitation with the inclusion of antioxidants

Group of patients	Parameters			HP (U/mg lipids)
	Spontaneous	ADLP	NDLP	
	(nmol/mg protein*min)			
Control (n = 5)	0,61 ± 0,11	2,9 ± 0,2	6,2 ± 0,2	1,46+0,30
Before rehabilitation measures (n = 10)	1,56 ± 0,23	7,01 ± 0,24	9,76 ± 0,39	5,95 ± 0,54
After rehabilitation measures (n = 10)	0,91 ± 0,04***	4,59 ± 0,05***	6,45 ± 0,38***	4,17 ± 0,44**

N o t e : * – indicates significant differences $P < 0,05$; ** $P < 0,01$; *** $P < 0,001$

As can be seen from table 3, the level of accumulation of TBA-active products in the spontaneous condition was 2,6 times higher than in control. After rehabilitation treatment with the inclusion of antioxidants the intensity of spontaneous LP in blood of this subgroup of patients decreased by 1,7 times, compared with the initial parameters. Along with this, the accumulation of TBA-active products in the enzyme-independent and enzyme-dependent inducible systems of LP was higher than control in 2,4 and 1,6 times, accordingly. As a result of antioxidant therapy during complex rehabilitation the intensity of inducible systems of LP decreased for ADLP and NDLP 1,53 and 1,5 times, respectively.

The state of AOS was also evaluated on the activity of protective enzymes catalase and superoxide dismutase in blood (table 4).

Table 4

State of antioxidant system of blood in patients in early stroke recovery period during complex rehabilitation with the inclusion of antioxidants

Group of patients	Catalase, mmol $H_2O_2/10^9$ erythr. min	Superoxide dismutase, nmol adrenalin/ mg protein min
Control (n = 5)	42,6 ± 0,7	4,4 ± 0,4
Before rehabilitation measures (n = 10)	28,8 ± 0,73	2,91 ± 0,31
After rehabilitation measures (n = 10)	38,9 ± 0,66**	3,85 ± 0,34**

N o t e : * – indicates significant differences $P < 0,05$; **$P < 0,01$

Hence, rehabilitation with antioxidant correction resulted in increase of the activity of catalase in 1,5 times, and superoxide dismutase in blood in 1,32 times, in comparison with the initial levels.

Conclusion

Thus, the analysis of indicators of antioxidant protection in blood of patients and invalids in early stroke recovery period during complex rehabilitation with the inclusion of antioxidants showed significant reduction in the level of accumulation of metabolites of LP and increased intensity of AOS. As a result, patients and invalids achieved positive changes in laboratory parameters, as well as positive results in partial and complete rehabilitation. The data certainly confirm the necessity to include antioxidant therapy at the stages of complex rehabilitation for stroke.

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THE INFLUENCE OF IMMUNOGLOBULIN A ON THE MICROCIRCULATION AND CONDITION OF HAEMOSTASIS WHILE THE ALLERGIC VASCULITIS

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While the examination of condition of platelet-vascular haemostasis within patients with allergic vasculitis there was stated that there is prevail the condition of hypercirculation, the basic pathogenetic fact of which is considerable decrease of anticoagulant properties, reduction in thrombin time and within the majority of patients there was observed the depression of fibrinolytic system. There also occurs massive thrombosing of microcirculation and serous impregnation of vessel wall and perivascular tissue under the influence of circulating immune complexes.

Keywords: allergic vasculitis, immunoglobulin A, haemostasis, microcirculation

Pathological manifestations of allergic vasculitis is based on inflammatory reaction of arterioles and vessels of the skin with an abnormality of structure and function of endothelium of blood vessels.

Allergic vasculitis is very varied by its origin (aetiology of them is unknown, predisposing factors and provoking moments are numerous), but they combine with generality of pathogenetic mechanisms, the base of which consists of immune-pathogenetic changes, which are connected with the allergic reactions of immediate and slow type [1]. The reason of allergization of organism while this can be such infavourable factors as: hyperinsolation, penetrating radiation, industrial dust, long focal infection, side effect of drugs etc [1, 2, 3].

Within the majority of patients while the examination of blood there are revealed the abnormalities, which testify to the presence of inflammation: increase of ESR, the level of fibrinogen, the content of α_2-globulins, the C-reactive protein, but there are absent the specific changes while the haemorrhagic vasculitis. Skin rash in the form of small haemorrhages with the histopathologic feature of vasculitis of vessels of skin microvasculator are character for the allergic vasculitis [1, 4, 5, 6, 7]. This research is dedicated to the examination of system of haemostasis while the haemorrhagic vasculitides.

Material and methods of research

The research of haemostasis was based on clinically-laboratory examination of 226 sick people with vasculitis and 20 practically healthy people of comparable age.

The definition of fibrinolytic activity of euglobulin clot by Kowarzik, Buluck

The principle of method is based on the deposition in the acid environment and low temperature of euglobulin faction, which contains factors of blood coagulation and fibrinolysis. The method is based on works of Milston, Macfarlane and Biggs, which have showed that plasminogen is the main component of euglobulin faction. Received sediment of euglobulin dissolves, fibrinogen transforms into fibrin. Time from the moment of clot formation till its dissolution expresses the fibrinolytic activity of examined blood.

The definition of aggregation activity of platelets

The aggregation of platelets was defined with the classical method of Born (1963), on the optical aggregometer «Chromolog» (USA). Tests of venous blood from the ulnar vein were taken to the plastic test tubes, the blood was stabilized with 3,8 % solution of sodium citrate in relation blood-anticoagulant 9:1.

The definition of antiaggregation activity of vessel wall

Equipment and reactives. 3,8% solution of sodium citrate, adenosine diphosphoric acid (ADP), plastic syringes or covered with silicone with the capacity of 5, 10 ml, tonometerfor measuring of arterial pressure, apparatus for measuring the aggregation of platelets, test tubes, pipettes with the capacity of 0,1; 0,2; 1 ml, centrifuge with cooling.

The index of antiaggregation activity of vessel wall is defined by the formula: aggregation of platelets in plasma, which is poor with platelets and received before the vein stagnation/aggregation of platelets in plasma, which is poor with the platelets and received after the vein stagnation.

Received results and their discussing

We have carried out the definition of level of circulating immune complexes within 226 patients with allergic vasculitis. This research was carried out from the supposition, that within sick people with allergic vasculitis, there occurs massive thrombosing of microcirculation and serous impregnation of vessel wall and perivascular tissue under the influence of circulating immune complexes. We have revealed that while the allergic vasculitis there is increased the value of immunoglobulin A (exceeds normal showings 2,5–3 times), which prevails in the composition of immune complexes and revealed in the type of granule while the microscopy of biopsy material of skin and kidneys.

The reason of forming of immune complexes can be the infection. Taking of medicines, change of protein composition of plas-

ma. The structural changes of vessel wall and abnormality of collagen synthesis lead to the contact stimulation of platelets and provoke micro thrombosing. The localization and evidence of clinical revelations is defined by zone and massiveness of vessel lesions.

Telangiectatic haemorrhages are pathogenetically connected with inferiority or structural change of connecting tissue, decrease of collagen content in the vessel wall, which lead to the focal thinning of the walls of microvessels and widening of their lumens, and inferiority of local haemostasis in connection with unsufficiency of subendothelium.

At the pathogenesis of hemorrhagic diathesis while the paraproteinemia the main role is played by increased content of protein in plasma, sharp increase of blood viscosity, slowdown of blood flow, thrombogenesis, stasis and damage of small vessels. Besides, «wrapping» of platelets with muff of protein leads to their functional inferiority.

Within 226 patients with allergic vasculitis (100 of patients of 1 group and 126 patients of 2 group) while the admission there were examined some indicators of haemostasis, particularly ADP-induced aggregation of platelets (AAS), fibrinolytical activity of euglobulin clot (FAEC), the factor of Willebrand (fW), antiaggregational activity of vessel wall (AAVW).

The quantitative definition of content of the factor of Willebrand in plasma. Its level while the allergic vasculitis naturally increases 2,5 times, and the degree of increase corresponds the severity and prevalence of lesions of microvessels, especially if we take into consideration that endothelium is the only place of factor Willebrand synthesis.

At the sharp phase of allergic vasculitis there is revealed the considerable worsening of all the indicators of haemostasis and, first of all of endothelial dependent.

Within patients with allergic vasculitis there were revealed considerable changes of studied indicators. The level of ADP of induces aggregation of platelets in the 1 group was increased till 3,47 ± 0,10 micromole/ADP and in the second group till 4,80 ± 0,14 micromole/ADP. Therefore, the level of aggregation of platelets in the 2 group to 27,7% above the showings of 1 group ($P < 0,001$) and to 54,2% above the facts of control group ($P < 0,001$). In the control group the level of AAS in average was 2,20 ± 0,10%. The maximal aggregation activity of platelets was noticed in the group of patients with more severe course of stroke.

The research of AAVW within patients with allergic vasculitis in the most sharp period of disease has revealed its decrease within sick people of 1 group till 0,96 ± 0,03 c.e. The lowest AAVW was noticed in 2 group, which was in average 0,71 ± 0,05 c.e. In the control group AAVW was 1,25 ± 0,04 c.e. AAVW in 2 group to 26,0% lower than the showings of 1 group ($P < 0,001$) and to 43,2% lower than the level of the control group ($P < 0,001$).

Within patients of 1 group the FAEC was in average depressed till 184,5 ± 1,2 min and within patients of 2 group till 219,7 ± 1,6 min. Thereby, within patients of 2 group there is defined the depressing of fibrinolytic activity 19,1%, than within patients of 1 group ($P < 0,001$) and to 51,5% lower the level of control group ($P < 0,001$). The level of FAEC in the control group in average was 145,0 ± 1,8 min.

Thereby within patients with allergic vasculitis there is observed the high content of Willebrand factor at the background of lowered antiaggregational activity of endothelial wall and decreased fibrinolytic activity of blood, and also there is revealed the increase of showings of platelets aggregation. It testifies to the direct connection of endothelial disfunction and abnormalities of haemostasis, what is one of the basic factors of appearance of allergic vasculitis.

Thereby, it should be taken into consideration that examined abnormalities of haemostasis, strengthening of thrombogenic activity and decrease of fibrinolytic activity of blood, can exist rather long time latently, will be rather lomg compensated by the thrombogenig potential of vessel system. Their realization requires some push, particularly AH, which leads to the disbalance of thrombocyte-endothelial interactions, and the londer disease is the more rough the abnormality of haemostasis and more heavy the course and outcome of allergic vasculitis.

In the haemostasiogramm there prevails the condition of hypercoagulation, the main pathogenic fact of which is considerable lowering of anticoagulant behavior, shortening of thrombine time.

Besides, there are observed initial signs of coagulopathy, to which there testifies the hypercirculation at the first phase of time shortening of blood coagulation by Li – White.

Conclusion

1. Within patients with allergic vasculitis, there occurs the massive thrombosing of microcirculation and serous impregnation of vessel wall and perivascular tissue under the influence of circulating immune complexes.

2. The research of condition of haemostasis within patients with allergic vasculitis showed, that there observed the depression of fibrinolytic system: low percent of spontaneous fibri-

nolysis, and also considerable increase of density of blood clot.

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Materials of Conferences

ENZYMES OF OXIDATIVE STRESS IN PIG BLOOD

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Under modern conditions big stress loads on animals can decrease the efficiency of adaptive system in an organism. In this connection, when designing the system of measures to protect productive health of pigs it is important to take into account characteristics of biochemical processes in animals in their postnatal development.

Long and marginally intensive stress causes activation of «primary toxins». Those are active forms of oxygen. Higher intensity of free radicals oxidation assists the formation of numerous free radicals resulting in peroxidised lipids and oxidative stress. Activated oxygen metabolites (superoxide radical, hydrogen dioxide, etc.) produce a harmful effect at cell and tissue level.

Xanthine oxidase is an enzyme referred to the class of oxireductases. It catalyzes the reaction of production of superoxide-anion-radical that may be an initial link of a multi-step process resulting in the oxidative stress.

The research was carried out at Open Joint Stock «Landrace» in Novosibirsk region. The object of the research were Landrace pigs. The animals were selected to be grouped following the principle of analogues with regard to origin, breed, productivity, age and live weight. The pigs were kept in accordance with the technology for complexes and farms. Blood to examine was taken from aural vein. The activity of xanthine oxidase was examined in blood serum of pigs aged 1, 2, 3, 4, 5 and 6 months. The data obtained was processed statistically with the package of applied software Statistica 6 and Excel.

The experiment identified age dynamics of xanthine oxidase activity in the blood serum of Landraces. The examination showed that the xanthine oxidase activity was high in the blood serum of the pigs aged 1 month (3,78 ± 0,09 mcM/hr.l, $p < 0,001$) versus six month pigs. This testifies to the fact that young animals are more susceptible to the oxidative stress. According to the data of the experiment it may be suggested that the xanthine oxidase activity can be applied as a test for oxidative stress in pigs.

The work is submitted to the International Scientific Conference «Fundamental research», Dominican Republic, April 13-24, 2011, came to the editorial office on 19.01.2011.

ENZYMES OF ANTIOXIDATIVE DEFENSE IN PIG BLOOD

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An organism responds to stress by a standard response-stress. This is the process connected with homeostasis regeneration and vitality maintenance. The process increases activity of regulatory stress-system that makes organs and tissues involved function under altered conditions.

As a result, the stress-system activation intensifies the discharge of stress-hormones into blood. The primary messengers are followed by a cascade of biochemical reactions that encourage mobilization of an organism to respond to the action of a certain stressor. Xanthine oxidase facilitates the formation of oxygen intermediates under oxidative stress. They realize oxidizing modification of lipids. Antioxidative defense prevents changes in the lipids structure. Catalase, peroxidase, etc., are referred to the enzymatic link of the antioxidative defense. They break down hydrogen dioxide having been formed under the oxidative stress.

The research was carried out at Open Joint Stock «Landrace» in Novosibirsk region. Landrace pigs were the object of the research. The animals were selected to be grouped following the principle of analogues with regard to origin, breed, productivity, age and live weight. The pigs were kept in accordance with the technology for complexes and farms. Blood to examine was taken from aural vein. The activity of xanthine oxidase was examined in blood serum of pigs aged 1, 2, 3, 4, 5 and 6 months. The data obtained was processed statistically with the package of applied software Statistica 6 and Excel.

Age changes in the activity of the examined enzymes were revealed in the blood of Landrace pigs. Significant increase in the peroxidase activity was identified in the blood of gilts aged 5 months (54,01 ± 1,62 c.u, $p < 0,001$). At this age period catalase activity was high enough, but xanthine oxidase activity was low. The data obtained testifies to the protective effect of catalase and peroxidase under the oxidative stress and their activity may be the evidence of the oxidative stress process running.

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USE OF LASER-BASED TECHNOLOGIES IN CARDIOVASCULAR BIOPROSTHESES PRODUCTION

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Bioprostheses formed from xenopericardium have been extensively used in cardiovascular surgery. Xenopericardium cutting is performed with scissors, a scalpel or a nibble matrix, though all these techniques don't provide high-quality accuracy. The purpose of the study was to evaluate the possibility of laser-based technologies application for biomaterial cutting in cardiovascular bioprostheses production.

Materials and methods

The study used a bovine pericardium, preserved with ethylene-glycol diglycidyl ether without any damage to collagen matrix. At the 1st stage xenopericardium cutting was performed using Nd:YAG and Er:YAG solid-state lasers as well as scissors, a scalpel and a nibble matrix. At the 2d stage CO_2 laser, generating continuous radiation. was used. The pericardial structure assessment before and after the cutting was done using light microscopy.

Results: In the marginal zone of the pericardium collagen dissociation up to 40 um was found in scissors and scalpel cutting and up to 5 um in nibble matrix cutting. The mean Nd:YAG laser emission power of 5–9 W didn't allow cutting the pericardium through. Destructive changes such as collagen homogenization and dissociation as well as fibrocyte breakdown were observed up to 60 um from the cutting line. The increase in the mean laser emission power up to 12 W let cut xenopericardium through, however it led to the enlargement of destructive changes area up to 80 um. The study showed that Er:YAG and CO_2 laser emission didn't cause any destructive changes of the pericardium around the cutting area while dissecting the tissue. The cutting speed reached 80 mm/min using Er:YAG laser and this speed increase resulted in lower cutting quality. CO_2 laser use allowed the speed increase up to 400 mm/min.

Conclusion

The use Er:YAG and CO_2 laser emission for the epoxy-treated xenopericardium cutting not having any mechanical or high-temperature impact on the tissues around the cutting area. The use of CO_2 laser lets improve cardiovascular bioprostheses production.

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TYPOLOGICAL PROPERTIES OF NERVOUS SYSTEM INFLUENCE ON DEFENSE BEHAVIOR ELITE ATHLETES IN TAEKWONDO

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The influence of psychological factors on the results of performances of sportsmen in competitions, on the effectiveness of their work at the trainings doesn't give rise to doubt. Indeed, the higher the level of mastery of sportsmen is, the more complicated competitions, in which they take a part, are, the more considerable is the contribution of psychological factors to the reached results. For the lowering of emotional tension of different origin in the psychic there become more active and function the mechanisms of psychological protection. Individual psychological protection is a subject mechanism of forming and realization of the condition of sportsman's readiness to the reaching of success at the emulative actions. The tasks of research, which was carried out by the project № 10-06-38656 a/U and supported by the guarantor of RHSF, included studying of activity of protective behavior in connection with the stability to the psychical overloads and existing adaptative resources, therefore we carried out the comparison with typological behavior of nervous system.

In the research there took a part sportsmen of the combined teams of Russia by tae kwon do VTF (male team – 33 sportsmen, female team – 32 sporstmen) at the age of 18 till 32 years. For the estimation of degree of use the mechanisms of psychological protection we use inventory of Plutchic-Kelermann-Conte and method of studying of typological behavior of nervous system (Ya. Strelyau).

At the base of received results we can make a conclusion, that sportsman with the high showings of the nervous system's strength at the moments of excitement will more rare resort to protective mechanism by the type «regression» and «substitution». People initially predisposed to the control of their behavior have less expressed substitution (sportsmen with the high showing of the nervous system's strength by the braking). In addition there exists an ability that these sportsmen could have the protection by the type «projection» as the protective reaction. Sportsmen with the high level of mobility of nervous processes can demonstrate emotional indifference or rejection of unpleasant for them situation.

At the base of received correlative interconnection we can make a conclusion that the higher qualified tae kwon do sportsman's strength and balance of nervous system the less he is inclined to unconstructive reaction to the difficult situations at the form of primitive psychological protections.

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CHANGES OF PORTAL HAEMODYNAMICS WHILE CRONIC DIFFUSIVE DISEASES OF LIVER

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Portal hypertension (PH) of the sick people with chronic diffusive diseases of liver defines the quality of life and prognosis of bleeding development [5]. The main pathogenic part is the increase of resistibility in vessels of liver and the increase of volume of blood inflow into a portal system [2]. For the estimation of hemodynamic changes in liver there are used ultrasonography of liver, dopplerographic research of portal, splenic veins and liver arteries [5], this facts give an opportunity to define the extent of portal pressure while the chronic hepatitis (CH) at the early stages of disease [1]. While the ultrasonic Doppler sonography for the diagnostics of the syndrome of portal hypertension they measure diameter and square of cross section of portal and splenic vein with the defining of speed showings of blood flow in them [3]. But diameter and square of cross section of these veins and also showings of blood flow speed in them mainly change while the stably high portal pressure, which is observed more often while the cirrhosis of liver [4]. With our view, this indirect method of early diagnostic of portal hypertension can't be rather informative. To this task in full there can be responsible the measuring of pressure in v. port. Therefore the aim of this work is to explain the use of ultrasonic Doppler sonography for dynamic control of extent of CH of viral aetiology sick people's portal pressure.

