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RESVERATROL INHIBITS NONALCOHOLIC FATTY LIVER DISEASE IN RATS

Luis Bujanda[1], Elizabeth Hijona[1], Mikel Larzabal[2], Marta Beraza[1], Pablo Aldazabal[3], Nerea Garcia-Urkia[3], Cristina Sarasqueta[4], Angel Cosme[1], Belen Irastorza[5], Alberto Gonzalez[6], Juan I. Arenas Jr.[1]

[1]*Department of Gastroenterology, University of Country Basque, Donostia Hospital, Centro de Investigaciyn Biomadica en Enfermedades Hepaticas y Digestivas (CIBERehd), San Sebastian, Spain,*
[2]*Department of Pathology, Donostia Hospital, San Sebastian, Spain,*
[3]*Department of Experimental Surgery, Donostia Hospital, San Sebastian, Spain,*
[4]*Department of Epidemiology, Donostia Hospital, San Sebastian, Spain,*
[5]*Department of Pharmacology, Donostia Hospital, San Sebastian, Spain,*
[6]*Department of Microbiology, Donostia Hospital, San Sebastian, Spain*

Background: The prevalence of nonalcoholic fatty liver disease (NAFLD) is high. NAFLD is linked to obesity, diabetes mellitus, and hypertriglyceridemia. Approximately 20% of patients with NAFLD will eventually develop cirrhosis. Our purpose was to investigate whether resveratrol decreased hepatic steatosis in an animal model of steatosis, and whether this therapeutic approach resulted in a decrease in tumor necrosis factor α (TNF-α) production, lipid peroxidation and oxidative stress.

Methods: Male Wistar CRL: Wi (Han) (225 g) rats were randomized into three groups. A control group (n = 12) was given free access to regular dry rat chow for 4 weeks. The steatosis (n = 12) and resveratrol (n = 12) groups were given free access to feed (a high carbohydrate-fat free modified diet) and water 4 days per week, and fasted for the remaining 3 days for 4 weeks. Rats in the resveratrol group were given resveratrol 10 mg daily by the oral route. All rats were killed at 4 weeks and assessed for fatty infiltration and bacterial translocation. Levels of TNF-α in serum, hepatic malondialdehyde (MDA), oxidative stress (superoxide dismutase, glutathione peroxidase, catalase and nitric oxide synthase) and biochemical parameters were measured.

Results: Fat deposition was decreased in the resveratrol group as compared to the steatosis group (Grade 1 vs Grade 3, $P < 0.05$). TNF-α and MDA levels were significantly increased in the steatosis group (TNF-α; 33.4 ± 5.2 vs 26.24 ± 3.47 pg/ml and MDA; 9.08 ± 0.8 vs 3.17 ± 1.45 μM respectively, $P < 0.05$). This was accompanied by increased superoxide dismutase, glutathione peroxidase and catalase and decreased nitric oxide synthase in the liver of resveratrol group significantly ($P < 0.05$ vs steatosis group). Bacterial translocation was not found in any of the groups. Glucose levels were decreased in the group of rats given resveratrol ($P < 0.05$).

Conclusion: Resveratrol decreased NAFLD severity in rats. This effect was mediated, at least in part, by TNF-α inhibition and antioxidant activities.

Background

Nonalcoholic fatty liver disease (NAFLD) is characterized by histological changes similar to those seen in subjects with alcoholic hepatitis but in whom alcohol intake is absent or poorly significant. Factors promoting NAFLD development include obesity and diabetes. From 69% to 100% of patients with NAFLD are obese [1]. NAFLD prevalence in severe obesity is greater than 30% [2,3]. Because of all these reasons, it is important to have animal models that allow us to study the effect of different substances on NAFLD.

Polyphenols have a variety of biological functions, including antioxidant, anti-inflammatory, and anticancer effects [4]. Resveratrol is a phytoalexin polyphenolic compound occurring in various plants, including grapes, berries, and peanuts. Multiple lines of compelling evidence suggest its beneficial effects on neurological, hepatic, and cardiovascular systems. The potential mechanisms responsible for its biological activities include downregulation of the inflammatory response through inhibition of the synthesis and release of pro-inflammatory mediators, modification of eicosanoid synthesis, inhibition of Kupffer cells and adhe-

sion molecules, inhibition of inducible nitric oxide synthase and cyclooxygenase-2 (COX-2) via its inhibitory effects on nuclear factor (kappa)B (NF-kB) or the activator protein-1 (AP-1) (5,6). In our previous studies, resveratrol was seen to decrease the liver lesions and transaminase elevations caused by alcohol in mice [7].

Our purpose now was to investigate first whether resveratrol decreased hepatic steatosis in an animal model of steatosis, and second, whether this therapeutic approach resulted in a decrease in tumor necrosis factor α (TNF-α) production and oxidative stress.

Methods *Animals and diets*

Wistar CRL: Wi (Han) male rats (Charles River) weighing approximately 225 g were used. All experiments were conducted in accordance with the Guide for the Care and Use of Laboratory Animals published by the US Public Health Service. Animals were kept on a regular 12-hour light period at a controlled temperature ($25 \pm 2°C$). The modified diet (high carbohydrate-fat free) consisted of carbohydrates (80%, as starch), protein (16%, as casein), and vitamins and minerals (4%)(PANLAB, Barcelona, Spain). The standard diet consisted of a balanced diet containing carbohydrates (51%), protein (16%), vitamins and minerals (4%), and lipids (3%). The standard diet contained 2.9 kcal/g, and the modified diet 3.58 kcal/g. The model was based on the model reported by Delzenne in 1997 [8].

Experimental procedures

Rats were distributed into three groups: control, steatosis and resveratrol. The control group was given free access to feed and drink. The control group was fed a standard diet. The steatosis and resveratrol groups were given free access to feed and water 4 days per week, and were fasted for the remaining 3 days (access to water was only allowed). Feed consisted of a modified diet. During the dietary restriction cycles, steatosis and resveratrol groups were fed a modified diet (Figure 1). Rats in the resveratrol group were given resveratrol 10 mg daily by the oral route through an orogastric catheter. Resveratrol was diluted in 1 mL of water.

Resveratrol was obtained from SIGMA Chemical, (Pool, Dorset, UK).

All rats were killed after completing 4 cycles of feeding and fasting, i.e. 28 days after study start. The timing of killing was decided based on previous trials in which hepatic damage was seen to be very high after four weeks in the steatosis group. Feed taken by the rats and weight of the animals were controlled at the end of the study. At the end of the study, all rats were anesthetized using an intraperitoneal injection of an overdose (45 mg/kg) of sodium pentobarbital.

Pathological evaluation

A histological study was performed following a midline laparotomy to remove the liver. Liver was weighed, and liver tissue samples taken at the time the rat was killed were immediately placed in 10% buffered formalin and subsequently embedded in paraffin. Hepatic index was obtained by dividing liver weight by rat weight Ч 100. Liver sections were stained with hematoxylin and eosin using standard techniques. Sections were viewed without knowing the treatment group to which each animal belonged. Biopsies were classified into four grades depending on fat accumulation using the Brunt et al [9] classification, assigning grade 0 when no fat was found in the liver, grade 1 when fat vacuoles were seen in less than 33% of hepatocytes, grade 2 when 33%–66% of hepatocytes were affected by fat vacuoles, and grade 3 when fat vacuoles where found in more than 66% of hepatocytes. The deposit of fat was classified in macrovesicular, micro-vesicular and mixed. Two experienced pathologists blinded to the experiment evaluated all samples. Agreement between both pathologists was determined.

Biochemical measurements

Laboratory parameters such as ALT, glucose, and albumin were measured using an automatic analyzer (Roche/ Hitachi Modular Analytics, Roche Diagnostics, Mannheim, Germany) at 37°C. Serum TNF-α levels was measured using ELISA kits (R&D Systems, Boston, MA-Catalog Number RTA00). TNF-α levels was expressed in pg/mL.

Model of steatosis

Figure 1. NAFLD model used in the study

Lipid peroxidation

Malondialdehyde (MDA) was measurement in hepatic tissue. For hepatic malondialdehyde (MDA) determination, weigh 25 mg of tissue and add 250 µl of RIPA buffer with protease inhibitors. Sonicate for 15 seconds at 40 V over ice and centrifuge at 1.600 Ч g for 10 minutes at 4°C. We use the supernatant for analysis. MDA was quantified using the thiobarbituric acid reaction as described by Ohkawa [10]. MDA levels were measured using Cayman's TBARS Assay Kit. MDA levels were expressed in µM.

Oxidative stress

Superoxide dismutase, catalase, glutathione peroxidase, and nitric oxide synthase levels as oxidant/antioxidant biochemical parameters were measurement in hepatic tissue. Levels were quantified using Cayman's (Cayman Chemical Company, Ann Arbor – Michigan, USA) assay kit following the instructions of the manufacter.

Bacterial translocation determination

Samples of mesenteric lymph nodes and portal and peripheral blood when available were collected under sterile conditions before rat death and cultured in MacCo-nkey agar (Oxoid), Columbia sheep blood (Oxoid), and Esculin-Bile-Azide agar (Merck), and

incubated at 37°C for 48 h. Bacterial translocation was defined as a positive culture of mesenteric lymph nodes. Systemic infections were defined as a positive culture of any of the remaining biological samples.

Statistical analysis

Data are expressed as the mean ± SD statiscal analysis was performed with non-parametric Mann-Whitney test. Standard calculations were performed using SPSS version 16.0. Results were considered statistically significant at $P < 0.05$.

Results

Rat weight significantly increased in the control group (221 ± 10 g to 355 ± 16 g), remained similar in the group with fatty liver disease (222 ± 12 g to 226 ± 14 g), and decreased in the resveratrol group (218 ± 9 g to 201 ± 11 g). Hepatic index was 4.47 ± 0.63, 4.38 ± 0.34, and 3.9 ± 0.31 in the steatosis, resveratrol, and control groups respectively.

Histological evaluation

No fatty infiltration was seen in the control group (Figure 2). Mean fatty infiltration in the steatosis group was 3 (Table 1). Fat deposit in the steatosis group was classified as macrovesicular. Mean fatty infiltration in the resveratrol group was 1, and fat deposit was mixed. Fatty infiltration in the resveratrol group was significantly lower

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than in the steatosis group ($P < 0.05$). Inter-observer agreement was 0.84 and intra-observer agreement was 0.79.

Table 1. Grades of fatty infiltration in rats and groups

Group	Rats (n°)	Steatosis grades			
		0	1	2	3
Control	12	12	-	-	-
Steatosis	12	-	-	2	10
Resveratrol	12	-	10	2	-

Laboratory findings

ALT levels were 40 ± 11 IU/L in the control group, 34 ± 9 IU/L in the steatosis group, and 34 ± 11 IU/L in the resveratrol group ($P < 0.05$ between control group vs steatosis and resveratrol groups). Glucose levels were 230 ± 45 mg/dl in the control group, 162 ± 25 mg/dl in the steatosis group, and 145 ± 33 mg/dl in the resveratrol group. Statistically significant differences in glucose levels were seen between the control and steatosis groups and the resveratrol group ($P < 0.05$ between control group vs steatosis and resveratrol groups). Albumin levels were 38.1 ± 2.3 g/dl in the control group, 40.54 ± 1.87 g/dl in the steatosis group, and 41.1 ± 2.9 g/dl in the resveratrol group ($P < 0.05$ between control group vs steatosis and resveratrol groups).

TNF-α and lipid peroxidation (MDA)

Figure 3 shows that TNF-α levels were increased in the steatosis group as compared to the other two groups ($P < 0.05$). MDA was significantly elevated in the steatosis group as compared to the control group (μM). MDA liver levels were lower in the resveratrol group than in the steatosis group ($P < 0,001$).

Oxidative stress

The data in table 2 demostrate that resveratrol administration significantly decreased the effects of the stress oxidative in the hepatic tissue.

Bacterial translocation and systemic infections

Cultures of samples of portal blood, peripheral blood, and perihepatic lymph nodes were negative in all three groups tested.

Discussion

NAFLD represents a wide spectrum of disorders, the hallmark of which is hepatic steatosis. NAFLD was considered a benign condition, but is now increasingly recognized as a major cause of liver-related morbidity and mortality. Insulin resistance is the basis for accumulation of free fatty acids and triglyceride storage in hepatocytes or steatosis. Oxidative stress from steatotic hepatocytes leads to lipid peroxidation, impaired mitochondrial and peroxisomal oxidation of fatty acids, and cytokine release [11]. Endotoxins and endotoxin-inducible cytokines, particularly TNF-α, are required for the pathogenesis of NAFLD in experimental animals. Therefore the TNF-α plays an important role in NAFLD [12,13].

In our study, hepatic steatosis was significantly decreased in rats treated with resveratrol. This effect was associated to a decreased TNF-α production. Different studies have shown that resveratrol decreases TNF-α production. We therefore think that the decreased liver damage in a model of liver steatosis could be related to its anti-TNF-α effect. Other studies [14-16] have shown a relationship between NAFLD and TNF-α levels. Our study shows that TNF-α levels were increased in both the steatosis and resveratrol groups as compared to the control group, suggesting that TNF-α is an important factor in liver damage occurring in NAFLD. However, TNF-α levels were lower in the resveratrol group than in the steatosis group. We therefore think that TNF-a is an important factor for development of this condition. In agreement with other authors [17-19], we did not consider administration of anti-TNF-a or use of another group given repeated TNF-a doses because adequate evidence was already available. Infliximab (anti-TNF-a) reverses the steatosis and the expression of the proinflammatory markers (TNF-a, IL6, IL-1B) and improves insulin signal trasduction in a

model of steatosis in rats [20]. The presence of a control group (reference group) allows to compare the effects of the modified diet (high carbohydrate-fat free) on the liver (steatosis group) and the effect of the resveratrol (resveratrol group).
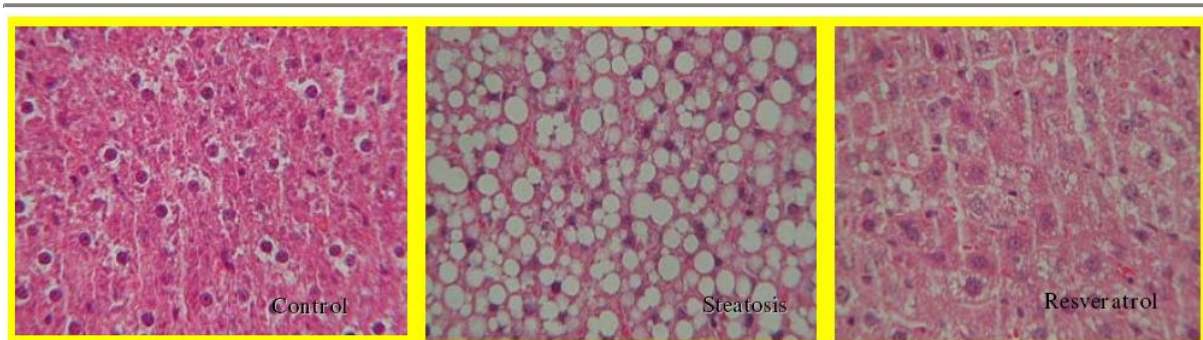
Figure 2. Histological study in the different groups (control, steatosis, and resveratrol)
Thus, the control group is shown to have no fat vacuoles. A great number of vacuoles were seen in the steatosis group, while the resveratrol group had much less vacuoles of a lower size. Hematoxylin and eosin staining of liver tissue x 40.

Table 2. Changes of superoxide dismutase, catalase, glutation

	Control	Steatosis	Resveratrol
Superoxide dismutase (U/ml)	2.74 ± 2.08	1.15 ± 2.1	3.1 ± 3.2*
Catalase (nmol/min/ml)	3807 ± 315	284 ± 26	713 ± 50*
Glutathione peroxidase (nmol/min/ml)	449 ± 27	6.5 ± 3	406 ± 25*
Nitric oxide synthase (uM)	1.9 ± 0.6	9.17 ± 0.9	4.19 ± 0.7*

$*P < 0.05$ vs steatosis group

Bacterial translocation from the intestinal lumen to mesenteric lymph nodes is considered to be one of the main events in the pathogenesis of spontaneous bacterial peritonitis and other infections in cirrhosis. TNF-a is involved in the occurrence of bacterial translocation in rats with cirrhosis [21]. We therefore considered whether bacterial translocation acting as a stimulus for TNF-a production occurred in our model. Cultures of samples of portal blood, peripheral blood, and perihepatic lymph nodes were negative in all three groups tested, which rules out this mechanism as responsible for TNF-a elevation.

There are many models of NAFLD liver injuries in animals [22,23]. In rats, cycles of feeding and fasting with hypertonic high calorie diets have been seen to induce fatty liver [8]. In this study, we used feeding and fasting cycles with a modified diet because it is a fast, easy procedure that results in pathological changes similar to those occurring in humans. In our model the deposit of fatty acids and triglyceride storage in hepatocytes is produced by insulin resistance [8,11]. Insulin resistance is the basis for accumulation of free fatty acids and triglyceride storage in hepatocytes, and represents the "first hit" in the pathogenesis of NAFLD [11]. Body mass significantly decreased with the high carbohydrate-fat free diet and dietary restriction. This may be due to a metabolic imbalance of carbohydrate, protein, and fat. However, hepatic index was higher in the group with steatosis as compared to the resveratrol and control groups. Such higher hepatic index occurred despite the increased rat weight in the steatosis group, which means that resveratrol acts by decreasing fat accumulation in the liver and fat weight, and therefore decreases hepatic index.

ALT is a relatively liver-specific aminotransferase. Elevation of ALT activity in serum is the result of leakage from damaged cells and therefore reflects hepatocyte dam-

age. Elevated transaminase levels correlated strongly with NAFLD [2]. ALT levels were significantly lower in the res-veratrol group as compared to the control group (34 IU/L versus 40 IU/L) and similar to steatosis group levels. In the group treated with resveratrol, lower glucose levels and higher serum albumin levels as compared to untreated rats were also found. Studies have reported increases in serum TNF-α levels in humans with insulin resistance [24]. Hyperglycemia and insulin resistance are associated to the presence of NAFLD [2,25]. Changes in plasma levels of markers predicting for the onset of diabetes occurred with a high carbohydrate-fat free diet [25]. Glucose levels were decreased in the resveratrol group [26], as occurred in our study. Other studies have also noted that res-vera-trol improved insulin sensitivity, lowered plasma glucose, and increased mitochondrial capacity in obese mice [27]. Insulin resistance was not analyzed in our study.

A.
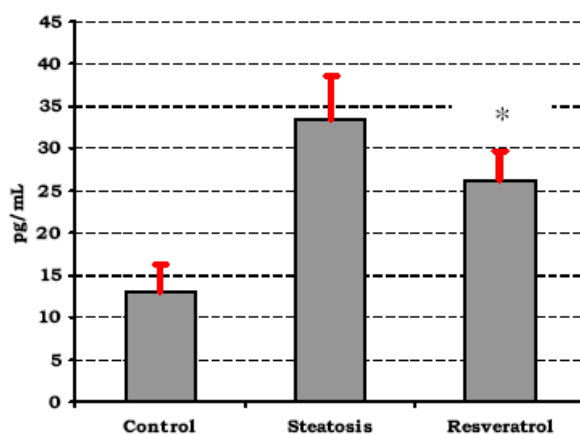
*P< 0.05 as compared to steatosis group

B.
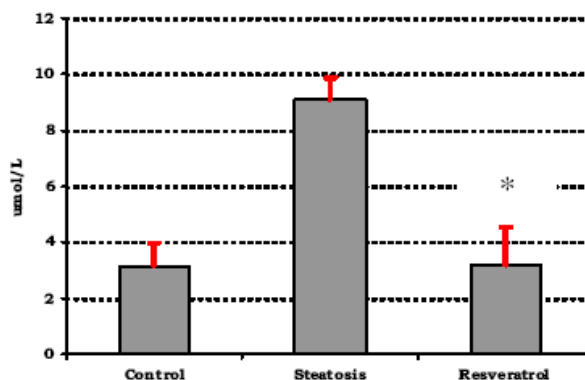
*P< 0.05 as compared to steatosis group

Figure 3. TNF-a and MDA levels
A. TNF-a levels in differents groups (pg/mL). TNF-a levels were lower in the resveratrol groups as compared to the control and steatosis groups. B. Levels of MDA in differents groups (|iM). MDA levels were lower in the resveratrol groups as compared to the steatosis group (*P < 0.05).

High hepatic MDA levels were found in the steatosis group, in agreement with other studies [28]. Resveratrol improved MDA levels. Oxidative stress is believed to play an important role in pathogenesis of NAFLD. It is likely to be involved in disease progression from steatosis to stea-tohepatitis and potentially cirrhosis. It has been shown that chronic oxidative stress, generated through oxidation of cytotoxic free fatty acids, may lead to cytokine upregu-lation and depletion of hepatic antioxidant levels [29,30]. In addition, enhanced lipid peroxidation leads to the generation of by-products, such as MDA, which have been shown to further stimulate cytokine production. They are involved in hepatic stellate cell activation, fibrogenesis, and enhanced extracellular matrix protein deposition [28]. Resveratrol caused increased of hepatic antioxidant levels as superoxide dismutase, glutathione peroxidase and catalase and decreased nitric oxide synthase in the liver.

Fatty acid oxidation is an important source of reactive oxygen species in fatty livers. Some consequences of increased reactive oxygen species levels include an impaired protein stability, membrane destruction via lipid peroxidation, and release of proinflammatory cytokines (increased TNF-α levels) [31]. Reactive oxygen species may attack polyun-satured fatty acids and initiate lipid peroxidation within the cell, which results in MDA formation. Oxidants may not only act as toxic substances, but also as second messengers (activation of transcription factor NF-kB) [32]. Resveratrol increases insulin sensitivity and insulin-like growth factor-1 levels (IGF-1) [28]. Resveratrol would also act by decreasing lipid peroxidation and reactive oxygen species release, thereby decreasing inflammatory response and liver lesions [33,34]

Recently, researches suggest that other mechanisms the resveratrol improve in NAFLD are by the activation of AMP-activated protein kinase and the activation of SIRT1 [35-37].

Conclusion

In summary, our study shows that resveratrol decreases liver steatosis in rats and that its effect is mediated, at least partly, by TNF-α and antioxidant activities. In our model, bacterial translocation was not responsible for TNF-α elevation. Further studies are warranted to determine whether resveratrol decreases or prevents liver steatosis.

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ULTRASONOGRAPHICALLY DETECTED GALLBLADDER POLYPS: A REASON FOR CONCERN? A SEVEN-YEAR FOLLOW-UP STUDY

Wolfgang Kratzer[1], Mark M. Haenle[1], Andrea Voegtle[1], Richard A. Mason[2], Atilla S. Akinli[1], Klaus Hirschbuehl[3], Andreas Schuler[4], Volker Kaechele[1], the Roemerstein study group

[1]*Zentrum fur Innere Medizin, Klinik fur Innere Medizin I, Universitatsklinikum Ulm, Ulm, Germany,*
[2]*University Hospitals of Cleveland Case Medical Center, Case Western Reserve, University School of Medicine, Cleveland, Ohio, USA,*
[3]*Zentralklinikum Augsburg, Abteilung Innere Medizin I, Augsburg, Germany,*
[4]*Helfensteinklinik Geislingen, Medizinische Klinik, Geislingen, Germany*

Background: The management of coincidental detected gallbladder polyps (GP) is still nebulous. There are few published data regarding their long-term growth. Objective of the present study was to investigate the prevalence and growth of gallbladder polyps in a survey of unselected subjects from the general population of a complete rural community.

Methods: A total of 2,415 subjects (1,261 women; 1,154 men) underwent ultrasound examination of the gallbladder, in November 1996 as part of a prospective study. Subjects in whom GP were detected at the initial survey underwent follow-up ultrasound examinations after 30 and 84 months.

Results: At the initial survey gallbladder polyps were detected in 34 subjects (1.4%; females: 1.1%, range 14 to 74 years; males: 1.7%, range 19 to 63 years). Median diameter was 5 ± 2.1 mm (range 2 to 10 mm) at the initial survey, 5 mm ± 2.8 mm (range 2 to 12 mm) at 30 months and 4 ± 2.3 mm (range 2 to 9 mm) at 84 months. At the time of first follow-up no change in diameter was found in 81.0% (n = 17), reduction in diameter in 4.8% (n = 1) and increase in diameter in 14.3% (n = 3). At the time of second follow-up no increase in polyp diameter was found in 76.9% (n = 10) and reduction in diameter in 7.7% (n = 1). No evidence of malignant disease of the gallbladder was found.

Conclusion: Over a period of seven years little change was measured in the diameter of gallbladder polyps. There was no evidence of malignant disease of the gallbladder in any subject.

Background

The development and refinement of diagnostic imaging modalities such as computed tomography (CT), magnetic resonance imaging (MRI) and ultrasonography (US) and their widespread application have led to an increase in the coincidental diagnosis of gallbladder stones and gallbladder polyps [1,2]. As a result, clinicians are ever more frequently confronted with the question of how to proceed in cases of coincidentally discovered gallbladder polyps. The appropriate management of these entities remains controversial [3-5].

Gallbladder polyps represent a heterogeneous group of changes in the gallbladder wall and include entities such as cholesterol polyps, inflammatory polyps, adenomas, leiomyomas and lipomas [6]. The prevalence of gallbladder polyps is reported in the range of 0.3–9.5%, depending on the population studied and on the study design. Prevalence figures in European studies fall in the range of 1.0–4.8%, which is lower than reported in Southeast Asian populations [7-15]. In surgical and pathological studies, the prevalence of gallbladder polyps ranges from 0.004 to 13.8% [16].

To date, only a few studies have investigated the growth behavior of gallbladder polyps in follow-up [9,13,17-21]. Follow-up studies in cross sectional random samples have not been published. The majority of available data derive from surgical or ambulatory patients, or were conducted as part of preventive health measures (table 1) [13,17,18,21].

Objective of the present study, conducted as part of a complete prospective sonographic survey of a rural population [22,23], was to determine the prevalence of gallbladder polyps and their growth behavior in long-term follow-up.

Methods

In November and December 1996 we conducted a prospective epidemiological study on the prevalence of alveolar echinococcosis in Rцmerstein, a rural community in southwestern Germany. As part of this study, the population was also examined for gallbladder polyps [22,23]. Subjects were informed of the additional examination of the gallbladder at the time of the examination itself in order to minimize bias related to a potentially higher response rate on the part of inhabitants with upper abdominal complaints or disorders of the gallbladder. The present study was conducted in accordance with the principles of the Helsinki Declaration and was approved by the ethics commission of Ulm University.

Ultrasound examinations

All inhabitants aged six years and older were asked to present for examination after a four-hour fasting period. All study participants underwent ultrasound examination of the gallbladder at which gallbladder size in three axes, the gallbladder wall and gallbladder lumen were assessed. In cases of inconclusive findings regarding differentiation between gallbladder stones and gallbladder polyps, patients were examined in standing position.

Table 1. Studies of the natural progression of gallblader polyps during follow up of patients and/or subjects

Author Year	Country	Population	n	Method	Follow-up Period	Patients undergoing surgery		Changes in polyp diameter during the observation period			
						N		Reduction	Disappearance	Increase	Unchanged
Eelkema 1962	USA	Patients	113	Cholecystography	15 years						
Moriguchi 1996	Japan	Outpatients	109	Ultrasound	5 years	4	No carcinoma	1.9%	1.9%	11.7%	84.5%
Shinkai 1988	Japan	Patients	60	Ultrasound	Average 22 months	9	No carcinoma	No statistically significant change	No statistically significant change	No statistically significant change	No statistically significant change
Heyder 1990	Germany	Patients: abdominal screening in a surgical population	92	Ultrasound	Average 9 months	2	No carcinoma	No data	13%	6,5%	No data
Collett 1998	New Zealand	Diabetics and healthy controls	564	Ultrasound	2 years – 30 patients 5 years – 22 patients	0	No surgery	No data	No data	No data	No data
Sugiyama 2000	Japan	Surgical patients	125	Ultrasound/ Endo-ultrasound	Average 2.6 years	3	No carcinoma	4%	1.6%	7.2%	87.2%
Csendes 2001	Chile	Surgical patients with dyspeptic symptoms or routine examination	98	Ultrasound	Average 5.9 years Range 24–144 months	14	No carcinoma	2%[1]/[2] 7%	18%[1]/[2]10%	5% [3]	53%[1]/[2] 72%

[1] after 8 years; [2] after 12 years; [3] after 4 years

The initial ultrasound examinations in 1996 were carried out by 8 assistants of the University Hospital of Ulm in 4 cubicles, where examinations were performed simultaneously. All personnel had been trained by the same experienced ultrasound examiner before the study, and this examiner was present in the examination room to provide a second opinion in cases in which the primary examiner could not give a definite diagnosis. The ultrasound examinations in 1999 and 2003 were all performed by the same experienced examiner.

The diagnosis of gallbladder polyps was made on the basis of the following criteria: hyperechoic structures without acoustic shadow that projected from the gallbladder wall into the gallbladder lumen and were either pedunculate or broad based; unequivocal visualization in two planes (longitudinal and in cross-section); no change in position of the wall change secondary to change in subjects' position; unremarkable gallbladder wall; un-

equivocal differentiation between a gallbladder septum and a gallbladder polyp. The diagnosis of "gallbladder polyp" was made only in cases fulfilling all the above criteria.

Ultrasound examinations were performed using three different types of ultrasound scanners (two units of the type ATL 800 and one ATL 9 HDI, manufactured by ATL Ultrasound Medical Systems, Bothell, WA, USA, each with either a 3.5–5 MHz or 4–7 MHz convex transducer head; and a Siemens Sonoline 400, manufactured by Siemens AG, Erlangen, Germany with a 5 MHz convex transducer head) by trained examiners working under supervision. The number of polyps and the diameter in millimeters of the largest polyp were then documented.

Follow-up 1999

Subjects diagnosed with gallbladder polyps at the initial survey in 1996 were sent a written invitation in May 1999 for follow-up examination. Follow-up examinations were conducted 30 months after the initial survey from May 25th to June 5th 1999. Of 34 subjects diagnosed with gallbladder polyps, 31 (91%) accepted the invitation. Two subjects did not respond to the written invitation, while the third refused the follow-up examination for personal reasons.

The ultrasound examinations were conducted using a Philips ATL HDI 5000 scanner with a 2–5 MHz convex transducer head. An increase or decrease in the diameter of the polyp was defined as a size change of greater than 2 mm.

Follow-up 2003

The second follow-up examination took place in October and November 2003 at 84 months after the initial survey. With the help of the Civil Registry Office of Rцmerstein, all 31 subjects participating in the first follow-up examination in 1999 were located. It was discovered that four individuals had moved, while one participant had died. The remaining 26 participants were sent a written invitation and were also contacted by telephone. Subjects were given the choice of being examined either at the University Hospital of Ulm or in Rцmerstein (school center). In order to maximize the response rate, subjects were also offered the option of being examined at home using a portable ultrasound scanner. Three subjects came to Ulm, while 14 were examined in Rцmerstein (school center) and five were examined in their homes. Examinations in Ulm and Rцmerstein were again conducted using a Philips ATL HDI 5000 scanner with a 2–5 MHz and 4–7 MHz convex transducer heads. Subjects examined in their homes were scanned using a portable SONOACE My Sono 201 scanner with a 2–5 MHz convex transducer head.

Three of the 26 subjects had undergone cholecystectomy in the intervening period. One further subject refused to participate in the follow-up examination for personal reasons. Thus, of the remaining 26 subjects, 22 (64.7%, n = 34; 14 males, eight females) participated in the second follow-up examination. Nine subjects could not be examined at follow-up: four had moved, one had died and three had undergone cholecystectomy.

Statistics

Because of the small number of subjects, data were analyzed descriptively.

Results

Of the total 3,841 registered inhabitants of the community of Rцmerstein six years of age or older, 66.6% (n = 2,560) participated in the initial survey in 1996. Excluded from the study were 145 initial respondents (5.7%), of whom 82 (3.2%) had undergone prior cholecystectomy. Sixty-two subjects (2.4%) were excluded because of inability to adequately visualize the gallbladder, while one subject (0.04%) was found to have both a gallbladder stone and a gallbladder polyp. At the initial examinations in 1996, gallbladder findings suggestive of malignancy were not identified in any subject.

Prevalence

The study population consisted of n = 2,415 subjects (1,261 women, median age 41.5 years, range 14–74 years; 1,154 men, median age 39 years, range 19–63 years). Sonographic criteria for gallbladder polyps

were documented in 1.4% of subjects (n = 34; 1.1% in females; 1.7% in males). The highest prevalence of gallbladder polyps was observed in the group of subjects 36–45 years of age (females, 2.1%; males, 4.7%; figure 1). In the same study population, the prevalence of gallbladder stones was 7.8% (10.5% in females, 4.9% in males; 23).

Number and diameter of polyps

Data on polyp size are limited to n = 31 subjects because documentation of the diameter of polyps was not available in three subjects. The diameter of the largest polyp was 5 mm or less in 20 of 31 subjects (64.5%) and between 6 mm and 10 mm in 11 of 31 subjects (35.5%). No polyps were larger than 10 mm. Median polyp diameter was 5 mm ± 2.1 mm (range 2–10 mm) for all subjects; 4 mm ± 2.2 mm (range 2–9 mm) in females; and 5 mm ± 2.1 mm (range 4–10 mm) in males. Of the total 34 subjects with identified polyps, 85.3% had solitary polyps, while 14.7% had multiple polyps (2 polyps in two subjects, 3 polyps in two subjects, more than 5 polyps in one subject). All polyps were pedunculate. Broad-based polyps were not observed in any subject

Follow-up 1999

Of 34 subjects with identified gallbladder polyps at the time of the initial survey, 31 (91.2%; 13 women, 18 men) presented to the first follow-up examination. At the time of the first follow-up examination,

polyps were again identified in 24 subjects (77.4%, n = 31). Polyps were no longer visualized in seven subjects. Among these seven subjects, two female subjects, however, had newly diagnosed gallbladder stones (figure 2). Median polyp diameter was 5 mm ± 2.8 (range 2–12 mm). Polyp diameter was less than 10 mm in 91.7% (22/24) of cases and less than 5 mm in 45.8% (11/24) of cases. Two polyps (2/24; 8.3%) were larger than 12 mm. In 81.0% (17/21) of cases, polyp size remained constant, while, in one subject (1/21; 4.8%), polyp diameter decreased and in three subjects (3/ 21, 14.3%), growth progression was observed (figure 2). In one subject, polyp diameter had doubled from 4 to 8 mm. Unfortunately, this subject left the community shortly after the first follow-up examination, preventing further follow-up. Examination of the two other subjects revealed size increase from 9 to 12 mm. Because of polyp size greater than 10 mm, these patients had been advised to consider cholecystectomy and subsequently did undergo the procedure. Histopathological studies in one subject revealed multiple gallbladder stones in an otherwise unremarkable gallbladder, while, in the second, cholecystitis of moderate severity was diagnosed. These three subjects with increases in polyp diameter did not report upper abdominal complains, nausea or vomiting, or intolerance of fatty foods; two, however, reported infrequent heartburn.
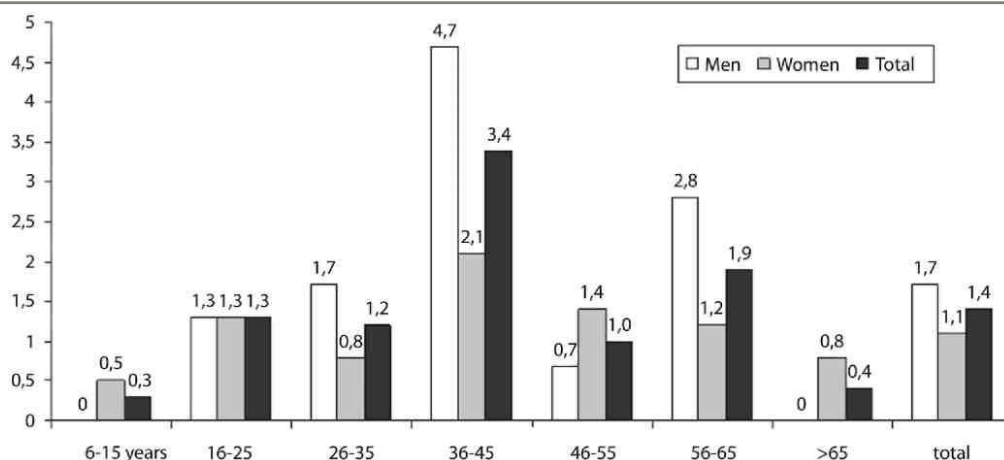
Figure 1. Gallbladder polyps: prevalence in percent (%) in relation to age and sex at the initial survey in 1996
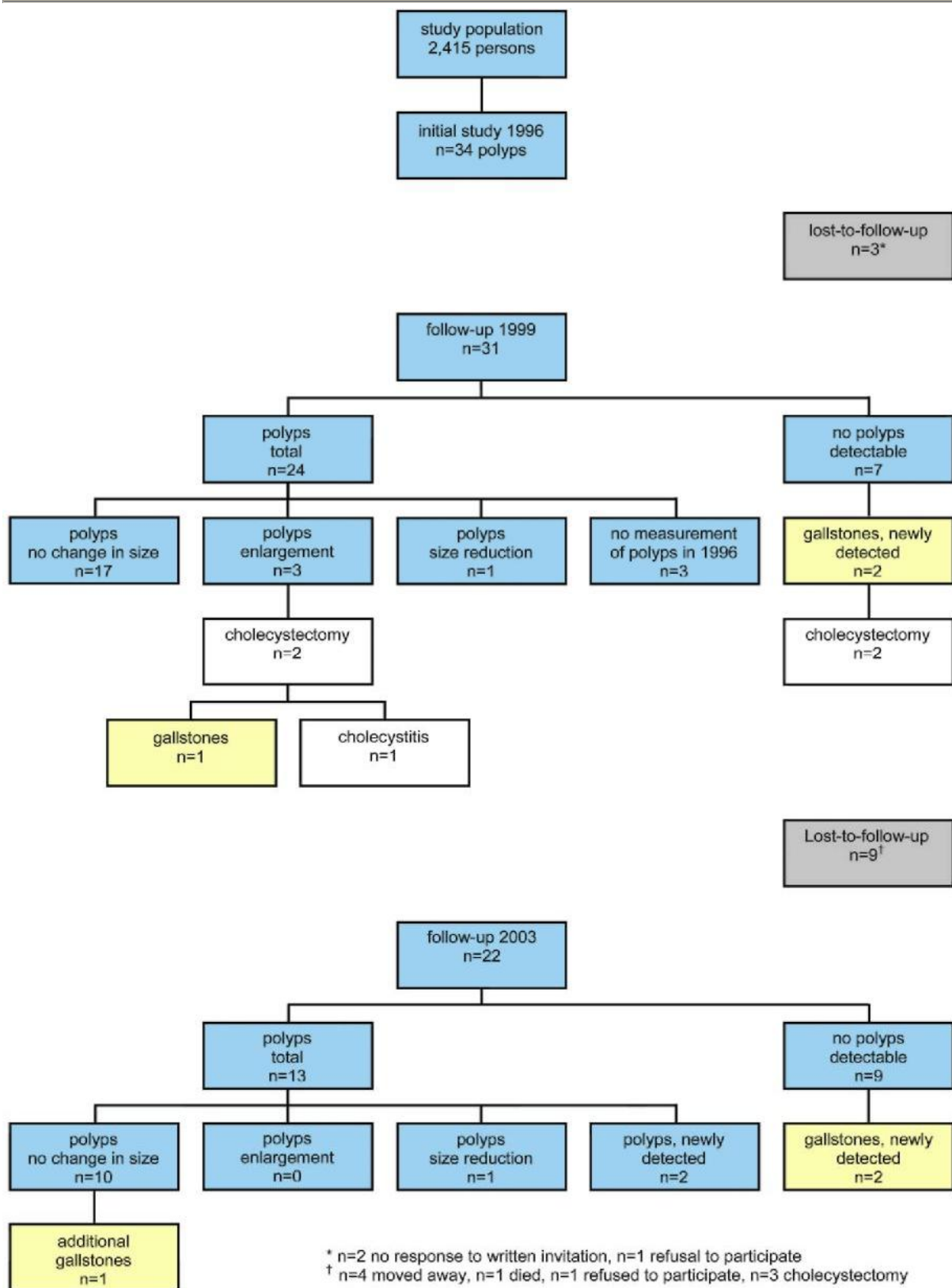
Figure 2. Initial study population in 1996 and results and ultrasound findings in 1999 and 2003

Follow-up 2003

In the remaining 22 subjects, polyps were no longer visualized in nine persons. In three of these subjects, the first follow-up examination in 1999 had also failed to visualize polyps; follow-up in 2003 showed that no new sono-graphically visualized polyps had developed in the four-year interval in these subjects. Among the remaining four subjects without polyps, two were found to have developed gallbladder stones in the interval. In one other female subject, the findings of cholecystolithiasis from the first follow-up examination in 1999 was confirmed (figure 2).

