

*Medical and Biological sciences**Articles*

A STUDY TO DERIVE A CLINICAL DECISION RULE FOR TRIAGE OF EMERGENCY DEPARTMENT PATIENTS WITH CHEST PAIN: DESIGN AND METHODOLOGY	
<i>Erik P. Hess, George A. Wells, Allan Jaffe, Ian G. Stiell</i>	5
THEMATIC RESEARCH NETWORK FOR EMERGENCY AND UNSCHEDULED TREATMENT (TRUST): SCOPING THE POTENTIAL	
<i>Julie Peconi, Helen Snooks, Adrian Edwards</i>	18
INVESTIGATIONS OF ALGAL FLORA OF “VERKHNEYE DVUOBYE” WETLANDS (OB-IRTYSH FLOODPLAIN): BRIEF DESCRIPTION OF EUGLENAL ALGAE	
<i>Valeyeva E.I.</i>	25
SYSTEMATIC REVIEW OF RANDOMIZED CLINICAL TRIALS ON THE USE OF HYDROXYETHYL STARCH FOR FLUID MANAGEMENT IN SEPSIS	
<i>Christian J. Wiedermann</i>	31
<i>Materials of Conferences</i>	
EXPERIMENTAL VALIDATION AND EFFICIENCY OF WHEAT BRAN BAS PHONOPHORESIS IN INTACT ANIMALS	
<i>Gaydamaka I.I.</i>	40
BALNEOTHERAPY AS CHOLELITHIASIS DEVELOPMENT PREVENTION IN DIABETES PATIENTS	
<i>Danilova M.L., Trusov V.V.</i>	41
AGE-RELATED CHANGES IN THE STRUCTURE OF ADENOHYPOPHYSIS DURING EARLY POSTNATAL ONTOGENESIS	
<i>Degtyar Yu.V., Kapitonova M.Yu., Pratama E., Khlebnikov V.V.</i>	41
MYORELAXATION IN EXTREME CONDITIONS OF LIFE ACTIVITY	
<i>Denisenko Yu.P., Vysochin Yu.V., Lukoyanov V.V., Yatsenko L.G.</i>	42
CLINICAL MEANING OF RAPID GROWTH HYSTEROMYOMA, APPROACHES TO THE DIAGNOSTICS	
<i>Dikariova L.V., Shvarev E.G., Shvarev G.E.</i>	44
THE TOPICAL AND TEMPORAL CHANGES IN QUANTITATIVE ELECTROENCEPHALOGRAPHY OF HIGH QUALIFICATION ATHLETES OF DIFFERENT SPECIALIZATIONS DURING ONE YEAR TRAINING PROCESS	
<i>Eremeyev S.I., Eremeyeva O.V., Kormilets V.C.</i>	48
COMBINED ACTION OF REMOTE EFFECTS OF RADIATION IN THE DOSE OF 2 GR AND ASBEST DUST ON ACTIVITY OF ENZYMES OF PURINE NUCLEOTIDES CYCLE	
<i>Ilderbayev O.Z.</i>	49
IMMUNOMODULATORY CHANGES IN THE LYMPH NODES MEDIATED BY STRESS DURING EARLY POSTNATAL DEVELOPMENT	
<i>Kapitonova M.Yu., Gupalo S.P., Degtyar Yu.V.</i>	50
HEMATOLOGIC STATE OF ELDERLY DIABETES PATIENTS AGAINST METABOLIC DISORDERS	
<i>Lipunova Ye.A., Skorkina M.Yu., Tugin V.N.</i>	51
DEVELOPMENT OF ENDOTHELIAL DYSFUNCTION IN SYSTEM MOTHER-PLACENTA-FETUS AT HYPERTENSIVE DISEASE IN GRAVIDAE	
<i>Pavlova T.V., Selivanova A.V.</i>	52
ANALYSIS OF RELAPSES AND RE-OPERATIONS LASER DACRYOCYSTORHINOSTOMY	
<i>Valiyeva G.N., Babushkin A.E., Orenburkina O.I.</i>	52

THE MORPHOLOGICAL PARTICULARITIES OF GONAD OF ANDROGENLESS RATS

Zenkina V.G., Karedina V.S., Solodkova O.A., Yufereva A.L. 53

Short Reports

CHROMOSOMAL ABERRATIONS AND CONGENITAL MALFORMATION IN THE INHABITANTS OF INDUSTRIAL CITIES OF WESTERN SIBERIA

Minina V.I., Gromov K.G., Likstanov V.I., Druzhinin V.G. 55

SEARCH FOR ANTIOXIDANT THERAPY MEANS BY KINETIC METHODS

Zhuravleva L.A., Krainik V.V., Usmanova G.A., Ushkalova V.N. 58

Pedagogical sciences

Articles

SEMIFIELDS AND SHEAVES

Vechtomov E.M. 60

Materials of Conferences

THE GENESIS OF THE PROBLEM CONSIDERING THE CONTROL OF FURTHER VOCATIONAL TRAINING QUALITY UNDER THE CONDITIONS OF MODERNIZATION IN RUSSIAN EDUCATION

Korytov V.A. 66

MODULAR-RATING TECHNIQUE AS MEANS OF EDUCATIONAL PROCESS IMPROVEMENT AT UNIVERSITY

Maslennikov A.S., Shebashev V.E. 69

OVEROBJECTIVE INVESTIGATION: FORGOTTEN FORM OR REGENERATING PROJECTS?

Mushich-Gromyko A.V. 70

TAKING EXAMINATIONS ON PALAEOLOGY AND SEDIMENTOLOGY ON THE «SEA BOTTOM» IN THE CORRIDORS OF PERM UNIVERSITY BUILDING

Ozhgibesov V.P., Kolchanova N.G., Kalinina T.A. 72

SOME ELEMENTS OF INNOVATION TEACHING PROCESS IN THE UNIVERSITY OF READING BEING IMPLEMENTED IN PERM UNIVERSITY

Ozhgibesov V.P., Kalinina T.A. 73

CASE STUDY IN PRACTICE OF TEACHING OF POLITICAL MANAGEMENT

Sashchenko N.P. 73

ORGANIZATION PRINCIPLES OF STUDENTS' SOCIAL AND ENVIRONMENTAL EDUCATION PROCESS

Shilova V.S. 75

Short Reports

THE SEQUENCE OF TRAINING TO THE BASIC SECTIONS OF BASE TECHNICAL-TACTICAL PREPARATION ON SPORTS HAND-TO-HAND FIGHT

Glazistov A.V. 78

TECHNIQUE OF TECHNICAL-TACTICAL PREPARATION IN SPORTS HAND-TO-HAND FIGHT AT THE STAGE OF ELEMENTARY EDUCATION

Glazistov A.V. 78

Economic sciences

Articles

INSTITUTIONS IN MARKET MECHANISM FORMATION

Ainabek K.S., Iskakova Z.D. 80

EDUCATIONAL SERVICE MARKET DEVELOPMENT IN TVER REGION: TENDENCIES OF REGIONALIZATION AND INTEGRATION

Kuzmina A.A. 84

*Materials of Conferences***NECESSITY OF NEW REGIONAL SOCIAL AND ECONOMIC POLICY FOR RUSSIA***Karakashyan E.M.* 88**REGIONAL MECHANISM OF FOOD SUPPLY SECURITY***Lysochenko A.A.* 89*Short Report***MONITORING OF EDUCATIONAL SERVICE MARKET AS INFORMATIVE FOUNDATION OF LABOUR FORCE DEMAND AND SUPPLY PATTERN OPTIMIZATION IN TVER REGION***Kuzmina A.A.* 91*Chemical sciences**Materials of Conference***RECYCLIZATION OF 6-AMINO-5-CARBONITRILEFUOPYRANES UNDER THE ACTION OF NUCLEOPHILS***Anis'kova T.V., Timofeyeva Z.Yu., Yegorova A.Yu.* 92*Technical sciences**Materials of Conferences***PROGRESSIVE METHOD OF CUTTING STAINLESS AND HEATPROOF STEELS AND ALLOYS***Krainev D.V., Norchenko P.A., Ingemansson A.R.* 94**THYRISTOR INVERTERS WITH AN IDLE LIMITER FOR TRANSFORMER LOADS***Magazinnik L.T.* 94**PROBLEMS AND PROSPECTS OF NATURAL STONE DEVELOPMENT***Tsygankov D.A.* 95**SUBSTANTIATION OF PARAMETERS OF TECHNOLOGIES OF SHOCK DESTRUCTION OF FACING STONE WITH APPLICATION OF PLASTIC SUBSTANCES***Tsygankov D.A.* 97*Short Report***ANALYSIS OF PERSEIDS SHOWER METEOR CHARACTERISTICS ON THE BASIS OF PHOTOGRAPHIC OBSERVATION DATA***Sedelnikov A.V., Serpukhova A.A.* 99*Psychological sciences**Materials of Conferences***DEVELOPMENT OF SITUATIONAL SUPPORT CENTERS IN EDUCATIONAL DECISION-MAKING ACTIVITY***Egorov A.I.* 102*Philosophy**Materials of Conferences***SOCIAL AND PHILOSOPHIC ANALYSIS OF DEATH PHENOMENON***Kharitonova N.N.* 104*Ecological technologies**Materials of Conferences***THE RESEARCH OF RADIOACTIVITY COMMERCIAL ICHTHYOFAUNE OF RAZDOLNAYA RIVER ESTUARY (PRIMORSKIY REGION)***Borisenko G.S.* 106**HYDROLOGICAL RISK ON KAMA WATER BASINS AS CONSEQUENCE OF CHEMICAL POLLUTION***Kitaev A.B., Dvinskikh S.A.* 106

**INVESTIGATION OF FIELD LAYER INFLUENCE ON REGENERATION
CHARACTER OF CUT-OVER LANDS IN MIDDLE ANGARA REGION**

Runova Ye.M., Savchenkova V.A.

108

A STUDY TO DERIVE A CLINICAL DECISION RULE FOR TRIAGE OF EMERGENCY DEPARTMENT PATIENTS WITH CHEST PAIN: DESIGN AND METHODOLOGY

Erik P. Hess¹, George A. Wells², Allan Jaffe³, Ian G. Stiell⁴

¹*Department of Emergency Medicine, University of Ottawa, Ottawa, Canada*

²*Department of Epidemiology and Community Medicine, University of Ottawa, Ottawa, Canada*

³*Department of Internal Medicine, Division of Cardiology, Mayo Clinic College of Medicine, Rochester, USA*

⁴*Department of Emergency Medicine, Department of Epidemiology and Community Medicine, University of Ottawa, Ottawa, Canada*

Background: Chest pain is the second most common chief complaint in North American emergency departments. Data from the U.S. suggest that 2.1% of patients with acute myocardial infarction and 2.3% of patients with unstable angina are misdiagnosed, with slightly higher rates reported in a recent Canadian study (4.6% and 6.4%, respectively). Information obtained from the history, 12-lead ECG, and a single set of cardiac enzymes is unable to identify patients who are safe for early discharge with sufficient sensitivity. The 2007 ACC/AHA guidelines for UA/NSTEMI do not identify patients at low risk for adverse cardiac events who can be safely discharged without provocative testing. As a result large numbers of low risk patients are triaged to chest pain observation units and undergo provocative testing, at significant cost to the healthcare system. Clinical decision rules use clinical findings (history, physical exam, test results) to suggest a diagnostic or therapeutic course of action. Currently no methodologically robust clinical decision rule identifies patients safe for early discharge.

Methods/design: The goal of this study is to derive a clinical decision rule which will allow emergency physicians to accurately identify patients with chest pain who are safe for early discharge. The study will utilize a prospective cohort design. Standardized clinical variables will be collected on all patients at least 25 years of age complaining of chest pain prior to provocative testing. Variables strongly associated with the composite outcome acute myocardial infarction, revascularization, or death will be further analyzed with multivariable analysis to derive the clinical rule. Specific aims are to: i) apply standardized clinical assessments to patients with chest pain, incorporating results of early cardiac testing; ii) determine the inter-observer reliability of the clinical information; iii) determine the statistical association between the clinical findings and the composite outcome; and iv) use multivariable analysis to derive a highly sensitive clinical decision rule to guide triage decisions.

Discussion: The study will derive a highly sensitive clinical decision rule to identify low risk patients safe for early discharge. This will improve patient care, lower healthcare costs, and enhance flow in our busy and overcrowded emergency departments.

Background

Patients with acute chest pain often undergo extensive diagnostic testing and risk stratification to diagnose acute coronary syndrome (ACS) and determine the likelihood of future adverse cardiac events. Chest pain can be either cardiac or noncardiac in etiology and represents a continuum of risk from benign self-limiting conditions to life-threatening illness requiring rapid diagnosis and treatment. Currently it is not well established which patients require extensive diagnostic investigation. The goal of this study is to derive a clinical decision rule that predicts adverse cardiac events with a high degree of sensitivity and which will allow emergency

physicians to accurately identify patients with chest pain who are safe for early discharge without provocative testing.

Definition and epidemiology of acute coronary syndromes

ACS is a term that encompasses the disease entities unstable angina pectoris, non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI). Although myocardial infarction has been defined by a number of clinical, electrocardiographic (ECG), and biochemical characteristics, it is generally agreed that the term indicates death of cardiac myocytes due to prolonged ischemia [1]. Unstable angina pectoris, on the other

hand, indicates myocardial ischemia without biochemical evidence of cardiac myocyte death [2].

Data from the 2004 National Hospital Ambulatory Medical Care Survey indicate that chest pain is the second most common chief complaint in North American emergency departments, accounting for 6 million patient visits [3]. Approximately 565,000 patients are ultimately diagnosed with acute myocardial infarction, and nearly twice as many are diagnosed with unstable angina pectoris [4-6].

Statement of the problem in the emergency department

Chest pain is a diagnostic dilemma for the emergency physician. Data from a recent Canadian study suggest that 4.6% of patients with acute myocardial infarction and 6.4% of patients with unstable angina are misdiagnosed in the emergency department [7], with slightly lower rates reported in the U.S. (2.1% and 2.3%, respectively) [8]. In patients without a prior cardiac history, the challenge is to determine if the chest pain is cardiac in etiology. In patients with a prior cardiac history, the challenge is to determine the short-term risk of adverse outcome.

