

*Medical sciences**Article*

- PROTEIN CARBONYL PRODUCTS IN BLOOD CELLS
AT CHRONIC KIDNEY DISEASE3
Muravlyova L.E., Molotov-Luchanskiy V.B., Kluyev D., Tankibayeva N.U., Kolesnikova E.A. 3
- STANDARD ANATOMY A LIVER'S PORTO-CAVAL CANAL AMONG MEN WITH
DIFFERENT TYPES OF CONSTITUTION (CONSTITUTIONAL PECULIARITIES
MALE LIVER'S PORTO-CAVAL CANAL)
Russkikh A., Samotyosov P., Gorbunov N., Zalevskiy A., Madvedev F., Shabokha A. 6

Materials of Conferences

- SOME SHOWINGS OF VARIABILITY OF HEART RATE WITHIN YOUNG
BADMINTON PLAYERS
Chan Dyk Njan 13
- PECULIARITIES OF NITROUS OXIDE STRESS-REACTION AND METABOLISM AMONG
PERSONS OF YOUTHFUL AGE WITH VARIOUS LEVELS OF NORMAL DIASTOLIC
ARTERIAL PRESSURE
Kuvshinov D.Y. 13
- MRI OF ADRENAL GLANDS IN PATIENTS WITH HYPERTENSION-VERGE NORMS
AND PATHOLOGY
Lukyanenok P.I. 15
- PECULIARITIES OF PHYSICAL DEVELOPMENT OF JUNIOR SCHOOLCHILDREN
OF COMPREHENSIVE SCHOOL AND SPECIALIZED EDUCATIONAL INSTITUTION
OF COMPENSATING TYPE IN KRASNODAR KRAI
Minko O.V. 16
- FEATURES OF ROTATION OF INTESTINAL TUBE IN RAT
Petrenko V.M. 17
- MORFOGENESIS OF MESENTERIC LYMPH NODES IN RAT
Petrenko V.M. 17
- FACIAL PAIN IN PATIENTS WITH THE PATHOLOGY OF THE NOSE
AND PARANASAL SINUSES
Stagnieva I.V., Stagniev D.V. 18
- THE POSSIBILITIES OF RADIONUCLIDE DIAGNOSTIC OF THYROID
GLAND CANCER
Zelenin A.A. 19

*Economic sciences**Article*

- EMPLOYMENT AND SELF-EMPLOYMENT TRENDS IN RUSSIA AND IN THE WORLD
AT THE TURN OF THE CENTURY
Ilchenko A., Abramova E. 20
- INTERNATIONAL MIGRATION IN RUSSIA AND PROSPECTS FOR SOCIAL
AND ECONOMIC DEVELOPMENT OF THE COUNTRY
Metelev S.E. 25

*Agricultural sciences**Materials of Conferences*

- PRACTICE OF CREATION INDUSTRIAL WINTER-PROOF SIMBIOTOV SWEET MERRY
Bgashev V.A., Solonkin A.V. 29
- THE FUTURE OF RUSSIA – SORGOVYE CULTURE
Efremova E.N. 29

| | |
|---|----|
| <i>Biological sciences</i> | |
| <i>Materials of Conferences</i> | |
| THE «AJUGA GENEVENSIS L.» CHEMICAL COMPOSITION AND THE BIOLOGICAL ACTIVITY STUDY | |
| <i>Butenko L.E., Kuleshova S.A., Postnikova N.V., Lovyagina S.A.</i> | 31 |
| THE «BRASSICA NAPUS L. SCHROT» CHEMICAL COMPOSITION AND THE BIOLOGICAL ACTIVITY RESEARCH | |
| <i>Butenko L.E., Kuleshova S.A., Postnikova N.V., Kunak E.Y.</i> | 33 |
| THE CHANGE IN THE LEVEL OF TRIGLYCERIDES IN BLOOD SERUM OF PIGS IN ONTOGENESIS | |
| <i>Dementyev A.V.</i> | 36 |
| THE CONTENT OF FREE FATTY ACIDS IN BLOOD SERUM OF PIGS IN DIFFERENT PERIODS OF POSTNATAL DEVELOPMENT | |
| <i>Dementyev A.V.</i> | 36 |
| AGE CHANGES OF LIPIDS METABOLISM INDEXES IN PIG BLOOD | |
| <i>Dementyev A.V.</i> | 37 |
| EXAMINATION OF THE LEVEL OF SULFHYDRYL GROUPS IN PIG LIVER MITOCHONDRIAL FRACTION | |
| <i>Dementyeva T.A.</i> | 37 |
| THE CONTENT OF THIOLIC GROUPS IN MITOCHONDRIA OF DIFFERENT PIG ORGANS | |
| <i>Dementyeva T.A.</i> | 38 |
| AMINOTRANSFERASE ACTIVITY OF BLOOD IN PIGS FATTENING | |
| <i>Dementyeva T.A.</i> | 38 |
| PHOSPHATASE ACTIVITY OF BLOOD IN PIGS FATTENED TO DIFFERENT LIVE WEIGHTS | |
| <i>Dementyeva T.A.</i> | 39 |
| THE CONTENT OF GENERAL LIPIDS IN BLOOD OF GENOTYPICALLY DIFFERENT PIGS | |
| <i>Lazareva L.V.</i> | 39 |
| TO QUESTION ABOUT THE THIRD ALARM SYSTEM | |
| <i>Zozulya G.G., Leonenko I.G., Malyshev S.G., Mozharov S.N., Ovchinnikov A.S., Petrov N.Y.</i> | 40 |
| <i>Pedagogical sciences</i> | |
| <i>Materials of Conferences</i> | |
| THE COOPERATION OF THE RUSSIAN FINNO-UGRIC IN THE EDUCATION | |
| <i>Matveeva L.A.</i> | 42 |
| <i>Sociology</i> | |
| <i>Materials of Conferences</i> | |
| VARIETY OF FORMS OF INDIVIDUAL DEVELOPMENT IN CONDITIONS OF MODERN KAZAKSTAN | |
| <i>Zholdubaeva A.K.</i> | 43 |
| <i>Technical sciences</i> | |
| <i>Materials of Conferences</i> | |
| METHODS OF TECHNOLOGY IN THE TESTBOOK «PROGRAMMING TECHNOLOGIES» | |
| <i>Kamayev V.A., Kosterin V.V.</i> | 46 |
| THE DESIGN PROCEDURE FOR THE TURBINE ROTORS' VIBRATORY CHARACTERISTICS | |
| <i>Lobodenko E.I.</i> | 46 |
| TO THE PROBLEM OF MODELING OF ACTIVITY OF THE COMPANY FOR PRODUCTION AND SALE OF COMPUTER ENGINEERING | |
| <i>Noskov S.I., Zusman M.B.</i> | 48 |

PROTEIN CARBONYL PRODUCTS IN BLOOD CELLS AT CHRONIC KIDNEY DISEASE

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Protein reactive carbonyl derivatives (RCD) content in erythrocytes and neutrophils in blood of patients with chronic kidney disease was investigated. The were four groups: 20 patients with nephrotic form of glomerulonephritis; 23 patients with hypertensive form of glomerulonephritis; 21 patients with pyelonephritis; 21 patients with pyelonephritis associated with arterial hypertension. Control subjects were healthy volunteers. The increasing of RCD content in neutrophils at patients of all groups were established. Two multidirectional trends of RCD content in erythrocytes were found. The probable role of RCD in erythrocytes and neutrophils in blood of patients with chronic kidney disease was discussed.

Keywords: protein reactive carbonyl derivatives, blood, chronic kidney disease

The participation of oxidative stress in the progression of kidney disorders is not doubt. Reactive oxygen intermediates and other prooxidants contribute to the development of kidney disorders by means of indirect effects on hemodynamics and adverse impact on selective permeability of glomerular membrane, provoke an acute and chronic inflammation and tissue destruction [1, 2, 3].

Besides of lipids as traditional target – prooxidants induce oxidative damage of proteins. There are different variants of modified proteins which formed depending on the types of adverse agent [4].

The increasing of the level of protein carbonyl groups, advanced oxidation protein products in blood plasma at patients with chronic renal failure and reduction of the concentration of sulfhydryl groups was described [5, 6, 7, 8]. The augmentation of protein carbonyl groups in blood of patients with chronic renal failure under regular hemodialysis was determined [9]. R. Inagi и T. Miyata [10] have created a hypothesis of participation of «carbonyl stress» in the development of complications of uremia. As has been showed later the modified proteins contribute to forming of complications of uremia by involving oxidative stress and inflammatory syndrome [11, 12]. Experimental – based results have demonstrated that possible mechanism of oxidized proteins negative effects may be connected with their participation in induction of renal fibrosis [13]. Our prior studies demonstrated an alteration of protein oxidative modifications in blood of patients at chronic pyelonephritis [14].

Great interest is studying the oxidation of proteins not only in plasma but also in blood cells, especially in neutrophils. Neutrophils are believed to play a fundamental role in mediating tissue injury with subsequent renal failure [15].

However, comparison of trends of protein carbonylation in blood cells under oxidative stress has not been performed.

The aim of our investigation was the comparative analysis of the protein carbonyl deriv-

atives content in erythrocytes and neutrophils of patients with chronic kidney disease.

Materials and methods of research

The four groups of patients with chronic kidney disease in stage of clinical manifestations were formed. Chronic and irreversible renal structural changes proved by clinical, laboratory and instrumental studies. Anamnesis, the dynamics of clinical changes, results of laboratory testing of blood and urine were scrutinized. In difficult cases nefrobiopsiya was performed for confirmation of morphological types of nephritis. 20 patients with nephrotic form of glomerulonephritis were included in the first group. 23 patients with hypertensive form of glomerulonephritis were included in the second group. The third and fourth groups were represented by 21 patients with pyelonephritis and 21 patients with pyelonephritis associated with arterial hypertension correspondingly. Control subjects were healthy volunteers ($n = 15$) without any medication. All patients and healthy subjects were informed of any discomforts associated with the blood sampling before giving their consent to participate.

Laboratory methods

Blood sampling. Blood collected from the brachial vein (5 ml/sample) was drawn into Vacutainer tubes containing heparin in the morning after an overnight fast. Plasma was separated by low speed centrifugation at 4 °C.

For neutrophils separation we used the procedure of previously described [16]. Cells were then washed, counted, and resuspended in buffer. Purity and viability were assessed by trypan blue dye exclusion. The samples of > 85% neutrophils with > 90% viability were obtained. Since neutrophils are short-lived, they used within 2-4 hours of collection. Erythrocytes were washed three times in iso-osmotic saline and suspended in the physiological saline. Erythrocytes used within 2-3 hours of collection. Protein carbonyl derivatives were measured in erythrocytes by an adaptation of the method of Levine et al. [17] using the precipitates of deproteinised samples [18]. Spectrophotometric measurement of RCD values was performed and calculated using the extinction coefficient of DNPH-reactive carbonyl derivatives at 370 nm = 22,000 mol⁻¹cm⁻¹.

Results of research and their discussion

Data are expressed as mean ± SD (SD – standard deviation). Results compared using Mann-Whitney test for unpaired data commercial Statistica 7.0 package was used. Differences were considered significant when the *P* value was 0,05 or less.

The results obtained showed the increasing of RCD content in blood cells at patients of all groups in compare to control subjects (Table 1).

The most significant augmentation of RCD content was fixed in neutrophils at patients with pyelonephritis. Arterial hypertension did not provoke amplification of oxidative stress in neutrophils at patients with chronic kidney disease.

The tendency to increasing of RCD content in erythrocytes at patients of all groups in compare to control subjects was obtained. Here-

with the analysis of RCD values distribution into each group demonstrated the presence of two multidirectional trends in changing of carbonyl derivates content. It did not allow us to choose the average of RCD and demanded to pool patients into two clusters (Table 2). RCD content in erythrocytes at patients of first cluster exceeded the control value ($p < 0,05$). At the same time substantial decreasing of RCD content was fixed in erythrocytes at patients of the second cluster in compare of control subjects and persons of the first cluster ($p < 0,05$).

Table 1

Comparison of the mean of RCD content in erythrocytes and neutrophils at patients with chronic kidney disease and normal controls

| Patients with chronic kidney disease: | RCD content in | |
|--|----------------------|------------------------------------|
| | Erythrocytes nmol/ml | Neutrophils nmol/ 10 ⁻⁶ |
| Nephrotic form of glomerulonephritis, $N = 20$ | 10,77 ± 3,62 | 0,33 ± 0,06* |
| Hypertensive form of glomerulonephritis, $N = 23$ | 9,23 ± 4,11 | 0,35 ± 0,1* |
| Pyelonephritis, $N = 21$ | 12,44±4,18 | 0,51 ± 0,23* |
| Pyelonephritis associated with arterial hypertension, $N = 21$ | 11,89 ± 5,18 | 0,38 ± 0,14* |
| Control subjects, $n = 15$ | 8,24 ± 1,67 | 0,02 ± 0,009 |

The notes:

*Significant difference between control subjects and patients with chronic kidney disease, $P < 0,05$.

Table 2

Different pools of RCD content in erythrocytes at chronic kidney disease

| Patients with chronic kidney disease: | RCD content (nmol/ml) |
|--|-----------------------|
| Nephrotic form of glomerulonephritis, $N = 20$ | 10,77 ± 3,62 |
| Cluster 1 $N = 11$ | 14,39 ± 1,97* |
| Cluster 2 $N = 9$ | 6,25 ± 1,06# |
| Hypertensive form of glomerulonephritis, $N = 23$ | 9,23 ± 4,11 |
| Cluster 1, $N = 12$ | 13,46 ± 4,09* |
| Cluster 2, $N = 11$ | 4,41 ± 0,91*# |
| Pyelonephritis, $N = 21$ | 12,44 ± 4,18* |
| Cluster 1 $N = 13$ | 15,26 ± 1,65* |
| Cluster 2 $N = 8$ | 5,04 ± 0,98*# |
| Pyelonephritis associated with arterial hypertension, $N = 21$ | 11,89 ± 5,18 |
| Cluster 1 $N = 17$ | 15,60 ± 2,58* |
| Cluster 2 $N = 9$ | 4,89 ± 1,48*# |
| Control subjects, $N = 15$ | 8.24 ± 1,67 |

The notes:

*Significant difference between control subjects and patients, $P < 0,05$;

Significant difference between patients of cluster 1 and patients of cluster 2, $P < 0,05$.

It is interesting to discuss increasing of intracellular concentration of oxidized proteins in neutrophils of all groups of patients. Accumulation of RCD in neutrophils suggests the development of intracellular oxidative stress. We suppose that the surplus content of carbonyl derivatives of proteins may be prerequisite for formation of scaffold for neutrophil extracellular traps (NETs).

According to accepted model [19, 20], the stages of NET formation include the destruction of nuclear envelope, disorganization of chromatin with following accession of neutrophil's granule proteins to its components, rupture of cell membrane and releasing complex including nuclear acids from neutrophil. The final formation of NETs occurs in blood. Reactive oxygen spe-

cies are involved in this process at the stages of the initiation and regulation of NETs formation. In this case we assume that the action of reactive oxygen species may be connected with carbonylation of histones and other chromatin proteins.

Earlier we described the changing of the ratio of H1, H2A, H2B, H3 and H4 histones in neutrophils at patients with chronic kidney disease [21]. This data may be useful for substantiation of our conjecture. The RCD affect on spatial structure of proteins and induce the formation the new binding sites. This position also corresponds to the adopted model of NETs.

We also suppose that the surplus intracellular carbonylation of proteins can promote the incorrect forming of NETs. The appearance in blood free components of NETs (free nuclear acids, histones, other proteins, RCD) or NETs with reduced efficiency exacerbates the disorders of endothelium and disturbance of hemostasis. Fuchs TA et al [22] have proposed the model of NETs participation in red thrombus formation.

The coexistence of erythrocytes with increased and decreased content of RCD is very interesting. We have offered special term for indicating this phenomenon – «Delta carbonyl derivatives». Such striking difference of clusters based on «Delta carbonyl derivatives» draws attention and demands explore the reasons of it. The phenomenon «Delta carbonyl derivatives» may be connected with imbalance of young and old erythrocytes in bloodstream at patients with chronic kidney disease. The erythrocytes demonstrate different age-related sensitivity to pro – oxidant action [23].

RCD formation is connected with oxidative damage of wide range of erythrocyte proteins. The proteins of cytoskeleton and membranes may be one of main targets for pro – oxidants action. Oxidative damage of cytoskeleton and membranes proteins may induce alterations of stability, deformability and ability of erythrocytes to reversible aggregation. Such red cells are subject to hemolysis into renal glomerular apparatus. Free hemoglobin has a strong toxic effect and aggravates of renal damage [24].

On the other hand, the presence in bloodstream of erythrocytes with decreased content of RCD makes it possible to surmise augmentation of rigidity of red cell membranes, leading to lower efficiency of gas-transport function. Arterial hypertension may be independent factor of influence; its role in maintaining of carbonyl stress must be clarified. In any case further research must be continued.

Thus, RCD are not only involved in presentation of the oxidative modification of proteins. RCD appear to be the active components of the second echelon of pro – oxidant attack, which impact on metabolism, functions and demeanor of erythrocytes and neutrophils.

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STANDARD ANATOMY A LIVER'S PORTO-CAVAL CANAL AMONG MEN WITH DIFFERENT TYPES OF CONSTITUTION (CONSTITUTIONAL PECULIARITIES MALE LIVER'S PORTO-CAVAL CANAL)

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It was received information about constitution's variations of male liver porto-caval canal somatotype-dependent. It was revealed that liver's portal system is more developed among men of andromorphic somatotype (according to J.M. Tannery) when the least development the caval system's hepatic veins in comparison with other somatotypes. It is established that in case of histologic proved liver cirrhosis age- and somatotype-independent the portal system is more developed. Individual and typological peculiarities sizes' change of number, length and diameter the caval- and portal systems' vessels are revealed when contrastive analyzing the liver's organometric parameters among men with and without cirrhosis. It is proved that men of andromorphic somatotype age- independent have the least values of indexes the liver's caval system but bigger indexes of the portal system; it causes a high risk to irreversible changes' development in the liver's structure in view of the fact of hereditary predisposition of this somatotype to cirrhosis.

Keywords: somatotype, the liver's porto-caval system, cirrhosis

Liver is a kind of chemical laboratory in case of breakdown of which different pathologic processes develop in the organ and in organism. For example, in case of cirrotic liver injury complicated with portal hypertension structural changes occur in intra- and anhepatic porto-caval systems having an effect on organism's condition of human being (Eramishantsev A., 1991; Lebezev V., 1994; Kitsenko E., co-authorship 2005; Nazyrov F., 2005; Colapinto R. et al., 1983; Bilbao J. et al., 2002). In Eramishantsev A. opinion, changes in system of intrahepatic porto-caval system are the cause of an irreversible process of replacement connective tissue to liver cells regeneration of which is possible if intrahepatic blood flow is normal. There is a question why one has liver's irreversible changes and other people do not have them, although influence's force, number and method of affected factor (viral, toxic, autoimmune hepatitis etc.) are equal. As is known the liver's vascular architectonics is quite well researched in normal state (Loginov A., 1990; Cejna M., 2001) but at the same time a successful development of surgery in different liver condition including cirrhosis is not possible without a detailed research of bloodstream in comparative topographico-anatomical aspect. Anatomico-topographic, histologic peculiarities of bloodstream were described in the last century (Gugushvili L., 1972; Burgener R., 1988). In what follows, peculiarities of anatomy the liver's blood-vascular system were being researched on sex-, life-style-, and different diseases of therapeutic and surgical specificity- dependent including cirrhosis (Blyuger A., 1989; Nazyrov F., 2005; Osipenko O., 2006; Chuklin S., 2007; Haskal et al., 1994; La Berge J., 1995; Banares R. et al., 1998). All systems were researched separately and it is inadmissible because both venous systems

work as incorporated in pathogenesis of liver cirrhosis (Eramishantsev A., 2003). Besides, these works have more descriptive character based on clinical observation, roentgenologic and ultrasound investigations. An analysis of domestic and foreign manuals shows the absence of information about constitutional peculiarities of constitution the liver's porto-caval bloodstream. There is no information about a degree of development of one or another venous system in different liver's parts male somatotype-dependent. A high level of cirrhosis disease among men pathogenesis of whom is still unclear forces to look for new approaches to research the constitution of liver porto-caval canal including constitution's variants on male constitution-dependent. A clinical anthropology researching individual typological variability of phenotype is capable to estimate age and constitutional changes situated in ideas of biomedical anthropology (Khrisanofova E., Perevozchikov I., 1991; Gorbunov N., 2001; Nikolayev V., 2007). To sum up, one can assert that when quite detailed describing of anatomy the liver blood canal's histology there is no much information about constitutional peculiarities of liver porto-caval blood flow among men. In this situation anthropological approach is more reasonable which allows explaining constitution's variants of porto-caval system by the use of constitutional peculiarities of male organism.