Polyp diameter remained constant in 76.9% (10/13) subjects. In one subject (1/13; 7.7%) a polyp decreased in size. Two subjects (2/13; 15.4%), in whom the first follow-up examination in 1999 had failed to visualize the polyps found at the initial survey in 1996, again met sonographic criteria for the diagnosis of gallbladder polyps. A comparison of median polyp size over seven years suggests that their diameter does not significantly change. In all examinations, females had a smaller polyp diameter than did males. Thickening of the gallbladder wall was not observed in any subject. Median diameter of polyps for all subjects was 4 mm ± 2.3 (range 2–9 mm), for women, 4 mm and for males, 5 mm. For the whole population, 53.8% (7/13) of polyps were smaller than 5 mm, while 46.2% (6/13) showed a diameter between 6 and 9 mm.

Discussion

Prevalence study

The prevalence of gallbladder polyps in our population sample was 1.4% (males, 1.7%; females 1.1%), which corresponds to prevalence data published by Цzmen et al. for Great Britain and by Heyder et al, for Germany [7,9]. Our data were collected as part of a complete survey of a rural population with a response rate of 66.6% [22,23]. To date, the only available data regarding the prevalence of gallbladder polyps in a representative population sample were published by Jшrgensen et al., who reported a prevalence of 4.6% for males and 4.3% for females [8]. Prevalence data from larger, non-surgical patient populations derive from preventive medical studies or from selected populations in Japan and Taiwan, with prevalences in the range of 5.3–9.5% [10-14]. All studies show a predominance of males for the development of gallbladder polyps, compared to a female predominance for the development of gallbladder stones [10-14,23,24]. In our study, the peak age for first manifestation of gallbladder polyps lay between 36 and 45 years. In this age group, the respective prevalences for males and females stood at 4.7% and 2.1%, respectively. Segawa and Lin reported the highest prevalence for both sexes in the fourth decade of life [10,15]. Similarly, Okamoto and Jшrgensen found the highest prevalence in males in the fourth decade, but in the fifth and sixth decades in females [8,10,11,15].

Follow-up study

To date, no data on the follow-up of gallbladder polyps derived from studies of representative population samples have been published. Of published studies, the majority used diagnostic ultrasound, while Eelkema et al. analyzed data obtained by cholecystography and Sugiyama et al. examined some of their patients using endosonography. Most subjects were surgical patients, although Collett et al. report on diabetics and healthy controls [9,13,14,17-21]. The average follow-up periods of the available studies range from nine months to 15 years. In most instances, patients were re-examined at intervals of six or 12 months. Similar to the study by Collett et al., we examined our subjects at established follow-up dates of three and seven years [19].

All gallbladder polyps diagnosed at the initial survey were 10 mm or less in diameter. A similar distribution was reported by Moriguchi et al., who reported diameters 5 mm and less in 57%, 6–9 mm in 37% and 10 cm and above in only 6% [13]. Jшrgensen et al. and Csendes et al. reported diameters < 5 mm in even higher percentages of subjects, namely 85% and 80%, respectively, and did

not, in their respective populations, identify any polyps larger than 10 mm in diameter [8,17]. The median polyp diameter in our initial survey was 5 mm ± 2.1 mm (range 2–10 mm), which was comparable to data reported by Shinkai et al. at 4.8 mm ± 2.9 mm. In the study reported by Collett et al., the average initial diameter was 3.9 mm. Heyder et al., however, reported larger diameters at 6 mm (range 2–15 mm) [9,19,20].

With respect to diameter, the majority of polyps showed no change at either the first (1999) or second (2003) follow-up examination. In 1999, polyp diameter remained constant in 81% (17/21) of subjects, with one person (5%) exhibiting reduction in the size of his polyp and three persons (14%) showing size progression (figure 3). A comparison of size progression between 1999 and 2003 shows that 91% (10/11) of polyps remained constant, one became smaller (1/11; 9%) but none became larger. Over the entire 84-month period 62% (8/13) of polyps showed no change in size, 15% (2/13) became smaller and 23% (3/13) became larger. Thus, our results lie between data published by Moriguchi and Sugiyama on the one hand and those of Csendes on the other [13,17,18]. Over an observation period of five years, Moriguchi et al. found an increase in polyp diameter in 11.7% (12/103), while in 84.5% (87/103), polyp size remained constant. Conversely, Csendes et al., who followed subjects for an average 71%, found no change in polyp diameter in 50% of subjects while an increase or decrease in diameter was observed in 25% each (table 1) [13,17].

At the first follow-up examination, 30 months after the initial survey and with a response rate of 91%, polyps were visualized in only 77% (24/31) of subjects; at the second follow-up examination, 84 months after the initial survey and with a response rate of 65%, polyps were identified in 41.9% (13/31) of subjects. The proportion of polyps that were no longer detected at follow-up examinations was lower in reports by other authors [13,17-19].
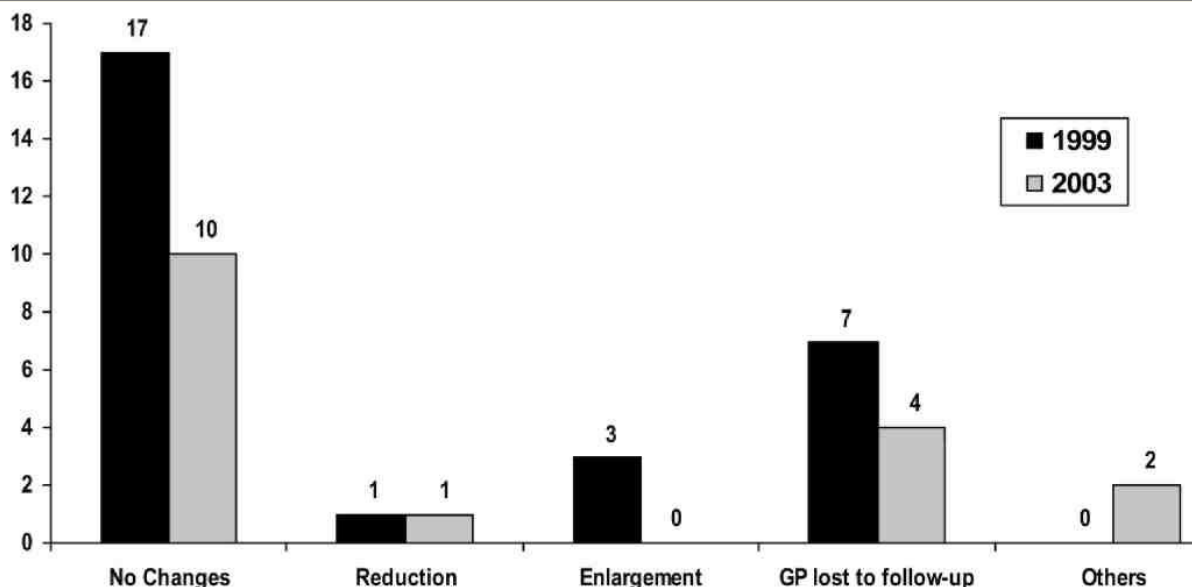
Figure 3. Changes in gallbladder polyps (GP) between 1996 and 1999 and between 1996 and 2003

Of the three subjects in our study who exhibited polyps with size progression, two underwent cholecystectomy. The histopathological findings in one patient revealed multiple gallbladder stones in an otherwise unremarkable gallbladder. In all, 19.4% (n = 6) of all structures initially identified as polyps were identified as gallbladder stones at

follow-up. Similar results have been reported from surgical series [6,4,25,26].

A possible reason for the false-positive ultrasound findings might be that polyps may form the site of origin in the development of gallbladder stones [6,27].

The histopathological findings in the second subject who had undergone cholecystectomy due to size progression revealed cholecystitis of moderate severity, which, at the time of the ultrasound examination, may have been polypoid in appearance [27,28]. A further reason for the failure to demonstrate polyps at histopathological examination could be that polyps may be destroyed by the mechanical action of the gallbladder wall.[8] This may also be an explanation for the observation in our study that the prevalence of gallbladder polyps among women and in advanced age is lower, while, at the same time, in this subsample, the prevalence of gallbladder stones is higher to a statistically significant extent. [23] Neither Sugiyama nor Moriguchi nor Csendes reported the development of gallbladder stones at follow-up [17,18,20].

One of the limitations of our study is the small number of only 34 subjects with polyps visualized at ultrasound. One reason may relate to the technically less advanced ultrasound scanners used at the initial survey compared with those used at follow-up. The portable ultrasound scanner used at the second follow-up examination of subjects in their homes may also have limited the strength of the findings and may possible have been the cause of false-negative findings.

Conclusion

The present study for the first time examined the growth behavior of gallbladder polyps in a representative population sample. In summary, we can conclude that the changes in size in the polyps over an observation period of seven years were slight. Size progression was observed in only three subjects. No evidence of development of malignant disease was observed. Remarkable was the high number of gallbladder stones at fol-low-up, which initially were diagnosed as gallbladder polyps.

Authors' contributions

WK conceived and designed the study, acquired, analysed and interpreted data, and drafted the manuscript. MMH collected, assembled and interpreted the data and drafted the manuscript. AV collected, assembled and interpreted the data and revised the manuscript for important intellectual content. RAM drafted the manuscript. AA analysed and interpreted the data, and revised the manuscript for important intellectual content. KH acquired, analysed and interpreted data, and revised the manuscript for important intellectual content. AS revised the manuscript for important intellectual content. VK helped conceive and design the study, acquired, analysed and interpreted data, and drafted the manuscript. All authors approved the final version of the manuscript. WK is guarantor.

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INNOVATIVE METHODS OF NANOMATERIAL GRAFTS APPLICATION IN NEUROSURGERY

Pavlova T.V., Krivetsky V.V., Pavlova L.A., Ivanov M.B., Kolesnikov D.A., Kolobov Yu.R., Pavlov I.A.

Belgorod State University, Pathology Department
Center of Nanostructural Materials and Nanotechnologies

The application of implants with bioactive coatings will have a considerable economical and social effect. The bony tissue regenerative abilities increase with the absence of the body intoxication phenomena and nanopathology development is shown in the paper. The use of innovation methods of allotransplantology makes quick and noninvasive repair of bony structures possible.

Many nanomaterials possess unique properties. Let us consider properties of an any material particle sized kind of tens and hundreds nanometers. In such a nanoparticle compared to larger objects the percentage of surface atoms or molecules increases in comparison with total atoms (molecules). It influence the given particle properties as a whole. Electric, magnetic, mechanic and some other properties of the material composed of such nanoparticles are no longer constant and begin depending on the size and form of the particles. Sometimes the nanostructured materials show absolutely surprising qualities, which can find potential application in the most various branches of science and technology, in medicine particularly.

In the Belgorod State University an integral method of getting biocomposites based on nanostructured titanium and its alloys with nanocrystalline bioactive calcium-phosphate coatings for making medical grafts. The presence of the coating gives the composite bioactive properties, that improves the graft ability to integrate with bone marrow cells and form bony tissue at the coatings surface. The coatings of nanocrystalline bone-salt, for which an ingenious method of synthesis and application to the graft surface has been developed, is of special interest.

In connection with this, the purpose of our research has been the study of biocompatibility and regenerative processes of bony tissue at operational interventions into bony tissue using materials with nanocrystalline bone-salt coatings.

Materials and methods

Model implants of nanostructured technically pure titanium of the trademark ВТ1-0 were produced in the form of a rod. Using the micro-arch oxidizing method the implant was covered with a layer of 2-5mcm thick and controlled porosity titanium dioxide.

Then nanocrystalline high-purity bone-salt [1] with layer thickness of about 5mcm was applied to the surface.

Laboratory animals (20 "V-star"-line rats) were involved into the experiment. The animals were divided into the following groups. 15 rats were subjected to resection craniotomy in the right temporal region with the implantation of a nanostructured titanium graft coated with nanocrystalline bony-salt. 5 animals made the control group (false-operated).

The rats were given ether narcosis. After the treatment of the operative field in aseptic conditions a 0,8cm length incision of soft tissues up to the bone was made. The wound edges were separated. In the region of the transitory fold a widowing was performed with an ophthalmic scalpel. The opening was enlarged up to the graft size, i.e. to 0,3x0,5cm. The implants were imbedded into the grade without biostructures' entrapment. The wound was sewed tightly. The toilette was carried out by means of brilliant green solution. After the anaesthesia recovery the rat is active, performs the toilette of its external integuments. Active movement retained in full, there were no pyramidal insufficiency signs registered.

After the operation the rats were divided into 3 groups: the regeneration study in 7 days (the 1st group), the regeneration study in 14 days (2), the regeneration study in 21 days (3), 45 days (4).

On the preset terms the animals were beaten death by decapitation against the background of etherization. For the determination of possible graft toxicity the parenchymal organs (liver, kidneys, lungs, heart) were taken out for the macro-examination and micro-histological study.

Black and grey rabbits weighing 2-2,5 kg (6)were used. 150 ml of thiopental were administered intramuscularly as narcosis. After sleeping phase coming-in an up to 4 cm length incision of soft tissues was performed in the right frontotemporal region in aseptic conditions. The bone was skeletonized and windowed, the opening being formed into a square burr hole sized 1,0x1,0 cm. The defect was substituted by a metal graft with nano-coating. The graft was fixed in the defect by jointing on the muscle and periosteal coverage. The skin was sutured. The animals were killed in 7 and 14 days.

The bone lamella was taken out together with the graft, examined and photographed through the scanning electron microscope FEI Quana 200 3D without additional treatment. The histological materials were colored with hematoxylin and eosin and subjected to a research under the optical microscope "TOPIS-T" CETI.

The bone lamella was taken out together with the graft, examined and photographed through the scanning electron microscope FEI Quana 200 3D without additional treatment.

Research results

At the function study of the animals it is evident that cognitive and mainly neurophysic functions are not altered. The animals are active, vigorous in the open plain, active movements are retained in full. There are no changes registered on the part of the cardio-vascular, respiratory and digestive systems.

At the microscopic examination of the animals it is seen that the incisions were healed by means of primary intension. By the 21st day the traumatic defect didn't stand out from the general surface. It should be noted that in the animals, having been operated using experimental implants, the vascular pattern is more distinct than that of the false-operated ones. Besides, in the experimental animals the dura mater vessels' frank repletion in the region adjacent to the bone lamella was defined on the 7th and 14th days.

At the submicroscopic scanning the following processes were described by us. So, in 7 days we observed the filling of the defect between the retained bony tissue and the implanted graft with argyrophil and collage fibers, which were already located on the lamella itself, they filling empty spaces with their processes in the regions with calcium-phosphate coating (Fig. 1). When studying the animals in 14 days, the covering of the whole lamella from the outside with a heavy layer of collagen and elastinic fibers occurs. The fibroblasts with deviating from them collagen fibers are seen very well. Only insignificant regions with the calcium-phosphate coating implant baring or fragments covered with argyrophil fibers, as analogous to the animals killed at the 7-day regeneration stage are defined.

When studying the reparation processes in 21 days, a panniculus, which is a rough fibrous tissue represented by collagen fibers located loosely and disorderly with the intercellular matrix, is seen, next is a lamellar bony tissue, wherein collagen fibers are located in parallel rows (bone lamella), but the orientation of the fibers in the neighboring layers is different. The lamellar bony tissue forms compact and spongy bone layers. The compact layer defines the mechanical strength of the bone and consists of lamellar bone tissue, where blood vessels and nerves begin being formed, and osteons. The spongy layer, which is inside the bone, only starts being formed. The lamellar bone tissue fibroblasts with greater amount of collagen and elastinic fibers gradually oust the cells of the osseous system process layer: osteoblasts, osteocytes and osteoclasts.
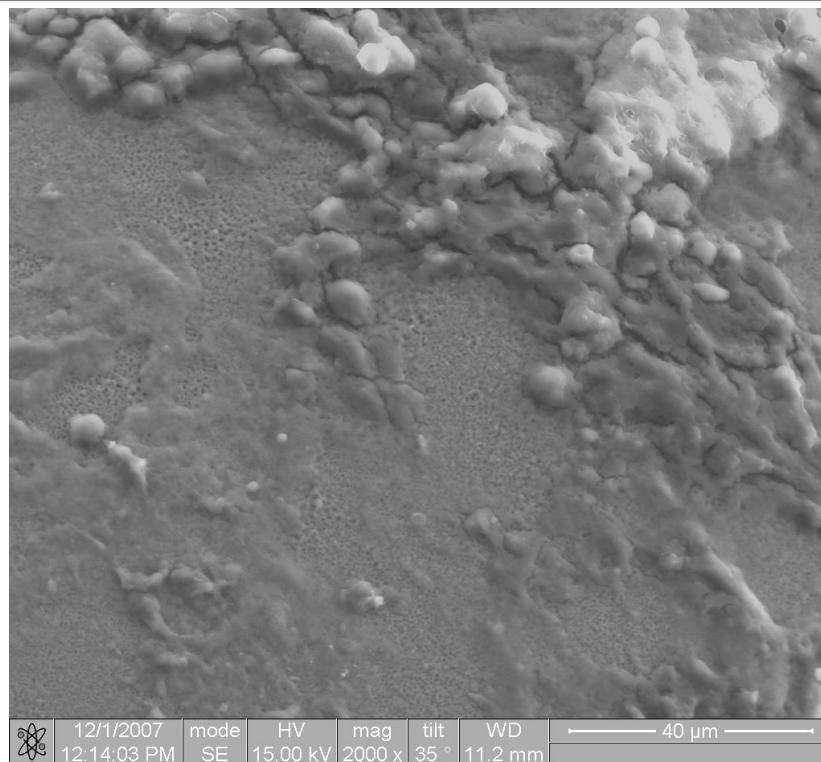
Fig. 1.A
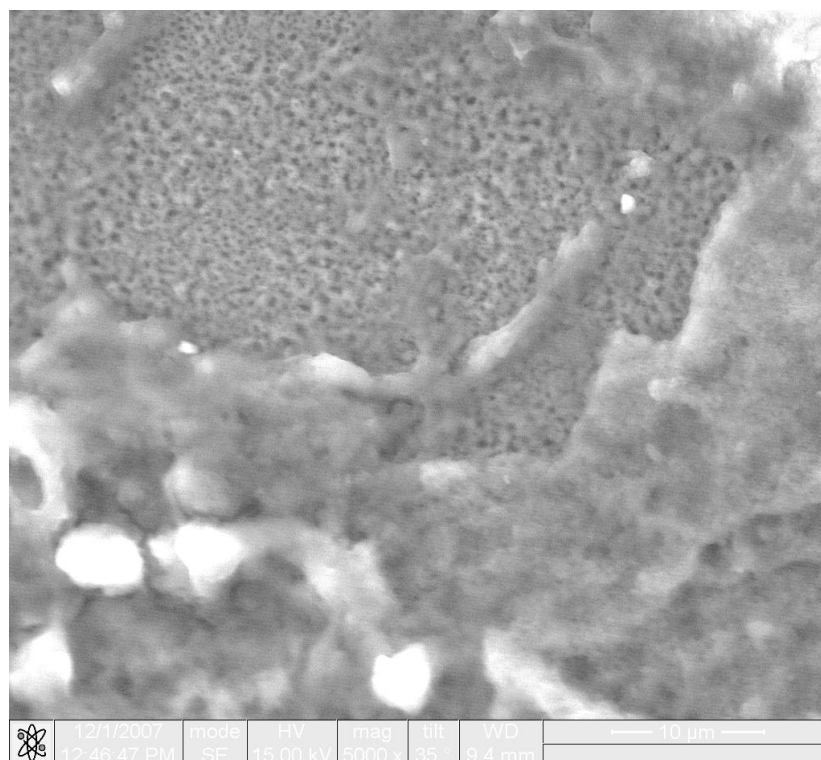
Fig. 1.B

Fig. 1. Titanium alloy graft fragment with nano-bone-salt coating when implanted into the rat's scull bony tissue (45 days of exposition). Covering of the graft with cells.
SEM. Fig. 1.A. PM (power magnification) x 2000. Fig. 1.B. Fragment of Fig. 1.A. PM x 5000.
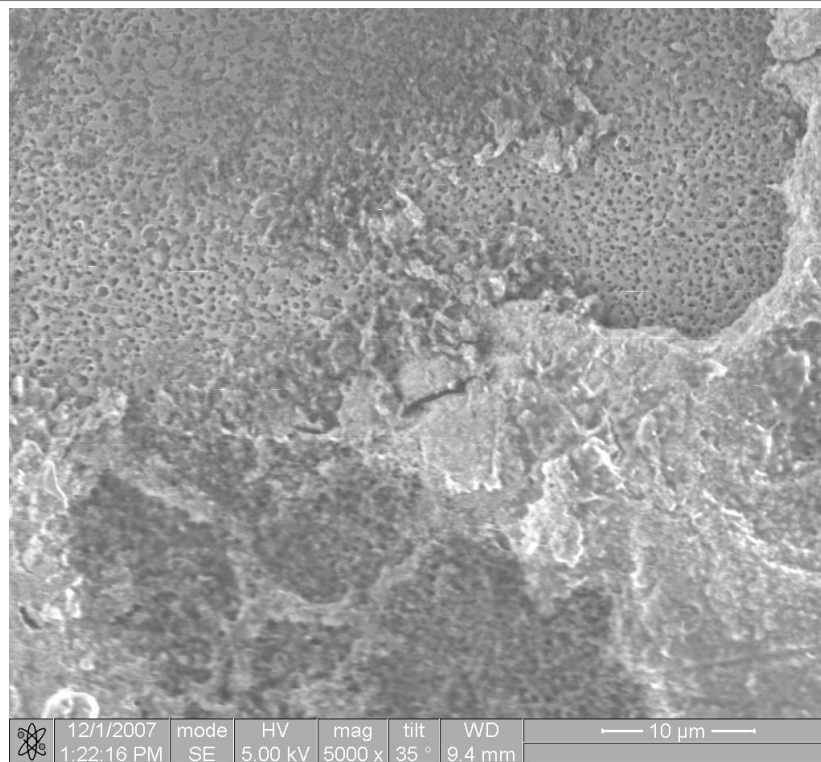
Fig. 2.A
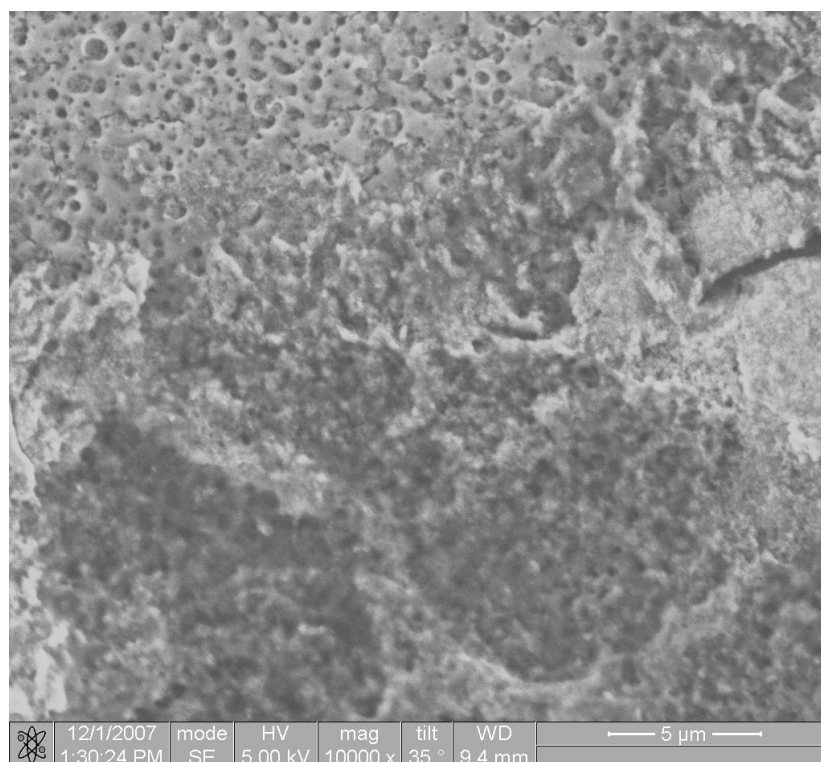
Fig. 2.B

Fig. 2. Titanium alloy graft fragment with nano-bone-salt coating when implanted into the rat's scull bony tissue (45 days of exposition). Cells' processes growth into the graft coating. SEM. Fig. 2.A. PM x 5000. Fig. 2.B. Fragment of Fig. 2.A. PM x 10000.
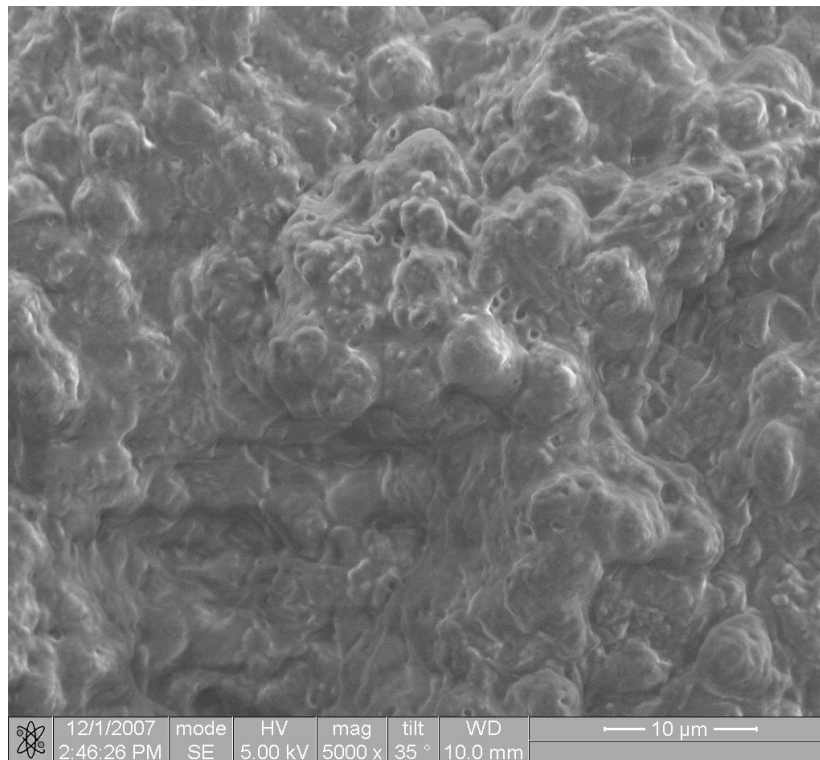
Fig. 3.A
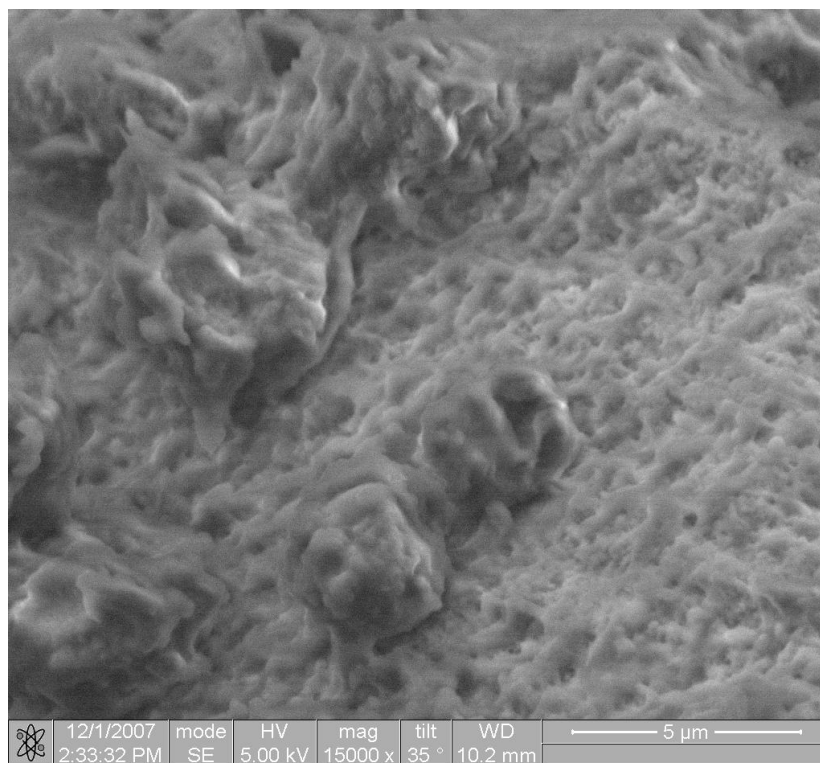
Fig. 3.B.

Fig. 3. Titanium alloy graft fragment with nano-bone-salt coating when implanted into the rat's scull bony tissue (45 days of exposition). Filling of the graft with fibrous tissue and cells. SEM. Fig. 3.A. PM x 5000. Fig. 3.B. Fragment of Fig. 3.A. PM x 15000.

There is a great amount of processes, with the help of which they make contacts with neighboring cells, in the osteoblasts. Secreted by practically all the cell's surface, procollagen contacts actively with the nano-coating. It should be noted that of the two types of osteoblasts (active and inactive) their active forms, which are responsible for the synthesis of collagen and other proteins being part of the organic bone matrix, deposit and exchange of calcium and other ions, occur for the most part.

Very few osteocytes occurred at this stage. The tissue was not yet fully structured and deprived of lacunes. The osteocytes represented round shape cells with long fine processes. The osteocytes in the basal region contained nuclei, many mitochondria, granular endoplasmic reticulum elements, Golgi complex. Moreover, a lamellar bone tissue formed by bone lamellas was defined in the preparations, it forming compact and spongy substance in the bone.

It should be remarked that between the first and 3-4 days the formation of a haematoma in the graft place was gross observed. Then, by the 7-14th day together with mildly expressed inflammation we observed the migration and proliferation of mesenchymal cells, the formation of fibrovascular tissue round the implant. After that the vascular invasion into the graft, osteoplastic resorption of the last and formation of a neoformed bone on the implant's surface took place.

At the examination of the rats in 45 days it was shown that the most part of the lamella was substituted by the tissue analogous to bone one located near the region of trepanation. When compared, the regeneration in rabbits occurred more quickly than that in the rats.

At the study of the parenchymal organs (liver, kidneys, lungs, heart) in a week after the implant introduction mildly expressed repletion was defined, that is indicative at the given stage of the false-operated animal group as well. There were no changes in 14 and 21 days registered.

Thus, the operative treatment using titanium implants with calcium-phosphate nanocrystalline bony-salt coatings helps better regeneration of bone tissue, the intoxication phenomena and nanopathology development being not found out. The use of innovation methods of allotransplantology makes quick and noninvasive repair of bony structures possible.

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HAEMODYNAMIC EFFECTS OF PLASMA-EXPANSION WITH HYPERONCOTIC ALBUMIN IN CIRRHOTIC PATIENTS WITH RENAL FAILURE: A PROSPECTIVE INTERVENTIONAL STUDY

Andreas Umgelter[1], Katrin Wagner[2], Wolfgang Reindl[1], Nils Nurtsch[1], Wolfgang Huber[1], Roland M. Schmid[1]

[1]*II. Medizinische Klinik, Klinikum rechts der Isar der Technischen Universitat Munchen, Munchen, Germany*

[2]*Klinik fur Kardiologie, Stadtisches Klinikum Bogenhausen, Munchen, Germany*

Background: Patients with advanced cirrhosis of the liver typically display circulatory disturbance. Haemodynamic management may be critical for avoiding and treating functional renal failure in such patients. This study investigated the effects of plasma expansion with hyperoncotic albumin solution and the role of static haemodynamic parameters in predicting volume responsiveness in patients with advanced cirrhosis.

Methods: Patients with advanced cirrhosis (Child B and C) of the liver receiving albumin substitution because of renal compromise were studied using trans-pulmonary thermodilution. Paired measurements before and after two infusions of 200 ml of 20% albumin per patient were recorded and standard haemodynamic parameters such as central venous pressure (CVP), mean arterial pressure (MAP), systemic vascular resistance index (SVRI), cardiac index (CI) and derived variables were assessed, including global end-diastolic blood volume index (GEDVI), a parameter that reflects central blood volume

Results: 100 measurements in 50 patients (33 m/17 w; age 56 years ($\pm$ 8); Child-Pugh-score 12 ($\pm$ 2), serum creatinine 256 μmol ($\pm$ 150) were analyzed. Baseline values suggested decreased central blood volumes GEDVI = 675 ml/m^2 ($\pm$ 138) despite CVP within the normal range (11 mmHg ($\pm$ 5). After infusion, GEDVI, CI and CVP increased (682 ml/m^2 ($\pm$ 128) vs. 744 ml/m^2 ($\pm$ 171), p < 0.001; 4.3 L/min/m^2 ($\pm$ 1.1) vs. 4.7 L/min/m^2 ($\pm$ 1.1), p < 0.001; 12 mmHg ($\pm$ 6) vs. 14 mmHg ($\pm$ 6), p < 0.001 respectively) and systemic vascular resistance decreased (1760 dyn s/cm^5/m^2 ($\pm$ 1144) vs. 1490 dyn s/cm^5/m^2 ($\pm$ 837); p < 0.001). Changes in GEDVI, but not CVP, correlated with changes in CI (r^2 = 0.51; p < 0.001). To assess the value of static haemodynamic parameters at baseline in predicting an increase in CI of 10%, receiver-operating-characteristic curves were constructed. The areas under the curve were 0.766 (p < 0.001) for SVRI, 0.723 (p < 0.001) for CI, 0.652 (p = 0.010) for CVP and 0.616 (p = 0.050) for GEDVI.

Conclusion: In a substantial proportion of patients with advanced cirrhosis, plasma expansion results in an increase in central blood volume. GEDVI but not CVP behaves as an indicator of cardiac preload, whereas high baseline SVRI is predictive of fluid responsiveness.

Background

Patients with advanced cirrhosis of the liver characteristically suffer from circulatory disturbance [1]. Portal hypertension leads to mesenteric vasodilation. Peripheral vascular resistance is decreased and a hyperdynamic circulation ensues. Due to the pooling of blood in the splanchnic vessels, central blood volume is diminished [2] and endogenous vasopressor systems are activated in compensation [3]. These patients are vulnerable to further haemo-dynamic insults and, if renal auto-regulation is overwhelmed, acute kidney failure is a common complication [4]. This is termed hepatorenal syndrome (HRS), if renal failure is advanced (serum creatinine > 133 μmol/l) and if septic shock and prerenal azotaemia caused by volume losses are excluded. It negatively affects mortality [5], even if transplantation is performed [6].

The maintenance of a stable circulation is therefore important in cirrhotic patients. Plasma expansion with albumin has been found to protect against renal failure in spontaneous bacterial peritonitis [7]. It has also become a mainstay in the treatment of HRS and a prerequisite of its diagnosis, particularly when, according to a current consensus statement, "true hypovolaemia" has to be excluded by administration of a substantial amount (up to 100 g daily) of albumin over two days [8]. During acute conditions such as infection or haemorrhage, as well as for the treatment of functional renal failure, parameter guided fluid therapy may be useful for avoiding or improving relative hypovolemia, but also for avoiding potential complications

of fluid overload. Data on the haemodynamic effects of an albumin infusion in cirrhotic patients, however, are scarce and it is not clear which parameters should be employed to guide fluid therapy in cirrhotic patients. Central venous pressure (CVP) has been shown to be of little value in the assessment of fluid responsiveness in critically ill patients [9-11]. In addition, elevated intra-abdominal pressure, as seen in ascitic patients, may influence CVP [12]. It therefore is of no surprise that in a recent study the traditional target values for CVP apparently failed to exclude hypovolaemia in patients with HRS[13]. Pulmonary artery catheters have traditionally been used for guiding haemodynamic interventions. Their use however remains controversial as they may be associated with complications and their predictive value in the assessment of fluid responsiveness is low [9,14-16]. Based on earlier work on indicator dilution techniques for the measurement of cardiac output (CO) and intra-thoracic blood volumes [17,18], trans-pulmonary thermodilution combined with continuous measurement of CO by pulse contour analysis has in recent years been evaluated [10,11,19]. Trans-pulmonary thermodilution has shown some promise in guiding fluid therapy by providing preload-associated parameters such as the global end-diastolic volume (GEDV). A treatment protocol targeting GEDV assessed by trans-pulmonary thermodilution resulted in reduced need for catecholamines and less time on mechanical ventilation in cardiac surgery patients [20].

It is, however, questionable if results from studies in non-cirrhotic patients are to be extrapolated to cirrhotic patients. Earlier studies found that central blood volume in cirrhotic patients cannot be significantly expanded, thus casting doubt on possible correlations between intra-thoracic blood-volumes, as a measure of preload, and CO [21,22]. To date, trans-pulmonary thermodilution has only been evaluated in ventilated cirrhotic patients during orthotopic transplantation of the liver [23].

The aim of this present study was to investigate the haemodynamic response to volume loading with hyper-oncotic albumin solution, and to compare CVP and volumetric measures as markers of preload, and predictors of fluid responsiveness, in cirrhotic patients.