Information obtained from the history, initial 12-lead ECG, and a single set of cardiac enzymes to detect myocardial necrosis is unable to identify patients who are safe for early discharge with sufficient sensitivity [9,10]. Neither the 2007 ACC/AHA guidelines for the management of patients with unstable angina and NSTEMI nor the practical implementation of the 2002 AHA guidelines for the emergency department proposed by Gibler et. al identify a group of patients at very low risk for adverse cardiac events who can be safely discharged without provocative testing [11,12]. In the absence of guidelines that accurately and reliably identify patients safe for early discharge, physicians' triage decisions are variable and often influenced by level of perceived medical and legal risk [13-15]. As a result patients at very low risk for adverse outcome are often triaged to chest pain observation units and undergo extensive

risk stratification protocols based on an unstructured assessment of pretest probability and perceived legal risk [16]. High sensitivity is ensured at the expense of specificity, with increased likelihood of false positive provocative testing and significant cost to the healthcare system.

Methodologic standards for clinical decision rules

Concomitant with the reporting of various decision rules has been an interest in the methodological standards for their development and validation [17,18]. These standards may be summarized as follows: 1) The outcome or diagnosis to be predicted must be clearly defined and the assessment of this outcome should be made in a blinded fashion. 2) The clinical findings to be used as predictors must be clearly defined and standardized and their assessment must be done without knowledge of the outcome. 3) The reliability or reproducibility of the clinical findings used as predictors must be demonstrated. 4) The subjects in the study should be selected without bias and should represent a wide spectrum of clinical and demographic characteristics to increase the generalizability of the results. 5) The mathematical techniques for deriving the rule must be identified. 6) Clinical decision rules should be sensible: have a clear purpose, be relevant, demonstrate content validity, be concise, and be easy to use in the intended clinical application. 7) The accuracy of the decision rule in classifying patients with (sensitivity) and without (specificity) the targeted outcome should be demonstrated. 8) Prospective validation on a new set of patients is an essential test of accuracy because misclassification is commonly higher when decision rules are tested on a population other than the original derivation set. 9) Implementation to demonstrate the true effect on patient care is the ultimate test of a decision rule; transportability can be tested at this stage.

Review of previous studies

Currently, there is no decision rule that is widely used in Canadian and U.S. emergency departments. Although a number of

studies have been published that risk stratify patients who present to the emergency department with chest pain, none that directly address the clinical question at hand could be considered methodologically robust according to the criteria described previously [19]. Some of the methodologic deficiencies will be described in the following paragraphs.

The specific outcome measures varied considerably among the studies, consisting of acute myocardial infarction alone [20-32], acute myocardial infarction and unstable angina [33-37], acute myocardial infarction and death [38-40], all-cause mortality, acute myocardial infarction, and need for revascularization [10,41-50], and similar composite outcomes with slight variations [19,51-63]. Most studies did not report assessing the outcome without knowledge of the predictor variables.

Fourteen studies reported assessing the predictor variables in a standardized fashion with a data collection sheet specifically designed for a prediction rule study [19,22,23,25,26,31,33,34,47,50,56-59]. However, only four explicitly reported collecting the predictor variables without knowledge of the outcome [19,50,56,57].

Only one study assessed the reliability of the clinical findings to be used as predictors in the rule [19]. However, this study did not report kappa values for the predictor variables considered for inclusion in the rule.

The definition of subjects in previous studies has been extremely variable making it difficult for physicians to interpret and apply the findings to their own patients. Several studies did not specify age criteria for enrolment [23,27-31,33,35,39-41,44,45,48-50,52,55,56,58,60].

Among those that did specify age criteria, different criteria were used: over the age of 18 [21,22,34,38,54,59,63], over the age of 20 [43,46], over the age of 24 [10,24,47], over the age of 25 [19,25,26,53], over the age of 30 [32,36,42,51,61], between 20 and 80 years of age [62], and between 24 and 39 years of age [57,64]. In some studies all patients with a primary complaint of chest pain

were eligible for enrolment [19,21,22,24-29,31-34,43,44,46,49,53,54], whereas others required additional or different eligibility criteria [10,23,24,30,35,36,38-42,45,47,48,50-52,54-63,65]. Exclusion criteria varied greatly among the studies as well.

The mathematical techniques were described in all of the studies except one [31]. Several studies developed prediction rules that lacked clinical sensibility and were not easily used in the intended clinical application [21-31,33,34,36,50,52,59,61,62]. Twenty-four studies reported the accuracy of the decision rule in terms of sensitivity and specificity in diagnosing the predicted outcome [10,19,21-30,32-35,45,49,50,54,59,60,62,65].

Twelve prediction rules have been prospectively validated on a different set of patients from which the rule was derived [21,22,25,26,34,37,42,53,55,57,61,65]. None of these have consistently performed with sensitivities of $\geq 98\%$ across studies [66]. Only three prediction rules have been implemented to demonstrate their true effect on patient care [25,36,56]. The clinical decision rule developed by Goldman et al. [25] had a sensitivity of 88% documented in the implementation phase, and the outcome was limited to acute myocardial infarction. Sensitivities as low as 62% have been reported for the decision rule by Selker et al. [36]. Finally, the decision rule developed by Reilly et al. [56] addressed the decision of whether to admit emergency department patients with chest pain to the hospital ward or intensive care unit, not whether to discharge a patient home or arrange additional observation and diagnostic testing.

Objectives

The goal is to derive a clinical decision rule that is highly sensitive for predicting adverse cardiac events and which will allow emergency department physicians to accurately identify patients with chest pain who are safe for early discharge without prolonged emergency department observation, hospital admission, or provocative testing. Specific objectives are: 1) To develop and

pretest standardized clinical assessment methods for patients with acute chest pain, incorporating results of initial cardiac testing. 2) To apply these standardized clinical assessments to patients with chest pain. 3) To determine the interobserver reliability of the clinical findings. 4) To determine the association between the clinical findings and the development of adverse cardiac events within 30 days. 5) To use multivariate techniques to derive a highly sensitive clinical decision rule for patients with chest pain to guide triage decisions and selection of further diagnostic testing. 6) To assess the classification performance of the derived decision rule. 7) To determine emergency physicians' accuracy in predicting acute coronary syndrome without the decision rule.

Methods/design *Study design and setting*

This will be a prospective cohort study in which consecutive emergency department patients with a chief complaint of chest pain and possible ACS will be enrolled. The study will be conducted at a tertiary care academic emergency department in Ottawa, Ontario, Canada with an annual census of approximately 60,000 patient visits.

Study population

All adult patients at least 25 years of age with a primary complaint of chest pain of at least 5 minutes duration and possible ACS will be eligible for enrolment. Patient eligibility will be determined by the attending emergency physician on duty based on clinical judgment.

Patients will be excluded if any of the following criteria are met: 1) Acute ST-segment elevation (≥ 0.1 mV in limb leads or ≥ 0.2 mV in precordial leads) on the initial ECG. 2) Hemodynamic instability or tachycardia (systolic blood pressure < 90 mmHg, bradycardia < 50 beats/min, tachycardia > 100 beats/min). 3) Pulmonary edema on chest x-ray. 4) Age < 25 years. 5) A history of cocaine use or positive test for cocaine. 6) Severe communication problems such that a reliable history cannot be obtained. 7) A clear traumatic etiology of the chest pain. 8)

A radio-logically-evident cause of chest pain on chest x-ray (e.g., pneumonia, pneumothorax). 9) Prior enrolment in the study within the past 30 days. 10) Terminal non-cardiac illness. 11) No available phone contact. 12) Pregnancy.

Patient assessment

All patient assessments will be made by staff physicians who are certified in emergency medicine by the Royal College of Physicians and Surgeons in Canada and/or the College of Family Physicians of Canada. Rotating house-staff will perform patient assessments per standard practice but will be asked to have the staff physicians perform study assessments. The primary investigator will orient each of the physician assessors individually and provide one-on-one training to ensure uniform data collection. All physicians will complete data collection forms after assessing the patient and before obtaining results of diagnostic tests, without knowledge of the outcome.

Quality assurance

Throughout the duration of the study, the completeness of data collection and compliance in patient enrolment will be monitored. Physicians will be given regular feedback regarding their completeness of data collection. No feedback regarding the reliability or accuracy of each of the predictor variables will be given.

Selection of variables

The variables selected for assessment in the study were chosen based on review of the literature, input from all the investigators, and solicited feedback from the designator physicians. The number of variables collected was limited to ensure efficient completion of data forms in the context of patient care and optimize physician compliance. The variables to be collected on each patient are listed in Tables 1 and 2.

Electrocardiogram interpretation and cardiac biomarker assessment

Investigators blinded to the final outcome will review all ECG's in a structured format to identify the presence or absence of ST segment elevation or depression (classi-

fied as < 0.05 mV, 0.05 to 0.1 mV, and > 1.0 mV deviation) in at least 2 contiguous leads, T-wave inversion (≥ 0.2 mV when isolated or < 0.2 mV when in 2 or more contiguous leads with dominant R waves), left bundle branch block, right bundle branch block, or pathological Q-waves. Each of these findings will be categorized as "known to be old" or "not known to be old." The overall interpretation of the ECG will be categorized as normal, nonspecific ST-T wave changes, ab-

normal but not diagnostic of ischemia, infarction or ischemia known to be old, infarction or ischemia not known to be old, or consistent with acute myocardial infarction (ST-segment elevation or new left bundle-branch block). This ECG classification system is known to have high inter-rater reliability and to correlate well with 30-day outcome rates of death, myocardial infarction, and revascularization [67,68].

Table 1. List of prospectively collected historical variables

Demographics	<ul style="list-style-type: none"> • Age (years) • Date of emergency visit (d/m/y) 	<ul style="list-style-type: none"> • Gender (male/female) • Arrival by ambulance
Cardiac medications	<ul style="list-style-type: none"> • Aspirin • Clopidogrel • Other anticoagulants (warfarin, aspirin/dipyridamole) • Beta blockers • Calcium channel blockers 	<ul style="list-style-type: none"> • Nitroglycerin (or other nitrates) • Angiotensin converting enzyme inhibitors • Cholesterol-lowering drugs
Cardiac risk factors	<ul style="list-style-type: none"> • Hypertension • Diabetes Mellitus • Hypercholesterolemia • Renal insufficiency 	<ul style="list-style-type: none"> • Family history of cardiac disease • Smoking history
Cardiac history	<ul style="list-style-type: none"> • Acute myocardial infarction • Cardiac arrest • Peripheral vascular disease • Angina • Ventricular tachycardia 	<ul style="list-style-type: none"> • Known coronary artery disease • Atrial fibrillation • Congestive heart failure • Stroke or transient ischemic attack
Chest pain characteristics	<ul style="list-style-type: none"> • Duration and time of onset of longest episode (days, hours, minutes; a.m., p.m.) • Was the pain present on arrival to the ED? • Is the pain worse with exertion? • Is the pain similar to previously diagnosed ischemia? • Has there been 2 or more episodes of pain in the last 24 hours? • Where on the chest is the pain located? • Does the pain radiate? • Is the pain worse with movement or position? • The physician's overall assessment of the pain (typical or atypical) 	<ul style="list-style-type: none"> • Has the pain completely resolved? • Is the pain present at rest? • Is the pain pleuritic (sharp, worse with deep breathing)? • Has there been a change in the usual pattern of angina within the last 24 hours? • Did the pain recur during the ED visit? • How would you describe the pain? • Is the pain associated with nausea, vomiting, or diaphoresis?

Table 2. List of variables to be prospectively collected from the physical examination and diagnostic tests

Variables to be Collected		
Physical Examination	<ul style="list-style-type: none"> • Temperature (degrees Celsius) • Heart rate (beats per minute) • Systolic blood pressure (mm of Hg) • Diastolic blood pressure (mm of Hg) • Cardiac auscultation findings (S3, S4, Systolic murmur, diastolic murmur) 	<ul style="list-style-type: none"> • Lung auscultation findings (crackles/rales at bases, crackles/rales to scapulae, wheezes) • Chest wall tenderness (reproducing presenting symptom) • Pitting edema in lower extremities
Diagnostic tests	<ul style="list-style-type: none"> • Interpretation of first readable ECG (normal, nonspecific ST-T wave changes, abnormal but not diagnostic of ischemia, infarction or ischemia known to be old, infarction or ischemia not known to be old, consistent with AMI (ST-elevation or new left bundle branch block)) • Cardiac stress test done • If yes, type of stress test (nuclear, exercise, stress echo, other) • If yes, result (positive for ischemia, negative for ischemia, equivocal) • If equivocal, mild ischemia, moderate ischemia, or severe ischemia? 	<ul style="list-style-type: none"> • Cardiac troponin T • Cardiac CT done? • If yes, any stenosis $\geq 70\%$? • Coronary angiography done? • If yes, any stenosis $\geq 70\%$? • Did the patient undergo revascularization? • If yes, stent placement, angioplasty alone, or coronary artery bypass grafting?
Physician judgment	<ul style="list-style-type: none"> • Probability of unstable angina or acute myocardial infarction (to the closest percent) 	

Cardiac troponin T (cTnT) has been reported to have a higher sensitivity than CK-MB for diagnosis of acute myocardial infarction [69], and current guidelines suggest using cTnT as the sole cardiac marker to detect cardiac ischemia [70]. Thus, the sole cardiac marker utilized in this study will be cardiac cTnT (Elecsys Troponin T, Roche Diagnostics, Indianapolis, Indiana). The 99th percentile of the reference range is $< 0.01 \mu\text{g/L}$. The lowest concentration at which 10% imprecision is achieved (10% coefficient of variation) is $0.035 \mu\text{g/L}$. Some have suggested using the 10% coefficient of variation as the cutoff for myocardial injury to increase specificity and exclude other causes of cTnT elevation such as chronic kidney disease, left ventricular hypertrophy, pulmonary embolism, or sepsis [71,72]. However, several studies have shown that any detectable elevation in cTnT identifies patients at high risk for ischemic complications, and a rising or falling pattern of cTnT can distinguish acute from chronic disease [73-76]. In a robust emergency department trial by Hamm et al. almost every patient at short term risk (30 days) was identified by elevations in cTnT above the 99th percentile [74]. Use of the 99th percentile independent of the coefficient of variation has a very low false positive rate for diagnosing acute myocardial infarction and has recently been validated [77]. Thus, $0.01 \mu\text{g/L}$ will be the cutoff for a diagnosis of acute myocardial infarction. These reference values conform to the ESC/ACC guidelines for use of existing assays clinically and for clinical trials [2,70].