The researching aim: To detect peculiarities the liver porto-caval system's constitution somatotype-dependent.

Researching tasks:

1. To run anthropomorphic measurements and somatotyping of male corpses of the second mature and elderly age dead in the issue of accidents with quickly dying pace with following researching liver's porto-caval canal.

2. To detect organ metric peculiarities and peculiarities the porto-caval canal's constitution among men of different somatotypes with histological proved liver cirrhosis and without.

3. To run comparative analysis the porto-caval system's somatotypical peculiarities and liver's organ metric between groups of men with and without cirrhosis.

Materials and methods of research

176 male corpses dead in issue of accidents with quickly dying pace of the second mature and elderly age (aged from 36 to 74; mean age $58,46 \pm 1,54$) were re-

searched. Anthropomorphic researching with following somatotyping was run (Bunak V., 1931; Chtetsova V. co-authorship., 1979; Bashkirov P., 1962; Tanner J.M., 1956).

The liver was removed from subcostal bilateral approach after anthropomorphic corpses researching. The liver's organ metric was run with help of measuring tape. The following organ metric characteristics were being determined: liver's weight, length, width and thickness right and left liver's lobes. After this the sampling of autopsy material was run for the following histological researching. In the researching the method of colouring van Gizon was used. These colouring types allowed detecting structural elements of hepatic tissue and to diagnose cirrhosis («nutmeg liver», Avtandilov G., 1990) (Fig. 1, 2).

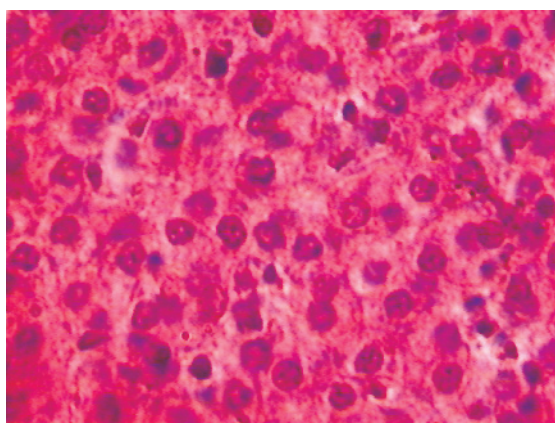


Fig. 1. Male liver histogram aged 48 in a normal condition

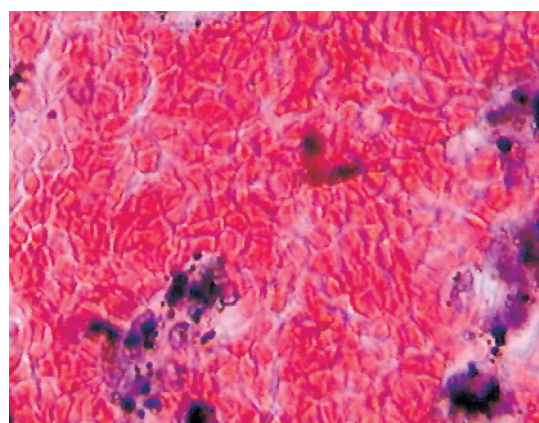


Fig. 2. Male liver histogram aged 56 suffered from cirrhosis (nutmeg liver)

According to histological researching results from 176 researched male corpses a group of 37 men in number was sorted with cirrhosis.

The research the liver porto-caval canal's constitution was run with method of bloodstream reconstruction with help of anatomic corrosion preparations (Fig. 3).

Organ metric researching the liver porto-caval canal's vessels was run on finished corrosion preparation based on method of topographic-anatomic researching offered by Malygin A. (1949) according to which vessels' number, mean diameter and length of portal and caval systems in right and left liver lobes were determined. Af-

ter this a comparative analysis of male groups with and without liver cirrhosis was run.

Statistic data processing was run based on PC Intel Pentium IV using Ms Excel 9,0, Statistica for Windows 6.0, Primer of Biostatistics Version 4.03 by Stanton (Glants S., 1999; Sergienko V., Bandareva I., 2006).

Results of research and their discussion

Anthropomorphic measurements of male corpses with following somatotyping after preliminary histological researching showed the following somatotypes' distribution in groups (Table 1).

Table 1

Quantitative and percentage somatotypes' distribution among men of different researching groups

| Somatotypes | Researching groups (N = 176) | |
|--------------|--|--|
| | Men free of liver cirrhosis (n ₁ = 139) | Men with liver cirrhosis (n ₂ = 37) |
| Gynaemorphic | 23 (16,5%) | 3 (8,1%) |
| Mesomorphic | 47 (33,8%) | 14 (37,8%) |
| Andromorphic | 69 (49,7%) | 21 (54,1%) |

In the course of researching of organ metric indexes of male group's liver without cirrhosis a number of peculiarities was detected (Table 2).

It was detected that objects of gynaemorphic type in contrast to men of mesomorphic and andromorphic types have statistically significant ($p < 0,05$) smaller value of index-

es of liver weight and falciform ligament's length, objects of andromorphic somatotype have bigger value of these indexes, objects of mesomorphic somatotype take an intermediate place. The smaller value of liver weight among men of gynaemorphic somatotype is connected

with statistically significant ($p < 0,05$) smaller value of indexes of linear sizes (length, width, thickness) of right and left lobes in comparison with objects of other somatotypes the values of linear indexes of which are not different in the main.

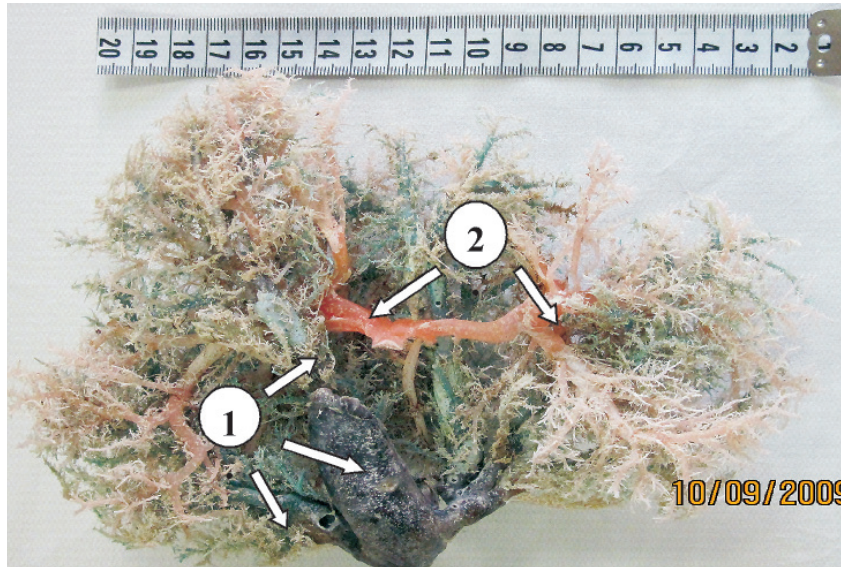


Fig. 3. Corrosion preparation of the liver porto-caval system (1 – green colour – the hepatic veins' system, 2 – pink colour – portal vein's system)

Organ metric indexes male corpses' liver without cirrhosis among different somatotypes

Table 2

| Parameters | Somatotypes | | | Significance's level p |
|----------------------------------|-----------------------------|----------------------------|-----------------------------|--------------------------|
| | Gynaemorphic ($n_1 = 23$) | Mesomorphic ($n_2 = 47$) | Andromorphic ($n_3 = 69$) | |
| Liver weight (kg) | $1,33 \pm 0,02$ | $1,54 \pm 0,04$ | $1,87 \pm 0,06$ | $p_{2-3,2-4,3-4} < 0,05$ |
| Falciform ligament's length (cm) | $8,33 \pm 0,04$ | $11,41 \pm 0,18$ | $13,56 \pm 0,39$ | $p_{2-3,2-4,3-4} < 0,05$ |
| The right lobe's length (cm) | $17 \pm 0,04$ | $17 \pm 0,21$ | $18,47 \pm 0,25$ | $p_{2-4,3-4} < 0,05$ |
| The right lobe's width (cm) | $14 \pm 0,07$ | $13,91 \pm 0,28$ | $16,41 \pm 0,45$ | $p_{2-4,3-4} < 0,05$ |
| The right lobe's thickness (cm) | $7 \pm 0,04$ | $8,33 \pm 0,18$ | $8,93 \pm 0,23$ | $p_{2-3,2-4,3-4} < 0,05$ |
| The left lobe's length (cm) | $13 \pm 0,07$ | $11,33 \pm 0,25$ | $14 \pm 0,34$ | $p_{2-3,2-4,3-4} < 0,05$ |
| The left lobe's width (cm) | $10 \pm 0,04$ | $10,25 \pm 0,15$ | $10,27 \pm 0,28$ | — |
| The left lobe's thickness (cm) | $3 \pm 0,01$ | $4,16 \pm 0,17$ | $4,64 \pm 0,17$ | $p_{2-3,2-4} < 0,05$ |

Organ metric parameters the liver portal system's vessels gynaemorphic somatotype's objects distinguish for certain ($p < 0,05$) smaller values in comparison with parameters of representatives of mesomorphic and andromorphic somatotypes (Table 3).

It was revealed that for objects of gynaemorphic somatotype from group without cirrhosis smaller organ metric parameters of portal system's vessels (number, length, and diameter) for right and left liver lobes are typical. For objects of andromorphic somatotype

bigger indexes of these parameters are typical. Objects of mesomorphic somatotype take an intermediate place.

Somatotypical peculiarities the liver caval system's constitution of objects of gynaemorphic somatotype are cardinal opposite. It is revealed that men of this somatotype have significant ($p < 0,05$) bigger value the indexes vessels' number, length, and diameter. Objects of andromorphic somatotype have smaller value of these indexes. Objects of mesomorphic somatotype take an intermediate place (Tab. 3).

Table 3

Organ metric indexes male corpses' liver free of cirrhosis among different somatotypes

| Parameters | | Somatotypes (N = 139) | | | Significance's level <i>p</i> |
|---------------|---------------|---|--|---|--|
| | | Gynaemorphic (<i>n</i> ₁ = 23) | Mesomorphic (<i>n</i> ₂ = 47) | Andromorphic (<i>n</i> ₃ = 69) | |
| Portal system | Number | 3,17 ± 0,09 | 4,33 ± 0,05 | 5 ± 0,01 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| | Length (mm) | 5 ± 0,02 | 6,58 ± 0,27 | 6,28 ± 1,11 | <i>p</i> _{2-3,2-4} < 0,05 |
| | Diameter (mm) | 1 ± 0,01 | 2,03 ± 0,09 | 3,38 ± 0,08 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| Caval system | Number | 4 ± 0,04 | 3 ± 0,01 | 2,42 ± 0,07 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| | Length (mm) | 15,33 ± 0,23 | 9 ± 0,01 | 7,23 ± 0,09 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| | Diameter (mm) | 4 ± 0,03 | 1,83 ± 0,08 | 2,53 ± 0,15 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |

It is revealed that the value of indexes the liver's organ metric parameters and interhepatic vessels of male porto-caval system without cirrhosis of different age do not distinguish significant.

Thereby, according to the data the liver's organ metric and its porto-caval canal in the group of men without cirrhosis one can draw a preliminary conclusion that objects of gynaemorphic somatotype age-independent with significant smaller value of indexes of organ metric (liver's weight, its lobe's length, width, thickness) venous blood flow in portal system is significantly smaller in comparison with other somatotypes and outflow is more because of more developed system of hepatic veins therefore, the load on hepatocytes decreases. Objects of andromorphic somatotype having a more developed interhepatic system of portal vein have weak developed outflow system (system of hepatic veins) that is it appears an

inconformity between volume of outflowing and coming venous blood sideways to the last one therefore, the load on hepatocytes increases which means that objects of this somatotype subject to pathologic influence of damaging factor on hepatocytes (cirrhosis development) and have less chance to regenerate.

While researching of liver organ metric parameters and its porto-caval system of male corpses with histological proved cirrhosis it is revealed that there is an absence of statistically significant differences by indexes of liver weight, length, width, and thickness among objects of different age groups and somatotypes.

Researching showed that interhepatic vessels in all corrosion preparations of caval and portal systems age- and somatotype-independent are characterized by a small number, sizeable diameter, short and dilated peripheric vessels heels of which are «melt» like «burnt tree» (Tables 4, 5; Fig. 4, 5).

Table 4

Organ metric indexes liver vessels of male corpses with cirrhosis of different somatotypes

| Parameters | | Somatotypes (N = 37) | | | Significance's level <i>p</i> |
|---------------|---------------|--|--|---|--|
| | | Gyanemorphic (<i>n</i> ₁ = 5) | Mesomorphic (<i>n</i> ₂ = 14) | Andromorphic (<i>n</i> ₃ = 18) | |
| Portal system | Number | 2,14 ± 0,02 | 3,2 ± 0,01 | 3,1 ± 0,02 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| | Length (mm) | 8,2 ± 0,3 | 11,2 ± 0,05 | 14,12 ± 0,21 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| | Diameter (mm) | 4,1 ± 0,02 | 9,8 ± 0,02 | 10,3 ± 0,01 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| Caval system | Number | 3,5 ± 0,02 | 3 ± 0,01 | 2,12 ± 0,05 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| | Length (mm) | 5,21 ± 0,03 | 7,1 ± 0,01 | 8,13 ± 0,07 | <i>p</i> _{2-3,2-4,3-4} < 0,05 |
| | Diameter (mm) | 3,1 ± 0,02 | 3,13 ± 0,08 | 4,51 ± 0,11 | <i>p</i> _{2-4,3-4} < 0,05 |

Table 5

Organ metric indexes liver vessels of male corpses with cirrhosis of different age groups

| Parameters | | Age groups (N = 37) | | |
|---------------|---------------|---------------------------|---------------------------|------------------------|
| | | Aged 36-60 ($n_1 = 16$) | Aged 61-74 ($n_2 = 21$) | Significance's level p |
| Portal system | Number | 3,15 ± 0,02 | 3,2 ± 0,12 | — |
| | Length (mm) | 9,12 ± 0,3 | 9,14 ± 0,15 | — |
| | Diameter (mm) | 4,1 ± 0,02 | 4,2 ± 0,12 | — |
| Caval system | Number | 3,5 ± 0,12 | 3,1 ± 0,21 | — |
| | Length (mm) | 5,21 ± 0,13 | 5,1 ± 0,11 | — |
| | Diameter (mm) | 3,4 ± 0,02 | 3,3 ± 0,04 | — |



Fig. 4. Corrosion preparation the caval system's vessels of male liver with histologic proved cirrhosis aged 68 of andromorphic somatotype

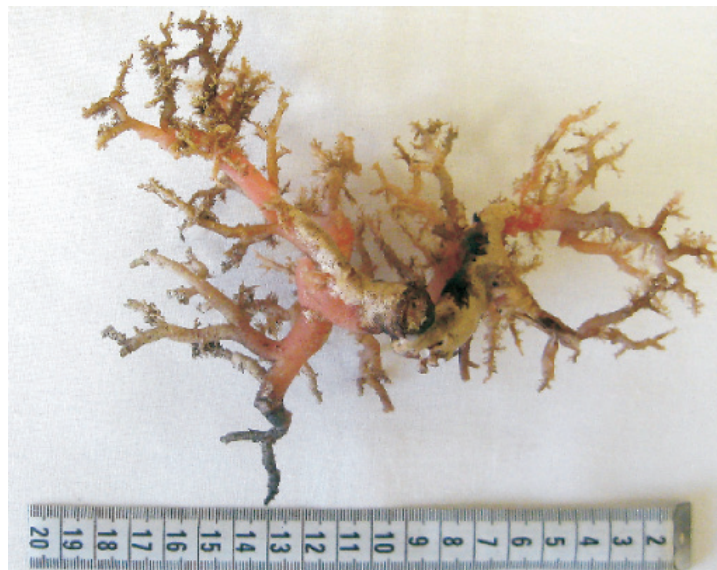


Fig. 5. Corrosion preparation the portal system's vessels of male liver with histologic proved cirrhosis aged 57 of mesomorphic somatotype

Besides, it is revealed that the value vessels' indexes of portal system of cirrhosis changed liver exceed the value vessels' indexes of caval system somatotype- and age-independent.

In spite of the fact that there is an absence the organ metric parameters' differences of cirrhosis changed liver among men with different somatotypes one can not except a somatotypical predisposition to the liver cirrhosis development because a number of objects of gynaemorphic somatotype taking part in the researching ($n_1 = 3$ (8,1%)) is considerable less than a number of objects of mesomorphic somatotype ($n_2 = 14$ (37,8%)) and more than andromorphic one ($n_3 = 21$ (54,1%)).

Thereby, the researching the liver's organ metric peculiarities and its porto-caval system proves a previously made conclusion that ability of hepatic issue to regenerate depends on maturity degree of intrahepatic caval and portal systems the maturity degree of which depends on constitution.

The comparative analysis of liver organ metric parameters and intrahepatic porto-caval vessels of male groups with and without cirrhosis also proves a constitutional predisposition to liver cirrhosis development. It is established that liver's weight among objects of gynaemorphic somatotype is significant ($p < 0,05$) less than liver's weight among men with liver cirrhosis of the same somatotype ($1,33 \pm 0,02$ and $1,66 \pm 0,12$ kg) considering smaller value of almost all linear parameters of the both lobes.

It is established that indexes of vessels canal of portal system among objects of gynaemorphic somatotype without cirrhosis ($p < 0,05$) are significant less than the same one among representatives of gynaemorphic somatotype with liver cirrhosis; value of indexes of caval system among objects of gynaemorphic somatotype without cirrhosis is significant ($p < 0,05$) bigger than the same one among representatives of gynaemorphic somatotype with cirrhosis. One can not say about representatives of mesomorphic and andromorphic somatotypes of comparison groups because they have minimal differences of researching indexes. Objects of mesomorphic somatotype without liver cirrhosis differ from objects of the same somatotype with liver cirrhosis in smaller indexes of vessels canal of portal system, notably smaller indexes of length ($6,58 \pm 0,27$ and $11,2 \pm 0,05$ cm) and diameter ($2,03 \pm 0,09$ and $9,8 \pm 0,02$ cm). While comparison of organ metric indexes of objects of andromorphic somatotype among the comparison groups there are not many differences. There is just small index the vessels' diameter of portal system ($3,38 \pm 0,08$ and $10,3 \pm 0,01$ cm).

Analysis of received data allows detecting somatotype-dependent male predisposition to liver cirrhosis development. Men of andromorphic somatotype age-independent have smaller value of indexes of outflow (caval system) venous blood from liver but bigger value of indexes of portal system.

Therefore, increase of length and diameter of vessels of portal system can be interpreted as factors proving predisposition to liver cirrhosis.

All in all, researching of changeability of organ metric parameters of liver and intrahepatic vessels of porto-caval system subject to male somatotype allowed determining somatotypical revealed risk factors of liver cirrhosis development. The comparative analysis of organ metric indexes of male liver with and without cirrhosis can serve as a factor of constitutional predisposition to irreversible changes in the liver's structure among men of andromorphic somatotype.