Methods

The institutional ethics committee (Ethikkommission des Klinikums Rechts der Isar der Technischen Universiдt Мьnchen) considered the protocol part of clinical routine and waived the need for informed written consent. Written consent was obtained for the publication of data.

Patients

Patients with cirrhosis Child-Pugh-Class B or C and ascites grade II or III treated in our ICU were included. Albumin substitution was prescribed according to our internal standards because of the risk of kidney failure as defined by the RIFLE criteria (acute increase in serum creatinine of 1.5 times baseline or oliguria of < 0.5 ml/kg/h for at least 6 hours), or established renal failure along with indicators of pre-renal kidney failure (fractional excretion of sodium < 1% and no evidence of pre-existing renal impairment). To be included, patients had to already be instrumented with a thermodilution arterial line and a central venous catheter. Exclusion criteria were sepsis diagnosed by clinical criteria, and, if appropriate, chest x-rays, blood or urine cultures, and current haemorrhage. Patients receiving vasoactive or cardiotropic drugs were also excluded, as were mechanically ventilated patients.

Albumin substitution was prescribed according to our treatment standards for cirrhotic patients with pre-renal kidney failure as suggested by the recent literature [8].

Haemodynamic Measurements

Patients were studied in a supine position, with zero pressure at the midaxillary line. CVP was recorded at end-expiration; thermodilution measurements using 15 ml of ice-cold saline were recorded in triplicate using a commercially available device (PiCCO; Pulsion Medical Systems, Munich, Germany)

and their average recorded. Briefly, transpulmonary thermodilution works when a bolus of cold saline solution is injected via a central line (usually located in the superior vena cava) and detected downstream by a thermistor at the tip of the femoral arterial catheter. CO is calculated by the analysis of the thermodi-lution curve using the Stewart-Hamilton algorithm. Mean transit time and exponential downslope time of the thermodilution curve are also analysed. The product of CO and mean transit time is the volume of distribution of the thermal indicator, or "intra-thoracic thermal volume" comprising of the intra-thoracic blood volume and the extravascular lung water. The product of CO and exponential downslope time is the "pulmonary thermal volume" composed of the pulmonary blood volume and the extravascular lung water. The GEDV is obtained as the difference between intra-thoracic thermal volume and pulmonary thermal volume [24].

Values for mean arterial pressure (MAP), CVP, CO, Systemic Vascular Resistance (SVR), GEDV, Stroke Volume (SV) and Heart Rate (HR) were obtained, and, when appropriate, indexed to an estimate of body surface area (BSA), according to the formula of duBois, to calculate Cardiac Index (CI), Global End-diastolic Volume Index (GEDVI), Systemic Vascular Resistance Index (SVRI) and Stroke Volume Index (SVI). Stroke volume divided by pulse pressure was used as a marker for arterial compliance and calculated as follows: compA = SV/(RRsys – RRdia) [25]. Cardiac power index was calculated as CPI = CI Ч MAP/451 [26].

Study Protocol

Haemodynamic measurements were performed immediately before infusion of a bolus of 200 ml 20% albumin solution over a short time period (< 30 min). Measurement of haemodynamic variables were repeated 1 hour after the start of infusion, to allow for maximal plasma expansion. Albumin infusions were prescribed by the treating physician and were administered as aliquots of 200 ml 20% solution (40 g of albumin). For sta-

tistical reasons, only the first two measurements after inclusion for each patient were analysed.

Statistical analysis

Data were assessed for normal distribution using the Kol-mogorov-Smirnov test. Normal distribution was found for all haemodynamic parameters. Accordingly, data are presented as mean (± SD). Haemodynamic parameters before and after albumin infusion were compared using Students T-test for paired samples.

Parameters displaying significant changes in univariate analysis were evaluated for correlations with Pearson's test.

A positive response to volume loading was defined as an increase in CI of > 10%. This value was chosen for the following reasons: Previous studies investigating fluid responsiveness have used cut-off values for CI of 10–20% [16]. Reproducibility of measurements of CO and GEDV have been found to be $4 \pm 2\%$ and $5 \pm 2\%$, respectively, and increases after plasma expansion of an amount similar to our study previously resulted in mean increases in cardiac output of 7 – 15% [22].

Table 1. Baseline characteristics of all patients

Age (years)	56 (± 8)
Gender (m/f)	33/17
MELD-score	28 (± 9)
Child-Pugh-score	12 (± 2)
Child-Pugh class (B/C)	10/40
Serum creatinine (µmol/l)	256 (± 150)
Fractional excretion of Sodium (%)	0.040 (± 0.026)
Creatinine clearance (ml/min)	22 (± 16)
CVP (mmHg)	11 (± 5)
GEDVI (ml/m²); (n: 680–800)	675 (± 138)
CI (L/min/m²); (n: 3–5)	4.1 (± 1.2)
SVI (ml/m²); (n: 40–60)	48 (± 13)
HR (bpm)	88 (± 20)
SVRI (dyn s/cm⁵/m²); (n:1700–2400)	1898 (± 1015)
comp$_a$ (ml/mmHg)	1.58 (± 0.57)
MAP (mmHg)	79 (± 14)
CPI (mmHg L/min/m²)	0.71 (± 0.27)

MELD: Model of End-Stage Liver Disease; CVP: Central Venous Pressure; GEDVI: Global End-Diastolic Volume Index; CI: Cardiac Index; SVI: Stroke Volume Index; HR: Heart Rate; SVRI: Systemic Vascular Resistance Index; comp$_a$: Arterial Compliance; MAP: Mean Arterial Pressure; CPI: Cardiac Power Index

Responders and non-responders were compared using the Student T test for unpaired samples. For baseline haemo-dynamic parameters that were significantly different between responders and non-responders, ROC curves were constructed to analyse their respective value to predict an increase of CI by >10% after volume loading.

Results

Baseline parameters

50 consecutive patients were included between August 2005 and January 2007. Baseline characteristics are presented in Table 1. Significant correlations were found between baseline values of GEDVI and CI ($r^2 = 0.20$; p = 0.001) and between baseline values of GEDVI and SVI ($r^2 = 0.28$; p < 0.001).

Haemodynamic effects of fluid loading

Haemodynamic parameters obtained before and after 100 albumin infusions were analysed and are presented in Table 2. In 43 cases there was an increase in CI of > 10% after albumin infusion.

Table 2. Haemodynamic parameters before and after infusion of 200 ml of 20% albumin solution

	Before	after	
CVP (mmHg)	12 ($\pm$ 6)	14 ($\pm$ 6)	p < 0.001 95% CI 1 – 3
GEDVI (ml/m^2); (n: 680–800)	682 ($\pm$ 128)	744 ($\pm$ 171)	p < 0.001 95% CI 38 – 87
CI (L/min/m^2); (n: 3–5)	4.3 ($\pm$ 1.1)	4.7 ($\pm$ 1.1)	p < 0.001 95% CI 0.3 – 0.5
SVI (ml/m^2); (n: 40–60)	49 ($\pm$ 12)	54 ($\pm$ 13)	p < 0.001 95% CI 2 – 6
HR (bpm)	89 ($\pm$ 18)	90 ($\pm$ 16)	p = 0.816 95% CI -3 – 1
SVRI (dyn s/cm^5/m^2); (n: 1700–2400)	1760 ($\pm$ 1144)	1490 ($\pm$ 837)	p < 0.001 95% CI -370 – -170
compA (ml/mmHg)	1.59 ($\pm$ 0.52)	1.70 ($\pm$ 0.62)	p = 0.040 95% CI -0.21 – 0.02
MAP (mmHg)	78 ($\pm$ 12)	80 ($\pm$ 13)	p = 0.310 95% CI -1 – 4
CPI (mmHg L/min/m^2)	0.72 ($\pm$ 0.27)	0.81 ($\pm$ 0.31)	p < 0.001 95% CI 0.06 – 0.13

CVP: Central Venous Pressure; GEDVI: Global End-Diastolic Volume Index; CI: Cardiac Index; SVI: Stroke Volume Index; HR: Heart Rate; SVRI: Systemic Vascular Resistance Index; comp$_a$: Arterial Compliance; MAP: Mean Arterial Pressure; CPI: Cardiac Power Index

Correlations between changes in haemodynamic parameters

Changes in CI following volume challenges showed significant correlations with changes in GEDVI ($r^2 = 0.51$; p < 0.001), but not with changes in CVP (r^2 0.01, p = 0.45) or MAP ($r^2 = 0.01$; p = 0.26). Likewise, changes in SVI were correlated with changes in GEDVI ($r^2 = 0.27$; p < 0.001) but not with changes in CVP or MAP. As expected, there was an inverse correlation between CI and SVRI ($r^2 = 0.21$, p < 0.001), but no correlation between CI or GEDVI and MAP.

Predictors of fluid responsiveness

In responders CVP, GEDVI, SVI and CI were significantly lower than in non-responders, whereas SVRI was significantly higher (Table 3).

ROC-Curves for GEDVI, CVP and SVRI are displayed in Figure 1. Area under the curve was greatest for SVRI (area 0.766; p < 0.001, 95%CI 0.674 – 0.859) and CI (area 0.723; p < 0.001, 95%CI 0.629 – 0.816), still significantly better than chance (area = 0.5) for CVP (area 0.652; p = 0.010, 95%CI 0.542 – 0.761) and bordering significance for GEDVI (area 0.616; p = 0.050), 95%CI 0.501 – 0.731). For SVRI a cut-off value of 1270 dyne·s/cm^5/m^2 discriminated between responders and non-responders (sensitivity 0.67, specificity 0.77). For CVP the best combined sensitivity and specificity

was found for a threshold value of 10 mmHg with 0.74 and 0.54, respectively. For GEDVI a threshold value of 680 ml/m^2 had a sensitivity of 0.59 and a specificity of 0.65 for predicting a positive response to albumin infusion.

Table 3. Differences in pre-infusion haemodynamic parameters between responders and non-responders

	responders	non-responders	
CVP (mmHg)	10 (± 4)	13 (± 6)	p < 0.001 95% CI 1 – 3
GEDVI (ml/m²); (n: 680–800)	638 (± 135)	714 (± 117)	p < 0.001 95% CI 38 – 87
CI (L/min/m²); (n: 3–5)	3.7 (± 1.0)	4.7 (± 1.0)	p < 0.001 95% CI 0.3 – 0.5
SVI (ml/m²); (n: 40–60)	45 (± 14)	54 (± 9)	p < 0.001 95% CI 2 – 6
HR (bpm)	90 (± 15)	86 (± 19)	p = 0.816 95% CI -3 – 1
SVRI (dyn s/cm⁵/m²); (n:1700–2400)	2262 (± 1323)	1390 (± 648)	p < 0.001 95% CI -370 – -170
compA (ml/mmHg)	1.49 (±	1.68 (± 0.56)	p = 0.040 95% CI -0.20 – 0.02
MAP (mmHg)	78 (± 13)	80 (± 13)	p = 0.310 95% CI -1 – 4
CPI (mmHg L/min/m²)	0.71 (± 0.27)	0.81 (± 0.32)	p < 0.001 95% CI 0.06 – 0.12

CVP: Central Venous Pressure; GEDVI: Global End-Diastolic Volume Index; CI: Cardiac Index; SVI: Stroke Volume Index; HR: Heart Rate; SVRI: Systemic Vascular Resistance Index; comp$_a$: Arterial Compliance; MAP: Mean Arterial Pressure; CPI: Cardiac Power Index
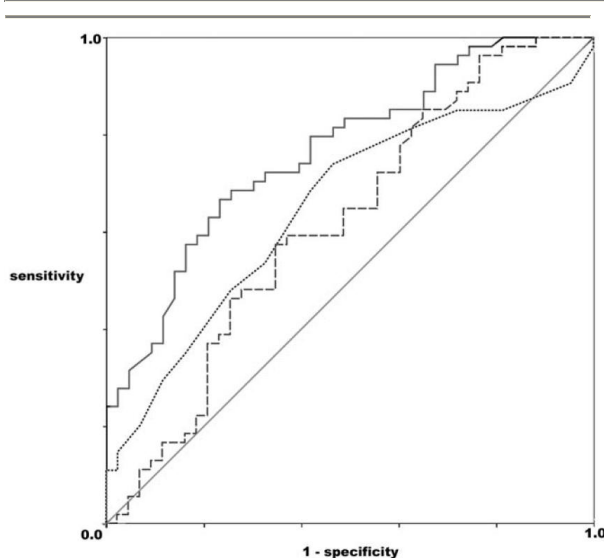
Figure 1. Receiver operating characteristic curves for systemic vascular resistance index (continuous line), central venous pressure (dotted line) and global and-diastolic volume index (broken line). The diagonal line is the line of no-discrimination.

Discussion

At baseline we found a GEDVI in the lower range of normal despite a relatively high CVP. CI was in the normal range and SVRI at a low normal value. These findings are in accordance with the concept suggested by the peripheral arterial vasodilation hypothesis on cirrhotic circulatory dysfunction [1]. Infusion of albumin solution resulted in an increase in GEDVI, which correlated to an increase in cardiac index that was larger than 10% in almost half the cases. This is similar to what has previously been reported in fluid resuscitation of septic patients [11]. Responders to volume loading displayed a baseline haemodynamic pattern suggestive of lower cardiac preload with less hyperdynamic circulation and higher peripheral resistance.

The improvement in CI after volume therapy supports the notion that relative central hypovolaemia contributes to circulatory dysfunction in cirrhotic patients. After plasma expansion with albumin we found an increase in central blood volume. This is in contrast to the results of other studies who failed to detect relevant changes in central blood volume after fluid loading in patients with advanced cirrhosis [22,27]. We believe

that in these studies the possible effects were missed due to the small number of patients included. Indeed, both studies showed increases in central blood volume after volume loading, however, this failed to reach statistical significance.

In our study, baseline GEDVI correlated with baseline CI and SVI, and GEDVI was lower in patients with a positive response to volume loading than in those with a negative response. Furthermore, increases in GEDVI correlated to increases in CI and SVI, highlighting that GEDVI, evaluated by trans-pulmonary thermodilution, behaves as an indicator of preload in patients with cirrhosis. CVP was lower in patients who responded to volume loading and increased significantly after infusion. The volume loading-induced changes, however, were not proportional to the changes in CI and SVI, and baseline CVP did not correlate with CI or SVI. This confirms previous reports and underlines the limited value of CVP as a marker of cardiac preload. Both parameters performed poorly as predictors of volume responsiveness as has been previously documented in various clinical settings [16,28].

Cardiac preload is defined as myocardial wall tension at end diastole, and, according to Laplace's law, is determined by ventricular geometry and intra-ventricular pressures. Myocardial contractility depends on end-diastolic tension of the myocardial sarcomers and the connection between increasing preload and contractility is given in the sigmoidal Frank-Starling curve. Without knowing the individual myocardial properties at the moment of interest, we cannot determine the position on the Frank-Starling curve of any given preload condition. This explains why good intra-individual correlations between preload markers and CI in paired measurements may be accompanied by a low predictive value of single measurements of preload associated markers for fluid responsiveness.

Following volume challenges we observed substantial decreases in SVRI in our patients. SVRI is dependant on (MAP-CVP) and CI by a linear relationship. Therefore, with constant CVP, any changes in CI must be accompanied by proportional changes in SVRI, MAP, or both. In patients with septic shock, opposite changes of a similar relative size of both MAP and SVRI have been observed after volume loading [11]. In contrast, we found large decreases in SVRI with only minuscule increases in MAP. This contrasts to a previous study on plasma expansion in patients with spontaneous bacterial peritonitis (SBP) [29]. Here the authors described an increase in peripheral vascular resistance after treatment of SBP with antibiotics and albumin. They hypothesized that this may be due to the pharmacological action of albumin as a scavenger of nitric oxide, thus reducing the vasodilatory properties of plasma. However, haemodynamic measurements in this study were days apart and the increased vasotonus, may have been due to reduced septic vasodilation. In our study cohort, care was taken to select patients without infection or haemorrhage, so that any related confounding factors were avoided.

Whereas MAP was not different between the patients who responded to volume loading and those who did not, SVRI was significantly and by a large proportion higher in responders when compared to non-responders. However, CI was significantly lower in responders than in non-responders. Pre-infusion values of SVRI (and CI) were predictive of volume responsiveness in our patients. As suggested previously [30], this may indicate that in a proportion of patients with cirrhotic circulatory dysfunction, relative central hypovolaemia, resulting in further activation of endogenous vasopressor systems to maintain MAP at the cost of high peripheral resistance, may contribute to impaired cardiac output, despite what is essentially a hyperdynamic circulation. Volume therapy may thus decrease vasopressor activation, and may lead to decreased levels of endogenous vasopressors such as norepinephrine, renin and angiotensin, as has been described previously [22]. Renal dysfunction in cirrhosis deteriorates along a con-

tinuum starting with an impaired capacity to excrete sodium and free water leading to an oedematous state with increased plasma volume and ascites, to pre-renal failure and, finally, irreversible tubular damage. According to current understanding, an important etiologic factor is elevated levels of vasoconstrictors affecting the renal microcirculation, narrowing the kidneys' capacity to cope with additional haemody-namic insults. Volume management may be relevant to the prevention and treatment of functional renal failure in cirrhosis. Recent studies on vasopressor therapy in HRS highlight the importance of adequate volume status. Whereas it had previously been shown that albumin was necessary for the beneficial effect of terlipressin [31], a recent study by Alessandria et al. showed that a substantial number of patients included in a study on treatment of HRS responded to plasma expansion alone when it was tailored according to CVP instead of using the usual fixed-dose regimen [13]. In this study the aim was a CVP of 10 – 15 mmHg. In our study, 33% of patients with a CVP greater than 10 mmHg and 24% of patients a CVP of over > 15 mmHg still responded to albumin infusion with a further increase in CI. Consequently, neither CVP nor GEDVI should be recommended as parameters to direct fluid resuscitation in cirrhotic patients with pre-renal kidney failure.

In ventilated patients, dynamic parameters such as pulse pressure variation or stroke volume variation have shown much better predictive power for assessing fluid responsiveness [28]. However, the majority of cirrhotic patients at risk of renal failure are breathing spontaneously and these circumstances, dynamic parameters are not applicable. A time honoured method for the assessment of fluid responsiveness, "passive leg raising" (PLR) [32], has recently gained renewed interest in the intensive care setting. PLR generates a transient increase in venous return. The immediate haemodynamic response of mean blood flow to this manoeuvre, assessed by methods such as oesophageal Doppler [33] or trans-thoracic echocar-

diog-raphy [34], has been used to estimate fluid responsiveness. The recently published method of PLR is difficult to apply in the intensive care setting, because a fixed angle of the hips is required throughout the procedure and the whole bed must be tilted instantaneously by 45°. Cirrhotic patients may react differently to tilting than other patients or normal controls [35], and the elevated intra-abdominal pressure of ascitic patients may also affect PLR-induced blood transfer [36]. Therefore, PLR may give different results in cirrhotic patients. This has not to our knowledge been evaluated.

Without static parameters predictive of fluid responsiveness, but a variety of monitoring tools capable of providing data on CI and MAP, iterative protocols of fluid challenges may offer the possibility of increasing cardiac output in patients with reduced effective intravascular volume [14]. Whether this translates to improved kidney function in cirrhotic patients with renal failure should be evaluated in future studies.

The obvious limitations of our study are the uncontrolled design and the use of albumin solution instead of crystalloid solutions for the volume challenge. Hyperoncotic albumin solution acts as a plasma expander and, in addition, has distinct pharmacological properties.

Conclusion

In contrast to earlier studies we have observed a significant increase in central blood volume and CI after albumin infusion in a substantial proportion of patients with advanced cirrhosis. In contrast to CVP, GEDVI behaved as a preload indicator, but neither parameter was able to predict fluid responsiveness with acceptable accuracy. After albumin infusion there were no relevant changes in MAP, but large decreases in SVRI. Pre-infusion SVRI and CI discriminated between patients with and without a positive response in CI to volume loading. Circulatory dysfunction in cirrhotic patients with pre-renal kidney failure may be amenable to plasma expansion and future trials to

evaluate fluid resuscitation strategies in these patients are warranted.

Acknowledgements

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Materials of Conferences

THE SPIRIT-PROCAINE BLOCKADES IN THE TREATMENT OF THE VERTEBRAL ARTERY SYNDROME

Khachatryan A.M., Sizgunov D.S.
Saratov state medical university, department of hospital surgery
Saratov, Russia

The irritative and reflective spasm of vertebral arteries (VA), besides extravascular compression, plays a big role in the development of the spondylogenous vertebral-basilar arterial insufficiency (VBI).

We have investigated 45 patients with VBI. During the X-rays examination all the patients had got degenerative changes in cervical spine, as in vertebras, so in intervertebral joints and disks.

Duplex ultrasound investigation found extravascular compression of vertebral arteries — in 12 cases two-sided, in 23 — unilateral. The levels of compression were identified with data of the X-rays examination of the cervical spine. The spasm of VA without compression took place in 10 cases. Transcranial ultrasound investigation had found the decrease of linear blood circulation rate (LCR) in VA, also in the basilar arteries (BA) in the most cases. There were the increase of the resistant index (RI) in these arteries in all the cases, which is the objective deponent of the spasm. We have also revealed positional dependence — while turning head to the contralateral side the LCRs in the injured VAs were decreased by $34,5\pm3,3\%$ from the initial, and in the BA — by $28.9\pm2,7\%$; simultaneously were increased RIs — by 0,08 from the initial significations (on the average).

The procaine blockades (PB) of the periarterial sympathetic plexus at the level of the third segment of VA (S.Novocaini 2% - 3ml) were performed to all 45 patients. For 15 of them (with damage of the both VAs) were made bilateral blockades, for the remaining — at the injured side. After 7 days were made periarterial alcoholizations (PAA) for all the patients at the same level (30° ethyl alcohol). The neurological and ultrasound examination was repeated in 3, 72 hours after PB and in 3, 72 hours and on the tenth day after PAA.

In the nearest period after PB the improvement of the condition, the decrease of the clinical signs of VBI and positional dependence were noticed in the most cases(66,7%). On the whole, good and excellent nearest results had got 30 among 45 patients. The duration of the effect of PBs was ranged from 5 to 72 hours.

The positive dynamics in neurological condition after PAA on the whole is similar with the early therapeutic effect of PBs. The regression of the symptoms had come in the more number of the patients than after PB. Besides, the therapeutic efficiency of the PAAs was more steady than after the PBs — sig-nificant improvement of the clinical condition after 72 hours was noticed in 36 cases(80%).

At the end of the hospitalization (10th – 12th day after PAA) 12 patients had got excellent, 21 — good and 7 patients — satisfactory results of the therapy.

The clinical improvement was correspond to the ultrasound data. The LCR has increased in comparison with the initial ones from 35,2 to 42% in VAs, and from 22,4 to 52% in BAs, 16 patients had got normal indexes. Normal indexes of RI were noticed in the most cases, the positional dependence has decreased significantly. The reduction of the interhemispherical asymmetry of the circulation took place in all the cases with one-sided defeat of the VAs.

The application of the spirit-procaine blockades of VA is effective and pathogenically justified method of treatment of the VBI caused by vertebral pathology.

THE BIOLOGY OF THYMOSIN PEPTIDES

Parakhonsky A.P.
Kuban medical university
Krasnodar, Russia

The thymosins are a family of hormonal-like peptides which in combination with cytokines, T-cells, B cells, dendritic cells, and macrophages, help to provide an immune umbrella for combating pathogenes, destroying malignant cells and regulating wound healing and angiogenesis. Thymic derived peptides isolated from thymosin fraction 5 also play a more general physiological role and have been found to influence a number of endocrine and neuroendocrine pathways. Biological response modifiers such as thymosin-α_1 (Tα_1), are produced in significant quantities within the thymus whereas other for example, thymosin-β_4 (Tβ_4), the major actin sequestering peptide in cells are more ubiquitous in nature and are found in highest concentrations in blood platelets, neutrophils, macrophages and a wide variety of other cell types.

Recent studies have established that Toil can block in a time and dose dependent fashion glucocorticoid (GC) induced apoptosis of immature thymocytes. Apoptosis of developing thymocytes is a crucial process in the development of T-cell immunity. The life and death of thymocytes (as well as other cells), is a crucial balance of microenvironmental and intracellular signaling. Apoptosis of thymocytes is influenced by interaction between developing thymocytes and the microenvironment of the thymus. This finding may

further help to characterize other potential therapeutic applications for $T\alpha_1$. Current studies demonstrate the potential for $T\alpha_1$ in modulating the effects of GC induced immunosuppression and suppression of thymic function. Results from this study and previous studies suggest that $T\alpha_1$ can potentially protect non-selected thymocytes from GC induced depletion within the thymus thus allowing for increased time for selection and production of new thymocytes.

Clinically, $T\alpha_1$, is now approved in 21 countries and has been utilized for the treatment of patients with cancer and immune deficiency disorders including AIDS, chronic hepatitis B (HepB), and hepatitis C (HepC) and as an adjuvant to enhance the efficacy of vaccines in the elderly and in immunocompromised patients. $T\alpha_1$ is active as a monotherapy for HepB and in combination with interferon, in HepC. It has a very good safety profile. $T\beta_4$ was first characterized by its ability to stimulate the expression of terminal deoxynucleotidyl transferase, a non-template directed DNA polymerase in bone marrow stem cells and to inhibit macrophage migration. Known, that it is the major actin sequestering peptide in normal mammalian cells and plays an important role in the remodeling and healing of tissues. $T\beta_4$ has been found to accelerate wound healing and angiogenesis in a variety of *in vitro* and *in vivo* models. $T\beta_4$ represents a new class of wound healing compound. It is not a growth factor or cytokine but rather exhibits a number of physiological properties which include its ability to sequester and regulate actin, its potent chemotactic properties (specifically for endothelial cells), and its capability to down regulate a number of inflammatory cytokines that are present in chronic wounds.

Over the past few years, remarkable progress has been made in the biochemical and clinical characterization of many of the major isoforms of $T\beta_4$ in both normal and abnormal cells. To date, about 20 isoforms of $T\beta_4$ have been identified. Using microarray analysis, it has now been established that a number of β thymosins are regulated in a variety of disease states including cancer. Studies are currently underway to determine whether characterization of specific β-thymosins including an isoform of $T\beta_4$ not found in normal tissue will be useful in helping to diagnose specific disease entities and to develop new therapeutics for treatment.

THE NEUROIMMUNE BIOLOGY – CURRENT STATUS AND FUTURE POTENTIAL

Parakhonsky A.P.
Kuban medical university
Krasnodar, Russia

There is a strong popular belief in midbody interaction since prehistoric times. Pathologists noted first that the size of the thymus was profoundly influenced by emotional events and by neuroendocrine abnormalities. Hans Selye discovered (1936) that the hypothalamus-pituitary-adrenal axis was activated by diverse "nocuous" stimuli, which lead to a rapid involution of the thymus. He called the agents eliciting this phenomenon "stress". Selye concluded that stress induced a "general adaptation syndrome", which elevated the resistance of the animal to diverse insult. Hypothalamic lesions were shown to prevent anaphylactic death in guinea pigs in 1949 by Szentivanyi and colleagues. This demonstrated the dominant regulatory power of the nervous system over immune reactions. Korneva and Kai (1965) made similar observations were made in various animal species. Jancso and co-workers (1964) discovered the neural regulation of inflammation. These fundamental discoveries were not followed by intensive research activity. Progress has been slow because of the lack of basic knowledge and because of the immense technical difficulties encountered by investigators of this area.

In the seventies a handful of laboratories started to re-examine various aspects of neuroimmune-interaction. It was established that pituitary hormones have the capacity to stimulate, inhibit and modulate immune responses. Placental and pituitary hormones were also shown to be involved in immune system development and in the maintenance of immunocompetence (Berczi et al.). The innervation of lymphoid organs and cells was demonstrated. Neurotransmitters and neuropeptides were shown to be important immunomodulators. (Felten et al., Bienenstock et al.) Gradually immune derived cytokines were shown to deliver feedback signals towards the neuroendocrine system (Wenmacher, Besedovsky et al., Goldstein et al.). Compelling evidence was produced, indicating that immune reactions may be conditioned in the classical pavlovian sense and that emotions affect immune function (Ader et al., Bienenstock et al.). Evidence is increasing rapidly for the physiological role of cytokines and of immunocytes in the function of various organs and tissues, and in reproduction. It is also becoming obvious that Selye's general adaptation syndrome corresponds to the acute phase response. This is a multi-faceted and highly coordinated systemic defence reaction, which involves the conversion of the immune system from a specific, adaptive mode of reactivity to a rapidly amplifiable polyspecific reaction mediated by natural immune mechanisms. Immunological (poly)specificity is assured by profoundly

elevated levels of natural antibodies and liver-derived acute phase proteins.

Much has been learned about the regulation of cell activation, growth and function from immunological studies. Burnet's clonal selectional theory designates antigen as the sole immune activator. Bretcher and Cohn recognized first that at least 2 signals are required. This was followed by numerous studies on cell-to-cell interaction within the immune system and led to our current understanding of the importance of cell adhesion molecules and cytokines in cell activation and proliferation. This, coupled with the available information about the mechanisms of action of hormones and neurotransmitters, and of signal transduction and nuclear regulatory pathways paves the way to understanding how higher organisms function in their entire complexity. It is now apparent that the Nervous- Endocrine- and Immune-systems form a systemic regulatory network, which is capable of regulating all aspects of bodily functions in health and disease. This provides new foundations for Biology.

OCCUPATIONAL DISEASES OF THE SKIN IN CLINIC DERMATOVENEROLOGY

Parfyonova M.A., Babkina V.I., Silina L.V., Shehovtsova N.A.
Kursk state medical university
Kursk, Russia

The purpose of research was definition of prevalence of various forms of skin diseases, revealing of their communication with a trade, studying of structure professional dermatosis in Kursk and Kursk area.

Medical cards of 2108 patients who are taking place on the account in Kursk a regional clinical dermatovenereologic clinic and Kursk the center of professional pathologies during the period with 2003 on 2006 years are analysed. From the general number of patients the diagnosis eczema is put 462 surveyed (22 %), including 3 patients with the diagnosis professional eczema according to the Kursk center of professional pathologies. During research two groups have been generated: working - 201 patient (44 %) and not working (children, students, pensioners) - 261 person (56 %). Among working men have made 82 % (165 patients), women - 18 % (36 person). Desease eczema is marked in the most able-bodied socially active age - from 25 till 50 years. On nosological the group working with the diagnosis eczema is submitted to the form widespread - 92 patients (45,7 %), microbic - 72 (35,8 %), paratraumatic - 22 (10,9 %) and fungoid eczema - 15 person (7,6%). From 92 patients with the diagnosis widespread eczema among working, professional eczema makes 3,26% - 3 patients with trades: the senior

leaser of spinning shop, the mason, the mechanic. Surveyed during the labour activity contacted to synthetic fibres for which processing used 30 % an acetic acid, spirit; for washing - antistatic; the laying of a brick, unloading of building materials was carried out; contact to a dust of the mixed structure (cement, quartz, chrome, wood); restoration of details pitches under 3 category of harmful works and on sharpening welding seams by abrasive circle by dry way. The experience of work of patients in adverse working conditions is more than 17 years.

Conclusions: high prevalence eczema - 22 % (462 patients) from all skin diseases is established; among the working population eczema 44 % (201) suffer; professional eczema has made 3,26 % from 92 patients with the diagnosis widespread eczema; desease is marked at able-bodied socially active age of 25-50 years; the experience of work in adverse working conditions is more than 17 years; low detectability is connected to absence in inspection of the sick analysis of labour activity and factors of manufacture.

PHENIBUT AND ITS DERIVATES INFLUENCE TO THE CELL SECTION OF THE IMMUNE RESPONSE IN THE IMMUNE DEFICIT

Samotrueva M.A., Ovcharova A.N., Tyurenkov I.N.
Astrakhan State Medical Academy, Astrakhan, Russia
Volgograd State Medical University, Volgograd, Russia
Astrakhan Base Medical College, Astrakhan, Russia

There is a great number of the facts, indicating at the close integration of the central nervous system, its coordination infringement is playing the important role in the development as the neuromental, as the immune disorganize. The great importance is been attaching to the reseaches, touching on the influence of the psychopharmacological medicine at the immune status parameter. In this research we have made the studying of the phenibut and its derivates influence laboratory code RGPU−149, RGPU−150 and RGPU−151 at the organizing of the reaction hypersensitivity of the delayed-model (RHDT) with the experimental immune deficit.

The research has been made with 60 mice of the line CBA mass $18 − 20$ g. The animals were distributed on the groups (n = 10); control № 1 – the immunizing animals, receiving phys. solution; control № 2 – immunizing animals with the immunedeficit model (cyclophosphamid (CPh) in the doze 100 mg/kg); experienced groups – the immunizing animals with the immune depression, receiving phenibut inside – intraperitoneal in the therapeutic doze 25 mg/kg and

its derivate: RGPU−149 (47,6 mg/kg), RGPU−150 (49,2 mg/kg) and RGPU−151 (48,1 mg/kg). For phenibut derivates the doze is 1/10 from LD_{50}.

The Results of the study are presented in table.

Table 1. The influence of phenibut and its derivate at RHDT forming in the conditions of the experimental immunesuppression

Animal groups	Control 1: (phys.solution): n = 10	Control 2: CPH n = 10	Experimental I: PHEN1BUT+ CPh n = 10	Experimental 2: RGPU−149+ CPh n = 10	Experimental 3: RGPU−150+ CPh n = 10	Experimental 4: RGPU−151+ CPh n = 10
Index RHDT, M ± m, %	11,4 ± 0,5	8,2 ± 0,6***	19,7 ± 2,7*	21,5 ± 1,5***	31,7 ± 2,4***	26,5 ± 4,4***

In the course of the carried out tests it was fixed that the single inside intraperitoneal leading cyclophosphamid is conducire to the suppression of the cell reaction of the delayed type (reaction index below control № 1 in 1,5 times). The leading of phenibut and its derivates to animals with the immunesuppression model is accomponing with the stimulating action with the regard to the cell section of the immune reactivity, it reveals itself with the increase of the reaction index RHDT more than 50% not only by comparison with the animals from the control group № 1 (p<0,05), but more than 40% with respect to the exponents in the mice groups, receiving «placebo» (p<0,05).

So, phenibut and its derivates with the laboratory codes RGPU−149. RGPU−150 and RGPU−151 are removing pharmacoinduced immune deficiency, it is evidence of the immunecorrecting qualities presence. The present conclusion allows to regard the learning substances as the perspective ones as the means of the correction of the neuroimmune pathology.

INCREASING OF PHAGOCYTES FREE RADICALS ACTIVITY UNDER THE INFLUENCE OF MAGNETOTHERAPY AMONG PATIENTS WITH ISCHEMIC HEART DISEASE

Spiridonova M.S., Lesovskaya M.I., Tsyganova O.B.
*Krasnoyarsk State Pedagogical University named after V.P. Astafjev
Krasnoyarsk, Russia*

Nowadays the Ischemic Heart Disease (IHD) gets younger thus this disease used to appear among 50-65-years old people but now it appears among 35-years old people. It could be caused by negative ecological factors, which may lead to both increasing and decreasing free radicals aggression of human blood phagocytes. One of the main parts of heart destruction is an intensification of cardiac hystiocytes' lipids free radicals oxidation, which correlates with its level of destruction and with the level of lipids peroxidation products and antioxidants concentration in the blood plasma (Abramova J.I., Vladimirov U.A.). That is why Red-Ox balance is a very important characteristic for diagnostic and correction. One of the most popular types of correction of different diseases is common magnetic therapy (CMT).

Therefore effectiveness of magnetic treatment was assessed by chemiluminescent analyze. The investigation includes examination of blood samples which were taken from people with IHD both gender (male = 56 and female = 26) age was from 43 to 66 years old. The magnetic field was made by special apparatus "Magnetoturbotron-2" (frequency is equal 10 Hz, intensiveness equals 1 milli Tesla). Course of treatment includes ten everyday and 20-minutes treatments. There were assessed different medical indexes such as quantity of leucocytes and phagocytes. The functional phagocyte activity was estimated by biochemiluminometer.

The investigations show that magnetic field did not increase leukocytosis and did not suppressed phagocytic function. But functional activity of leucocytes have increased and exceeded normal level among 61% of patient moreover it increased during the magnetic treatment. As the result, quantity of patient with normal reactivity of phagocyte decreased. Such kind type of chemiluminescet corresponds to ineffective phagocytosis when reactive types of oxygen are generated out of cells it can be risk of peroxide destruction of the nearest tissues.

Thus magnetic field with the level of magnetic induction 1 milliTesla suitable only for the forming local stress-reaction, but it is not universal strategy of treatment such dangerous diseases as ischemic heart disease. That is why it is necessary to investigate more suitable dose of magnetic induction with the help of

chemiluminescent analyze which is very sensitive to the blood free radicals level.

MOLECULAR-GENETIC PRE-CONDITIONS FOR THROMBOSIS DEVELOPMENT

Tsvetovskaya G.A., Chikova E.D., Voronina E.N., Novikova Ya.V., Pichko N.P., Belevantseva A.V., Lifshits G.I.
*Institute of Chemical Biology
and Fundamental Medicine
Center of New Medical Technologies
in Akademgorodok
Novosibirsk, Russia*

One of the most important tasks of medical practice in modern society is an early detection of thrombophilic states, as various forms of thrombophilia are the origin causes of such severe diseases as infarctions, insults, and also the cause of operative intervention, pregnancy and inflammation complications resulting in disability and lethal outcomes.

Arterial and venous thromboses development risk can both be connected with the effect of acquired risk factors (operative therapy, oncologic and cardiovascular diseases, atherosclerosis, inflammation, pregnancy, stresses, etc.) and be of hereditary nature. According to modern ideas the thrombotic complications at cardiovascular diseases in 50-65% of the cases (on various authors' evidence) are connected with the defects of the genes controlling the hemostasis system components.

The **research purpose** is to find out the hemostasis system genetic mutations occurrence frequency, endothelial factors and define the significance of analysis for the diagnosis, purposeful pathogenetic therapy choice in the patients with thromboses of various localization vessels.

Materials and methods: The examination on the mutations in the hemostasis system, folate cycle, the genes controlling the vascular wall state and drug metabolism in the liver, warfarin (CYP2C9) in particular, was carried out for the purpose to estimate the predilection to the thrombophilia development and to define individual sensibility to warfarin.

The material for the molecular-genetic analysis was venous blood taken into plastic tubes with EDTA. For the hemostasis system investigation the tubes with citrate were used. The definition of allelic variants of the genes investigated was carried out by the polymerase chain reaction method with the following analysis of restriction fragment length polymorphism (PCR/RFLP).