Having at least a 6 hour interval between cTnT specimens is the AHA definition of an adequate set of biomarkers [2,78]. However, recent data suggest that specimens drawn at least 3 hours apart have the same rate of detection of acute myocardial infarction as the AHA schedule, as long as at least one specimen is drawn ≥ 6 hours after pain onset [79]. Thus, cTnT will be measured at emergency department arrival and ≥ 6 hours from pain onset, with at least 3 hours between samples [79].

Run-in period

The data collection forms, patient assessment techniques, and patient follow-up questions will be evaluated during an 8-week run-in period prior to the actual study. This will allow time for training of the physician assessors and revision of the data collection forms as appropriate.

Interobserver reliability

A subset of patients will be assessed by a second emergency physician who will be blinded to the results of the first assessment. These second assessments will be performed on a feasibility basis whenever two study physicians are available.

Outcome measures

The primary outcome will be acute myocardial infarction, death of cardiac or unknown cause, or revascularization within 30 days of the emergency department visit. The secondary outcome will be acute myocardial infarction, death of cardiac or unknown cause, revascularization, or a new perfusion defect demonstrated on myocardial perfusion imaging.

Acute myocardial infarction will be defined as any one of the following: (1) a cardiac troponin T (cTnT) ≥ 0.01 with a rising or falling pattern (defined as a change of $\geq 0.03 \text{ ng/mL}$ for values that are initially $< 0.2 \text{ ng/mL}$; for levels $\geq 0.20 \text{ ng/mL}$, a positive cTnT will be defined as a change of $\geq 20\%$ between samples)[1,72,80] or (2) development of pathological Q-waves on the ECG or ECG evolution consistent with acute myocardial infarction. Revascularization will be defined as reestablishment of coronary artery patency by percutaneous coronary angioplasty with or without stent placement or coronary artery bypass graft (CABG) surgery. The final component of the primary outcome will be death of cardiac or unknown cause within 30 days of the emergency department visit.

The primary outcome will be determined by investigators blinded to the knowledge of the predictor variables. If a diagnosis cannot be assigned, 2 coinvestigators will review all clinical data and assign an adjudicated

cated outcome diagnosis. If a consensus can not be reached between two co-investigators, an adjudicated diagnosis will be assigned by the primary investigator. If all 3 disagree, the final diagnosis will be the most significant diagnosis. The reliability of the primary outcome determination will be assessed by having all positive outcomes and 10% (randomly selected) of patients with negative outcomes reviewed by an investigator blinded to the first interpretation.

Data analysis

Interobserver agreement for each variable will be measured by calculating the kappa coefficient, the proportion of potential agreement beyond chance, along with 95% confidence intervals. Variables with kappa values ≥ 0.6 will be considered to represent "substantial agreement" and considered for inclusion in the clinical rule.

Univariate analysis

Univariate analysis will be used to determine the strength of association between each variable and the primary outcome. The appropriate univariate technique will be chosen for the type of data: for nominal data, the chi-square test with continuity correction; for ordinal variables, the Mann-Whitney U test; and, for continuous variables, the unpaired 2-tailed t-test, using pooled or separate variance estimates as appropriate.

Multivariable analysis

Multivariable analysis will be used to derive a model to predict the primary outcome. Variables found to be both reliable (kappa ≥ 0.6) and strongly associated with the primary outcome ($p < 0.05$) will be evaluated with both logistic regression and recursive partitioning. Second order interaction among predictor variables that are known to be clinically related will be evaluated using Mantel-Haenszel and logistic model procedures. Appropriate composite variables will be considered for incorporation in the multivariate analyses. The objective will be to find the best combination of predictor variables that are highly sensitive for detecting the primary outcome while achieving the maximum possible specificity. To be

clinically acceptable, the model must be nearly 100% sensitive and contain the fewest number of predictor variables to facilitate ease of use by clinicians.

Recursive partitioning will be performed using KnowledgeSEEKER Version 5.2 software (Angoss Software International, Toronto) [81-83]. In recursive partitioning, the relationship between a dependent outcome variable (Y) and a series of predictor variables (X) is defined by a series of binary splits, resulting in a decision tree in which data are partitioned into several nodes or leaves along branches. The significance of each binary split can be quantified based on the chi-square technique.

Attempts to find the best model will also be made by performing logistic regression as an alternative technique. Model building will proceed with forward stepwise selection until no variables meet the entry (0.05) or removal (0.10) criteria for the significance level of the likelihood ratio test. In order to provide a simpler model for clinicians, cut-points will be sought for continuous variables. The variables chosen by the best model will constitute the decision rule.

Classification performance

The derived decision rule will be evaluated by comparing the classification of each patient to their actual status for the primary outcome. This will enable an estimate of the sensitivity and specificity of the rule, with 95% confidence intervals.

Patient subgroups

The classification performance of the decision rule will be assessed in the following patient subgroups: a) patients with and without a prior cardiac history b) patients with ECG's classified as normal or nonspecific ST-T wave changes and negative cardiac biomarkers and c) patients with outcomes at 0, 4, 14, and 30 days from the emergency department visit.

Physician judgment

Data from questions relating to physicians' predictions will be tabulated and presented in descriptive format. The probability will be used to calculate a receiving operat-

ing characteristic (ROC) curve for the diagnosis of acute coronary syndrome.

Sample size

Excluding the run-in stage, 1200 patients will be enrolled over 12 months at the study hospitals during phase I. Since no hypothesis is being tested, the sample size is based on estimation of the precision of the sensitivity of the derived decision rule as well as on the precision of the estimates of interobserver variability and the logistic regression coefficients. The sample size has to accommodate a large number of clinical variables (31), a large number of physicians (more than 60), the prevalence of acute coronary syndrome (21% of eligible patients in two recent Canadian studies [7,19]), as well as our plans to assess subgroups. A sample size of 1200 patients with possible ACS in which 11% of cases are excluded for ST segment elevation should yield approximately 120 ACS cases. 120 cases are needed to derive a rule that is 100% sensitive with upper and lower 95% confidence limits of 100% and 97.0%, respectively.

Ethics approval

Research ethics board approval was obtained from The Ottawa Hospital. As the study will not affect usual practice, there were no specific ethical concerns. At enrolment, participants will be informed that they will be contacted by phone in one month to determine their status, and verbal consent will be obtained at the time of the follow-up phone call. Personal identifiers will be removed from clinical records where present and not stored in the study database.

Discussion

Chest pain is a diagnostic dilemma for the emergency physician. In the absence of an accurate and reliable method of identifying patients at very low risk for adverse cardiac events, physicians' triage decisions are variable and often influenced by level of perceived medical and legal risk [15]. As a result very low risk patients are triaged to chest pain observation units and undergo extensive risk stratification protocols based on an unstructured assessment of pretest probability

and perceived legal risk [16]. Despite this inefficiency, a number of emergency department patients at risk for adverse cardiac events are being missed [8].

We aim to derive a clinical decision rule that is highly sensitive for predicting acute myocardial infarction, need for revascularization, or death within 30 days of presentation to the emergency department using techniques successfully applied to ankle, knee, and cervical spine radiography [84-86]. Future plans are to prospectively validate the derived rule in new set of patients. This will improve patient care, lower healthcare costs, and improve flow in our busy and overcrowded emergency departments.

Acknowledgements

This study is jointly funded by the American Heart Association, the Society for Academic Emergency Medicine, and the Emergency Medicine Foundation.

References:

1. Thygesen K, Alpert JS, White HD: **Joint ESC/ACCF/AHA/WHF Task Force for the Redefinition of Myocardial Infarction. Universal definition of myocardial infarction.** *Circulation* 2007, **116**:1-20.
2. Luepker RV, Apple FS, Christenson RH, Crow RS, Fortmann SP, Goff D, Goldberg RJ, Hand MM, Jaffe AS, Julian DG, *et al.*: **Case definitions for acute coronary heart disease in epidemiology and clinical research studies: a statement from the AHA Council on Epidemiology and Prevention; AHA Statistics Committee; World Heart Federation Council on Epidemiology and Prevention; the European Society of Cardiology Working Group on Epidemiology and Prevention; Centers for Disease Control and Prevention; and the National Heart, Lung, and Blood Institute.** *Circulation* 2003, **108**(20):2543-2549.
3. McCaig LF, Burt CW: **National Hospital Ambulatory Medical Care Survey: 2004 emergency department summary.** *Adv Data* 2006:1-32.
4. Rosamond W, Flegal K, Friday G, Furie K, Go A, Greenlund K, Haase N, Ho M, Howard V, Kissela B, *et al.*: **Heart disease and stroke statistics--2007 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee.** *Circulation* 2007, **115**(5):e69-171. Epub 2006 Dec 28
5. Kontos MC, Jesse RL: **Evaluation of the emergency department chest pain patient.** *American Journal of Cardiology* 2000:32B-39B.
6. Pope JH, Ruthazer R, Beshansky JR, Griffith JL, Selker HP: **The clinical presentation of pa-**

tients with acute cardiac ischemia in the emergency department: a multicenter controlled clinical trial. *Journal of Thrombosis and Thrombolysis* 1998;63-74.

7. Christenson J, Innes G, McKnight D, Boychuk B, Grafstein E, Thompson CR, Rosenberg F, Anis A, Gin K, Tilley J, *et al.*: **Safety and efficiency of emergency department assessment of chest discomfort.** *CMAJ Canadian Medical Association Journal* 2004;1803-1807.

8. Pope JH, Aufderheide TP, Ruthazer R, Woolard RH, Feldman JA, Beshansky JR, Griffith JL, Selker HP: **Missed diagnoses of acute cardiac ischemia in the emergency department.** *New England Journal of Medicine* 2000, **342(16)**:1163-1170.

9. Swap CJ, Nagurney JT: **Value and limitations of chest pain history in the evaluation of patients with suspected acute coronary syndromes.** *JAMA* 2005, **294(20)**:2623-2629.

10. Limkakeng A Jr, Gibler WB, Pollack C, Hoekstra JW, Sites F, Shofer FS, Tiffany B, Wilke E, Hollander JE: **Combination of Goldman risk and initial cardiac troponin I for emergency department chest pain patient risk stratification[see comment].** *Academic Emergency Medicine* 2001, **8(7)**:696-702.

11. Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey DE Jr, Chavey WE 2nd, Fesmire FM, Hochman JS, Levin TN, *et al.*: **ACC/AHA 2007 guidelines for the management of patients with unstable angina/non ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non ST-Elevation Myocardial Infarction): developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and the Society of Thoracic Surgeons; endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation and the Society for Academic Emergency Medicine.** *Circulation* 2007, **116(7)**:e148-304. Epub 2007

12. Gibler WB, Cannon CP, Blomkalns AL, Char DM, Drew BJ, Hollander JE, Jaffe AS, Jesse RL, Newby LK, Ohman EM, *et al.*: **Practical Implementation of the Guidelines for Unstable Angina/Non-ST-Segment Elevation Myocardial Infarction in the Emergency Department: A Scientific Statement From the American Heart Association Council on Clinical Cardiology (Subcommittee on Acute Cardiac Care), Council on Cardiovascular Nursing, and Quality of Care and Outcomes Research Interdisciplinary Working Group, in Collaboration With the Society of Chest Pain Centers.** *Circulation* 2005, **111(20)**:2699-2710.

13. Katz DA, Williams GC, Brown RL, Aufderheide TP, Bogner M, Rahko PS, Selker HP: **Emer-**

gency physicians' fear of malpractice in evaluating patients with possible acute cardiac ischemia. *Annals of Emergency Medicine* 2005, **46(6)**:525-533.

14. Ting HH, Lee TH, Soukup JR, Cook EF, Tosteson AN, Brand DA, Rouan GW, Goldman L: **Impact of physician experience on triage of emergency room patients with acute chest pain at three teaching hospitals.** *American Journal of Medicine* 1991, **91(4)**:401-408.

15. Pearson SD, Goldman L, Orav EJ, Guadagnoli E, Garcia TB, Johnson PA, Lee TH: **Triage decisions for emergency department patients with chest pain: do physicians' risk attitudes make the difference?** *Journal of General Internal Medicine* 1995, **10(10)**:557-564.

16. Zalenski RJ, Rydman RJ, Ting S, Kampe L, Selker HP: **A national survey of emergency department chest pain centers in the United States.** *American Journal of Cardiology* 1998, **81(11)**:1305-1309.

17. Stiell IG, Wells GA: **Methodologic standards for the development of clinical decision rules in emergency medicine.** *Annals of Emergency Medicine* 1999, **33(4)**:437-447.

18. Laupacis A, Sekar N, Stiell IG: **Clinical prediction rules. A review and suggested modifications of methodological standards.** *JAMA* 1997, **277(6)**:488-494.

19. Christenson J, Innes G, McKnight D, Thompson CR, Wong H, Yu E, Boychuk B, Grafstein E, Rosenberg F, Gin K, *et al.*: **A clinical prediction rule for early discharge of patients with chest pain.** *Annals of Emergency Medicine* 2006, **47(1)**:1-10.

20. Baxt WG: **Use of an artificial neural network for data analysis in clinical decision-making: the diagnosis of acute coronary occlusion.** *Neural Computation* 1991, **2**:480-489.

21. Baxt WG: **Use of an artificial neural network for the diagnosis of myocardial infarction.** *Annals of Internal Medicine* 1991, **115(11)**:843-848.