Materials and methods of research

64 sick people with chronic hepatitis were researched. CH sick people were divided into 3 groups by the degree of activity of inflammatory process. The first group (with minimal activity) consisted of 22 sick people, their average age was 23,3 ± 2,5 years; the second group (with moderate activity) consisted of 23 patients, their average age was 35,7 ± 2,7 years; the third group (with high activity) was formed of 19 sick people, their average age was 49,3 ± 2,6 лет. At the group of CH patients the average duration of disease was 5,9 ± 4,3 years from the moment of formation of diagnose. At the groups of CH patients the markers HBV at the phase of replication were revealed of 16 (25%) sick people, at the phase of integration – of 11 (17,2%) sick men. Markers HCV at the phase of replication were revealed of 10 (15,6%) people, at the phase of integration – of 11 (17,2%) patients. Markers HBV+HCV were revealed of 13 (20,4%) patients. For the revelation of varicose veins of esophagus to all patients there was carried out fibrogastroduodenoscopy at the apparatus «Olimpus» (Japan). For the morphological verification of diagnosis of 45,3% (n = 29) patients with CH there was carried out thick needle biopsy of the liver. While the histological research of hepato biopsies there was estimated the activity of the process by the morphological criterions Bianchi, were defined the index of histological activity by Knodelle and the degree of fibrosis. Ultrasonic research of organs and vessels of abdominal cavity was carried out by the methods of V.V. Mitkova and co-authors [5] at the ultrasonic apparatus «Aloka SSD-5000» (Japan) with multi frequent convex sensor 3,5 MHz at the regime of energetic and color mapping, there were estimated quantitative and qualitative parameters of liver and spleen. Haemodynamics at the vessel structures was defined by method of Doppler sonography. There were measured the diameter and square of cross section of portal and splenic veins with simultaneous examination of speed showings (maximal linear and volume speeds), blood flow in them, the level of pressure in portal vein. Received clinically-instrumental facts were treated by the classical for medically-biological works criteria of parametric and nonparametric statistic. The trustworthiness of abnormalities was estimated with the application of criteria of Student and Fisher with the use of packet Primer of Biostatics (Version 3,0).

Results and their discussion

The echographic characteristics of the liver's and spleen's condition of patients with chronicle hepatitis of different degree of activity of inflammatory process included quantitative and qualitative parameters of grey dial echography. The quantitative parameters of grey dial echography of liver and spleen of CH sick people were represented in the table 1. Received results of researches testify to that sizes of liver and spleen in considerable measure are connected with the activity of inflammatory process in liver. The analysis of results of researches of haemodynamics in portal and splenic veins, represented at the table 2, showed that patients with minimal activity had no observed essential widening of their diameter, and average extent of portal pressure was near to the norm. On the contrary, sick people with high activity had the diameter of portal and splenic veins, and also extent of portal pressure, which considerably increased ($p < 0,05$). The showings of portal haemodynamics of the patients with moderate activity occupied the intermediate position between two previous groups of patients. While the Doppler sonographic research of blood flow in the portal vein there was no observed considerable decrease of maximal speed of blood flow and increase of volume blood flow. In the splenic vein there were noticed signs of abnormality of haemodynamics, which by their direction coincided with the same in the portal vein, but quantitatively these changes were not so essential.

It's appropriate to mention that if patients with CH of minimal activity only had an observed tendency to the rise of portal pressure, that patients with CH of high activity had its registered high

level. It should be noticed that observed sick people had no clinic, morphological signs of cirrhotic changes at the tissue of liver. There were examined the peculiarities of portal haemodynamics of the patients with CH of moderate and high activity of pathological process in liver. For the patients with moderate activity there were character three types of blood flow in the portal vein: eukinetic (19,5 ± 0,3 sm/sec), hypokinetic (16,2 ± 0,1 sm/sec) and hyperkinetic (23,0 ± 0,2 sm/sec). Patients with CH of high activity had two revealed types of blood flow in portal vein: eukinetic (20,2 ± 0,2 sm/sec) and hypokinetic (15,3 ± 0,4 sm/sec). The appearance of hyperkinetic type of blood flow of the sick people with CH of moderate activity with an extent of pressure in the portal vein from 148,0 till 181,0 mm of water column was estimated as one of the compensatory mechanisms of portal blood circulation. Hypokinetic type of blood flow in the portal vein of the patients with CH of moderate and high activity was connected, apparently, with the morphological changes of liver parenchyma and stably raised intrasinusoidal pressure. Patients with CH of different activity had also an examined dependence of the blood flow speed in the portal vein, and also its diameter from the level of portal pressure.

Table 1

Sizes of liver and spleen of the patients with chronicle hepatitis

Parameters	Diagnosis			
	CH of minimal activity (n = 22)	CH of moderate activity (n = 23)	CH of high activity (n = 19)	Control group (n = 40)
Liver				
Slanting size of right lobe, mm	139,31 ± 3,59*	154,26 ± 7,54**	187,74 ± 7,32***	137,8 ± 1,79
Anteroposterior size of left lobe, mm	56,18 ± 1,31*	76,65 ± 8,62**	91,26 ± 9,78**	55,7 ± 1,87
Anteroposterior of spiegelian lobe, mm	18,04 ± 1,09*	19,87 ± 2,11	24,16 ± 1,71**	17,6 ± 1,83
Spleen				
Square, sm^2	33,75 ± 1,01*	34,08 ± 0,79**	41,13 ± 1,61**	31,8 ± 1,49

Note: * – $p > 0,05$ in comparison with control, ** – $p < 0,05$ in comparison with control, *** – $p < 0,01$ in comparison with control.

Table 2

Parameters of hepatoportal haemodynamics of the patients with CH

Parameters	Diagnose			
	CH of minimal activity (n = 22)	CH of moderate activity (n = 23)	CH of high activity (n = 19)	Control group (n = 40)
Portal vein				
1. Inside diameter, mm	10,7 ± 1,1*	12,9 ± 1,2*	13, 9 ± 1,1**	10,2 ± 0,7
2. Maximal speed of blood flow, sm/sec	21,5 ± 1,8*	18,9 ± 2,1*	17,5 ± 1,5*	21,6 ± 2,7
3. Volume speed of blood flow, ml/min	1250,4 ± 334,1*	1233,2 ± 336,7*	1259,3 ± 159,8*	1075,0 ± 83,6
4. Level of portal pressure, mm of water column	120,1 ± 7,3*	167,1 ± 14,2**	193,3 ± 10,5**	113,0 ± 4,4
Splenic vein				
1. Inside diameter, mm	6,8 ± 0,7*	7,3 ± 0,7*	8,1 ± 0,9**	6,4 ± 0,6
2. Maximal speed of blood flow, sm/sec	18,6 ± 1,1*	17,3 ± 1,2*	16,5 ± 1,2*	19,2 ± 2,2
3. Volume speed of blood flow, ml/min	386,3 ± 78,9*	406,1 ± 84,1*	439,2 ± 73,4*	345,4 ± 34,6

Note: * – $p > 0,05$ in comparison with control, ** – $p < 0,05$ in comparison with control, *** – $p < 0,01$ in comparison with control.

Researches showed that while the rise of the level of portal pressure there lowered the speed of blood flow in the portal vein. Thus patients with CH of moderate activity while the level of portal activity 148,0 mm of water column had the speed of blood flow of 23,0 sm/sec, while the rise of portal pressure till 181,0 mm of water column there was observed the decrease of the blood flow's speed till 16,0 sm/sec. While the rise of the level of pressure in the portal vein from 188,0 till 204,0 mm of water column patients with CH of high activity had an observed lowering of the blood flow's speed in the portal vein from 20,0 sm/sec till 15,0 sm/sec, correspondingly. Received facts testify to that by the rising of portal pressure there is registered the lowering of the blood flow's speed in the portal vein. In the clinical practice about the degree of portal hypertension on judge by the extent of diameter of portal and splenic veins. In connection with this there were compared extents of portal pressure and diameter of portal vein. Researches were carried out of all observed patients with CH of different activity. It was found that while the rise of portal pressure there was observed the increase of the diameter of portal vein. Thus sick people with CH of moderate activity while the portal pressure 148,0 mm of water column the diameter of portal vein was 11,0 ± 0,2 mm, and while the rise of portal pressure till 181,0 mm of water column the diameter of portal vein increased till 14,0 ± 0,3 mm. While the rise of portal pressure from 188,0 till 204,0 mm of water column of the patients with CH of high activity there was observed the dilatation of portal vein from 12,0 ± 0,2 mm till 16,0 ± 0,1 mm, correspondingly. Received facts testify that in the majority of cases there was registered right parallelism between the level of portal pressure and extent of the diameter of portal vein. At the same time not infrequent were cases when this parallelism wasn't observed. From the received results it follows that parameters of liver haemodynamics are connected between each other while the main role of activity of inflammatory process. In connection with this we can't exclude the situation when with the degree of intensity of morphological changes between the level of portal pressure and extent of the diameter of portal vein there not always observed the interconnection.

Conclusion

Practically all healthy people by the facts of ultrasonic Doppler sonography with the use of empiric formula of calculation the average extent of portal pressure was 113,0 ± 4,4 mm of water column with rippling at the limits from 103 till 143 mm of water column. Portal hypertension, while the viral diseases of liver, develops at the stage of chronic hepatitis, the degree of its intensity depends on the activity of inflammatory process in the liver. Widening of the diameter of portal and splenic veins, and also increase of the square of their cross section not always correlate with the level of portal pressure.

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SOME PROBLEMS IN COMPUTER RECONSTRUCTION OF ORGANS, TISSUES AND CELLS IN HUMAN AND ANIMAL MORPHOLOGY

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Modern computer equipment allows us to create 3-D models of methodical – biological objects that find a wide implementation in typographic anatomy and surgery, as well as in computer tomography of diagnosis purposes (Maykaya, 2000; Blinov, 2005). Along with that another area of medical science exists, in which a work with visual images goes on that could make a breakthrough in our knowledge of human and animals organ, tissue, and cells structure. It is the morphology that includes anatomy, histology, and cytology. It could allow us to carry out a multi-level reconstruction of organs and their components. This knowledge was especially important for defining anatomic, histological, and cytological peculiarities of various knots and tracts distribution in heart, where significant blanks in topographic determination of all the organ's leading systems and its nervous and vascular components exist. It leads to the fermentation of our knowledge on the organ's function morphological substance in its normal and pathological condition. Classical heart leading systems and knot operative myocardium metastructure reconstruction methods are very rare to find in literature (Thaemert, 1978) because of their laboriousness and significant technical difficulties (a cutting of serial ultrathin cuts on numerous nets of one block takes years of work). We can try to make the researcher's problems easier if we use little animal organs enclosed in one block of epoxy gums and further its cutting into thick

(50–100 mcm) cuts, then half-thin (1–2 mcm) cuts, and, if necessary, from them – into ultrathin cuts (50–70 nm). Further, as we obtain analog pictures, we can try, using a perspective, to form a single image (like it is done in animation). Or, as we digitize a cut series, we can obtain the same result if we use a 3D graphic editor. It should be outlined that special program products for metastructure and histological pictures analysis are extremely rare and expensive, and their development requires work of competent programmers along with the labor of morphologists. Structure modeling, first of all, of inner muscular organs (heart, uterus) with the usage of serial half-thin and thick cuts will allow us to define the layer organs structure and then will reveal functionally-important part of these organs (for example, sphincters, nerve ganglions, leading ways). An involvement of cybernetics students of RCSPC medical-biological faculty will aim them for the development of program applications that can be used in future to reconstruct all the various mammal types organs, including those in normal ontogeny and under various pathologies. Besides, it will, if provided with the digital organ model, to rotate it in different angles and reveal the peculiarities of its tissue, cellular, and subcellular structure.

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UNEVEN GROWTH AND GISTOGENESIS OF THORACIC DUCT

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Thoracic duct (TD) has endothelial wall in embryo of 7 week with first endothelial valves in embryo of 8 week. It transformates into multi-layered TD wall in ending of human uterine development when thickness of the wall increases in a 20 times. Uneven growth of TD wall connects with its gistogenesis intimately. Correlation of thickness of TD wall and width of its lumen is less 0,05 before 12 weeks of uterine human life what permit to regard TD as thin-walled vessel. In fetuses of 4–5 months TD become thick-walled vessel. Inner layers of TD wall try the largest tension under inner pressure and stretch more than outer layers. Moreover subendothelial layer of connective tissue remains thin and crumbly with net of thin retcular fibres. Their thickness increases in broaden and compacted outer layer where first collagen fibres appear. The first smooth myocyties appear, muscular coat forms on boundary between layers with diferrent hard. The coat brakes moving distortion (relative displacement of layers) and prevents destruction of TD wall. Lymph from TD lumen penetrates through endothelium into connective tissue and erodes it, brakes weak intermolecular connections, slows down fibregenesis. Speed of diffusion diminishs rapidly in thickness of the wall. And thus subendothelial layer of connective tissue remains thin and plastic. Outer coat of TD promotes new formation and growth of valves because it slows down outer dilatation of TD and stabilizes structures of residual deformation. Muscular coat limits dilatation of TD and stretching of inner layers of TD wall, its folden deformation. Thus uneven growth is in the base of TD morfogenesis and gistogenesis.

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DIFFERENTIAL FACTOR IN ANLAGE OF LYMPHATIC BED

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Anlage of primary lymphatic system comes by means of formation of lateral pockets in large primary veins with thin endothelial wall under the pressure of adjacent arteries with external coat. Comunications of central canal and lateral pockets of increasing veins narrow. The pockets separate from secondary veins as lymphatic chinks with endothelial covering. Some of primary veins turn off blood flow together with lymphatic chinks as tributaries preceding venous pockets including part of protocapillary net. Lymphatic capillaries preserve very thin endothelial wall without basal membrane and lose vascular connection with blood bed. Therefore usually lymph pressure is lower than the venous and prone to the greater fluctuations right to zero. Lymphovenous connections preserve usually in the neck of human and mammals where negative venous pressure originates periodically. Thus lymphatic bed including roots in microcirculatory bed develops from venous collaterals by means of reducing their connections with venous magistrals. In conditions of intensive organogenesis and increasing blood pressure the basal membrane forms under thickenning endothelium of blood capillaries. The membrane cuts off lymphatic collaterals with thin endothelium without basal membrane. The pressure of differentiated advential coat of secondary veins is conducive to separation of venous pockets. Thus transverse gradient of blood and mechanical pressure originates in primary drainage system of parallel vessels [collateral – magistral – collateral] and diferentiates the system on secondary or true veins and primary lymphatic vessels as modificate or persistent primary veins.

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LYMPHATIC SYSTEM. INTERNATIONAL EMRYOLOGICAL TERMINOLOGY (PROJECT)

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Today while waiting for the publication of International Embryological Terminology I propose to preserve the division «Lymphatic System» in its project, excluding lymphoid organs (thymus, spleen) and mesenchyma, but introduce lymphatic trunks. In classical interpretation mesenchyma exists in human embryos of 3-4th weeks and at the beginning of anlage of lymp sacs on the base of primary veins (6th week) it loses network construction transforming in different types of connective and muscle tissues.

Lymphatic System

Lympf sacs

Jugular sac
Axilar sac
Retroperitoneal sac (unpaired)
Iliac sac

Thorasic ducts, right and left

Cisterna chyli (unpaired)

Lymphatic trunks

Jugular trunks
Axilar trunks
Lumbar trunks
Cisternae of lumbar trunks
Intestinal trunks

Lymphatic vessels

Lymph nodes (anlages)

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Short Reports

PREDICTORS OF COMMON BILE DUCT PATHOLOGY PRIOR TO CHOLECYSTECTOMY, EVALUATION RISK ASSESSMENT COMMON BILE DUCT STONE AND COMPARATIVE STUDY BETWEEN INRAOPERATIVE CHOLANGIOGRAPHY AND OTHER EXAMINATION (CT, USM, MRCP, ERCP) PATIENTS WITH LAPAROSCOPIC CHOLECYSTECTOMY

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Choledochoscopy is as important as cholangiography, but it does not show high sensitivity for anomaly and distal strnosis. Choledochoscopy is not widely used as diagnostic method and more popular for treatment.

I group – patients with high risk (80 patients), II group – patients with medium risk (38 patients) and III group – patients with low risk (49 patients).

Intraoperative cholangiography is important step in searching and characterizing common bile duct stones or anatomic deformations as well as help surgeon to choose adequate operative tactics during operation.

Nowadays laparoscopic cholecystectomy (LC) has been used widely as standard surgical intervention during bile cyst disorder (cholelithiasis, polyps, acute cholecystitis and etc). It is known that 10-20% choledocholithiasis [1, 2], 5-7% common bile duct distal stenosis [14], 8–13% bile duct anomaly has been found out during gallbladder stone disease [8].

Not identifying above mentioned pathology during operation cause complication such as bile duct injury in 0,1–1% cases [6, 7, 9], postcholecystectomic syndrome in 15–20% cases [11], cholangitis, pancreatitis and consequently may origin sosial problems.

Taking into the consideration all these issues accurate investigation of bile ducts should be mandatory for all patients who will undergo LCH. According the result of standard preoperative examination (clinic, US, laboratory) the stone finding ability all of these examination is 50% and they can not reveal silent common bile duct stone (2–13%), bile duct anomaly and stenosis accurately[20, 21].

The purpose of investigation

The definition importance of intraoperative visual examination for assessment bile duct condition is goal of our investigation.

Materials and methods

167 consecutive patients with symptomatic gallbladder disease underwent attempted LCH at the Azerbaijan Republic Central Clinic Hospital of Health Ministry and Azerbaijan Medical University Surgical department as well as Germany federation Berlin DRK and Humboldt Hospital between 2005 and 2008.

A total of 167 patients (49 men and 118 women) with a mean age of 41–50 years (range, 20–75 years) were admitted hospitals. All patients selected for the study were carried out standard examination such as CBC, bilirubin, ALT, AST, amylase. The bile duct examination methods are included clinical, laboratory, visual examination method such as US, MRCP, ERCP and biopsy. All these patients were divided in three groups according the test results. I group – patients with high risk (80 patients), II group – patients with medium risk (38 patients) and III group – patients with low risk (49 patients).

Laparoscopic cholangiography was performed as below: After gallblader grasping and retracted in cephalic position by trocar, gall bladder duct was dissected. The wide metallic clip was inserted between gallbladder neck and gall bladder duct in order to prevent migration bile stones to common bile duct and leaking contrast dye during cholangiography. Then pediatric tube was inserted through into gallbladder duct, 5–10 ml contrast material was injected and cholangiogram was obtained.

Results. All patients in I group-patients with high risk (80 patients) were performed MRCP, 67 of them pathology were revealed. Although 18 of them were not showed any pathology, during intraoperative cholangiography 3 of them pathology were revealed. One of them has Mirizzi anomaly and two have distal stenodid in bile ducts.

II group- patients with medium risk (38 patients) were included patients with history of jaundice or pancreatitis and more than 60 years old. We performed intraoperative cholangiography patients in this group. During examination 3 of them patology was detected. 5 of them was applied transcystic drainage due to wide common bile duct and distal access, 2 of them laparoscopic stone extraction, 3 of them bile duct stone were extracted postoperatively after performing ERCP and sphincterotomy.