48 patients aged from 24 to 59 years old with the diagnoses myocardial infarction, ischemic insult, and lower limbs deep venous thrombosis were examined. The first group (29 patients) was formed by the persons, who the treatment was prescribed after the investigation of the hemostasis system functional state and simultaneous molecular-genetic analysis; the 2nd group (19 persons) was made up of the patients appealed for the consultation from other medical and prophylactic institutions with non-effective therapy of the present disease and difficulties in drug dosage of the indirect anticoagulant – warfarin. For the warfarin sensibility estimation two quantity indexes were used: induction phase duration – terms of the INR therapeutic level achievement (number of days) and weekly warfarin dosage (mg), which was required for maintaining of the achieved effect.

Results: The heterozygous mutation of the folate cycle enzyme methylenetetrahydrofolate reductase (MTHFR), the polymophous substitution 677C->T (A223V) was registered by us in 56% of the cases; the homozygous mutation was registered in 5 patients. In 21% of the examinees the methionine synthase (MTR) gene mutation, the polymorphous substitution 2756A->G(D919G) was detected. These mutations lead to the substitution of amino acid residues in the polypeptide chain of enzymes, that decreases their specific activity. One of the manifestations of the MTHFR and MTR deficit is an abundant accumulation of homocysteine in blood that results in the negative influence on the endothelium, disturbing the cell permeability and decreasing the nitrogen oxide production. The hyperhomocysteinemia was detected in 21,6% of the cases, in three patients among them the homocysteine level exceeding the normal one 1,8 times.

From the number of the examinees with repeated infarctions and/or ischemic insult, deep venous thrombosis there were polymorphous variants of the genes controlling the thrombocytic hemostasis registered. In 24% of the cases the polymorphous locus containing variable number of tandem repeats (VNTR) of the thrombocytic glycoprotein gene 1b(GP1ba). In 32% of the cases the polymorphous substitution 1565T→C (Leu33Pro) of the IIIa thrombocytic glycoprotein gene (integrin beta 3), and in 18% - the polymorphous substitution 807C→T of the Ia thrombocytic glycoprotein gene (Gp1a-integrin - alpha -2).

The FII prothrombin gene mutation connected with the substitution of G with A (20210 G→A) and leading to the protein and prothrombin level increase in blood, was registered in our patients in 26% of the cases.

The most severe thrombophilia cases were characterized by the **combined** polymorphous variants of the genes of the thrombocyitc hemostasis, folate cycle, coagulative part of hemostasis and polymorphism of the genes of the endothelial part – the plas-

minogen activator inhibitor (PAI-1), the polymorphous substitution 675 5G→4G (9% in our research) and the gene of the endothelial NO-synthase (NOS3(e)), VNTR-polymorphism and the polymorphous substitution C→T(Glu298Asp) (11% of the cases). It is known that NO (nitrogen oxide) is a powerful vasodepressor, possesses antithrombotic action, inhibiting adhesion and thrombocyte aggregation, activating the tissue-plasminogen activator and other important antithrombotic functions of blood. The NOS3(e) expression or transcription disturbance at the gene mutation results in the NO synthesis decrease, the consequence of which is the vasoconstriction increase, vasodilatation decrease and the tendency to blood clot organization. The polymorphous variant 4G of the PAI-1 gene is attended by the gene's overexpression and, consequently, results in the PAI-1 increase in blood, therefore the fibrinolytic system activity decreases significantly.

All the patients taking part in this investigation needed a long or a life-long application of the indirect anticoagulant – warfarin, that required an adjustment of the preparation dosage to avoid the overdosage. When defining the warfarin sensibility 29 persons from the number of the examined patients had the most popular genotype CYP2C9*1/*1, 39,6% - turned out to bear the alleles CYP2C9*2 and CYP2C9*3 (11 and 8 persons accordingly). The CYP2C9*2 and CYP2C9*3 alleles bearers had unstable INR indexes and required special attention at the warfarin optimal dosage adjustment.

Conclusion: The evidence of the role of genic disturbances in the development of thrombophilias has been obtained. It is shown that the patients with homozygous variants of mutation alleles of the MTHFR genes (C677T), thrombocytic glycoproteins, endothelial NO-synthase and PAI-1 are subjected to the most severe course of thromboses and are hardly treatable. The plasminogen activation inhibitor and endothelial NO-synthase can be used as markers characterizing the endothelium state and for the definition of endothelial dysfunction.

The data obtained point out to a real possibility to influence this or that part of the hemostasis system and/or the system of fibrinolysis, correct the endothelial dysfunction at early stages of the disease depending on the genes' polymorphous variants form. The detection of thrombophilia predisposition genes gives an opportunity to take the preventive measures timely. A purposeful action on the thrombocytic part, coagulative hemostasis or vascular wall in the persons with genic disturbances allows avoiding severe complications at the influence of acquired risk factors on the body. At the necessity of the indirect anticoagulant warfarin adequate dosage adjustment in conditions of its long or life-long application the genetic testing allows forecasting the response to the given preparation intake with due consideration of the patient's sensibility.

The introduction of molecular-biological methods into the laboratory practice, the mutations of the genes coding tissue factors, proteins and glycoproteins of the vascular, thrombocytic, coagulative parts of the hemostasis system and the system of fibrinolysis in particular, can promote the definition of fine mechanisms of clotting and anticlotting blood systems' disturbances. An integrated research including the comparison of various hemostasis system parts' genes' mutations presence with the system's functional state is perspective in both practical and scientific relations, as it allows defining meaningful factors having an effect on the pathological process development and performing a search of pathgenetically relevant methods of treatment. The genetic typing of the hemostasis system parameters and the factors characterizing the endothelium function as the thrombophilia predisposition criteria should be included into the examination record of the patients subjected to either acquired or inherited risk factors.

At the present development stage of the biological and medical sciences the role of molecular-biological mechanisms in the formation of thromboses should be paid considerably much attention to in the programs of biological and medical departments' students training.

HUMORAL-METABOLIC IMBALANCE IN MEN AND WOMEN SUFFERING FROM CARDIO-VASCULAR METABOLIC SYNDROME

Tsygankova O.V., Ruyatkina L.A., Bondareva Z.G., Fedorova Ye.L., Ragino Yu.I.
Novosibirsk State Medical University
Novosibirsk, Russia

The purpose of the paper was the analysis of sex differences of basal insulinemia (BI) and malondialdehyde (MDA) – low density lipoprotein oxidation value (LDL), interrelation. 143 men aged 47,6±0,5 and 83 women aged 48,3±0,7 with metabolic syndrome (MS). Normotensive men and women without abdominal adiposis (AA) and dyslypoproteidemia formed control groups. The anthropometric characteristics were defined: lipidogram parameters - by the enzymatic calorimetric method using chemical agents "Vital Diagnostics", insulin basal parameters – by the radioimmunoassay technique with the help of Immunotech Insulin Irma sets, glycemia – by the glucose oxidase test. The LDL oxidation resistance was defined on the MDA levels (nmol/1mg of β-lipoproteins albumin) by fluorometry.

When being compared on a series of hemodynamic and metabolic characteristics (body mass index, glycemia, cholesteremia), the men and women differed in the abdominal adipopexia degree (waist circumference (WC) accordingly 99,9±1,3 and 89,5±0,9 cm; p<0,001), triglyceride (2,2±0,2 and 1,6±0,1 mmol/l; p<0,001) and α-cholesterol (1,3±0,1 and 1,6±0,1 mmol/l; p=0,002) levels. BI authentically correlated with the body mass index (r=0,34; p=0,047), WC (r =0,66; p=0,004) and triglycerides (r=0,29; p=0,046) in the men. BI in the MS women correlated with WC only: r=0,40 (p=0,02).

The MDA levels in the MS men (5,1±0,3 nmol/1 mg of LDL albumin) exceede the control ones(2,3±0,2; p<0,01). In the MS and healthy women these parameters didn't differ (2,8±0,1 and 2,6±0,1accordingly; p>0,05). Authentic correlations (p<0,05) of the MDA levels and insulin were detected both in the men (r=0,35) and women (r=0,50), that reflects the prooxidant role of insulin. In the men this relation became significant in conditions of hyperinsulinemia (≥15 мкед/мл), and in the women it didn't depend on definite BI values. At the same time, the MDA parameters correlated with WC (r=0,43; p<0,05) as well in the men. There are no correlation relationships of the MDA levels and AA indexes detected.

The actual participation of insulinemia in the oxidative stress realization through the LDL peroxidation mechanism in conditions of the MS cardiovascular cluster was detected in the men and women. This influence, depending on the sex, is realized at various BI levels. The basal insulinemia leading role in the interrelations with the AA clinical marker – the waist circumference in men, has been established. Their basal hyperinsulinemia manifests its prooxidant influence in two ways: through the direct relation with MDA and indirectly – through the AA parameters; in women insulinemia influences MDA levels irrespective of its basal level parameters. Taking into account the BI correlation with the WC parameters, irrespective of the sex, in the MS diagnostics one can rely on the AA and not concrete levels of insulinemia from the clinical and prognostic point of view.

FEATURES OF ENTOMOPATHOGENIC BACTERIA DISTRIBUTION THROUGH MIGRATING BIRDS

Uzdenov U.B.
*Karachayevo-Cherkessian State University named after Aliyev U.D.
Karachayevsk, Russia*

The role of migrating birds in the transcontinental distribution of entomopathogenic bacteria has been studied not well enough. The purpose of our research is to study the bio-ecological interrelations of Bacillus thuringiensis bacteria with various kinds of migrating birds. As it is known, the involvement of birds into this process occurs through parasitizing of blood- sucking insects and mites on them (Pustovaya, 1971; L'vov, Iliychov, 1979; Novikov, 1984; Olsufiyev, Dunayev and others, 1970). The survival rate of crystal-forming bacteria in the digestive tract of birds was established by W.A. Smirnoff, C.F. Macloed (1961); I.C. Adams, P.A. Hartman (1965). The authors do not exclude the leading role of birds in preservation and distribution of these parasitizing kinds in the external medium. Literary evidences testify that, when studying the ecologo-geographic distribution of Bacillus thuringiensis strains, it was not paid special attention to migrating birds, pathogenic viruses and bacteria have been studied far more deep for that matter.

In different years we carried out microbiological research of the internal organs of migrating birds and 43 entomopathogenic bacteria strains, which are represented by eight subspecies: Bacillus thuringiensis var. thuringiensis (12 cultures); alesti (4); kurstaki (4);sotto (5); subtoxicus (7); kenyae (3); galleriae (6); finitimus (2), were segregated. More than a half of the strains were segregated from the gastric contents. Among animal food birds there are much more bacillicarriers than among vegetal and mixed food. The migration routes of the trapped bird units cross practically all the continents of the Earth, the most visited of which are Africa, South America and Asia. The majority of the examined birds are represented by the species: whoop Upupa epops (L.); common swallow - Hirundo rustica (L.); sand swallow - Riparia riparia (L.); starling - Sturnus vulgaris; rosy pastor - Pastor roseus (L.); gray wagtail - Motacilla cinerea; yellow-headed wagtail - Motacilla citreola (Pall.) and others. We also studied the microflora of biting lice of 11 species in quantity of 162 units collected from wild birds, from which such rare serovars as var. morrisoni, var. kenyae, var. alesti. were segregated.

The variety of the bacteria obtained is conditioned by the fact that birds, especially insect-eating ones, eating various insects, among which there is a high percentage of infected species, become infected with micro-organisms of the Bacillus thuringiensis group, as, however, with other species of viruses and bacteria. This situation is proved by frequent segrega-

tion of the strains out of the stomach and intestines of the examined wild birds.

Blood-sucking arthropods, which serve as bacillicarriers, perform a role in birds infecting with the given group bacteria. It is quite possible that the Bacillus thuringiensis strains segregated from the wild birds' liver is connected with the delivery of the bacterium from the blood-sucking arthropods. The mites, possessing a complex biological cycle of development, being closely connected with the microflora of the external medium, feather and skin integument of its host are constantly infected with micro-organisms of various taxons. According to the data from Petrishcheva P.A. (1967) these contacts promoted the appearance of symbiotic interrelations in mites with many micro-organisms in the process of evolution. However, Bacillus thuringiensis, possessing entomopathogenic properties, can propagate in certain cases in the intestinal opening of insects and mites, the bloodsuckers being most likely ready to deliver the crystal-forming bacteria transmissibly.

From the materials got on the bacteriological examination of the internal organs of wild birds and their ectoparasites one can conclude that birds, especially insect-eating ones, take direct part in the distribution of the given group of micro-organisms, defining their ecological amplitude.

The existence of intercontinental migration paths of birds (on the ringing data more than half of the wild birds examined by us arrive in the CIS territory from South America, South and North Africa, India, Azores and British Isles…) and establishment of a certain percentage of bacilli carriage among their parasites (plumage lice, bloodsucking bugs and mites) allow us to assume that migrating birds perform a significant role of transcontinental exchange of Bacillus thuringiensis strains.

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IMMUNOHISTOCHEMISTRY OF SOMATOSTATIN SPECIFIC DENSITY IN PANCREATIC GLAND OF FETUSES AND NEWBORNS

Ulyanovskaya S.A., Suhanov S.G.
Northern State Medical University
Archangelsk, Russia

It is known that somatostatin has asignificant effect on various digestion processes, slows down the inflow of nutrient materials into portal blood and blocks the critical increase of metabolites in blood [Klimov P.K. and coauthors, 1987].

The earlier carried out investigation of the incretory part of the developing pancreatic gland revealed regional morphogenesis features of the organ. It was detected that against the background of the gland's ductal part hypoplasia the insular one exceeded the innate norm in its specific density [Sukhanov S.G., Ulyanovskaya S.A., 2006, 2007]. In connection with this it was decided, first of all, to study the content of somatostatin as one of the main metabolites of the insular tissue of the fetal gland.

The purpose of the work is to study and evaluate quantitatively the content of somatostatin granules in the pancreatic gland tissue of fetuses and newborns by the immunohistochemical method.

Material and methods of the investigation: the work was carried out on the autopsy material collected at the department of morbid anatomy of the SEH ARTH of Archangelsk, the immunohistochemistry and histiometry of fetuses' (17-40 weeks) and died newborns' (18 cases) pancreatic gland was carried out. The glands wee fixed in the neutral formaline; for the somatostatin granules identification the monoclonal antibodies to somatostatin (DAKO) were used.

The investigation results: during the whole research period the granules containing somatostatin were detected. The granular cells were located, as a rule, in the insular periphery. The content of colored granules in the cells was characterized by the undulation dependency, and the statistical series – by different degree of asymmetry and excess. The average values of the specific density (Aai) in the gland's tissue made: in the fetuses up to 20 weeks - 8,5±0,39; 24-27 weeks - 12,1±0,56; 28-31 weeks - 13,5±0,64; 36-40 weeks - 7,8±0,41; in newborns - 11,1±0,59.

The carried out research testified that the content of somatostatin in the pancreatic gland tissue of fetuses and newborns depends on the age factor significantly. A further study of the fetuses' pancreatic gland insulars' cellular composition using the immunohistochemical method will specify the phenotypically conditioned features of the organ's morphogenesis.

The work was granted in the competition on the priority orientations of the science development in the Archangelsk Region, project N 10-13.

BIOMEDICAL ENGINEERING IN RAISING EFFICIENCY OF EMOTIONAL PROCESSES DIAGNOSTICS
Yatsenko A.F.
PSEU
Vladivostok, Russia

Evidence of emotional marking can be found everywhere in modern medicine. Our study of the emotional and behavioral problems of homeless children are connected with the portable ear-scanners that produce detailed images of internal segmentary trophic centers. Our device allows to receive data performed by image-guided computer instrument. By the registration of the skin resistance changes from the skin surface of an auricle the long-term statistical material we had received by removal ear-scanned topograms of epidermis various activity at healthy and sick conditions. As a result of special processing topograms of electrophysiological parameters of a skin («an instant portrait») a lot of stationary and dynamic processes at a segmentary level in body's vegetative department in a super slow range of frequencies were possible to register conditions of all. Our biomedical engineering device (computer-based skin-scanner) have been designed and produced by engineers working in collaboration with doctors, biochemists, physicists, and microbiologists. Also the use of our biomedical engineering device are directed in many kinds of treatments, especially in diagnosis and maintaining the basement health functions that are affected by disease or injury. On a ratio of values of base functions in one segment the pathological center is allocated, inflammatory process is classified on a phase, the belonging to concrete body or its part is defined. The objectives of the study were to explore opportunities of the registrations of changes of skin resistance in study the emotional profile of homeless children being considered for deviant behavior, and evaluate the relationship between child emotional and behavioral problems and use of registrations of skin resistance changes. The computer-based method consists in measuring the epidermal resistance of human auricles by scanning them. A sample of 125 youth (between 9 and 11 years old) who were homeless and children from permanent placement were estimated. These children have complex needs. We found significant differences by deviant behavior between homeless boys and girls and boys and girls from permanent housed group, as follows (ANOVA-F=6,68, t=2,58; $p<0,05$) and (ANOVA-F=16,47, t=4,07; $p<0,05$). The comparison of the revealed parameters with results of other methods of investigation has shown perspectives of informational making up a diagnosis by using this approach. Using ear-external sensors will be able to continuously measure response to treatment. It allows to use computer-based device by the people who look after the patient who will not be medically qualified but will be highly skilled technicians trained in specialized diagnostic and therapeutic devices and procedures. We recommend our device for everyone who may have access to regular non-invasive screenings to detect disease as early as possible.

Short Report

THE CIRCULAR STAPLER AND GYNECARE PROLIFT SYSTEM USAGE FOR THE SURGICAL TREATMENT OF HEMORRHOID DISEASE ACCOMPANIED WITH PERINEUM PROLAPSE

Kulikovsky V.F., Oleynik N.V., Naumov A.V.
*Regional Clinical Hospital of St. Ioasaaf,
the Coloproctological Department
Belgorod, Russia*

Hemorrhoid disease is frequently found man pathology (extend to 118-120 cases in 1000 of adult people) (P.Godeberge, 2000; G.I.Vorobiov, 2001 et al.). In pelvic floor prolapsed women the frequency of concomitant hemorrhoid disease is increased to 60-70%, as it appears because of rectum connective and muscular tissue laxity according to mechanical theory and become one of the manifestations of pelvic prolapse. The combined prolapse has to be removed simultaneously. Variable opinions exist about surgical techniques choice for this pathology treatment (M.Kahn, S.Stanton, 1998; V.Ryvkin et al., 2001 et al.).

The aim: to improve the anatomical and functional postoperative results in patients with combined posterior prolapse and to evaluate feasibility, intraoperative complications, short-term follow-up results of GPS and PPH simultaneously usage.

Materials and Methods

For prolapse diagnostics the following procedures have been performed: dedicated questionnaire, digital rectal and vaginal examination, RRS (with straining according to Parks), defecography, ultrasound and magnetic resonance imaging (performed to diagnose mm. levator ani and recto-vaginal aponeurosis (Denonvilliers' fascia) damage, anorectal function testing, using multifunctional computer system Polygraf ID. 22 patients (mean age 43,3 years; range 39-55 years) underwent Gynecare Prolift System (GPS) emplacement for recto-vaginal septum plastic and transanal mucosal incision with circular stapler using PPH system for hemorrhoid simultaneously treatment. The indications for this operation consider being: rectocele of II-III degree, according to ICS (POPQ) with mm. levator ani rupture or atrophy, Denonvilliers' fascia rupture, perineum descending, rectum mucosal prolapse, hemorrhoid of III and IV Degree. The results had been compared with control group (35 patients, mean age 46,4 years; range 32-65 years) underwent levatoroplasty, hemorrhoidectomy according to Milligan's and Morgan's technique and rectal mucosal incision. The results of surgery techniques had been estimated, using the following criteria: the painful syndrome intensity, the frequency of purulent complications, the frequency of erosions and granulomas in patients underwent mesh-plasty, the dyspareunia appearance in distant follow-up period, rectocele and perineum descending anatomical correction (due to defecography data), voiding normalization, continence normalization (in patients incontinent before surgery).

Results

The painful syndrome was more intensive the patients of the control group, which were associated with ano-rectal wounds after hemorrhoidectomy and transanal mucosal incision and was independent of the recto-vaginal septum reconstruction method. The most of purulent complications had been revealed in the ano-rectal wounds of the control group too, 5 (14,2%). There was one (2,9%) suppuration in the vaginal wound after levatoroplasty and one (4,5%) after mesh implantation with no necessity in mesh removal. Vaginal erosion 1(4,5%) and granuloma 1(4,5%) appeared in the patients of the investigational group. The dyspareunia appearance in distant follow-up postoperative period had been noted in 2(3,8%) patients of the control group because of excessive vaginal narrowing after levatoroplasty. Rentgenological disappearance of mucosal prolapse and hemorrhoid disease symptoms removal has been achieved in the both groups. But the functional results were better in the group with mesh and circular stapler used. So, the voiding normalization marked 25(71,4%) patients of the control and 21(95,4%) of the investigational group. The patients' subjective sensations of voiding improved had been confirmed by impartial data of anorectal manometry. Estimation criteria were better in the patients with mesh implantation and PPH usage comparably with control group: first sensation - 26,6±2,1ml and 28,4±2,3 ml; maximum tolerable volume (ml) - 73,9±3,1 and 78,9±3,1; rectal compliance (ml\mmHg) - 5,3±0,9 and 7,3±0,9. The same data have been shown by balloon test. There were 19(86,4%) patients had been able to expel a 150ml-balloon in the investigational and 23(65,7%) patients in the control group. But it was not found out any difference in recto-anal inhibitory reflex analysis in patients transanal mucosa' incision and PPH procedure underwent. About in 50% of the patients' perineum descending had been diagnosed by means of defecography. After surgery examination shown the normalization of pelvic floor location (-3,3 ±0,3cm in the rest and -5,1 ±0,4 cm in straining effort) and anorectal angle configuration (115,2 ±5,7º in the rest and 152,1 ±3,3 º in straining effort) mainly in women undergone PPH and mesh using for rectovaginal septum correction. The last can be accounted by vagina' pull up with the mesh' arms to the sacrospinal ligaments. The data in the control group were: -4,3 ±0,3 cm in the rest and -8,9 ±0,4 cm in straining effort and 132,3 ±7,1º and 169,8 ±6,4º accordingly. In the normal's anorectal border locates above 3 cm from pubococcygeous line in the rest, and in the straining effort falls down less than 3 cm. In the normal's anorectal angle value amounts 99,9±1,5º in average in the rest and 135,5±2,2º in straining effort. At least the half of

the patients with anatomical perineum descending were 1st – 2sd degrees incontinent. Anorectal manometry and pudendal nerve terminal motor latency test showed the gradual improvement of the continence after pelvic floor level and configuration reconstruction. Postoperatively (6-12 month follow-up) the pressure in the internal anal sphincter region (mmHg) became $31,1\pm2,9$ and $35,9\pm3,9$; in the external anal sphincter region (mmHg) $43,9\pm3,7$ and $49,1\pm4,8$; pudendal nerve terminal motor latency test (msec) marked $2,71\pm0,29$ and $2,11\pm0,21$ in the patients of the control and investigational groups accordingly. In normals: pressure in the IAS region– $39,4\pm2,7$ mmHg; EAS – $53,5\pm3,7$ mmHg; pudendal nerve terminal motor latency test -$1,95\pm0,21$ msec. It can be explained by pudendal nerve traction stopping. The further biofeedback therapy and pudandal nerve electro stimulation improved the continence. The patients themselves had estimated the postoperative results as: good, satisfactory and not satisfactory. The control group data were 7(20%) good, 17(48,6%) satisfactory, 11(31,4%) no satisfactory. The most of good and satisfactory results have been pointed by patients had undergone mesh implantation and PPH: 7(31,8%) – good, 13(59,1%) – satisfactory, 2(9,1%) - no satisfactory.

Conclusions: In plural character of pelvic posterior segment prolapse, including rectocele, rectal mucosal prolapse and hemorrhoids, the combined operation is necessary. The use of circular stapler according to Longo's procedure permits to make the prolapsed mucosal incision and remove hemorrhoid prolapse simultaneously; to avoid the intensive painful syndrome and inflammatory complications typical for transanal mucosal mobilization and incision. Traditional levatoroplasty is not enough for rectocele reconstruction in case when this pathology is caused by mm. levators ani atrophy or rupture and rectovaginal fascia multiple damages. The prolene mesh transplantant is very useful in those situations. The GPS using permits to standardizes, to make easier the surgery procedure and to avoid technical complications. Besides these prolene implants and PPH combined using are effective in perineum descending syndrome treatment. But the relatively high rate of vaginal erosions, granuloms, purulent complications force to limit this method using and employ it by limited indications.

EFFECTS OF NONSYMMETRICAL DIMETHYLHYDRAZINE AT THE PROTEIN DEFICIENCY IN DIET ON THE GROWING ANIMALS

Muravleva L.Ye., Kulmagambetov I.R., Terekhin C.P., Klyuyev D.A., Koikov V.V., Abdrakhmanova Yu.E., Mursataeva A.M., Muratova A.Z., Utibaeva R.A.

Karaganda State Medical Academy
Karaganda, Republic of Kazakhstan

The purpose of the present research NDMH was influence on a condition of biochemical processes in blood plasma of the growing animals receiving a diet with deficiency of protein. Effects of nonsymmetrical dimethylhydrazine at the protein deficiency in diet of the growing animals has been represented by superfluous accumulation of the oxidized proteins and infringement of the structure-forming properties of blood plasma in growing animals.

Our researches has shown, that the expressed infringements of an oxidative metabolism, increase of extracellular nucleic acids in blood and changes of the blood plasma teziograms morphotypes are fixed at growing animals for 30 days after unitary injection of nonsymmetrical dimethylhydrazine (NDMH) [1].

It is shown, that the alimentary factor has essential influence on reactions of an organism of animals at NDMH injection [2-6].

NDMH influence on a condition of biochemical processes in blood plasma of the growing animals receiving a diet with deficiency of protein is not studied practically that has served as the purpose of the present research.

Research materials and methods

Experiment has been carried out on 60 white not purebred infant rats-weanling of both sexes with initial weight of body 50 g, divided into 3 groups (control, comparison group and basic group). NDMH has been unitary injected in a dose 5 mg/kg intraperitoneally to animals of the comparison group and basic group. Experiment term lasts 30 days. Animals of control group and comparison group received the general vivarium diet during all experiment. Animals of the basic group has been kept on an isohigh-calorie semisynthetic diet during 30 days.

The structure of an isohigh-calorie semisynthetic diet was presented by protein of gluten (8 %), deficient on methionine, lysine and threonine, lard (15 %), carbohydrates (68 %), a mineral component (4 %), a vitamin mix (4 %), small wood sawdust (1 %). The carbohydrate component is presented by granulated sugar (10 %) and potato starch (58 %). Mineral and vitamin components was made according to recommendations [7]. Animals received forage and water without restrictions. The forage rests were considered.

Animals has been deduced from experiment by a method of incomplete decapitation under an easy ether narcosis according to the international recommendations [8].

Morphology of blood plasma has been defined by a method wedge-shaped dehydrotation. A plasma drop has been placed on a fat-free surface and dried up at a room temperature. The dry film-facies, reflecting intermolecular interactions in blood plasma, was formed after water evaporation [9].

Degree of spontaneous and oxidation metal-catalyzed protein oxidation (MCPO) has been defined in blood plasma. The method of an estimation of the protein oxidative modification (POM) has been based on reaction of interaction of oxidized aminoacidic residues with 2,4-dinitrophenylhydrazine with formation of ketone dinitrophenylhydrazones (KDNPH) and aldehyde dinitrophenylhydrazones (ADNPH) of the basic and neutral character. Protein oxidative modification has been initiated by Phenton medium. Degree of protein oxidative modification was expressed in units of the optical density, related on 1 ml

of plasma [10]. Results of biochemical researches has been processed according to the method of Mann-Whitney [11].

Results of research

The analysis of the blood plasma phascias morphotypes in infant rats-weanling of the comparison group has revealed presence of the following general trends: partial loss of an intermediate zone, occurrence of chaotic type of cracking and decrease of the concretion quantity. Similar changes of the phascias morphotypes are markers of system changes of the structure-forming properties of blood plasma in growing animals for 30 days after unitary NDMH injection [1].

Morphotypes of blood plasma in growing animals of the basic group are character-

ised by an infringement of the phascias formation zonality, loss of symmetry and equi-radial cracking, formation of amorphous areas in the central zones of phascias, the general decrease of the concretion quantity and occurrence of the concretion atypical forms.

However there are also differences in morphotypes of the blood plasma teziograms of females and males. Elements of three-zone structure (fig. 1) remain in 60 % of the blood plasma teziograms of females-weanling whereas phascias formation zonality has not been expressed, or was absent in 40 % of teziograms. Generated concretions were characterized by the small sizes.
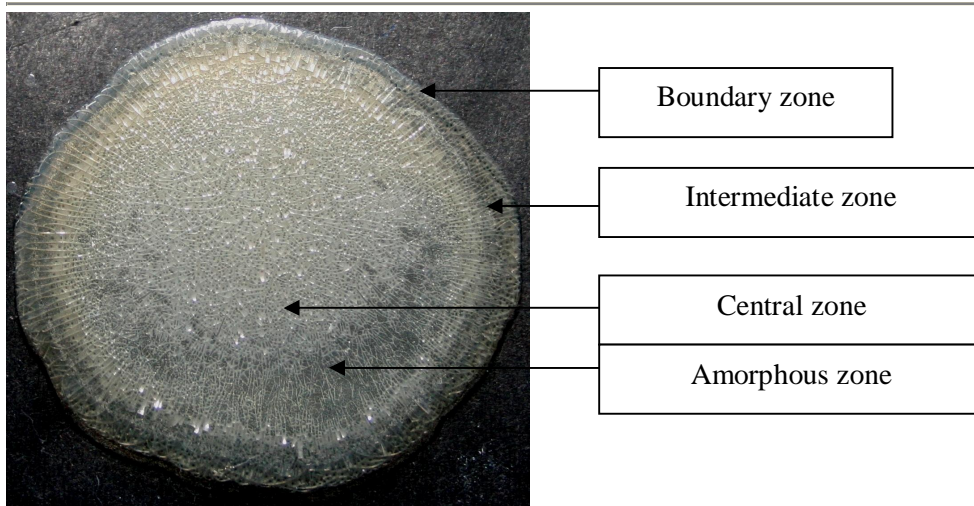
Fig. 1. Teziograms of females-weanling at basic group
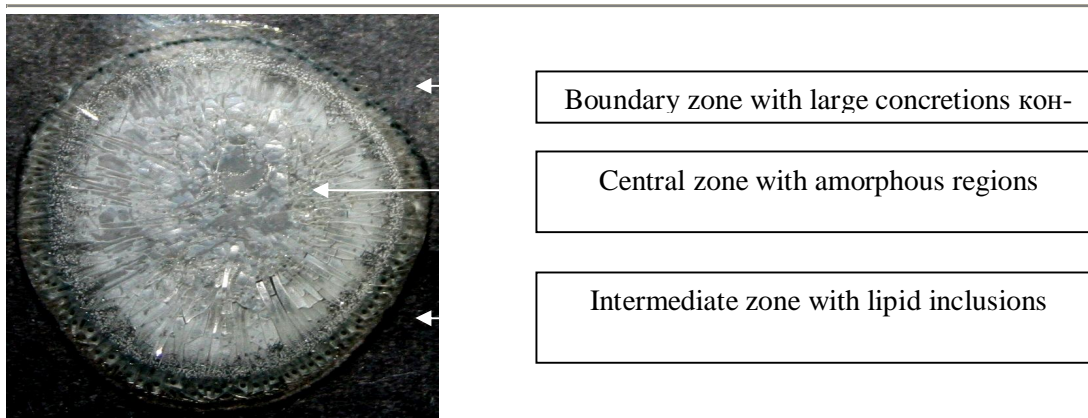
Fig. 2. Teziograms of males-weanling at basic group

Large amorphous areas in the central zone were observed in 20 % of blood plasma teziograms of male. Accurate large concretions were fixed in 60 % of teziograms. We has noted formation of the concretions with different sizes (large and small - dot) and different configuration (round, extended, rod-like) within one phascia.

Similar changes of the phascias morphotypes are markers of not only system, but also subsystem changes of the structure-forming properties of blood plasma in growing animals of the basic group with deficiency of protein in a diet.

Strengthening of the protein modification oxidation can serve as one of the possible causes of infringement of the blood plasma phascias morphotypes in rat-weanlings of basic group. Definition of of the spontaneous POM catabolites has shown, that at growing animals of the basic group the contents of dinitrophenylhydrazones of basic and neutral character authentically differed from those of the control.

We has revealed reliable increase in the contents of dinitrophenylhydrazones of basic and neutral character in blood plasma of rats at the basic group in comparison with those of animals of the 2nd group.

Table 1. Influence of NDMH unitary injection on indicators of spontaneous protein oxidative modification in blood plasma of the growing animals, kept on a diet with deficiency of protein, (M$\pm$m)

Groups of animals	Sample	KDNPH of neutral character, reference units/ml	ADNPH of neutral character, reference units/ml	KDNPH of basic character, reference units/ml	ADNPH of basic character, reference units/ml
Control	Σ (n=9)	4,88±0,51	5,22±0,45	2,75±0,49	0,439±0,054
	♀ (n=5)	4,82±0,63	5,18±0,54	2,65±0,54	0,434±0,061
	♂ (n=4)	4,96±0,37	5,27±0,39	2,87±0,46	0,445±0,052
Comparison group (NDMH unitary injection)	Σ (n=30)	7,16±0,73 *	8,01±0,71 *	5,91±0,64 *	0,974±0,088 *
	♀ (n=15)	6,95±0,70 *	7,84±0,71 *	5,73±0,62 *	0,961±0,093 *
	♂ (n=15)	7,38±0,70 *	8,18±0,69 *	6,09±0,62 *	0,987±0,083 *
Basic group (NDMH unitary injection +protein-deficient diet)	Σ (n=20)	8,99±0,31 *[#]	9,86±0,38 *[#]	7,50±0,35 *[#]	1,383±0,054 *[#]
	♀ (n=10)	9,04±0,33 *[#]	9,91±0,41 *[#]	7,47±0,35 *[#]	1,381±0,059 *[#]
	♂ (n=10)	8,96±0,31 *[#]	9,81±0,36 *[#]	7,53±0,37 *[#]	1,383±0,056 *[#]
Notes: * - reliability of indicators in relation to the control (p<0,01); # - reliability of distinctions of the basic group in relation to comparison group (p <0,01)					

We has revealed the increase of the blood plasma protein sensitivity in animals of the experimental group to action of prooxidizers is revealed. It is documented by reliable increase of the contents of metal-catalyzed POM catabolites. Level of catabolites formed at addition of Phenton medium not only reliably exceeded those of the control, but also of comparison groups.

Table 2. Influence of NDMH unitary injection on indicators of metal-catalyzed protein oxidative modification in blood plasma of the growing animals, kept on a diet with deficiency of protein, (M+m)

Groups of animals	Sample	KDNPH of neutral character, reference units/ml	ADNPH of neutral character, reference units/ml	KDNPH of basic character, reference units/ml	ADNPH of basic character, reference units/ml
Control	Σ (n=9)	9,25±1,69	10,57±1,74	4,79±0,79	0,999±0,150
	♀ (n=5)	9,12±1,75	10,58±2,15	4,82±0,76	0,984±0,158
	♂ (n=4)	9,42±1,87	10,55±1,41	4,75±0,94	1,017±0,162
Comparison group (NDMH unitary injection)	Σ (n=30)	17,65±0,77 *	18,77±0,74 *	8,47±0,53 *	1,929±0,109 *
	♀ (n=15)	17,43±0,73 *	18,60±0,78 *	8,42±0,49 *	1,909±0,121 *
	♂ (n=15)	17,87±0,77 *	18,93±0,68 *	8,53±0,58 *	1,950±0,095 *
Basic group (NDMH unitary injection +protein-deficient diet)	Σ (n=20)	19,48±0,62 *#	20,22±0,74 *#	10,97±0,87 *#	2,435±0,319 *#
	♀ (n=10)	19,30±0,57 *#	20,01±0,54 *#	10,77±0,77 *#	2,370±0,360 *#
	♂ (n=10)	19,67±0,65 *#	20,44±0,87 *#	11,18±0,95 *#	2,500±0,277 *#

Notes: * - reliability of indicators in relation to the control (p<0,01);
- reliability of distinctions of the basic group in relation to comparison group (p <0,01)

Prooxidant effect of NDMH is the reasons of superfluous accumulation of the oxidized proteins in blood plasma of growing animals [1]; oxidative stress is also developed owing to deficiency of protein in a diet [12]. It determines infringement of the structure-forming properties of blood plasma in growing animals. Thus, deficiency of protein in a diet of growing animals appreciably aggravates detrimal effect of NDMH.

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INSURANCE BUSINESS DEVELOPMENT IN GLOBALIZATION AGE

Iskakova Z.D., Serikova G.S.

Karaganda state university of economics
Karaganda, Republic of Kazakhstan

For the insurance market of Kazakhstan the changes, which manifest themselves in the increase of the insurance companies' number, owned capital, insurance reserves, assets, insurance premium revenues and insurance payments volume are indicative. Together with that the rate of Kazakhstan insurance business growth are not high enough. In connection with this the insurance supervision institution needs to take measures on the insurance market development security.

In the present-day international economics the financial sector has become the defining one. And the insurance can be recognized as one of the most integrated forms of the financial industry.

As a whole the processes of integration and globalization have actively influenced on the qualitative and quantitative parameters of the international insurance market, changed its structure, the system of international trade in insurance services, state regulation of insurance activities within the framework of national economies. It is becoming evident that both at the world-wide and regional levels there is a global integration of insurance markets, which promotes the movement of cross border capital flows to their most productive use.

The national insurance market integration into the international economics promotes, on the one hand, the increase of the insurance market capital intensity and strengthening the financial soundness of insurance companies, and on the other hand, hazards and risks, which the state and national insurers concern about, appear. Undoubtedly, under such circumstances a reasonable state policy taking into account the national insurance market interests is needed.

Being one of the most important elements of the modern economics system, the insurance business tests the globalization influence for itself to the full extent. In connection with this the native insurance business evaluation for the purpose of defining its competitive power on the threshold of the WTO accession is especially topical for Kazakhstan. The insurance business, one can say, is at the stage of development.

As the main distinctive feature of the present-day insurance business of Kazakhstan one can segregate a high level of the regulatory structure development and state regulation. Really, many regulatory legal acts dedicated to regulating the relations in the area of insurance are based on the EC legislative provisions and the acts adopted within the framework of the WTO. The RK Agency on the financial market and financial institutions regulation and supervision (AFS), which carries out a dedicated policy on the insurance operations clarity and legality promotion appears as the main state regulatory authority.

The Kazakhstan insurance market at the present stage is comparatively small both in terms of the gathered premium and insurers' volume (41 insurance companies, 6 of which are with foreign participation), that, however, derogates its dignities and importance among insurance markets of other countries of the CIS by no means. A sustainable growth of the republican business life in recent years and the measures taken by the state on the national insurance industry reforming promoted an accelerated development of this branch. For the insurance market of Kazakhstan the changes, which manifest themselves in the increase of the insurance companies' number, owned capital, insurance reserves, assets, insurance premium revenues, insurance payments volume, which are shown in table 1, are indicative. As a whole the dynamics of the main showings of the insurance market development for the period of several years is characterized positively.