22. Baxt WG, Skora J: **Prospective validation of artificial neural network trained to identify acute myocardial infarction.** *Lancet* 1996, **347(8993)**:12-15.

23. Baxt WG, Shofer FS, Sites FD, Hollander JE: **A neural network aid for the early diagnosis of cardiac ischemia in patients presenting to the emergency department with chest pain.** *Annals of Emergency Medicine* 2002, **40(6)**:575-583.

24. Baxt WG, Shofer FS, Sites FD, Hollander JE: **A neural computational aid to the diagnosis of acute myocardial infarction.** *Annals of Emergency Medicine* 2002, **39(4)**:366-373.

25. Goldman L, Weinberg M, Weisberg M, Olshen R, Cook EF, Sargent RK, Lamas GA, Dennis C, Wilson C, Deckelbaum L, *et al.*: **A computer-derived protocol to aid in the diagnosis of emergency room patients with acute chest pain.** *New England Journal of Medicine* 1982, **307(10)**:588-596.

26. Goldman L, Cook EF, Brand DA, Lee TH, Rouan GW, Weisberg MC, Acampora D, Stasiulewicz C, Walshon J, Terranova G, *et al.*: **A computer protocol to predict myocardial infarction in emergency department patients with chest pain.** *New England Journal of Medicine* 1988, **318(13)**:797-803.
27. Kennedy RL, Burton AM, Fraser HS, McStay LN, Harrison RF: **Early diagnosis of acute myocardial infarction using clinical and electrocardiographic data at presentation: Derivation and evaluation of logistic regression models.** *European Heart Journal* 1996, **17(8)**:1181-1191.
28. Mair J, Smidt J, Lechleitner P, Dienstl F, Puschendorf B: **A decision tree for the early diagnosis of acute myocardial infarction in nontraumatic chest pain patients at hospital admission.** *Chest* 1995, **108(6)**:1502-1509.
29. Mair J, Smidt J, Lechleitner P, Dienstl F, Puschendorf B: **Rapid accurate diagnosis of acute myocardial infarction in patients with non-traumatic chest pain within 1 h of admission.** *Coronary Artery Disease* 1995, **6(7)**:539-545.
30. Ng SM, Krishnaswamy P, Morissey R, Clopton P, Fitzgerald R, Maisel AS: **Ninety-minute accelerated critical pathway for chest pain evaluation.** *American Journal of Cardiology* 2001, **88(6)**:611-617.
31. Poretsky L, Leibowitz IH, Friedman SA: **The diagnosis of myocardial infarction by computer-derived protocol in a municipal hospital.** *Angiology* 1985, **36(3)**:165-170.
32. Tierney WM, Roth BJ, Psaty B, McHenry R, Fitzgerald J, Stump DL, Anderson FK, Ryder KW, McDonald CJ, Smith DM: **Predictors of myocardial infarction in emergency room patients.** *Critical Care Medicine* 1985, **13(7)**:526-531.
33. Bassan R, Pimenta L, Scofano M, Soares JF: **Accuracy of a neural diagnostic tree for the identification of acute coronary syndrome in patients with chest pain and no ST-segment elevation.** *Critical Pathways in Cardiology: A Journal of Evidence-Based Medicine* 2004, **3(2)**:72-78.
34. Harrison RF, Kennedy RL: **Artificial neural network models for prediction of acute coronary syndromes using clinical data from the time of presentation.** *Annals of Emergency Medicine* 2005, **46(5)**:431-439.
35. Bjork J, Forberg JL, Ohlsson M, Edenbrandt L, Ohlin H, Ekelund U: **A simple statistical model for prediction of acute coronary syndrome in chest pain patients in the emergency department.** *BMC Medical Informatics & Decision Making* 2006, **6**:28.
36. Selker HP, Beshansky JR, Griffith JL, Aufderheide TP, Ballin DS, Bernard SA, Crespo SG, Feldman JA, Fish SS, Gibler WB, *et al.*: **Use of the acute cardiac ischemia time-insensitive predictive instrument (ACI-TIPI) to assist with triage of patients with chest pain or other symptoms suggestive of acute cardiac ischemia. A multicenter, controlled clinical trial.** *Annals of Internal Medicine* 1998, **129(11)**:845-855.
37. Chandra A, Jones FM, Beam D, Promes SB, Kline JA, Cairns CB: **Limited Utility of the Acute Cardiac Ischemia Time-Insensitive Predictive Instrument (ACI-TIPI) in the Evaluation of Chest Pain Unit Patients.** *Acad Emerg Med* 2005, **12(Suppl 1)**: 30-b-31.
38. Eagle KA, Lim MJ, Dabbous OH, Pieper KS, Goldberg RJ, Van de Werf F, Goodman SG, Granger CB, Steg PG, Gore JM, *et al.*: **A validated prediction model for all forms of acute coronary syndrome: estimating the risk of 6-month postdischarge death in an international registry.** *JAMA* 2004, **291(22)**:2727-2733.
39. Fox KA, Dabbous OH, Goldberg RJ, Pieper KS, Eagle KA, Van de Werf F, Avezum A, Goodman SG, Flather MD, Anderson FA Jr, *et al.*: **Prediction of risk of death and myocardial infarction in the six months after presentation with acute coronary syndrome: prospective multinational observational study (GRACE).** *BMJ* 2006, **333(7578)**:1091. Epub 2006
40. de Araujo Goncalves P, Ferreira J, Aguiar C, Seabra-Gomes R: **TIMI, PURSUIT, and GRACE risk scores: sustained prognostic value and interaction with revascularization in NSTEMI-ACS.** *Eur Heart J* 2005, **26(9)**:865-872. Epub 2005
41. Antman EM, Cohen M, Bernink PJ, McCabe CH, Horacek T, Papuchis G, Mautner B, Corbalan R, Radley D, Braunwald E: **The TIMI risk score for unstable angina/non-ST elevation MI: A method for prognostication and therapeutic decision making.** *JAMA* 2000, **284(7)**:835-842.
42. Chase M, Robey JL, Zogby KE, Sease KL, Shofer FS, Hollander JE: **Prospective validation of the Thrombolysis in Myocardial Infarction Risk Score in the emergency department chest pain population.** *Annals of Emergency Medicine* 2006, **48(3)**:252-259.
43. Conway Morris A, Caesar D, Gray S, Gray A: **TIMI risk score accurately risk stratifies patients with undifferentiated chest pain presenting to an emergency department.** *Heart* 2006, **92(9)**:1333-1334.
44. Garcia Almagro FJ, Gimeno JR, Villegas M, Munoz L, Sanchez E, Teruel F, Hurtado J, Gonzalez J, Antolinos MJ, Pascual D, *et al.*: **Use of a coronary risk score (the TIMI Risk Score) in a non-selected patient population assessed for chest pain at an emergency department.** *Revista Espanola de Cardiologia* 2005, **58(7)**:775-781.
45. Jaffery Z, Hudson MP, Jacobsen G, Nowak R, McCord J: **Modified Thrombolysis in Myocardial Infarction (TIMI) risk score to risk stratify patients in the emergency department with possible acute coronary syndrome.** *J Thromb Thrombolysis* 2007, **24(2)**:137-144. Epub 2007

46. Lyon R, Morris AC, Caesar D, Gray S, Gray A: **Chest pain presenting to the Emergency Department-to stratify risk with GRACE or TIMI?** *Resuscitation* 2007, **74(1)**:90-93.
47. Pollack CV Jr, Sites FD, Shofer FS, Sease KL, Hollander JE: **Application of the TIMI risk score for unstable angina and non-ST elevation acute coronary syndrome to an unselected emergency department chest pain population.** *Academic Emergency Medicine* 2006, **13(1)**:13-18.
48. Boersma E, Pieper KS, Steyerberg EW, Wilcox RG, Chang WC, Lee KL, Akkerhuis KM, Harrington RA, Deckers JW, Armstrong PW, et al.: **Predictors of outcome in patients with acute coronary syndromes without persistent ST-segment elevation. Results from an international trial of 9461 patients. The PURSUIT Investigators.** *Circulation* 2000, **101(22)**:2557-2567.
49. Domanovits H, Schillinger M, Paulis M, Rauscha F, Thoennissen J, Nik-fardjam M, Laggner AN: **Acute chest pain-a stepwise approach, the challenge of the correct clinical diagnosis.** *Resuscitation* 2002, **55(1)**:9-16.
50. Mitchell AM, Garvey JL, Chandra A, Diercks D, Pollack CV, Kline JA: **Prospective multicenter study of quantitative pretest probability assessment to exclude acute coronary syndrome for patients evaluated in emergency department chest pain units.** *Annals of Emergency Medicine* 2006, **47(5)**:447.
51. Tong KL, Kaul S, Wang XQ, Rinkevich D, Kalvaitis S, Belcik T, Lepper W, Foster WA, Wei K: **Myocardial contrast echocardiography versus Thrombolysis In Myocardial Infarction score in patients presenting to the emergency department with chest pain and a nondiagnostic electrocardiogram.** *Journal of the American College of Cardiology* 2005, **46(5)**:920-927.
52. Fernandez Portales J, Perez Reyes F, Garcia Robles JA, Jimenez Candil J, Perez David E, Rey Blas JR, Perez de Isla L, Diaz Castro O, Almen-dral J: **Risk stratification using combined ECG, clinical, and biochemical assessment in patients with chest pain without ST-segment elevation. How long should we wait?** *Revista Espanola de Cardiologia* 2003, **56(4)**:338-345.
53. Goldman L, Cook EF, Johnson PA, Brand DA, Rouan GW, Lee TH: **Prediction of the need for intensive care in patients who come to the emergency departments with acute chest pain.** *New England Journal of Medicine* 1996, **334(23)**:1498-1504.
54. Reilly B, Durairaj L, Husain S, Acob C, Evans A, Hu TC, Das K, McNutt R: **Performance and potential impact of a chest pain prediction rule in a large public hospital.** *American Journal of Medicine* 1999, **106(3)**:285-291.
55. Durairaj L, Reilly B, Das K, Smith C, Acob C, Husain S, Saquib M, Gan-schow P, Evans A, McNutt R: **Emergency department admissions to inpatient cardiac telemetry beds: a prospective cohort study of risk stratification and outcomes.** *Am J Med* 2001, **110(1)**:7-11.
56. Reilly BM, Evans AT, Schaidler JJ, Das K, Calvin JE, Moran LA, Roberts RR, Martinez E: **Impact of a clinical decision rule on hospital triage of patients with suspected acute cardiac ischemia in the emergency department.** *JAMA* 2002, **288(3)**:342-350.
57. Marsan RJ Jr, Shaver KJ, Sease KL, Shofer FS, Sites FD, Hollander JE: **Evaluation of a clinical decision rule for young adult patients with chest pain.** *Academic Emergency Medicine* 2005, **12(1)**:26-31.
58. Martinez-Selles M, Ortiz J, Estevez A, Andueza J, de Miguel J, Bueno H: **A new risk score for patients with a normal or non-diagnostic ECG admitted to a chest pain unit.** *Revista Espanola de Cardiologia* 2005, **58(7)**:782-788.
59. Lorenzoni R, Ebert AG, Lattanzi F, Orsini E, Mazzoni A, Magnani M, Barbieri C, Rossi M, Mazzuoli F: **A computer protocol to evaluate subjects with chest pain in the emergency department: a multicenter study.** *Journal of Cardiovascular Medicine* 2006, **7(3)**:203-209.
60. Porela P, Pulkki K, Helenius H, Antila KJ, Pettersson K, Wacker M, Voipio-Pulkki LM: **Prediction of short-term outcome in patients with suspected myocardial infarction.** *Annals of Emergency Medicine* 2000, **35(5)**:413-420.
61. Selker HP, Griffith JL, D'Agostino RB: **A time-insensitive predictive instrument for acute myocardial infarction mortality: a multicenter study.** *Medical Care* 1991, **29(12)**:1196-1211.
62. Seyal JM, Clark EN, Macfarlane PW: **Diagnosis of acute myocardial ischaemia using probabilistic methods.** *Journal of Cardiovascular Risk* 2002, **9(2)**:115-121.
63. Miller CD, Lindsell CJ, Anantharaman V, Greenway J, Pollack CV, Tiffany BR, Hollander JE, Gibler WB, Hoekstra JW: **Performance of a population-based cardiac risk stratification tool in Asian patients with chest pain.** *Academic Emergency Medicine* 2005, **12(5)**:423-430.
64. Walker NJ, Sites FD, Shofer FS, Hollander JE: **Characteristics and outcomes of young adults who present to the emergency department with chest pain.** *Academic Emergency Medicine* 2001, **8(7)**:703-708.
65. Diercks DB, Hollander JE, Sites F, Kirk JD: **Derivation and validation of a risk stratification model to identify coronary artery disease in women who present to the emergency department with potential acute coronary syndromes.** *Academic Emergency Medicine* 2004, **11(6)**:630-634.
66. Macgougan CK, Christenson JM, Innes GD, Raboud J: **Emergency physicians' attitudes toward a clinical prediction rule for the identification**

and early discharge of low risk patients with chest discomfort. *CJEM* 2001, **3**(2):89-94.

67. Forest RS, Shofer FS, Sease KL, Hollander JE: **Assessment of the standardized reporting guidelines ECG classification system: the presenting ECG predicts 30-day outcomes.** *Ann Emerg Med* 2004;206-12.

68. Weber JE, Shofer FS, Larkin GL, Kalaria AS, Hollander JE: **Validation of a brief observation period for patients with cocaine-associated chest pain [see comment].** *New England Journal of Medicine* 2003, **348**(6):510-517.

69. Collinson PO, Gaze DC, Morris F, Morris B, Price A, Goodacre S: **Comparison of biomarker strategies for rapid rule out of myocardial infarction in the emergency department using ACC/ESC diagnostic criteria.** *Annals of Clinical Biochemistry* 2006, **43**(4):273-280.

70. Apple FS, Wu AH, Jaffe AS: **European Society of Cardiology and American College of Cardiology guidelines for redefinition of myocardial infarction: how to use existing assays clinically and for clinical trials [see comment].** *American Heart Journal* 2002, **144**(6):981-986.