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*Materials of Conferences***SOME SHOWINGS OF VARIABILITY OF HEART RATE WITHIN YOUNG BADMINTON PLAYERS**

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In the opinion of many authors (A.V. Polustuev, 2002; A.V. Sherbakov, 2009; S.A. Kosenchuk, 2010; and others.), modern sport badminton is notable for the specific of approach to the train and competitive process, because the result depends on the whole complex of the components: technically tactical training, functional and psychological condition. Very important component of train process is accordance of physical load to the current functional condition. One of the most objective criterions of estimation of sportsmen's current functional condition is showing, which displays the condition of mechanisms of vegetative regulation of cardiac activity.

For examination of sportsmen's functional condition there becomes more and more popular the analysis of variability of heart rate (VHR), which is an integral showing of functional condition of cardiovascular system and organism in whole.

The aim of the research was examination of some showings of variability of heart rate within young badminton players.

The research was carried out at the base of «Specialized Children and Youth School of Olympic Reserve №9», (Krasnodar) and specialized SCYSOR of Krasnodar krai in the city of Korenovsk and Dinskaya village, there were examined 35 badminton male players at the age of 17-21, who was qualified as master of sports. The analysis of variability of heart rate was carried out with the use of hardwarily program coplex «BHC-Spector» of «Neurosoft» firm (Russia, Ivanovo).

For the screening estimation the most informative are the showings of cardiointervalography by R.M. Baeovski, 1988: Mo – mode, AMo – Amplitude of mode, VS – Variational swing, AQ – Average quadratic declination, IV – index of voltage.

As the results of carried out researches show the examined young badminton players are able to be divided by their vegetative status: with the presence of normotonia – 22, parasympathicotonia – 10, sympathicotonia – 3.

Received facts allow to take into consideration the degree of tension of central mechanisms of regulation of young sportsmen at the process of their adaptation to the changing invironment impact.

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PECULIARITIES OF NITROUS OXIDE STRESS-REACTION AND METABOLISM AMONG PERSONS OF YOUTHFUL AGE WITH VARIOUS LEVELS OF NORMAL DIASTOLIC ARTERIAL PRESSURE

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An increase in arterial pressure (AP) is the leading cause of death among the population of the world, strong and independent risk factor of heart-vascular diseases, and its role exceeds the contribution of smoking, hyperglycemia, dislipidemy, and obesity. This risk has two thresholds: it grows along with AP! Under physical or mental strain, in terms of stress, systolic pressure alters in larger scale than diastolic, but the latter is paid little attention to.

The research objective is to estimate the relation character between normal dualistic arterial pressure with the level of stress-activity and biochemical markers (NO) among young people.

Methods and materials. The research has been carried out upon almost healthy students of 17-21 years old of the first and the second year of medical and paediatric faculties of medical academy. All tests were carried out in laboratory conditions at morning hours (8,00 to 12 a.m.) with a regulated handwritten consent od students.

To estimate stress-reactivity (SR) we used six different methods:

- 1) color test of Lusher (L.N. Sobchick, 1990);
- 2) questioning of J. Taylor to reveal the anxiety level (A.B. Leonova, V.I. Medvedev, 1981);
- 3) evaluation of «individual minute» (Y.O. Alyanchikova, A.G. Smirnov, 1997);
- 4) iridoscopic definition of the number of iris nervous rings (E.S. Velhover and others, 1989);
- 5) functional probe «Mathematic calculation» (V.I. Kiselev and pthers, 1989);
- 6) automatic analysis of heart rhythm with usage of apparatus-program complex «Chronocard 2.2» to evaluate the index of regulatory systems' tension (IRST) (R.M. Bayevskiy, 1079).

All SR parameters were estimated via ranging into high, average, and low (3, 2, and 1 point correspondingly), sum SR was calculated.

To receive an express-evaluation of physical healthiness we used a method, developed under the supervision of professor G.L. Apanasenko (1988). The degree of extra-introversion and neurotism was defined via the question list of G. Aizenk (1992).

To define the level of nitrous oxide (NO) metabolites among 123 students (60 young men and 63 women) we undertook an intake of alveolar air and its condensation until the discharge of 1,5-2 ml of fluid. Prior to that at the level of shoulder artery arterial pressure (AP) and pulse frequency (PF) were defined by a device «Omron MX-3». The estimation of sum concentration of nitrites and nitrates (CNN) – stable nitrous oxide metabolites – in the concentration of alveolar air was carried out through restoration of nitrates back to nitrite-anions under an impact of coppered cadmium under pH = 9. The concentration of nitrite-anions was defined with Griss reactive that was mixed with an equal volume of the studied probe; absorption under the wave length of 550 nm was estimated on the analyser SpectraCount (Packard, USA). CNN was defined according to the metering

curve with usage of sodium nitrite (V.I. Buvaltsev and others, 2002).

Statistic processing was carried out with an applied program package «Statistika 5.5». M – selective average, and m – error of average were defined. The reliability of inner-group differences under the inspection of statistic hypothesizes in our research was defined with criterions of Mann-Witney (U-criterion), criterion of Wilcoxon. Correlation coefficient of Spirman was calculated as well.

The research results. All the studied were divided into 3 classes of normal diastolic pressure: 60-79 mm of mercury – optimal ADP, 80-84 mm of mercury – normal ADP, 85-89 mm of mercury – high normal ADP. Persons who received 3 or less points in the express-evaluation of healthiness level by G.L. Apanasenko were excluded from the further result analysis.

Table 1
Parameters of stress-reactivity and CNN among young men with different levels of normal ADP

| Indexes | Persons with optimal ADP | Persons with normal ADP | Persons with high normal ADP | <i>p</i> |
|---------------------------|------------------------------|------------------------------|------------------------------|----------|
| | <i>n</i> = 44 | <i>n</i> = 10 | <i>n</i> = 5 | |
| ADP, mm of mercury | 70,11 ± 0,74 | 82,20 ± 0,47 | 87,60 ± 0,93 | |
| Average AP, mm of mercury | 128,61 ± 1,72 | 134,00 ± 3,01 | 131,00 ± 3,83 | |
| Cardiac rate | 70,57 ± 1,51 | 76,40 ± 2,43 | 76,00 ± 2,92 | |
| Height, cm | 178,55 ± 1,13 | 180,6 ± 1,59 | 178,8 ± 2,85 | |
| Body mass, kg | 69,97 ± 1,52 | 70,50 ± 1,86 | 76,40 ± 6,73 | * |
| Introversion, points | 12,40 ± 0,47 | 12,60 ± 1,03 | 11,80 ± 1,62 | |
| Neurotism, points | 7,68 ± 0,72 | 7,30 ± 1,36 | 5,00 ± 0,89 | * |
| IRST, point | 117,59 ± 11,32 | 122,30 ± 22,78 | 145,60 ± 35,01 | * |
| Sun heart rate, points | 9,24 ± 0,24 | 9,89 ± 0,42 | 9,20 ± 0,37 | |
| CNN, mcM/l | <i>n</i> = 42 7,44 ± 0,94 | <i>n</i> = 10 5,38 ± 0,83 | <i>n</i> = 4 3,76 ± 0,61 | * |

Table 2
Parameters of stress-reactivity and CNN among young women with different levels of normal ADP

| Indexes | Persons with optimal ADP | Persons with normal ADP | Persons with high normal ADP | <i>p</i> |
|---------------------------|------------------------------|------------------------------|------------------------------|----------|
| | <i>n</i> = 90 | <i>n</i> = 18 | <i>n</i> = 5 | |
| ADP, mm of mercury | 72,55 ± 0,5 | 82,00 ± 0,41 | 88,00 ± 0,68 | |
| Average AP, mm of mercury | 116,96 ± 0,98 | 124,00 ± 2,05 | 124,00 ± 2,37 | |
| Cardiac rate | 75,99 ± 0,92 | 82,42 ± 3,14 | 77,67 ± 3,62 | * |
| Height, cm | 165,78 ± 0,59 | 162 ± 1,56 | 166,83 ± 2,94 | |
| Body mass, kg | 54,64 ± 0,7 | 54,14 ± 1,67 | 56,51 ± 1,77 | |
| Introversion, points | 11,94 ± 0,35 | 10,61 ± 0,78 | 11,83 ± 0,79 | |
| Neurotism, points | 9,06 ± 0,47 | 11,83 ± 1,08 | 9,33 ± 1,56 | * |
| IRST, point | 118,83 ± 9,66 | 155,64 ± 29,98 | 105,9 ± 40,22 | * |
| Sun heart rate, points | 9,47 ± 0,19 | 11,21 ± 0,46 | 10,00 ± 0,63 | |
| CNN, mcM/l | <i>n</i> = 42 8,24 ± 0,58 | <i>n</i> = 10 7,96 ± 2,42 | <i>n</i> = 3 7,24 ± 1,20 | |

The majority of young men (44 persons) had an optimal arterial diastolic pressure (ADP), those with optimal ADP also had the lowest body mass. According to the sum HR groups differed insignifi-

cantly, and the level of neurotism was even lower among persons with normal ADP. The comparison of NO metabolites concentration in the condensate of the inhaled air showed us that the highest con-

centration of it have persons with optimal ADP, and the lowest – those with high normal ADP. Diastolic pressure correlated with CNN among the young men with optimal ADP ($r = -0,38$, $p = 0,0144$), and among those with high normal pressure – with IRST ($r = 0,79$, $p = 0,0327$).

The results' analysis among the young women showed us that the majority of the studied has an optimal ADP level. Differences in height and mass were unreliable, a trend towards body mass growth was observed among the patients with high normal ADP. Persons with high normal pressure had higher indexes of neurotism, stress-reactivity, including high IRST parameters. Differences in CNN carries a character of trend – the highest concentration was observed among the patients with optimal ADP.

According to the described data we can suppose that for young men humoral factors, particularly nitrous oxide production are more important in the process of dualistic pressure regulation, while for women stress prevails the stress factor. Besides, young women with normal pressure, obviously, form even higher risk group than persons with high normal pressure. However, additional research is required for more detailed answer to this question.

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MRI OF ADRENAL GLANDS IN PATIENTS WITH HYPERTENSION-VERGE NORMS AND PATHOLOGY

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Adrenal condition assessment in patients with hypertension by MRI has certain characteristics, because the shape, size and position of the adrenal gland are different. At present, information on how to conduct a survey of the adrenal gland based on morphological (death), as well as norms derived with x-ray computer tomography. Simple transfer of the data on MRI survey on low-floor systems cannot be applied because the dimensions obtained when CT and MRI are significantly different, so much so that the definition of a number of parameters for CT for frontal sections without reconstruction images difficult. In particular this applies to the frontal or sagittal sections, where not only describes the rules for the adrenal glands of these cross-sections, but even among the MRI CT they may vary in degrees of intensity signal from cerebral and brain substance evaluation used sequences of sections and the thickness of the slices.

Therefore we have decided to describe along with pathologies in patients with hypertension, normal values of the adrenal gland, which could then be used in the practice of doctors.

Adrenal survey conducted among 470 healthy persons (M-226, W-244) between the ages of 20 to 60 years. In the categories of age range with a difference at 10 years old were assessed the shape and dimensions of the adrenal gland in axial and frontal cross-sections at thickness of slices, 5 and 7 mm in T1 and T2 sequences with the parameters of the protocols used for kidney and adrenal glands. In axial and frontal cross-sections determined the height of the medial leg right and the left adrenal gland and the length of lateral leg. These two sections are determinative, since the legs of the adrenal gland can be arranged at an angle to each other and, consequently, sizing only one axial sections, may make the error in measurement.

Lateral leg length is measured from the beginning of the adrenal gland to visualization its merger with the medial leg at the level of the body in front and axial cross-sections; the height of the medial – maximum of visualization on axial and front-end transects To average the data standards for adults, we have combined age ranges 21-40 years and 51 and older in two groups, to some extent through simplification. This is done specifically because the age range of 1 to 20 law requires individual interpretation due to the growth of the organism. In the old, i.e. over 51 years during the life of the accumulated negative factors (weight gain, osteoporosis, reaction to stressful situations, metabolic diseases, etc.), including the individual modalities reaction of the adrenal gland that can cause changes in their form and structure.

According to the results of the measurements of the height of the medial leg right adrenal gland in the age group 21-40 years in the front rail was $19,06 \pm 4,79$ mm; the length of the lateral – $13,3 \pm 3,37$ mm. The dimensions of the medial leg left adrenal gland in norm in front-end transects were: the height of the medial leg – $23 \pm 3,72$ mm; length of lateral leg – $12,9 \pm 2,36$ mm.

In the older age group 51 years and more, these indicators were: the height of the medial leg right adrenal gland – $21,54 \pm 3,23$ mm; length of lateral leg – $12,63 \pm 3,44$ mm; the height of the medial leg left adrenal gland in front of cross-sections – $22,2 \pm 5$ mm; length of lateral leg – $16,66 \pm 3,71$ mm.

In axial transects the height of the medial leg right adrenal gland in the Group of 21-40 years old $22,48 \pm 4,49$ mm; length of lateral leg right adrenal gland – $13,34 \pm 3,51$ mm. Dimensions-height medial leg left adrenal gland in axial sections $20,5 \pm 4,32$ mm; length of lateral leg left adrenal gland in axial transects $14,94 \pm 3,54$ mm. In the older age group, the height of the medial leg left adrenal gland in axial transects was $21,74 \pm 4,73$ mm; length of lateral leg – $13,82 \pm 4,11$ mm.

If you take the averages for all age groups 20-60 let, the size of normal adrenal gland in front of cross-sections are estimated to be: the height of the medial leg right adrenal gland – $19,2 \pm 4$ mm; length of lateral leg right adrenal gland – $12,6 \pm 3$ mm. The height of the medial leg right adrenal gland in axial transects – $22,19 \pm 5,65$ mm; length of lateral leg right adrenal gland in axial cross-sections – $12,41 \pm 4$ mm.

The averages for the left adrenal gland for all age groups were: the height of the medial leg left adrenal gland in front of cross-sections – $21,39 \pm 4,44$ mm; length of lateral leg left adrenal gland in front of cross-sections $12,91 \pm 3$ mm. Size of left adrenal gland for all age groups – 20-60 let in axial transects were: the height of the medial leg – $20,14 \pm 4,68$ mm wooden; length of lateral leg left adrenal gland – $15,0 \pm 4,68$ mm wooden. On the basis of received data can be concluded that the normal left adrenal gland normally more right ($p < 0,01$). These data do not conflict with pat morphological descriptions.

When the characteristic form of the adrenal gland, remember that they are in front of cross-sections in the form of inverted «Y», a long wing which is medial foot and short-lateral. In axial transects form adrenal gland is either in the form of «birds» or inverted or lying on its side of the letter «V»; less frequently, about 3-5% of cases in axial cross-sections it has branching type of building, contains 2 lateral leg as brush hanging down in parallel. Lateral leg right adrenal gland located close to the bottom of the hollow Vienna and, usually, is welded with it. In the structure of adrenal gland in norm no hypo intensive inclusions, clearly defined cortical and cerebral substance, but may be elements of a lipid infiltration.

The angle of the bland-lateral leg from medial in the frontal plane may be different. For axial cross section it does not matter, while the front rail lateral foot may not completely fit within the plane of the section, i.e. look shorter than it actually is. This explains the diversity of forms of adrenal gland when researching in front of cross-sections. Sometimes lateral foot is angled towards the top, and we are dealing with a variant form, resembling the letter «Y». In axial transects better viewing structure of cerebral and brain substance adrenal gland, and diligence it to the bottom of the hollow Vienna.

Form of adrenal glands, which differ from the norm, but do not have nodular or diffuse hyperplasia, attributed to adenopathy. From the perspective of clinic's – adenopathy – is a condition of endocrine glands, which in the future, under certain conditions, can be transformed into nodular or diffuse hyperplasia or hypertrophy gland or under the influence of any factors (e.g., treatment) to return to normal. In this sense, adenopathy is a term more closely explains a valid functional and morphological range of deviations from the norm. In our study, such changes are identified by 257 sick AG, which amounted to 47 per cent to the group as a whole.

However, even if you have high blood pressure, approximately 21 % of patients with adrenal glands do not exceed in size beyond the limits of admissible norm and had no structural abnormalities.

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**PECULIARITIES OF PHYSICAL
DEVELOPMENT OF JUNIOR
SCHOOLCHILDREN OF COMPREHENSIVE
SCHOOL AND SPECIALIZED
EDUCATIONAL INSTITUTION
OF COMPENSATING TYPE IN
KRASNODAR KRAI**

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A special role at the complex of actions that form full-fledged personality of child belongs to the physical development. But as the analysis of literary sources shows, the comparison of the level of child's physical development occurs within the middle-aged rates of physical condition in any single Russian region, usually in Moscow and its area. The aim of this research is examination of morphological peculiarities of physical development of junior schoolchildren of comprehensive school and specialized educational institution of compensating type in Krasnodar krai. For solving this problem in this research there was applied anthropometric method. We used generally accepted anthropometrical instruments: easel wooden stadiometer (for length of the body measurement), metallic auxanometer of Martin, centimeter tape, floor electronic balance. For every child there was created a special «Chart of anthropometric facts», in which there were entered showings, received at the result of measurements. At the experiment there took part children of junior school age about 8–11 years old in quantity of 123 persons, 82 of them were students of Krasnodar comprehensive school № 12 (48 girl and 34 boys) and 41 of them were students of State specialized educational institution of compensating type of Belaya Glina village in Krasnodar krai (20 girls and 21 boys). As the result of research there was stated that the dynamics of average length of the bodies within 8–11 years old children of specialized educational institution of compensating type has positive tendency and is identical to the development of this characteristic within their peers of comprehensive school; by the average showings of body weight student of specialized educational institution have low values in comparison with children of comprehensive school. Thereby, received anthropometrical showings, which characterize physical development of junior schoolchildren of comprehensive school and specialized educational

institution of compensating type, are able to be used for improvement of the process of physical education within the scope of educational program.

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FEATURES OF ROTATION OF INTESTINAL TUBE IN RAT

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Rotation of intestinal tube (RIT) passes against hand in 4 stages of human embryogenesis. RIT in white rat was not described in literature. On first stage of RIT (on 90°) midgut is displaced on the right side from hindgut (colon) under pressure of hepatic right lobe. Growth of ventral (preportal) parts of liver predominates on second stage of RIT in man, including passing to the right side and under duodenum. Therefore head of pancreas (HP) grows to the left side with displacing of initial segment of jejunum under sagittal segment of colon and to the left side from midline, where loops of jejunum are formed. II RIT is absent in white rat: growth of dorsal (retroportal) parts of liver predominates, they displace inner organs to bottom of abdominal cavity. Therefore all small intestine remains on the right side from midline, hindgut is on the left side from midline and on the it at more caudal level. HP grows into mesocolon. Caecum with its oblique and sagittal position is on the left edge of caudal part of umbilical hernial sac, loops of ileum occupies the remaining, most part of the sac. III RIT in man manifests as transference of sagittal segment of colon together with caecum and loops of ileum to the right side from midline (transition from sagittal plane in frontal plane). III RIT inverts and reduces in rat:

1) after setting in abdominal cavity loops of ileum are directed by means of hepatic right lobe often to the left side from midline and they displace initial part of colon to the right side with formation its ventral loop;

2) jejunum forms loops on the right side from midline and they «leave» middle part of ascending colon on midline;

3) HP «stretches» colon to the right side with formation dorsal loop of colon, which includes transverse colon and ending of ascending colon (reduced transition from sagittal plane in frontal plane);

4) caecum makes similar turn to the right side (on $\geq 90^\circ$) by means of traction of ileum and

remains under liver (IV RIT is absent in rat) or passes to the left side from midline and grows in caudal direct, to the left iliac fossa (inverse and reduced IV RIT).