Table 1. Showings of Kazakhstan insurance market development (MIO tenge)

№	Showings	2005	2006		2007	
			sum	rate of growth	sum	rate of growth
1	insurance companies number	37	40	8,1	41	0,3
2	total assets	73 346,3	135 489,7	84,7	223556,1	65,0
3	owned capital	45 259,8	80 200,7	77,2	126276,8	57,5
4	insurance premiums	67123,1	120265,9	79,2	147343,3	22,5
6	insurance payments	10769,8	14092,2	30,8	45749,5	2,6 times
6	obligations	28 086,5	55 289,0	96,9	97279,3	75,9
6.1	pure insurance reserves among them	21 010,5	45 749,5	2,2раза	86359,8	88,8
6.2	other obligations	7 076,0	9 539,5	34,8	10919,5	14,5
Note – made up on the basis of the RK AFS statistical data						

The data of table 1 confirm the qualitative shifts in the Kazakhstan insurance market development. For the analyzed period a noticeable consolidation of native insurance companies in the volume of total assets, owned capital and insurance reserves took place. The insurance operation volumes increased considerably in the Republic, therefore the revenue of insurance premiums and payment of insurance indemnities, which testify to carrying out of accepted obligations by the insurance companies under insurance contracts, increased as well.

A serious positive tendency of the native insurance business development is the insurance companies' financial stability elevation. Since the 31st of December, 2007, a third stage of the severization of requirements to the insurance companies' minimal authorized capital has become operational. According to the Kazakhstan Republic Agency Instruction on the financial market and financial institutions regulation and supervision from March, 25, 2006, N87 "On regulation values and design procedures of insurance (reassurance) institution prudential standards, forms and time for prudential standards completion reports submission" depending on the character of their carried out activity the minimum permissible dimen-

sion of the insurance companies' authorized capital should make:

at the "comprehensive insurance" license receiving – 430 (four hundred and thirty) million tenge;

at the "life insurance" license receiving – 670 (six hundred and seventy) million tenge;

at the "comprehensive insurance" license and reassurance license receiving – 450 (four hundred and fifty) million tenge;

at the "life insurance" license and reassurance license receiving – 690 (six hundred and ninety) million tenge;

at the reassurance license receiving with performing reassurance as an exclusive kind of activity – 530 (five hundred and thirty) million tenge [1].

The main causes of the severization of requirements to the minimal owned capital are the high rate of the gathered insurance premium volume growth insecured by the corresponding rate of the owned capital growth and the convergence to the requirements established by the EC Directives, that is 2-3 Mio Euro.

In spite of such achievements and not bad insurance market development growth ratios, according to analysts' estimates, the rate of Kazakhstan insurance business devel-

opment is insufficient, and the insurance companies' level doesn't satisfy the growing requirements of economics and financial services market. Like in other CIS countries, in the structure of joint insurance premium of Kazakhstan insurers the "comprehensive insurance, i.e. different from life" branch, the share of which on 1.01.2008 made 96,8%, while the share of life insurance revenues - 3,2% in all, dominates.

To our opinion, the very sector of long term funded life insurance of natural persons – the capital intensive sector requiring substantial investments and serious consumer confidence credit, will turn out to be the most sensitive in conditions of integration processes intensifying. Here native insurers trail large multinational companies with multiyear history and billionth capitals. To tell the truth, it isn't followed by the fact that all the life insurance companies today will have to leave it. As a whole, the native life insurance market should gain credence and occupy its niche in the future.

As it is known, one of the insurance operations' financial stability security terms is reassurance. Complex risks guaranteeing the payment of a gross premium in the cases, when the local market capacity is not enough to cover the risk, are generally reassured outside Kazakhstan. The volume of the Kazakhstan reinsurers' insurance premiums transmitted for the reassurance of nonresidents made 61681,2 Mio tenge or 33,5% from the total insurance premiums volume. The share of premiums transmitted to Russian reinsurers made 13,8 %, the USA – 21,2%, Germany - 15,8%, Sweden – 7,1%, Switzerland – 3,9%, Great Britain – 6,9%, Bermuda Islands – 2,1%. In the aggregate amount of insurance premiums transmitted for reassurance the main part occupied by the premiums on voluntary property insurance - 94,3%, voluntary private insurance - 1,5%, obligatory insurance - 4,2% [2].

As the analysis results show there is no need now to speak about the full-blooded insurance service market of Kazakhstan. For years of market changes they failed to form a

stable, corresponding to modern wants of the society, insurance service market in full. A sluggish demand of legal and natural persons for insurance services both by virtue of low income level and the formed failure of trust to the security of insurance institutions; the immaturity of market relations in the sector; the low life insurance level; the absence of a developed market of capital issues in the country, that limits the possibilities of insurance reserves distribution; the imperfection of insurance regulatory and legal framework; the national reassurance market underdevelopment; the high volume of the insurance premiums transmitted abroad by the reassurance channels [3] prevent the insurance market from the proper development.

In the long term, for the existing insurance market problems solution we think the performance of the following principal measures to be important:

- the every possible use of the insurance system potential as one of the sustained industrial development mechanisms of the Republic;

- the accelerated development of life and other socially meaningful types of insurance;

- the creation of optimal conditions for the development of fair competition in the insurance market, that is linked with the relevant rate reduction of insurance services, insurance products quality input, guaranteeing of clarity and security in the activity of insurance (reassurance) institutions and insurance brokers;

- the step solution of reassurance problems with due consideration of the restricted national insurance and reassurance markets' potential on risk-taking, the volumes of which increase every year;

- the gradual expansion of foreign presence in the insurance market, that will allow using foreign insurers' resources for the reproductive market base development by attracting new service consumers on voluntary types of insurance.

For the purpose of government insurance enterprises' and other professional mar-

ket participants' activity supervision perfection, and also the protection of rights and interests of its subjects it is necessary to: improve the insurance system reliability by means of establishing of standard requirements and norms; provide the insurance services practiced internationally; establish rules, standards and solvency ratios and financial stability on the basis of the accounts composed according to the international standards of price formation for insurance services; promote the insurance campaign's financial recovery including obligatory growth of the capital and the performance of enforcement procedures on its assets management.

For the purpose of more accurate organization and functioning of the obligatory insurance system the following measures are necessary to take:

the stipulation of conditions for the receipt of a license for the right to perform the activity on obligatory types of insurance by insurance enterprises;

the continuation of the work on the pro-forma financial statements perfection;

taking measures on the part of the Government on the organization of state control for the obligatory legislation observation by the insurers.

From our point of view, these measures taking will allow providing the Kazakhstan insurance market development, promoting the competitive power of insurance companies, that is necessary under the conditions of globalization and integration of the insurance market of Kazakhstan into the world's insurance market.

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AUDIT CERTIFICATE CONSTITUTION AND STRUCTURE ACCORDING TO IAS REQUIREMENTS

Khakhonova N.N.

Rostov-on-Don State Economical University

Rostov-on-Don, Russia

The changes taken place in the constitution and contents of the International Audit Standards make the problems of audit certificates preparation topical enough. In the offered article the principle differences of the IAS new reductions requirements from the earlier worked ones are briefly generalized.

The rules of composition of an independent audit certificate on the results of the audit of a full set of general-purpose external financial statements based on the principles and rules providing a just presentation of information are established by the following standards:

the IAS 700R "Independent audit report on general-purpose external financial statements' full set inspection" (adopted instead of the IAS 700 "Audit report (certificate) on financial records");

the IAS 701 "External auditor's report (certificate) modification".

A feature of the IAS 700R standard unlike the IAS 700 one is the fact that it is solely dedicated to the formation of an unqualified opinion. All the questions connected with the audit certificate modification have been included into a separate standard the IAS 701 "External auditor's report (certificate) modification", wherein the statements on the introduction of modifications into the certificate according to the audit results, and for the very expressing the auditor's qualified opinion or adverse opinion and for the disclaimer of opinion, are contained.

According to the point 17 of the IAS 700R the following things are referred to the audit certificate elements: the appellation, addressee, introductory paragraph, management responsibility for the financial reporting delivered, auditor's responsibility, auditor's opinion, another responsibility on reports preparation, auditor's signature, date of the audit certificate (report), auditor's address.

The ***document's appellation*** should clearly indicate what it is; the external auditor's report.

The ***addressee*** of the audit certificate should be defined in accordance with the audit assignment conditions.

The ***introductory paragraph*** should clearly mark the legal body, whose financial accounting was audited, and should contain the announcement that these financial records were subjected to audit. Here it is also necessary to point out:

- the list of all the reporting types, which make the financial accounting;

- the documents, wherein the material provisions of the accounting policy and other explanatory materials are developed'

- the date and the period comprehended by the financial reporting.

The ***management responsibility***. The certificate should contain the announcement that the administration of the Auditee is responsible for the preparation and just financial reporting according to the applied reporting structure. Thereat, unlike the standard's previous reduction the responsibility volume should be discovered and it includes:

- the establishment and maintenance of the internal control appropriate for the preparation and just financial reporting, which doesn't contain essential distortions because of fraudulent activities or errors

- the formation and application of the corresponding accounting policy of the enterprise;

- the creation of tally sheets, which are reasonable under the given circumstances.

The *auditor's responsibility*. In the audit certificate there should be clearly shown that the auditor's responsibility consists in expressing the opinion concerning the financial reporting. In the report (certificate) the auditor should declare that the audit was carried out in accord with the International Audit Standards.

The *auditor's opinion*. The unqualified opinion can be expressed only when the financial reporting gives a true and fair presentation or is presented justly in all the material respects in accordance with the applicable accounting principles. It is also necessary to point out the principles applied.

Other information. In some jurisdictions there could be the requirements to reflect additional points in the audit certificate. These points should be discovered in a separate paragraph after the auditor's opinion.

Another responsibility on reports preparation. By another responsibility the following is meant: the auditor can be given an additional responsibility besides expressing the opinion on the financial report. So, a certificate on certain questions, which turned out to be in the attention focus of the auditor in the course of the audit, can be required, the expressing of the opinion on the adequacy of the tally sheets or the Auditee's internal control system's efficiency, in particular.

Thus, the standard requires: if within the audit certificate on the financial accounting the auditor expresses an opinion on the questions belonging to the sphere of another accounting responsibility, he should develop the diapason of this responsibility in a separate unit of the certificate, it following the paragraph containing the opinion.

The *auditor's signature*. The audit certificate should be signed in the name of the audit firm by the auditor personally or have both signatures depending on the national legislation provisions. The requirement to point out the fact that the auditor is a professional budget officer or the audit firm and/or the auditor have a necessary license can also be foreseen by the last.

The *date of the audit certificate (report)*. The auditor should date the audit certificate not earlier than he receives sufficient competent audit evidences, on the basis of which he can express his opinion on the financial reporting. The sufficient competent audit evidences should include the proofs of the fact that a full set of the financial accounting of an organization has been prepared and authorized persons are responsible for this accounting.

In the point 65 of the IAS 700R the rules of the description of the auditor's using the structure and terminology established in a legislative or normative act or in the national standards of audit of a concrete jurisdiction have been formulated. In this case there is a notation in the certificate that the audit was carried out in the conformity with the IAS and national standards of the audit of a concrete jurisdiction or country, only if the certificate itself contains all the enumerated below elements at least in the minimal volume:

A separate chapter of the new standard develops the requirements to the audit reports (certificates), if the audit was carried out simultaneously on both the IAS and the standards of a separate jurisdiction or country. The point 62 of the Standard points out directly: the auditor can declare that the audit certificate is prepared according to the International Audit Standards only in the case, if the auditor fulfilled all the requirements of the International Standards in the course of the audit.

The audit certificate should be presented in the written form or in the form of a printed document, or in the electronic form.

As a supplement to the IAS 700 standard the Thesis on the International Auditing Practices 1 014 "Audit Report (certificate) on the audit of financial reporting prepared according to the IFRS" was published.

Materials of Conferences

INVESTMENT PROCESS AND ITS PECULIARITIES IN RUSSIA

Matveyev Yu.V., Matveyev K.Yu.
Samara State University of Economics
Samara, Russia

There are a lot of different opinions about the definition of the notion "investment process" in modern economic theory.

F. Sharp gives the following definition: "the investment process is the process of making decisions by investors about securities in which investments were made and about the amount and investment period"[1].

In this case the author reduces the definition of the object of investment (in the frame of securities) and the essence of investment process is accepted as "making decisions by investor". In other words it is a thought process that has a purpose to make investment decision and it's not a comprehensive characteristic of considering category.

Some of the authors consider that the sense of investment process is in the increment of invested capital[2], others identify the investment process with investment activity[3] and the another says that the investment process is a mechanism of transportation of means from somebody who has free money to person who wants to get it only from financial institutes and finance markets. These interpretations of consideration categories don't discover the essence of investment process which shift the accents and constricts the semantic meaning of the notion.

In our opinion we can proceed from a definition that the investment process is a system of ecological, social and economic relations in a frame of expanded reproduction of all elements of national wealth.

Investment base of reproduction was started on a market stage of the development of economics for providing expanded reproduction of commodity production. Because of complicated challenges the investment process is difficult and multifaceted and it has its own specifics and restrictions.

One of the main restrictions is connected with definition of substance of investment relations which imparts them the peculiarity and makes them distinctive. According to system and functional approach this substance, in the opinion of the majority of economists, is a tangible product: the capital value of which moves in different forms and brings an income to the owner and user. A special movement happens - from investor (owner and decision-maker) to subject – user where investment resources are concentrated and then converted into capital investments (costs). In this process increments of capital value begin which transform to additional profit with production and realization of commodities. Investments before resources return to investor as dividends and the rest of the profit enlarges the private means of user (businessman).[4]

Not refusing the traditional approach, in which the notion of investment commodity is connected with the means of production and the category of investment is considered as an equal notion to capital investments, we consider that the investment process includes not only capital investments but also all different types and forms of investments of financial means with a purpose of earning income in the future with simultaneous rejection of usage of these means on current consumption.

Another restriction, which defines the distinguishing content of investment process, is connected with special forms of movement of investment resources between subjects in financial form and in real (natural) form. If the first form is quite clear, the second one demands a specification.[5] In the process of real investment, we believe, capital is invested not only for the creation of capital goods (reproductive capital), but also to increase the amount and quality of human capital (knowledge, health, advanced professional training) and natural capital.

In this way the investment process are full of many economic relations between its parties on the occasion of movement of the investment resources with a purpose of increasing the quality and quantity of economic growth, and investments are a hereditary category of reproduction and saving the capital, category of the basis of postindustrial paradigms (the soci-

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[4] See: Kalashnikov I. Investment system: reproduction aspect//Economist, 2002.№9. P.29. It ought to be remarked that investments in economic theory is connected with accumulated capital (savings) that is its economic essence. Only investing the capital as accumulated value is involved in economic process. This interrelation performs the essence of capital as economic resource destined for investment"/See: Marenkov N.L. Investments. Series "Textbooks of MSU". Rostov-on-Don: "Fenics",2002. P.5-16

[5] For e.g., O.V. Petko writes: "On a microlevel the investments process begins from the moment of investing finance, tangible and labour resources in preparation and realization of the investment projects and finishes by achieving set targets". On a microlevel investment process can be considered as an important form of realization of saving on the public level which provides expanded reproduction of basic capital and current capital". /Prtko O.V. The Problems of refreshing on investment process in Russia./Russian State committee of Fishing industry; Murmansk State Technical University. Murmansk,2001. P. 112

ety based on knowledge), as a condition of making of reproduction process in complicated conditions.

We should notice that the new tendencies in development of investment process are set which influence the formation of the external surroundings for the economy, on the development of national investment processes.

The most important tendencies are: the concentration of investment flows in main directions of world technological development; the growth of in-vestment character of the capital, stipulating the structure of consumption of investments; increasing investments to the human capital; strengthening liquidation function of investments.

In this connection the question about structure of investments is more clear. Evidently that economy exists for human, but humans don't exist for economy. More increments of national wealth are provided owing to use of human capital (table 1).

Table 1. National wealth and structure of capital of the world in the start of the XXI century

Countries	National wealth		Including, due to types of capital, billion dollars			Including, due to types of capital, %		
	Sum total billion dollars	Per head, thousand of dollars	human	natural	reproductible	human	natural	reproductible
World sum total	550	90	365	90	95	66	16	17
Countries of the «seven» and European Union	275	360	215	10	50	78	4	18
Countries of OPEC	95	195	45	35	15	47	37	16
Countries of the Commonwealth of Independent States	80	275	40	30	10	50	38	13
Including Russia	60	400	30	24	6	50	40	10
Other countries	100	30	65	15	20	65	15	20

Source: L.Nesterov, G.Ashirova. National wealth and human capital // questions of economy. 2003. №2. P.103

The main importance of human capital as a main productive force in relation to material capital is explained by constantly augmentation and not expenditure in the process of the adaptation (knowledge, theory, ideas, projects and etc.) in contrast to material capital (physical), which is without these features.

Human capital is formed as a result investments and accumulation by humans of certain stock of health, knowledge, skills, capabilities and motivations which are used in other spheres of public reproduction, which cooperate to growth of the productivity of labour and efficiency of the production.

Human capital in a similar base capital requires its improvement and exposure to physical and moral amortization. The physical amortization of the human capital is influenced by consumed production by humans, the situation of the environment etc. The minimization of the level of the amortization of human capital and the provision of its development possibilities is owed to investment in human, social sphere and socialization of all economic progress.

Thus investment processes can be changed as in structure of the investments but also in organization. There occurs a change of the type of reproduction of forms of the accumulation and representations about criterion of the efficiency of the development of economy. Real accumulation occurs when there are increasing densities of the human capital in structure of the public wealth. At the same time analysis of the investment process in Russian economy showed that the biggest part of the structure of the investments is investments in financial assets, but it's noticed that statistical analysis has not provided the allocation of the part of investments in human capital.

Orientation of the investments is defined firstly by the interest of the investor of the receipt of profit and the possibility of the receipt of profit in other spheres. However until investments, for example, in changing of the property, gives profitability more than innovative business, interest in the redistribution of the property rights will be more than its preservation,

therefore the struggle against «reiderstvo» and appeals for «innovative behavior» will unsuccessful.

The necessity of the orientation to the interests arises in connection to the course of Government of Russian Federation to the modernization of the economy by concentration of resources in the state and controlled by government corporations. Not denying the importance of this concentration of recourses in base directions of modernization and at an active role of government, representatives of the economic science are interested in the following: does the management of these corporations need innovative in business or not? If certain interest is absent then the government is compelled to take the management functions in relation to created corporations, and that finally inevitably leads to loss of the real control for their adaptation to the completed system of the economic relations, which don't derive interest in innovations7.

Therefore, in our opinion, the statement is that the absence of the positive vision of changes to innovation for the decade of current economic growth in Russia is connected not only with economic politics, but also the completed system of the economic relations and its institutional embodiment. Therefore the social systems of the state and state institutes must change (develop).

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ECONOMICS IN THE CONTEXT OF SOCIAL DEVELOPMENT

Osik Yu.I., Aymagambetov E.B.
Karaganda Economic University of Kazpotrebsoyuz

There was different correlation between ethics and economics in different periods of time. In Aristotle philosophy ethics, politics and economics are included in one system. Later in XVIII-th century, in order to please some politicians, moral feelings were disregarded by the model "economic personality". The results of it are the following: firstly, economics and ethics still have been studied separately; secondly, ethical standards and principles are often ignored by economics. This is the way of modern society development.

In general, development is interpreted as the process of regular changing, the transfer from one condition to another more perfect one; the transformation from old qualitative condition to new one, from simple to difficult, from inferior to superior [1]. Social development is qualitative and directed changing.

These features distinguish development from other forms of measuring. There is the opinion that directivity of the development can be ascending, progressive and descending, regressive; both progress and regress is natural. The work [2] is devoted to the speculation of criteria for social progress on the basis of the authors, who admit progress existence, division into three groups.

The first group thinks that social progress is the progress of production, as economic relations are fundamental for any social-economic formation, so the criterion of the progress should be still found in the field of economic relations, production and economic interests of a person.

The second group considers that there are several equitable subsystems in society; each of them has its own criteria of progress. This point of view, occurred in the course of historical materialism in the criticism of vulgar-economic understanding of progress, was also popular in Russian philosophy of the late XX-th century [3]. Above mentioned authors distinguish five criteria for five subsystems, although, according to the point of view of the another philosopher, the author of the discussion [2], using this approach one can find more than fifty criteria. That is why the latter is offered the third point of view: criterion of social progress is the level of people's freedom, living in this society.

Defining freedom as realized necessity, we come to the conclusion, that modern development of society is regress, because up-to-date person is more and more becoming a slave of things – commodities, services, means of communication, advertisement and signs. It prevents us to solve the problem.

We offer to substantiate the fourth point of view consisting in the following, that criterion of the progress should be found in unity and harmony, economics and ethics congruency. The main initial points for this substantiation are cybernetic approach to the research of the complex systems managing theory as the general scientific approach and multilevel interpretative approach to the research of the theoretical economic unity laid in institutional economics. The main assumptions, accepted in this work, are: a) economics is regarded as complex "system in system", consisting from a number of subsystems and being a society subsystem; b) ethical standards and principles are embodied in socio-economic activity of a person through the organizational culture.

Let's examine the economics managing from the position of general, cybernetic approach as the managing of complex open systems. R.F.Abdeev in the work [4] offered a mechanism with double-outline feedback for illustration of the process (fig. 1): outline, responsible for dynamics, development, adaptation to the changeable environment, is represented as managing of economics through formal institutions (economic regulation outline). The second outline, responsible for stability, the system integrity, its long-

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7 D.Sorokin. Reproduction sector of the Russian economy: 1990-2007 years // Questions of economy. 2008. №4. P.105, 106.

term existence, is represented as self managing of economics through informal institutions (economics self regulation outline). The double-outline generalized mechanism of managing is offered for social managing mechanism interpretation owing to the fact that complex system regulation is impossible without self regulation, managing – without self managing.
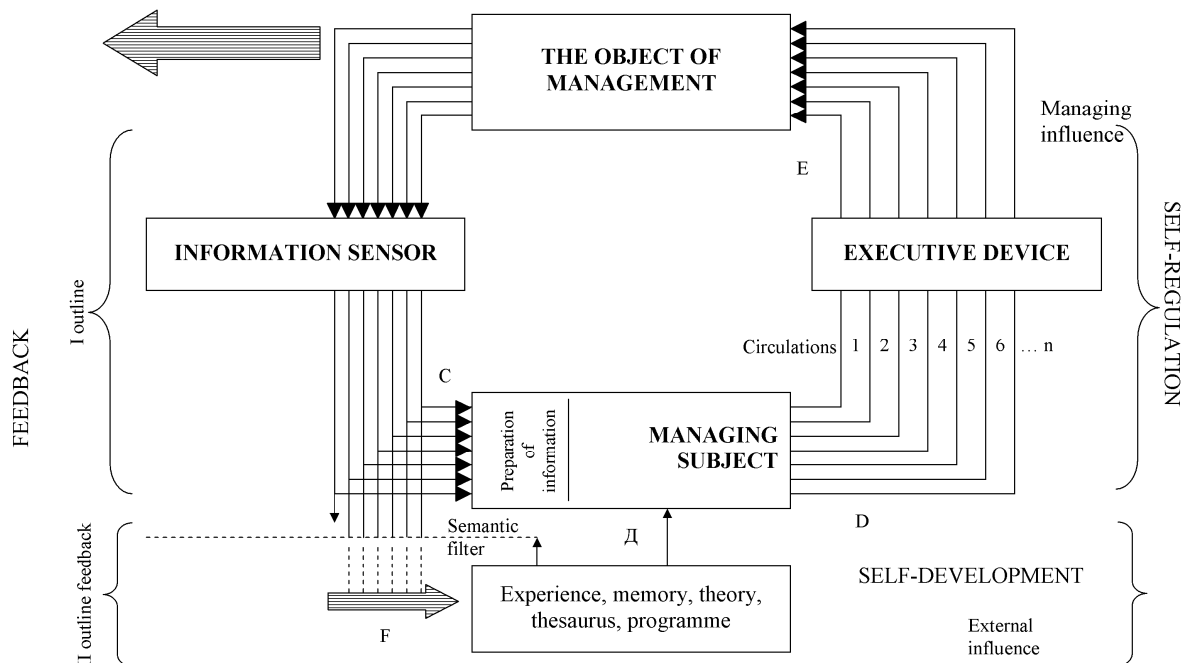
Fig. 1. Generalized mechanism model for self-organizing system-generalized model of management mechanism

We consider that the outline, responsible for dynamics, development of social-economic system is economics, and the outline, responsible for stability, integrity of the system is ethics. In this case the development is represented as harmonic combination, ethics and economics unity.

Taking into account the works of foreign and Kazakhstan researchers (U.J.Aliev, R.E.Elemesov, Ju.M.Osipov and some others) about terminology and the economic science subject , and the fact that manifestation of ethical standards and principles in practice of social-economic systems functioning is shown via the organizational culture, we offer the continuum of ascending from abstract economics to economic system (fig. 2). National economy is represented as the system in the conditions of the specific state managing in the continuation. National economy represents the system not only managed by the state, but also self regulated by the specific national organizational culture.

Thus, practical ethics is reflected in economic activity via organizational culture, and its interior layers and heart – values – form ethical standards and principles.

The moving forces and trends of social-economic development in modern conditions dictate the necessity of its examining as the stream. In the stream of social-economic activity on the base of interpretative institutional economics (IIE) V.Efremov marks out the following four levels in the descending sequence: cognitive, institutional, organizational and resource-technological [5].

Upon the description the analyses subject and the research goals correspondence to each level of social-economic activity, given by V.Efimov, we made up flow diagrams of the levels research in the frame of descending and ascending connections. (fig. 3-4). Three types of search goals are seen from the pictures: result (what happens?), mechanism (how does it happen?), evolution (why does it happen?). If the researcher is primarily interested in the result of economic activity in one or another period of time, the primary attention should be paid to the resource-technological level. If he is interested in the activity mechanism, working in the proper period of time, his attention should be concentrated on institutional and organizational levels. In case if the research worker is interested in economic activity mechanism changes, the attention should be focused on institutional and cognitive levels [5, p. 63]. In order to answer the following questions "Why in the specific national economics do not work or work with great reservations abstract economic laws? Why do different countries with the same economic system achieve absolutely different results in social-economic activity?" the division into levels and specific goals statement for each level is need. But the operated research methods application in modern economics doesn't allow to get satisfying answer.

property economics microeconomics command economics

variety of national economics

producing forces mesoeconomics mixed economics

macroeconomics

production relations

| Economics | *Structure formation* | Economic system | *Government regulation (formal institutions)* | Social economic system | *Social regulating (informal institutions)* | National economy |

Nominative science sphere.

Realistic science sphere

Fig. 2. Continuous ascending scheme from economics to national economic system taking into account the feed-back

The purposes of research **The levels of social-economic activity** **Actions**

Changes in mechanism of economic activity - - - - - - beliefs

problems, which the actors* have by applying the rules can cause changes in their beliefs

The activity mechanism, working during the particular period of time - - - - - rules

Using the power, the actors* try to change the rules in their favour

power

Signals to the actors*, which help them to correct their decisions, showing their power

The current result of economic activity - - - - - - Resources and technologies

Fig. 3. The ascending connections between levels of social- economic reality
*Participant of social-economic activity

The purposes of research	The levels of social-economic activity	Actions

Changes in the mechanism of economic activity ------- beliefs

Rules determination

rules

Power relations realization between the actors

Activity mechanism, working for some time

power

Resource technological flow- production control

current result of economic activity ------- Resources and technologies
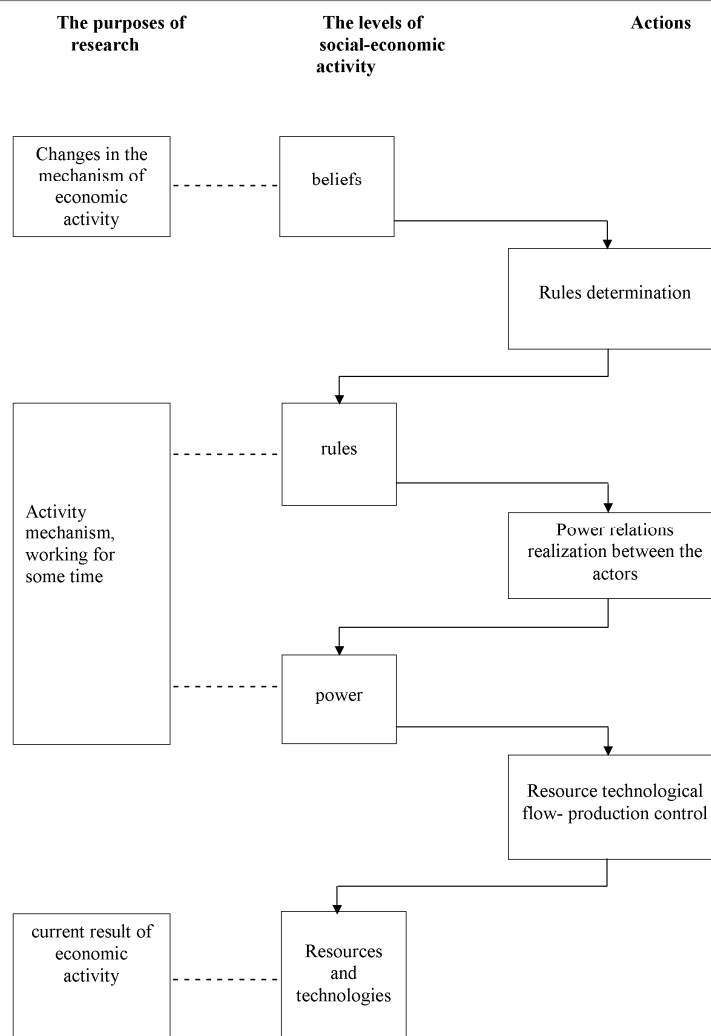
Fig. 4. The descending connections between levels of social- economic reality

Practical usage of IIE can be demonstrated on the analysis of the free trade theory by A.Smith. Created for the proper historic conditions –England in the second part of the XVIII-th century, domination of handmade manufacturing without equipment – and spread on the whole economics, won in the conflict of simplicity and complexity, and according to O.I. Ananyev theory "the economic science is developing as the theoretical science, which is oriented on the ideals and natural science norms" [6, 361].

At the same time the ideas of free entrepreneur activity in the economic liberalism conception by A.Smith which proved the necessity of feudal rules liquidation with the inherent relationship of personal dependence were turned into the idea of the free trade without connection with concrete historical and social-economic conditions by the followers of the scientist.

According to the conception "invisible hands of competition", the market mechanism without any state interference in economics can be ensured for the combination of private and public interests and on the basis of it may have the most effective development of economics. But the author of this conception was very cautious about it.

Firstly, A.Smith had written that if the market can't do anything in the sphere of management it must be done by the state.

Secondly, the author marked "two incidents, when on the basis of general rule, it's beneficial to regulate foreign industry in the purpose of encouragement the native one. The first example is true when separate branch of industry is necessary for defense of the country". The second one when the native country products are taxable in order to encourage home industry [7, 449-451].

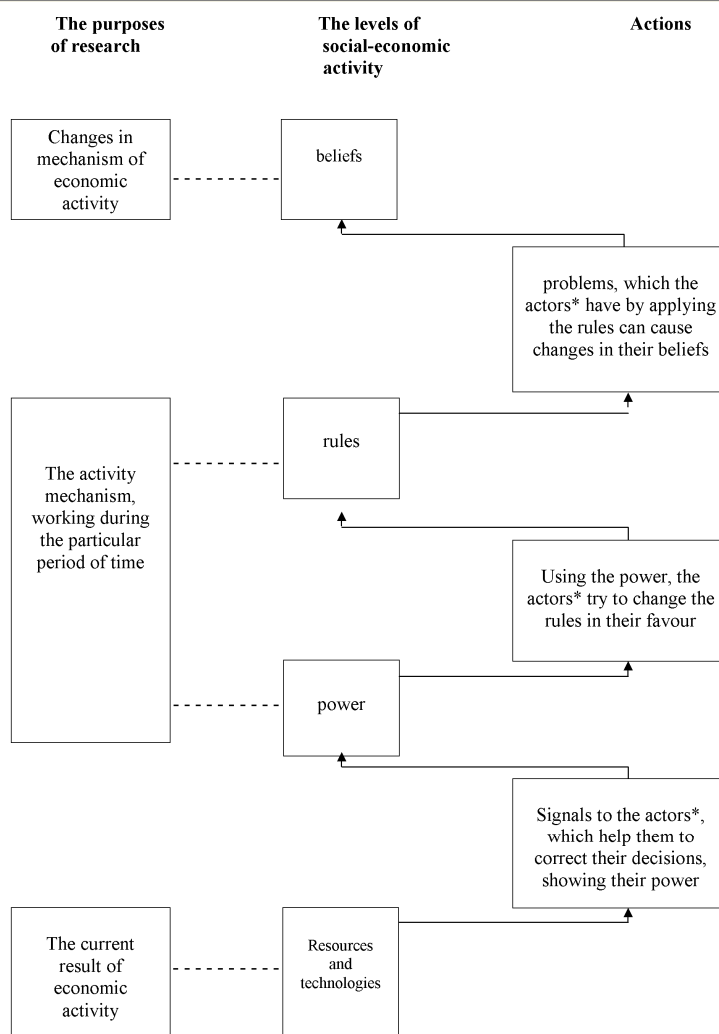A.Smith considered in his work "Navigational act" from the position of interpretive institutional economics two levels can be picked out. On the resource – technological and organizational level there are several negative consequences (shortening of foreign trade in definite period of time; decrease of firms' income, satisfaction of people with the consumer goods and at least military action against England).

But at the institutional level it is seen the positive role of England economic development: evaluation of own trade fleet, development of Holland monopoly on the sea that at least depends on the economic dependence and increase of England politic influence.

In conclusion, this gives us the notion of 3 different economic theories – classic, neoclassic, institutional and all of them interconnected in one subject, it is theoretical economics which is also correlated with the practice of managing activity.

In other words, interpretative institutional economics discovers the connection of abstract economics ("definite persons, who is free, without any restrictions in their relations and satisfied with the opportunity to follow their own interests due to the natural inclinations" [8, 149]) through the economic system ("system of such human societies private economics which can't be disturbed by state power, war and other activities in the sphere of trade" [8, 149]), and national economic system (which makes the common state politic organism [9]), with the national economic system [10-13], integrity of which is provided for informal institutes.

IIE lets answer the question, "what kind of aids influence on the achievement of solvent level and present power, and in consequences of what causes the country was deprived on everything" [8, 150]. The comparative analyses let do the following conclusion, that economics devotes to the resource – technological level, economic system to the organization one, national economic system to the institutional, national managing system concerns to the cognitive levels (fig. 5).
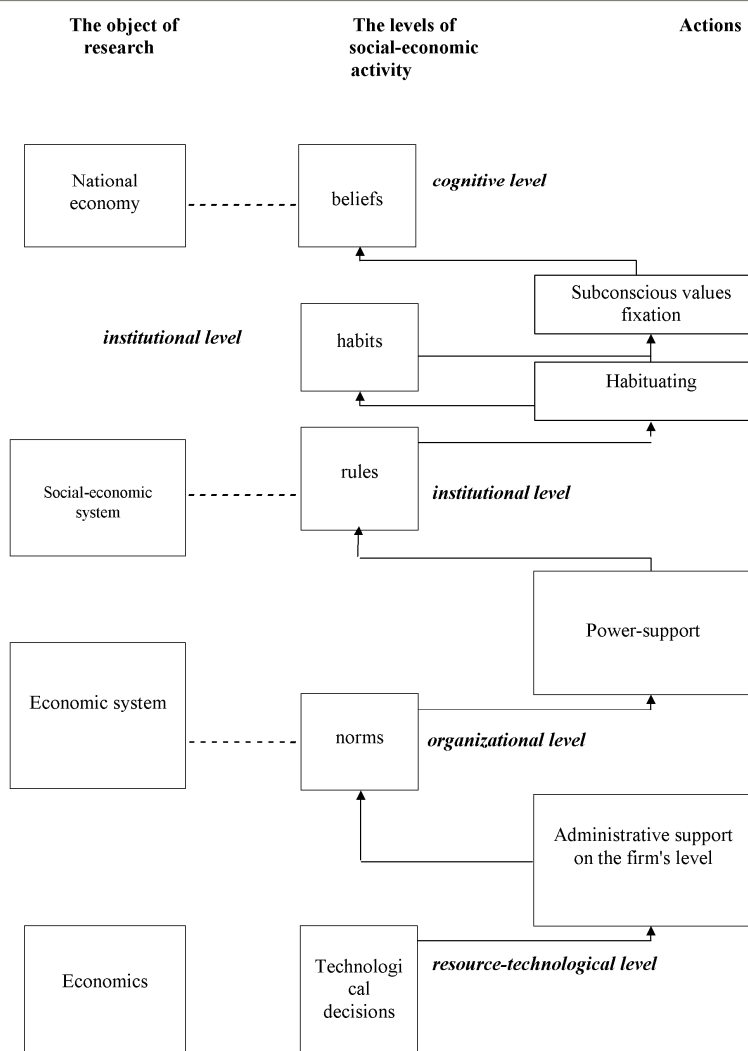
Fig. 5. National economic system formation concerning economic theory

In the picture you can see that if the notion "rule of game" in it's meaning is spread on all these levels from the abstract non-structured environment, where the social – economic activity is going on in the absence of any institutes, the norms will be equal to the organizational level, rules and habits to the institutional level and belief will be equal to the cognitive one.

So, our research is directed to the confirmation of opinion, that ethics is the main part of economics and the interpretative institutional economics shows its place in the stream of economic activity – the cognitive level of social–economic one.

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FOUNDATIONS OF ECONOMIC THEORY
Ziganshin G.Z.
Kazan State Energy University
Kazan, Russia

People have been concerning making a lot of goods necessary for their life maintenance for ages. Little by little for miscellaneous goods exchange there appeared money and the idea of "Economy", and even the science of "Economics" was formed. It is common knowledge that it is one of the most ancient sciences. It had always been attracting scientists and educated people. It is explained by the fact that studying economics – is the realization of the objective necessity of learning people's motives, activity in their business operations, management laws at all times – from Aristotle and Xenophon up to this day. It is interesting to remember that in XIX century Pushkin A.S., who Tsar Nikolay I charged to think over the youth upbringing principles, first of all spoke against family education, and among obligatory sciences to study mentioned political economics. At the end of XIX century in his book "Foundations of Political Economics" Bunge V.N. noted that there was no political economics in those nations, who were at the lower step of the pan-human development. Today the interest of educated people in economic theory (political economics) grows more and more. It is explained by those global changes, which take place in the whole world and especially in Russia. An outstanding American scientist Samuelson P. called economic theory the Queen of Sciences. The Nobel Prizewinner Freedman M. wrote that economics –was a charming science, it was amazing because its fundamental principles were very simple, they could be written in one piece of paper, though they understood by few. The difficulty of this science reflecting the multiform world of economy is in the fact that its study requires, according to the words of a well known specialist in the economic idea history Heilenbronner A., "the stamina of a camel and patience of a saint" from the reader. The graduates of higher educational institutions in modern conditions must be able to show discrimination in a broad spectrum of economic issues, evaluate conservative and positive tendencies of social evolution to define their position in the changes taking place independently, be ready for practical activities and have a certain world outlook. A range of academic disciplines including economics is called up to solve this problem. Samuelson P. wrote in his textbook "Economics" known all over the world that the human having not studied the economic theory regularly was like a deaf man trying to value a piece of music.