In one patients due to wide common bile duct and distal sphincter was performed LCH and laparoscopic choledochoduodenoanastomosis. Another patient had wide common bile duct and common bile duct stone and we decided to performe open cholecystectomy fot this patient. One patient was discovered distal stenosis and common bile duct stone and we applied LC, ERCP and sphincterotomy. 30 of 38 patients were not revealed any pathology.

Increasing any of cholestasis enzyme, history of jaundice or pancreatitis within 1 month and patients with more than 60 years old are indication for intraoperative cholangiography. All these symptoms are criteria of intraoperative cholangiography. Gener-

ally, II group patients with medium risk chance of finding pathology of common bile duct is 21,05%.

III group – patients with low risk – If has any suspicion (small stones, wide gall bladder duct, wide common bile duct, pancreatitis and etc) intraoperative cholangiography need to be conducted. Intraoperative cholangiography have to be performed patients without history of preoperative ERCP or pathology in MRCP, but suspicious symptoms in laboratory or US

As shown in our studies we revealed pathology in 6 patients when performed intraoperative cholangiography in 49 patients. One patient was revealed wide common bile duct and stone and performed LCH simultaneously choledochoduodenoanastamosis. In 2 patients were founded out only common bile duct stones, one of them was conducted laparoscopic stone extraction, another was performed LCH simultaneosly intraoperative sphincterotomy. In 2 patients distal stenosis were detected, one of them was converted open cholecystectomy, another patient was operated with LCH simultaneously choledochoduodenostomy. One of the patient was discovered Mirizzi syndrome and therefore open cholecystectomy was made.

Generally, III group – patients with low risk the frequence of common bile duct pathology is 12,25%. We found common bile duct in 12,25% patients.

We got conclusion that if patients were observed wide common bile duct, wide gall bladder duct, pancreatitis features, numerous small stones during laparoscopic intervention, intraoperative bile duct exploration need to be done.

Therefore, these aforementioned signs need to be added intraoperative selective criteria. Because as shown in our studies assessing these criteria increase frequency of detecting common bile duct pathology during operation (12,25%).

Characters of all these three groups and results of examination give us clue that during preoperative routine examination we may suspect about common bile duct pathology, but to make more accurate diagnosis we need to conduct intraoperative cholangiography. It is worth to note that high and medium risk patients should be performed MRCP during preoperative period.

MRCP does not have high sensivity to identify distal stenosis. To determine this pathology accurately need be performed ERCP and intraoperative cholangiography.

If patient suffer from both gallbladder stone and common bile duct pathology then treatment plan should be more mini-invasive. More precisely, LCH and ERCP must be first choices.

The patients with common bile duct pathology first choice treatment method is laparoscopic method, if it is impossible, the operation need be converted to open method or performed postoperative ERCP. The 16,1% patients with symptomatic gallbladder stone and planning for LCH were found common bile duct pathology. The most common pathology are choledocholithiasis (8,54%) and distal stenosis (4,6%).

In preoperative period common bile duct pathology identification indices were shown sensitivity 72,5% and specificity 62,5% for cholestasis signs, sensitivity 77,5%, specificity 78,9%, accuracy 80,8% for US, sensitivity 95,3%, specificity 83%, accuracy 96,3% for MRCP.

Discussion. The results of conducting examination (clinic, US, laboratory) show that they can discover bile ducts pathology only in 50% cases and standard examinations can not identify common bile duct stones (2–13%), anomaly or stenosis.

MRCP demonstrate high sensitivity in determination common bile duct stones, but can not identify anomaly or pathology accurately, not cost effective and advice to use only according indications [3, 4, 5, 15]. Laparoscopic US or endo US is not cost effective and can not reveal anomaly or stenosis [5].

Although ERCP is supposed to be «gold standard» in common bile duct pathology, it is invasive and complication rate is relatively high (10%). Hence this method is widely used for treatment than diagnosis [22].

Choledochoscopy is as important as cholangiography, but it does not show high sensitivity for anomaly and distal strnosis. Choledochoscopy is not widely used as diagnostic method and more popular for treatment [1].

Intraoperative cholangiography is considered most accurate and cost effective method in identification bile ducts stones, stenosis and anomaly. But information about effective using this method is contradictory. Some investigations recommend to apply intraoperative cholangiography for all patients [18]. Although other investigations advice not to apply for all patients, because of uselessness [19].

Although the accurate examination of bile ducts is necessary to prevent damage bile ducts and identify common bile duct stones such as silent, stenosis and anomaly, the examination methods have not proven their effectiveness yet. Therefore identification effectiveness and indications bile ducts examination methods have not lost their science-practice importance.

Summary, intraoperative cholangiography is important step in searching and characterizing common bile duct stones or anatomic deformations as well as help surgeon to choose adequate operative tactics during operation.

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THEORETICAL ASPECT OF PERSONAL READINESS FOR PROFESSIONAL ACTIVITY FROM FUTURE SPECIALIST FORMATION POSITION

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In conditions of socioeconomic, political and ideological transformations implementation the social significance of their psychological supply grows. A discrete role thereat belongs to the psychological science and practice acquiring in latter days more and more significance in the basic spheres of the society's life activity.

The solution of numerous social-psychological problems is made difficult by the insufficient theoretical and experimental-practical exploration of the questions associated with the psychological readiness ones.

The readiness problem has been in the picture of domestic works devoted to personal self-development problems, the personal potential realization, axiological objectives self-choice, life policies forming-up, in particular (Abulkhanova-Slavskaya K.A., Asmolov A.G., Bozhovich L.I., Dubrovina I.V., Dyachenko M.I., Kandybovich L.A., Zabrodin Yu.M., Zimnyaya I.A., Feldstein D.I., and others).

At the same time an insufficient format of psychological concepts, the corresponding conceptual mechanism and conditions of successful personal readiness formation are observed. It should be noted that there is both a scientific and practical demand for an integrated study of personal different fields' (educational, vocational, sportive) readiness peculiarities in different stages of personhood achievement. A special social meaning is acquired by the revelation of psycho-pedagogical conditions for the personal readiness formation in the system of education.

The modern objectives of the higher education reforming determine, first of all, the strategy of higher priority attention to the personality of all the subjects of the academic process – both students and teachers. Nowadays the conviction, that the narrow-tactical «dedicated or technological approach» in education should give its place to a wider and more strategic «learner-centered or humanitarian» one, is being spread more and more.

The learning-educational process of getting higher education in a university is built on the fact that students should be oriented on being taught different subject skills and activities. Many students manifest their passiveness and dissatisfaction with the academic activity, cannot use and develop their motor, cognitive and creative abilities, which their teacher orient them on at classes. The lack of anxiety for active self-development and acquirement of professional knowledge and skills, creative abilities promotion can be associated with the predominance of the technocratic or dedicated training for the present time.

In the dedicated education in the process of academic activity the personal development is hardly taken into account (mainly is declared), the student's anxiety for success, creativity, independence, initiative to solve professional, educational, problem tasks. So, Klarin M.V. gives the following didactic characteristic to the technocratic approach within an education model building [1].

The didactic searching in the tideway of the technocratic approach: proceeds from effective reproductive activity as a self-dependent value; preferentially directed to didactic aims of a low cognitive level; are personally neutral; make an accent on standardized educational procedures and suppose a positive emotional background, but, at the same time, personally neutral character of the student's and the teacher's involving in the academic process; put the teacher into the position of an operator-teacher [2]. The main objective in the dedicated education – is the assimilation of subject-disciplinary knowledge on the teacher's order. In this case, for the pedagogue, the learner (student) is an object for training and up-bringing.

In traditional education the teacher creates means, forms motives, shows aims, organizes conditions; the main trend of this education is the achievement of the required by the programs educational results and total control over the educational content and information obtaining. Such dedicated approach promotes only the development and formation in the learner of «passive-personal readiness»; according to K.D. Ushinsky, they are brought up by creatures «…constantly preparing to an activity and remaining dreamers forever…».

At the present time in education the attention is more and more drawn to the didactic technologies in the tideway of the learner-centered approach [2].

According to the learner-centered approach, it is important to implement certain psycho-pedagogical conditions in the process of the interaction of the student and the teacher, so that the learner appeared as a full subject of educational-cognitive activity. The main optimal interaction implementation form is the preparation, for the teacher – the professional-psychological preparation, where the prime attention is drawn to the professional

development, self-determination; for the learner – the psycho-pedagogical preparation, where the prime attention should be aimed at the personal development. Under the given circumstances an *active personality readiness* to self-development is formed through the system of «subject-subject relations».

The teaching process organization based on the learner-centered approach means that all the methodical solutions of the teacher, for example, the educational material organization, use of these or those ways and methods, should be refracted through the prism of the learner's personality, his needs, motives, experience, abilities, activeness, mentality and other individual-psychological peculiarities.

The purpose of our work was the investigation of the student's personality readiness formation peculiarities in self-development and creation of preconditions for professionalism in the context of educational activity.

In the course of an educational process the interests and needs for self-development should be taken into account and the student's personality self-development preconditions should be created. The whole educational process of the academic activity should be aimed at an integral development of a personality, the consideration of its wants and interests in the field of getting higher professional education. The learning-educational process is becoming the process of self-determination in professional-pedagogical culture and education values in the course resting on the learner-centered and activity approaches.

A theoretical study of psychological literature and experimental research testified that the readiness in the conditions of a certain kind of activity – is an extended notion. In accord with the up to date knowledge it can be considered as a many-component and multivariate structure being characterized by certain set of signs for every activity.

The set of readiness signs in a certain kind of activity involves: the ideological, moral, functional, psychological, special (professional) and personal readiness.

The personal readiness is a necessary component for this organic whole, often being decisive for the efficiency and success of an activity. It represents one of peculiar psychic states of an activity subject.

As every other psychic state it is an integral manifestation of a personality, it is always causal, characterized by definite time parameters, has a dynamic (functional) system at its root. It means that, first, all its components are connected between each other; second, its functioning is subjected to the hierarchic principle; third the relations between the components are mobile and each of them, by virtue of the determining influence of an activity's objective conditions, can be leading.

Joining a large cohort of scientists, specialists working in the field of psychology of personality, it should be emphasized that a successful activity depends not only on their relatively stable qualities, but also on more changeable psychic states. «Every psychic event happens as if against a certain psychic state of a person, which conditions its behavior, and later also its change», S.L. Rubinstein (1954) wrote. Therefore, both at a theoretical, but especially at a practical level the psychological testing of learners should be obligatory analyzed include getting not less than two personality parameters:

– individual-psychological makers of a personality;

– temporary psychic states of a personality, including reactive states.

At the differentiation of individual-psychological makers of a personality or stable qualities of a personality and temporary psychic states expressing them, their dialectic unity should be taken into account for the personality's features can be vividly manifested for a short while in the corresponding psychic states, the personality's stable feature itself appears to be a component of different states, the dominant role being played by it in their structure not necessarily.

Of course, the qualities of a personality have a corresponding effect on the course of psychic states, which, in their turn, influence the formation of personality traits, the professionally important qualities promoting an effective and successful activity among them.

The idea that the qualities of a personality grow from psychic states and the developed trait becomes the condition for new states formation was offered by N.D. Levitov (1971) already.

Thus, a leading specific activity results, on the one hand, in the formation of specific personality traits, and on the other hand, – in working-out of temporary subjective states, which not only promote the efficiency of an activity, but determine the behavior of the activity subject as a whole.

One of important aspects while analyzing the inner conditions of an activity is an organic alliance of the substantial (qualitative) and energetical (quantitative) analyses of the personality structure as a whole, its separate components and their psychological manifestations. To provide such integrity in the personality activity source – the activity motivation, understanding is of prime importance. The simultaneous sighting of the substantial and energetical activity aspects, and the personality structure accord-

ingly, is specific for their psychological study (Aseyev V.G., 1976).

For every kind of activity there is a certain set of substantial components (signs) – i.e. a specific syndrome including the majority or minority of personality characteristics.

The theoretical or experimental studies on psychology of personality served the conventional basis for the establishment of structural components of the personality readiness state syndrome for practical professionals-psychologists. The components are:

– well-developed intuition;
– self-consciousness;
– high level of abstract-logical and social mentality;
– positive moral qualities;
– faciliativeness;
– high level of empathy;
– role behavior wide range formation.

Such a personality readiness cannot be developed at a large scale, however, proceeding from the premise that the profession of a practical psychologist has actually become a very popular one, it is necessary, as scientists consider, to acknowledge that many specialists do not originally possess those necessary individual qualities, which further on allow making their work effective and professionally literate.

An essential practical importance of the personality readiness state in activity is in the fact that it represents a background, which, on the one hand, psychical processes aimed at the orientation of a subject in situations and conditions of the activity, adequate to these conditions self-regulation of actions, thoughts, feelings, behavior as a whole, solution of specific problems leading to the objective achievement, take course against. On the other hand, it is well known in psychology that stable personality traits grow from psychic states, and the developed traits become the condition for the formation of new the states providing the efficiency and success of the activity.

Thus, a certain activity (professional, educational, sportive) lead, first, to the formation of specific personality characteristics; second, to working-out of the readiness type personality states, which not only promote the efficiency of the activity performance, but also determine the behavior of a person as a whole.

It is readiness that, according to N.S. Pryazhnikov, should become the main objective of professional and personality self-determination (the synonyms of which are self-actualization, self-realization, self-fulfilment, self- transcendence). N.S. Pryazhnikov (2001) writes: «The main (ideal) objective of professional self-determination is gradually to form in the client the inner readiness to plan, correct and realize the perspectives of his development (professional, life and personality one) independently and consciously» [3].

The relevance of the topic is determined by the process of study and formation of conditions promoting the personality and professional growth.

Under the personality readiness we understand an individual-psychological directivity, tuning to voluntary activity, mobilization of abilities to active and rational skills, actions. The efficiency of personality readiness formation methods and means will depend on the degree of theoretical statements working-out by our laboratory and the system of estimation and criteria and regulation of psychic states and personality traits.

The personality readiness psychological theory must be founded on methodological statements of the determinism principle and learner-centered and activity approaches. The working-out of scientific humanistic paradigm about the place of personality readiness in the academic process and professional activity will be of an essential value.

That is why the scientific interest will be focused on the investigation of various kinds of readiness, its structure, component representation and mechanisms of transition, transformation of psychic states into stable personality qualities in conditions of academic and professional activity.

The analysis of theoretical and methodical literature allowed us to detach the components of students' personality readiness formation and to define the psychological-pedagogical conditions for the formation of these components. Their close relevance and supplementation with each other will promote the effective self-realization of professional actions and personality manifestations of students at sessions on the selected speciality. It will be manifested in the fact that the pedagogical skills' separate component formation realization occurs only with the organization of all the complex of conditions. Psycho-pedagogic conditions play a key role in the formation and development of the marked by us components.

The most important psycho-pedagogic conditions for the student's personality readiness are:

1. *The transfer of the student from the position of an education and upbringing object into a self-development subject*.

This condition will be implemented if:

– a subject-subject interaction of all the participants of the educational process has been guaranteed;

– the situation of success in the academic activity has been created, that conditions the provision of positive growth experience for a student in the group's and teacher's presence,

that stimulates a further work of the personality over himself and is the source of self-development and self-bringing-up;

– the interpersonal relations, which suppose the creation of mutual understanding, kindness and openness at classes, have been formed. A teacher should become a true tutor having interest and respect with students.

2. *The personality readiness specific components representation*.

The personality readiness represents a form of superstructure, a system reaction on the corresponding real or predicted situation, the information content of which is integrated into a mental model providing such a reaction. The quality of the state is determined by the degree of its adequacy to the activity implementation content and objective conditions. The personality readiness involves the following components:

– motivational – the interest, aspiration to achieve success, need to achieve the aim;

– cognitive – the understanding of problems, duties, knowing means towards the end, skills to forecast own activity;

– emotional – the confidence in success, inspiration, feeling of responsibility;

– conative – the sense of purpose, i.e. subjection to a purpose, mobilization of forces, concentration on the problem, abstraction from troubles, overcoming doubts;

– communicative – the constructiveness and effectiveness of contact interaction with people and environment, ability to gain, support and develop business and personal contacts.

Ultimately, the state of personality readiness is formed by means of many specific components – the phenomena, every one of which can be dominant, and then the given component will have an effect on quality features of the state derivative from the interaction of internal and external conditions of life.

The carrying out of students' personality readiness main components diagnostics supposes that at the educational process organization the individual development features of students should be taken into consideration to the maximum. This is the motivation-conative relation to the academic activity; the success achievement and trouble avoidance motivation; the cognitive need and creative activity presence in getting knowledge and academic training level in the field of psychology; the ability to self-education, self-development, self-bringing-up processes on the basis of reflexive thinking, consciousness, understanding, rethinking of the process and results of own activity; the level of methodological and practical knowledge and skills, etc.

3. *The creation of personal development situations at learning sessions immediately*. The given condition supposes:

– a contact between the teacher and student through a dialog, which supposes the equality of psychological positions of the two interacting sides. The situation of double-sided interactions means an active role of all the sides involved into the communication. The dialogical interaction supposes:

– the education space retargeting to the personality sphere of students;

– a «game» form for creation of personality development situations with active use of interactive learning and control methods, change of role positions;

– the application of means and methods for learning motivation formation. The educational process is aimed at the formation of positive motivation in its reinforcement by means of activeness of the person itself;

– the application of problem educational methods in adoption of scientific knowledge system and results, the process of getting results, formation of cognitive independence and development of creativity of the student.

4. *The education and culture of axiological potential development through one's own activity.* An individual develops in the process of its own activity. In the basis of the activity approach in education the personal inclusion of every student into the process lies, when the activity components are aimed and controlled by it.

The personality approach – is the inclusion of students into the educational process organization. The problem setting at a session, planning its solutions, further realization and evaluation of the implemented actions are fulfilled together with the teacher; the creation of conditions for the choice of session conduction forms.

5. *The students' reflexive skills development updating*. The educational process efficiency depends to a large extent on how actual the students' reflexive skills become (depth, latitude, complexity, verity). At pedagogical skills realization the reflexive actions of students become an integral component at every stage of their activity organization, that promotes the personality development and self-cognition process activation.

6. *The readiness of the teacher to the learner-centered approach realization*. The teacher's personality readiness requires his psychological skills (communicative, organizational, gnostical, constructive) development realization:

– to draw attention to the activity subject or relations during the communication with educatees;

– to instrument the recognition of both the educatee and educator to differences in opinions, judgements, tastes, abilities – then the communication with children becomes interesting and spiritually rich;

– not to resort to direct and open appraisal of the educatee, to use the method «I – information» when evaluating him, then the learner's self-confidence consolidates and his activity and self-evaluation grow;

– to manifest the empathic understanding of the student, respect and kindness, to express sympathy to his life, feel with his success and misfortunes;

– to underline the unique character and soleness of his personal «I» – then the status and self-control of this educatee in the group grow.

7. *The ratio of personality and situational factors in behaviour determination*. The classical research of Hartshorn and May (1928) testified that human behaviour depends not only on stable personality traits, but also on situational conditions. However, can external conditions, besides internal ones, influence the behaviour, if one bears in mind the following important position of S.L. Rubinstein: external conditions act through internal ones [4]? How after all one can combine the oneness of personality traits and «external situations» in the personality theory (for example, in personality integration itself) still remains out of view of investigators. The uncertainty of this most important problem has found out both «personality traits» theory and situational personality theory to be invalid with all acuteness. Having arisen in psychology and not been solved yet, the dispute over the comparative role of different behaviour factors (and life as a whole) can be solved dialectically on the basis of a certain new personality theory considering the differentiating of situations in the process of individual personality structure development. Such a theory should be built at a higher consistency level and include into the personality integration not only personality traits, but also the variables of situations in their relation with these traits.