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MORFOGENESIS OF MESENTERIC LYMPH NODES IN RAT

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I study development of mesenteric lymph nodes (MLN) in white rat, including 40 embryos of 12-21 days, the 10 new-born's (first day) and 40 rats of first month, on serial histological sections, staining by hematoxylin and eosin, picrofuxine, azur-II and eosin, silver nitrate with graphic reconstruction, and total preparations after injection of dark-blue mass of Gerota into mesenteric lymphatic bed. In the fetuses of 18-19 days cranial mesenteric artery and its branches invaginate into lumen of neighbouring mesenteric lymphatic vessels together with their endothelial walls and intermediate connective tissue. In result is formed common anlage of MLN as stromal tape. It becomes lymphoid tape in the fetus of 20 day. The tape narrows and loosens (decreasing of quantity of lymphocytes) in distal direct. In ventral direct from head of pancreas the lymphoid tape is discovered only in lumen of left mesenteric lymphatic trunk. Right mesenteric lymphatic trunk remains before head of pancreas by means of screening of wide cranial mesenteric vein. In the fetuses of 20-21 days this lymphoid tape is deformed (on sections it has crimped shape or consists of fragments with different sizes and shape) under pressure of neighbouring organs or in result twisting of root of mesentery. In the fetus of 21 day and new-born rat the tape is divided on the separate MLN with oval, round and bean's shape in connection with thickening of their capsules and accumulation of lymphocytes in their parenchyma. I didn't find MLN with tape form, but saw solid chain of paracolic MLN before head of pancreas. The central and possibly peripheral MLN lie along and about mesenteric lymphatic trunk, but MLN never interrupt it.

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FACIAL PAIN IN PATIENTS WITH THE PATHOLOGY OF THE NOSE AND PARANASAL SINUSES

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Headache is the most common pain symptom which occurs in 25-40% of population. Now it is considered that the nature of painful sensation depends not only on the damage, but also on the social, emotional and economic status of the patient. The International Association for the Study of Pain proposed the following definition: pain is an unpleasant sensation and emotional experience associated with actual or potential tissue damage or described in terms of such damage. That indicates that the pain sensation may also occur in the absence of tissue damage and can be caused by the mental component of pain perception. For the otorhinolaryngologist the most significant pains are facial pains. They are characterized by great diversity, insufficient analysis of etiology and pathogenesis of many forms and related problems of differential diagnosing and treatment [1, 2]. Pain is always subjective. The perception of pain depends on the psychological state, individual experience, sex, age, social factor, and religion of the patient. The perceptive component of pain reflects the discomfort of damage.

One of the most difficult moments of diagnosis is an unbiased analysis of pain symptom. Most developed methods for studying pain in medical practice are based on the subjective estimation of investigated patients, i.e. on sensations of the patient that cannot be objective.

In the Ear, Nose & Throat Clinic of the Rostov-on-Don State Medical University we have evaluated the facial pain symptom in 80 patients with diseases of the nose and paranasal sinuses using the «Multifactorial verbal-color pain test» [3]. This is a complex express method of pain evaluation and measurement. The test estimates intensity of pain syndrome components on 7 factor scales at multiple levels of psychic reflection – nociception, pain sensation, experience of pain, behavior under pain, and adaptability and allows to obtain an integral pain estimate in points/percents (both quantitative and qualitative). The study was performed with the computer version of test – «Peresvet Antibol» program. The test contains 7 scales, for each of which the minimum test result is zero, and the maximum is 6 points. Scales: lie, pain frequency, pain duration, pain intensity, sensory sensation of pain, emotional attitude to pain, neurotization, modalities (adaptability). This allows us to estimate the perception of pain at the level of nociception, sensation, experience, behavior under pain and adaptability.

All 80 patients had a detailed clinical examination including inspection, palpation and percussion of available walls of paranasal sinuses, anterior and posterior rhinoscopy, computed tomography (CT) of paranasal sinuses. In-depth history taking showed that 36 patients (45%) had acute inflammatory process in the paranasal sinuses, 23 patients (29%) had the exacerbation of chronic rhinosinusitis with disease duration from 7 months to 12 years. 22 patients (26%) with various forms of chronic rhinitis associated the cephalgia symptom with nasal breathing difficulty. 24 patients (30%) had nasal mucus discharge, 42 patients (52%) – mucopurulent discharge, 14 patients (18%) had no nasal discharge. 76 patients (95%) noted the difficulty in nasal breathing. All patients had signs of inflammatory process of nasal mucous membrane and/or paranasal sinuses with different degree of manifestation on CT.

The apparent painful symptom is observed in patients with acute purulent processes in the paranasal sinuses due to high (4 or more) points on scales of pain intensity and frequency, and in patients with absence of purulent process due to high points on scales of emotional perception and neurotization. We found the low average value of painful symptom (weak painful symptom) even in patients with the evident serious purulent process in the paranasal sinuses. The effects of overfatigue, stress, physical and mental overstrain on the painful symptom are noted on the scale of modality. Meanwhile the physical environmental factors (weather changes, noise, vibration, body position) were not decisive. Thus, the painful sensation that occurs in a patient did not correlate in any way with the cause and severity of the pathological process. This results from the fact that in the etiology of headaches there are many pathogenetic mechanisms, many of which are still insufficiently studied.

In clinical practice the significance of the painful symptom is rather high and demands more thorough analysis of all aspects of this major symptom.

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THE POSSIBILITIES OF RADIONUCLIDE DIAGNOSTIC OF THYROID GLAND CANCER

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Among radionuclide methods of thyroid gland cancer diagnostics there is tyrosceintigraphy with preparation Technetrit 99 mTc (MIBI). The goal of this research is to study the informativeness of this diagnostic study among patients with knot wen shape. Dynamic tyrosceintigraphy within the first 20 minutes after the preparation introduction once again two hours after the introduction was carried out among 181 patient. For all patients the correlation «cold knot/intact thyroid gland tissue» was estimated during each stage of the research. Besides, ultrasound investigation, tyroglobulin (TG) estimation, and knot biopsy was carried out. Depending on the technetrit accumulation degree all patient were divided into three groups. The first group – no medicine accumulation in knot. The second group – little accumulation, the third group – significant accumulation of medicine.

While analyzing the obtained data we have established a certain correlation dependence between indexes of TG and «knot – intact tissue» among patients of the second and the third group ($r = 0,66$).

Such dependence was not registered among the patients of the first group. No definite dependence between the size of visualized knot and the level of tyeglobulin in patients' blood, hormonal function of thyroid gland and technetrit test results.

It has been outlined that a single increase in index «knot – intact tissue» is insufficient to adequately diagnose cancer. Consideration of a factor of further dynamics of its accumulation after an hour and two hours allows us to significantly increase the test informativeness from 63 up to 82%. Unreliable negative test results were registered among patients without accumulation of technetrit in knot (about 10%) that were linked to small knot size (microarcinomes < 0,8 cm). We should outline that in 88% percent of cases of high preparartion accumulation under ultrasound investigation hypoechogenic formations were observed, in 79% of cases – its increased blood supply, 76% – microcalcifications. Research with technotrit allowed us to reveal 12 patients with thyroid gland cancer who do not have ultrasound semiotics of malignant growth and describing the process as a liquid or isoechoic formation.

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EMPLOYMENT AND SELF-EMPLOYMENT TRENDS IN RUSSIA AND IN THE WORLD AT THE TURN OF THE CENTURY

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In the article the features of employment and self-employment in Russia and in certain countries of the world in economic crisis and post-crisis periods are considered. The experience of population self-employment government regulation in various countries is analyzed.

Keywords: employment, self-employment, unemployment, countries of the world

Employment is the socio-economic relations among people on the subject of participation in generally useful labor. The employment indicator defines quantitative and qualitative levels of able-bodied population use, economic situation in the country, business and financial activity, living standard, income level, and population solvent demand. Employment is characterized by various forms, and structure of population employed in economic sectors.

The indicators of employment and unemployment are important not only for national economies development analysis, but for social progress evaluation. Employment and unemployment are the parameters that form population incomes, wage labor payment first of all. The level and the structure of incomes, on the one hand, determine the purchase power of various population groups, the balance of

countries economic and social development. On the other hand, these indicators enable us to draw a conclusion about self-employment level in the countries of the world.

Let us consider the features of employment in three groups of countries: advanced (Great Britain, Germany, France, Italy, Japan), developing (Egypt, China), and transition economies (Russia, Poland, Ukraine).

In advanced countries the greatest employment growth for almost twenty years occurred in Germany (38,7%). The labor markets in Great Britain, Italy, and Japan practically did not widen. The employment increase in developing countries was higher than in advanced countries (in Egypt – by 50%, in China – by 21%). In Russia and CIS the workers number decreased. Its increase after 2000 did not compensate the reduction in 1990-s (Table 1).

Table 1

Employed Number in Russia and in Certain Countries of the World (million persons) [5; 6; 7; 8]

| Country | 1990 | 2000 | 2004 | 2006 | 2007 | 2008 |
|---------------|-------|-------|-------|-------|-------|-------|
| Great Britain | 26,8 | 27,4 | 28,4 | 28,9 | 29,1 | 29,5 |
| Germany | 29,0 | 36,6 | 35,7 | 37,3 | 38,2 | 38,7 |
| France | 22,4 | 23,3 | 24,7 | 25,1 | 25,6 | 25,9 |
| Italy | 22,4 | 21,2 | 22,4 | 23,0 | 23,2 | 23,4 |
| Japan | 62,5 | 64,5 | 63,3 | 63,8 | 64,1 | 63,9 |
| Egypt | 14,4 | 17,2 | 18,7 | 20,4 | 21,7 | ... |
| China | 639,5 | 720,9 | 752,0 | 764,0 | 769,9 | 774,8 |
| Russia | 75,3 | 65,1 | 67,3 | 68,9 | 70,6 | 71,0 |
| Poland | 17,3 | 14,5 | 13,8 | 14,6 | 15,2 | 15,8 |
| Ukraine | 25,4 | 20,2 | 20,3 | 20,7 | 20,9 | 21,0 |

The unemployment of economically active population considerable part is the feature of labor markets in all countries (Table 2).

The unemployment level differs among the countries, and high and low indexes are observed both in developing and in advanced countries.

According to International Labor Organization, in 2007 the number of the unemployed in the world risen by 2,9 million and reached 189,9 million persons. In 2007 in the world

45 million new working places were created. However that didn't influence the total number of unemployed in the world – the unemployment level was 6% both in 2006 and in 2007. Almost 62% people of able-bodied age (3 billion people) were placed in a job in 2007. Roughly 16,7% of all workers (487 million people) earned extremely few money – their families live on \$1 per diem. Families of 43,5% of workers (1,3 billion) live on \$2 per diem [2].

Table 2

Employment Level in Russia and in Certain Countries of the World, % [6; 7; 8]

| Country | Unit weight of economically active population | | | Unit weight of the unemployed in economically active population | | |
|---------------|---|------|------|---|------|------|
| | 2004 | 2006 | 2008 | 2004 | 2006 | 2008 |
| Great Britain | 50 | 50 | 51 | 4,7 | 5,4 | 5,3 |
| Germany | 49 | 51 | 51 | 11,0 | 10,3 | 7,5 |
| France | 45 | 45 | 45 | 9,9 | 9,8 | 7,4 |
| Italy | 42 | 42 | 42 | 8,8 | 6,8 | 6,7 |
| Japan | 52 | 52 | 52 | 4,7 | 4,1 | 4,0 |
| Egypt | 31 | 31 | 33 | 10,3 | 10,6 | ... |
| China | 58 | 59 | 60 | 4,2 | 4,1 | 4,2 |
| Russia | 51 | 52 | 52 | 7,8 | 7,2 | 6,3 |
| Poland | 49 | 44 | 45 | 19,0 | 13,8 | 7,1 |
| Ukraine | 47 | 48 | 49 | 8,6 | 6,8 | 6,4 |

In the 90-s the unemployment in Russia had mass nature. The highest unemployment level in this country was fixed in 1995–2000 – about 7 million people have the official unemployed status. In the period from 2002 to 2007 the unemployment level in Russia decreased annually. And in 2007 the minimal mark was achieved – 4,2 million people. International financial crisis provoked the production slump in many economic sectors. In October 2008 the reduction wave began. Since the end of 2008 there was the unemployment level growth – 5,8 million people. In 2009 this index risen up to 6,2 million people and in 2010 achieved 6,7 million people. In January 2011 the unemployment level decrease up to 5,8 million people occurred [2].

The indicators, describing population living standard (poverty level, people devel-

opment index that includes expected life interval, education level, GDP) are connected with unemployment level. The lowest poverty level is in advanced countries (about 5% from total population number). The highest – is in developing countries (from 16,7 to 32,6%). In the transition economies, for example in Russia, this indicator is 15,2%. People development index of advanced countries is considerable (about 0,950 at the average). Developing countries are notable for low people development index level (about 0,700 at the average). Russia has an interim value – 0.802 [7].

Apart from unemployment level employment is characterized by the distribution of workers among the economic sectors and kinds of activity (Table 3).

Table 3

Employees Distribution among Economic Sectors in Russia and in Certain Countries of the World, (%) [7; 8]

| Country | Year | Industry | Agriculture | Building | Transport and communications | Trade | Other sectors* |
|---------------|------|----------|-------------|----------|------------------------------|-------|----------------|
| Great Britain | 2008 | 13,1 | 1,5 | 8,1 | 6,7 | 19,0 | 51,7 |
| Germany | 2008 | 23,2 | 2,3 | 6,5 | 5,5 | 17,4 | 42,1 |
| France | 2008 | 15,8 | 3,0 | 7,2 | 6,3 | 16,6 | 51,0 |
| Italy | 2008 | 21,3 | 3,8 | 8,4 | 5,5 | 20,2 | 40,8 |
| Japan | 2008 | 18,9 | 4,2 | 8,4 | 6,1 | 23,5 | 38,7 |
| Egypt | 2007 | 12,6 | 31,7 | 8,4 | 6,1 | 14 | 27,2 |
| China | 2008 | ... | ... | ... | ... | ... | ... |
| Russia | 2009 | 20,4 | 8,4 | 7,1 | 9,4 | 17,3 | 37,4 |
| Poland | 2007 | 23,8 | 14,7 | 6,9 | 6,4 | 16,8 | 31,3 |
| Ukraine | 2009 | 17,6 | 15,6 | 4,8 | 6,9 | 23,4 | 31,7 |

The note. *Other sectors include financial activity, operations with realty, lease, education, health care, social services, other services.

The feature of employment structure in advanced countries is the low share of agricultural workers and high unit weight of workers of trade and catering. In developing countries on the first place by employment among the sectors is agriculture. In a number of developing countries the employment share in trade approaches to the share of industry workers and even exceeds it. The employment structure in CIS evolves in direction of its market trans-

formation with great difference between European and Asian countries. In the first group of post-Soviet countries (for example in Russia) the structure changes according to advanced countries, whereas in the second group (Poland and others) it has a propensity mainly for the type of employment in developing countries.

These conclusions are confirmed by the unit weight of urban population in the total population number (Table 4).

Table 4

Unit Weight of Urban Population in Total Population Number in Russia and in Certain Countries of the World, (%) [7; 8]

| Country | 1995 | 2000 | 2005 | 2006 | 2007 |
|---------------|------|------|------|------|------|
| Great Britain | 88,7 | 88,9 | 89,2 | 89,2 | 89,9 |
| Germany | 86,5 | 87,5 | 88,5 | 88,5 | 73,5 |
| France | 74,9 | 75,7 | 76,7 | 76,7 | 77,1 |
| Italy | 66,9 | 67,2 | 67,5 | 67,5 | 67,9 |
| Japan | 64,6 | 65,2 | 65,7 | 65,7 | 66,3 |
| Egypt | 42,8 | 42,1 | 42,3 | 42,3 | 42,6 |
| China | 31,4 | 35,8 | 40,5 | 40,5 | 42,2 |
| Russia | 73,0 | 73,1 | 73,0 | 73,0 | 73,0 |
| Poland | 63,1 | 61,7 | 62,0 | 62,0 | 61,3 |
| Ukraine | ... | ... | 67,4 | 67,4 | 68,3 |

The table data show the high urbanization level of advanced countries. It is quite explicable with the historical point of view. Initially advanced countries are industrial countries.

The feature of developing countries is the agricultural direction. Traditionally China was notable for high population number, and there always was a problem of food safety ensuring. The feature of this country is that it has 22% of world population and at the same time only 7% of world ploughed field. China's sown areas are about 130 million hectare, there are 10 hundred square meters of sown areas per one Chinese. This country to the beginning of 21 century was able to achieve food self-sufficiency having less agricultural holdings than Russia and with the population that 8 time more than in Russia. New working places creating and struggle with poverty are the basic elements of Chinese concept of agriculture steady development [4].

As mentioned above, Poland has a propensity for the type of employment in advanced countries. The country has sufficient agro climatic conditions for animal husbandry and plant growing development. But as opposed to China agricultural producers in Poland do not obtain proper support from the Government, and more than 60% of village population prefers «surviving» strategy instead of «development» strategy [3].

It should be noted that there are workers distribution by their occupation depending on the type of the country. In advanced countries the share of managers, legislators, office workers, nonmaterial and trade workers, skilled workers, and operators is higher. In developing countries agricultural workers, unskilled workers prevail, and some of these countries have the high share of nonmaterial and trade workers.

Russia and Poland have an interim place by the occupational structure of employment: by the one group of work they are nearer to advanced countries, by the other – to developing countries.

Thereby the data adduced confirm the unstable condition of transition economies; crisis phenomena turn population to agriculture and services sphere.

One of the most important features of countries employment is the workers number distribution by the employment status (Table 5).

In advanced countries the share of employees was 74,5–89,5% of total workers number in large European states and Japan. Russia is in advance by that indicator (92,7%). In this case it is great dependence of Russian population from journey-work at private and public economic sectors. In developing countries the unit weight of employees is considerably lower. For a lot of developing countries the high share of self-employees and helpers at family enterprises is typical.

Table 5

Workers Number Distribution by the Employment Status in Russia and in Certain Countries of the World in 2008 (%) [7; 8]

| Country | Employees | Employers | Self-employees | Production cooperatives members | Helpers at family enterprises | Employees not distributed by employment status |
|---------------|-----------|-----------|----------------|---------------------------------|-------------------------------|--|
| Great Britain | 86,7 | 12,9 | ... | - | 0,4 | - |
| Germany | 88,4 | 10,7 | - | - | 1,2 | - |
| France | 89,5 | 4,6 | 5,3 | 0,0 | 0,6 | - |
| Italy | 74,5 | 1,2 | 20,4 | 0,1 | 1,7 | 2,0 |
| Japan | 86,5 | 2,5 | 7,0 | - | 3,5 | 0,5 |
| Egypt | 58,5 | 14,1 | 13,3 | - | 14,1 | - |
| China | ... | ... | ... | ... | ... | ... |
| Russia | 92,7 | 1,5 | 5,6 | 0,1 | 0,1 | - |
| Poland | 77,1 | 4,1 | 14,7 | ... | 4,1 | - |
| Ukraine | 82,0 | 1,0 | 16,7 | ... | 0,3 | ... |

Self-employees are those who organize the work without assistance, and it is the basic source of income. Self-employees include entrepreneurs; persons employed in individual labor activity (ILA), cooperatives members, people employed in personal subsidiary plot (PSP) [1]. Self-employment has two opposite aspects. On the one hand, self employment in market conditions is invariable impartially inherent element of market relations. Its development is conditioned by the action of both economic and social factors. Market economy takes self-employment to new level of goods production, hired labor force use. Economic ideology of the market is the transition of each able-bodied person to self-sufficiency and self-earning. More over, market creates new incentives to work through economic reality transformation: generation of property institution, entrepreneurship conditions. Last years in the world there is the trend to economic growth ability loss at the expense of governmental and large-scale sectors development. These sectors are not mobile, while small enterprises and self-employed subjects have high flexibility that enables to satisfy changeable necessities of the society. Just these enterprises have advantages in labor force involvement and low capital need. Exactly self-employment gives certain independence and opportunities to initiative development to the person, and in the sequel individual entrepreneurship experience and new financial abilities on a national scale are the basis of growth and development existing enterprises of small and medium-sized business that ensure the economic development level of the country.

On the other hand, for almost all countries of the world in crisis and post-crisis periods self-employment was the «surviving» strategy

for population. In this case self-employment is the forced measure. It is provoked by economic factors, market economy establishment problems and holes in social policy.

The result of incomplete employment is secondary employment development (second, third working place with full or short-time pay). Secondary employment in households became the important source of real incomes, receiving by significant part of countries population.

Thereby self-employment is able to be both the «development strategy» and «surviving strategy» for the population, and its choice depends on situation in the country.

Conclusions

Each country has its own type of population employment and self-employment.