71. Panteghini M, Pagani F, Yeo KT, Apple FS, Christenson RH, Dati F, Mair J, Ravkilde J, Wu AH, Committee on Standardization of Markers of Cardiac Damage of the I: **Evaluation of imprecision for cardiac troponin assays at low-range concentrations.** *Clinical Chemistry* 2004, **50**(2):327-332.

72. Wallace TW, Abdullah SM, Drazner MH, Das SR, Khera A, McGuire DK, Wians F, Sabatine MS, Morrow DA, de Lemos JA: **Prevalence and determinants of troponin T elevation in the general population.** *Circulation* 2006, **113**(16):1958-1965.

73. Aviles RJ, Askari AT, Lindahl B, Wallentin L, Jia G, Ohman EM, Mahaffey KW, Newby LK, Califf RM, Simoons ML, *et al.*: **Troponin T levels in patients with acute coronary syndromes, with or without renal dysfunction[see comment][summary for patients in CMAJ.** *167*(6):671;PMID: 12358205]. *New England Journal of Medicine* **346**(26):2047-2052. 2002 Sep 17; 2002

74. Hamm CW, Goldmann BU, Heeschen C, Kreyman G, Berger J, Meinertz T: **Emergency room triage of patients with acute chest pain by means of rapid testing for cardiac troponin T or troponin I[see comment].** *New England Journal of Medicine* 1997, **337**(23):1648-1653.

75. Kavsak PA, MacRae AR, Lustig V, Bhargava R, Vandersluis R, Palomaki GE, Yerna MJ, Jaffe AS: **The impact of the ESC/ACC redefinition of myocardial infarction and new sensitive troponin assays on the frequency of acute myocardial infarction.** *American Heart Journal* 2006, **152**(1):118-125.

76. Jaffe AS: **Chasing troponin: how low can you go if you can see the rise?** *J Am Coll Cardiol* 2006, **48**(9):1763-1764.

77. Apple FS, Parvin CA, Buechler KF, Christenson RH, Wu AH, Jaffe AS: **Validation of the 99th percentile cutoff independent of assay imprecision (CV) for cardiac troponin monitoring for ruling out myocardial infarction.** *Clinical Chemistry* 2005, **51**(11):2198-2200.

78. Gibler WB, Cannon CP, Blomkalns AL, Char DM, Drew BJ, Hollander JE, Jaffe AS, Jesse RL, Newby LK, Ohman EM, *et al.*: **Practical implementation of the guidelines for unstable angina/non-ST-segment elevation myocardial infarction in the emergency department: a scientific statement from the American Heart Association Council on Clinical Cardiology (Subcommittee on Acute Cardiac Care), Council on Cardiovascular Nursing, and Quality of Care and Outcomes Research Interdisciplinary Working Group, in Collaboration With the Society of Chest Pain Centers.** *Circulation* 2005, **111**(20):2699-2710.

79. Macrae AR, Kavsak PA, Lustig V, Bhargava R, Vandersluis R, Palomaki GE, Yerna MJ, Jaffe AS: **Assessing the requirement for the 6hour interval between specimens in the American Heart Association Classification of Myocardial Infarction in Epidemiology and Clinical Research Studies[see comment].** *Clinical Chemistry* 2006, **52**(5):812-818.

80. Macrae AR, Kavsak PA, Lustig V, Bhargava R, Vandersluis R, Palomaki GE, Yerna MJ, Jaffe AS: **Assessing the requirement for the 6hour interval between specimens in the American Heart Association Classification of Myocardial Infarction in Epidemiology and Clinical Research Studies.** *Clinical Chemistry* 2006, **52**(5):812-818.

81. Friedman JH: **A recursive partitioning decision rule for nonparametric classification.** *IEETransComput* 1977, **16**:404-408.

82. Ciampi A, Hogg SA, McKinney S, Thiffault J: **RECPAM: a computer program for recursive partition and amalgamation for censored survival data and other situations frequently occurring in biostatistics. I. Methods and program features.** *Comput Methods Programs Biomed* 1988, **26**:239-256.

83. Ciampi A, Thiffault J, Nakache JP, Asselain B: **Stratification by step-wise regression, correspondence analysis and recursive partition: a comparison of three methods of analysis for survival data with covariates.** *ComputStatDataAnal* 1986, **4**:185-204.

84. Stiell IG, McKnight RD, Greenberg GH, McDowell I, Nair RC, Wells GA, Johns C, Worthington JR: **Implementation of the Ottawa ankle rules.** *JAMA* 1994, **271**(11):827-832.

85. Stiell IG, Wells GA, Hoag RH, Sivilotti ML, Cacciotti TF, Verbeek PR, Greenway KT, McDowell I, Cwinn AA, Greenberg GH, *et al.*: **Implementation of the Ottawa Knee Rule for the use of radiography in acute knee injuries.** *JAMA* 1997, **278**(23):2075-2079.

86. Stiell IG, Wells GA, Vandemheen KL, Clement CM, Lesiuk H, De Maio VJ, Laupacis A, Schull M, McKnight RD, Verbeek R, *et al.*: **The Canadian C-spine rule for radiography in alert and stable trauma patients.** *JAMA* 2001, **286**(15):1841-1848.

THEMATIC RESEARCH NETWORK FOR EMERGENCY AND UNSCHEDULED TREATMENT (TRUST): SCOPING THE POTENTIAL

Julie Peconi¹, Helen Snooks¹, Adrian Edwards²

¹*Centre for Health Information, Research and Evaluation (CHIRAL)
School of Medicine, Swansea University, Wales, UK*

²*Department of General Practice, Centre for Health Science Research,
University Hospital of Wales, Wales, UK*

Background: To identify the benefits of a network in emergency and unscheduled care research, a six week scoping study was undertaken. Objectives were to: draw together stakeholders; identify and prioritise research topics; identify sites for recruitment to studies; and agree a research strategy for a network.

Methods: A workshop was held to discuss and agree a research strategy based on results from four activities: visits to established research centres in emergency and unscheduled care; a literature overview; interviews with stakeholders in a GP out-of-hours service; and an exploration of the potential for routine data to support research in emergency care.

Results: Participants attended the workshop from user groups, primary care, the ambulance service, social care, the national telephone based health helpline, the Welsh Assembly Government and the academic sector. Site visits identified opportunities for collaboration. Gaps in knowledge were identified concerning the effectiveness of alternative models of emergency care delivery. Interview data highlighted a lack of evidence related to the quality of out-of-hours provision of primary care. The All Wales Injury Surveillance System (AWISS) was found to offer the potential to use routine data to support quantitative studies in emergency care. Three key issues emerged across all activities: working across boundaries; patient involvement; and triage.

Conclusion: The study included views from patient, provider, policy and academic perspectives and built the case for a research network in emergency care. Now funded, TRUST (Thematic Research network for emergency and UnScheduled Treatment) will allow the development of research proposals, building of research teams and recruitment of sites and patients both in Wales and across the UK. It aims to address the imbalance between investment and research in this area and help support provision of 'the right care to the right people at the right time'.

Background

Thematic research networks are perceived to be one way of enhancing capacity for research and development to provide an evidence base for healthcare. Research networks have been established in England through the UK Clinical Research Collaboration (UKCRC), a partnership of the major stakeholders influencing clinical research in the UK. The UKCRC aims "to establish the UK as a world leader in clinical research, by harnessing the power of the NHS" [1]. It has developed the UK Clinical Research Network (UKCRN) to support clinical research and to facilitate the conduct of randomised prospective trials of interventions and other well designed studies [2]. The UKCRN supports six topic-specific clinical research networks in England: in cancer, dementias and neurodegenerative diseases, diabetes, medicines for children, mental health and stroke.

Against this backdrop, in February 2005, the Wales Office of Research and De-

velopment for health and social care (WORD) issued a call for proposals for 'scoping' studies, to identify the benefits of establishing thematic research networks in Wales. Scoping study funding was intended to enable 'preparatory activities to help individuals and groups form new networks, or develop existing networks and consolidate their development planning'. The Emergency and Unscheduled Care Thematic Research Network (TRN) scoping study was one of twenty-six, commissioned to be undertaken within a short period of six weeks. Following submission of the scoping studies, a further call was issued, for full thematic research networks.

In December 2005, based on results of the scoping study activities, TRUST: Thematic Research network for emergency and UnScheduled Treatment was one of nine networks funded by WORD for an initial period of three years. Although local emergency care research networks have been estab-

lished) [3] and the importance of a whole systems approach in emergency care recognised [4], this is the first time in the UK that a national network in emergency care research has been funded and the opportunities it presents are significant.

With increasing demand on all emergency services in the UK and other developed countries [5,6], and evidence that a substantial proportion of emergency ambulance callers and Emergency Departments (ED) attenders do not clinically need the service offered [7-9], it is vital to develop and evaluate the system that delivers care to those who ask for an immediate response. In this paper we use the term *unscheduled care* to describe care that is provided (or demanded) without warning or planning. The term covers a range of clinical and social conditions and needs, from life-threatening emergencies to requests for information or assistance for problems that may not be clinically urgent.

In the UK there are many points of access to *unscheduled care*; the emergency ambulance (999) route, national telephone health helpline (NHS Direct), general practitioner (GP) surgery or out-of-hours service, ED, Minor Injuries Units and community pharmacists. Patients call or attend providers with a wide range of healthcare needs for treatment, transportation, advice and information. Patients need to be triaged so that those with urgent or life-threatening clinical problems can be identified for an immediate response, and those with less urgent conditions can be offered care that is appropriate to their needs without wasting National Health Service (NHS) resources. 'Our health, our care, our say', the policy document recently published by the UK Department of Health, highlights the need to improve patient experience and significantly reduce unnecessary hospital admissions through a new strategy for urgent care [9]. Implementation of effective prevention strategies and increasing the ability of patients to manage their perceived 'emergencies' at home or with the help of community based facilities such as the pharmacist, fit with the current emphasis

on shifting resources and care from the secondary to the primary sector [10].

The emergency and unscheduled care sector is undergoing rapid change. New models of care are being implemented through the ambulance service (e.g. paramedic practitioners with extended skills training), NHS Direct, a 24 hour nurse-led telephone based healthcare advice and information line (e.g. handling non-serious 999 calls), Minor Injuries Units and Walk-in Centres. New primary care contracts in general practice and community pharmacy also provide the opportunity to change the pattern of care delivered. A new contract in 2003-4 allowed general practitioners to 'opt out' of their traditional 24 hour availability. Almost all took up this option enabling a completely new provision for out-of-hours primary care commissioned by Primary Care Organisations (PCOs). Currently a patchwork of deputising-derived services, GP co-operatives, NHS Direct-linked services, and Trust-based contracts are provided. These new models of care have yet to be fully evaluated to understand the impact on patient care and the NHS through, for example, changes in demand for other services.

Still further changes are anticipated in the next few years. Among these, review and revision of skill mix and professional provision are likely. Greater integration with NHS Direct and availability of advice and information, often online or via digital television, is also probable. Yet many of these changes do not build on an evidence base of safety and effectiveness and formal evaluations are rare, with the opportunity to learn from new initiatives missed.

The aim of this scoping study was to explore the potential benefits of the development of a research network for emergency and unscheduled care both in Wales and beyond. Its objectives were to draw together key stakeholders in emergency and unscheduled care, identify partner sites for recruitment to trials and other studies, identify research topics of priority and agree an overall research strategy for a network. This paper

describes the development and rationale of the network through the scoping study and highlights the role the network can now play in enhancing research and development to meet the rapidly changing context of the emergency and unscheduled care field.

Methods

The scoping study was led by HS from the School of Medicine, Swansea University. The study involved one dedicated Research Officer (JP) and included participants from across Wales and specialist collaborators in England. The research team included co-applicants from all sectors that contribute to the provision of emergency/unplanned care: ED, GP out-of-hours, the Welsh Ambulance Service Trust, NHS Direct Wales, and social care. Within each sector representation was gained from service providers, policy makers, academics and service users.

During the short study period the team employed four methods of data collection: site visits to key centres of emergency and unscheduled care research in the UK, a literature overview, interviews with stakeholders and an exploration of the use of routine data to support research studies in emergency care. Results from these four strands were then fed into a one-day workshop which focused on identifying the benefits of establishing a research network in emergency and unscheduled care in Wales, and research strategies and priorities for such a network.

Site visits

Site visits were made to key centres of emergency and unscheduled care research in the UK: the Medical Care Research Unit at Sheffield University and the Centre for Primary Health Care Studies at the University of Warwick. These sites were selected due to their track records of undertaking and publishing research in this field and their strong links to policy makers in the UK through contractual arrangements with the department of health. Discussions were based on a semi-structured interview guide, and centred on research programme plans, overlapping research interests and opportunities for collaboration.

Literature overview

A Medline search on alternatives to hospital/emergency care from 1984 onwards was undertaken. Search terms included '(alternative) and (hospital)' and '(alternative) and (emergency) and (care)'. Due to time constraints, results were then limited to systematic reviews, meta-analyses and randomised controlled trials.

Interviews with stakeholders

A series of semi-structured interviews were held with stakeholders as key informants in one GP out-of-hours service in Wales. During interviews, respondents were asked about their views concerning current service provision, current and anticipated research needs, service development and potential benefits of a network for research in emergency and unscheduled care. Interviews were conducted by AE and field notes were taken. Results were analysed and synthesised according to existing or potential priority areas for research and capacity building needs in the sector.

Exploration of routine data

Discussions took place with the lead for the All Wales Injury Surveillance System (AWISS) to explore the potential for routine data to support research in emergency and unscheduled care. AWISS is a computerised system designed to collect and collate information on injuries treated in ED in Wales. During the study, data were sought from EDs across Wales in order to run analyses to determine factors contributing to increased demand for ED care.