The comparison and a more detailed further analysis of the given signs allow drawing a certain way of the personality theory and the corresponding psychognostic supply perspective development.

8. One of the realization conditions of the learner-centered education in a higher institution can be *the organization of psychological preparation of students and teachers*.

As the principle directions of the preparation to the activity of teachers and students in a higher establishment the methods of psychoprofylaxis, psychognosis, psychocorrection, psychological consultation, psychological enlightenment and other methods should be considered and realized. The generalization of psychological and professional counseling experience through a dialog, for example; holding of objective-reflexive trainings and interdepartment scientific-methods seminars; rendering individual counseling assistance to the student are of positive value. The fact is that the prevailing at a higher establishment group session forms including group games and trainings, etc. are more applicable for brainwork training and not for intimate personality sides' development. That is why the student's personal contact with a qualified specialist psychologist-pedagogue can be an indispensable means of the student's individual support, if he himself is in want of such a support and has realized that.

9. An important condition for the personality self-development is *control and self-control*, which represents the feedback in the personality development. The effective personality diagnostics should rest on the information about the personality manifestations not in a certain, comparatively narrow, kind of activity, but in life as a whole, i.e. bear a system-style character (see above about the corresponding principle).

A creative interest to the teacher's professional activity personality readiness investigation testifies to the given problem topicality. Together with that the certain professional activities personality readiness components, inclusive of the concurrent activity of subject-psychologist, remain insufficiently studied. The method of the selective formation of the future subject-teachers' psychological readiness for their practical activity as early as in conditions of higher establishment training requires renovation.

Currently, the diagnostics problem, the development of the personal readiness state criteria, means and methods, that is necessary both for the creation of a theory and practical purposes – the control and readiness control, the forecasting, projecting of valuation in problem solving, the professional selection, special psychological training, the activity efficiency and success and psychic health provision, still remain not less important.

All this set of problems needs further efforts for their settlement.

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Materials of Conferences

UNIVERSITY SCIENCE AND ITS INNOVATIVE POTENTIAL

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Higher school is the corner-stone in the development of science. In the universities of developed countries science is surely profitable.

Higher school science is seen as a strong innovative development resource in education system.

We understand that a traditional role of the institute to transfer knowledge to society, to teach and train specialists, to satisfy the needs of economics is rather scare.

Modern university can and must influence fundamental knowledge development and practical innovation.

Fundamental development of science and its support in university training is very urgent now.

Higher schools tries to attract modern information-instructive and teaching project to direct staff of a higher school in integration process and support fundamental scientific and university education.

The development of scientific-research work and profound training of students is a part of modernization of education.

Integration of science and education in intensive process of training promotes improvement of staff qualification, development of the youth creative initiative ability and its active participation in solving problems connected with inventive and rationalization activity, with search of effective nonstandard decisions of scientific and technical problems.

The epoch of innovative development of society in intellectual labour market demands the appearance not only specialists of high professional knowledge, but also people possessing teaching, organizational, management skills and their own scientific world outlook.

Scientific research in institutes ensures guarantees and conditions in training highly qualified specialists. Qualified training of specialists is raised by anew set departments of chairs of main specialties at the Kursk State Technical University.

These formations successfully solve problems of the fastest adaptation of future engineers at the expense of thorough registration of all needs of industry, their perspective development, the use of modern production equipment in training and research work.

Such approach attracts students to innovative activity.

It is very important to give all students the opportunity to take part in different competitions and projects.

We are sure that the main subject of any project is a scientific-educational part directed to the development of scientific research interest, to knowledge extantion.

Such approach helps our instructors to connect modern science and great experience of industry with the cognitive possibilities of future specialists.

The fulfillment of our project gives us the opportunity to realize some principles that are very important in creative upbringing of any personality.

– principle of cognition through the most advanced fields of knowledge both science-based and art-based

– principle of group integration and responsibility for everybody

– principle of cooperation with the ability to respect the work and achievements of colleagues.

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THE PRINCIPLES OF THE CONSTRUCTION OF NON-LINEAR THINKING STYLE COMPONENT FOR SCHOOLCHILDREN

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In this publication «non-linear» implies the thinking style that studies the man and the surroundings as a complicated and open system that is capable of self-organization and is oriented for the exposure of general connections and relations and for the necessity of the constructive nature of instability and chance. For the main characteristics of non-linear thinking style in this research we study (detailed analysis and outlined characteristics motivation are available in [1]):

- criticism, logical strictness, conclusiveness and argumentation in combination with readiness to study the alternative position;
- abstractness in combination with the ability to set relations between the ideal model and real process;
- the desire to study the nature of conceptions and ideas;
- scale range, orientation for the exposure of the deep relations and mutual correlations between processes and phenomenons of different nature;
- versatility (an approach to the problem from different sides, the readiness to objective analysis of the opponent's point of view);
- the readiness to take action in an instable situation, crisis, when it is necessary to study and analyze the range of possible consequences while considering their coordination with the inner state of the system;
- complementarity (the unity of conscious and subconscious, reasonable and emotional, rational and intuitive).

From the point of the formation of the outlined non-linear thinking characteristics for the schoolchildren the following content blocks play the major role: logical, probabilistic-statistic and synergetic. Let's look at the major principles of the outlined content construction.

The school working practice shows us that while studying the theoretic material of the mentioned blocks without any relation (or with weak relation) with other school content their developing and world outlook material is not often realized. In that case the idea can be advanced: in the process of studying of the outlined content blocks a great attention should be devoted to its applications and the processing of skills and knowledge in various situations and on different material. The scholars does not only learn a content block but also try to use it, they master general methods and approaches to the analysis and evaluation of the real existing situations. In that case we can not only think of the strengthening of the implementation orientation but also of the principles humanitarization of studying the outlines learning blocks. The humanitarization principles mean not only the strengthening of the human content of those blocks but also the evaluation of skills and knowledge as tools within the «human-world» system; the disclosure of the co-evolution idea; the strengthening of the studied content's application orientation.

After that it is necessary to study two questions: the correlation between the outlined content blocks and their correlation with other educational subjects.

First of all, in order to comprehend the material more consciously and to realize its place and meaning it is necessary to reveal the relation between the content of the studied blocks to the scholar. It is needed to be shown that they do not deny each other and not only widen each other but also are the additions for one another. Probabilistic- statistic and synergetic content helps us to understand the limits of the logical apparatus implementation. Moreover, the synergetic content gives us the opportunity to evaluate the place and meaning of the logistic and probabilistic-statistic content blocks.

So we can conclude that the contents of the studied blocks are linked to each other, they amplify and widen one another.

Secondly, within the process of the studied contend learning a great role is played not only by the relations between the blocks but also by intersubject relations. School academic subjects provide material for the processing of logical, probabilistic-statistic and synergetic content. For example, while studying natural science and social science the scholars obtain the real comprehension of the accidental natural phenomenons spreading, existing systems and the effects of self-organization.

The content of the outlined blocks creates the possibility for deeper study of different subject's material where the necessity of knowledge and logical, probabilistic-statistic, and synergetic skills implementation is commonly needed.

As the block's content integrates into the canvas of various school subjects it creates the conditions of complex solution for the problem of the formation of non-linear thinking model for scholars.

Thus, we can formulate the principle of **intersubjectivity** of the construction of three outlined blocks according to which the mutual integration of their content and other school subjects will happen. The content of these blocks should be actively used within the process of studying of different school subjects and the knowledge that scholars have obtained from those subjects must be drawn in while studying logistic, probabilistic-statistic and synergetic material.

Manu tutors draw their attention to the necessity of early and balanced work aimed for the formation of logical, probabilistic and statistic thinking for schoolchildren. The study of self-organization (synergetic) theory also requires preparation works. In that case we come to the principles of **complexness and duration,** that describe the necessity of the organization of the committed work aimed for studying the outlined block's content and the formation non-linear thinking style on different education levels.

It is purposeless to study the logic, stochastic, and self-organization theory elements only from the position of school material comprehension by scholars. This material has been specifically selected and adapted. It is important to help scholars to form a single interpretation of the world and realize the non-linearity and instability of the modern world, teach them to orient and act within the real situations. The abilities of the studied content lines are pretty high since provide us with tools of description and studying the object of the reality. For that the outlined block's content study orientation for the forming of skills and ideas that correspond to non-linear thinking style is highly needed. And so we have the principle of the **developing and personally-oriented** education model.

Within the process our problem solution we should also look into the implementation of the humanitarization and individualization principles according to which the pupil is put into the centre of education process, his personality and consideration of his peculiarities. Those principles imply the creation of the conditions for each scholar's abilities development and the creation of the conditions for his self-expression and self-determination.

The realization of the described principles of the three outlines content block (logistic, probabilistic-statistic and synergetic) construction must provide for the achievement of our goal: the formation of non-linear thinking style for scholars within the education process. The material of various school subjects is also involved in the work.

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ABOUT EINSTEIN'S MISTAKES IN APPREHENSION OF THE UNIVERSE DEVELOPMENT NATURE LAWS

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The article «About Einstein's mistakes in apprehension of the Universe development nature laws» reveal the necessity of the information meaningfulness that correct light speed in space and influence the energy power consideration in the physical laws. Information consideration in the explanation of the universe development natural laws will allow us to systematize and form the correlation between «Nothing» and «Something», define the formula of «Everything» and the «God Substance», scientifically explain the presence of information system and ultrathin and thin energy as a Higher mind. Further in this work a correction of the Einstein's formula is made which allows us to explain the correction of the light speed and the existence of the ephyra, string theory and parallel worlds.

Keywords: information, ultrathin and thin energy, «Nothing» and «Something», «God Substance» formula, «Everything», Universe development cyclicity law

Australian magazine «New Scientist» published an interesting information about Australian astrophysicist John Webb who discovered a fact that requires a revision of the modern astrophysics basics – Einstein's relativity theory [1]. Thus, A. Rykov wrote, that «much in the Einstein's theory and also modern theoretical astrophysics can be understood by a clear mind. Even Einstein pointed out that peculiarity of the modern astrophysics» [2].

J. Webb and his colleagues studied the light origin from the faraway galaxies through the space clouds that consist of metal solutions. Their research result led them to a conclusion that light speed is dependent on where in space a numeration takes place, in other words, the light speed is not a constant. This gives us a reason to decline the Einstein's theory and move on to the next research level, where physical laws have relative nature and alter in dependence on the studied object location in space and also to accept the existence of parallel worlds, basing on confirmation of the string world-creation theory [1].

These ideas are pre-defined by the existence of the Universe basics as an information and energy interaction and integration (I_e) and (E_i), as «in the beginning there were word and light», according to the sources of holy books [3, p. 111, 191; 4, p. 653]. Here we can outline, that modern scientists recognize energy as a basic component of the whole material world [2].

The recognition of information (I_e) and ultrathin and thin energy (E_i) as the Universe fundamental principle, in other words, «God Substance», puts away the question of the God denial. However, the God existence denial can be observed within astrophysics and mathematics.

S. Howking testifies: «Since the gravity law exists, the Universe can and will create nothing out of itself. …There is no necessity to call for God to fire the fuse and start everything» [5].

Further, the hypothesis of J.A. Poincare assumes that three-dimensional Universe sphere can be pulled into a single point by hypothetic «hypercord». It was confirmed by G. Perelman in his calculation and developed a hypothesis into a theorem. According to it in the scientific literature says, that G. Perelman and J.A. Poincare have upset supporters of the divine world creation origin [6].

All the discoveries described above are subjects of the material world, and ultrathin and thin world («Nothing») stays out of their research field. It is why the statements of God existence denial as a characteristic of the ordered information system and ultrathin and thin energy proves to be unfounded.

Here we would like to outline that even British astrophysicist James Maxwell in 1867 theoretically described energy receipt from information for the first time [6]. This idea was experimentally- proved by Tokyo University scientists in 2010 under the lead of Masaki Sano. In this experiment Japanese physicists for the first time achieved the inner system energy increase an basics of usage only the data of its condition, that was pointed out by the «Natural Physics» magazine, where, according to their calculations, the efficiency of the information into energy transformation equaled 28 % [7].

Considering this statement about the information transformation into energy we can correct the famous Einstein's formula:

$$E = mc^2 \qquad (1)$$

according to the information consideration. Then it will look as follows:

$$I_{em}E_i = e_{im}I_m \cdot c^2; \qquad (2)$$

$$E_{im} = e_{im}[k_i \cdot c^2], \quad (3)$$

where I_{em} is the energy and matter information; E_i is the information energy; E_{im} is information energy in matter; e_{im} is body mass information energy; I_m is body mass information; k_i is the light speed correction coefficient; c is the light speed.

In the second and the third formula the information presence can alter the light speed in dependence on the passage environment density and the studied object location in space. It is why the physical laws must have relative character that is testified by J. Webb and his colleagues.

Astrophysicists are in search for the God Substance that could allow us to explain numerous secrets of the Universe. From our point of view, the God substance could be explained in the following way:

$$G = I_e E_i, \quad (4)$$

where I_e is the information that discharges energy; E_i is an ultrathin and thin energy, that has been formed out and is coming from information and creates a new information flow.

Ultrathin and thin energy (*Chi*) later formed positive and negative energy types, such as Yin(+) and Yang(–) that conditioned the gravity, magnetic field, energy fractions, ephyra origin that predetermined the material world emerge in the traditional apprehension.

The Universe develops according to the general cyclicity law, where out of «Nothing» arises «Something» and then this «Something» comes back into the initial «Nothing» condition, while under «Nothing» a system of ordered information and ultrathin and thin information that have traits of the Higher mind is implied.

Further, out of the God Substance we can define the formula of «Everything» as follows:

$$G_A = \int_{-\infty}^{+\infty} I_e E_i, \quad (5)$$

where G_A is the total basics of everything that is in the Universe, $(+\infty, -\infty)$ are the development directions, $\int$ is the information function(I_e) and ultrathin and thin energy (E_i) integral.

About the Universe «awakening» modern scientist astrologists and astrophysicists, cosmologists point out that it starts with the bug blast of the information-energetic superdense sphere. Thus, the model of A. Freedman shows us that the Universal evolution can go two ways:

1) endless substance recession from the blast point;

2) a recession phase is replaced by the compression phase back to the collapse, when the Universe will transform back into a single point [8].

Further on, an alternative Universe development variant exists. In says that «the initial condition of the nowadays cycle was not the Freedman's singularity point, not the space egg waiting for the big blast, but homogenous and cold space – matter. At some moment it started to warm up…, forming galaxies, stars, and planets. As it reaches maximum, that warmup should be replaced by a cooldown that will lead to the «death» of the Universe, and then a new cycle will start…» [8].

Another hypothesis about the Universe as a hologram strengthen the position of the information including into the basics of its existence. Physicist David Bohm of London university was the first one to introduce such idea in 1980-ies. He came up with this idea after Alain Aspect had experimentally shown that elementary fractions can instantly exchange information on any distance. Moreover, D. Bohm supposes that if our world is a hologram, then every its part contains an information about the whole – the Universe [13]. In this direction scientist Craig Hogan from the USA represents the Universe as a sphere which surface is covered with little fractures of plank length, and each of them carries a piece of information in it – the bit, and everything that is inside is the hologram that they created [9].

Physicist according to «The physical vacuum theory» [10] came to a conclusion that «… the main concepts of the physical vacuum that take starts from Total «Nothing» and creates all the structure of informative and material worlds led to the confirmation of the Divine Origin» [11, p. 102-103]. V.V. Popova, L.V. Adrianova, E.A. Savelieva testify that God is outside informative-energetic system: «The God creates Total «Nothing» [11, p. 104;123]. They write: «The God is an absolute and single being that does not have any components» [11, p. 125]. But such saying does not only contradict the Bible and the Koran text, that say that «IN THE BEGINNING there was a Word; The Word was God; God is the Light», but also the logics of the system approach. God cannot be an empty concept without components and out of the world creation system. If one accepts an incorrect concept of the single world by the mentioned authors, there is a danger of falling into a total mysticism area.

Thus, in physical laws we should consider the information meaningfulness that corrects the light speed in space and influence the energy. Information consideration in the physical laws of the Universe creation explanation will allow us to systematize and establish the relation between «Nothing» and «Something», define the «Everything» and «God Substance»

formula as well as the basics of information system existence and ultrathin and thin energy as a Higher mind.

According to the mentioned above a display of a general development cyclicity law is discovered, when «Something» forms out of «Nothing» and then «Something» transforms back to «Nothing». And such alternation can be endless. It is why the cyclicity nature is in the permanent restoration into its initial condition of an ultrathin and thin world (ultrayhin and thin energy of the corresponding informative field) in the Universe development from the material forms and, on the contrary, to provide for the continuous process of the information field, ultrathin and thin and material world development and renewal.

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Short Reports

THE INFLUENCE OF THE EARTH'S MOVEMENT TO THE RESULTS OF THE TRACKING OF THE COSMIC FLYING APPARATUSES

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In the work there is substantiated the necessity of taking of into account the influence of Earth's movement on the facts, which are received while the surface observations of the trajectory of cosmic apparatuses (spacecraft, satellite). At the process of the tracking of the geostationary satellite there was revealed that even movement of the Earth influences the aberration of electromagnetic waves from the established at the satellite generator. The measuring of apparent abnormalities from the factual position of satellite, which were caused by this effect, allowed directly defining the parameters of movements of Earth and Solar system (speed, declination and direct ascent of the apex of the Sun). The trustworthiness of received extent is confirmed by their coincidence with known meanings from the observational astronomy.

As it's known, the trajectory of cosmic flying apparatuses is calculated by the methods of celestial mechanics with a very high degree of exactness. While the control of their behavior from the Earth there are practically always observed divergences with the calculation. The divergences between the measured position of satellite and calculated, which were caused by technical reasons, as, for example, drift while the calibration, are usually easily removed by technical corrections. Other divergences, which are connected with the conditions of spreading of the electromagnetic wave in the heterogeneous sphere, are also rather good studied and are taken into consideration. But there are observed anomalies, the essence of which is often can be unknown, and we should do rather artificial correction with the aim of removal of these divergences. One of the serious reasons of these anomalies can be the influence of the Earth's movement on the results of tracking of its satellite. Though at the observational astronomy there is long ago known such influence on the apparent position of stars (the phenomenon star aberration, opened Bradley [1]), it is still not taken into consideration while the observation of the artificial satellites. The enquiry id that the satellites belong to the system of coordinates of Earth, that means they evenly fly with it in a space. And in this situation, as it's considered, there is no such influence. This view point was formed over many years of unsuccessful experimental attempts to revel the movement of the Earth not by the astronomic observations, but with the help of carried out experiments on it (1818 Aragou, 1838 Babinet, 1859 Fizeau, 1865 Angstrom, 1881 Michelson, 1887 Michelson and Morley, 1887 Michelson, Morley, 1921–1925 Miller, 1926 Picar, Stael, 1955 Essen, 1959 Townes and Cedarholm, 1979 Brillet and Hall and many others). All in all in the 1904 year, H. Poincare in the work [2] made a suggestion that the impossibility to reveal the bsolute movement of the Earth presents the general law of nature. But while this he didn't except the possibility of disproof of it by future experiments. And at the conference in the Pasadena [3] H.A. Lorenzt categorically declared: «*So far there was question of first order effect only, i.e. of effects that would be proportional to the first power of the ratio between the velocity of the Earth and the speed of light. In almost all cases in which astronomers and physicist have tried to detect an influence of the Earth motion on optical and electromagnetic phenomena , only effects of this order of magnitude could have been observed. The fact that all these attempts have been fruitless led by and by to the conviction that the motion of the Earth can never produce the first order effect*.»