Many hundreds years ago philosophers noticed that the economics of separate countries and even the world's economics develop in cycles. Much later economists got interested in the economic cycles. But the economic development cyclicity nature remained unknown up to the present time. As our research showed, there was a lack of methods and techniques to investigate economic processes. Thus, one should get interested not in the cyclicity problems in economics, but develop a theory of economics. The significance of the theory consists not in the fact that it is a set of ready recommendations applied immediately in business practices and policy, but in the fact that it serves, according to Keynes J., an intellectual instrument, thinking technique, helps the one, who knows it, come to the right summaries and conclusions. Thereat, the unreasonable theorizing is undesirable as well, as it is useless. An English economist Litte I. figuratively called such scientists "non-economists" and fairly took up the position that the "non-economists" are usually too much academic, they separate themselves from the real world extremely hard. A severe crisis of all the life sides of our society could not help being re-

flected on the modern state of the economic science of Russia. The economic science crisis as a private form of the general crisis manifestation is natural, for economics is the reflection of the economic idea; one can notice that it is the economic processes that served powerful impetuses for the economic theory development in the past. So, the theory of economics of Marshall A. appeared and got wide spread as a result of the crisis of 1872 and the following 20 years' depression, Keynesianism – after the crisis of 1829-1933 and the following depression, monetarism – after the crisis events of 1960-70-s, etc.

The inconsistency of the sights developed in the economic theory and representations about the world, the modern economic idea crisis – are not local phenomena (peculiar to the Russian economic theories only), but a universal tendency of XX century and the West. So, J. Galbraith wrote: "Economics, remaining in the narrow framework of the market micro- and macro- analysis, ceases to be a science and turns into a conservatively used system of beliefs pretending to be a science ". Russian scientists Kondratyev N.D., Vernadsky V.I., Bogdanov A.A., Slustky Ye.Ye., Gumilev L.N. and others also proved the necessity to review our idea of the world in their works.

Some scientists blame Marxism in dogmatism. However, we can't help admitting that Marxism – is significant stage in the economic theory development. Samuelson P. especially marks out only three eminent thinkers having had a defining effect on the economic theory development in the history of the economic idea: A. Smith, K. Marx, J. M. Keynes. Another prominent American scientist J. Galbraith considered that Marx's doctrine is too important to be entirely given to Marxists. J. Schumpeter also referred Marx to great scientists, and it didn't prevent him from criticizing Marxism. At the beginning of XX century the doctrine of K. Marx was subjected to criticism in the works of Russian economists (Tulgan-Baranovsky, Rubin, Zheleznov and others, for example).

There is no escape from noticing that the accumulation of dogmas represents an unavoidable phenomenon in any science. Thus, the theory of conditioned reflexes of Pavlov I.P. was seen as a cure-all, the pick of this absolutization falling on the 50-s of XX century. A dogma – is a useless reality. What was the truth at one stage of the human thought course in the cognitive process, gets treated as an absolute at another one, becomes an axiom with a stark content and is already useless. But life is changing, and our ideas of life can't help changing as well, and then a need for new concepts, new approaches and new paradigm requiring changing the social thought course itself arises. The new theory appears as an immediate response to the crisis. (All the references before and after the paragraph ate taken from the mentioned textbook).

The majority of scientists and experts see an outlet from the present-day socio-economic crisis of Russia in the transition to the market economy focused on the people's growth in prosperity, in the abandonment of the closed economy and its substitution with the open one, which received the development in the USA, Japan, some countries in the West and other countries. That is why our searches in the passing rich world's experience in teaching the economic theory are quite natural. Thereat, certainly, one shouldn't blindly copy the achievements of western scientists. If to estimate the western economic science as a whole, it is impossible to be unconscious of its being pretty much mathematized and asocial, overloaded with diagrams. It can lead to the risk of too much formalization and devolution of the economic theory as an objective science, whereat the attention of the world's scientific community was directed again and again. The default of the present theory lasted for this long. At the same time one should begin comprehending. For example, economy (Greek oikonomike, from oikos = dwelling + nomos = law) – is 1) an aggregate of production relations at a certain stage of development of the society; 2) the economy of the country, region, district, any enterprise, etc. That was lack to build the present theory of economy (noneconomic theory) – it is much. (Further is ours).

Over the years after the invention of a nomogram and creation of automatic control systems (ACS) theory within the space of 30 years, i.e. after getting some results, gradually it became clear that **the material production theory backbone is flows, the basis of process mathematical models – is flow balance equations in processes, and even the source of music is sound. Processes are primary, and theories describing them are secondary.**

Let us remember the role of mathematics in building of theories. Still E. Fermi wrote about the topicality of physical processes modeling: "In magnetohydrodynamics it is possible to make such a mistake, that you shouldn't believe the result of long and complex mathematical manipulations, if it is impossible to understand its physical sense, at the same time one mustn't rely upon a long and composite chain of physical arguments, if it is impossible to illustrate it mathematically". But to use mathematics conditions are also required. Before our publications [1] **there was no even scheme of enterprises' current assets circulation in the correspondences of accounting records, there was no scheme of monetarized and monetary flows circulation between primary market segments, mathematical models of controlled production processes were required.** To develop a theory of economy the models of association of the flows and control means were needed. Potential conditions for this are the combination of the three professions: "Business accounting", "Computer-aided manufacturing" and "Mathematic simulation of operating procedures" [2]. An overwhelming surprising by the total absence of any flows and a scheme of enterprises' current assets circulation in the correspon-

dences of accounting records has become an impulse for this. Our works differ both from foreign and Russian ones with the fact that the abovementioned combination of the three professions is the educational starting point in them. Besides, they have been begun with the invention of a **nomogram** (nomogram - from Greek nomos = law + gramma = theoretical or empirical dependences graphic presentation simplifying practical computations) for the closed-loop feedback systems and **immediate production of control means** of operating procedures for the first time in the world's science. Using the nomogram for the ACS in developing the economic theory resulted in understanding *economy as a closed-loop feedback system* and put a stop to concoction of different variants of the economic theory [3].

It is important to remember that the word "Economics" in English was rendered into Russian as economy, economic theory and political economics. But from the same dictionaries it follows: (from Latin Liquidus = free of debts) – 1) financial, readily mar-ketable, shiftable into cash (for example, liquid funds); 2) monetary assets; 3) efficiency, promotability – this is already the word management. With this comprehension it turns out that *Economy = liquid estate property + monetary assets + management.*

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Materials of Conference

RESEARCH OF ANTIHYPOXIC ACTIVITY OF BENZOTHIAZOLE DERIVATIVES

Tsublova E.G.[1], Nosko T.N.[2], Arbaeva M.V.[3]

[1] *Bryansk state engineering-technological academy, Bryansk, Russia*

[2] *N.M. Emanuel Institute of Biochemical Physics of Russian Academy of Science, Moscow, Russia*

[3] *Bryansk city polyclinic №4, Bryansk, Russia*

Tests were spent on white nondescript mice-male in weight 20-24 g.

Amino- and ethoxyderivatives of benzothiazole with laboratory names ABTI, EBTI and EABTI have been chosen for a research. Shown actions of compounds were compared to a reference substance (amthizole succinate). Test compounds were administered intraperitoneally in doses of 0.5-5 mg/kg, a reference substance in doses of 10-50 mg/kg. Antihypoxic activity of compounds was estimated on models acute hypoxia (hemic, histotoxic and normobaric hypoxia and hypercapnia) according to the Guidelines of experimental pre-clinical studies of new pharmacological compounds (under the editorship V.P.Fisenko, 2000).

As a result of done tests it is established, that on model of acute hemic hypoxia significant ($p < 0,05$) increase in lifetime of laboratory animals was observed under influence of compounds with name ABTI-1 (in a dose of 1 mg/kg) and EABTI-A1 (in a dose of 0.5 mg/kg). The positive effect was 27 and 9 % accordingly in comparison with the control. The reference substance (amthizole succinate) in the noted conditions of test in doses of 10 and 25 mg/kg did not show distinct antihypoxic action, but in a dose of 50 mg/kg significantly increased lifetime of mice by 28 % ($p < 0,05$). In conditions of acute histotoxic hypoxia compounds EBTI-3 and EABTI-A1 were effective. When administered EBTI-3 in a dose of 1 mg/kg lifetime of mice increased in 13 % in comparison with the control, when administered EABTI-A1 in a dose of 5 mg/kg increased in 25 %. Amthizole succinate in the noted conditions of test significantly ($p < 0,05$) increased lifetime of mice in following doses: 25 mg/kg (in 31 %) and 50 mg/kg (in 34 %). Among the test compounds in conditions of acute normobaric hypoxic hypoxia and hypercapnia increase of lifetime of mice was observed when administered compounds with name ABTI-3 in a dose of 0,5 mg/kg and EABTI-A1 in doses of 0,5 and 5 mg/kg. Thus laboratory animals lived longer animals of control group in 15, 33 and 26 %. Positive action of a reference substance (amthizole succinate) on this model acute hipoxia when administered in doses 25 and 50 mg/kg was 17 and 19 % accordingly compared with control values.

Thus, on the basis of the carried out researches it is established, that among the test benzothiazole derivatives the greatest positive effect in the noted conditions of test was at EABTI-A1. The value shown antihypoxic actions is comparable, and in some cases exceeds (on model acute normobaric hipoxia and hypercapnia) those of a reference substance known antihypoxant (amthizole succinate).

Materials of Conferences

SOME ASPECTS OF MODEL OF PSYCHOLOGIC-PEDAGOGICAL SUPPORT OF PERSONALLY-PROFESSIONAL SELF-DETERMINATION THE STUDENTS OF AGROENGINEER HIGH SCHOOLS

Chudnova O.A., Shevchenko S.V.
Stavropol state agrarian University
Stavropol, Russia

Transition of higher education to a paradigm « formation during all life » is characterized by its strengthening of students orientations. The modern higher education is called to work on the future and by virtue of this mission should advance system of the requirements shown « here and now ». « Formation for employment should not be considered in isolation from formation for education of the citizen, from necessity of development of the person and formation of the public responsibility », – is spoken in the materials, the results of project TUNING devoted to the description.

Now sharply there is a problem of creation of conditions in educational system of high school for successful personally-professional self-determination of students. However the system of modern higher education does not put a special problem in formation and development in students of ability to predict the life, to find unique senses of the ability to live.

Traditional both habitual valuable norms and stereotypes cannot serve in conditions of dynamically changing realities of the modern world a reference point for the developing person putting significant efforts for search of the vital way. For realization so a challenge it is necessary to form special valuable-semantic installations by a life, to the experience, to build the personal position dictating need for judgement eventual of some the past and the future.

Self-determination of the student rather independent stage of socialization, which essence consists in formation at the individual of comprehension of the purpose and meaning of the life, readiness for independent ability to live on the basis of correlation of the desires, cash qualities, opportunities and the requirements shown to them from associates.

Despite of a significant amount of the works, devoted questions of professional self-determination, unresolved still have questions both on essence, and on interrelation of social and actually professional components of self-determination.

Becomes development of special methods obvious necessity and ways of psychological support and support of a developing person which would create conditions for development of ability to predict and comprehend the subsequent stages of the life and to form a professional image I.

The important condition of success of personally-professional self-determination at all grade levels, in our opinion, can become psychologic- pedagogical support of personally-professional self-determination of students in high school. Considering, that each student has individual vital problems, the opportunities of development, object of psychologic-pedagogical support of educational process in high school should become internal potential of the future expert.

It is represented to us, that the purpose of psychologic-pedagogical support of personally-professional self-determination of students is actualization and development of individually-psychological potential, satisfaction of need for social and professional self-determination, formation of socially-professional installations, motives, attitudes, the valuable orientations initiating processes of self-development of the person of the future experts.

In our opinion, psychologic-pedagogical support of educational process in high school can be considered as the combinatory technology including as psychological aspect:

- diagnostics of an initial level and dynamics of professional education of students; revealing of character and features of professional installations, expectations, intentions, interests, preferences and values, and also personal opportunities of students;

- the help in development of is professional-personal potential;

- psychological support in overcoming difficulties of independent designing activity and behaviour;

- consultation concerning ability to live;

- assistance in professional self-determination.

As pedagogical aspect psychologic-pedagogical support includes:

- creation of the humanistic educational space directed on integration of attitudes of all subjects of education;

- aesthetisation of spheres and environments of training and education;

- the account of all elements of educational space, including creation highly organized student's and pedagogical community, optimization of professional partnership of students, teachers and other subjects of teaching and educational process;

- methodical maintenance of educational process.

Realization of psychologic-pedagogical support of educational process is possible at presence of the complex program, in which basis of designing the basic stages (initial, the basic, final) vocational training and education of students in high school can be put. Problems of the initial stage of professional education are: the adaptation of first-year students to conditions and the maintenance of educational process, a place and roles in the general structure of this process; mastering of organizational norms and traditions; inclusion in system of interpersonal communications

and attitudes; formation and development of skills of the independent organization of education-cognitive activity.

The decision of these problems assumes use of following means and ways of psychologic-pedagogical support of the initial stage of professional education of students:

1) diagnostics of readiness for education-cognitive activity, motives of the doctrine, valuable orientations, socially-psychological and professional installations, interests, preferences of the person;

2) help in development of educational skills and mastering by technics of self-control, development of forecasts of development of is professional-personal potential of students;

3) psychological support of first-year students in overcoming difficulties of an independent life and an establishment of harmonious mutual relations with classmates and teachers;

4) consultation of the first-year students who are experiencing difficulties and a problem in professional self-determination;

5) assistance in professional self-determination, a choice of new means of strengthening of positive motivation to the future trade;

6) orientation of students to cooperation, their inclusion in parity dialogue.

Allocating the basic postulates of the theory of support, such as necessity of system support, on positive internal potential of development of the student, interaction instead of influence, it is necessary to note its continuous character, a support, that the system of complex support of educational process is while at a stage of becoming.

Despite of it, it is possible to allocate the general invariant attributes:

- the general understanding of support as special kind of the help in search of ways of the sanction of the actual contradictions meeting at the organization of educational process;

- comprehension of necessity of the complex approach provided by command work of experts of various structures: psychologists, teachers, social teachers and medical workers;

- a generality of use of a fundamental method of support in unity of diagnostics, information search, planning, consultation and the primary help in realization of plans;

- understanding of necessity of work in close communication with practical activities of educational establishment;

- presence of base elements of a network: activity of curators, services of support, territorial different types the centers, coordination and methodical services of system.

Introduction of the term "support" does not grow out research experiment-linguistic, its replacement classical – the help, support or maintenance – not to the full reflects an essence of the phenomenon.

It is a question not of any form of the help, especially about maintenance, and about such support, in which basis preservation of a maximum of freedom and the responsibility of the subject for the decision of an actual problem lays.

Priority directions of psychological support in high school are:

1. the help to the student at a stage of adaptation to process of high school training and to new conditions of a life.

2. the help to the student in overcoming problems in training and dialogue with contempoparies.

3. the help to the student in the decision of complex social and emotional problems of development.

The model of complex psychological support promotes activization of potential of development and self-development of the subject of vocational training and sets opportunities of its personal self-realization.

THE USE OF APHORISTIC POSSIBILITIES AS THE ALTERNATIVE KIND OF MEANS OF THE PEDAGOGICAL PROCESS

Dushina Ye.V.
Irkutsk State University
Irkutsk, Russia

The search and use of alternative means of pedagogical process is one of the phenomenon of the modern pedagogical reality. Alternative means allow us to influence management, organization and efficiency of the pedagogical process as well as the creation and development of its unities more effectively, influence the relations, taking place and appearing in the pedagogical process, and on the whole, humanize the process of education and upbringing.

As the non-conventional means, helping us use humanitarian knowledge in the pedagogical process, we consider *aphoristics* – genre of oratorical art, with *the aphorism* as *its unity taken from the fiction, characterized by authorship, laconism (in one sentence), common value, originality of the expression and content.*

"Aphorism is a carved thought" (V.V. Malyavin), which does not contradict but confirm, does not refer someone to other thoughts, but direct to the sense, which is in itself. That is why with some time aphorisms do not become out of date, but gain more value, becoming centers of the thoughts of the society, capacious form of the thought of the society as the reflection of the reality and the reflection of the author's attitude to it through the aphorism.

The ideas of studying aphorisms from the point of view of pedagogics appeared quite long ago. Pedagogue- linguists B.B. Komarivskij and I.M. Kantor named them among other lexical expressive means, serving for and enriching pedagogics. Many linguists paid their attention to the initially didactical character of aphorisms (A.S. Aksamotiv, N.M. Gribachev, V.V. Malyavin, S.G. Spirkin, I.P. Sharapov, L. Uspenskij, N.T. Fedorenko and others), this idea is also proved in the encyclopedias.

At the present state the number of the researches, devoted to the studying of aphoristic possibilities as alternative means of pedagogical process is not large. The investigations are aimed at the studying of aphoristic possibilities as alternative means, helping: train and improve the quality of the future teachers preparation (M.S. Kobzeva, N.A. Gorbachev); deeper understanding of the professional lexics while reading special (equal pedagogical) literature (V.A. Ivanov and A.A. Pushkin); retrospection of philospho-pedagogical and pedagogical expressions (R.M. Ganiev and O.R. Archegova); pedagogical heuristic activity (V.N. Sokolov); upbringing and education of the personality of the child (Z.B. Tzallagova). Each investigation itself represent a new list in the studying of the aphoristic possibilities as the means of education and help us point out its perspectives in the term of its use in different pedagogical and psychological technologies. In such a way, in school of Wisdom (school № 5, Shelechov, Irkutsk region, Russia) experimental work connected with the examination of the model of the technology of pupil personality formation takes place, which is able to build up one's life according to the laws of Truth, Good and Beauty with the help of the "value-sense" field of aphoristics "Truth. Good. Beauty".

In our investigation we worked out the author's version of the teacher's activity to form interest to the pedagogical science among future teachers. As the means we choose pedagogical aphoristics of Konstnatin Dmitrievich Ushinskij. As the result of this investigation the "Program of forming interest to the pedagogical science among students-future teachers with the help of pedagogical aphoristics of Konstnatin Dmitrievich Ushinskij" has been developed. The content of the Program include pedagogical aphorisms of K. D. Ushinskij. The use of pedagogical aphorisms of K. D. Ushinskij allowed us to create the activity of the teacher in such a way that forming interest to the pedagogical science among students is achieved through the development and accumulation of pedagogical knowledge, working out beliefs in the rightness of actions, increasing ability of the rational realization of the professional pedagogical activity through the constantly appearing of the creative aspiration to new things, phenomena, etc. Besides that, pedagogical aphorisms of K. D. Ushinskij, due to its energetically compacted sense of the content, contribute to strengthening of assuredness among future teachers in the rightness of the choice and ability to develop pedagogical skills, in their maturity to get new pedagogical knowledge independently. That was proved by our investigation.

Today we may state the fact that the use of aphoristics and its creative possibilities allow us to consider it as the effective, non-conventional means of the pedagogical process, which is able to influence the formation of the person and his or her qualities and to help to direct the activity of the teachers and pupils on the basis of pedagogic and psychology creative.

PROBLEMS OF PATRIOTIC EDUCATION IN RECENT TIMES

Levanova Ye.A., Seryakova S.B., Pushkareva T.V.
Moscow State Pedagogical University
Moscow, Russia

Deep politico-social and economical changes taking place at the turn of XX-XXI centuries in Russia influenced radically on the society development in economical, cultural, legal and civil aspects. The changes occurred in the country require the search for a new content, new ways of formation of a citizen able to find himself in this world.

The problems of patriotic education at the present stage are acquiring a special importance. As the basic tendencies creating necessary foundations for the patriotic education perfection in conditions of the Russian society being renovated the following directions are marked out: social life democratization; civil society becoming, striving to Russian citizens' social protection guarantee; priority of national rebirth idea; facing regional and features; influence of the international culture on the formation of a citizen; intensification of attention to positive experience of training a patriot in the history of native pedagogical idea, etc.

The concept content of "patriotism" includes the following components: love to Motherland, native places, native tongue, respect to the past of one's Motherland, traditions and customs of one's people, knowledge of Motherland history, understanding problems facing the country and the ties of patriotism; respect to other peoples, their customs and culture, intolerance to racial and nationalist enmity, striving to provide honour and dignity of Motherland, respect to the army and readiness to defend Motherland; readiness to serve Motherland interests, active and conscious participation in labour activity at the combination of personal and social interests.

Patriotic education has historical roots. In spite of the ideological hesitations the patriot formation problem remains relatively stable in any nation.

Moreover, many educational work forms connected with the formation of a patriot are coming back to practice already and being transformed into more concrete forms of work in the new conditions.

And now it is topical to prevent the discontinuity of moral and ethical bonds between the elder and the younger in the process of patriotic and civil becoming of the new generation.

The problem of patriotism had been the subject of constant attention for the period of the whole centuries-long history of the native pedagogical idea. A great spiritual potential of the patriotic topic finds its origin in the written and oral creations of Ancient Russia. This topic created by generations of our compatriots was developed as a whole complex of ideas rendering moral and organizing influence on the social life of the Russian Nation. It was interpreted as follows: the idea of Fatherland unity and concord, the idea of dear land defence, the idea of Homeland, the idea of moral obligation before the society, the idea of liability for Motherland destinies. It conditioned its special place in the spiritual life of the Russian society.

The present-day situation of the Russian society development is evaluated as a recessionary one, that is connected, in terms of the younger generation education, with the loss of moral orienting points. Under the circumstances the appeal to the idea of patriotism can become that very axiological foundation, whereon the formation and development of the personality of a Russian citizen is really possible. But to achieve the intended effect – the formation of the personality of a Russian citizen and patriot – it is necessary to eliminate primary causes of schoolchildren's depatriotization and create conditions for the development of a new system of patriotic education.

The formation of a patriot, patriotic qualities, as a possible purpose of education has a range of advantages on the following directions:

- patriotic education has historical roots. In spite of the ideological hesitations the patriot formation problem remains relatively stable in any nation. Moreover, many educational work forms connected with the formation of a patriot characterized by an aggregate of socially meaningful purposes are coming back to practice already and being transformed into more concrete forms of work in the new conditions;

- the idea of patriotism, social importance of patriotic qualities, remains one of the foundational ones for any state, it is also a part of the international community foundation, as people are united not only by the love for their native country, but by panhuman and common values;

- the idea of patriotism should be perceived as a non-national idea also, for there are practically no states in the world with a hundred-per-cent mononational population. All this means that the idea of "patriot" in this case appears as sort of a cementing force, warrantor of oneness and power of the state, protection criterion of the personality itself.

Several determinations and comprehensions are frequently used today: patriotic education, patriotic qualities formation, patriotic activity. By patriotic education we mean a specially organized purposeful process of formation of stable patriotic qualities characterizing the personality of a school child as the subject of moral and political, economic intercourses in the national public education. The formation of patriotic qualities – is a process and, to some extent, the result of patriotic education, whereby the development of personality's stable peculiar features aimed at the definition of its relations with the state and society, definition of its place within the system of these relations, occur.

DYNAMICS OF INNOVATIONAL PREPARATION OF BACHELORS AND MASTERS OF ARRANGEMENT OF A NATURE AND PROTECTION OF AN ENVIRONMENT

Mazurkin P.M.
Mari state technical university
Yoshkar-Ola, Russia

Manage should not ideology, and thought
D.Gelbrajt

In comparison with Bologna process, proceeding from a principle "Overtake, not catching up" in addition to six key positions (two-cyclic training, introduction of credit system, quality surveillance of education, expansion of mobility, maintenance of employment and maintenance of appeal of a multilevel education system) from the Russian side is necessary for taking into account the seventh strategy is a maintenance of innovations on the part of graduates of technical universities at a level of world novelty, that is with reception of patents for inventions as rights on the intellectual property received during multilevel preparation.

The retrospective analysis of innovational activity has allowed is realized to be prepared to planned in Russia with 2008 for 2020 to transition for innovational economy. The beginning productive inventive activity in Mari Polytechnical Institute - Mari State Technical University is 1975 (tab. 1) when the patent group was created and is received per one year the first 4 inventions.

Table 1. Dynamics of copyright certificates and patents at Mari State Technical University (under annual reports of a department of the intellectual property)

Year	Time t, years	On Mari Polytechnical Institute - Mari State echnical University			P.M. Mazurkina's inventions				
		Every-thing, pieces	with students and post-graduate stu-dents:		Every-thing, pieces	Part from Mari State Technical Univer-sity, %	including with students and post-graduate students:		
			pieces	share, %			pieces	share, %	part, %
1975	0	4	0	0	-	-	-	-	-
1976	1	8	0	0	-	-	-	-	-
1977	2	8	0	0	-	-	-	-	-
1978	3	15	**2**	13.3	1	6.7	0	0	0
1979	4	16	0	0	2	12.5	0	0	0
1980	5	26	3	11.5	2	7.7	0	0	0
1981	6	38	0	0	2	5.3	0	0	0
1982	7	32	1	3.1	4	12.5	0	0	0
1983	8	48	1	2.1	6	12.5	1	16.7	**100.0**
1984	9	70	10	14.3	7	10.0	0	0	0
1985	10	66	9	13.6	5	7.6	0	0	0
1986	11	67	9	13.4	6	9.0	0	0	0
1987	12	68	9	13.2	2	2.9	0	0	0
<u>1988</u>	13	62	9	14.5	3	4.8	0	0	0
1989	14	74	10	13.5	6	8.1	3	50.0	30.0
1990	15	80	25	31.3	14	17.5	14	**100.0**	56.0
1991	16	**92**	38	41.3	15	16.3	15	**100.0**	39.5
1992	17	70	29	41.4	14	20.0	10	71.4	34.5
1993	18	58	32	55.2	**23**	39.7	21	91.3	65.6
1994	19	47	24	51.1	19	40.4	15	78.9	62.5
1995	20	30	13	43.3	10	33.3	9	90.0	69.2
1996	21	23	17	73.9	14	**60.9**	14	**100.0**	82.4
1997	22	2	2	**100.0**	0	0	0	0	0
1998	23	8	7	87.5	0	0	0	0	0
1999	24	20	16	80.0	1	5.0	0	0	0
2000	25	33	21	63.6	2	6.1	0	0	0
2001	26	37	26	70.3	1	2.7	0	0	0
2002	27	22	16	72.7	3	13.6	0	0	0
2003	28	53	37	69.8	3	5.7	0	0	0
2004	29	59	35	59.3	13	22.0	8	61.5	22.9
2005	30	50	**42**	84.0	11	22.0	11	**100.0**	26.2
2006	31	53	23	43.4	16	30.2	3	18.8	13.0
2007	32	54	37	68.5	5	9.3	3	60.0	8.1
In total:		1393	503	36.1	210	15.1	127	60.5	25.2

The tendency of official reception of patents is characterized (fig. 1a) by the formula

$$n_0 = 32586045{,}0 t^{15{,}69825} \exp(-28{,}06691 t^{0{,}26461}) .$$ (1)

Separately oscillatory behaviour is shown on fig. 1b and it occured on model

$$n_1 = A_1 \cos(\pi t / p_1 - 6{,}11697),$$ (2)

$$A_1 = 0{,}048870 t^{1{,}98337} \exp(-0{,}00060967 t^{2{,}35017}),$$

$$p_1 = -0{,}28147 + 0{,}29014 t^{0{,}62839},$$

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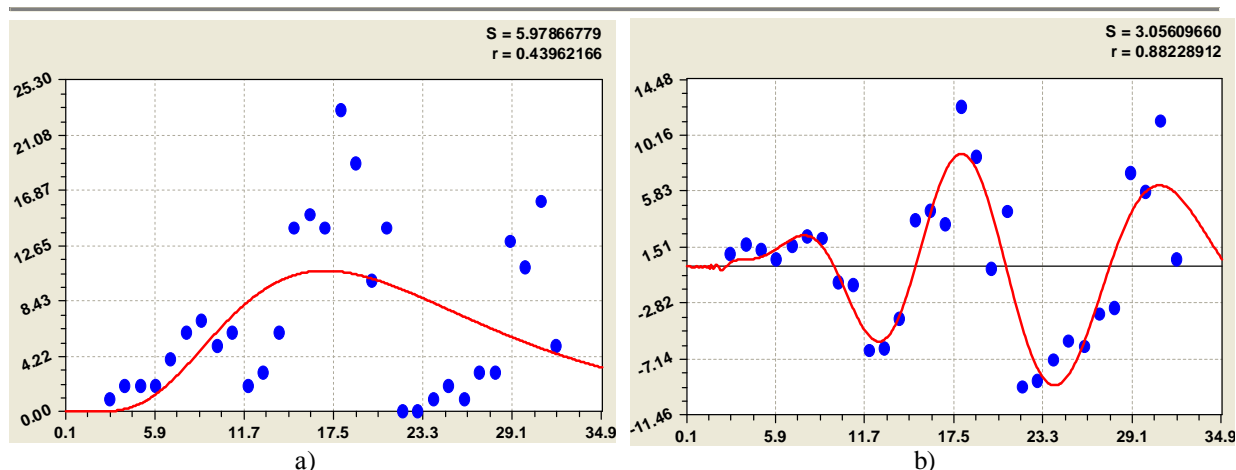
Fig. 1. Dynamics of number of patents for inventions of the author of article
a - the basic tendency; b- the first wave of positive adaptation to methodology of invention

where A_1 - Amplitude (half) first oscillatory indignation in positive adaptation to varied conditions of social and economic life, pieces; p_1 - The period (half) of oscillatory indignation in innovational activity.

After association of the tendency and a wave component (fig. 2) the model is received

$$n = n_0 + n_1 + ...,$$ (3)

$$n_0 = 23{,}54611t^{25{,}04048}\exp(-26{,}37391t^{0{,}35231}), \quad n_1 = A_1\cos(\pi t / p_1 - 0{,}13900),$$

$$A_1 = 1{,}50364t^{0{,}52991}, \quad p_1 = -0{,}16249 + 0{,}17297t^{0{,}69360}.$$
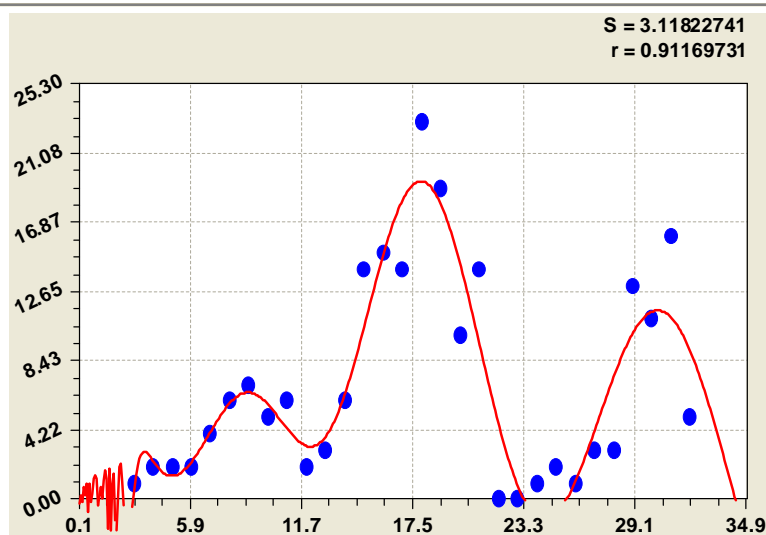
Fig. 2. Dynamics of number of patents for inventions of the author of article in view of the tendency and wave adaptation

In the beginning a creative way often fluctuation was observed, and then, with occurrence of experience of invention and development of two methods of search designing and designing of biotechnical complexes frequency is reduced.

The second wave (fig. 3a) appeared crisis with becoming frequent frequency under the formula

$$n_2 = A_2\cos(\pi t / p_2 + 2{,}77133),$$ (4)

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$$A_2 = -1{,}89361 \cdot 10^{-7} t^{26{,}15019} \exp(-17{,}22498 t^{0{,}42329}),$$
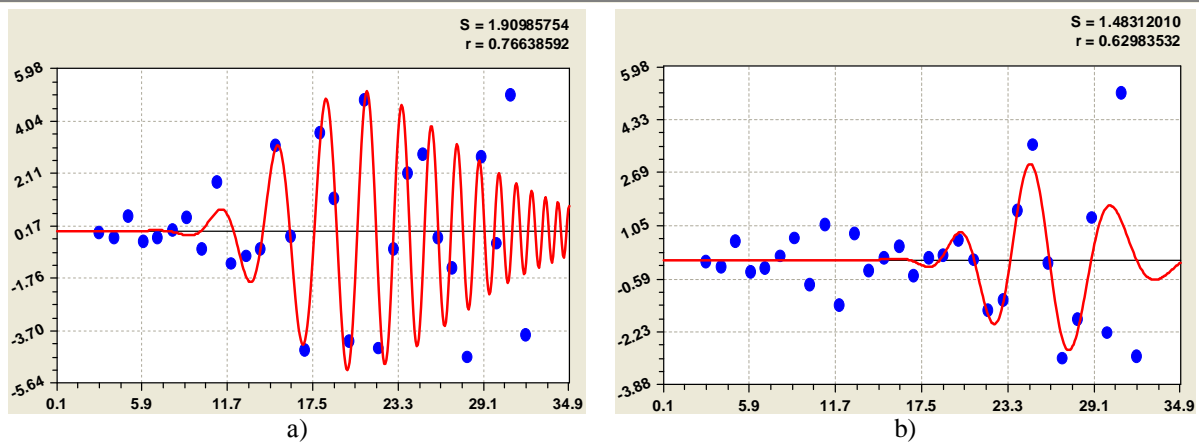
$$p_2 = 3{,}10791 - 0{,}019363 t^{1{,}29836}.$$

Fig. 3. Fluctuations of number of patents for inventions of the author of article
a - the second crisis wave; b - the third wave (5)

The third wave (fig. 3b) on expectations of innovational economy looks like:

$$n_3 = A_3 \cos(\pi t / p_3 - 1{,}09730),$$

$$A_3 = 3{,}28139 \cdot 10^{-42} t^{42{,}72385} \exp(-1{,}56075 t^{1{,}01464}), \quad p_3 = 1{,}11506 + 0{,}026928 t^{0{,}97173}.$$

(5)

Two more waves of indignation were received, one of which is the response to new hopes on adjustment of innovations of a world level.

COMPETENCE APPROACH TO PSTU "POWDER MATERIALS SCIENCE" DEPARTMENT GRADUATES' TRAINING
Oglezneva S.A.
Perm State Technical University
Perm, Russia

One of the third generation SES projecting principles is the competence approach – the priority vector-goals orientation of education: capacity of study, self-determination, self-actualization, socialization and individuality development. [Baidenko V.I. Revelation of HEI graduates' competence structure as necessary projecting stage of SES HPE of new generation: Methodical study guide – M.: Research Center of Specialists' Training Quality Problems, 2006 – p. 72.]

Among the competences to be formed in a HEI's graduates the general and professional ones stand out. In the general competences the learning-and-cognitive, informative and communicative ones are distinguished. By the learning-and-cognitive competence an aggregate of cognitive activities skills; grasp of target-setting, planning, analysis, reflection, personal activity success self-esteem mechanisms; knowing of action devices in non-standard situations and heuristic methods of problem solving, measuring practice possession, use of statistical and other methods of perception, is meant. The informative competence is characterized by the ability to search, analyze, select, treat and pass the necessary information with the help of information technologies independently. The communicative competence includes the grasp of skills of interaction between the people close about, ability to work in group, acquaintance with various social roles. The professional competences are subdivided into the organization-and-managerial, economical, general scientific, general professional and special ones.

Many principles of the present-day approach to students' training the Department of "Powder Materials Science" realizes successfully due to it system of specialists' training. The Department's history started in 1960. For all these years the Department Chairman has been Antsiferov V.N. – Member of the RAS, Laureate of the State Prize of the USSR, Prize Winner of the Council of Ministers and Ministry of Higher Education of the USSR, the Russian Federation Government Award Double-Winner, Owner of the Titles of "Honoured Worker of Science and Technology" and "Soros Professor", Honorary Freeman of Perm;

awarded the medal "For Valiant Work", the order of "Badge of Honour" and the "Order of Merits for the Good of Motherland" of the 4th Degree. Among the Department faculty there are the RF Government and Perm Region Administration Prize and other Rewards Winners. Presently, the academic process at the Department is conducted by 7 instructors in 29 academic disciplines, inclusive of 19 laboratory courses.

The main task of the Department is the training of encyclopedic knowledge experts in the area of Materials Science, Powder Metallurgy and Spayed-On Coatings Practices, Information Technologies, knowledge in the area of economics, management and right. The multi-tier system of education includes training of specialists with the conferral of academic degrees and qualifications: in the line of 150100 "Metallurgy" with bachelor and master degree award in technology (master program 550512 "Powder Metallurgy, Composite Materials and Coatings"); in the line of training a professional on the speciality 150108 "Powder Metallurgy, Composite Materials and Coatings", specialization 110812 "Management in advanced materials technology".

A characteristic of the academic activity organization at the Department of Powder Materials Science is the acquirement of research activities performance experience. The graduate papers of research character on relevant topics the students perform on the basis of the "Scientific Center of Powder Materials Science of PSTU", the organizer and research supervisor of which is Antsiferov B.N. The Center is the leading organization performing basic and applied research on the priority orientations of the RF science and technology development in Russia in the area of powder materials science. At the Center's disposal there is a staff of highly qualified specialists, the park of unique research and processing equipment from press arrangements to spectral analyzers and electron microscopes allowing performing the total cycle of research and the output of science-intensive products made of advanced materials worked out. The Powder Materials Science Department and the "SC PM" form a spatially united academic scientific complex, where the interaction and integration forms of the Department in the academic activity organization are realized. A number of the Center's collaborators are invited to the lectureship on special disciplines of the academic curriculum, and the students are hired to work as junior technical and engineering employees, workers and laboratory assistants with remuneration to the Center (on their spare time). The students have accessibilities to the unique research and technological equipment of the Center, the teachers' and students' research carrying out in association with the Center's collaborators, the performance of graduate qualification works of the Department students under the leadership of highly qualified collaborators of the Center and with the help of the Center's equipment, the access to the Center's library stock and carrying out laboratory works on the Center's equipment.