The workshop

An invitation to the workshop was extended to all those involved in the scoping study and other commissioned scoping studies with overlapping interests and concerns. Other key stakeholders were invited, including representatives of patient groups and additional researchers in emergency/unscheduled care. All invitees were encouraged to bring colleagues who they felt could also contribute to the formation of the network. Presentations were given on the preliminary findings from the four strands

above. Delegates were then split into discussion groups to identify research priorities and network strategies on the key themes that had emerged from the presentations. Delegates chose which discussion to attend based on their area of expertise and personal interest. Each group was asked to consider their respective theme in terms of a research strategy, key research questions and priorities to be addressed through the network. Key points from each discussion were then fed back to the full group in a plenary session and other delegates were invited to comment on and/or add to the results.

Results

Site visits to centres of research excellence in emergency and unscheduled care

The Scoping Study lead (HS) and Research Officer (JP) visited the Medical Care Research Unit in Sheffield and the Centre for Primary Health Care Studies at the University of Warwick. The visits enabled the identification of opportunities for collaboration. The programmes in Sheffield (in part core-funded by the Department of Health) and Warwick focus on research concerning the system of emergency care provision, rather than on individual treatments or elements of that system. Partners at the collaborating sites were in agreement that the funding of a network in emergency care in the UK could be valuable in allowing the development of programmes of research in this area. They agreed that the proposed network could help to develop capacity and collaboration in emergency and unscheduled care research, allowing research funding to be drawn into the area from generic sources aimed at improving quality of care and cost-effectiveness of service delivery. In addition, a useful function of the network was felt to be the enhanced opportunity for recruitment of sites and patients to randomised controlled trials.

Literature overview

Current research uncovered through the literature overview included work on novel forms of home care, particularly involving nurses or therapists in forms of care

traditionally undertaken by doctors; on the development of definitions and standardisation of methods in an emergency care setting and on specific problems such as triage and protocols for training. One recent systematic review focussing on reducing attendances and waits in EDs was reviewed although much of the literature identified was concerned with opinions and causes, rather than evaluations of innovations to reduce these waits and attendances.

However, overall, the overview revealed that there is a lack of high quality published research – particularly randomised controlled trials – on the topic of the provision of alternative models of current emergency and unscheduled care. Gaps in current knowledge concerning effectiveness of alternative models of emergency care delivery were identified as well as the need for the development of definitions and protocols.

Interviews

Eighteen semi-structured face to face interviews were carried out with stakeholders (including GPs, policymakers and directors) in one GP out-of-hours cooperative in Wales, and the service and policy leads in this area, to identify key research issues in out-of-hours provision. Specific aspects highlighted as requiring review or evaluation included: the effectiveness of call handling, the efficacy of nurse and doctor triage in preventing home visits and consultations and evidence to support the newly introduced national four hour waiting time targets in ED. Difficulties in engaging consumers in setting priorities, integrating patients' experiences of the services into subsequent development of the services, managing demand and communication with other sectors (e.g. palliative care) were also identified as topics requiring further research.

Routine data exploration

Although initial analysis of data from one Trust in South Wales highlighted possibilities for understanding patterns of changing demand, retrieval of data from hospitals did not prove possible to achieve within the scoping period. The study concluded that, if

full participation could be achieved, routine data gathered through the All Wales Injury Surveillance System (AWISS) could offer the potential to support studies with a wide range of designs, including: randomised controlled trials, cohort studies, ecological and multi-level studies, modelling, time series analyses, cross-sectional and database analyses as well as multi-agency studies.

The workshop

The network workshop was held on 19th April 2005 in Swansea, with twenty-five participants from user groups, primary care, the ambulance service, social care, NHS Direct Wales, the Welsh Assembly Government and the academic sector. Although representatives from ED expressed interest, due to work constraints, no one from this key sector attended.

There were approximately equal numbers in each discussion group with representatives from across disciplines in each group. Discussions focused on three key issues that had emerged from the presentations:

- 1) working across service boundaries to provide appropriate unplanned care
- 2) involving patients in the planning and delivery of emergency and unscheduled care
- 3) triage: how to 'sort' patients so that the right care is offered to the right patient at the right time

Delegates identified clear gaps in evidence that need addressing to allow planning and implementation of new services, particularly concerning the effectiveness of complex interventions and their wider or halo effects; triage; issues of access; patients' views and priorities; and drivers for demand. It was also noted that, whilst research with practical and relevant outcomes are a priority for the network, the development of methods for evaluation and indicators of quality should not be neglected.

There was consensus that a thematic research network in emergency and unscheduled care could draw together stakeholders with a range of skills and perspectives to de-

velop and enhance research in this field, in order to address a current mismatch between investment in service development and re-configuration and the evidence base for new service delivery arrangements.

Discussion

This scoping study confirmed the dearth of high quality research in emergency and unscheduled care and highlighted the potential for a national thematic research network to help address the lack of robust evidence in this area. Given the short time frame involved, the exercise set out to identify key problems facing emergency care research today, in order to inform the development of a network, its activities and focus. The study was necessarily limited in its scope by the short term nature of funding. Within six weeks activities were undertaken that were felt to be most useful in assessing the need and potential benefits of a research network in emergency and unscheduled care. We did not quantify these benefits or assess costs.

Opportunities for collaboration with some English centres of excellence were identified through similar programmes of research although further engagement of existing emergency care groups across the UK and internationally is necessary. The network would also be able to assist in recruitment of sites and patients for studies and offer a means of effective consultation with a range of key stakeholders. This initial series of interviews with stakeholders in GP out-of-hours service providers, the analysis of routine data and the workshop revealed further questions and research priorities. Scoping study activities brought together key players and stakeholders in emergency and unscheduled care, strengthening commitment to the proposed network.

Thematic networks can work, but need to focus their activities and build capacity to achieve critical mass [11]. Drawing together interested parties for discussions only at a 'talking shop', or providing basic research skills training is not enough to justify investment in the infrastructure. The network will need to develop capacity and systems for

the maintenance and expansion of research activities over time. It will then need to add value through bringing in research money; providing focused training and mentor-ship in research skills and through helping to publish research findings that will contribute to building the evidence base priority areas.

Researchers, providers of care across the sectors of ED, the ambulance service, primary care, NHS Direct Wales, social care and policy makers from across Wales were brought together through this scoping study. Medical, nursing, paramedical, academic and other professional and patient groups were represented. It is the first time in Wales that these groups have been brought together across the emergency care system, to focus on research issues in this way. The opportunity for development of a programme of research to meet the perspectives and needs of the participating sectors was recognised as unique and was highly valued.

The size of Wales (manageable distances and structures for collaboration), interest levels across sectors, existing research strength in the area and priority for policy makers support the development of the network and highlight the potential benefits it could bring to this field. The current research infrastructure in Wales, with the establishment of the Clinical Research Collaboration Cymru, of the UK Clinical Research Collaboration, and the forthcoming Research Professional Network, a network of dedicated professionals to support research [12], will be fundamental to the success of TRUST. Investment in the network will now allow initial links to be strengthened and built upon through application for research funding for projects, and eventually a programme of research that would include infrastructure funding to support the network both in Wales and further a field.

Conclusion

A research network focussing on emergency/unplanned care, now funded, is ideally placed to address the imbalance between investment in innovations and under-

pinning research evidence to the benefit of patients and the wider NHS.

TRUST: Thematic Research network for emergency and UnScheduled Treatment aims to build on the existing area of research strength in this field and of co-applicants, specifically where there is a lack of evidence to underpin current developments. It aims to attract new research funding into the field of emergency and unscheduled care and will contribute to the development of research proposals, allow efficient building of teams and recruitment of research sites and patients. If successful, TRUST will build research capacity in emergency and unscheduled care in Wales and beyond, and will contribute to the required evidence base to support the provision of the '*right care to the right people at the right time*'.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

HS designed the study, brought together participants, contributed to data collection and led the writing of the scoping study report on which this article is based. JP contributed to data collection, wrote sections of the original report and drafted this article. AE led the interviews with stakeholders in the GP Out-of-hours service and wrote this section of the final report. All authors contributed to refining the paper through revising and commenting on earlier drafts.

Acknowledgements

Those also involved in the TRUST scoping study: Douglas Chamberlain, Michael Colquhoun, Matthew Cooke, Jeremy Dale, Ceri Davies, Mark Ellis, Adrian Evans, Hugh Gardner, Leslie Gemmell, Abigail Harris, Dylan Jones, Sara Jones, Ronan Lyons, Stuart Moncur, Jon Nicholl, Sandra Owen, Frances Rapport, Peter Richmond, Ian Russell, Yvonne Tommis, Norman Vetter, Richard Whitfield. This study was funded by WORD: the Wales Office of Research and Development, Welsh Assembly Government.

References:

1. UK Clinical Research Collaboration

2. **UK Clinical Research Network (UKCRN)** www.ukcrn.org.uk
3. Wright D, Crouch R, Clancy M: **Role of networks in supporting emergency medicine research: findings from the Wessex emergency care research network (WECReN).** *Emerg Med J* 2005, **22**:80-3.
4. Alberti G: **Emergency Care Networks.** *Br Med J* **329**:1057-8. 2004, 6 November
5. Hallam L: **Primary medical care outside normal working hours: review of published work.** *Br Med J* 1994, **308**:249-53.
6. DOH: **Ambulance services, England: 1998–9.** London: DOH; 1999.
7. DOH: **Taking healthcare to the patient: transforming NHS ambulance services.** DOH; 2005.
8. Snooks H, Williams S, Crouch R, Foster T, Hartley-Sharpe C, Dale J:
9. **NHS emergency response to 999 calls: alternatives for cases that are neither life threatening nor serious.** *Br Med J* 2002, **325**:330-333.
10. DOH: **Our health, our care, our say: a new direction for community services.** DOH; 2006.
11. Wanless D: **The review of health and social care in Wales. The report of the project team: Welsh Assembly Government** 2003.
12. Griffiths F, Wild A, Harvey J, Fenton E: **The productivity of primary care research networks.** *Br J Gen Pract* 2000, **50**:913-15.
13. **Welcome to the Clinical Research Collaboration Cymru** [<http://www.crc-cymru.wales.nhs.uk>]

INVESTIGATIONS OF ALGAL FLORA OF “VERKHNEYE DVUOBYE” WETLANDS (OB-IRTYSH FLOODPLAIN): BRIEF DESCRIPTION OF EUGLENAL ALGAE

Valeyeva E.I.

Institute of North Development Problems of RAS

Tyumen, Russia

As the investigations showed, in the main river channel and large branches with a high flow rate the Euglena, at the sufficient diversity, don't make a great numerosity. The Euglena role in the structure of algal complexes of playas, the lakes at the littoral shallow waters overgrown with highest aquatic vegetation (pondweed, hornwort, Canada water weed, sedge, etc.) is more noticeable at the retarded flow and well warmed water column.

As it is known, the founder of the Theory about the Earth biosphere, Academician Vernadsky V.I., in his “Sketches on Geochemistry” segregated “floodplain life concentrations”, an example of which he considered to be the Amazon, Orinoco, Zambezi, Ob and Irtysh floodplains. In this question the author had opponents taking up the position that the Ob and Irtysh lowlands cannot serve the examples of “living matter concentration” as their ecosystems do not possess a great standing population (Lapo, 1987). But the main idea of Vernadsky V.I. consisted in the fact that against the background of the taiga and tundra visual environment of Eurasia and North America rich in more modest biota forms the lowlands of the great and small northern rivers of the Globe were, are and will be in the future not only life oases, but also outstanding natural regulators of the global ecological balance. In other words, the value of Siberian Rivers is beyond the scope of both purely biological and regional geographic views.

The territory of Priobye has always been the arena of the West Siberian Plain, Ural Country and the neighboring part of the Arctic sea basin hydrologic systems' dynamic interaction: the Ob channel is traced 200 km apart within the open part of the Kara Sea (Plotnikov, 1992).

The Ob basin area makes about 3 million km² with the length of 3676 km. Within the North of the Western Siberia the Ob crosses three bioclimatic subzones: south-, middle- and north-taiga ones. In the region of

Khanty-Mansiysk the Ob merges with the Irtysh, forming a floodplain, which is called the “Ob-Irtysh” one in terms of the commonness of many natural-geographic features.

The floodplain of the Lower Ob falls within the domain of the Atlantic-Arctic influence of the Variable zone and is located in two bioclimatic subzones (Alisov, 1969). The Berezovsky middle-taiga floodplain district (the region of Khanty-Mansiysk - Berezovo) is the territory of our investigations. The middle-taiga floodplain landscapes (the inflow of the Irtysh – Belogorye – Berezovo – Vanzovat) are the passage type on the features of natural complexes' formation: here the natural boundaries of the south-taiga and north-taiga landscapes are combined (Vegetation ..., 1969). The first ones are usual for the regions of high hypsometric layers; the second ones, by virtue of their great hydromorphy, - for the lowest parts of the floodplain. The Ob-Irtysh floodplain as “West Siberian phenomenon” is characterized by tremendous sizes (up to 60 km wide) and broad-crested floods – over 100 days (Petrov, 1979).

The Ob lowland has mainly a submeridional direction (Makaveyev and others, 1969): the channel flows undergo a constant effect of the Coriolis force steadily shifting the Ob channel eastwards, in the result of which a floodplain dry land band with oxbow lakes having a weak relation to the active channel flow appear from the western side. On their natural conditions such floodplains can be referred to amphibian landscapes (Petrov, 1979). The specific features of flood-

plain-forming processes in the Ob lowland have defined the formation of a huge complex of plain-type wetlands, a unique implement of which is sor surfaces – “playas”. In these lake-like developments of the Ob, Irtysh and their tributaries secondary branches’ channels of various sizes the optimal conditions for the formation of plankton and benthos standing populations in colossal scales are created. Like in the whole organic world the hierarchic pyramid of living beings here towers on the foundation formed by water plants and invertebrate animals. In the partnership of all the microbiota types such water represents in practice a high-caloric and nutrient “broth” (Nature of floodplain ..., 1992). It is this very foundation in the aggregate with the features of the Ob-Irtysh floodplain hydrology that defines the development of the biota unique in its diversity and biomass. First of all, it concerns the algal flora (Valeyeva, Moskovchenko, 2001).