But not so long ago in the works [4–7] while the tracking of the behavior of the satellite at the geostationary orbit the even movement of Earth was experimentally revealed without attraction of astronomic observations of the stars. Here was scientifically proved, that even movement of Earth is revealed in the aberration of electromagnetic waves (effect of first order), which are spread from the source of radiation, which was fixed relatively the receiver and the Earth itself, and it allowed directly measuring the parameters of its movement.

The source was established at the geostationary satellite Intelsat704 (USSPACECOM Catalog №23461), and the receiver in the antenna of surface radio telescope (surface station TAT-01B in Kazan, Russia). In the situation when satellite is motionlessly «hung» above the Earth, the relative speed of source and receiver is equal to zero and their coordinates (geocentric length and width of satellite, geodesic coordinates of telescope) are still practically constant during the long time. Some real periodical shift of the satellite with an amplitude of deviation of the azimuth about 0,04° should been observed by the influence of light pressure during the twenty-four hours. But because of the influence of the aberration the antenna fixed not this factual position of the satellite (length and width), which is clearly calculated geometrically, but apparent one. As it was revealed at the experiment, these apparent coordinates change because of daily and yearly changes of the corners of aberration, which were caused by the movement of the Earth in an orbit, what caused supplementary change of measured by the surface station corners (azimuth and height). The dynamic of the behav-

ior of apparent position of the satellite is defined by temporal behavior of aberrational additions (Δξ и Δφ) to its real geocentric ξ and width φ. The dependence of this additions of the parameters of the Earth's movement for the private situation, when satellite is at the meridian of station and has zero inclination, was mathematically described in the works [4, 6]. Here we cite such correlations for the general case of unconditioned position of satellite

$$\begin{aligned}
\Delta\xi_{orb}(t) &= \beta_{orb}\sqrt{1-(\sin\varepsilon\cos\gamma)^2}\cos(\omega t+\Xi);\\
\Delta\xi_{apx}(t) &= -\beta_{apx}\cos\delta\cdot\sin(\omega t+\Xi+\gamma-\alpha_{apx});\\
\Delta\varphi_{orb}(\tau) &= \beta_{orb}\sin\varepsilon\cdot\cos\gamma\cdot\cos\varphi;\\
\Delta\varphi_{apx} &= \beta_{apx}\sin\delta\cdot\cos\varphi,
\end{aligned} \qquad (1)$$

where the difference between lengths of sputnik and telescopes $\Xi = \xi - \xi_{telescope}$; ω – corner frequency of Earth's rotation; t – solar local time of surface station (telescope); $\beta_{orb} = (V_{orb}/c)$; $\beta_{apx} = (V_{apx}/c)$; V_{orb} – speed of the orbital movement of Earth; V_{apx} – speed of the movement of the Solar system; c – speed of light; ε = 23,45° – corner of the inclination of Earth axis to the axis of ecliptic; γ = γτ – slowly changing during the year phase of the orbital movement of the Earth; τ – number of days from the beginning of new tropical year (00:00:00 GMT 23 of September); Ω = 2π/T, T = 365,2444 days – duration of the tropical year in our epoch; δ and α_{apx}, correspondingly, declination and direct ascent of the apex of the Sun.

These expressions (1) can be used while the transition from the geocentric equatorial system of coordinates, which is connected with the meridian of telescope, into any other, in which there are measured their defined corners. In the works [4–7] there were measured azimuth and the corner of height of sputnik in the horizontal system of coordinates and was showed in detail as aberrational additions (1) change the behavior of azimuth and height of geostationary sputnik while the preservation of its factual coordinates. The main difference between the experiment and calculation without taking into consideration of aberration prediction in all these observations was the presence of the displacement of the experimental sinusoid of azimuth by the phase because of aberration to the corner ϑ into the sphere of more late times. The reason of this displacement, as it was established [4], consists in addition of two periodical processes of the similar frequency: real displacement of the sputnik under the influence of the light's pressure and apparent because of aberration. These two processes in such situation are always moved by the phase to the 90°, because vector of pressure of solar stream is directed by the radius of the Earth's orbit, and vector of orbital speed of Earth by the tangent to it. As it was shown in [4, 6] the measured in the experiment amplitude α_{obs} and displacement of the phase ϑ for the sinusoid of azimuth are connected with the parameters of movement of Earth and Sun. In the general case this correlation has a view

$$\alpha_{obs}\sin\vartheta = q_1\left[\beta_{orb}\cos\Xi\left(\sqrt{1-(\sin\varepsilon\cos\gamma)^2}\right)+p\sin(\gamma+\Xi-\alpha_{apx})\right], \qquad (2)$$

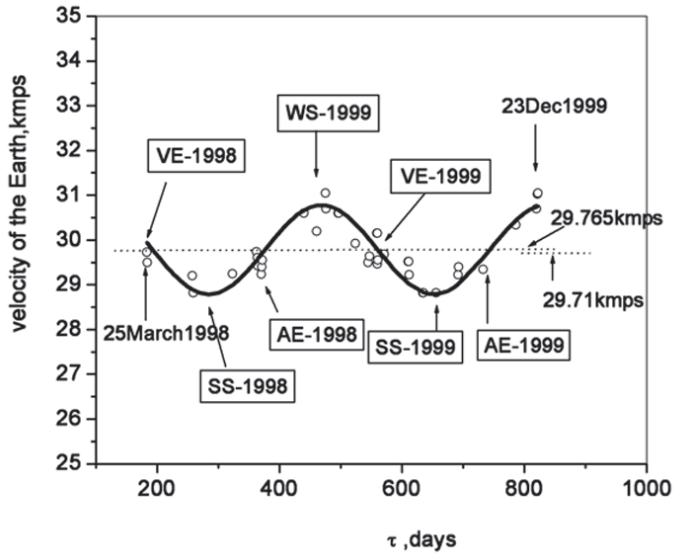
where $q_1 = \dfrac{\sin\Phi-\cos\Xi\cdot\mathrm{tg}\varphi\cdot\cos\Phi}{(\cos\Xi\cdot\sin\Phi-\mathrm{tg}\varphi\cdot\cos\Phi)^2+\sin^2\Xi}$;

Φ – geodesic width of telescope), and $p = \beta_{apx}\cos\delta$.

While the use of experimental meanings α_{obs} and ϑ, which were measured three different times, from the decision (2) were defined β_{obs}, α_{apx} and p, and all in all the speed of movement of Earth and the parameters of the Solar system's movement. In the picture there is presented seasonal dynamic of carrying out the orbital speed of Earth, which was measured by this method.

As we in the graphs, the behavior of its values is similar to the behavior from the observational astronomy. Firstly, their averaged for the year values (29,71 kmps and 29,765 kmps, correspondingly) practically coincide. On the other hand their values in winter (the Earth is in perihelion) are a little above the average, and in the summer (the Earth is in aphelion), are correspondingly lower. Thereby, here takes a place the full aberration ($\beta_{orb} = 10^{-4}$ rad), that means such as for stars (20,5″). Received in the experiment direct ascent of the sun's apex α_{apx} was equal to 270°. This value with the high precision coincides with the hour angle of the sun's apex, which was accepted at the astronomy 18^h59^{min}, that means 269,75°. Received in [4] values of the declination of the sun's apex (89,5°), and also the speeds of absolute movement of Solar system (600 km/s) are also rather well conformed to known. Practically clear coincidence of results with the facts from the observational astronomy confirms their trustworthiness. Thereby while the tracking of the trajectory of satellites it's perfectly necessary to take into consideration the influence of the movement of Earth to the results of observation. It becomes especially important while the moving of flying cosmic apparatuses to the big distances, when the apparent abnormalities from the factual position could be rather considerable. Possibly, for example, that the nature of

still unexplained mysterious «anomaly of Pioneer», which declined the course of apparatus Pioneer10 to the hundreds of thousands kilometers from the calculation while its going out of the orbit of the last planet of Solar system, can be explained by this aberration. While the angle (20,5″) and such distances of just this order there should take place the apparent abnormality. While such explanation there is no place for the influence of inexplicable strength, and for the presence of the mistakes in the development of transmitter. The division of factual and apparent divergences is especially important in the GPS navigation, where high precision is reached by big number of corrections, for the receiving of the experimental facts of which there are working numerous stations of tracking all over the world.



Seasonal behavior of the orbital velocity of the Earth during the period March 1998 – December 1999. Open-this experiment (averaged 29,71 km/s); solid-astronomical observations (averaged 29,77 km/s)
τ – amount of days from start of 1997 tropical year (00:00:00 GMT September, 23, 1997),
VE – vernal equinox, SS – summer solstice, WS – winter solstice, AE – autumnal equinox

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PROSPECTS FOR THE USE OF MULTIPHASE PHASE-POLE-CONTROLLED AC INVERTER DRIVES IN TRACTION SYSTEMS

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The use of the multiphase (i.e. having a number of phases more than four) systems «inverter – induction motor», in which the frequency control principle and phase-pole control method are used together, allows to improve considerably a number of technical-and-economic characteristics of the traction systems of transportation facilities: in this case the drive system can have decreased mass-and-overall dimensions and manufacturing cost as well as improved reliability in comparison with DC and 3-phase AC drives.

Keywords: multiphase, induction motor, 3-phase AC drives

The results of the investigation made by the authors of this paper allow making a conclusion about the following: the use of the multiphase (i.e. having the number of phases more than four) systems «inverter – induction motor» in the traction drives of transportation facilities allows to improve considerably a number of the technical-and-economic characteristics of these traction systems. The use of these multiphase drives is most effective if the classical frequency control principle and phase-pole control method (PPM) [l-4] are used together in them.

Expansion of AC drive control field

The phase-pole method of a multiphase inverter control bases upon the following principle: if the electrical angles between the voltages (or currents) of the nearest phases of an inverter are increased by a factor of some whole number (without any change in the inverter voltage frequency), a set of the induction motor mechanical characteristics can be obtained (Fig. 1). These characteristics differ in the synchronous speed and maximal torque values. Such effect can be obtained only if the phase number «*m*» (i.e. the number of phases) equals certain values that are more than four [2, 3].

The use of this mode together with the frequency control principle in the multiphase systems produces the effect that could not be obtained in the analogous 3-phase systems: that allows a few times increase of the motor maximal torque over all range of the rotation speed regulation without any change in the saturation extent of the motor magnetic circuit. The control fields (i.e. the fields completed by motor mechanical characteristics that can be obtained in a drive system without any change in the motor magnetic circuit saturation extent) of the 30 kW power system «inverter – induction motor», in which the classical frequency control principle is used (field 1), and of the 12-phase similar system, in which the frequency control method and PPM are used together (field 2), are shown in Fig. 2.

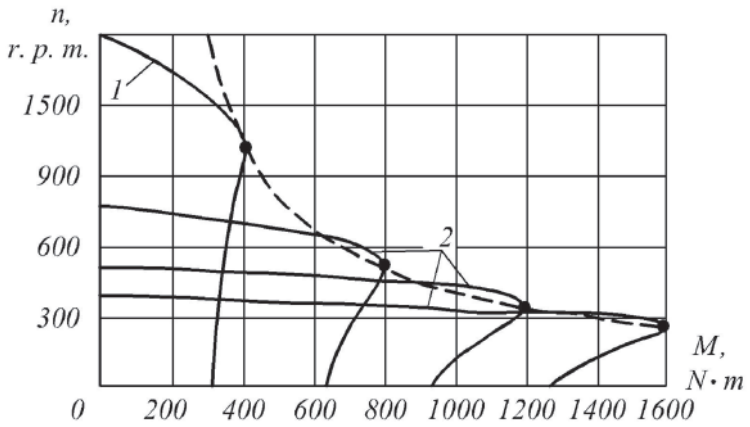

Fig. 1. Mechanical characteristics of a 30 kW power 12-phase induction motor, where the line 1 is natural characteristic, line 2 is the characteristic when PPM is only used (without frequency control), *n* is speed of rotation, and M is motor torque

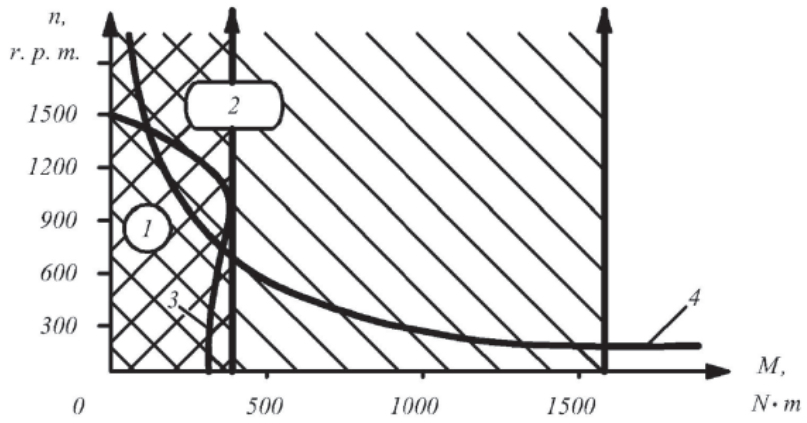

Fig. 2. Control fields of the system «inverter – induction motor», where the field 1is for the classical frequency control, field 2 is for the combined use of PPM and frequency control, line 3 is the natural mechanical characteristic of the induction motor, and line 4 is nonlinear-falling mechanical characteristic of the drive system load mechanism

Improvement of technical-and-economic characteristics

From this it follows, among other things, that forming nonlinear-falling mechanical characteristics of a drive system (line 4 in Fig. 2), that is necessary in the traction drives, the use of the multiphase PPM-and-frequency-controlled systems allows (in comparison with the case when the analogous 3-phase system is used):

1) without any change in the saturation extent of the motor magnetic circuit:

– to use the motors having less mass-and-overall dimensions (for example, less by about 40 % if m = 12) and less manufacturing cost for the obtaining of the same torque value; or

– to achieve considerable increase (for example, the 3,5–3,8 times rise if m = 12) of the maximal torque of the motor having the same mass-and-overall dimensions;

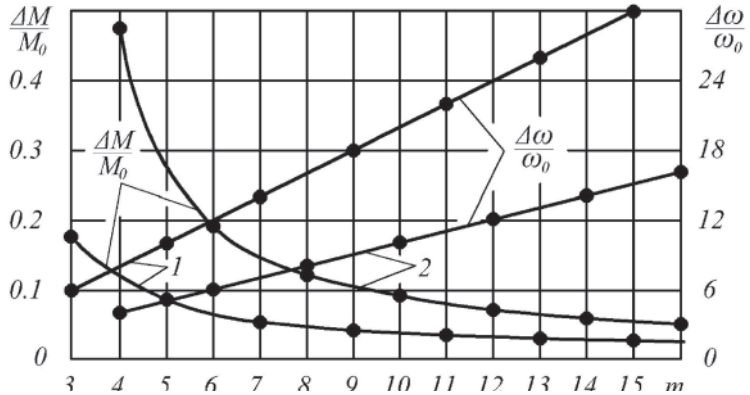

Fig. 3. m-dependences of torque swing (ΔM) and frequency ($\Delta\omega$) of torque and inverter input current oscillations for the case when the classical 180-degree algorithm of inverter control is used, where the line 1 is for odd m, line 2 is for even m, M_0 is the torque constant component, and ω_0 is the inverter output voltage frequency

2) to improve the drive reliability parameters as the time of trouble-free (non-stop) operation of the system can be prolonged if the system operation condition changes into some abnormal one (for example, if a motor phase winding was broken). This can be obtained owing to the combined use of PPM and some other special algorithms of multiphase inverters control.

Besides, the results of the investigations [1, 2] show that even if the classical 180-degree algorithm of inverter control is used, the increase of the induction motor drive phase number leads to the following:

– decrease of the amplitude and increase of the frequency of the oscillations of the motor torque and inverter input circuit current (Fig. 3 and Fig. 4). That allows to expand the rotor speed regulation range down from the nominal speed value (for example, by about 100 % if the phase number rises from 3 to 9) and to decrease the mass-and-overall dimensions of the filter in the inverter input circuit (for example, about 2,5–3,0 times decrease if the phase number rises from 3 to 9);

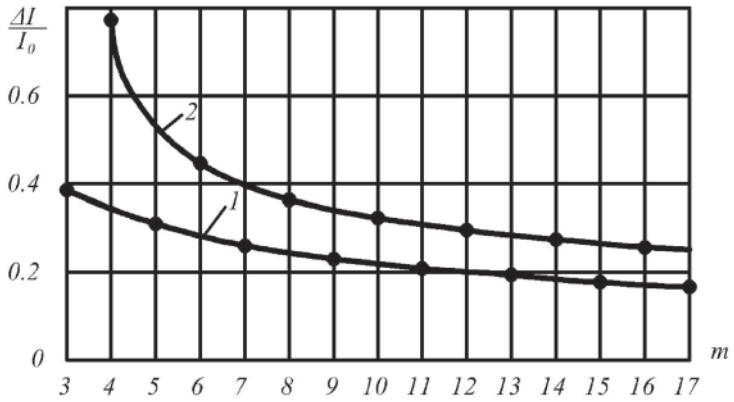

Fig. 4. *m*-dependences of inverter input current swing (ΔI) for the case when the classical 180-degree algorithm of inverter control is used, where the line 1 is for odd *m*, line 2 is for even *m*, and I_0 is the inverter input current constant component

– decrease of the electrical losses in the rotor circuit (for example, by 30–40 % if the phase number rises from 3 to 9).

Conclusion

The use of the multiphase «inverter – induction motor», in which the classical frequency control principle and phase-pole control method are used together, will allow improving considerably a number of technical-and-economic characteristics of the traction systems of transportation facilities.

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Materials of Conferences

FUNCTIONAL ACTIVITY OF DUNALIELLA CELLS UNDER COMBINED LOW-TEMPERATURE AND UV IMPACT

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This work presents the results of photosynthetic oxygen discharge by control cells and cell that have been grown up by insufflation of air mixture into photo-reactors under hardening temperature (5°C) and exposed to further influence of low positive temperatures and various doses of UV-light. It is defined, that cells, that have been grown up in intensive culture under hardening temperature show high functional steadiness to further low-temperature and varios doses of UV-light impact. The resume has been done, that this steadiness of seaweed is related to intercellular metabolism and conjugated stability.

Plants reaction to low-temperature stress consists in various alterations of metabolic and physiological processes that are supposed to adapt vegetative organism to changing conditions. Vegetative cell possesses a powerful protective system to oxidation stress that is developed within the cells of heat-loving plants under the impact of low positive temperatures[4, 6]. Low-temperature stress leads to alterations in number of protective ferments and their activity, as well as non-enzymatic elements, such as carotenoids, flavonoids, α-tocopherol, ascorbate, etc.[5] Accumulation of anti-oxidants can be labeled as a display of general non-specific protective reaction of cell to low-temperature stress [4-6].

It is also known, that plants survival in unfavourable conditions is directile linked to their adaptive abilities. Facts are known while vegetative organism adapts to one factor obtains steadiness to another one. Along with that conjugated quality can turn out to be quite distant from the initial adaptive reaction. The study of conjugated steadiness are carried out with different sets of stress factor couples [2] and obtained data is sometimes discrepant.

The goal of this work is to study photosynthetic activity of control cells that have been grown up under low hardening temperatures (5°C) and exposed to further impact of low positive temperatures and various doses of UV-light in order to define the steadiness limits of Dunaliella seaweed population.