The teachers and students are given a modern research and educational and scientific equipment, laboratories for materials, metals, thermal treatment testing, submicroscopic and X-ray structural analysis, powder materials pressing and baking, gas-thermal and condensation-vacuum methods of coating. By the end of studies the students acquire basic skills of engineering and research activities, foundations of information technologies used in modern design, management and administration.

The graduate qualification works' most effective form realized at the Powder Materials Science Department is the research paper topic – the works on the topic appointed individually to every student begin with carrying out of term papers on special and general technical disciplines, go on when carrying out the graduation bachelor work in the 4th year and students' research work (SRW), and finish at carrying out the diploma project in the 5th year or master dissertation in the 6th year. All this time the student grasps the principles of the research activity and acquires skills of the work on the equipment in the collective of research assistants and engineers under the leadership of an experienced specialist and a teacher of the Department. The scientific results obtained by the student together with the results of the Center's staffers are used while carrying out the Federal target programs and contractual research engineering for the leading enterprises of the Perm Territory and RF, that trains a responsible attitude of the student to the works performed.

The Department's research work, wherein the students and post-graduates take an active part, is realized on several lines: the development of structurally heterogeneous functional powder materials with predetermined properties and made of metal alloys and ceramics; the investigation and nanocrystalline materials; the development of scientific foundations, facilities and technological processes of defensive and hardening coatings obtaining, the research and forecasting of highly porous cellular materials' rheological properties at static and dynamic loading, the development of powder steels' and alloys' structural and phase change models at heat treatment and surface impregnation, etc.

The results of the scientific and pedagogical activities organization of the Department become the successes of the staffroom and the student collectives. Presently, the Powder Materials Science Department is one of the leading Departments of the Perm State Technical University, and according to the results of the Contest of Scientific and Pedagogical collectives of higher educational institutions of the Perm Region the Department body takes the top places regularly (in 2000 and 2005 – the first place). The scientific "School of Powder Materials Science" works at the Department of All Russia scale; it won the competi-

tion of the RF fellowships of the RF leading scientific schools research governmental support many a time and oft. In 1982 the student body of the Department as part of the Perm Polytechnical Institute got the prize in the name of Leninist Komsomol for the research works. Annually not less then 15 best students of the Department are awarded with medals, diplomas and certificates of merit of the RF Ministry of Education on the results of the graduation papers contest, and also the diplomas for the reports at conferences. The Department students were granted individual scholarships of the RF President, titles of "Soros student, within the framework of the European Community "Commet" and "Erasmus" on the collaboration in the area of teaching and research the students, postgraduates and teachers of the Department completed their training and practical study at the Technical University of Vienna. Among the graduates of the Department there are leaders of enterprises and regional Administration.

The results of the accumulated practical experience, pedagogical and scientific activities of the Department's body are published in textbooks, 43 monographs, 27 learning guides. More than 50 new courses have been developed at the Department, 78 titles of study aids have been published.

Since 1970 a postgraduate study has been opened at the Department, and in 1991 – the doctoral studies on scientific specialties 05.16.06 "Powder metallurgy and composite materials" and 05.02.01 "Materials Science (industry)" were opened. Under the direction of the academician of the Russian Academy of Science V.N.Antsiferov 22 doctor's and 68 master's theses have been protected.

Thus, the academic process organization system at the Powder Materials Science Department, especially in senior courses, when the graduate performs research and developments under the leadership of highly qualified experts and teachers independently, working in the collective and realizing the responsibility for his work to it, together with the material remuneration and motivation to publishing his results allow forming not only the professional, but also learning-and-cognitive, informative and communicative competences in the graduate.

Since 2008 a new professional educational program of specialists training on the specialty 210605.65 "Nanomaterials" has been working at the Department. The accumulated experience of students' training will be a pledge of training highly qualified experts in the area of nanotechnologies and nanomaterials.

ROLE WHICH IS GIVEN TO THE STUDENT IN EDUCATIONAL SYSTEM

Pavlenko V.V.
SSUI
Novokuznetsk, Russia

Today in the modern press the problem of participation of the student in scientifically-educational process for which it and is developed at all is not shined. All publications reflect directions on which it is necessary to move, there is a search of ways of perfection of technology of teaching, science and education integration, attempts to make scientifically-educational process innovative and many other things are undertaken. Scientific researchers are not carried out in our country in the field of interrogation of students and schoolboys that give existing education to them, what lacks exist in educational process according to their representations, that in their opinion it is necessary to change in an education system. First, this area of research represents very important component, capable to find the best ways of creation of innovative scientifically-educational system; secondly, involves students to participation in working out of such program; Thirdly, forces young generation to think and develop as in power of thinking, and learns to reflect the thoughts in the verbal form; fourthly, it is scientific work for students who under the guidance of leading scientists can make questionnaires most prominent aspects of educational system; fifthly, this creation, on the basis of the deep analysis of existing educational programs and the relation to them of the basic consumer (his career: professional suitability, device possibility on specialties, scientific growth, conformity to requirements of customers already at an employment stage etc.) Concepts (which today in our country simply does not exist) capable to make scientifically-educational process innovative; sixthly, it is research work, training and career for a large quantity of sociologists, philosophers, psychologists and experts in other disciplines on the scale of all country at existing specificity of schools, high schools, educational systems etc. Thereupon for teachers disappears necessity: search within the precincts of educational institutions that of dissertations; preparations of pseudoscientific researches for career growth; to be broken off on performance of the basic work and carrying out of scientific researches (one in a damage of another). If the teacher aspires to give simultaneously a quality education and to raise the status in scientific activity creation of a feedback the student-teacher will be the best achievement of this purpose and. Self-development and perfection of pedagogical and scientific activity for both parties, adjustment of contacts, mutual understanding, appeal creation scientifically-educational programs and for teachers ability to light an audience to draw attention and to interest students to master a subject that should lay down in a basis of reports on the activity as the scientific work, allowing

to receive scientific degrees. As it is impossible to garble level of readiness of students in subjects of each separately taken teacher, scientific activity of already concrete teacher will be in direct dependence on indicators (not simply progress which can be manipulated) activity of students in scientific activity.

The work was submitted to international scientific conference «Prospects for the development of university science», Dagomys (Sochi), 20-23 September 2008, came to the editorial office on 21.07.2008.

POLITICAL SOCIALIZATION IN THE HIGHER MEDICAL EDUCATION

Parakhonsky A.P., Venglinskaya E.A.
Medical institute of the supreme sisterly education Krasnodar, Russia

The central concept of our researches is political socialization which is understood as a way of the person to finding civil outlook, comparison of the system of values to the certain vision of the state interest, influence on such identification of purposeful factors. Political socialization in high school as the party of a vital way of the developing person is space of a meeting (interaction, connection) official pedagogics (educational system), a policy (political traditions), concrete conditions of the biography of the separate person or the whole generation. Studying of so multiplane subject as political socialization various generations, first of all, youth, demands the interdisciplinary approach. It presumes to answer the following basic questions: conducting approaches to of political socialization in a history and the modernity in various scientific directions; Historical experience of interaction of pedagogics, medicine and authority in practice of political socialization representatives of various ethnoses, faiths, regions, generations, floors in conditions of educational system of the higher school; optimum ways of studying political of socialization in a modern, polycultural society and development of recommendations on its perfection, including through interaction of pedagogical system of the higher school with the government.

The answer to the first item gives a panorama of various approaches to a problem, necessary for its three-dimensional consideration owing to integrated approach of an object of research. The answer to the second item can give representation about historical dynamics of pedagogical mechanisms of political socialization inside various educational levels and on their crossing. The answer to the third item will allow to offer new approaches to studying modern lines in of political socialization, those conditions and factors which define procedures of political socialization people from different generations at their meeting with the state. It is necessary for high school system to provide graduates, except for a professional knowledge and skills, skills to be guided in an escalating stream of the information, readiness for constant updating and updating of knowledge, and also ability to dialogue to interaction in collective, to the decision of disputed situations.

From these positions it is possible to believe, that - the manager in system of higher education it is necessary to include the following aspects in process of preparation of the medical sister: historical - a history of development of medicine and the general pathology; ethical - basic principles and concepts "is angry", "kindly", "validity", "conscience", "honesty"; legal - realization of key rules standard - legal certificates; medical - scientific validity, an estimation of a degree of risk, utility or uselessness, danger or safety for health and lives of the patient; psychological - models of interaction, psychological features of the medical worker and the patient; social - conformity to system of knowledge of norms and the values formulated in a society; religious - an admissibility of actions of the medical sister from positions of existing religious faiths; Educational - formation of valuable orientations in relation to the person of the examinee, to the own person, formation of the concept " I am a manager ".

Thus, the given approach allows to form the competent spiritual - moral person of the future medical the sister - manager, thus, to reduce negative consequences of use of new technologies both for separately taken person, and for a society as a whole.

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COMBINED METHODS OF NUMERICAL SOLUTION FOR ALGEBRA DIFFERENTIAL EQUATIONS

Vaschenko G.V.
Sibirian State Technological University Krasnoyarsk, Russia

We consider algebra - differential equations of the normal form and Cauchy problem [1] as follows:

$$x' = \Psi(x(t), z(t)), \; z(t) = \Phi(x(t), z(t)),$$

$$x(0) = x^0, \; z(0) = z^0 = \Phi(x^0, z^0),$$

$$(1)$$

where $t \in [0, T]$, $\Psi : G \subset R^n \to R^m$, $\Phi : G \subset R^n \to R^{n-m}$, $x(t) \in R^m$, $z(t) \in R^{n-m}$.

Combined numerical methods for solution (1): implicit Euiler's scheme with simple iterations and implicit Runge -Kutta's scheme with Newton's itera-

tions are presented. It is shown convergence and exact numerical solutions.

Asymptotic properties of the both combined methods are discussed. We also give examples in which the numerical and the exact solutions are compared.

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LIFEWARE REALIZATION AS SITUATION OF SUCCESS IN EDUCATION

Yurtayeva N.I.
Nizhnekamsk Chemical-Engineering Institute
(Branch of Kazan State Technological University)
Nizhnekamsk, Republic of Tatarstan, Russia

The Russian society has been performing its life changes complex process focused on democratic transformations for the last years. Humanitarization of education is becoming an integral part of higher school renovation, is the means of students' panhuman culture formation. Most likely the new type of education will appear as a projective one called up to convert the culture in accord with those changes, which take place in the social development. The higher education quality is the key element, when creating the European Higher Education Zone. More than ever a further development of methods, approaches and criteria of quality assurance at all the levels (institutional, national, European) is necessary now. The quality assurance is the prime responsibility of higher educational institutions and it provides the basis for the academic community real responsibility. The training of specialists should be assured not only by the teacher's professional competency high level, but also by the conditions for the development of new educational technologies oriented to personality growth, the learner's peculiarities revelation, the acknowledgement of his subjective experience as originality and inherent worth, the composition of pedagogical effects with the agreement of individual and social experience. The entry of the human into the new development epoch, the change for the interaction with the help of global communications is attended by the realization of the fact that the outside world possesses simultaneously both the properties of integrity and multiplicity. In the constantly changing society the human is offered a wide range of choice, when solving professional and personal problems, that increases the degree of individual responsibility. Due to this the axiological, and it means – humanitarian, aspect of life grows.

The requirements made for the future specialists in conditions of the changes taking place in the society are, first of all, a high level of abilities to realize their intellectual possibilities, to use all their creative potential for displaying initiative and entrepreneurial spirit, solving problems in conditions of market economy harsh mechanisms. That is why the learner-centered education having the humanitarian aspect as the leading one, can create conditions for sound manifestation and development of personal functions of the educational process subjects, create the situation of learners' success.

Short Report

CONDITION CHANGE DYNAMICS AND COMPETENCE STRUCTURE DIAGNOSTICS OF FUTURE PHYSICAL EDUCATION TEACHERS

Ivanov B.M., Kuznetsova Z.M., Imashev A.M.
The Kama state academy of physical training, sports and tourism
Naberezhnye Chelny, Russia

Functional competence of future physical education teachers is considered as a part of their professional competence, characterized by mastering their main pedagogical functions (knowledge – ability – skills).

The problem is increasing future physical education teachers functional competence.

Actuality of the problem is the future physical education teachers professional physical education quality increasing process.

The object of the research is condition and functional competence of the future physical education teacher dynamics.

The subject of the research is condition and functional structure competence dynamics of the future physical education teachers (knowledge – ability – skills).

The purpose of the research is experimental study of the Kama state academy of physical culture, sports and tourism future physical education teachers condition and functional competence structure dynamics.

The task of the research is:

1. To analyze peculiarities of the future physical education teacher functional competence according to courses of study;

2. To conduct systematic – structural analysis of the Kama state academy of physical culture, sports and tourism future physical education teachers functional competence characters.

3. To reveal directions of the future physical education teachers functional competence formation process correction.

4. The methods used in research are:

a) Questionnaire

b) mathematics-statistical processing of the result.

The diagnostic instrument is a questionnaire «Portabe function diagnostics card of the physical education teachers» (Imashev, 1998) comprising 100 knowledge – ability – skills as functional elements of the 10 main physical education teachers pedagogical functions.

Organization of the research. 170 extra-mural fifth course students of the Kama state academy of physical culture, sports and tourism were offered to give information about their functional competence level according to the following rules:

– «zero» – no knowledge about the given functional element;

– «one» – there is knowledge about the given functional element;

– «two» – there is ability (the given functional element is used at least once);

– «three» – there is skill (the given functional element is used automatically.

The research is done from September 2004 up to June 2005.

The results of the research show that changing dynamics of the future physical education teachers functional competence is progressive: differences between future physical education teachers functional competence meanings are valid.

For revealing the system of structurally interconnected groups of functional competence influencing upon future physical education teachers general functional competence forming correlation factors between all functional competence meanings were found. They were formed into mutually connected matrixes, between main pedagogical functions and correlation pleiades were built.

Students of the first course have projecting pedagogical function with the most correlation factors meanings.

Students of the second course as system forming factor have constructive, projecting and mobilization pedagogical function.

Students of the third course don't have vivid system forming factor but a tendency of communicative, developing and mobilization pedagogical functions.

Students of the fourth course as system forming factors have the orientation – educative pedagogical function which correlates close to the constructive and projecting pedagogical functions.

Students of the fifth course have the tendency to the developing and mobilization pedagogical functions.

So , the hypothesis in completely confirmed:

1) dynamics of the Kama state academy of physical culture, sports and tourism extra-mural faculty future physical education teachers functional competence changing is progressive;

2) the basic of future physical education teacher functional competence forming process is projecting (1 course), constructive (2 course), mobilization (3 course), orientation (4 course) and developing (5 course) pedagogical functions which harmoniously coexist with other pedagogical functions in the correlation pleiad.

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Materials of Conferences

CORRELATION ENERGY OF DOUBLY EXCITED STATES OF HELIUM-LIKE ATOMS
Kavera V.V.
Krasnodar, Russia

1. Selection and description of used approach

Main problem at calculation of multielectron atoms, which elementary case are helium-like atoms, eventually is the necessity to take into account of interaction between electrons. The review of approximate methods of the solution of this problem (as of 2000 year) it is possible to find in [1].

In the present work we use the one-configuration first approximation of a variational method (further VM_1), in which one parameter - charge of the nucleus varies only, and all interaction of electrons is with each other reduced only to mutual shielding by them of this charge. Thus VM_1 is most simple from all possible methods, which use approximation of independent particles. The description VM_1 can be found in many sources (for example - in [2]) and there is no necessity to consider it here in full details.

We note, that we not take into account in this approach exchange effects. The wave function of two-electron atom in this approximation is look as

$$\psi = \psi_1 \cdot \psi_2 , \tag{1}$$

where ψ_1 and ψ_2 - wave functions of separate electrons, which differ from hydrogen-like functions only by replacement in them of a real charge of the nucleus Z on effective charges Z_{e1} and Z_{e2}, which are variational parameters.

Eventually formula of energy (hereinafter everywhere in the text as units of energy is used Rydberg -Ry) two-electron atom calculated by the method VM_1 is noted as

$$E_{He1} = \varepsilon_1 \cdot (Z_{e1}/n_1)^2 + \varepsilon_2 \cdot (Z_{e2}/n_2)^2 , \tag{2}$$

where n_1 and n_2 - general quantum numbers of appropriate electrons, and ε_1 and ε_2 - factors, which take into account relativistic effects and influence of the nucleus. In the present work we have taken their value from experiment under the formula

$$\varepsilon = E_{H\,exp} \cdot (n/Z)^2 , \tag{3}$$

where $E_{H\,exp}$ - experimental value of energy of hydrogen-like atom for given Z and given n.

2. Correlation energy

The residual between precision energy of atom and energy calculated by one from methods of approximation of independent particles is named as correlation energy.

We can estimate accuracy of approach VM_1 with the help of correlation energy. In the present work we have analyzed of correlation energy of a method VM_1 for nl_1nl_2 states of helium-like atoms, where n - main quantum number, common for both electrons, and l_1 and l_2 - orbital quantum numbers of appropriate electrons. The similar analysis for a ground state of two-electron atoms can be found in various sources (for example in [2]), but we could not find any publication of similar investigation for doubly excited states (DES) and we claim for superiority in this problem. We have analyzed of correlation energy for all nl_1nl_2 states of He-like atoms, for which it

was possible to find the experimental data now, but because of limitation of the size of the article we shall present here as an example only data obtained for $nsns(1S)$ states. The values E_{He1}, calculated by a method VM_1, values of energy $E_{He\,exp}$, taken from experiment, and also value of correlation energy $E_{cor} = E_{He\,exp} - E_{He1}$, for $nsns\,(1S)$ states are given in a table 1.

We have analyzed relation of correlation energy from Z and n, and have detected, that the nl_1nl_2 states are divided into two groups. The first group involves lowest states for the given configuration, i.e. states with least possible n. It is states, in which at least one electron is on the such orbit, for which $n = l + 1$. In the old quantum theory this condition corresponds to the special case of circular orbits. Second group involves all remaining states of configurations, i.e. states with $n > l + 1$ for everyone from two electrons. We obtained the formulas

$$E_{cor} = (1/2) \cdot C \cdot (1/n) \cdot Z \cdot [\, k_1 - k_2 \cdot (Z-1)/Z \,] \tag{4}$$

and

$$E_{cor} = (1/2) \cdot C \cdot (1/n) \cdot Z \cdot k_1 \tag{5}$$

accordingly for the first and second group of states, where k_1 and k_2 - integer factors, which values are given in a table 2, and C - numerical factor. The values C, at which formula (4) and (5) give precision co-incidence with experiment, are given in a table 1 for nsns (1S) states. It is easy to see, that C with a large degree of probability is a constant and is in range 0,110-0,116, i.e. is close to 1/9.

Table 1. The data of experiment and calculations for nsns (1S) states of helium-like atoms for n from 1 up to 3

State	Z	$E_{He\ exp}$ (Ry)	E_{He1} (Ry)	E_{cor} (Ry)	C	E_{He} (Ry)	Ref. $E_{He\ exp}$
1s1s (1S)	1	1,0550	0,9448	0,1101	0,110	1,0559	[3]
	2	5,8068	5,6948	0,1120	0,112	5,8059	[4]
	3	14,5597	14,4457	0,1140	0,114	14,5568	[4]
	4	27,3131	27,1987	0,1143	0,114	27,3099	[4]
	5	44,0699	43,9561	0,1137	0,114	44,0672	[4]
	6	64,8318	64,7202	0,1116	0,112	64,8313	[4]
	7	89,6035	89,4946	0,1089	0,109	89,6057	[4]
	8	118,3845	118,2829	0,1016	0,102	118,3940	[4]
	9	151,1885	151,0900	0,0985	0,099	151,2011	[4]
	10	188,0111	187,9201	0,0910	0,091	188,0312	[4]
2s2s (1S)	1	0,2972	0,2444	0,0528	0,106	0,2999	[5]
	2	1,5571	1,4436	0,1135	0,114	1,5547	[6]
	3	3,8077	3,6431	0,1646	0,110	3,8098	[7]
	4	7,0788	6,8434	0,2354	0,118	7,0656	[7]
	5	11,3354	11,0452	0,2902	0,116	11,3229	[8]
3s3s (1S)	2	0,7206	0,6431	0,0776	0,116	0,7171	[9]
	6	7,4304	7,2260	0,2044	0,102	7,4482	[10]
	7	10,2379	9,9849	0,2530	0,108	10,2442	[11]
	8	13,4581	13,1900	0,2681	0,101	13,4863	[10]

Table 2. Factors k1 and k2

State	k_1	k_2
nsns(1S)	2	2
npnp(1D)	2	2
nsnp(3P)	2	0
npnp(3P)	1	0
nsnp(1P)	1	3
npnp(1S)	0	4

Finally we have following semi-empirical formula for calculation of full energy of helium-like atom for nl_1nl_2 states

$$E_{He} = E_{He1} + E_{cor}, \qquad (6)$$

where E_{He1} is calculated by a method VM_1 and follows from the formula (2), and E_{cor} follows from the formulas (4) and (5) and is entered because of analysis of the experimental data.

In that specific case of states nsns (1S), npnp (1D), ndnd (1G) etc., when both electrons are on same orbit, or, as speak, occupy the same quantum cell, the formulas (4) and (5) receive especially simple kind

$$E_{cor} = C \cdot (1/n) \qquad (7)$$

for $n = l + 1$ and

$$E_{cor} = C \cdot (1/n) \cdot Z \qquad (8)$$

for $n > l + 1$.

We note, that our refusal to take into account of exchange degeneration is justified for these states from any point of view.

The particular case of the formula (7) for n = 1 corresponds to a ground state of helium-like atoms (1s1s) and results to E_{cor} = C, i.e. the correlation energy in this case does not depend from Z and it was marked by Bethe as the curious fact in [2]. The Hartree-Fock method also results in independence of correlation energy of a nuclear charge in case of a ground state 1s1s , but the constant obtained at it, has average value 0,085 unlike 0,111 for case of a method VM_1. The correlation energy of a Hartree-Fock method was a theme of many works at the end of 1950s and at the beginning of 1960s, however after appearance of the first experimental data on DES of atoms in a middle of 1960s the point of view has prevailed, that the Hartree-Fock method and generally approximation of independent particles is inapplicable for the description of a similar class of states because of large increase for them of correlation energy. The obtained above formulas show, that at least in case of a method VM_1 the approximation of independent particles can be applied successful for DES if to consider correlation energy not as an annoying error, but as the simply taken into account correction with interesting physical properties which will be discussed below. Moreover, simplicity of obtained expressions results that the correlation energy is transformed from a problem into a proof of effectiveness of approximation of independent particles. Already now it is possible to use algorithm of calculation , offered us, as the simple and at the same time rather precision semi-empirical approximation to describe known lines of spectra of helium-like atoms and to predict or to help to identify until now unknowns lines.

The data of calculation of energy E_{He} under the formula (6), in the supposition, that C = 1/9, are given in table1 for those of nsns (1S) states, for which the experimental data are known . Goodness of fit of calculations with experiment quite satisfactory, taking into account errors of measurements and approximations at calculations. The data of the same calculation for a unknown for today nsns (1S) states at n from 4 up to 10 and Z from 1 up to 10 are given as an example in a table 3.

Table 3. The data of calculation for nsns (1S) states of helium-like atoms for n from 4 up to 10

Z	$E_{He}(Ry)$ 4s4s	$E_{He}(Ry)$ 5s5s	$E_{He}(Ry)$ 6s6s	$E_{He}(Ry)$ 7s7s	$E_{He}(Ry)$ 8s8s	$E_{He}(Ry)$ 9s9s	$E_{He}(Ry)$ 10s10s
1	0,0893	0,0616	0,0459	0,0360	0,0293	0,0245	0,0210
2	0,4175	0,2762	0,1980	0,1500	0,1183	0,0962	0,0802
3	0,9958	0,6508	0,4612	0,3457	0,2699	0,2174	0,1794
4	1,8242	1,1854	0,8356	0,6230	0,4839	0,3879	0,3186
5	2,9029	1,8802	1,3212	0,9820	0,7605	0,6078	0,4979
6	4,2319	2,7352	1,9180	1,4227	1,0997	0,8771	0,7170
7	5,8114	3,7504	2,6260	1,9452	1,5014	1,1959	0,9763
8	7,6417	4,9261	3,4455	2,5494	1,9657	1,5641	1,2758
9	9,7230	6,2623	4,3763	3,2355	2,4927	1,9818	1,6152
10	12,0556	7,7592	5,4183	4,0035	3,0823	2,4490	1,9943

3. Results

3.1. From a point of view of physics of the formula (4) and (5) result to exotic, i.e. in nonclassical relation of energy of interaction of charged particles to a distance between them.

If in the formulas, obtained by us, to present n as a radius of atom r (remembering, that in hydrogen-like atoms r ~ n^2), we shall receive for different parts of full energy of atom of relation

$$E \sim 1/r^k ,$$

where for terms, calculated by the method VM_1, k = 1, that completely corresponds to the classical law of the Coulomb, and for correlation energy, k = 1/2. Thus here there is an additional interaction decreasing on a distance slower, than Coulomb force.

The additional calculations, carried out by us, have shown, that the relation E ~ $1/r^{1/2}$, or accordingly E ~ 1/n, occurs only in that case, when both electrons have identical general quantum numbers n. We found proofs of existence of similar relation of correlation energy from a general quantum number of external electrons not only in helium-like atoms, but also in atoms with large number of electrons, and in molecules and crystals.

That fact, that coincidence of general quantum numbers n at both electrons is required for appearance of relation E ~ 1/n, can indicate resonant character of additional interaction. Moreover it results in electron-electron attraction, instead of repulsion and very strongly depends on a configuration of spin and orbital moment, that makes it even less similar to electrostatic

interaction, but similar to interaction, which exist between protons in the nucleus.

3.2. From a mathematical point of view it is obvious, that if in two-electron atom there were no nonclassical interactions, the method VM_1 would give precisiouly analytical solution of a three-body problem. The simplicity of the formulas (4-8) allows to hope, that the analytical solution is possible and with taking into account of nonclassical interactions. It would become possible after an evaluation of correlation energy E_{cor} and constant C from certain general principles.

3.3. From a practical point of view it is interesting, that since some value n usual Coulomb repulsion electrons (decreasing as $1/n^2$) will become less additional not - Coulomb attractions (decreasing as $1/n$). It can result in macroscopic case to join of electrons in certain stable or metastable structures - quasineutral (if number of electrons equally to number of positive ions) or charged, just as the protons are integrated in the charged nucleus. The similar processes could spontaneously happen in strong rarefied plasma of intersidereal space, in high layers of an ionosphere of the Sun, Earth and other cases, in which the large distances between charged particles (appropriate to the large values n) are realized. It is possible, that the similar effects could explain at least some from anomalous plasma-like effects observed in atmosphere and an ionosphere, such as a ball lightning etc.

To receive a similar new states of substance in experiment, it is necessary, that the electrons of substance were excited synchronously, i.e. had identical energy and identical values n in each instant . To the present moment not much of similar (doubly exited) states is obtained even for two-electron atoms . For molecules them it is known even less. Moreover both in case of atoms, and in case of molecules the values n are not reached yet value, at which the attraction between electrons exceeds a repulsion between them. In case of macroscopic skew fields the problem of synchronous excitation of electrons up to maximum large n till now not to pose, though technically it is not unattainable, since the similar problems are decided at creation of quantum generators of coherent electromagnetic radiation.

Let's remind also, that the explanation of a superconductivity involves appearance of additional electron-electron attraction , which exceeds Coulomb repulsion under certain conditions.

Moreover there are the direct analogies between additional correlation energy of electrons in superconductors and additional correlation energy of electrons in separate atoms in the literature (see for example [3]), and the Cooper pair sometimes is represented as two electrons moving round an induced positive charge, and is compared to atom of a helium.

All of this makes probablis bose-einstein condensation of synchronously excited electrons both in atoms, and in macroscopic skew fields from that mo-

ment, when not - Coulomb attraction of electrons will begin to exceed Coulomb repulsion. The similar superconductivity already could be named super-high-temperature.

Conclusion

The approach based on separation of full energy of multielectron systems on classical Coulomb and nonclassical not - Coulomb parts, allows on the one hand to simplify calculations, and with another - to see interesting regularities, which were not visible at use of more complex methods. Most interesting is the discovery of that fact, that under certain conditions electron-electron attraction exceeds electron-electron repulsion. The most important practical consequence it is the capability of existence of ordered structures of a new type in the special way exited substance.

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POLYMER-IMPREGNATED CONCRETE BASED ON WATER DISPERSION OF VINYL CHLORIDE

Kondrashov G.M.
Non-State Educational Establishment of continuing professional education "Academy of business and property management"
Volgograd, Russia

For the purpose of defining maximal chemical durability of the formed material at the optimal con-

tent of the polymer the kinetics of polymer concrete decomposition in acid media has been investigated.

The data got at the investigation of the air content dependence on the polymer-cement ratio in the mortar modified by ВДВХМК-65Е-ВДК (Fig.1) testify that in the area conforming to 7-10% content of the polymer from the cement mass the decrease of air entrainments and increase of the forming closed pores number, the result of which is receiving the polymer-cement frame possessing maximal chemical durability.

The possibility of cement systems lifetime increase in aggressive media owing to their modification by chemically resistant water dispersion has been established in principle.

For the purpose of establishing modified concretes' corrosion resistance the tests in various aggressive media: nitric, sulfuric and hydrochloric acids and also solutions of sodium chloride and sulfate, were carried out. The corrosion resistance was estimated on the modified materials' strength properties loss, when cured in 10% aggressive medium.

Due to the carried out experiments it is established that on the intensity degree of the effect on the modified mortars' physical and mechanical properties the investigated aggressive media represent the following comparative range: hydrochloric acid > sulfuric acid > nitric acid > sodium sulfate > sodium chloride > benzine. In salt solutions the modified materials' durability increases considerably compared to the non-modified ones.

The mathematical treatment of the experimental data inclusive of the works performed by the research workers of A.F. Polak's school, Ivanov F.M., Rozental N.K. and others allowed the author to suggest a calculation formula for the modified concretes' and mortars' durability definition depending on the aggressive agents in the exploitation medium:

$$\tau = -\frac{1}{A_0 \eta} \left[\frac{L}{L_0} \right]^2, \qquad (1)$$

where η - is the aggressive substance concentration in the exploitation medium; L – the thickness of the construction being subjected to the exploitation medium's aggressive effect, (cm); L_0 – the laboratory sample thickness (4 cm); A_0 – the constant defined experimentally by the errors sum-of-squares minimization on the formula ($A_0 < 0$):

$$A_0 = \frac{\sum_{i=1}^{M} \eta_i t_i \ln(S_i / S_0)}{\sum_{i=1}^{M} \eta_i^2 t_i^2}, \qquad (2)$$

where S_i – is the sample strength [kg/cm^2] after being cured in the aggressive medium for the time t_i; m – the number of measurements carried out for every sample;

S_0 – the sample strength initial value [kg/cm^2]; η – the mortar concentration ($0 < \eta < 1$).

The established functional dependence and corrosion resistance of the modified mortars and concretes in acidic and salt aggressive media allow forecasting a material's lifetime and, consequently, structural units' durability as a whole at the anticorrosion protection design stage already.

TECHNICAL SILICON REFINING
Nemchinova N.V.
Irkutsk State Technical University
Irkutsk, Russia

Silicon is widely used in various branches of industry. So, due to its ability to create valuable alloys with unique properties Si is used for making rust-resistant pipes when obtaining silicon steel for electrical industry, in transformer, instrumental, corrosion-resistant, heat-proof, spring, constructive and other steels. Silumins (silicon and aluminum alloys) applied in space and aviation, automobile, instrument-building and other industries; corrosion-resistant silicon bronzes, silicon and magnesium alloys, abrasive materials based on silicon carbide are widely known. Silicon is used for the production of a wide range of organic silicon compounds. The ultrapure Si – is the main semi-conducting material for transistors, current rectifiers, radio waves enhancers, controllers, electronic chips for computing devices. Silicon serves as the basic material for making photoelectric converters (PEC) as well [1].

The technical (metallurgical) silicon (Si_{tech}) is obtained by the carbo-thermal method out of silica-containing raw material in electric arc furnaces on the general reaction: $SiO_2 + 2C = Si + 2CO$ [2,3]. The Si_{tech} obtained at the melting process dissatisfy the consumer requirements on the ultimate product chemical purity. That is why refining is practiced nowadays.

A complex operation of refining should reduce the content of *Al, Ca, Fe, Ti* and other admixtures in the silica and also fully remove small and big slag pockets. The silicon refining methods (those not introduced into production as well) at the national and overseas plants are based on the following physical and physico-chemical phenomena:

- the slag separation by settling the liquid for coagulation and separation of small inclusions into a single phase;

- the slag separation by the silicon remelting and settling an additive agent of the degassing flux;

- the separation of metallic impurities by their transferring into fugitive chlorides and fluorides by blowing with gases or solid additions gases;

- the same with an additive oxidative agent - O_2 and transfer of the admixtures (*Ca, Al* and others, for example) into oxides passing into slag;

- the purification of powdery silicon in solid by halogens, chlorhydric or sulphuric acids, etc.; the ultimate product being the refined silicon powder;

- the silicon treatment in plasma.

The main method of Si_{tech} commercial refining at the CJSC "Kremny" (Shelekhov, Irkutsk Region) – is the oxidizing-flux one performed in scoops by air blowing (with adding siliceous sand as the flux) [4]. We carried out the pilot plant tests on the operating equipment of the enterprise by two refining methods. 1. The refining of Si_{tech} by the oxidating method with the following crystallization was performed at the following parameters: the compressed air flow = 29-34 m^3/h; the melt temperature = 1550-1570^{0}C; the gas- and air mixture supply increase up to ≈0,6 MPa; the blowing time = 16 hours; the silicon crystallization period = 48 hours.

2. The refining of Si_{tech} by the oxidating method by blowing the melt with oxygen-rich air was performed (without adding fluxes) at the following process variables: the pressure in the oxygen and compressed air supply lines ≈0,5 MPa; the melt temperature = 1472-1481^{0}C; the refining time (average) = 1,5 hours; the consumption indices of oxygen, compressed air, m^3/h, accordingly: 4; 19,5. After the carried out tests the degree of Si_{tech} refining from principal impurities made, %, accordingly: on the first method - *Fe* - 97,27; *Al* - 95,5; *Ca* - 99,64; on the second method – *Fe* - 6,7-8,2; *Al* - 70; *Ca* - 94,95.

Thus, the silicon refining procedures suggested allow obtaining refined silicon of high chemical purity without significant changes of the process flow sheet existing at the plant.

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ADVANCED FEATURES OF OIL-BEARING STRATA VERTICAL AND LATERAL HETEROGENEITY MAPPING AND STUDYING USING INFORMATION MEASURES

Ozhgibesov V.P., Belyayeva O.V.
Perm State University
Perm, Russia

As a rock characteristics heterogeneity measure in a vertical geological cross section the coefficient of relative entropy (Pelto, 1954; Yaglom, Yaglom, 1960; Dementyev, Khitrov, 1966; Ozhgibesov, 1975) was used.

$$K_\Phi = \frac{-\sum\limits_{i=1}^{n} p_i \log p_i}{\log N}$$ (1),

where K_Φ – is the coefficient of relative probability entropy (coefficient of facial heterogeneity); n – the number of group intervals of the measured parameter; p_i – the probability of the observation result fall within the i-th group interval; N – the number of group intervals of the measured parameter (here N=10, that is why the denominator represented as a common logarithm is equal to 1).

The first extremal case. The petrophysical rock properties parameters' amplitudes have been studied on the bore well logs.

It goes from the formula (1) that at n = 10 and $p_i = 0,1$ the K_Φ value is equal to 1. In the calculations we used the logarithm to base 10. The considered case conforms to the *maximal heterogeneity* of the vertical section of the isochronal stratigraphic range chosen. The number of facial rock types is equal to 10.

The second extremal case. If the vertical section is homogeneous, all the values of amplitudes in the well log fall within the same grouping class. In this case $p_i = 1$, and the K_Φ value is equal to zero, as $\log 1 = 0$. The number of facial rock types in the vertical section is equal to 1.

Present-day computer technologies allow getting in the shortest time such vertical section heterogeneity complementary information, which is impossible to get in other ways. This heterogeneity can also be mapped.

For the geological section heterogeneity problem solution on the GC, OGC, SP and RC diagrams we applied the computer programs, which allow analyzing and interpreting the well information quickly using standard petrophysical algorithms and also making the relative section entropy map.

The use of the relative entropy coefficient for the evaluation of vertical section lateral variability has an advantage of other ways of mapping of facies re-

flecting the geological system heterogeneity. This advantage consists in the fact that the number of facial rock types, which are taken into consideration, when lateral variability of the facies evaluated by information measures theoretically unlimitedly (as distinct from the traditional method of drawing facial maps on the basis of lithological triangles).

The K_Φ value allows coming to the conclusion about facial heterogeneity of the vertical geological section in every well, and also studying the heterogeneity index variability in the studied area on the parameter value, which changes from 0 to 1. When using this extremely formalized information parameter, the lithology on the direct core sample observations should be taken into account, as $K_\Phi = 1$ for *any* homogeneous stratum. For example, for homogeneous porous sandstone and homogeneous dense argillite the K_Φ value will be the same. Rocks are indistinguishable on this formalized characteristic.

With the appearance of special computer programs allowing representing a well log automatically in the form of a discrete series of points and composing a histogram on the basis of these data in the preset number of grouping classes the possibilities of studying vertical and lateral heterogeneity of a geological section by information measures have increased.

The source material presentation and its further computer treatment procedure described here allow solving the problems, which couldn't be solved earlier because of the labour intensity and duration of measuring and computation operations (Ozhgibesov, 1975).

However, it should be borne in mind that the beginning of the problem solution and the problem definition itself consist in the substantiation and choice of a concrete stratigraphic interval with isochronal (or relative isochronal) boundaries of its bottom and roof. The analysis and final conclusions about the multivariable lithologic-petrophysical heterogeneity of the vertical section and its lateral variability should be made only with due account for (probably, simplified) the three-dimensional lithlogic-petrophysical model of the studied territory.

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BASIC RESULTS OF WORKING OUT AND INTRODUCTION OF TECHNOLOGIES OF DESTRUCTION OF FRAGILE MATERIALS WITH APPLICATION OF PLASTIC SUBSTANCES IN MINING AND BUILDING

Tsygankov D.A.
Institute of Mining of Siberian Branch of Russian Academy of Sciences
Novosibirsk, Russia

Plastic substances for the purpose of destruction of natural or artificial brittle materials came into use comparatively not long ago. Despite of this fact there are concrete results briefly expressed in the following in this area.

The working out and realization of the brittle materials destruction technologies using plastic substances in industry should be connected with the initial definition and subsequent regard for a complex of factors reflecting the specificity of objective and subjective operative conditions.