The temperate expansion of labor markets with relatively low unemployment level, increasing of the high-tech and services sphere workers share, substantial immigration oriented on skilled workers inflow and filling of workplaces in sectors unattractive for native population is peculiar to advanced countries. The underemployment is quite typical for advanced countries. However in such countries it is used on a voluntary basis or as a temporary measure when coming to the job after the break by various reasons. So in the Netherlands there are 33% of workers are underemployed, in Norway – 26%, in Great Britain and Denmark – more than 20%. Self-employment develops population labor activity.

The main features of developing countries are high growth rates of workers, relatively high level of unemployment (including hidden unemployment in traditional agrarian sector), work force emigration, the choice of self-employment as a «surviving strategy».

The transition economies are characterized by employment expanding in extractive and raw materials sectors, high unemployment level and great work force migration mainly from CIS, secondary employment development.

With regard to post-crisis Russia the investigation of self-employment scale, its reasons, territorial and sectoral structure, and change dynamics should be the object of close attention among economists and regional management. For promotion of Russian economy in advanced countries group local government should purposefully and validly facilitate the most indigent citizens in self-employment («surviving») and then in following self-development of entrepreneurship (small business).

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INTERNATIONAL MIGRATION IN RUSSIA AND PROSPECTS FOR SOCIAL AND ECONOMIC DEVELOPMENT OF THE COUNTRY

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Modern science, like all humanity at the beginning of the XXI century faces new, more complex and difficult social, organizational, economic, political, legal, cultural and educational problems.

Keywords: international migration, Russia, prospects

The profound changes that are taking place in the world at the turn of XX-XXI centuries have led to greater international labor migration. Russia's transition to restrictive policy contributed to the fact that over 1997-2004 according to official data migration inflow of international migrants in the country decreased from 364,7 to 39,4 thousand or about 9 times, and the outflow of migrants out of the CIS countries decreased from 60,3 to 34,0 thousand or less than 2 times. At the same time in 2004 international migration outflow in the Far Eastern Federal District amounted to 568 people, in the Siberian Federal District it made 3933 people (the migration outflow from the Omsk region to Germany made 6112 people).

At the same time, under conditions of significant population decline due to negative natural increase, the western drift of internal migration playing a crucial role in the population decline of the eastern regions of the country as well as large-scale flows of irregular migrants (from 1, 5 to 15 million people including 250–450 thousand of the Chinese migrants) it becomes necessary to reconsider the existing model of migration policy¹.

According to the UN forecasts, the population of almost all European countries (of Russia and Japan as well) will decrease in the period from 1995 to 2050. Starting from 2009 the working-age population decrease in Russia will make 1 million people and more per year. Up to 2025 working-age population is projected to decline by 18-19 million people.

When analyzing the situation and looking for a way out the UN is considering several alternative scenarios of immigration flow and its possible influence on population changes and population aging in European countries including Russia. The number of immigrants required to prevent working-age population decline in Russia is estimated at 498 thousand people per year (about 25 million people in 2000-2050) with the most favorable fertility dynamics and life expectancy. The migration problem in the

next two to three decades will become of momentous importance for Russia. The scarcest resource in the country in the short term will be labour. Not oil, gas, or money, but labour, especially skilled one! It is no secret that the depopulation of the country has been taking place for more than 15 years. Almost all developed countries of Western Europe are in alike difficult demographic situation today.

The international flow of migrant workers in Russia's economy is being formed under the influence of very contradictory trends at the national labor market reflecting structural changes in the economy, employment and unemployment, labour supply and demand. These also include significant territorial differences. An important feature of the current model of the Russian economy is the thing that a strong demand for foreign labor in almost all regions including those with a crisis and critical situation with employment and unemployment has formed.

In general, the current situation in the Russian labor market remains quite complicated. Since, on the one hand, there are no considerable free labor resources connected with the cyclical pattern of unemployment which could be used to support further growth of Russian economy. On the other hand, a significant level of available resources due to the structural nature of unemployment is maintained. In this regard, under current conditions the measures aimed at addressing the structural imbalances in labor supply in the domestic labor market in favor of the fastest growing industries and territories by increased labor mobility are of particular significance².

While working out the strategic priorities of the country's development it is important to remember that during the reforms of the 1990-s the socio-demographic potential of Russia not only diminished but also deteriorated in quality. The human development index (HDI) in 1992 was 0,849 indicating that Russia belonged to the industrialized countries with high

¹ Sm.: Topilin A. Prognozy migracii naselenija Rosstaga i nacional'nye interesy Rossii // Mezhdunar. jekonomika. – 2006. – №3.

² Sm.: Suspicyyn S.A. Prostranstvennyye transformacii v kontrastnyh scenarijah ee razvitija: postanovka problemy i jempiricheskie ocenki // Region: jekonomika i sociologija. – 2006. – №1.

human potential (the maximum value of the index – 0,915 – was in Canada). But by 2002 it dropped to 0,795 resulting in the country's sinking in the scale from 30-th to 57-th place (out of 175 countries studied) and joining, according to the UN classification, a group of countries with average development level. There appeared high imbalance of the various components of the human potential in Russia. If the index of education of the Russian's citizens in 2000 remained close to that of the most developed countries, then the index of their longevity and income index corresponded to the level of the underdeveloped countries.³

Recently, in the conditions of recovery growth two opposing processes which paradoxically combine and determine the change in the socio-demographic parameters of reproduction have developed in the country.

First, there is the dynamic growth of material well-being indicators (based on 1,4 fold increase of per capita GDP during 5 years):

- significant (1,7 fold) increase in real personal income during 5 years with 2,1 fold increase of real wages and 1,5 fold increase in the personal consumption;
- improvement of consumption standards;
- increase of the population savings and loans which contributes to changes in the demand structure in favor of the acquisition of capital goods.

Second, despite considerable improvements in material well-being of the population demographics failed to be changed for better. Under these conditions there is not any evidence of a significant improvement in the dynamics of the major social indicators, but rather their stagnation or even new wave of deterioration which includes such features as life expectancy, health, and crime rates.

The situation is aggravated by the fact that regional and industry-specific distribution of human capital caused by the current attractiveness of the territories, industries and professions forms distortions in the labor force concentration in particular territorial and economic entities and the techno-economic systems, increases the imbalance in labor resources and blocks progressive economic and technological transformations in Russia.

According to the Federal State Statistics Service forecast in the period up to 2025 the trend of population concentration in the Central and Southern Federal Districts will maintain, their proportion in the country's population will increase in 2002-2026 from 26,3 to 27,3% and from 15,8 to 16,9% respectively. At the same time population decline in the North Western, Siberian and Far Eastern Fed-

eral Districts will continue. Omsk region in 2025 will be in the group of 14 Russian eastern and northern regions with a maximum reduction of the working-age population. These are the areas with permanent and significant population outflow. During 2006-2025 working age population may decrease from 1,300 thousand to 950 thousand people i.e. by 350 thousand people, or by 27%. Migration will lead to the population loss of 131,3 thousand people including 58,5 thousand of working age people. These developments can seriously complicate the challenges of economic development and aggravate social problems.

Thus, the forecasted by the Federal State Statistics Service scenario of migration suggests the preservation of prevailing negative trends in population distribution and human resources across the country.

The regions to the east of the Ural – Siberia and the Far East – are a strategic reserve of Russia's survival and of the development of comparative advantages of its economy. The area of the Siberian Federal District makes 30% of the Russian territory and is home to 20,5 million people. (14,3% of the population of Russia). 85% of Russia's reserves of lead and platinum, 80% of coal and molybdenum, 71% of nickel, 69% of copper, 44% of silver, 40% of gold are concentrated in Siberia and its GRP makes 11,4% of Russia's GDP. Foreign countries in the West and the East are interested in joint development of these resources, nor do they exclude the possibility to use them in their own interests in case of strengthening of disintegration processes in Russia.

The development of resources in Siberia and the Far East makes a new strategic potential, new point of world development. Its importance is greater than the development of the United States' West, the development of Canada and Australia. Practice shows that the strategy of economic development based on abstract liberal economic approach is good for geographically compact countries, but for the countries with vast territories and pointwise-advanced transition economies it is destructive, disintegrating.

In the strategic perspective a principally new format for the social and economic development of Russia is being formed. Implementation of key comparative advantages of national economy – the fuel and energy, technical, scientific, agricultural and transit ones – will depend largely on the way the benefits determined by its immigration appeal will be used. An adequate strategic response of Russia to the challenges of the XXI century should ensure the strengthening of its position in the global economy on the basis of scien-

³ See *ibid.*

tific, technical, natural and transit rent. An immigration resource can considerably contribute to this rent. For Russia, the situation is in many ways complicated by the fact that a number of its potential competitive advantages can not be realized due to human resources deficit. These include the enormous sparsely populated territory rich in natural resources including such important for the twenty-first century as lands suitable for agricultural use, fresh water and energy.

At the same time, there are real and far more preferable possibilities to change demographic and socio-economic situation in the future through more active migration, innovation and economic policy.

This scenario implies a significant improvement in the social and economic situation in these regions and enhancement of their migration attractiveness in order to considerably reduce the outflow of population from the eastern and northern territories. This requires a changed attitude of the Centre to them and substantial financial resources gained by the increased share of natural-territorial rent left for the regional development. Under this scenario a differentiated approach to the development of the territories and institutional structures will also be required. In the southern part of Siberia and the Far East with their favorable conditions for the permanent residence of people the resources for the modernization of the whole industrial and social complex will be required. The Far North regions should be developed for the convenience of the people living and working there on the basis of periodic shifts.

Bearing in mind geopolitical prospects and challenges presented in various scenarios of global development, the importance of such zones for the country as a whole can only increase over time. In the Siberian Federal District the best suitable in this respect territories are the southern regions of Western Siberia including Omsk region.

The profound changes of demographic processes in the country pose major challenges to be answered by the Russian society in the XXI century. It will succeed here if we combine the answers that allow to develop social and economic advantages of the country with efficient use of favorable qualitative and quantitative changes in the human capital of Russia on the basis of the radical improvement in the dynamic and structural parameters of the population reproduction and international migrants flows.

The development of a response adequate to the challenges of the XXI century requires qualitatively new system of economic and social institutions corresponding to the changing demographic situation in Russian, a fundamen-

tal change in social and economic system on the basis of a dramatic rise in the value of human resources and their priority role in the economic development of the country. It is necessary to give up the current model based on the low value of human capital, the neglect of a person, his/her needs and requirements.

For this to happen, on the one hand, the distribution of economic resources in favor of those best contributing to the favorable changes in the socio-demographic potential should be made. On the other hand, it is important to shift the focus from traditional to innovative forms and methods of economic development, maximize the impact of the resources channeled to the economy, education, health, science, etc. Such a change in the quality of growth can result in economic and social progress and compensate for unfavorable demographic developments.

The existing structure and the quality of the migration flows do not meet the urgent strategic needs of the state so far.

The present spontaneous often uncontrolled migration makes a negative impact on economic, social, demographic, ethno-cultural and other processes in the Russian Federation as a whole and in its particular regions. The results of this unregulated migration are imbalances in economic and social development of the state and its regions, disproportions in the regional labor market development; the growth of criminogenic centers and threats to the security of the border subjects of the Russian Federation, particularly in the Far East (population expansion), strengthening of the public anti-immigrant moods, etc. All this does not contribute to national security.

Russia's joining the global network of international migration and its transformation into a global center of mass illegal migration dramatically enhance the importance of developing and implementing of measures aimed at suppressing this type of illegal activity. In order to develop new strategies and mechanisms to combat illegal immigration one should take into account that the existing legislative framework regulating migration relations does not meet the pressing practical needs. It lags behind the current experience of foreign countries, do not fully comply with international standards, remains fragmented in the regulation of certain areas and types of migration.

It is necessary to re-work the legislation on migration in order to create more effective mechanisms regulating and controlling immigration processes, particularly to combat illegal immigration and trafficking of Russian citizens outside the territory of the state, to integrate migrants in social and economic conditions of the country, to optimize migra-

tion flows. Both economic and organizational measures are required: full demarcation of the borders, proper equipment and maintaining of the state borders, the development of training of migration services personnel, etc. Migration being an important strategic source of economic growth and the successful solution of geopolitical problems, it is important to radically change the whole set of implementation mechanisms of these processes and to activate the state's regulatory influence on the migration flows, their dynamic and structural parameters.

To improve the current socio-economic situation in Siberia the following high-priority problems are to be solved:

- 1) to stop out-migration from Siberia;
- 2) to lower the unemployment rates (in Siberia they are 2 times higher than all-Russian ones and make 9,5 %).
- 3) to create comfortable environment for living and economic activities of the Siberians.

The major ways to solve these problems are the following:

- 1) to set up manufactures on advanced processing of raw materials and natural resources of Siberia. Making use of the enormous scientific potential accumulated in Siberia for many years it is necessary to increase innovative production manufacturing final products with high added value. This will reduce the share of transport costs in the cost of products;

- 2) to develop small and medium-sized businesses that can play an important role in solving the problems of unemployment and the introduction of innovative technologies. We have not developed small and medium business producing life necessities goods;

- 3) to raise the level of the building industry to change the situation in the housing market;

- 4) to ensure integrated development of Siberian territories on all levels – from municipal to district ones.

Social and economic development of the area is the main duty of local authorities.

*Materials of Conferences***PRACTICE OF CREATION INDUSTRIAL WINTER-PROOF SIMBIOTOV SWEET MERRY**

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In favourable years a merry on Lower Volga brings overcrops, but while is not an industrial culture, as trees often fall out from damages in a winter period, not attaining the stage of the complete fruiting. For togo that in our time a merry became in a region a reliable and profitable fruit culture it is necessary to create not only undersized and skoroplodnye but also ustoychivye to winter stressoram of plant.

Practice testifies that trees more frequent than all perish from morozoboin and burns on shtambakh and in the grounds of skeletal branches. Much more reliable trees, created on the basis of inoculation of merry on shtamby of winter-proof sorts of cherry, but they also superfluously sil'noslye. At defence of barrels reflecting a sunlight trees become screens steadier, but the same there is a problem on diminishing of force of growth of plants and a task does not decide on reduction of period to entering into the mass fruiting.

In order that to achieve objective on creation steady in a culture undersized and skoroplodnykh trees were the last years constructed and began to be created simbioty from the 2th and 3th biological components of including merry. In the first block of variants an of high quality merry is inoculated on shtamby of sredne- and undersized clonal podvoev of LC-52 and VSL-2 in 0,60...0,70 m high Experience rotined that resistance to cold of shtambov of these forms of podvoev on a level corresponded resistance to cold of cherry of sorts Vladimirskaya and Rastun'ya.

In the second block of variants an of high quality merry is inoculated on shtamby-insertions long 0,60...0,70 m codes, formed the cherry of magalebskoy and sakhalinskoy, in same queue instiled on podvoi of LC-52 and VSL-2. Two standards of cherry sakhalinskoy attracted in work, to it used only in the decorative gardening. In the third block of variants an of high quality merry is inoculated on shtamby-insertions long 0,60...0,70 m codes of podvoynykh forms of LC-52, VSL-2 and cherries steppe, graft on the cherry of magalebskuyu. As a control variant an of high quality merry, graft on the cherry of magalebskuyu, is used.

In the third year of carrying out tests all created forms of simbiotov develop normally, depending on subwar of form and graft is have different force of growth and predisposition to the speed-up fruiting.

In a prospect will be exposed simbioty proper modern production requirements.

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THE FUTURE OF RUSSIA – SORGOVYE CULTURE

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At the present stage of development of agricultural science researchers poses increasing challenges for the development and justification of resource, economically balanced irrigation technologies.

When you create a strong forage base in Russia are very important crops that can provide high and stable yields of green and dry matter in extreme conditions. Important role in this regard can play different uses of sorghum – sugar, grain, silage, Sudan grass.

Sorghum thanks to high drought tolerance, low demands for nutrients and soil, can be grown with critical folding climatic conditions. Competitive advantages over other sorghum crops: high yield, lower seeding rate and costs for the purchase of seeds, high ecological plasticity, universality of use; polividnost.

However, the sowing of this crop under irrigation cover small area, and the harvests very low, apparently connected with the imperfection of the technology of cultivation of this crop.

Sweet sorghum on the irrigated lands can create 80...100 tons of green matter per hectare, sorgovyevye culture, with higher zharovynoslivost and drought, and same time stability in terms of productivity, while at the same time respond well irrigation, while ensuring high standards of small the irrigation crop increment. This property is required to use the shortage of irrigation water, well as in the planning culture in the conventionally irrigated lands – the satellites.

The green assembly line of forage annual crops, sorghum is a cost-effective: in the first place: good sorghum regrowth after cutting, which makes it possible to obtain non-irrigated lands 2...3, and on irrigation – to 4 mowing the green mass yield and with 40...50, 100 or more tons per 1 ha. Secondly, the rate of seeding sorghum in 3...5 times less corn, about 10 times less than legume-grass mixtures, and yields – significantly exceeds the last. Third, the use of varieties and hybrids sorgovyevye cultures of different groups of maturity and planting them at different times, achieved the guaranteed food supply specifically identified in the periods and as

necessary. The time for receipt of the green mass can be changed depending on the difficult conditions without significantly affecting on the overall performance of the crops, that not observed in the other annual crops with *odnukosnyh*.

Ability of plants to sugar sorghum accumulate large amount of soluble sugars making it potential sources raw materials for food industry. In areas with hot and dry climate to solve the problem of sugar beet due to difficult and sometimes impossible. Sweet sorghum how drought-resistant, high-yield and *zharovynoslivaya* culture in these conditions is the indispensable *saharonosom*.

For obtaining the stems with high content of sugars in the juice of sweet sorghum, when grown in his *Volga delta* on several soil types, and processing of thick extract of sweet sorghum as well as for the beverage industry functionality on its base with the addition of extracts of other plants is considered the feasibility of building new processing plants sweet sorghum.

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*Materials of Conferences***THE «AJUGA GENEVENSIS L.» CHEMICAL COMPOSITION AND THE BIOLOGICAL ACTIVITY STUDY**

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The «Ajuga Genevensis L.» ecdysteroids and the flavonoids quantitative content has already been defined. The acute toxicity, the wound healing and the antibacterial action of the «Ajuga» dry extract have already been fixed up.

Our ancient ancestors have known a lot of the herbs and the herbage, and they, moreover, have given them the very apt names. So, they have named and entitled the «Ajuga Genevensis L.» modest inconspicuous – looking plant, and they widely have used it for the sick people healing. And although the modern medicine still has not recovered all the «Ajuga Genevensis L.» herb health – giving properties, it seems, that, in the nearest future, especially that popularity would come to the «Ajuga Genevensis L.» one, which it is deserved much. So, the «Ajuga» plant's botanic name origin and its meaning are quite unknown, though it has been mentioned still in the writings of Roman scholar and scientist of the 1 – st century Pliny the Elder (or Gaius Plinius Secundus). So, this medicinal herb and the country simple has been the favorite medicative and the medicinal plant of the English phytotherapist and the phytophysician Nicholas Culpepper. Then, he treated the injuries and healed the bruises, the internal hemorrhages, the bloody diarrheas, the tuberculosis (TBC) and the hangover (e.g. «the morning after the night before») by the syrup, having prescribed inside. In the domestic national medicine, this plant was also quite well – known long ago, and it had been mentioned in many antique and the ancient manuscripts. During the Crimean War, they medically treated the malaria by the «Ajuga», instead of the traditional quinine, but the freshly squeezed juice and the mashed leaves were applied by them to the various and the different wounds, to the burns, to the ulcers and to the injuries and to the bruises. That is why, the folk medicine and the folksy remedy are recommended the herbal potion to be medical treated against the malaria, at the simple and the bloody diarrheas, at the gastritis, at the gastric ulcer and at the duodenal ulcer, at the cholelithiasis disease, at the pulmonary tuberculosis (TBC), at the haemoptyses or the blood spitting, at the female's genital

organs inflammation, at the rheumatism, as well as the diaphoretic drug, at the catarrhal infections and the cold diseases.