The sources of the water plants of river flows are different. The connection between the species composition of a river and the water body, from which it flows out, is evident: lakes – sources or lakes – playas, through which the river flows down, surely exercise a significant influence on the development of the river plankton, promote a greater constancy of its quantitative and qualitative composition (Skabichevsky, 1974). A considerable role in the formation of river plankton population is played by river bottom water bodies, especially floodplain lakes constantly connected with the river: at the flood decline the plankton is driven to the main river channel. The sandy soils containing a great amount of the resting algal stages are an additional source of the river plankton enrichment both in quantitative and qualitative respects. I.e. the algae are not only transferred by the river flows, but also are “sorted” and live in the rivers.

The river channel heterogeneity is the cause of considerable differences of the algal

flora down the stream. In the literary sources concerning the Arctic zone of Siberia the greatest algal species diversity, even of such a rather small group for these latitudes as euglena algae, compared to other arctic regions is registered. Probably, that is why the Ob-Irtysh floodplain, especially its wetlands, has been attracting the attention of aquatic biologists for many decades, algologists among them. In the second part of the XX century the algal flora research were activated in the described territory. The 60-s and 80-s years were the most meaningful and effective ones in this respect. A major contribution to the study of algae in this territory was made by the scientists of the Inferior Plants Laboratory of the Central Siberian Botanic Garden of the RAS (Novosibirsk). In July-August, 1964, Kuksn M.S., Cand. Sc. (Biology), carried out the rout investigations of the phytoplankton of 23 sor water bodies in the floodplain of the Lower Irtysh and Ob from Khanty-Mansiysk to Salekhard (Kuksn, 1970) as part of the “Hydrorybproyekt” Institute expedition. A considerable contribution to the study of the lower course of the Ob and its neighboring water bodies in the tundra forest belt was made by Safonova T.A. (1964, 1972), Dr. Sc. (Biology), whose interest is the euglena algae. The information of the algal flora of the considered territory is contained in the works of Kiselev I.A. (1970), Semenova L.A., Alexyuk V.A. (1983). The Lower Ob phytobenthos in the region of Belogorye – Oktyabrskoye is described by Levadnaya G.D. (1986).

In a series of works of Yurova (Valeyeva) E.I. (1974, 1975, 1976) the questions dealing with the algal flora of the Irtysh downstream – phytoplankton features, its horizontal and altitude distribution, seasonal dynamics, - are considered. In the author’s thesis work (1975) there is the algal class-list containing 297 taxonomic units from 7 sections.

Table 1. List of Lower Ob water bodies' algae

№	Genus name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	p. <i>Trachelomonas</i> Ehr.	17	14	11	17	17	12	12	17	11	20	9	15	21	12	19	17	23	15	16	10	20
1	<i>T. abrupta</i> Swir.	+	+					+	+		+							+			+	+
2	<i>T. amphora</i> Swir.						+	+						+				+				
3	<i>T. armata</i> (Ehr.) Stein		+		+	+				+	+					+				+		
4	<i>T. arnoldii</i> Roll						+		+					+						+		+
5	<i>T. borealis</i> (Safon.) Safon. comb. nova							+						+		+	+					
6	<i>T. calva</i> Conrad emend. Safon.	+				+									+	+					+	
7	<i>T. caudata</i> (Ehr.) Stein				+						+	+							+			
8	<i>T. cerviculata</i> Stokes emend. Swir.			+						+			+			+						+
9	<i>T. cingeri</i> Roll		+					+						+				+				
10	<i>T. citrififormis</i> Drez.	+		+			+		+		+								+			
11	<i>T. coronata</i> Swir.				+				+								+					
12	<i>T. curta</i> Da Cunha									+			+	+							+	
13	<i>T. cylindrica</i> Ehr. sec. Playf.					+	+				+	+				+				+		
14	<i>T. dubia</i> Swir. emend. Defl.		+	+	+				+		+							+				
15	<i>T. ferox</i> (Skv.) Popova													+				+	+			
16	<i>T. globularis</i> (Awer.) Lemm.			+			+		+					+		+			+			
17	<i>T. granulata</i> Swir.	+				+			+									+	+			
18	<i>T. granulosa</i> Playf.	+	+		+			+			+				+		+					
19	<i>T. hexangulata</i> Swir.				+	+				+				+				+				+
20	<i>T. hispida</i> (Perty) Stein emend. Defl. var. <i>hispida</i>	+	+		+	+	+		+		+	+	+	+			+			+		+
21	<i>T. hispida</i> var. <i>crenulato-collis</i> (Maskell) Lemm.							+					+		+	+	+	+	+	+		+
22	<i>T. intermedia</i> Dang. f.	+		+		+	+		+		+		+	+				+		+		+

№	Genus name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	<i>intermedia</i>																					
23	<i>T. intermedia</i> f. <i>chanchinae</i> (Skv.) Popova		+		+					+	+			+		+	+					+
24	<i>T. intermedia</i> var. <i>spinifera</i> (Popova) Popova			+					+				+		+			+				
25	<i>T. kellogii</i> Skv.					+					+	+				+			+			
26	<i>T. komarovii</i> Skv.				+						+				+		+		+			+
27	<i>T. lacustris</i> (Drez.) emend. Balech	+		+										+		+				+	+	+
28	<i>T. lemmermanii</i> Wolosz.						+	+	+				+					+				
29	<i>T. longicauda</i> Swir.				+								+				+	+		+		
30	<i>T. manginii</i> Defl.				+						+				+			+				+
31	<i>T. nigra</i> Swir.	+			+				+			+	+	+			+		+			
32	<i>T. oblonga</i> Lemm. var. <i>oblonga</i>	+	+						+					+						+	+	
33	<i>T. oblonga</i> var. <i>ovalis</i> (Playf.) Popova		+							+				+	+			+			+	+
34	<i>T. oblonga</i> var. <i>pulcherrina</i> (Playf.) Popova	+					+						+									
35	<i>T. oblonga</i> var. <i>punctata</i> Lemm.			+		+				+	+					+	+	+				
36	<i>T. obovata</i> f. <i>klebsiana</i> (Defl.) Popova				+										+	+	+	+				
37	<i>T. obovata</i> Stokes emend. Delf. f. <i>obovata</i>	+							+										+	+		+
38	<i>T. ornata</i> (Swir.) Skv.					+		+			+						+	+				
39	<i>T. patellifera</i> Popova			+	+							+	+	+			+		+			
40	<i>T. planctonica</i> Swir. f. <i>planctonica</i>	+	+			+		+	+			+	+		+			+				+
41	<i>T. planctonica</i> f. <i>oblonga</i> (Drez.) Popova	+								+				+		+			+			
42	<i>T. pulchra</i> Swir.					+	+		+		+					+				+		
43	<i>T. raciborskii</i> Wolosz.				+						+					+				+		

№	Genus name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
44	<i>T. recticollis</i> Defl.		+						+	+				+				+	+			
45	<i>T. rotundata</i> Swir.					+										+				+	+	+
46	<i>T. scabra</i> Playf. var. <i>scabra</i>	+					+								+				+		+	+
47	<i>T. scabra</i> var. <i>borealis</i> Safon.					+		+		+						+	+					
48	<i>T. spatirinha</i> Skuja			+							+			+				+		+		
49	<i>T. superba</i> Swir. emend. Defl.					+		+					+	+			+	+				+
50	<i>T. verrucosa</i> Stokes				+											+				+	+	
51	<i>T. volvocina</i> Ehr. var. <i>volvocina</i>	+	+	+		+			+			+		+	+	+						+
52	<i>T. volvocina</i> var. <i>subglobosa</i> Lemm. emend. Swir.						+				+		+				+	+				
53	<i>T. volvocinopsis</i> Swir.	+	+			+					+											+
54	<i>T. woronichiniana</i> Popova					+												+		+	+	+
55	<i>T. woycikii</i> Koszw.				+						+			+	+	+			+			
	p. <i>Stronhomonas</i> Defl.	3	2	2	1	1	3	1	2	1	2	3	2	2	1	2	3	2	3	1	2	3
56	<i>S. acuminata</i> (Schmarda) Defl.	+		+		+	+			+		+	+					+				
57	<i>S. fluvialis</i> (Lemm.) Defl.	+	+									+					+					+
58	<i>S. planctonica</i> (Wolosz.) Popova				+				+		+					+	+		+	+		+
59	<i>S. schauinslandii</i> (Lemm.) Defl.	+					+					+	+	+	+	+						
60	<i>S. tanibovica</i> (Swir.) Defl.			+			+	+	+					+					+		+	+
61	<i>S. wermontii</i> Defl. var. <i>commune</i> Popova		+								+						+	+	+		+	
	p. <i>Euglena</i> Ehr.	8	7	2	6	8	2	4	5		4	4	7	3	5	7	10	10	6	8	7	11
62	<i>E. acus</i> Ehr. var. <i>acus</i>	+	+			+						+	+	+			+	+		+		+
63	<i>E. acus</i> var. <i>longispina</i> Defl.	+				+							+						+	+	+	
64	<i>E. bucharica</i> J. Klebs		+		+		+					+				+					+	+

№	Genus name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
65	<i>E. deses</i> Ehr. f. <i>intermedia</i> Klebs							+	+						+			+			+	
66	<i>E. gracilis</i> Klebs							+						+				+	+			+
67	<i>E. hispida</i> Lemm.				+						+		+				+	+		+		
68	<i>E. korschikovii</i> Gojdies					+									+	+						
69	<i>E. limnophylla</i> Lemm.	+	+				+				+						+	+		+		
70	<i>E. oxyuris</i> f. <i>skwortzovii</i> (Popova) Popova		+						+				+			+		+	+			+
71	<i>E. oxyuris</i> Schmarda f. <i>oxyuris</i>	+	+		+	+							+				+		+		+	+
72	<i>E. pavlovskoensis</i> (Elenk. et V. Poljan.) Popova			+											+		+	+		+	+	
73	<i>E. pisciformis</i> Klebs			+		+		+						+				+				+
74	<i>E. proxima</i> Dang.				+							+								+		+
75	<i>E. spathirhynchus</i> Skuja	+														+			+		+	
76	<i>E. spirogyra</i> Ehr.	+			+	+					+	+	+			+	+			+		+
77	<i>E. tripteris</i> (Duj) Klebs	+	+		+						+		+		+		+	+				+
78	<i>E. variabilis</i> Klebs		+			+		+							+	+		+	+			+
79	<i>E. viridis</i> Ehr.	+				+			+							+		+			+	+
	p. <i>Phacus</i> Dujard	1	1		1	2		2	2		2	1	2	2	1	1	2	2	1	2	1	2
80	<i>Ph. acuminatus</i> Stokes	+									+	+					+	+	+			
81	<i>Ph. arnoldii</i> Swir.							+	+												+	
82	<i>Ph. caudatus</i> Hübner		+					+	+									+				+
83	<i>Ph. longicauda</i> (Ehr.) Duj				+	+					+		+	+		+				+		+
84	<i>Ph. parvulus</i> Klebs					+							+	+	+	+	+			+		
	TOTAL	29	24	15	25	28	17	19	26	12	27	17	26	28	19	29	31	37	25	27	20	36

- I. Irtysh downstream
1. Irtysh inflow
 2. Konda inflow
 3. Gornaya Branch
 4. Chaginsky Sor
 5. Shapshinsky Sor
 6. Leushinsky Tuman
 7. Cherny Sor
 8. Pagilevo
 9. Shubnoye Lake
 10. Kamyshovoye Lake

- II. Ob downstream
11. Ob river near Kabel village
 12. Big Ob
 13. Small Ob and floodplain water bodies
 14. Mountain Ob
 15. North Sos'va inflow and oxbow water bodies
 16. Bolshoy Altynsky Sor
 17. Bolshoy Karymkarsky Sor
 18. Bolshoy Sor
 19. Untorsky Sor
 20. Vanzevatsky Sor
 21. Bolshoy Kazymsky Sor

The first published work with the description of benthos and algal flora fouling in the Konda downstream belongs to Porkhacheva N.A. (1986): the list of the algae found out contains 69 specific and infraspecific taxonomic units.

Together with the development of oil and gas complex and intensifying of the technogenic press on the aquatic ecosystems in Priobye the character of the algological researches is being changed: the algal component of the examined water bodies is considered as an "indicator of their ecological state" at the development of rational nature management methods on rivers and other water body types. In this respect at the end of the 1970-s Naumenko Yu.V. (1985, 1986, 1988) carried out the Konda river lowlands' algal flora taxonomic composition investigations, the river's characteristics relative to pH, water salinity and other factors were given. In the material treated 198 new specific and infraspecific taxonomic units of algae from 6 sections has been found out. The author thinks that the overrepresentation of boreal species in the algal flora is due to the high bogginess of the territory.

In 1984-85 by the order of the "SibrybNIIproyekt" Institute the rout investigations of the Ob-Irtysh floodplain's algal flora in the region: the Konda inflow – the Irtysh inflow – the downstream of the Ob (Belogorye – Vanzevat), including the wetlands "Verkhneye Dvuobye" and the sor system, were carried out. 21 water bodies (table), a considerable part of which hadn't fallen within the eyeshot of the algologists before, were examined altogether.

In the work presented here only the results of the euglena algae qualitative determination have been given; other algal flora groups have been not considered due to a great volume of the practical material. 384 samples of the net plankton (mill silk N73) fixed by 5% formalin solution were treated altogether. The samples were looked through the MBI-6 microscope in 10 replicates. The identification of species was carried out on

the determinants of native and foreign authors.

In the reviewed materials 84 specific and infraspecific taxonomic units from 4 geni of the *Euglenaceae* family were found out. Three species were not identified.