The projecting of technologies of crushing firm formation lumps with drop-weight using plastic substances in conditions of mineral deposits exploitation open-cut mining method will be connected with: the necessity to use mining engineering able to produce high impact energies; the provision of destruction directivity elements absence by means of using smooth wading rods, the lack of the necessity to use estuarine parts and shot hole walls sealing; the use of maximally possible hole depth filled up with a plastic substance. Thereat, because of weight dropping height limitations there will be restrictions on maximum dimensions of the lump, the destruction of which takes place along the whole length of the hole drilled in it and filled up with a plastic substance practically simultaneously.

The projecting of technologies of crushing average and low strength formation lumps with a hydraulically and pneumatically operated hammer using plastic substances in conditions of mineral deposits exploitation open-cut mining method will be connected with: the possibility to use mining engineering producing lesser impact energies; the provision of destruction directivity elements absence by means of using smooth wading rods; the lack of the necessity to use estuarine parts and shot hole walls sealing; the use of maximally possible hole depth filled up with a plastic substance. Thereat, because of the tractor chasses-mounted hydraulically and pneumatically operated hammer raising possibilities limitations there will be restrictions on maximum dimensions of the lump, the destruction of which will take place in the contact point of the hydraulically and pneumatically operated hammer rod (lance) and plastic substance in the shot hole at its gradual moving from the estuarine part to the face one.

The projecting of technologies of crystalline rocks mining using plastic substances in conditions of

mineral deposits underground mining methods will be connected with the preservation of natural appearance of crystals, raw material losses reduction in the interior of the earth, elimination of a range of time-consuming and labour-intensive operations in underground conditions and higher safety of mining works performance.

The projecting of technologies of building structures' masonry work will be connected with the reduction of labour-intensive working operations, greater expression of the aperture form, and the lack of linked engineering structures integrity affect because of low impact energies application.

The projecting of technologies of mass concrete basement destruction will be connected with the reduction of primary technological processes' labour intensity, the possibility of portable elements' form and size management, the lack of linked engineering structures integrity affect because of elimination of the vibration action on the part of heavy mobile impact mechanisms, and also the work execution cost reduction.

The projecting of technologies of framework prefab reinforced concrete engineering structures destruction will be connected with the reduction of danger and hazard of elevated installation and construction works, the reduction of terms and production cost of main technological operations performance.

In spite of the possibility of higher work execution safety and also the preservation of production rhythm of an enterprise for the period of carrying out crushing firm formation lumps with drop-weight, the use of the given technology won't be economically feasible compared to the drilling-and-blasting method. It is connected, first of all, with great time and value of works on the preparatory distribution of the lumps in the job site and impossibility of blast-hole drilling exclusion.

A competitive method of crushing average and low strength rock lumps with regard to the drilling-and-blasting one is their crushing using hydraulically and pneumatically operated hammer on the chasses of light mobile mining machines. It is connected, first of all, with relatively small cost of machine change of such equipment, and also the lack of the necessity of preliminary distribution of all the available lumps in the job site.

The introduction of the building structures' masonry work directed destruction technology into construction operations will be fully competitive compared to the application of manual non-mechanized instruments, as it decreases hard manual labour sharply and makes the forming of better quality apertures possible.

Materials of Conferences

PROTEST BEHAVIOUR AS THE INTEGRATED PARAMETER OF CRISIS OF THE ADOLESCENT'S PERSON

Guseinov A.Sh.
KGUPKST
Krasnodar, Russia

The adolescent period is often defined as: *crisis, conflicted and* even *protesting*. L.S.Vygotsky has suggested a negative phase in **adolescent's stage** and its **protesting** character has connected with destruction the established system of interests. As E.Erikson reckoned, an **inability to self-identification in** a youth **can cause the protest**, anxiety, insecurity.

Aggression and the protest of adolescents are formed often as the protest against misunderstanding adults, because of dissatisfaction with the status.

In three **empirical researches** (sample - 210 persons) was supposed, that training in specialized schools, playing sports lead to escalation of protest behaviour of adolescents. The **test of protest behaviour of the person (PBP) is created**. Reliable distinctions in groups according to Student and significant correlations of variables in each sample according to Spearman were interpreted only.

We compared a conflictness and unadaptability of adolescents athletes and the adolescents who are not going in for sports by tests: MMPI; Leari; PBP. *The high level of protest behaviour both of athletes and of usual schoolboys* is revealed. The protest behaviour *of* athletes directly correlates with *a hysteria* r=0,33; *psychopathy* r=0,51; *schizoid* r=0,42 and is negatively connected with *the friendly relation to people* r =-0,27. **The athletes, who have a neurosis, have not enough chances to get the high position, they are dissatisfied with themselves and it provokes the protest** behaviour. A sport is initially *conflicted* and **the simple playing sports, without an involvement of the adolescent into communication, do not protect from unadaptabilit**y **and crisis.**

Further *an influence of conditions of pedagogical activity on protest behaviour of the person was estimated*. 30 teachers and 30 pupils of a boarding school, and also 30 teachers and 30 pupils of a grammar school are interrogated. Tests**:** Assinger; the test of a conflictness; Fidler; PBP. It is revealed, that **teachers are more** *disputed* **and aggressive** in comparison with pupils, **and in a boarding school a psychological climate is estimated as low and they are ready to the protest.** Thus, **the adolescent's crisis cannot be overcome by forces of teachers as teachers are in stress and the personal crisis, which is caused by an insufficient estimation by a society of their professional work.**

In the third research we compared personal features of protest and normal adolescents. *Protest adolescents***, in comparison with normal adoles-**cents, have an *abnormally high of aggression, primitive defenses are expressed, coping are less effective*. **Prevalence of low-leveled defenses, which have protest adolescents, testifies to serious intrapersonal problems. Primitive defenses prevent persons to realize the problems, do not promote a formation of effective coping and aggravate adolescent's crisis.**

So, **the analysis of the several researches** lead in different populated areas, on various samples, shows that the protest behaviour of adolescents finds out complex multivariate connections with the parameters of aggression, unadaptability and the personal's conflict. It **confirms the thesis about crisis character of the adolescent stage of person's development, but also testifies that** *the protest behaviour* **can be integrated and reasoning factorial parameter of unadaptability and trouble of the adolescent's person**.

PERSON AT LATE ONTOGENESIS STAGE: DEVELOPMENT AGE TASKS AND ELDERLY AGE CRISIS

Sakharova T.N.
Moscow State Pedagogical University
Moscow, Russia

The development at age is performed in the direction of human spiritual maturity. By spiritual maturity in psychology one can mean the determination of a human to solve his life problem to the more and more full extent.

The destination of age, to our mind, can be derived from E. Ericson's theory. In his opinion, the life cycle final stage is the psycho-social conflict of "integrity against desperation". The primary task of this period is to accept the worth of the life spent. People should look back and reconsider their achievements and failures. Consequently, the focus of attention should be shifted from the future to the past experience. It becomes possible only when the previous stages were finished successfully. E Ericson marks some components of such a state - the acceptance of one's life journey as the only proper one without dispraising others' life journeys; the sense of "universal" solidarity with people of various times and nations, when every welcomed human seems to be native and sort of close. Only then the form of active relationship of a human with the life narrowness will become wisdom "with many shades of meaning from "mind" maturity to knowledge concentration, - matured judgment

and deep cosmic comprehension". [Ericson E. Identity: Youth and crisis. – M., 1996.] In our opinion, wisdom here can be considered as the highest form of spiritual development of a person.

Otherwise, as opposed to wisdom, a sense of despair attended by affections concerning unrealized opportunities and committed errors is formed. A shortage or lack of integrity in such people can be manifested in a concealed death anxiety, sense of frustration and desperation because of the impossibility to change anything. It can be hidden behind the disgust of a person to itself or complaint of social institutions or individuals. [Khukhlayeva O.V. Psychology of development: youth, maturity, old age – M.: Asadema, 2002 – pp. 38-43.]

Speaking on development tasks of a personality at the age of old, Slobodchikov V.I. notices that, on the one hand, during this time it is extremely important to realize the necessity to work on the completion of what can be accomplished. And on the other hand, - to feel the limits of the possible and accept the imperfectness of both itself and the outside world. [Slobodchikov V.I. Tsukerman G.A. Integral periodization of general mental development – Problems of Psychology, N5, 1996.]

From our point of view, it is necessary to consider one more specific task of personality development at the age of old – it is the self-sentiment within the life-death system. According to Novikov I.B., the age of old is a bridging phase between life and death; it is a period of tense inner work related to the realization of one's own death inevitability. [Novik I.B. Life-death system – M., 1992.]

Discussing the old age personality development tasks, one can't help considering the elderly age crisis, which is typical of this period.

In the elderly age crisis one can mark two basic lines. The first one – is the necessity to admit the finiteness of one's own existence. The second one – is the admittance of the necessity to perform those life tasks, which were not being performed during the previous life.

In case of a successful accommodation of the crisis in elderly people their attitude to their own life in the period of old age is changed. The attitude to the old age as a period of rest disappears. The old age starts to be perceived as the period of a serious moral work and moral enhancement. Let us view, how the critical state in elderly people can manifest itself, in detail. Let us begin with the fact that the most difficult thing is to let the idea of finiteness of one's life on the Earth. That is why we can so often observe the non-admittance of the old age itself by them. The aging manifestation many people tend to consider as symptoms of an illness, which, as any illness, can disappear. That is why so much time is spent for curing and doctors' prescriptions adherence. Sometimes the struggle with aging becomes the primary occupation of a retiree. In this case a super valued attitude to

healthcare products and hypochondriac concentration on their painful feelings are possible.

In some elderly people the general background of mood can low down somehow. A blue, pensive mood without any objective reasons becomes more and more often. A resentful temper and anxious suspiciousness increase, and negative emotional responses to some or other troubles become rather long.

Shakhmatov N.F. supposes that during this period almost half of the elderly suffer from a specific depressive disturbance of mood – so called age-situational depression. A sense of futility and irrelevance, indifference to anything are indicative of it. Most often this loneliness being outlived is just a feeling, and not a real loneliness. [Shakhmatov N.F. Psychic aging – M., 1996.] Research workers describe intensifying of biotype fears connected with growing helplessness and the body's functions' senescence. Moreover, irrational fears (for example, fear for aggression, chase), moral fears (to render an account of one's own life sense) appear. It is possible to say that the general fear level grows considerably. Some researchers suppose that many behavior patterns traditionally referred to the elderly – jerk responses, proneness to speculations and criticism of the environs, restraint – can be interpreted as their own struggle with fears and anxiety.

An essential aspect of the crisis is the deprivation of claim for recognition in many elderly people. It is the result of the fact that the formal recognition fundamentals – the status, material wealth, appearance – get lost. In those people, for who the significance of the formal recognition indicators is higher than that of the informal ones, the threat of ego destruction and self-esteem lowering emerges.

It should be also noted that an elderly person has to organize his/her time in a new way. Earlier life in many ways depended on external circumstances, work in particular. Now the human stays face to face with himself, that is hard and unusual for many.

One more activity type, which suffers the greatest changes at the old age, is communication. On the one hand, researchers mark a growing proneness to conflict in communication of the elderly with each other, and, on the other hand, they speak on the possibility of gaining the sense of attachment as a result of loneliness fear influence, and also the communication worth revision under the influence of a soon leave.

Also the conflicts between generations become common, they being connected with the unwillingness to perform new roles by both senior and junior family members. Very often the elderly people's care of the younger generation bears the character of hyper-tutorship and causes conflicts.

The elderly age crisis course is worsened by desexualization of the elderly. Sex differences in clothing and behavior blend. Every conversation about sex relations is rejected harshly and sometimes aggressively.

In spite of negative manifestations, and often contrary to the biological influence, the personality development at the age of old can bear a positive character and be attended by the feelings of happiness and joy unusual in youth and associated with enjoying life.

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ABOUT TEENAGERS` ETHIC CHARACTERISTICS' DEVELOPMENT
Popov L.M., Ismagilova R.R.
Kazan State University
Kazan, Naberezhnye Chelny, Russia

Ethic characteristics of male and female juveniles were investigated with the help of the inquirer "Good – Bad" (Popov L.M.), which has already been known well enough in psychological literature.

The "Good" integral estimate variation range for female juveniles makes 114,4 to 89,7. In male juveniles the "Good" highest level makes 106,2, and the lowest one – 82,5. The "Bad" significance level is considerably lower. So, girls have the limits from 83,8 to 56,3, and boys – from 90,8 to 57,6.

Among the technologies most accurately oriented to the development of moral-ethic characteristics we have emphasized such ones, which, first, are person-centered, second, have a dialogic foundation, third, are reflexive and, forth, create imitation space. The ballintic group, group discussion, group situation solution, group analysis of concrete situations and role game are referred to such technologies in particular.

The results of our investigations found out a positive influence of the methodical and psychological conditions chosen by us on the development of ethic characteristics in teenagers and senior high school students. A higher development level (by 18%) of the factor "Good" was observed in the experimental group at the end of the academic year (56,8% - 65,4% - 74,1%), whereas in the control one – the given factor value is more stable during the whole academic year (58,4% - 59,4% - 60,5%).

The organization of the given technologies with teenagers and senior high school students contributed to the "Bad" factor reduction. So, at the end of the academic year the number of negative characteristics in the experimental group was authentically less (by 31%) than in the control one (36% - 14,8% - 4,9%) and respectively in the experimental group (38% - 36,39% - 31,4%).

Thus, we wanted to mark that we tried to choose the most necessary, so called core moral ethic characteristics.

Materials of Conferences

RELEVANCE OF ENVIRONMENTAL EDUCATION AND ITS ESSENCE

Bespalov A.M.
*Biysk State Pedagogical University
named after V. Shukshin
Biysk, Russia*

The problem of ecological education was acknowledged and became the subject matter only in the second half of XX century. It is then, when the warnings of philosophers about the destructive action on the universe, inclusive of the human himself, by the anthropo-centrist ideas of the world became urgent. Modern Russian educational conceptions in its overwhelming majority are based on such ideas. That is why it is necessary to find out those approaches and foundations to the ecological education, which will be adequate to the subject itself.

The idea of a human as a social creature has solid grounds under it. It is the society, where a human child, because of joint activity and communication with other people, can become a human. But the human activity, by means of which a human stands out of the natural world, opposes it to the last, alienates it and its essential forces from the universe. That is why it is practically impossible to solve the problem of keeping balance between the natural world and the human only at the activity level. The activity itself is not a comprehensive reason for the human existence. Rendering a considerable influence on the other levels, it is defined by them in many ways. By the way, as Batishchev G.S. noticed, "no matter how great the achievements are, there will always be found such reality levels, which, because of their far greater complexity, will prove to be so far ultramundane, backbreaking difficult for an adequate penetration of human activity in them. Such subject-matters, remaining for the time being historically unapproachable, lie beyond the boundaries of subject-matter-ness" [1]. It shows that not only changes of nature, but also knowledge of possible changes, have its own limits within the bounds of reality. Also, it underlines the need for the acknowledgement of the fact by the human that, beyond activity, he is in special relations with the world, himself, his and its past, present and future, invariably *ultramundane* for historically defined activity, in the relations of "deep attachment and involvement" [2].

Such an acknowledgement is possible only in the state of integral perception of the world, inseparability of the Human and the Universe into a subject and object, i.e. in the state of subject-object relations overflow. In such relations with the world the human is at the pre-activity (in psyche – it is the unconscious and subconscious) and over-activity (it involves meditation and creative work) levels.

However, it should be noted that none o the levels in itself is not able to provide an effective and full-blooded enough human existence. Without a sufficient development of all the mentioned levels the human remains a unilateral, one-dimensional, incomplete person. This imperfection, unilateralism was caused by various reasons in various historical epochs, but eternally resulted in one thing: the domination of one or another level of human relations with the world, and so – the alienation from it.

One more important definition of the human should also be noted. As a Kazakhstan philosopher Khamidov A.A. points out, "a human becomes a subject inasmuch he stops practically assimilating to a finite (and that is why adaptive) creature, inasmuch he stops being closed on his qualitative and quantitative definition, on his specific measure and essence" [3]. A human as a subject is constantly becoming, is being in the absolute movement of becoming, as he acts not only in accordance with his logic, measure and essence, but also in accordance with the logic, measure and essence of the object standing against him (in this very fact the foundational importance of activity in the human becoming consists). And even being a representative of a particular social group, a bearer of a special status, etc., he is never completed with these definitions. Certainly, a measure of the truly human (i.e. corresponding to the tendency of absolute movement of becoming) is defined both by a general type of the social medium, where the individual lives in, and his own life intentions and ambitions. Thus, only going beyond his own finiteness, definiteness of the present human existence conditioned by the cultural-historical level of human society development, an individual becomes a real Human, Personality. A topically parallel outcome is possible in the acts of creativity, deep involvement into the existence and real inter-subject mutuality. Together with that, creativity supposes a radical coming into the situation principally uncontrollable from the outside. That is why a demand for the formation of a talent to personally-inner mental self-control in a human grows today. That is why modern education should be filled with ecological, humanitarian, moral, axiological, spiritual content. And it is referred not only to the training of humanists, but also to the comprehensive school, to the training of any specialist, in one way or other coming to the level of creative relationship with the world. But it has a special value for those, who concentrate creative potencies in themselves: teachers, therapists, public figures, scientists, litterateurs, art representatives, etc.

It follows from this that ecological education cannot be defined as a "system of social norms, rules, knowledge, skills and institutions aimed at the provision of long-term interests of the human in the Biosphere" [4]. *Ecological education – is a deep onto-*

logical cultural-cosmic phenomenon grounded in the existence, the appropriation of modes of being in the Universe by the human, the modes providing maintenance of the balance in the interaction with the Universe. Thus, it cannot be restricted by definite scales preassigned by the society. For, who learns, *learns*, first of all, *to be*, and not only to know. And, who teaches, *teaches* not knowledge as it is, but *modes of being in the Universe*, "he being and knowing at the same time" [5].

But the human is always mentioned as a concrete-historical subject constantly finding certain definiteness, finiteness, appears as an accessory of the social medium. That is why education is understood as the formation and introduction into a special mode, as well. Thereat, those, who fall out of the defined frames of the mode specified by the society, are alienated by the society. Together with that, one of the present-day world's features is the acceleration of social processes causing global changes in the arrangement, functioning and development of the society and nature within the limits of one generation life; the acceleration being conditioned by the technological revolution. Moreover, one generation can outlive several changes alike. They are the changes of natural and climatic, technological, informative and ideological character. On the one hand, they scale up the abilities of human influence not only on social processes, but on the entire world surrounding the human himself, and on the other hand, they reduce the abilities of culture mass reproduction traditional forms geared to the transfer of its external manifestations. The mode strongly preset by education fails to touch a new reality. A human, when finding himself in new existence conditions generating both positive and negative destructive influencing factors earlier unknown for him, feels ever-increasing physiological helplessness, psychological discomfort and intellectual overpressure. Life itself makes us develop more fundamental levels of the human essence in the process of education today. It is, first of all, the creative workability enabling to provide both an adequate response to the time challenge and preservation of self-definition, thereat. It is also the ability to self-control, self-preservation, self-purification and self-recovery of one's own vital forces.

The modern education system is mainly built on the teacher-students communicative intercourse, in the process of which the assimilation of verbally formed images of the object world by the students takes place. Beyond the framework of school programs there remains the perception of the real object world. Partially this disadvantage is pieced out at practical classes, when learners directly make or correlate various object verbalization systems to their own experience and already defined image verbally organized by their own consciousness. But, in the first case, school is short of time and tangible assets (it is impossible to reproduce the way of object-

transforming activity passed by the mankind for thousands years of its history in conditions of school). And in the second one - there required a coming out beyond the communicative intercourse framework in the problem situation organization, where the "choice", "finding" the "right" image from already ready images of the object world, even if these images are not given during the classes directly, to the deep ontological communication, when a new image "is built", is produced. Besides, for the perception of nature the coming out beyond not only the communicative intercourse framework, but also beyond the framework of the deep verbal intercourse proper, is needed. A direct deep communication with nature is necessary to form an image notional perception, beyond which "nature is deprived of its real fullness" [6]. A dialog here is simply indispensable. Thereat, the subject-matter-ness of "other" senses by means of the rational way often remains the problem of organization of a dialog with nature unsolvable, as various logics are met here. That is why the development of not only rational thinking, but also irrational abilities, which, having no use in the rationalized world, are generally blocked and exist in the human only at the virtual energy level, is so important in the present-day world.

In connection with the necessity of turning to the deep forms of attitude of the human to the world (first of all, creative attitude) resisting outside control, there emerges the problem of formation the ability to personally-inner mental self-control in the human, as it was mentioned earlier. As creative attitude, according to the correct note of M. Bakhtin, "doesn't accept any ethic estimation and aesthetic appearance of existence, drives off them, …performing by this the purity of its uniqueness" [7], as a similar estimation is possible only when realizing the creative attitude itself as an act, as inclusiveness of the creator-human into the Universe. And this realization is open to the philosophic reflection, first of all. Only at the philosophic level not only the world itself in its all integrity, but also the relations with it are problematized in their axiological-conceptual aspect. It makes the introduction of philosophical education into the educational process, starting with the elementary school, topical. Ecological education without philosophical understanding of the reality – is flawed.

The result of ecological education is the ecological world outlook, world perception, world attitude, including not only the system of knowledge, skills and abilities in the area of ecology, but also ethic, legal and other norms, behavior and activity repertoire regulating balanced interrelations with the environment, the readiness to observe them, the ability to percept and estimate one's own relationships with the world, etc.

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THE GLOBAL PROBLEMS OF MODERN HUMAN ECOLOGY

Musikhina E.A., Golovnyova T.I.
Irkutsk State Technical University
Irkutsk, Russia

The global problem of modern education is to form a person that is of full value and possesses highly developed social and personal intelligence. The person that is able to find a compromise between private "I" by Maslow and social "We" by Gegel; that adequately appreciates both itself and another person; which motto is "I am free as long as my freedom doesn't do harm to the other's people freedom" can be acknowledged as the ideal person. It is understood that it's impossible to become ideal, but why just not keep trying? Our further evolution is unthinkable without moral large-scaled ecological education that includes such disciplines as human ecology, dwelling ecology, regional ecology etc. The concept of the Earth cover as a sphere, that was put by Austrian geologist Zuss and completed by Russian scientist Vernadsky, became classical. Human ecology as a science must be based on the concept of health that is complex in its definition. It includes not only physical health of a human, but also his moral, psychical and matter conditions that all together form the sphere named "human ecology".

It is proved that one human appreciates another one accordingly to his own abilities. Primitive human tries to adapt a more complex person to his level and thus tries to make that person more primitive. By analogy with this simple example he tries to appreciate his environment, too. He has no doubts in that everything around exists only to satisfy his own needs. On the other side, those who adequately appreciate themselves are able to appreciate the others more adequately and don't try to think by patterns.

Those who are adequately appreciate themselves and all their surroundings are just unable to do harm to their environment – house, city, region, country and the whole planet. Understanding the value and uniqueness of a human life and human relationships is the way to harmonious natural resources exploitation. If we will continue to be harmful to our environment, the ecological crisis will go deeper. Mankind is coming to a deadlock by itself. Planet resources are not endless, mankind is already contradicting with its environment. Separating himself from the nature, trying to just satisfy himself, a man is acting like a virus, destroying not only his own environment but also himself. We can see this looking through the history of a mankind: wars, conflicts, mindless exploitation etc. The main role in this self-destructions are played by the governments because they make decisions for all their people. Our leaders must be more socially and intellectually developed, they must show the example for their people, they should remember that "the real intelligent man is that one who stays intelligent when he is alone".

Modern people should understand the simple truth: there is no existence out of the nature. The changes in the natural system inevitably result in the changes in our society. Vernadsky talked about the mankind as geological power that is able to change the Earth's surface. His theory of noosphere – the sphere of intelligence – is a result of his care for the future and for the development of a mankind. There is a necessity to form ecological mentality in people's minds independently from their nationality, location, job, interests and culture.

Soils, water and atmosphere pollution by industrial toxins, fluorides and pesticides are the real problem because the mankind is a part of the environment. Protecting and restoring soils is only a part of the problem and is a very important task because all toxins or their combinations in the soils inevitably get in our organism.

The soils of Irkutsk region are significantly different. They are forming in the conditions of the influence of the rocks spreading under them, different relief types and climate conditions. In the general agricultural areas there are the following soil types: grey forest (38,6%), carcareous, soddy podzolic, chernozem (5,9%), meadow and bog soils. Grey forest soils are located within mastered territories, mainly in Irkutsk, Usolye, Cheremkhovo, Zalari, Zima, Tulun,

Kuitun, Nizhne-Udinsk and Taishet regions. Carcareous soils are mainly located in Ust-Orda Buryat region, Bratsk, Kachug and Ust-Udinsk regions, they are very fertile. Soddy podzolic soils are located in taiga and subtaiga zones that are characterized with low fertile and are rarely used in agriculture. Chernozems are highly fertile soils with large content of humus; they are located in steppe and forest-steppe regions [1].

Effective functioning of the whole nature protection activities system is impossible without geoinformational systems (GIS) that allow monitoring, processing and analyzing the data, damage evaluation etc. At present there are a few of GIS in Irkutsk region, such as "Baikal" and "Irkutsk region". In the ecological subprogram of GIS "Irkutsk region" the different map making method is developed, i.g. population disease, atmosphere, water and soils pollution. Basing on that data a complex medical-ecological map of the south part of Irkutsk region is made.

Unfortunately, instable economics and insufficient technical and financial means do not allow carrying out the activities targeted to restore soils. There are also no reliable methods that allow to adequately evaluate and predict the consequences of different influences on the soils taking into account its spreading on the surrounding areas.

The Irkutsk regional office on hydrometeorology and environment monitoring observes soils pollution near the industrial cities of Irkutsk region. They define the following toxins: lead, manganese, chrome, nickel, molybdenum, tin, vanadium, copper, zinc, mercury, cobalt, sulfates, and measure pH in the soils. They observe the atmospheric sediments, snow cover and soils fluorides pollution. They inspect soils to define oil products and pesticides.

The criteria of soils pollution is the highest permissible concentration (HPC) of a pollutant. If there are no HPC defined, the pollution level is compared with ambient level or with soils clarkes. Clarke is the percentage of a chemical element in the Earth crust named after F.U. Clarke.

The technogenic soils pollution is at highest level near the industrial enterprises, big cities and roads. The main sources of soils pollution are gas-and-dust emissions sedimentation and sewage dumps. Besides, heat energy enterprises are the sources of ash dumps. On 10.01.2000 there were 26.759 hectares of breached lands in Irkutsk region. These negative activities are anthropogenic, and they result in soils degradation and total lands pollution.

Analyzing the soils pollution data for the period of 10-15 years we can't evaluate the real ecological-economical damage to the Irkutsk region soils. The modern ecological activity does not pay attention to pollution spreading and to the interference between different pollution types. Though there are many methods to evaluate the ecological damage to soils, atmosphere and water, unfortunately, they are not appropriate because they don't take into account the physical properties of time: time density – the rate of space organization, and time pace – the speed of transforming a cause into a consequence.

We suggest to apply the new author's method [2] of ecological-economical damage evaluation. The formula of the method is:

$$Ev = \frac{C_{dam} \cdot S_{dam}}{100 \cdot S_{gen}^n} \cdot R_{com} \cdot T_{max} \cdot \left(\frac{1}{Sc}\right)^{n-1},$$

where Sdam – breached lands area; Cdam – breach rate; Sgen – total area of a level; Rcom – the number of breached relations in natural system; Tmax – component's life time; Sc – scaling factor; n – level number.

Replacing the Cdam by HPC we obtain the formula for soils damage evaluation:

$$Ev = \frac{HPC \cdot S_{dam}}{S_{gen}^n} \cdot R_{com} \cdot T_{max} \cdot \left(\frac{1}{Sc}\right)^{n-1}$$

Thus, changing the formula, we can also evaluate water and atmosphere damage. After that we can evaluate the complex environmental damage and define the interference areas. This will promote the harmonious exploitation and, accordingly, the preservation of a mankind.

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THE TIME-SPACE METHOD OF ECOLOGICAL DAMAGE EVALUATION

Musikhina E.A., Dmitrieva L.J., Musikhina O.M.
Irkutsk State Technical University
Irkutsk, Russia

In view of high anthropogenic pressure on environment the new approach of complex ecological territory evaluation should be found. Surrounding spaces are multi-sided, and mankind influences on the environment at local, regional and global levels. Frequently something that is useful for a group of people is harmful for the environment. And the environment is a dynamic system that has many external and internal factors.

The Federal ecologic, technologic and nuclear inspection service's board resolution dated 02.04.08 states the following. During the last decades intensive

industrialization and extensive natural resources exploitation took place in Russian Federation. That caused great negative environmental impact and accumulating pollution in different environmental components ("ecological damage") which is concerned with using old technologies.

When developing market economics that leads to large-scaled privatization and industrial producing decrease (first of all in military and chemical industry) in the 90-th, a significant amount of mismanagement and economically unattractive actives appeared, which are characterized with high risk level for environment and human health, as well as for the territories close to ecological crisis. The most influence in the social sphere is observed in those territories of environmental impact, which are located within populated and industrial areas (they have direct affect on the health of more than 60 billion Russian people, who live in the cities and work on the factories).

The complex environmental impact evaluation that is accumulated in Russian Federation as a result of economic activity was not carried out yet, and present data are fragmental. In particular, RusTechInspectation carried out environmental impact investigations in Kemerov and Irkutsk regions targeted on making suggestions on environmental impact elimination and polluted territories restoration.

Russian legislation does not define what is "environmental impact", "ecological damage"; does not regulate the questions concerned with responsibility for environmental impact caused during the past economic activity. There are no methods of recognition, registration and evaluating "ecological damage" concerned with economic activity. The mechanisms of financing the "ecological damage" elimination activities are not worked, as well as polluted territories restoration on the base of state-private partnerships.

Thus there is a necessity for developing and applying the complex of activities on ecological damage elimination, including polluted territories restoration, taking into account international experience and the detailed investigation of accumulated ecological damage problem. There is a necessity for founding and working juridical and investment mechanisms of environmental impact elimination.

Existing damage evaluating methods don't take into account the spreading of environmental impact on higher hierarchical system levels. Thus, in spite of their significance, they can't give a correct damage evaluation. Most researchers agree that natural systems have complex multi-level structure, but they use the category of time incorrectly. There is a necessity to deeply analyze the time in view of astrophysicist Kozyrev's time theory. According to this theory time possesses the following physical properties:

• Direction – time is directed from cause to consequence; we cannot change the order of cause and consequence.

• Pace – there is a time (Δt) and a space (Δx)

$$C2 = \frac{\Delta x}{\Delta t}$$

distance between cause and consequence. is a time pace, the speed of transferring cause into consequence. The more C2, the faster time goes. Time does not have an impulse but it gives additional power and rotation moment to a system.

• Density – organizes a system and reduces entropy. The more entropy, the larger time density. It also can be reduced by a special sheet or increased by parabolic mirrors (Kozyrev's mirrors).

• Holonomity – as time has no impulse, it appears everywhere at the same time.

• Data storage – the processes that lead to the entropy increase reorder the structure of surrounding matter.

• Asimmetricity – having a certain asimmetricity an organism obtains additional viability.

Thus, taking into account the structure of time adequate to the structure of space, we can conclude that environmental impact will breach all natural system's levels but in different rates. Thus, we should develop a new damage evaluating technology basing on the time-space ecologic-economical damage evaluating method.

It is a paradox that there is no time theory in physics yet, though there is space theory – geometry. More than 3000 years ago people knew how to use the categories of lines, plane and volume. Geometry as a science was founded by Euclid in III BC. And still physicists use geometrical views trying to open the secret of time.

Calendar time does not always show the qualitative changes that occur during different life cycle stages of a system. It defines only quantitative time intervals – the duration (second, minute, hour, day, month, etc.), and doesn't take into account energy potential changes that only physical time can define. External influences on a certain material system (natural or anthropogenic) slow down or speed up its internal processes. Even more, they can lead it to extremely instable condition and change the system. However, those influences can't change the development program that is put in a certain system by the time pace of the system of a higher level.

The world is constantly changing, and everything happens in the time. The time is inseparable from everything in the world. Physical laws exist in the time, energy saving is a consequence of some time's properties. Obviously, the causality principle should be a science foundation. Physical sense and mathematical expression of time pace (the time of transition of cause into consequence) can be derived from the time-space causality properties. We can't objectively evaluate the environmental impact consequences without understanding the role of time pace and time density.

With every hierarchical level the resolution ability of a system is growing because the time "flows" more slowly with level increase. Human activities change both time pace and time density. It is hard to evaluate the risks and breach boundaries (where the system can't restore itself) without the time-space model that takes into account the physical properties of time when evaluating the state of the environment. The highest level of environmental impact is on the local object. With level increase it slowly decreases.

Using the time-space model of ecologic-economical damage evaluation we can evaluate the lands breach as follows:

$$Ev = \frac{C_{dam} \cdot S_{dam}}{100 \cdot S_{gen}^n} \cdot R_{com} \cdot T_{max} \cdot \left(\frac{1}{Sc}\right)^{n-1},$$

where S_{dam} – breached lands area; C_{dam} – breach rate; S_{gen} – total area of a level; R_{com} – the number of breached relations in natural system; T_{max} – component's life time; Sc – scaling factor; n – level number.

This formula is an expression of time density,

$$T_{max} \cdot \left(\frac{1}{Sc}\right)^{n-1}$$

and the ratio is time pace. To evaluate the damage to another component (e.g. atmosphere or water) one should simply replace area with appropriate parameter.

Using this ecologic-economical damage evaluation formula we can define the breach boundaries and specified environment restoration activities to prevent the natural system from degradation. Besides, this method allows defining the areas of environmental impacts imposing (interference) and evaluating the summary environmental impact damage in these areas.

It is obviously that the damage within interference areas is quite high though the origin is quite far from them. These areas are the areas of high risk along with the local objects in the center of the circles. That's why we should define buffers (or ecological barriers) between industrial zones and between different industries within those zones to prevent the natural system degradation. Our method allows to do that and it should be used at any level – from a small town to a whole planet.

Replacing the Cdam by HPC (the highest permissible concentration) we obtain the formula for soils damage evaluation:

$$Ev = \frac{HPC \cdot S_{dam}}{S_{gen}^n} \cdot R_{com} \cdot T_{max} \cdot \left(\frac{1}{Sc}\right)^{n-1}$$

Replacing the areas by the volumes, we obtain the formula for water resources damage evaluation:

$$Ev = \frac{HPC \cdot V_{dam}}{V_{gen}^n} \cdot R_{com} \cdot T_{max} \cdot \left(\frac{1}{Sc}\right)^{n-1}$$

But in this case we must take into account the spreading of pollutants in the water. In the stationary basins we can neglect the dynamics as the formula itself takes into account the spreading of damage on surrounding areas. As for the rivers, we can estimate the limits of pollution by adding the following formula:

$$L = v \cdot t,$$

where L – a distance that the pollutant will get over going down the river; t – the time of pollutant's dissolution; v – the average speed of the river. Thus, the local influence is not a "point", as in the case of soils, but a polyline with the length of L.

Pollution spreading registration, along with damage evaluating within different hierarchical levels of a system, defining the areas of different damages interference – are a complex of tasks, which solution takes much time and forces. Thus there is a necessity to develop specialized technical means.

We developed a program product for evaluating soils damage. It includes the following functions:
• data storage for different pollutants since 1993 to 2004;
• graphical visualization of spreading, interference and combination of different pollution kind within Irkutsk region;
• defining the areas of interference and evaluating the damage within those areas;
• analyzing the evaluated damage;
• predicting the environmental impact within investigated region;
• graphical visualization of every pollutant's affect in different years and each city of Irkutsk region;
• ordering data by different parameters;
• searching the data within data base.

We are planning to develop a program product "WaterRisk" with following functions:
• pollution data storage;
• rules describing some point of author's method application, in particular, how to define the minimal radius of pollution basing on the its density;
• defining the areas of different damages interference;
• damage evaluation;
• graphical visualization of spreading and intensity of pollution;
• analyzing the evaluated damage;
• predicting the environmental impact within investigated region;
• data storage for the program results.

All these activities are targeted to the harmonious exploitation and, accordingly, the preservation of a mankind.

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Short Report

LEGAL REGULATION OF THE RATIFICATION IN RUSSIAN LEGISLATION

Kuznetsova E.N.
Academy of Management «The Tatar Institute of Assistance to Business»
Naberezhnye Chelny, Russia

The present stage of international relation development is notable for actively developing globalization and integration processes not only in economic sphere, but also in legal. Sharply there is a question of international law and national legal system interaction. International relations are based on the international contracts promoting maintenance of piece and safety all over the world, to development of cooperation according to principles of the United Nations Organization's Charter [1] acting as the guarantor of fundamental laws protection and the person's freedom, the states interests. In order to the international norms get an obligatory validity for the state, they should be recognized by the given state, should enter its legal system and become a part of the national legislation. The given position is fixed in the Constitution of the Russian Federation [2] (p. 4 cl. 15) and in the Federal law «About the Russian Federation international contracts» [3]. Introduction in action of many international contracts is carried out by means of their ratification that is stipulated by the Viennese convention on the right of the international contracts of 1969 [4] (cl. 11) which defines ratification as the international act. However according to the Federal law «About the Russian Federation international contracts» ratification is considered as state process which also refers as ratification process. A question to consider this process as state or international one was discussed within the framework of the United Nations international law Commission. Actually these are two different acts. In many Russian Federation international contracts it is underlined: «Ratification, acceptance, the statement or connection is carried out to the United Nations General Secretary». The agreement draft sent to corresponding state instances, the text is corrected and is approved according to the state legislation.

The problem of international legal regulation, namely ratification and the subsequent implementation the international contracts in the national legislation did not found all-round reflection in the Russian legal system. There is only one clause in the Constitution which reveals attitude to international contracts. The Federal Law «About the Russian Federation international contracts» as marks JU.A. Tikhomirov does not reveal the problem [5].

In our opinion it is necessary to consider the mechanism of ratification which allows to estimate readiness of the national legislation for international obligations performance, on modification in own legal system. In this sense ratification is the norms forming factor however the state institutes are not always ready to realize new norms. Ratification entails the whole circuit of the certain actions of the state bodies. However in the specified law there are no positions about implementations of the international norms and there are no positions about the clause and the statement of the states at ratification. The law contains positions when the international agreements are to be ratified, but there is a need to elaborate some positions of the law. We agree with professor P.V. Savaskov who notes necessity to add clause 15 of the Federal Law «About the Russian Federation international contracts» the proposition that the contracts providing economic obligations in case not stipulated by any law are subject to obligatory ratification [6]. And also we suggest making changes in clause 15 of the Russian Federation Constitution in which it is underlined, that if international agreement contains other rule, rather than a rule of the law priority value has the international contract. Mentioning statutory acts positions of the international contract there is transformation in the national legislation norms. And in the Russian Federation the international contract as a source of the internal right instead of as a source of international law starts to operate. The list of sources found reflection only in the doctrine there is no Russian statutory act where sources of international law would be determined.

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