So, there are about 16 «Ajuga» species in the world, which are being grown, as in Europe, well as in Asia. Now, only two «Ajuga» species are being used, as in the scientific, well as in the folk medicine and the folksy remedy – the «Ajuga Reptans» and the «Ajuga Genevensis L.». So, in the North Caucasus region, they are usually being met at the forest lawns and at the grassy glades of the forest, at the forest borders and at its edges, at the meadows, at the greenlands, and at the grasslands. It is sufficiently simple to be distinguished one species from another one: the caulis is become stink and downy only from the both sides, and there are the creeping stems at the «Ajuga Reptans», but at the «Ajuga Genevensis L.» – there is downiness along the whole stem. The herbal potion – is in the form of the washes, the lotions, and the washings are being used at the wounds, at the ulcers, at the burns, but in the form of the rinsings – at the inflammatory processes and the oral mucosa ulceration, the gingivites, and the quinsies. So, the herb juice and its herbage are being used for the corns, the freckles, and also the aphthous precipitations smearing at the children's thrush of the mouth or at the oral moniliasis, at the bees' sting, and also at the burns. The crumbled up and the chopped fresh leaves are usually applied to the purulent wounds, to the cuts, and to the ulcers. The potion and the infusion from the leaves or the herbs and the herbage are being applied for the hair growth strengthening.

Thus, the present paper's purpose is the chemical composition and the pharmacological activity research of the «Ajuga Genevensis L.» herb, having grown up in the North Caucasus region.

They have already proved by the generally accepted chemical reactions, that the «Ajuga Genevensis L.» herb is being rich by the ecdysteroids, by the phenolic compounds, by the saponins, and by the other biologically active substances (BAS).

So, it had been determined, preliminarily, by the paper chromatography method with the witnesses' authentic samples, that the luteolin was the predominant flavonoid just in the «Ajuga Genevensis L.» raw material, therefore, flavonoids quantitative definition was carried out by the methodology, having described in the pharmacopoeia, with the luteolin standard sample application [1].

So, the ecdysteroids quantitative definition has been carried out by the spectrophotometric method [2]. The obtained results have been shown in the Table 1.

Table 1
The «Ajuga Genevensis L.» herb BAS quantitative analysis results

| BAS Class | The Results, % | The definition method |
|-----------------------|----------------|----------------------------|
| Extractive Substances | 14,0 ± 0,29 | The Gravimetric one |
| Ecdysteroids | 6,7 ± 0,16 | The spectrophotometric one |
| Flavonoids | 3,63 ± 0,08 | The spectrophotometric one |

So, the dry extract has been prepared for the biological activity research, on the basis of the «Ajuga

Genevensis L.» water extraction. The «Ajuga Genevensis L.» antibacterial action has been defined by the «wells» method. Thus, this method has been based on the tested substance diffusion just from «the wells» into the nutrient agar, having sowed out by the quite different test – cultures and the various test – crops [1].

At the obtained results assessment so, the growth inhibition zone diameter up to 10 mm, they have estimated, as the weakly expressed antibacterial action, but more, than 10 mm – as the expressed one. On this basis, the antibacterial action has been revealed at the «Ajuga Genevensis L.» water extract for all the suggested test – cultures and the test – crops, except the «Salmonella Gallinarum» and the «Proteus Vulgaris».

The «Ajuga Genevensis L.» antibacterial action research results

Table 2

| The Tested Sample | The Test – Culture | | | | | | | | |
|-----------------------------------|---|----|----|----|----|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | The Growth Inhibition Zones Diameters in mm | | | | | | | | |
| The «Ajuga Genevensis L.» Extract | 15 | 10 | 11 | 14 | 16 | – | – | 7 | 11 |

The symbolic representation: – the growth inhibition zone diameter is absent. The test – cultures and the test – crops: 1 – «Staphylococcus (S.) Aureus 209»; 2 – «S. Aureus» (e.g. Makarov); 3 – «S. Aureus Type»; 4 – «S. Epidermidis Wood – 46»; 5 – «Escherichia Coli 675»; 6 – «Salmonella Gallinarum»; 7 – Proteus Vulgaris; 8 – «Bacillus Subtilis L₂»; 9 – «Bacillus Anthracoides – 96».

So, they have studied the «acute» toxicity of the «Ajuga Genevensis L.» herb dry extract at the «IBA» line mice. The extract dose, which was equal to 15,150,0 mg/kg at the peroral administration, had not been causing the mice death throughout the fortnight (e.g. 14 days, or 336 hours). All these animals' significant and the vital – important functions had been remaining just in the normal standard, that is, they all were not distinguished from the control mice' state. Consequently, the «Ajuga Genevensis L.» dry extract is, by its essence, the hazard IV grade substance, that is, it is, practically, safe for the human person [3].

So, the «Ajuga Genevensis L.» herb dry extract influence on the skin regeneration processes have been studied at the «Wistar» line white or albino rats. They have received the linear wounds at them, by means of the dermatotomy under the ether «Rausch – anesthesia». The «Ajuga Genevensis L.» herb dry extract, in the form of the 20% ointment, has been applied to the wounds just at once after the carried out operation, and further daily. They have practically used the comparison drug – the calendula ointment, under the similar conditions. Then, the studied ointments action obtained results have been evaluated, in comparison with each other and also with the animals' control (medically untreated) group. So, the skin recovery rate has been defined, by means of the wound's area measuring through the certain and the regular time intervals [4]. In the end, the obtained data had already been, statisti-

cally, processed, and then they was given and presented in the Table 3.

So, the reliable and the authentic significant reduction in the wounded and the traumatic surface area, at the «Ajuga Genevensis L.» ointment application has been observed on the 5-th test day, concerning to the control. In this animals' group, the wounds area has been reliably and authentically less from the 7-th day, in comparison with, as the control, well as the standard. Thus, the complete healing and the recovery of the injured and the traumatized skin areas, against the background of the studied ointment, has been observed on the 16-th test day, at the calendula ointment application – on the 18-th experiment day. So, the wounds self – healing has been registered on the 22-nd day of the research, in the mice' control group. Thus, the linear wounds medical treatment terms by the ointment, with the «Ajuga Genevensis L.» dry extract have already been shortened, in comparison with the control for 27%.

Concerning the analogue – ointment, the experimental ointment already on the 3-rd day has shortened the wounds' area for 37,6%, but the calendula ointment – for 33,3%. So, the similar picture has being observed throughout the whole tested and the experimental period. They, visually, had observed during their observations, that the wounds were quite the clean and the dry ones at the animals of the tested and the experimental groups, whereas the wounds were with the crude, twice dried up small

scabs and the small crusts, but sometimes with the purulent separations in the mice' control group. Thus, the «Ajuga Genevensis L.» herb dry extract

is being possessed of the wound – healing and the bactericidal action, and it is, quite practically, safe for the human person.

Table 3

The «Ajuga Genevensis L.» herb dry extract wound – healing activity study results, $M \pm m$, p

| Observations days | Control | Calendula ointment | «Ajuga» ointment |
|-------------------|-------------|--------------------------|---------------------------|
| 1 | 4,44 ± 0,52 | 4,58 ± 0,41 | 4,63 ± 0,26 |
| 3 | 3,87 ± 0,54 | 3,53 ± 0,45 | 2,89 ± 0,05 |
| 5 | 3,08 ± 0,29 | 2,71 ± 0,31 | 2,09 ± 0,20 ^x |
| 7 | 2,49 ± 0,26 | 2,17 ± 0,23 | 1,51 ± 0,16 ^{#x} |
| 11 | 1,83 ± 0,18 | 1,34 ± 0,18 ^x | 0,81 ± 0,13 ^{#x} |
| 14 | 1,26 ± 0,16 | 0,69 ± 0,12 ^x | 0,29 ± 0,04 ^{#x} |
| 16 | 0,92 ± 0,12 | 0,24 ± 0,06 ^x | 0 ± 0 |
| 18 | 0,51 ± 0,09 | 0 ± 0 | |
| 20 | 0,28 ± 0,03 | | |
| 22 | 0 ± 0 | | |

The notes:

x – the changes are reliable and the authentic, concerning the control, $p \leq 0,05$;

– the changes are reliable and the authentic, concerning the calendula ointment, $p \leq 0,05$.

In conclusion, it is necessary to be mentioned, that the «Ajuga Genevensis L.» herb phytochemical composition study is quite the perspective direction, in the search of the BAS natural raw material sources for the creation the medical herbal remedies and the therapeutic herbal agents on their basis.

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THE «BRASSICA NAPUS L. SCHROT» CHEMICAL COMPOSITION AND THE BIOLOGICAL ACTIVITY RESEARCH

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The polysaccharides and the amino acids quantitative content in the rapeseed oil production and its industrial wastes has already been defined. The

«Brassica Napus L. Schrot» acute toxicity, the wound – healing, the antimicrobial and the antibacterial action have already been fixed up.

At present, the great and the enormous interest is presented the vegetable and the plant wastes utilization challenge, which are being left in the large numbers and in the large quantities at the medicinal plant and the medicinal vegetative raw materials, the agricultural and the farming production processing in the wood and the timber working, the timber and the forest, and the food industries. So, the constantly accumulating plant and the medicinal vegetative raw materials are being created the great ecological challenge, though, quite often, they are the different and the various biologically active substances (BAS) main sources, and they are quite may be used, as the raw materials for the new medicinal products, the drugs, the pharmaceuticals, the medications, and the biologically active additives (BAA) and the biologically active food supplements (BAFS) receiving and their further production.

The «Brassica Napus L.» is one from the most perspective oil – bearing crops and the oil – yielding cultures in the world – wide plant and the vegetable oils production. The «Brassica Napus L.» seeds' world – wide production – is about 43 mln. tons, that is being made up 12–14% from the main oil – bearing crops and the oil – yielding cultures total volume. So, the «Brassica Napus L.» is being assigned the significant role, not only how the main source of the edible plant and the vegetable oil, but and, as the raw materials for a number of the technical products getting, in particular, for the methyl and the ethyl ethers production of the rapeseed (e.g. «Brassica Napus L.» oil fatty acids (or the bio fuel).

So, the numbers and the quantities wastes are being made up many hundreds of the tons, just after the «Brassica Napus L.» raw materials processing.

The «Brassica Napus L.» raw materials wastes are usually being contained the different and the various biologically active substances (BAS) rich complex, however they often are being simply burned out, or they are being destroyed by the quite another way.

Thus, the «Brassica Napus L.» is being contained the 30–37% crude protein, from the 10,5% up to 15,5% cellular tissue, and it is widely – used in the birds feeding [1]. The «Brassica Napus L.» arabino – xylem and the pectin indices are made up, correspondingly, 130 and 156, that is effected on the protein assimilability, which is reached up to 72%.

So, the erucic acid (e.g. up to 54% in the fat) and the glucosinolates (e.g. up to 4%) presence in it is by the limiting factor in the «Brassica Napus L.» usage and in the processing its different and the various products. The glucosinolates themselves are not presented any the toxic hazard. Thus, they are the very and the readily soluble glycosites in the water. They are completely left in the oilcake or in the «Schrot», at the pressing or at the oil extraction from the «Brassica Napus L.». However, the glucosinolates are being degraded with the isothiocyanates, the thycyanates, goytrina and the other substances' release, which are quite able to be bound the iodine and to be inhibited the thyroid gland function, under the myrosinase enzyme action, having contained in the plants or in some animals' gastrointestinal tract microorganisms. So, it is necessary to be steamed thoroughly during

10–20 min., for the complete «Schrot» myrosinase enzyme destruction.

Thus, our research purpose is the «Brassica Napus L. Schrot» chemical composition study, for the further processing its product usage, as the antimicrobial, the antibacterial, and the wound – healing remedy.

So, «Schrot» has been received just after the rapeseed (e.g. «Brassica Napus L.») oil pressing. The polysaccharides and the amino acids are the «Schrot» biologically active substances main groups, that is why we have already studied the amino acids and polysaccharides quantitative content. It has already been fixed up by the extraction with the hexane, that the «Schrot» is contained the 4% oil.

The crushed, the chopped, and the powered raw materials have exhaustively been extracted in the Soxhlet's extraction apparatus by the acetone – chloroform mixture, in the 1:1 ratio, for the lipophilic substances, the pigments, the low – molecular compounds and the polyphenolic substances' part, having prevented the polysaccharides' extraction, release, at the preliminary stage. Thus, the received «Schrot» has already been dried out in the air, and the polysaccharides' discharge by the fractions was carried out by the N.K. Kochetkov and M. Sinnera method, which was based on the step – by – step precipitation just from the polysaccharides' different and the various fractions extraction and on their gravimetric definition. Then, the obtained results have been given in the Table 1.

Table 1
The «Brassica Napus L. Schrot» polysaccharides' qualitative and the quantitative composition

| Fractions | The fractions' content, % | The obtained fractions external view | The components monosaccharides, Rf |
|-----------|---------------------------|--|--|
| BPIIC | 2,8 ± 0,02 ε = 0,35 % | The crystalline brown – greyishly powder, without any smell, sweetish taste, slightly soluble in the water | galactose (0,22) xylose (0,34) |
| PIB | 2,4 ± 0,03 ε = 1,5 % | The crystalline brown – greyishly powder, without any smell, sour – sweet taste, soluble in the water | glucose (0,29) glucuronic acid (0,59) |
| Hz A | 2,8 ± 0,08 ε = 2,05 % | The grey powder, with the characteristic smell, sweetish taste, slightly soluble in the water | xylose (0,34) |
| Hz Б | 0,8 ± 0,004 ε = 3,12 % | The dark – brown powder, without any smell, sweetish taste, slightly soluble in the water | arabinose (0,35) xylose (0,34) |
| Total: | 8,8 % | | |

So, the amino – acid composition has been defined at the amino – acid analyzer. Preliminary, the defatted raw materials have been subjected to the hydrolysis, as well as the amino – acids quantitatively have been defined by the internal standard method in the hydrolyzate. Thus, the obtained results have been given in the Table 2.

The «Brassica Napus L.» protein is being rich of the glutamine, the lysine, the leucine, and the alanine, however the nutrients and the nutritional supports digestibility just from the «Brassica Napus L.» is quite lower, than from the other forages and

the feeds. So, the rapeseed oil cake and the «Brassica Napus L.» are not inferior to the sunflower ones (e.g. 11,4 and 10,6 MJ of the exchange energy) by their energy value (e.g. 11,3 and MJ of the exchange energy).

The glucosinolates presence is the main obstacle of the «Schrot» direct usage, as the forage and the feed for the animals. So, the «Brassica Napus L.» degreased raw materials water extraction has already been chosen, in order to be prevented their toxic action. Then, the dried extract has already been received, on the basis of the water extraction.

Table 2

The «Brassica Napus L. Schrot» amino – acid composition

| The Amino acids | The content in the «Schrot» | | The Amino acids | The content in the «Schrot» | |
|----------------------|-----------------------------|-------|-----------------|-----------------------------|--------|
| | % | g./l. | | % | g./l. |
| ASP | 0,68 | 6,81 | IZO | 0,26 | 2,64 |
| TRE | 0,63 | 6,31 | LEI | 1,05 | 10,51 |
| SUL | 0,67 | 6,69 | TIR | 0,53 | 5,27 |
| GLU | 2,09 | 20,85 | FALA | 0,67 | 6,65 |
| GLY | 0,73 | 7,29 | GIS | 0,68 | 6,81 |
| ALA | 1,10 | 11,03 | LIZ | 1,01 | 10,08 |
| VAL | 0,41 | 4,12 | ARG | 0,97 | 9,73 |
| MET | 0,17 | 1,70 | | | |
| The Amino acids sum: | | | 11,65 | | 116,51 |

So, the dried extract 20% – th aqueous solution antimicrobial and the antibacterial activity has been defined by the «wells» method. This kind of the method is based on the tested substances diffusion just from the «wells» into the nutrient agar, having sowed and seeded by the quite different test – cultures and the various test – crops.

In the end, the carried out researches have already been exposed the «Brassica Napus L.» dried extract antimicrobial and the antibacterial activity to all the quite different test – cultures and the various test – crops.

With respect to the overwhelming majority of the utilized quite different test – cultures and the various test – crops: the «Enterobacteria» (e.g. «Escherichia Coli», «Proteus Vulgaris», «Salmonella Gallinarum»); the «Bacilli» (e.g. «Bacillus Subtilis L2», «Bac. Anthracoides-96», «Bac. Anthracoides-1»); the «Staphylococci (S.) Aureus Type», «S. Epidermidis Wood-46») – the action has been bactericidal (e.g. in the 80% cases). Further, with respect to the both «staphylococci» different test – cultures and the various test – crops (e.g. («Staphylococcus Aureus 209», «Staphylococcus Aureus» (by Makarov) has been exposed the bacteriostatic action (e.g. 20% of all the cases).

So, the «Brassica Napus L. Schrot» dried extract acute toxicity study has been shown, that the 13,850,0 mg/kg dose is not quite resulted in the mice' death. This is allowed to be related the extract to the IV toxicity class substances, that is it practically quite safe for the human person [2, 3].

The «Brassica Napus L. Schrot» dried extract wound – healing activity has been studied at the rats on the linear wounds model, which have been created under the chloral hydrate anesthesia (e.g. 300 mg/kg) [4]. So, daily, traumatic surface and the wounded area have been medically treated by the «Brassica Napus L.» dried extract 20%-th ointment (e.g. the basis – is the vaseline). The rats' group had been served by the special control, at which the wounds' healing was passed without any medical treatment. So, the specific animals have been the comparison group, by which the «Symphytum» ointment was applied on the wound, under the same and the similar conditions (e.g. Doctor Theiss, Germany).

Thus, the wounded area deceleration and the traumatic surface criterion for the assessing have been by the wound – healing action assessment criterion. Then, the measurements' statistic results have been presented in the Table 3.

Table 3

The «Brassica Napus L. Schrot» ointment influence upon the rats' skin regeneration rate, $M \pm m, p$

| Observations days | Control | «Symphytum» ointment | «Brassica Napus L. Schrot» ointment |
|-------------------|-------------|--------------------------|-------------------------------------|
| 1 | 3,89 ± 0,52 | 3,78 ± 0,54 | 4,21 ± 0,33 |
| 4 | 3,18 ± 0,42 | 2,79 ± 0,41 | 2,06 ± 0,19 ^x |
| 6 | 2,36 ± 0,36 | 1,97 ± 0,33 | 1,48 ± 0,12 ^x |
| 8 | 1,82 ± 0,24 | 1,54 ± 0,26 | 1,09 ± 0,16 ^x |
| 11 | 1,27 ± 0,29 | 0,86 ± 0,21 | 0,49 ± 0,06 ^x |
| 14 | 1,03 ± 0,21 | 0,34 ± 0,13 ^x | 0,19 ± 0,02 ^x |
| 16 | 0,71 ± 0,14 | 0,18 ± 0,06 ^x | 0 ± 0 |
| 18 | 0,46 ± 0,12 | 0 ± 0 | |
| 20 | 0,27 ± 0,04 | | |
| 22 | 0 ± 0 | | |

The note: x – the changes are reliable and the authentic, concerning the control, $p \leq 0,05$.

So, the linear wounds area and the traumatic surface at the ointment application from the «Brassica Napus L. Schrot» have been borne the reliable and the authentic character, in comparison with the control. The «Symphytum» ointment reliably and authentically has been accelerated the regeneration, only from the fourteenth research day. So, the «Brassica Napus L.» action reliably and authentically has not been differed from the «Symphytum» ointment effect, in the comparison aspect. In the control test and the experiment, the complete wounds – healing has been on the twenty – second research day, against the background of the «Symphytum» ointment – on the eighteenth day, at the «Brassica Napus L.» ointment application – on the sixteenth day. Thus, they have registered, that the animals' wounds have been dried and without any suppuration at the «Brassica Napus L.» ointment application, throughout the whole test and the experiment.

So, the «Brassica Napus L.» has been accelerated the skin regeneration process for the 27%, in comparison with the control and for 11%, with respect to the comparison preparation – the «Symphytum» ointment.

Thus, the «Brassica Napus L. Schrot» is being contained the quite valuable biologically active substances: the 8,8% polysaccharides, and the 11,65% amino acids. So, the «Schrot» dried extract is being possessed the antibacterial, the antimicrobial and the wound – healing actions, it is being related to the safe substances, that it is allowed to be predestined on the «Brassica Napus L. Schrot» further research prospects and the subsequent fruitful perspectives.