Methods and materials

Green single-cellular seaweed Dunaliella salina IPPAS D-294 that has been discharged out of salted Apsheron lakes and registered as a culture served as an object of our research. The weeds were grown under the temperature 27 °C in glass photo-reactors of 250 ml at the single-cellular weed cultures growth facility. The mineral environment contained (g/l): NaCI – 87,5; KNO_3 – 5,0; KH_2PO_4 – 1,25; $MgSO_4$ – 50; $FeSO_4$ – 0,009 and also a solution of micro-elements, 1ml/l. Suspension of cells in photo-reactors was lightened up with white light (16 Vt/m^2) all the time and continuously blown by the mixture (oxygen + 1,5 CO_2) under temperature 27 °C for control and 5 °C – for experimental suspensions. The source of UV-light was a mercury lamp of high pressure.

The rate of culture growth was defined by periodic calculation of the cells number in Goryaev chamber with a microscope or in a non-felometric way and by the alteration of suspension optical density.

The speed of oxygen discharge by cells was defined on polarographic facility with the implementation of platinum Clark electrode while lightening suspension in thermostabilised cell (40 °C) with white light of satiating intensity (100 Vt/m^2).

Results and discussions

Growing up cells in intensive culture with giving air mixture of temperature 5 °C (temperature of hardening) into experimental photoreactors led to the decrease in bio-productivity of 5-10 %. However, hardened suspensions were characterized by higher indexes of functional activity under the further stressors impact in comparison with the control cells.

Figure 1 provides us with the indexes of photosynthetic oxygen discharge by control (curve 1) and experimental cells, that were grown up under hardening temperature of 5 °C from the duration of further low positive (10 °C) temperature impact. As it is seen from the picture, control suspensions that were exposed to further impact of low positive temperature of 10 °C for 30 minutes decreased their photosynthetic oxygen discharge by up to 80 %. After two hours of low-temperature processing functional cells activity decreases significantly and equals 34 % (curve 1). Experimental cells were also exposed to further low-temperature (10 °C) impact. Functional activity of cells suspension after 30 minutes of incubation under the temperature of 10 °C equaled 90 %, and after 60 minutes of impact – decreased down to 74 %.The level of experimental cells functional activity stayed the same under the further period of low-temperature processing increase (curve 2).

Figure 2 shows us the results of the dependence of photosynthetic oxygen discharge by control cells (curve 1) and those that were grown up under the hardening temperature of 5 °C on further low positive temperature impact duration (5°C). Thus, after 30 minutes of low positive temperature impact photosynthetic oxygen discharge of the control cells decreased down to 75 %. As the duration period increased, the steadiness of the suspension functional activity decreased and after two hours it equaled

22 %. Experimental cells that were grown up under the conditions of cold hardening were also exposed to low-temperature impact (curve 2). As shown by the picture, experimental cells that were grown up in intensive culture with giving air mixture of temperature of 5 °C into the photoreactors show high steadiness to further low positive temperature (5 °C) impact. Thus, after 30 minutes of cold impact photosynthetic oxygen discharge equaled about 80-85 %, and after 60 minutes of incubation – 70 %. An increase in further cold impact duration did not decrease the functional activity of the cells.

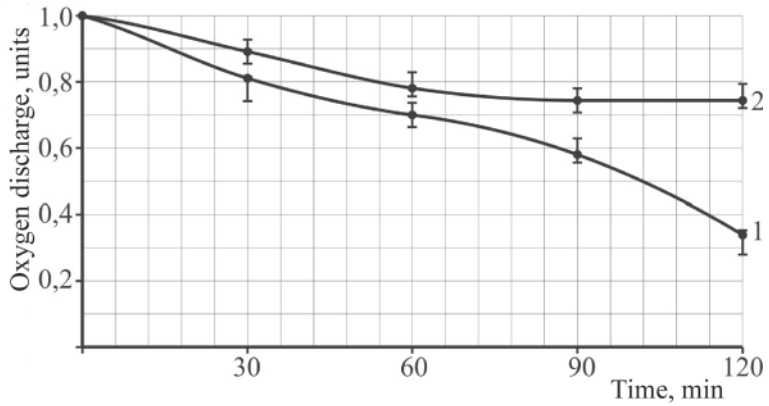

Fig. 1. Steadiness of photosynthetic activity of control cells(1) and those that were grown up under the hardening tempera-ture(5 °C) (2) in dependence on further low-temperature (10 °C) impact duration

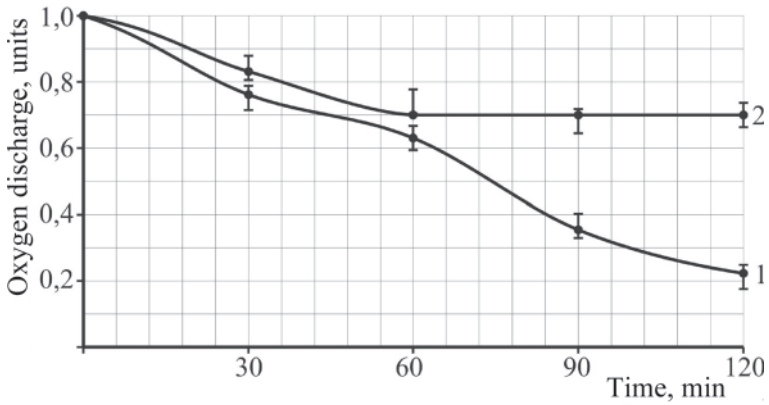

Fig. 2. Steadiness of photosynthetic activity of control cells(1) and those that were grown up under the hardening temperature(5 °C) (2) in dependence on further low-temperature (5 °C) impact duration

So, low further temperatures of 10 and 5 °C cause significant decrease in photosynthetic activity of the control cells trough all the 2-hour impact period down to 34 and 22 % correspondingly. Experimental suspensions that were grown up under the hardening temperature of 5 °C in intensive culture, show high steadiness to further impact of low positive temperatures of 10 and 5 °C. Evident stability of 74 and 70 % of the experimental cells stays the same during all the two-hours impact duration and is described by a stable plateau.

Research on how various doses of UV-light influence functional activity of control and experimental cells suspension was carried out as well.

Figure 3 shows us the dependence of photosynthetic oxygen discharge by control cells (curve 1) and cells, that have been grown up under low hardening temperature of 5 °C (curve 2).

As picture shows, under optimum temperature(40 °C) in polarographic cell control cells show high photosynthetic activity potential. Irradiation of control cells by acute doses of UV-light in various duration period showed that its dose-effect curve has more dramatic decrease that that of the experimental cells. Thus, under the irradiation dose of 10 seconds photosynthetic oxygen discharge equaled 80 %. Under these conditions steadiness of experimental cells functional activ-

ity was 90 %. As the dose of UV-light irradiation increased, the difference between functional activity of control and experimental cells equaled 20–25 %. Probably, hardening temperature of 5 °C increases the activity of anti-oxidant protective system and also increases cells resistance to acute doses of UV-light. Similar results were obtained by us earlier [1], when an increase in population resistance to chronic UV-light doses while growing up seaweed in intensive culture with giving hardening air mixture of 15, 10, and 5 °C into photoreactors.

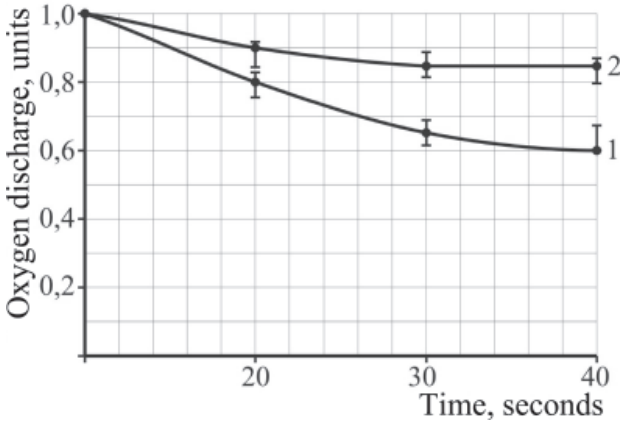

Fig. 3. Steadiness of photosynthetic activity of control cells(1) and those that were grown up under the hardening tempera-ture(5 °C) (2) in dependence on further UV-light impact duration

Most interesting, from our point of view, are the results obtained under the consecutive impact of two stress factors (low-temperature and UV-light) on photosynthetic oxygen discharge by seaweed suspension.

Figure 4 shows us the results of various acute UV-light doses irradiation (curve 1) and both low-temperature (5 °C) processing and various acute UV-light doses irradiation (curve 2) impact on photosynthetic oxygen discharge by cells. As it is seen from the picture, after 20–40 minutes of UV-light impact a decrease in photosynthetic activity equals 80–70 %, and preliminary low-temperature processing (30 minutes) significantly strengthen negative effect of UV-light (60–55 %). Obtained data testifies that consecutive impact of low temperature and UV-light significantly undermine functional cells activity.

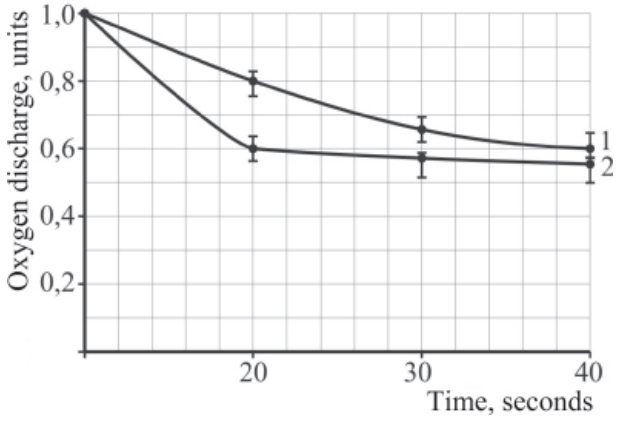

Fig. 4. Steadiness of photosynthetic activity of irradiated bu UV-light control cells(1) and those that were processed (30 minutes) under low temperature (5 °C) and UV-light

Thus, we can conclude that while growing up seaweed in intensive culture and hardening temperature a steadiness to both high doses of UV-light and further low temperature impact is developed within it. This data can be interpreted in accordance with the theory of «conjugated steadiness» [2]. Seaweed

that were grown up under the control conditions and exposed to consecutive impact of low positive temperature and UV-impact show a significant decrease in their functional activity.

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INFLUENCE OF SURFACE MODIFICATION OF ORTOPEDIC IMPLANTS BY NANOCOMPOSITE CARBON NITRIDE ON THEIR PROPERTIES

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The research task of this work was to study in vivo the effect of porous titanium surface modification by nanocomposite carbon nitride films on osteointegration properties of implants.

Materials and methods

Porous titanium implants with porosity θ = 40 % were made from granules of titanium sponge. The system of randomly distributed interconnected pores includes microscale pores of 2–5 μm and macrochannels (100–400) μm. The proportion of pores communicating to the surface accounted for ~75 % of the total number of pores. Diamond-like carbon nitride film (20–50) nm thick was deposited by the method of pulsed arc sputtering of graphite in nitrogen atmosphere. Porous titanium (PTi) and porous titanium with $CN_{0,25}$ film (PTi($CN_{0,25}$)) implants were saturated by the adherent fraction of autologous bone marrow extracted from the wing of iliac bone. The experiment was performed on 18 adult White giant rabbits of herd breeding, weighing 4–5 kg. The implants were implanted in rabbit right tibia and femoral condyles. Histological examination of bone tissue formed inside of porous was performed after removing titanium matrix in a solution of hydrofluoric acid and ethylene glycol. Mechanical testing of neogenic bone tissue (tensile strength) was performed on a universal testing machine FP 100/1 by original method. The designed method enables to determine the integral strength of neogenic bone tissue on the implant – host bone interface. Relative tensile strength (σ_{rel}) was determined as the ratio (σ_{NBT}/σ_{NB}), where σ_{NBT} was ultimate tensile strength of neogenic bone tissue and σ_{NB} – ultimate tensile strength of the native compact bone.

Results

According to histological studies, at 4 weeks after surgery the bone tissue of different maturity degrees takes about 30 % of the cross-sectional implants surface, therefore, all the pores interconnected with implant surface are filled completely with bone tissue. Histological reaction around foreign body (presence of multinucleated giant cells, osteoclastic resorption near the implant) was not found. Implant pores are filled with bone tissue due to both ingrowth mature bone trabecules from site of parent bed and through formation of the young bone tissue out of osteogenous progenitor cells.

At 16 weeks in the implants pores there formed the more mature bone structures. In center of implants the areas with immature bone tissue are still remaining. On the implant periphery it can be noticed integration of parent bed bone tissue and newly formed bone trabecules. Analysis of specimens in 52 weeks showed absence of fibrous capsule, no giant cell reaction. In the implantation site of PTi the mineralized bone structures are saved. In the peripheral areas there are signs of reconstruction bone tissue with hardening effects which are expressed more intensely than in PTi ($CN_{0,25}$). In place of introduction PTi ($CN_{0,25}$) the cortical plate is restored. Bone tissue integrates 1/3 implant diameter. Central bone tissue is thickened. The results of examination of neogenic bone tissue quality are shown on Fig. 1. Modification of porous titanium by $CN_{0.25}$ films improve quality of bone tissue which formed in the pores of implants.

The results of neogenic bone tissue tensile strength evaluation are presented in Fig. 2. As seen from Fig. 2, the bonding strength of the implant with the host bone is quite high after 4 weeks already. Relative tensile strength (σ_{rel}) of PTi($CN_{0.25}$) is higher than PTi implants. In 16 weeks the average strength of a neogenic tissue in the implant – host bone interface increased in a row: σ_{rel}(PTi) < σ_{rel} (PTi ($CN_{0,25}$)). At 52 weeks all implants showed the ultimate tensile strength values close to those of the contralateral limb compact bone. In two cases the failure occurred not at the interface of implant-host

bone, but in the native bone area, that suggested a solid bone tissue formation at bed-implant interface.

Resume

In vivo study the implants made of porous titanium and porous titanium with $CN_{0.25}$ films, showed that all implants are biocompatible. It was no case of the implant rejection. Osteogenesis begins with ingrowth of bone trabecules from the parent bed and forming new bone tissue from osteogenic cell progenitors, cultured in vitro. With extension of implantation time the reconstruction of the young bone tissue in the more mature structure leads to their integration with tissue from the periphery of implant. This process is the most active in the porous titanium modified by nanocomposite amorphous carbon nitride films obtained by vacuum pulsed arc sputtering of graphite target in presence of nitrogen.

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Short Reports

ECOLOGICAL OPTIMIZATION OF POLYMER FORMATION INHIBITOR PRODUCTION BIOTECHNOLOGICAL PROCESS

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Today the industry is undergoing a qualitative updating of technological through biotechnologies, energy and resource conservations, ecological and economic requirements. The global biotechnological boom has transformed biotechnology from ordinary branch into the leading factor of economic development. Biotechnology possibilities are unusually large, its methods are more advantageous than usual: they are used under optimum conditions (temperature and pressure), more productive, they are ecologically pure and they do not demand the chemical reagents poisoning the environment. It is based on proceeding in living systems physiological and biochemical processes, resulting in the energy release, metabolism products decomposition and synthesis, formation of chemical and structural cell components.

Besides, fundamental researches in the field of modern biotechnology – genetic and cell engineering – have allowed to create a scientific reserve and to give an impulse to applied working out set.

We have developed a simple and ecologically pure biotechnological method for tert-butylpyrocatehin producing. Tert-butylpyrocatehin is an effective inhibitor for polymer formation reducing at processing of pyrolysis liquid products, and it is actively used in polymer production. All known existing ways for tert-butylpyrocatehin obtaining are carried out on difficult technology in some stages.

The presented way of producing tert-butylpyrocatehin is based on tert-butylphenol application with bacterium using of *Pseudomonas* or *Bacillus* genera (tert-butylphenol is used to obtain pitches, varnishes, enamels, in the production of phenol-containing additives to oils and fuels in the petrochemical industry). Mineral medium consisting of $NaNO_3$, $KHPO_4$, $NH_4(SO_4)_2$, $CaHPO_4$, distilled water was used for microorganism cultivation. The medium was sterilized at 110^0C for 30 min. As a source of carbon and energy microorganisms was used tert-butylphenol, transforming it into tert-butylpyrocatehin.

The method with application of *Bacillus* genera allows achieving the highest results (94– 96%) in 20 hours at temperature 30 °C, tert-butylphenol is almost completely oxidized in tert-butylpyrocatehin in compared with *Pseudomonas*.

Materials of Conferences

REACTIONS OF 3-ARYLMETHYLIDENE-3H-PYRROL-2-ONES WITH 2-MERCAPTOBENZYMIDAZOLE

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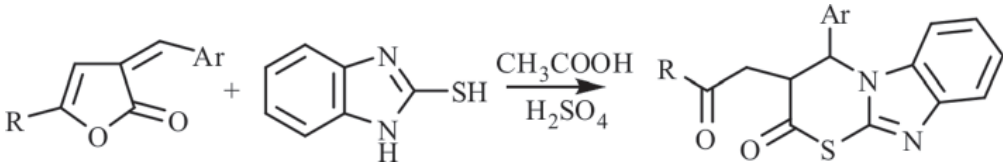
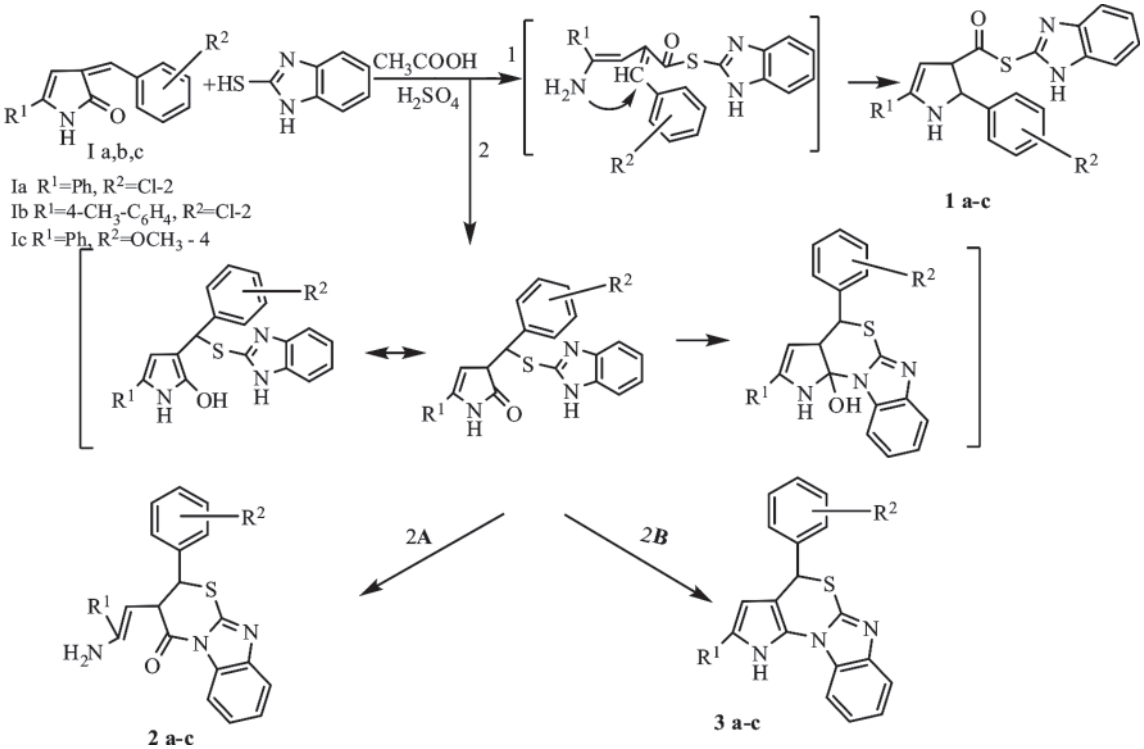
Interest to the arylmethylidene derivatives of 3H-pyrrol-2-ones is due to a wide spectrum of their useful properties, many of which find application in medicine, industry, and agriculture, their analogues are parts of alkaloids and drugs. Of special interest is modification of the pyrrolonic cycle under the action of nucleophilic reagents. We studied the reaction of 3-arylmethylidene-3H-furan-2-ones with binucleophilic – 2-mercaptobenzymidazole. The interaction under study can proceed by several reaction centers, which enables the substrate's structure to be modified by means of regioselective chemical transformations.