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THE CHANGE IN THE LEVEL OF TRIGLYCERIDES IN BLOOD SERUM OF PIGS IN ONTOGENESIS

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Free radical processes play a big role during adaptation with stress reactions involved as its initial stage. Stress condition in animals can develop

in connection with certain periods of ontogenesis («physiological stress»). Regarding individual development of animals, their birth and early postnatal periods are stress situations conjugated with basic changes of oxygenic regime of their organism. This is followed by the change in running of free radical reactions, lipids peroxidation.

Atmospheric oxygen is used as electrons acceptor in vital processes of an organism, herewith, oxygen metabolites forming. The free radical oxidation is a regular metabolic process, free radicals, when in minor quantities, are referred to signal molecules. When hyper-produced, radical-superoxide becomes an initial step of a multi-stage process (metabolic cascade) that results in oxidative stress under which oxygen metabolites become high toxic for biological systems. They cause lipids peroxidation, have a damaging effect at tissue and cell level.

Investigations were carried out at Closed Joint Stock «Landrace» in Novosibirsk region. Landrace pigs were the objects of investigations. The animals were selected and grouped by the principle of analogues with regard to origin, breed, productivity, age and live weight. The pigs were kept following the technology for complexes and farms. The blood to examine was taken from aural vein. The content of triglycerides was determined in the blood serum of pigs aged 1, 2, 3, 4, 5 months. The data obtained were processed statistically with the package of applied software Statistica 6 and Excel. The experiment identified the highest concentration of triglycerides in the blood serum of pigs aged 1 month (45,16%, $p < 0,001$). This testifies to lipolysis running in Landrace pigs in early periods of ontogenesis.

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THE CONTENT OF FREE FATTY ACIDS IN BLOOD SERUM OF PIGS IN DIFFERENT PERIODS OF POSTNATAL DEVELOPMENT

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Continuous or extremely intensive stress causes the activation of “primary toxins”. Active forms of oxygen are referred to those. Increased intensity of free radicals oxidation gives rise to the formation of multiple free radicals causing peroxidation of lipids and development of oxidative stress. Activated oxygenic metabolites (superoxide radical, hydrogen peroxide, etc.) have a damaging effect at tissue and cell level.

Lipids are a major source of energy for a newborn. Lipolysis activation results in a considerably increased concentration of free fatty acids. They are substrates for lipids peroxide oxidation and determine its intensity.

The lipids peroxidation processes run at a maximal rate in animals during the first days of their life. The transition of organism to the aerobic type of respiration encourages oxygenation of tissues. Proviso, the increased generation of oxygenic metabolites results from adaptive reactions and this activates the processes of the peroxide oxidation of lipids.

Investigations were carried out at Closed Joint Stock «Landrace» in Novosibirsk region. Landrace pigs were the objects of the investigations. The animals were selected and grouped by the principle of analogues with regard to origin, breed, productivity, age and live weight. The pigs were kept following the technology for complexes and farms. The blood to examine was taken from aural vein. The content of free fatty acids was examined in the blood serum of the pigs aged 1, 2, 3, 4, 5 months. Statistical processing of the data was done with the package of applied software Statistica 6 and Excel.

The maximal content of free fatty acids was found in the blood serum of one month piglets (59,66%, $p < 0,001$) that testifies to lipolysis present in the pigs in early postnatal development.

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AGE CHANGES OF LIPIDS METABOLISM INDEXES IN PIG BLOOD

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To study the characteristics of lipid exchange at early stages of pigs' postnatal development is crucial and timely for pig-breeding.

The content of lipids and their fractions in blood depends upon genetic factors, physiological status, feeding and age of pigs.

Lipids perform various functions in vital activity of the organism, structural and energetic functions being the basic.

Lipids are not only the source of power; they influence the reproductive function and productivity.

Lipids are part of cell membranes; they form ultrastructure of biological membranes and ensure their specificity. Main functions of the biological membranes are those of recognizing, transporting, fermentative and others. These functions depend upon different structural lipids available in the membranes.

Lipids are differentiated into two main groups: structural and reserve. Cholesterol is a structural lipid.

Cholesterol is referred to sterols, derivatives of cyclopentanhydrophenanthrene. As an intermediary compound, it is involved in the synthesis of bile acids, vitamins of group D and sex hormones. It is a structural component of biological membranes. Cholesterol and its esters with long-chained fatty

acids are important components of plasma lipoproteins and outer membrane of a cell.

In membranes, cholesterol together with glycolic lipids and phospholipids form complexes. Membranes of some species are distinguished by the presence of different classes of lipids and their quantitative content which depends upon genetic factors. A great amount of cholesterol is found in the membranes of erythrocytes of myelinic fibers, less cholesterol is in mitochondrial membranes. Permeability of a certain type of membranes goes down with the growing concentration of cholesterol in the lipid bilayer.

Cholesterol is found in the organism both in free and etherified forms. Lipoproteids combined with cholesterol in complexes are of great value when cholesterol transported.

Investigations were carried out at Closed Joint Stock «Landrace» in Novosibirsk region. Landrace pigs of different genotypes were the objects to investigate. The animals were selected and grouped by the principle of analogues with regard to breed, productivity, live weight and age. The pigs were kept following the technology for complexes and farms. The blood to examine was taken from aural vein. The content of cholesterol was determined in the blood serum of the pigs aged 1 month. The data obtained were processed statistically with the package of applied software Statistica 6 and Excel. According to the data of the investigations, it was identified that in List 217 progenies aged 1 month, the amount of cholesterol made up 15,18% ($p < 0,001$) against minimal values.

The experimental data confirm the possibility to employ the lipids metabolism indexes to forecast economic traits of pigs at early age.

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EXAMINATION OF THE LEVEL OF SULFHYDRYL GROUPS IN PIG LIVER MITOCHONDRIAL FRACTION

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The pigs of industrial complexes are affected by many artificial stress-factors caused by man. The stressors give rise to peroxide oxidation of lipids, its level being determined by the formation of radicals, destruction of membrane and mitochondrial structures and condition of anti-oxidant defense. Thiols are referred to anti-oxidants as they possess anti-radical and anti-peroxide properties. Some sulfur containing low molecular compounds contain SH-groups, cystin being referred to the compounds.

An experiment was carried out on the SSF experimental training farm «Tulinskoye» of Novosibirsk State Agrarian University. Large White and Kemerovo pigs were the objects to examine. The animals were selected for the principle of analogues. Blood was taken from aural vein. The content of cystin in blood serum and that of hemoglobin in blood were identified in the pigs. Blood biochemical indexes were examined in the pigs aged 6 months. The content of SH-groups was examined in mitochondria and supernatant of liver in the pigs. Tissue samples were taken from 6 animals of each group during control slaughtering. Mitochondria were isolated out of 10% homogenate in the 0,25 M solution of sucrose with the method of differential centrifuging. The mitochondrial fraction purity was tested by contrasting phases. To analyze, there was taken the number of mitochondria corresponding to 0,1–0,2 mg of mitochondrial protein. The protein was determined with bull serum albumin as a standard.

Statistical processing of the data was done with the package of applied software Statistica 6 and Excel.

The experiment identified that the concentration of general SH-groups in the liver mitochondria of Kemerovo breed increased by 12,77% ($p < 0,01$) and that of hemoglobin went up as well in comparison with the gilts of Large White breed. This testifies to the protecting effect of the sulfhydryl groups.

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THE CONTENT OF THIOLIC GROUPS IN MITOCHONDRIA OF DIFFERENT PIG ORGANS

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The concentration of sulfhydryl groups in blood and tissues reflects the intensity of metabolism. The involvement of thiolic groups in the processes of cell division and growth is identified. The SH-groups manifest their very good ability to enter into reactions. Thiols have hydrophilic properties. The thiols become localized in an aqueous phase of a cell where they protect a great many biologically important molecules from oxidative damages.

An experiment was carried out on the SSF experimental training farm «Tulinskoye» of Novosibirsk State Agrarian University. Kemerovo pigs were the objects to examine. The animals were selected for the principle of analogues. Biochemical indexes of the blood of 6-month pigs were examined. The content of SH-groups was examined in mitochondria, liver and heart supernatant in the pigs. Tissue samples were taken from 6 animals of each group during control slaughtering. Mitochon-

dria were isolated out of 10% homogenate in the 0,25 M solution of sucrose with the method of differential centrifuging. The mitochondrial fraction purity was tested by contrasting phases. To analyze, there was taken the number of mitochondria corresponding to 0,1–0,2 mg of mitochondrial protein. The protein was determined with bull serum albumin as a standard.

Statistical processing of the data was done with the package of applied software Statistica 6 and Excel.

The examinations showed that the concentration of general SH-groups in mitochondria of pig liver was twice as much as pig heart of both Large White and Kemerovo breeds. Regarding the supernatant, the differences were somewhat less. The experiment identified the increased concentration of the general SH-groups in liver mitochondria in Kemerovo gilts (0,01) versus Large Whites. The same age Kemerovo pigs exceeded Large Whites by 10,98% (0,05) for the level of thiols titer in heart mitochondrial fraction. The experimental data allow to suggest high anti-oxidative activity of thiol groups in mitochondria of different organs in Kemerovo breed.

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AMINOTRANSFERASE ACTIVITY OF BLOOD IN PIGS FATTENING

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One of the major problems of modern pig-breeding is searching for interior estimates to select pigs for productivity.

In this respect, enzymes are of interest, particularly aminotransferases that are involved in transamination of amino acids. It was proved experimentally that transamination reactions yield enzyme substrate complexes and dissociate a hydrogen atom attached to the carbon atom of amino acids. Composite relationship between aminotransferases activity and protein synthesis accounts for great importance of transamination in the process of vital activities of the organism. During postnatal development, transamination reactions and amino acid synthesis change identically.

Aspartate-aminotransferase-L-aspartate: 2-oxoglutarate-aminotransferase [C.F. 2.6.1.1] is an indicator-enzyme as the functional status of different organs (liver, heart) can be evaluated by increased activity of the enzyme in blood serum. It refers to the class of oxidoreductases, catalyzes the reverse reaction of an amino group transfer from L-aspartic acid to α -ketoglutaric acid. In terms of chemical composition, aspartate-aminotransferase is a composite protein, the co-enzyme of which is pyridoxalphosphatum, it localizes in all organs and tissues.

The examination aims to study the transaminase activity in the blood of pigs different in breeds when fattened to different live weights.

The examinations were carried out on the experimental training farm «Tulinskoye» under Novosibirsk State Agrarian University. Large White, Landrace and Kemerovo pigs were the objects to examine. The animals were selected by the principle of analogues with regard to origin, breed, productivity and live weight. The pigs were divided into three groups and kept following the technology for complexes and farms. The animals were fattened to 100, 120 and 140 kg. The blood to examine was taken from aural vein. The aspartate-aminotransferase activity was determined in the blood serum of the pigs.

The data obtained were processed statistically with the package of applied software Statistica 6 and Excel.

The experiment identified the differences among the breeds for the activity of aspartate-aminotransferase in the blood serum of the animals. When fattened to 100 kg live weight, the activity of the serum aspartate-aminotransferase was found to increase by 27,27% ($p < 0,001$) in the Kemerovo pigs versus the Large Whites. The experimental data testify to the enzyme activity decreased with the animals fattened to 120 and 140 kg.

Based on the data of the examinations carried out, it can be concluded that the activity of aspartate-aminotransferase may be employed in the evaluation of pigs' productivity.

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PHOSPHATASE ACTIVITY OF BLOOD IN PIGS FATTENED TO DIFFERENT LIVE WEIGHTS

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The improvement of breeding methods is based not only on the investigations of economic traits of animals, but on the study of biochemical indexes that determine the formation of productivity.

Enzymes are highly specialized proteins that are used by living organisms to run a great many interrelated reactions. Phosphatases are enzymes referred to esterases. One can discern alkali and acid phosphatases. Esterases catalyze numerous processes in the organism.

Alkaline phosphatase (phosphohydrolase of monoesters orthophosphate, C.F. 3.1.3.2). Molecular weight of the one is confined to 80–200 thousand Daltons. Alkaline phosphatase is metal-containing enzyme referred to non-specific phosphatases hydrolyzing phosphoester bonds.

Catalytic effect of the enzyme on lipid and carbohydrate metabolism is shown. This enzyme is involved in the processes of carbohydrates and lipids resorption in small intestines. It activates adsorption of glucose by kidney nephrons. The effect of alkaline phosphatase on the reactions of synthesis of fructose out of glucose is identified. The enzyme is involved in the reactions of phosphoric acid docking and splitting off in nucleic acids, carbohydrates, esters, etc.

The investigation aimed to study the activity of alkaline phosphates in pigs of different breeds under fattening to 100, 120, and 140 kg.

The experiment was carried out on the experimental training farm «Tulinskoye» under Novosibirsk State Agrarian University. Large White, Landrace and Kemerovo pigs were the objects to examine. The animals were selected by the principle of analogues with regard to origin, breed, productivity and live weight. The pigs were divided into three groups and kept following the technology for complexes and farms. The animals were fattened to 100, 120 and 140 kg. The blood to examine was taken from aural vein. The activity of alkaline phosphatase in the blood serum of the pigs was determined [4]. Statistical processing of the data obtained was done with the package of software MS Excel and Statistica 6.

The data of the experiment identified interbreed differences for the activity of alkaline phosphatase in the blood serum of the pigs. It was marked that the Kemerovo breed surpassed the Large White by 22,42% ($p < 0,001$) for the activity of the enzyme studied in blood when the gilts fattened to 100 kg. The Landrace occupied an intermediary position between the Large White and Kemerovo breeds. The enzyme activity of blood was determined to decrease with fattening to different live weights.

The data obtained allow to apply the phosphatase test to the estimation of productive traits of pigs.

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THE CONTENT OF GENERAL LIPIDS IN BLOOD OF GENOTYPICALLY DIFFERENT PIGS

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Nowadays, lipidology is a rapidly advancing branch of biochemistry. Achievements of the branch are widely applied to biology, medicine and livestock-breeding. Most lipids are several molecules bound with each other and not referred to highly polymeric substances.

Lipids refer to structural components of cells; they can combine with other substances to produce composite cellular structures. They perform protecting, transporting, regulating functions and play a big part in growth, thermoregulation, adipopexis, and energy exchange in the organism. Lipids deposit energy in a cell. They are involved in energy transformations in mitochondria, hormone and immune processes, cell differentiation, regulation of gene activity and cell cycle.

Lipids can be predecessors of the synthesis of some vitamins and hormones, particularly those of local action. Membrane enzymes activity correlates to the lipids contained in the membranes.

Lipids are the most important components of membranes and other interface surfaces between hydrophobic intracellular regions and liquids. Biological functions of membranes correlate to the ratio of separate structural lipids available in the membranes. Different animals have ontogenetic peculiarities of lipid exchange.

An experiment was carried out on the SSF experimental training farm «Tulinskoye» of Novosibirsk State Agrarian University. Precocious Meat pigs of Novosibirsk breeding (SM-1) were the objects to examine. They are well adapted to local natural and climatic conditions. The animals of control fattening and aged 6 months were examined. The offspring from six Precocious Meat boars (Svetly 1704, Sovet 1618, Sayan 225, Som 69, Sobol 139, and Signal 1440) were under the control in the experiment. The pigs were kept following the technology for complexes and farms.

The amount of general lipids was determined in the blood serum of six-month SM-1 pigs different in genotypes. Statistical processing of the data obtained was done with the package of software MS Excel and Statistica 6.

According to the experimental data the differences in the amount of general lipids in the blood serum of the progenies from genotypically different pigs was identified. The data obtained showed the greatest difference in the changes of the general lipids content in blood between the progenies of Signal 1440 and Sovet 1618. The difference made up 33,64% ($p < 0,001$). The depth of fat in the gilts of Signal 1440 was bigger than that in the same aged Sovet 1618 because fat depth directly correlates to the concentration of lipids in blood serum. The examinations carried out allow to suggest that the parameters of lipids exchange may be employed when evaluating pigs' productivity.

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TO QUESTION ABOUT THE THIRD ALARM SYSTEM

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At the beginning there was Word, and God had Word, and Word was God (1:15). So Sainted Blagovestvovanie begins from Ioanna in New Testament. The first Russian Nobel laureate on physiology of I.P. Pavlov (1904) on the basis of long-term study of higher nervous activity considered also, that Word from all variety of living organisms inherently only to the man, and named his second alarm system.

Appearance of the written language many linguists also consider the no less important stage of development of Humanity, what appearance of Word, because in exposition and writing sense-organs and different departments no less participate nervous, endocrine and other systems of organism of man.

Further study of zoophysiology and man in the second half 20 ages and beginning of a 21 age grounds not only to talk about the third alarm system but also search the mechanisms of management this system. So what is it possible to designate as there is the third alarm system? If Word and written Language can be named the second alarm system, and it is done Cyril and Methodius much for development of Humanity, by the third alarm system, in our view, it is necessary to count spirituality.

Conception of spirituality as well as concept of morality, closely associated, from old times used people in the different types of activity. Why, in our view, can spirituality be attributed to the third alarm system? I.P. Pavlov, as an elder of the world physiologists, examined a word as signal of signals voice, visile (writing word), vivid, concept, like vasa vasorum (our formulation), as complex system concepts and signals. The concepts of shower and spirituality are also CPLD between itself as an anatomy and physiology, structure and function, is two sides of one medal or coin, to one universe.

Examining these concepts is necessary deeply and widely, in ontogenesis and phylogenesis, in space and in time. A bioreceptivnyy genetic code can help herein. If on morphology of chromosomes presently we have much scientific information, maps are developed even with localization of genes in chromosomes, in area of the soul we have dim and litigious morphological presentations.

Spirituality it is the physiological state, related to education in ontogenesis and culture, presenting the process of onto- and phylogenesis development anymore. This development is passed on an inheritance in which bioreception, bioreceptivnyye

or bioenvironmental reflexes and bioreceptivnyy genetic code co-star. Therefore 3 transferred komponenta of any bioenvironmental system it is possible to consider the basic mechanisms of development of the bioenvironmental systems, their co-operation can be named the third alarm system in physiology.

For whom and is the third alarm system for what needed? For education of people. For what education? For patriotic education on all planet. It is important to love a planet as Motherland is Mother, to save it as Child, to protect it as Homeland. Is it possible to be engaged in patriotic education in one separately taken country? It is possible, but it will remind the construction of communism. Therefore patriotism is nearer to socialism and communism, what to nationalism or nazism. It is

possible the center of patriotic education and it is needed to leave Volgograd. It is simultaneous large responsibility.

UNO executes the functions, but consider not always by it, also however were quits with the referendum of people for the maintainance of the USSR. Therefore UNO is needed help. And creation of World folk front and Center of Patriotic Education must not prevent work of UNO.

02.06.2011-150 year of Incorporated Italy. Parallell: CSV = Caricyn, Stalingrad, Volgograd = Central Advice of Education on a planet.

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*Materials of Conferences***THE COOPERATION OF THE RUSSIAN
FINNO-UGRIC IN THE EDUCATION**

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In order to preserve national languages it is necessary to create an effective system of education in native language, starting with primary school and up to a university. However, today an obstacle for the development of national education system is the reformation of federal education standards, so called «optimization» of this field's financing. Its results can be heavy – shutting down incomplete schools, located in the country, where mainly native people live; reduction of academic hours, devoted to national languages; impossibility to establish a class studying a native (not Russian) language (requirement – there must be no less than 25 pupils, that will also affect country schools). The presence of negative factors that influence mastering of native languages, reduction of a language prestige for a speaker, negative approach to a language or to its speakers and, therefore, parents' refusal to study their child their native language served as a reason to search for new solutions to strengthen the motivation and increase standards within the process of mastering native languages.

Acceptation of laws on languages, alterations in laws on education, language development programmes, and national school in different subjects of Russian Federation gave certain impulse for preservation and even development of some languages. But, due to our conservative education system, the effect proved to be insignificant and nondurable. In the beginning of 2000-s national and regional component suffered greatly from ref-

ormations in the education system. Federal policy altered as well. Some positive shifts in school mastering of Finno-Ugric languages almost didn't have any effect upon the trend of their ousting from official area.