5-R-3-arylmethylidene-3H-furan-2-ones are known to react with 2-mercaptobenzymidazole at heating, in a solution of icy acetic acid, in the presence of catalytic amounts of concentrated sulfuric acid and do not interact at boiling in an ethanol solution, in the presence of catalytic amounts of triethylamine (potassium carbonate, sodium alcoholate) [1].



We studied the interaction of 5-R-3-(2-chlorobenzylidene)-3H-pyrrol-2-ones **Ia,b** and 5-phenyl-3-(4-methoxybenzylidene)-3H-pyrrol-2-one **Ic** with 2-mercaptobenzymidazole at heating during 30 hours in a solution of icy acetic acid and catalytic amounts of sulfuric acid. In the structure of the arylmethylidene derivatives of pyrrol-2-ones there are several reaction centers liable to nucleophilic attack, namely, an exocyclic double C-C bond, a carbonylic group, labile bonds in the cycle (C-N and C-H); besides, the presence of a second nucleophilic center in the reagent promotes its attack by the carbonylic carbon atom and closing the corresponding five-membered or six-membered cycles.



The data of elementary analysis and spectral characteristics, in combination with quantum mechanical computations, suggest the compounds formed to be 3-(2-amino-2-R^1-vinyl)-2-R^2-2H-benzo[4,5]imidazo[2,1-b][1,3]thiazine-4(3H)-ones **2a-c**, whilst the possibility of forming products **1a-c** and **3a-c** is excluded.

Reaction products **2a-c** were isolated with a yield up to 73 %. The IR spectra of compounds **2a-c** have the absorption bands of a carbonylic group

1698-1707 cm^{-1}, NH_2 3183–3201, 3426–3520 cm^{-1}, vibrations of aromatic rings 1600–1620 cm^{-1}. In the ^1H NMR spectra of compounds **2a-c** we note the signals of a vinyl proton within 5,68–5,71 ppm, the signals of the protons at tertiary carbon atoms within 5,72–5,74 and 6,82–6,92 ppm, the signal of a NH2 group's protons at 9,97–9,99 ppm, the multiplet of aromatic rings within 7,17–7,69 ppm, the signal of the methyl group protons of an aromatic substituent (for compound **2b**) around 2,35 ppm, and that of a methoxylic group (for compound **2c**) at 3,82 ppm.

We also tried to implement reaction of 5-R^1-3-R^2-3H-pyrrol-2-ones with 2-mercaptobenzymidazole under microwave radiation. Only the source compounds were detected in the reaction mixture, which means this reaction not proceeding under microwave radiation.

Experimental

IR spectra were recorded on an FSM-1201 Fourier spectrometer in KBr tablets, the spectral range being 400–4000 cm^{-1}. ^1H NMR spectra were obtained on a Varian-400 spectrometer within 20–25 °C in $CDCl_3$, TMS being the internal reference. The working frequency was 400 MHz.

3-(2-amino-2-R1-vinyl)-2-R2-2H-benzo[4,5]imidazo[2,1-b][1,3]thiazine-4(3H)-ones (2a-c). A mixture of 5-R-3-arylmethylidene-3H-furan-2-one (Ia, b, c) (0,01 mol) and 2-mercaptobenzymidazole (0,015 mol) was boiled in icy acetic acid with a catalytic amount of sulfuric acid during 30 hours, poured into cold water, and neutralized by a sodium carbonate solution. The crystals precipitated were filtered on a Schott filter and recrystallized from ethanol.

For **2a**: yield 73%; mp 263–265 °C; ^1H NMR, δ: 5,70–5,71 (1H, d), 5,72–5,73 (1H,d), 6,86–6,90 (1H, t), 9,97 (2H, NH_2), 7,19–7,66 (13H, m, Ar). Found (%) C, 66,74; H, 3,94; N, 6,69; S, 7,65. Calc. for $C_{24}H_{18}N_3SOCl$ (%) C, 66,74; H, 4,17; N, 7,73; S, 7,42.

For **2b**: yield 71%; mp 249–251 °C; ^1H NMR, δ: 5,70–5,71 (1H, d), 5,73–5,74 (1H,d), 6,89–6,92 (1H, t), 9,97 (2H, NH_2), 7,17–7,63 (13H, m, Ar), 2,23 (3H, s). Found (%) C, 67,92; H, 4,60; N, 4,05; S, 7,50 Calc. for $C_{25}H_{20}N_3SOCl$ (%) C, 67,33; H, 4,52; N, 9,42; S, 7,19

For **2c**: yield 68%; mp 141–142 °C; ^1H NMR, δ: 5,68–5,69 (1H, d), 5,72–5,73 (1H,d), 6,82–6,86 (1H, t), 9,99 (2H, NH_2), 7,20–7,69 (13H, m, Ar), 3,82 (3H, s). Found (%) C, 68,75; H, 4,33; N, 8,10; S, 7,44. Calc. for $C_{25}H_{21}O_2N_3S$ (%) C, 69,40; H, 4,95; N, 9,83; S, 7,50.

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FUNDAMENTALS OF CHEMOMETRICS IN DIFFERENT BRANCHES OF CHEMICAL SCIENCE

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The article shows the possibility of applying the method of multilevel modeling in evaluating the physical and chemical variables.

In Nature, as well as in the natural sciences, everything is interconnected. This regular occurrence is usually not seen, if we bear in mind two functional parameters. But multiparameter functional relationship is observed when we apply not less than three characteristics to the sought-for parameter [1, 2, 3].

In the study of the method of multilevel modeling (MMLM), which permits to carry out mathematical modeling of certain chemical processes in different environments, and also to estimate absent (scarce) characteristics in physical-chemical methods of analysis, let's limit with the assumption that regression is linear and is determined by the following dependence:

$$Y = a + b_1X_1 + b_2X_2 + ... + b_nX_n. \quad (1)$$

If we accept that a number of arguments is equal to two, then in terms of geometry, this equation defines the plane in the space of variables X_1, X_2 and Y.

To determine parameters a, b_1, ... b_n in equation (1) let's apply the method of least squares. After differentiation according to the variable parameters this method leads to the system:

$$\Sigma y = na + b_1\Sigma X_1 + ... + b_n\Sigma X_n; \quad (2\text{-a})$$

$$\Sigma yX_1 = a\Sigma X_1 + b_1\Sigma X_1^2 + ... + b_n\Sigma X_1X_2...X_n; (2\text{-b})$$

. . . . . .

$$\Sigma yX_n = a\Sigma X_n + b_1\Sigma X_1X_2 + ... + b_n\Sigma X_n^2. (2\text{-c})$$

To solve this system we divide equation (2-a) to n, then we obtain:

$$a = y_{av} - b_1X_{1(av)} - b_2X_{2(av)} - ... - b_nX_{n(av)}.$$

Substituting this value for a in formula (1) and equation (2-b) and (2-c), we find out that the formula MMLM with n variables has the following form:

$$Y\text{-}y_{av} = b_1(X_1\text{-}X_{1(av)}) + b_2(X_2 - X_{2(av)}) + ... + b_n(X_n - X_{n(av)}), \quad (3)$$

the coefficients b_1, b_2, ..., b_n are found from the following system of linear equations:

$$b_1\Sigma x_1^2 + b_2\Sigma x_1x_2 + ... + b_n\Sigma x_1x_n = \Sigma x_1y_1;$$

$$b_1\Sigma x_1x_2 + b_2\Sigma x_2^2 + ... + b_n\Sigma x_2x_n = \Sigma x_2y_2;$$

. . . . . .

$$b_1\Sigma x_1x_n + b_2\Sigma x_2x_n + ... + b_n\Sigma x_n^2 = \Sigma x_ny_n,$$

where the following conventional signs are adopted:

$$\Sigma x_1^2 = \Sigma(X_1 - X_{1(av)});$$
$$\Sigma x_1 x_2 = \Sigma(X_1 - X_{1(av)})(X_2 - X_{2(av)});$$
$$\Sigma x_1 x_n = \Sigma(X_1 - X_{1(av)})(X_n - X_{n(av)});$$
$$\Sigma x_1 y_1 = \Sigma(X_1 - X_{1(av)})(Y_1 - Y_{1(av)});$$ и т.д.

Let's point out the important physical meaning of MMLM coefficients. For example, the coefficient b_1 in equation (3) respond to the question, how many units varies Y_1, if X_1 changes by one unit on the assumption that X_2 retains a constant value.

Thus, the MMLM formula can eliminate the influence of factor X_2, bound with the factor of X_1 on Y in its pure form.

The problem of various characteristics optimizing of all sorts of systems becomes relevant in connection with the intensive development of the theory and practice of electrolyte solutions, physical and chemical methods of research, the development of modern methods of processing the experimental results. For example, parameters for the method of pair correlations in comparative calculations of physical-chemical properties of substances (e.g., concentration is in the functional dependence of analytical signal) in most cases are poorly known and considerably scatter or non-existent. That problem hinders their choice for a variety of assessment operations.

A common reliable regular occurrence, linking changes in various properties of complex compounds in a solvent, hasn't been found so far, as well as the quantitative relationships between the major, basic, physical-chemical properties and various derivative properties of complex compounds in various media.

Derivation of multiple linkages and interdependence of properties and their changes for solvents, including water and electrolyte solutions is possible with deliberate and clear choice of benchmarks and with properly determined values of physical and chemical key properties of the studied systems [4].

Depending on whether a system (herein solvent) exchanges with the environment in matter and energy, it is thermodynamically isolated, closed or open and respectively is characterized by the microcanonical, canonical or macrocanonical Gibbs's distributions. This basis must be sufficiently complete and contain at least four parameters: thermochemical, electrical, kinetic and structural parameters. Their usefulness follows from the correspondence of solvent molecules to statistical Gibbs's ensembles with the main role of internal and external parameters:

$$\xi = \phi\ (a_1, a_2, ..., T),$$

where ξ is an internal parameter, $a_1, a_2, ..., T$ is an external parameter.

1. It is known that if the system (herein solvent) is in equilibrium conditions without exchange with the macroscopic environment, or environment in matter and energy, it is thermodynamically isolated. In these conditions, its characteristics are determined by the parameters of the internal structure, i.e. by the length and coupling constant, atom's masses, the number of electrons, etc.

2. If the system communicates with the environment only by energy, it is thermodynamically closed. The process can be described by thermochemical parameters of constant number of particles.

3. In case the system exchanges with the macroscopic environment both with energy and matter, the system is thermodynamically open, the number of particles in the system is variable. In such a situation the number of particles may change, to a first approximation, by the forces of electromagnetic origin, which determine the appropriate response of the electromagnetic characteristics of the investigated system.

4. Any movement of bodies at a certain speed in the condensed phase generates dissipative processes, mainly characterized by kinetic parameters: viscosity, diffusion, thermal conductivity or other parameters.

Theoretically modulating the processes of measurement, i.e. interaction between a system and a device, it is necessary to take into account all the situations observed above. This idea is the basis for the evaluation of dissociation constants of electrolytes in the studied solvents pK, the radii of solvent molecules R_s, the energies of intermolecular interactions in pure solvents ΔH and other physical and chemical characteristics of solvents and non-aqueous electrolyte solutions.

Table presents the data obtained from the thermodynamic constants of dissociation of hydrochloric acid, the titrant, in analytical chemistry pK_{HCl}. Its systematic values, such basic properties of the solvent as a boiling point T, density ρ, viscosity η, a dipole moment of solvent molecule p, a molar mass of solvent M, an amount of bond lengths $\Sigma L \cdot 10^8$ cm, the radius of the solvent molecule $R_s \cdot 10^8$ cm and autoprotolysis constants (ionic product) of solvent pK_s are absent.

The program «MMLM» leads to the equation

$$pK_{HCl} = -0{,}03220 \cdot T - 5{,}08662 \cdot \rho + 0{,}52392 \cdot \eta + 2{,}71678 \cdot p - 0{,}05334 \cdot M + 0{,}40049 \cdot \Sigma L + 3{,}40571 \cdot R_s - 0{,}07179 \cdot pK_s + 6{,}70942. \quad (4)$$

multilevel factor (multidimentional) of modeling is $K_{MMLM} = 0{,}9741$.

As it will be shown further, all the members of the right part of the equation have dimension mol/dm^3. Dimension in other cases of MMLM (like identifying the dimension pK_{HCl}) are defined similarly.

The dimensional coefficients in MMLM, for example, in the same equation (4), can be obtained by solving the system of normal equations:

$$\begin{cases} a\Sigma(X_{i1}-X_{1(av)})^2+b_1\Sigma(X_{i1}-X_{1(av)})(X_{i2}-X_{2(av)})+b_2\Sigma(X_{i1}-X_{1(av)})\cdot(X_{i3}-X_{3(av)})+\ldots \\ +b_8\Sigma(X_{i1}-X_{1(av)})(X_{i8}-X_{8(av)})=\Sigma(X_{i1}-X_{1(av)})(y_i-y_{av}); \\ a\Sigma(X_{i2}-X_{2(av)})(X_{i1}-X_{1(av)})+b_1\Sigma(X_{i2}-X_{2(av)})^2+c\Sigma(X_{i2}-X_{2(av)})\cdot(X_{i3}-X_{3(av)})+\ldots \\ +b_8\Sigma(X_{i2}-X_{2(av)})(X_{i8}-X_{8(av)})=\Sigma(X_{i2}-X_{2(av)})(y_i-y_{av}); \quad (5) \\ a\Sigma(X_{i3}-X_{3(av)})(X_{i1}-X_{1(av)})+b_1\Sigma(X_{i3}-X_{3(av)})(X_{i2}-X_{2(av)})+b_2\Sigma(X_{i3}-X_{3(av)})^2+\ldots \\ +b_8\Sigma(X_{i3}-X_{3(av)})(X_{i8}-X_{8(av)})=\Sigma(X_{i3}-X_{3(av)})(y_i-y_{av}); \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ a\Sigma(X_{i8}-X_{8(av)})(X_{i1}-X_{1(av)})+b_1\Sigma(X_{i8}-X_{8(av)})(X_{i2}-X_{2(av)})+b_2\Sigma(X_{i4}-X_{4(av)})(X_{i3}-X_{3(av)})+\ldots \\ +b_8\Sigma(X_{i8}-X_{8(av)})^2=\Sigma(X_{i8}-X_{8(av)})(y_i-y_{av}) \end{cases}$$

for a, b_1, b_2,… b_8, where i is a number of variables (herein the number of solvents); $X_{i1} = T_{boiling}$; X_{i2} is a solvent density ρ, g/cm^3 ; X_{i3} is viscosity of the solvent η, сПз; X_{i4} is a dipole moment of solvent molecule p_i, D; X_{i5} is a molar mass of solvent M, g/mol, X_{i6} is an amount of bond lengths $\Sigma L\cdot 10^8$ cm, X_{i7} is a radius of the solvent molecules $R_s\cdot 10^8$ cm, X_{i8} is an indicator of autoprotolysis constants (ionic product) solvent pK_s, y_{av},$X_{1(av)}$, $X_{2(av)}$, $X_{3(av)}$ … $X_{8(av)}$ is an arithmetic functions (mathematical expectation) of the relevant parameters with the number of variables i. We obtain the following factors and their dimensions:

b_1 = – 0,03220 mol/dm^3·K; b_2 = – 5,08662 mol/kg;

b_3 = 0,52392 mol/dm^3·сП;

b_4 = 2,71678 mol/dm^3·D; b_5 = –0,05334 mol^2/kg,

b_6 = 0,40049 mol/dm^2, b_7 = 3,40571 mol/dm^2,

b_8 = –0,07179 mol^2/dm^6 and a = 6,70942 mol/dm^3.

The basic parameters for assessing the physical and chemical properties of solvents and the results of evaluations of MMLM derivative characteristics

№ п/п	$T_{boiling}$	r	h	p	M	ΣL	R_s	pK_s	pK_{HCl} (ref. lit.)	pK_{HCl} according to eq.(4)
01.	373,2	0,9971	0,894	1,84	18,0	1,26	1,45	14,00	-0,98	-1,43
02.	338,2	0,7914	0,547	1,70	32,0	3,48	1,89	17,30	1,20	1,58
03.	351,5	0,7895	1,080	1,69	46,0	5,02	2,19	18,95	1,95	2,18
04.	370,4	0,7995	2,256	1,68	60,1	6,56	2,50	19,46	2,51	2,99
05.	390,4	0,8058	2,950	1,66	74,1	8,11	2,65	21,56	3,04	2,88
06.	411,2	0,8098	3,820	1,65	88,1	9,65	2,81	20,65	3,62	3,09
07.	329,4	0,7920	0,316	2,88	58,0	5,27	2,30	32,50	4,00	4,58
08.	352,8	0,8054	0,428	2,79	72,1	6,81	2,40	31,00	4,45	3,89
09.	375,7	0,8089	0,500	2,48	86,1	8,35	2,56	25,62	–	3,13
10.	400,7	0,8304	0,542	2,16	100,1	9,89	2,68	25,30	–	1,67
11.	425,7	0,9445	0,796	3,82	73,1	5,12	2,53	31,60	3,40	3,49
12.	438,7	0,9366	0,919	3,79	87,1	6,66	2,72	31,20	3,30	3,64
13.	508,2	1,0253	3,340	5,37	179,2	6,09	3,10	20,56	3,56	3,43
14.	462,2	1,1014	1,960	4,30	78,0	5,82	2,37	32,30	3,06	2,86
15.	558,2	1,2618	10,13	4,69	120,0	5,94	2,61	25,45	3,25	3,40
16.	475,2	1,0327	1,830	4,09	99,1	6,66	2,70	24,15	2,80	3,06
17.	353,3	0,7856	0,345	3,84	41,0	3,79	2,54	32,20	8,10	7,62
18.	514,9	1,0257	2,510	4,94	102,0	6,70	3,12	29,20	–	5,42

Notes: 1 – water, 2 – methanol, 3 – ethanol, 4 – propanol, 5 – butanol, 6 – pentanol, 7 – acetone, 8 – methylethylketone, 9 – metilpropilketon, 10 – metilbutilketon, 11 – dimethylformamide, 12 – dimethyl-acetamide, 13 – hexamethylphosphotriamide, 14 – dimethylsulfoxide, 15 – tetrametilensulfon, 16 – metil-pirrolidon, 17 – acetonitrile, 18 – propylene carbonate.

Thus, when applying heterogeneous units of initial parameters X_{i1}, X_{i2}, X_{i3}, ..., X_{i8} and equations of the method of multilevel modeling

$$y_i = y_{av} + b_1(X_{i1} - X_{1(av)}) + b_2(X_{i2} - X_{2(av)}) + b_3(X_{i3} - X_{i3(av)}) + ... + b_8(X_{i8} - X_{8(av)})$$

units of measure and dimensional ratios y_i in mol/dm^3 for the thermodynamic constants of dissociation of hydrochloric acid pK_{HCl} are obtained. The coefficient method of multilevel modeling K_{MMLM} is introduced to assess the ties between variables. It is defined by the formula:

$$K_{MMLM}^2 = \Sigma(Y_{i-} Y_{av})^2/\Sigma(y_i - y_{av})^2,$$

where y_i is the variable Y, taken from the correlation table 1 (reference value), and Y_i is the variable Y, calculated from the equation MMLM (4).