We have to acknowledge the necessity to increase the level of national self-consciousness, improving a closer relations between Finno-Ugric public organizations and local and central authorities. There is a problem of issuing new textbooks and student books. It is linked to an insufficient level of financing educational area in certain regions of Russia. In this case Russian Finno-Ugrics have to accept aid coming from Ministries of culture and education of Hungary, Finland, and Estonia together with social-cultural organizations of these countries.

To sum up, the cooperation of Russian Finno-Ugric people in the area of education is aimed, first of all, for widening the national education in order to preserve their native languages. Besides, the major role in the process of mastering a national language belongs to the secondary school. Among positive results we should outline: introduction of national language as an academic subject in schools of regions; organization of training of specialists-tutors of national languages in institutions of higher education; development of special courses on mastering languages, history, and culture of Finno-Ugric nations; preparation and issuing of textbooks; creation of International social Association of Finno-Ugric universities.

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*Materials of Conferences***VARIETY OF FORMS OF INDIVIDUAL DEVELOPMENT IN CONDITIONS OF MODERN KAZAKHSTAN**

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Political and economic reforms in Kazakhstan have encountered serious problems of public regulation of social processes. These problems are caused by other principles of the organisation of life and activity of people, occurrence of other social phenomena assuming expansion of individual freedom, growth of the importance of the human person, increase of responsibility of the person in definition of own destiny, adequate comforts and to an optimum of its individual life.

The changed welfare circumstances do essential a substantiation of variants and possibilities of human individuality in modern conditions. There is a necessity of theoretical judgement of conditions of the reforming, those ways of self-determination of the person which they assumed, and also attempts to think other possible variants of search and individuality finding. Therefore objective public necessity demands qualitative change of character of a modern civilisation, its transition to higher step of social progress.

For the decision of this problem essential change philosophical World visions understanding of appointment of the person and its place, knowledge of the person, its individual qualities, dialectics of interaction of personal and public interests is necessary, first of all. At last, it is expressed in more weighed approach to the analysis and an individuality estimation in modern conditions. On this basis it is necessary to comprehend laws of human behaviour at transition of a society from one condition to another, transformation of social and individual consciousness in the conditions of political, economic, moral and spiritual reforming.

Depending on treatment of individuality various theories of historical process, political and economic doctrines are created, the choice of a social ideal, social development prospect is predetermined. In this connection the requirement for researches of dialectics of social and individual ability to live for aspect of a parity of the public purposes and requirements with valuably -target and semantic concepts persons in which formation the important role is played by specific features of the person is staticized. Thus, researches of social and individual ability to live, valuably – semantic coordinates of consciousness of the person, a problem of revealing of invariant structures individual and social appear logically interfaced. Thereof search of

the theoretical and methodological context, allowing to study these problems, is actual both for the theoretical description of the allocated phenomena, and for overcoming of some isolation of socially-philosophical researches.

The future of Kazakhstan, variants of its development can be considered and estimated in the most various planes. We will stop only on prospects of development of Kazakhstan from the point of view of evolution of interrelation of the person and a society where as the basic link of process of updating reconsideration of the settled approaches concerning a parity individual and public should act.

Assistance to individuality disclosing is a basic condition of development of modern Kazakhstan. In search of the new social and economic and political structures adequately reflecting realities of the changing and updated social validity, the main reference point, on our firm belief, the idea of individuality should act. The practical importance of judgement of possible variants of the decision of tasks in view goes deep character in a modern society of the most spiritual life, where problems of national, civil or legal identity as sharply standing today, are closely connected with, how much reflexed personal search of how much it is stimulated with society how much the individuality problematics, finally, is worked. And only in such context we consider prospects of development of the future Kazakhstan.

First of all, it is necessary to notice that the future of the Kazakhstan person in this light sees at all as one road. If social development in general always includes a certain set of variants degree of this plurality, distinguish at different stages of public evolution. There are periods concerning quiet, a sustainable development when the number of these variants is rather limited, and there are periods important-critical when the set of possible forthcoming lines of development sharply increases. As we believe, the today's transition state of the Kazakhstan validity is that that it is fraught just with an abundance of the most various prospects. If with reference to our theme to reduce this set to certain poles they are reduced or to tendencies of restoration of the past, or to cardinal breaks to a new condition.

Political programs, economic projects, educational courses can become really useful only when we are guided by the accurate and given reason knowledge of the nature and essence of the person, instead of foggy formulations, abstract descriptions or naive theories of a role and a place of the person, its mission and sense of existence. In other words, attention to the person, its needs and expectations, problems and pleasures – not minor (and conse-

quently unessential) addition to important and serious affairs, and that main basic condition without which any social progress is impossible.

Recently there were many works devoted to problems of a humanisation of our society, to creation of reliable system of guarantees of social, economic, political and legal security of the separate person. Round these problems disputes do not cease, the points of view face on how to combine a personal freedom and responsibility of the person before a society, equality and dissimilarity of abilities, social justice and encouragement of not ordinary, creative decisions. Meanwhile, in our opinion, movement in this direction is extremely limited by underestimation of a role of individuality in carried out process of modernisation of the Kazakhstan society.

From our point of view, as the base, a basis of the modern concept of the Kazakhstan society, one of necessary conditions of its construction organic inclusion in it individuality concepts acts. Degree of development of last – here the main thing in the person that, finally, defines, causes and determines all social processes occurring in a society. For this reason the measure of development of individuality of the person represents the major criterion and the form of an estimation of social progress. Such understanding of a place and a role of individuality of the person, reconsideration from this point of view of all primary goals of a science and practice will allow the Kazakhstan society to take a worthy place in the history of a human civilisation. In turn, the named positions assume preservation and reproduction of innovative potential in a society, maintenance of a necessary parity of traditions and innovations in social communications, development of poly – alternatively and different orientations cultures, tolerance in public relations, attention strengthening to processes of social self-organising.

Inclusion of a problem of individuality of the person in the developed concept of a society, has a number of the major theoretical aspects.

First, present position of the person in the theory and practice of a modern Kazakhstan society obviously does not correspond to its basic function and appointment. Time when at the decision of any practical questions of social and economic, political and spiritually-moral character it is necessary to make initial human wants and interests has come. Hence, the reformed society should be the public system to the full working on the person and integrally including it in the structure as actively operating the subject. Methods and means for realisation of the program of transition of the person in other structures and forms of the existence it is necessary to search mainly in spirituality sphere, and not just in external displays economic, social, political, etc. for lives.

Following major aspect of inclusion of the theory of individuality of the person in the modern

concept of a social system is its consideration not only as subject or the factor of development of a society, but also as the main and its higher purpose. Thus person conducting approbation and examination should act as the basic criteria and reference points at acceptance of administrative decisions, in working out of perspective programs, in definition of conditions and preconditions of spiritual revival of the Kazakhstan society.

Thirdly, everything, as to basic questions of reforming of existing model of a society, in particular education of the person with new qualities, with new thinking, with new approaches to life, demand constant theoretical judgement of the various changes occurring in structure of the individuality of the person. In this quality it (individuality) acts as the live reality being and operating in system most various social generalities, being the carrier of internal interests of the person and acting as the consumer of the material and spiritual blessings.

Working out of the concept including listed positions, acts as a fundamental problem of a modern science and practice for all history of development of mankind is, finally, history of individual development of the person. Without such work and until then while the developed deformations of individuality will not receive the due scientific analysis, all theoretical designs about offered models of a society will appear speculative schemes and the put forward purposes and problems on transformation of the person into the central figure of public progress, will hang in mid-air.

Thus given process should be carried out not on the basis of radical revision of basic principles and methods of knowledge of the person, and on ways of their revival and the further development of all positive, saved up in this area by human thought by means of critical judgement of the historical past. Besides told, the clear understanding of individuality is required and for practical need, successful «amortisation» of dangers and the accidents trapping human community in the future.

And orientation to humanism with its variety and alternative development of public forms of communications should become the first step in a direction of tasks in view. Opposing destructive tendencies in a society, destructive activity of separate persons, various forms of misanthropic ideology, the humanism becomes more and more active and effective factor of diverse polysystem vision of the world. The humanism allows a society to set a corresponding orientation to all processes, to carry out universal base values, to act as the original shock-absorber of arising pressure, to smooth a sharpness of separate negative tendencies. Methodological character of humanism, its tolerance and internal freedom give to the person a way and a measure allowing it to live by personal preferences and ideals, to fill the private world with the concrete individual maintenance, without fear to enter into the conflict to own principles.

There is a question: what means to establish a humanistic society? It means that in a society it is necessary to provide an unconditional recognition of the person as the higher social value. It means, that the purpose of activity of a society, its social institutes there was a person. It means, the appeal to the importance, egoism of individuality, to realisation of the individually-personal beginning, display of in self-disclosing, self-realisation, in free orientation and ability to develop in a creative impulse the internal spiritual potential.

The new form of humanistic outlook only then can be truly humane if can promote realisation of the unique nature of each individual in all completeness that will allow to integrate variety of various individualities in uniform truly human. The correct understanding of problems, an establishment of the purpose and result of human activity, comprehension of an essence of values and meaning of the life, a measure finding between them necessarily conduct (and will result) the person in its complete, in-

trinsic display and development, to returning to the person of humanity. Thus, than individualities will be more diverse, is especially positive-productive maintenance will fill historical space of the XXI-st century.

Proceeding from told, activization of workings out of individuality is connected with necessity of comprehension of a crisis situation, creation of programs, the theoretical models specifying to a way of an exit from developed position, revealing of those spiritual bases, national-cultural roots, in a support on which it is possible to accelerate process of revival, occurrence in a new stage of planetary existence and softening of consequences of global crisis.

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*Materials of Conferences***METHODS OF TECHNOLOGY
IN THE TESTBOOK «PROGRAMMING
TECHNOLOGIES»**

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On the foundation of system analysis a new concept of specialists' training has been developed. It is oriented for mastering way of thought, engineer training of future specialists from the second year of their education. Some chapters of the textbook are also useful for non-programmers.

Intelligence level is defined first of all by a degree of structuring and generality of a man's world model and the degree of mastering this model in his operations. A man's knowledge is not a sum, but a system. Creation of such system that provides for a successful activity in nonstandard situations is the main goal of an education. It isn't enough to read about the system approach in order to master it. It is necessary to solve problems.

Methods and materials. Training for system approach and deductive thinking starts with mastering practical work with functions and structures at examples of creations texts of ordinary instructions, for example, «How to cross a street?». A good text description is: unerring, well-defined, short, its essence must be apprehended quickly. It is formed from general to specific with usage of special sentence constructions – typical elements (typical structures). There is a positive experience of educating non-programmers in accordance with the described method, for example, in development of instructions for employees on carrying out their duties, actions in case of emergency.

As we master the description of a system functioning, we proceed to development of structure of systems. For it there are business games within practical lessons and development of an educative project.

Further we study problems of carrying out early stages of data structures, algorithms and large programmes with usage of analogy methods, morphological synthesis, synthesis on OR-AND graphs, heuristic methods. These methods proved to be effective in generation of ideas of constructing large programmes and program complexes. Approbation of these methods was carried out on tens of projects and program systems that were developed by both authors and graduate year students who worked under their authors' supervision.

Resume. Thus, on the foundation of system analysis a new concept of specialists' training has

been developed. It is oriented for mastering way of thought, engineer training of future specialists from the second year of their education. Some chapters of the textbook are also useful for non-programmers.

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**THE DESIGN PROCEDURE
FOR THE TURBINE ROTORS' VIBRATORY
CHARACTERISTICS**

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The vibrating process, having arisen at the mechanisms' and the machines' operation, is quite able to be told very much on their technical condition. So, properly and competently conducted vibration measurements are allowed to diagnose all these mechanisms' state, sparingly and promptly to be removed many defects produced. The simplified theoretical models knowledge are allowed to the operating engineer to define the units' and the aggregates' individual parts vibratory characteristics, and to judge on the accident – free operation of the unit and the aggregate, or the entire mechanism, as a whole. Let us consider one of such models.

We assume the individual components of the electric motor by the deformable bodies, having united into one mechanical system of the different and the various connections: the rigid, the elastic, and the dissipative ones. For all this, the system's rigid elements and the rigid structures are not allowed the relative linear and the angular displacements and the movements between the bodies, and the elastic connections are allowed the bodies' small movements in one or more directions. For all this, only the geometric dimensions of the units may be changed. We will define the electric motor model by the separate bodies' constant masses and their moments of inertia, and the unchangeable coefficients of rigidity c , and the damping μ , having entered the elements, the structures, and their connections into it. We will consider the vibrations, having arisen in the electric motor's bearings, as the simple linear

system forced oscillations, having happened in the vertical plane. Exactly such oscillations, regardless of the others, are made the maximum contribution into the aggregate's vibration state. So, we suppose, that the turbine rotor mass m is possessed the two stages of the freedom, all the other its displacements and the movements are prohibited. For all this, the lubricating layer can be presented itself the swing in the sliding bearing, the rigidity of which c , and the damper with the coefficient μ . So, the damper is the non-conservative element in this system. It is not possessed neither the mass, nor the elastic force; the damping force is arisen in it, only when the relative movement is being observed between the both ends of the damper. The heating system, e.g. the energy dissipation will be taken its place under this force action.

While the electric motor is well – balanced, and the gaps in the bearing units are small, the unbalance ratio is small, that is $E = P_0/Q_0 < 1$. Here, P_0 and Q_0 – are the dynamic and the static forces, having acted upon the sliding bearing. For all this, the turbine rotor shaft is made the oscillatory motion along the circular arc, the radius of which is equal to the half of the radial clearance in the bearing. So, the shaft is made the oscillatory motion inside the bearing. The differential equation, having described the small free vertical oscillations of the turbine rotor, will be the following:

$$\ddot{z} + k^2 z = 0,$$

where $k = \sqrt{c/a}$ – is the natural vibration frequency, a and c – the generalized system's inertia factors and the coefficients of the rigidity, correspondingly. As, here, we consider the impact upon one bearing, then a – is the turbine rotor's half mass. Then, we are quite able to evaluate the generalized coefficient of the rigidity, having supposed the system's static deformation, which is equal to the bearing clearance, that is $c = mg/f_{cr}$. Then, the allowable range of the values of the natural vibration frequency k and the natural vibrations period $T = 2\pi/k$ of our system will be defined by the permissible values of the bearing clearances. The natural vibrations frequency in the hertz is the reciprocal value from the period, that is $\nu = k/2\pi$. Then, we will have to find out the amplitude and the initial phase α of the oscillations, for the particular solution of the differential equation finding out, having supposed at the initial moment of time $z(0) = 0$, and the center of mass velocity at this moment $V_C = \omega \cdot f_{cr}$, where ω – is the turbine rotor's rotational velocity. Then, the following equation

$$z = \sqrt{(\omega^2 f_{cr}^3 / g)} \sin(\sqrt{g/f_{cr}} \cdot t)$$

will be described our system's oscillations, where g – is the free fall acceleration.

The natural oscillations will be changed their main characteristics, as the turbine rotor's unbalance. Let us suppose, that the turbine rotor's center of mass shifting has been taken its place for some value e . Then, the center of mass velocity and the system's rigidity will already be changed, as the static deformation for the turbine rotor's eccentricity e value is being increased: $V_{C_e} = \omega \cdot (f_{cr} + e)$ and $c_e = mg/(f_{cr} + e)$. In addition, it is quite able to be occurred the turbine rotor's axis deflection, for example, for the value ρ , then $V_{C_p} = \omega \cdot (f_{cr} + e + \rho/2)$ and $c_p = mg/(f_{cr} + e + \rho/2)$. Thus, the special tendency on the natural oscillations frequency reduction and their amplitude increase at the turbine rotor's constant unbalance is being observed. At this stage of the electric motor's operation, the liner material erasure in the one place is taken its place.

Gradually, the clearance increase in the bearing assemblies, the engine unbalance are taken their place in the process of the electric motor's operation, and, thus, the dynamic forces further increase \bar{P}_0 . As soon as the unbalance ratio in the plane of the bearing is become to be equal to the unity, the additional periodic force R is arisen, having resulted in the system's forced oscillations. Then, let us consider, as it is being appeared. The turbine rotor is sliding on the liner, while the shaft center is located below the bearing's central axis. So, the shaft is separated from the bearing, when the shaft center is raised above this axis, as the static forces are appeared to be equal to the dynamic ones. So, the shaft center free movement is taken its place, as long as the shaft does not hit the pad. The shaft will be slid along the liner, during some time after the impact, but once again its center will be come to the bearing's central axis, the shaft will be come off, and the whole phenomenon is persisted. Thus, the turbine rotor's periodic impacts and the attacks on the liner with the turbine rotor's rotating frequency ω will be taken their place in this mode, and the arising additional periodic force will be changed by the harmonic law $R = 0,5Mg \cos \omega t$. And, it is necessary to be solved another differential equation by us: $m \ddot{z} + c z = R_0 \cos \omega t$. So, its solution is consisted in the general solution of the corresponding homogeneous equation z_{on} and the particular \tilde{z} solution of the inhomogeneous equation of the oscillations: $z = z_{on} + \tilde{z}$. Thus, the first one – is described the oscillations with the natural frequency k , which, in the presence of the resistance, are quite able to be subsided. Then, the second one – is defined the purely forced oscillations, which are taken their place with the driving force frequency, and they are not subsided even, at the presence of the strong resistance.

At the calculations of the CT/П – 12,500 – 2YXJ4 turbine motor forced oscillations characteristics, having taken into account the resistance

forces, we have used the well – known solution, which is the following:

$$z = A e^{-bt} \sin(k_1 t + \alpha) + B \cdot \sin(pt + \gamma),$$

where

$$A = \sqrt{\omega^2 f_{ct}^3 / g}, \quad b = \mu / 2m, \quad k \approx k = \sqrt{c/m},$$

$$\alpha = 0, \quad B = h / \sqrt{(k^2 - p^2)^2 + 4 \cdot b^2 p^2},$$

$$h = R_0 / m, \quad p = \omega, \quad \gamma = \arctg(2bp / (k^2 - p^2)).$$

For all this, it has been appeared that the turbine rotor free oscillations' damping is taken its place very slowly, because of the turbine oil's technical properties. And, moreover, the turbine rotor oscillations design characteristics are satisfactorily agreed with the experimental tendencies and the trends, despite of the considered, here, model simplicity.

So, the magnitude of the force \bar{R} is quite able to be changed from the $(\bar{P}_0 - \bar{Q}_0)$ up to $(\bar{P}_0 + \bar{Q}_0)$ value, in the direction, having coincided with \bar{P}_0 , at the third mode of the electric motor operation ($E > 1$). For all this, the bearing shell erasure is taken its place around the whole circumference, and the shaft journal is worn out unilaterally, having increased the distance between the turbine rotor mass center and its rotation axis. So, the shaft journal contact point is moved around the whole circumference, and the shaft journal is always turned to the one side of the bearing. The regime of the shaft journal's progressive wear out and the bearing shell is come.

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TO THE PROBLEM OF MODELING OF ACTIVITY OF THE COMPANY FOR PRODUCTION AND SALE OF COMPUTER ENGINEERING

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Methods of mathematical modeling are well acknowledged tool for scientific analysis of complex objects of different nature with a number of internal and external relations. These methods allow formalizing the regularities attributed to these objects at the model level through development of their qualitative abstract form, which offers great opportunities in improving efficiency of generated control actions, as such experiments can be lead on the mathematical model instead of the «live» system.

In turn, the important stage in creating of mathematical model of any company activity, particularly, the one that produce and sell the computer equipment, is development of general model specification, that at the formal level connects the end results of such activity (performance index that define model output) with factors, that affect them (input of the model).

To the input variables we'll attribute: effectiveness, economy, quality, profitability, productivity, operating conditions, introduction innovations.

To the input factors, alongside with resource ones, we'll also include expert information on such variables, as: existence of stable connections with distributors, existence of own warehouses, net assets, abilities to attract credit assets, number of branch offices, number of advertising acts and some other.

In the report detailed model constructions will be presented, realizing mentioned specifications.

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