MMLM gains an evident advantage over the method of pair correlations. It is obviously seen when comparing the coefficients of multiple regression K_{MMLM} and pair correlations K_{pc}. The ratio K_{MMLM} of such basic parameters as $T_{boiling}$, ρ, η, p, M, $\Sigma L \cdot 10^8$, $R_s \cdot 10^8$ and pK_s by equation (4) for water, alcohols, ketons and other solvents is equal to 0.9741, while coefficients of pair correlations $pK_{HCl} - T$, $pK_{HCl} - \rho$, $pK_{HCl} - \eta$, $pK_{HCl} - p$, $pK_{HCl} - M$, $pK_{HCl} - \Sigma L$, $pK_{HCl} - R_s$, $pK_{HCl} - pK_s$ are respectively: 0,0012; 0,0009; 0,0083; 0,1668; 0,00003; 0,15020 and 0,3713 which is considerably less than 0,9741.

Thus, using as a benchmark the thermochemical (boiling point, molar heat of vaporization, etc.) and kinetic (viscosity, etc.), electrical (dipole moment, etc.) properties and molecular characteristics (the sum of the lengths of chemical bonds in the molecule of solvent etc.) which are easily identified reference values, gives a satisfactory equivalence between the estimated values MMLM with real experimental values, regardless to the nature and class of substances. The method of multilevel (multidimensional) modeling permits to solve numerous problems in the absence of important characteristics in different branches of chemical science and technology.

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Materials of Conferences

THE ANALYSIS OF STAVROPOL REGION LAND POOL OF STEPPE AND SEMIDESERT LANDSCAPES AND WAYS OF ITS NORMALIZATION

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The second half of the XX century was characterized by high anthropogenic stress on the fertile soils of Russian land pool, which lead to the deviation of ecological balance and the transformation of natural landscapes into natural-cultural and cultural-natural, or/in other words, into the agricultural landscapes with unstable ecological situation. Steppe and semidesert landscapes of Stavropol region are one of the most impressive example. An integration of landscape approach into the modern agricultural practice is needed for the restoration of their functional systems. The main point of soil usage system is in keeping of morphological units of natural landscapes, their hierarchical structure (outlining of countries, tracts and elementary associations), and the correlation system of all landscape units.

Nowaday province of region's steppe landscapes is presented by landscapes of rich-in-herbs cereal, cereal and dry steppes that grow on black earth that are almost utterly ploughed up now. Landscapes also function on principles of steppe landscapes. But anthropogenic processes altered the landscape system dramatically, to its benefit (forest belts planting) as well as to its disadvantage (watering, salting). The implementation of new agricultural technologies allows us to use maximum of soil resources. Up to 80% of steppe province country is ploughed up. Natural ecosystems are saved on 5–10% of it, which defines the disturbance of landscape self-regulation.

Wormwood-cereal steppes on chestnut and bright chestnut soils are most commonly present in semidesert landscapes. Large areas are occupied by saline soil and alkaline lands. Climate conditions are continental and dry. Small amount of precipitation (300–350 mm) defines the fragile relation between natural components. Natural landscape functionality still has its natural character but anthropogenic processes had a great impact on its structure. Large territories of semideserts were ploughed up with the introduction of large amounts of water into the natural turnover by Tersko-Kumskyi and Kumo-Manichskyi channels, the processes of salting started their development as well as the swamping of soils, wind erosion gained an advance that leaded to the desertification of semidesert landscapes. Low soil productivity defined the involvement of the great number of chemical elements, including those of toxical kind into the natural turnovers.

The exploitation of steppe and semidesert landscapes land pool, based on the denial of the importance of natural factors for modern soil-production processes lead us to the development of such degradation processes in soil cover as: water erosion – 16,5%, wind erosion – 13,33%; modern displays of water and wind erosion – 12,18%; waterlogging – 22,5%; salinization – 24,16%; other kinds of degradation processes – 11,33% (according to data of Stavropol Scientific Research Institute).

The region's steppe and semidesert landscapes soil stability is dependent on the humus content, which provides for the increase in soil's water capacity and the improvement of its structure. The more humus, absorbed calcium, and dust and small-sandy fraction is in the upper layer, the more the soil is stable against the washout.

The land pool of the region is divided into six agro-ecological groups (AEG) in the agricultural practice of the reproduction of the productivity of the soil cover that has been affected by degradation processes and adaptation of the morphological relief forms for agricultural plantings. The first AEG includes the lands of the majority of the steppe landscape enterprises that have plowed fields with the evaluation more that average level and country inclination under 1°, with the varieties of soil that can be united and used for the cultivation of all districted cultures in the system of field planting turnover. The group unites all the sub-kinds of black earth, chestnut, poic-black earth and poic-chestnut soils that have been formed under different bioclimate and hydrological conditions and are united by typical processes of soil-formation without any negative signs that affect the fertility.

The second AEG includes lands with the evaluation lower or near the average region level, with country inclination of 2–3°. The territories of plowing fields with various soil kinds that are lightly affected by erosion processes are present in this group. The group also unites the same soils as the first one but those of them that have negative signs that affect their fertility (low-erosive, low-salinizated, low-sandy). This group is suitable for the cultivation of less exigent agricultural plantings and is included into the system of forage planting turnovers.

The third AEG: the areas with the moderate level wind, water and combined erosion are included here. They all can by characterized by the great relief variety but they all can be used in the system of soil planting turnovers and stay within the plowing areas.

The decrease in the anti-erosive agrotechnical measures lead us to the emerging of plowing territories that lost 26 to 50% of their land lie power (A + B). These territories were recommended for their exclusion out of plowing compound. These lands refer to the forth group and can stay within

agricultural lands compound with the variation of their target purpose.

The fifth AEG includes the lands that are affected by strong degradation processes and have lost more than 50 % of their land lie power (A + B) and are unsuitable for the agricultural plantings cultivation. A complex of expensive land reclamation measures is needed to be taken in order to restore their initial qualities. That includes: earthing, introduction of increased doses of organic mineral fertilizers and others. A long rehabilitation period, 10 to 20 years is also necessary.

The sixth AEG includes the territories of dry farming and earlier irrigated plowing lands that has been affected by waterlogging and repeated salinization. They cannot be used for their target and are recommended for their transfer into the stage of land reclamation construction unless special measures of the existing irrigative network reconstruction, drain conduit manifold network construction, and their salinization are taken.

Thus we can see that the guaranteed prevention of the decrease in the region's steppe and semidesert landscapes land pool is seen by the modern agricultural system in the introduction of the new approach for the land usage – adaptive-landscape agriculture. In order to realize it the making up of soil-landscape maps for each enterprise with the outlining of the agro-ecological groups is needed as well as the creation of such upper soil layer that would imitate the image of steppe: foddergrass cultivation, saving of after-harvesting leftovers, strip placement of plantings, creation of contour forest plantations.

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THE PROBLEM OF CONSERVATION STURGEONS (ACIPENSERIDAE) IN THE AZOV-BLACK SEAS BASIN AND ITS REALIZATION

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In the past maximal landings at the each of south seas of Russia were 400-600 thousands of tons. Naturally the landing of traditional objects of trade (sturgeon, zander, sea roach etc) has lowered in 10 times and more. For example, in the Caspian sea the landing of sturgeon began in the XVI century. To the end of XIX century the landings of valuable species of fish were 300 thousands tons, out of them there were 40 thousands of tons of sturgeons. Their final overfishing occurred at the beginning of 50ies of XX century. It has happened before the building of weir and chemicalization of agriculture (Matishov, 2004). At the Azov-Black sea basin there is observed the decrease of the general landings and changing of the proportions of valuable and low valuable species of fish.

The general tendency is the changing of landing structure. At the background of decrease of volumes of landing its base is compound by small fish, which were rated among not valuable. Possibly besides mentioned reasons on the structure of landing there has an influence the changing of climate. The influence of global climatic changes on the sea fishing is not finally researched, but occurring processes, particularly, the quick change of the water temperature and contents of oxygen in it, lead to the increase of population of the small species of fish, which have no economically high value, to the worsening of conditions of reproduction of valuable anadromous and semi-species of fish. The confirmation for this fact is the statistic of marketable landings. Thus, in the Azov-Black basin from the middle of XX century at the landings there are progressively prevail small species: Azov anchovy, sardelle, black sea sprat, and the landings of sturgeons for the last 20 years have sharply decreased from 1036 tons to 1,041 tons (in 2008) and are at the level, which is not only doesn't provide natural reproduction, but at the verge of extinction at all.

In connection with this the development of commodity growth of sturgeon species of fish will allow to lower the load to the populations of sturgeons, to restore them at their natural environment and give to the populace, which is live in the Azov-Black region, supplementary work places.

The successful commodity growth of sturgeons is largely defined by the presence of feed. For the overcoming of crisis at the domestic feed-production there was set a task o continue researches by the searching of effective and inexpensive species of feed raw material, to cope with production of few component fish feeds. At the result there is reached the increase of volumes of production of aquaculture and guaranteeing to the populace the valuable food production.

The most effective and cheap type of feed for the sturgeons if the fish (Nikitina, 2003; 2004). While the fish nutrition there is preserved the most stable correspondence between protein and nonprotein exchange within sturgeons. Fish that is used as feed is the most balanced feed for sturgeons and is the base of their food at the natural conditions (Nikitina, 2006).

The catch of not valuable and small herring species is carried out 11-12 months a year, what make possible the growth of sturgeons during the whole year. The cost of feed fish is low: silversides – 10 rubles/kg, inedible sprat – 7,5 rubles/kg.

Thereby, the offered way is partly solve the problem of preserving of sturgeon species of fish and guaranteeing to the populace of Azov-Black region of naturally valuable delicatessen products.

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Materials of Conferences

SOCIALLY-PHILOSOPHICAL ASPECT OF POLITICAL CULTURE IN THE SOCIETY

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Changes in the sociopolitical sphere affect political values. System of values regulates relation of the person and society. Sociopolitical changes transform basic social institutions.

The political culture is one of those problems which are on a joint of public disciplines, and is a subject of their studying. The problem of the management of the political conscience, necessity of a scientific basis of political behavior of citizens led (since 50th years of the XX-th century) to the treatment theories of political culture. Among them it is necessary to note the works of G. Almond, S. Verba, R. Merton, B. Skinner, E. Fromm. The classification of political culture, offered by G. Almond and S. Verba, has received wide popularity. It is based on the results of comparative analysis of the political cultures, which exist in various countries, depending on degree of orientation of people on participation in political life, in maintenance political system functioning.

We select the most significant characteristics of political culture in order to use this analysis in future studies.

Specificity of political culture. The political culture characterizes the most constant person's notion and the typical shape of his relations with the authorities.

The subject of political culture. Style of the person's political activity is a measure of how he had learned and recognized current norms and traditions of state life.

Possible mismatch of the person's intentions and actions adds to the political culture internal contradictions; allows «logical», «illogical», «outer logical» elements (V. Pareto) coexist in it; contributes to the simultaneous maintenance of active and passive forms of political participation of the individual.

Institutionalization of political culture. Formation of political culture is realized through assimilation and maintenance people of its norms, patterns, standards of conduct and traditions.

Political adaptation. A person, learning the requirements of the status and role behavior, cultural values, develops its own spiritual potential, which allows to adapt to a definite political system, that is the political socialization of a person took place.

M. Habermas, C. Luman consider political socialization as the process of new values development by a person; they put forward intrapersonal, psychological mechanisms of formation of political consciousness and human behavior.

E. Erikson, E. Fromm pay attention to the study of unconscious motives of political activities (forms of political protest, countercultural behavior); they conceive political socialization as a hidden process of politicization of human feelings and notions.

The theoretical basis of the approach is the theory of rational choice, rather, one of its versions, including the analysis of cultural values, «cultural rationality». Political culture is not an alternative to a rational behavior, but it is a rational adaptation of tendency to the requirements of the institutional environment. Entering mutual relations with the power, people gradually master the most preferable strategy of behavior. It is considered that the concept of cultural rationality includes not only integrated content of political culture of the given society, but also the political culture of individual age cohorts, socialized in a specific political-institutional conditions.

Cultural rationality is manifested in the relations between citizens and the political system. According to Weber, any government strives to maintain its own legitimacy, convincing the public that the existing political institutions have a legitimate right to exist. In a long term plan, the task of legitimizing the system is not solved, for the system does not become effective, that is capable of meeting the material needs of citizens. But the loyalty of the system can be maintained by repressive measures. However, the threat of repression can't provide political stability for a long time.

The effective political system offers to the public two stimuli (A. Panebianko), using which the leaders of political organizations attract their supporters: the collective and selective.

The collective stimuli mean the achieving of the organization's ideological goals, selective mean various material «benefits» (increasing the status, social security, subsidiary measures). The prevalence of any stimuli is a theoretical assumption; usually a potential member of the organization seeks to benefit from their combination. Panebianko distinguishes only theoretically those for whom the most important selective stimuli, and those whose main interest is focused on collective stimuli. The system of stimuli of the real political organizations should include collective and selective stimuli. Their correlation may change with time. Collective stimuli are dominated at the initial stage of the organization's formation, and then selective stimuli obtain the leading hand.

The political system of a society uses a similar set of stimuli. Offering them to the citizens, it demands loyalty in return, which should be expressed in certain norms of behavior. Depending on what

stimuli dominate at the moment, and what it takes to get the desirable, cultural and political person's attitudes adapt to the political system. Almond believes that the disparity of positions and behavioral acts serves as a latent or potential source of political influence and activity.

Civil culture maintains a balance between authority and responsibility indicates another point of democratic politics. It provides an opportunity to understand why the most important political issues, if they remain unresolved, after all, create instability in a democratic political system. Balance between activity and passivity actually supported only if political issues are not too severe. If the political life is hard and remains so because of the pendency of the issue, which is in the spotlight, the discrepancy between attitudes and behavior begins to lose stability. Any long-term demolition of discrepancy very likely entails negative consequences. If we bring the behavior to conformity with the orientations, the volume of the control, which non - elite will implement over elite, causes mismanagement and instability. But if the positions are changed in such a way that will be combined with behavior, citizens' sense of powerlessness and non-inclusion can affect in the destructive image on the democracy of the political system and the society as a whole.

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Materials of Conferences

IMPORTANT ASPECTS OF SOCIAL MANAGEMENT IN SPORT-IMPROVING AND MASS WORK OF HIGH SCHOOL

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Student's life is very various. After ending studies the student has a free time, which is used for development of intellectual and physical abilities. A chair of physical culture of Perm State Polytechnical University together with sports club «Polytechnic» carry out the large sports-improving and mass work in our high school. The founders of the chair were the Honored worker of physical culture of Russia I.V. Pugachyov and the excellent worker of physical culture and sports N.N. Orlov. Now the chair has 44 highly skilled teachers, among which 7 senior lecturers, 2 Honored trainers of Russia. The effective work of the stuff is marked by assignment to 8 best teachers of a rank «Excellent of physical culture and sports»; 20 teachers have ranks of the judges of a national category on various kinds of sports. Sports club has deep traditions since 1960.

The elite of student's sports is made by the champions of Olympic games deserved foremen of sports Vladimir Alikin (biathlon PSPU), Michael Devetyarov (ski races, PSPU), participants of Olympic games, foreman of sports of the international class Yrii Velikorodnii (PSPU, marathon race, Munich and Montreal), Alexander Nosov (PSPU, ski combination, Capporo).

On celebrating 57 – anniversary of PSPU there have arrived the former graduates of high school becoming the chiefs of the enterprises, organizations. So, for example, the former governor of the Perm area, the minister of natural resources of Russia development of intellectual and physical abilities. A chair of physical culture of Perm State Polytechnical University together with sports club «Polytechnic» carry out the large sports-improving and mass work in our high school. The founders of the chair were the Honored worker of physical culture of Russia I.V. Pugachyov and the excellent worker of physical culture and sports N.N. Orlov. Now the chair has 44 highly skilled teachers, among which 7 senior lecturers, 2 Honored trainers of Russia. The effective work of the stuff is marked by assignment to 8 best teachers of a rank «Excellent of physical culture and sports»; 20 teachers have ranks of the judges of a national category on various kinds of sports. Sports club has deep traditions since 1960.

The ere used. The technique of questionnaire as a sort of sociological research included two parts: interview and questionnaire, carried out in parallel. 686 students of various faculties of high schools of the Perm area and cadets of military institutes were interrogated. As a list of questions the developed questionnaire was used.

The results of questionnaire have shown, that the majority 85 % of the students were engaged or are engaged in sports (87 % of the young men and 82 % of the girl). 95 % of the respondents positively concern to sports (96 % of the young men and 93 % of the girl). And many – 35 % (27 % of the young men and 48 % of the girl) would like to be engaged in swimming, if there were suitable conditions. The popularity of swimming is explained by the increased interest of the majority of the students to this kind of sports, as there are a lot of rivers, lakes and ponds in the Perm region, and it is not enough of swimming pools, especially in high schools. The popularity of such kinds of sports, as aerobics, the sports games, tourism is very high. Having entered the high school, the young people usually stop to be engaged in sports actively. Only 16 % (20 % of the young men and 11 % of the girl) respondents are engaged in sports «of maximum achievement» at the international, regional and city levels. Now for improving of health the students are engaged in physical culture and sports actively enough. The negative attitude to drugs – 68 %, and to smoking – 63 % is observed. Occasionally use spirits drinks 58 % of the students. Probably, it is necessary in this age in high schools to strengthen propagation of sports style, healthy image of life.

During the carried out research was revealed, that the majority interrogated 46 % (49 % and 41 % accordingly) positively appreciate the quality of training on physical culture. They are satisfied on the whole with the form of training, the contents, except for discrepancy of sports base of high schools to the modern requirements.

The financial position of the students practically completely depends on the parents and relatives – 87 %. On one grant manage to survive in our difficult time 12 % of the respondents. The part of the students earns additionally – 24 %. The future occupation for the majority of the students is connected with

Highly paid work – 65 %. Only 6 % (7 and 4 %) of respondents could be trainers.

In the future occupation the most students consider different factors: high earnings, pleasure from work, opportunity to travel, high prestige, opportunity to open the business – 45 %.

The sociological analysis has shown, that the students of high schools of Perm area mainly conduct a healthy image of life, are engaged in sports, try to improve their health, do not use the drugs, but do not have enough rest and, irrationally use the leisure.

Chairs of physical culture, sociology and politology of PSTU during 1998–2010 have carried

out a common sociological research. The urgency of the given research approves that more than 60% of the students of humanitarian faculty is released from training in the basic group on physical culture. In special medical group are engaged the majority of the economists, politologists of faculty.

According to the data of sociological research the students before entering PSTU were engaged in sports; 85% and now would like to be engaged in swimming; 35% – in aerobics, tourism, sports games. Unfortunately, in educational time it cannot be made, it is a pity but there is no a swimming pool at the university and the coming years its construction is not planned.

For increase of motivation of the students on chair of physical culture is developed a pedagogical methodical complex on discipline «Physical culture». More perfect working educational program for special medical group was prepared considering individual program on each group of diseases, condition of health of the students.

The complex tests on special physical preparation are developed. They enable to develop the correct recommendations to the students on correction of a functional condition and development of the professionally important qualities during study and to form a healthy image and style of life.

These measures allowed increasing motivation to be engaged by physical culture, which is objectively expressed by the data of sociological research.

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