References:

1. Alisov B.P. Climate of USSR. M.: Higher School, 1969, p. 250.
2. Valeyeva E.I. Flora of plankton algae of Irtysh downstream / Autoabstract, Sverdlovsk, 1975, p.18.
3. Valeyeva E.I., Moskovichenko D.V. Role of wetlands in stable development of North of Western Siberia. Tyumen: Publishing House of RAS, 2001, p. 228.
4. Vernadsky V.I. Sketches on Geochemistry. M., L.: Gosizdat, 1927, p. 188.
5. Kiselev I.A. On algal flora of Gulf of Ob together with some data for Lower Ob and Irtysh algae // Algae and mushrooms of Siberia and Far East. Novosibirsk: Nauka. Siberian department, 1970, part 1(3), pp. 41-54.
6. Kuksn M.S. Phytoplankton of sor system of Ob and lowlands of Irtysh // Algae and mushrooms of Siberia and Far East. Novosibirsk: Nauka. Siberian department, 1972, part 2(4), pp. 3-44.
7. Lapo A.V. Traces of past biospheres, or a story about how the biosphere is organized and what is left of the biospheres of the geological past. M.: Znaniye, 1987, p. 208.
8. Levadnaya G.D. Phytobenthos composition of Lower Ob in the sector of villages Belogorye – Oktyabrskoye // New about flora of Siberia. Novosibirsk: Nauka, Siberian department, 1986, pp. 23-31.
9. Makaveyev N.N., Khmeleva N.V. General features of river bed evolution in river turns and methods of their investigations // Experimental geomorphology. M.: Publishing House of Moscow University, 1962, Issue 2, pp. 7-25.
10. Naumenko Yu.V. On Lower Irtysh phytoplankton composition // USSR AS Repoter, Novosibirsk, Nauka, Siberian department, 1986, pp. 45-49.
11. Naumenko Yu.V. Phytoplankton of Ob, Lower Irtysh and its changes under the effect of anthropogenic factors. Autoabstract ..., Novosibirsk, 1985, p. 16.
12. Naumenko Yu.V. Konda phytoplankton // USSR AS Reporter, 1988, pp. 66-67.
13. Petrov I.B. Ob-Irtysh floodplain. Novosibirsk: Nauka, 1979, p. 136.
14. Plotnikov V.V. Introduction // Nature of Lower Ob floodplain: land ecosystems. Yekaterinburg, 1992, pp. 3-10.
15. Popova T.G., Safonova T.A. Euglena algae expansion in USSR territory // Aquatic and terrestrial communities of Siberian inferior plants. Novosibirsk: Nauka, Siberian department, 1974, pp. 15-28.

16. Porkhacheva N.A. Phytobenthos of Irtysh downstream // New about flora of Siberia. Novosibirsk: Nauka, Siberian department, 1986, pp.14-23.
17. Nature of Lower Ob floodplain: land ecosystems. Yekaterinburg, 1992, p. 214.
18. West Siberian Plain vegetation. Map M 1: 1 500 000 / under the editorship of Mikhailovsky V.Ya. M.: SDGC, 1976, p. 4.
19. Safonova T.A. Algae of Ob downstream water bodies and neighboring forest tundra areas // Algae and mushrooms of Siberia and Far East. Novosibirsk: Nauka. Siberian department, 1964, Part 1, pp. 130-147.
20. Safonova T.A. On Trachelomonas Ehr. (Euglena algae) genus expansion in water bodies of Ob floodplain // Biological Institute of AS of USSR, 1972, Issue 19, pp. 352-361.
21. Safonova T.A. Euglena algae of Western Siberia, Novosibirsk: Nauka, Siberian department, 1987, p. 192.
22. Semenova L.A., Alexyuk V.A. Ob downstream phytoplankton // Biology and Ecology of Lower Ob ecosystem's aquatic organisms. Sverdlovsk: USSR AS, 1983, pp. 32-42.
23. Skabichevsky A.P. Intraspecific evolution of inferior plants and taxonomia questions // Problems of inferior plants' phylogeny. M.: Nauka, 1974, pp. 7-19.
24. Yurova E.I. Seasonal dynamics of Lower Irtysh phytoplankton // Ukrainian botanic magazine, 1975, Vol. XXXII, N3, pp. 349-352.
25. Yurova E.I. Irtysh downstream phytoplankton features // USSR AS Reporter, 1994, N5, Issue 1, pp. 133-135.

SYSTEMATIC REVIEW OF RANDOMIZED CLINICAL TRIALS ON THE USE OF HYDROXYETHYL STARCH FOR FLUID MANAGEMENT IN SEPSIS

Christian J. Wiedermann

*Division of Internal Medicine 2, Department of Medicine,
Central Hospital of Bolzano, Bolzano, Italy*

Background: Patients with sepsis typically require large resuscitation volumes, but the optimal type of fluid remains unclear. The aim of this systematic review was to evaluate current evidence on the effectiveness and safety of hydroxyethyl starch for fluid management in sepsis.

Methods: Computer searches of MEDLINE, EMBASE and the Cochrane Library were performed using search terms that included hydroxyethyl starch; hetastarch; shock, septic; sepsis; randomized controlled trials; and random allocation. Additional methods were examination of reference lists and hand searching. Randomized clinical trials comparing hydroxyethyl starch with other fluids in patients with sepsis were selected. Data were extracted on numbers of patients randomized, specific indication, fluid regimen, follow-up, endpoints, hydroxyethyl starch volume infused and duration of administration, and major study findings.

Results: Twelve randomized trials involving a total of 1062 patients were included. Ten trials (83%) were acute studies with observation periods of 5 days or less, most frequently assessing cardiorespiratory and hemodynamic variables. Two trials were designed as outcome studies with follow-up for 34 and 90 days, respectively. Hydroxyethyl starch increased the incidence of acute renal failure compared both with gelatin (odds ratio, 2.57; 95% confidence interval, 1.13–5.83) and crystalloid (odds ratio, 1.81; 95% confidence interval, 1.22–2.71). In the largest and most recent trial a trend was observed toward increased overall mortality among hydroxyethyl starch recipients (odds ratio, 1.35; 95% confidence interval, 0.94–1.95), and mortality was higher ($p < 0.001$) in patients receiving $> 22 \text{ mL} \cdot \text{kg}^{-1}$ hydroxyethyl starch per day than lower doses.

Conclusion: Hydroxyethyl starch increases the risk of acute renal failure among patients with sepsis and may also reduce the probability of survival. While the evidence reviewed cannot necessarily be applied to other clinical indications, hydroxyethyl starch should be avoided in sepsis.

Background

Sepsis and its frequent accompaniments – septic shock, systemic inflammatory response syndrome (SIRS) and adult respiratory distress syndrome (ARDS) – are major cell wall is among the mechanisms believed to initiate causes of multiple organ failure and mortality in hospitalized patients [1]. Overall hospital mortality rates of 21–47% have been reported among sepsis patients [2–5]. Acute renal failure (ARF) is a frequent complication [6]. Release of lipopolysaccharide endotoxin from the bacterial the signs, symptoms and physiologic and biochemical abnormalities characteristic of septic shock. Maldistribution of fluid in the microcirculation is typical of septic shock and results from endotoxin-induced endothelial damage. In severe sepsis, acute circulatory failure is often associated with hypovolemia and inadequate venous return, cardiac output and tissue nutrient flow [7]. Hypo-volemia is a significant risk factor for

mortality in sepsis [8], and these patients often require large volumes of resuscitation fluids [9]. Persistent vasodilation may also contribute to mortality among patients with sepsis [10]. Due to increased capillary permeability albumin efflux from plasma to the interstitium is increased three-fold in septic shock patients [11]. Septic patients frequently develop hypoproteinemia, which is significantly correlated with fluid retention and weight gain, development of ARDS and mortality [12].

Colloids are widely used as first-line treatment, in particular in Europe, usually in combination with crystalloids [13]. The artificial colloid hydroxyethyl starch (HES) has gained increasing acceptance for fluid management in a variety of indications. HES solutions differ according to their average molecular weight, molar substitution defined as the proportion of hydroxyethyl units substituted per glucose monomer, and substitution pattern as characterized by the ratio of substi-

tution at the C2 and C6 positions on the glucose ring. More rapid clearance of HES molecules from plasma is observed after infusion of HES solutions with lower molar substitution, C2/C6 ratio and, to a smaller extent, molecular weight [14]. Impetus for the usage of HES has been generated by the higher unit acquisition cost of albumin [15]. Nevertheless, as previously reviewed [16], safety concerns about HES have been mounting. Some complications of HES are dose-related, and sepsis patients may require prolonged fluid administration typically with relatively high cumulative volumes. Consequently, the safety of HES in this indication needs to be appraised with particular care. The systematic review presented here is the first to assess randomized clinical trials of HES in sepsis.

Methods

Randomized clinical trials evaluating HES in sepsis were sought by computer searches of the MEDLINE and EMBASE bibliographic databases and the Cochrane Library. Search terms included: hydroxyethyl starch; het-astarch; shock, septic; sepsis; randomized controlled trials; and random allocation. Additionally, reference lists were examined and selected specialty journals searched by hand. Eligibility was not restricted on the basis of trial endpoints, type of HES solution, time period or language of publication. Both published and unpublished trials were eligible for inclusion.

From the trial reports data were extracted on numbers of patients randomized, specific indication, fluid regimen, follow-up and endpoints. Extracted data also included the daily and cumulative HES doses and the duration of HES administration. Close attention was paid to the investigators, time periods and trial data to avoid duplication in case the same trial was the subject of multiple reports and to ensure completeness of the included evidence in the event that multiple reports of the same trial contained partially non-overlapping data.

Major findings of the included trials were qualitatively summarized and tabulated.

Due to heterogeneity in the control regimens, endpoints, length of follow-up and other trial design features a quantitative meta-analysis was not judged to be feasible.

Descriptive statistics included the median and interquartile range (IQR). Calculations were performed with R version 2.2.1 statistical software (The R Foundation for Statistical Computing, Vienna, Austria).

Results

Included trials

The selection process for randomized clinical trials is depicted in Fig. 1. Twelve trials with a total of 1062 patients were included [7,9,17-27]. None was unpublished. With 537 patients, the recent Efficacy of Volume Substitution and Insulin Therapy in Severe Sepsis (VISEP) trial accounted for approximately half the patients in the review [27]. Two included trials were described by Rackow and co-workers in the 1980s [7,9] and 5 by Boldt et al. in the 1990s [17-22]. The remaining 5 trials conducted by various teams of investigators were reported since 2000 [23-27]. One trial in a mixed population of patients with either septic or non-septic shock was excluded because septic shock was absent in approximately one-third of the patients and study endpoint results for septic versus other forms of shock were reported only in aggregate form [28,29]. Another trial involving 27 patients with severe sepsis and 36 with postoperative SIRS was also excluded due to aggregation of data [30]. Unaggregated data for that trial were requested from the investigators, but no response was received.

Trial characteristics

The characteristics of the included trials are summarized in Table 1. The median number of sepsis patients per trial was 30 (IQR, 26-64). Only three trials involved more than 100 patients [22,24,27]. Patients with severe sepsis or septic shock were enrolled in 6 trials [7,9,24-27]. Of the 6 other trials, 5 involved postoperative sepsis [17-22] and one sepsis with hypovolemia in ventilated and hemodynamically controlled patients [23].

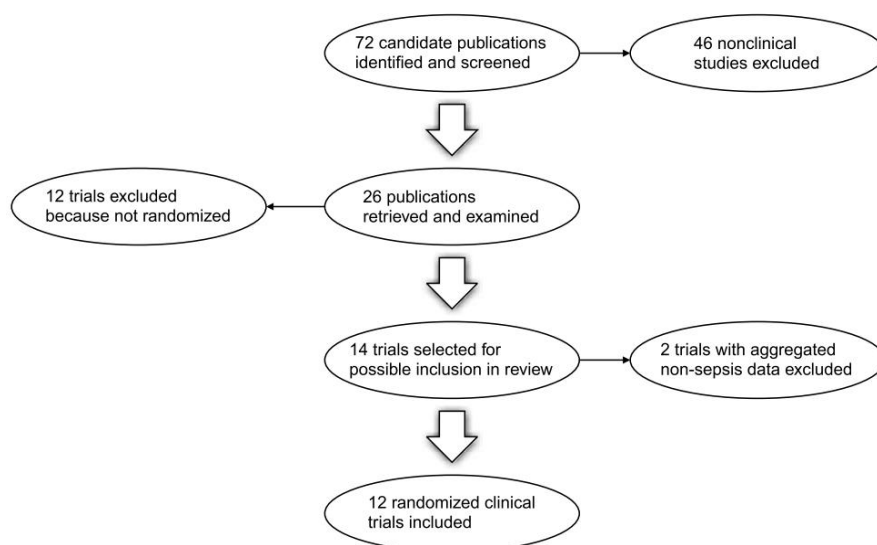


Figure 1. Randomized trial selection process.

HES with a molecular weight of 200 kDa and molar substitution of 0.5 (HES 200/0.5) was evaluated in 8/12 trials (67%). HES 200/0.62 was investigated in two trials and HES 130/0.4 and HES 450/0.7 in one each. The control fluid was 20% albumin in 6 trials, gelatin in 3, 5% albumin in 2 and crystalloid in one.

Ten trials (83%) were acute studies in which the observation periods ranged from less than 1 h to a maximum of 5 days. Only two trials were designed as outcome studies with follow-up of 34–90 days.

Cardiorespiratory and hemodynamic variables were end-points of 7 trials and coagulation parameters of 3. Other evaluated endpoints consisted of extravascular lung water, gastric mucosal acidosis, circulating soluble adhesion molecules, ARF and morbidity and mortality.

HES posology

Patients in the included trials received HES for a median of 5 days (IQR, 1–5 days). The median daily HES dose was $12.6 \text{ mL}\cdot\text{kg}^{-1}$ (IQR, $11.0\text{--}13.7 \text{ mL}\cdot\text{kg}^{-1}$) and the median cumulative dose $49.8 \text{ mL}\cdot\text{kg}^{-1}$ (IQR, $22.6\text{--}63.0 \text{ mL}\cdot\text{kg}^{-1}$).

Major findings

Hemodynamic and cardiorespiratory variables were improved by HES 130/0.4 and

HES 200/0.5 compared with 20% albumin [19,22,26] but not gelatin [25]. Acute Physiology and Chronic Health Evaluation (APACHE) II score was also improved by HES 130/0.4 but not 20% albumin [26]. HES 200/0.5 either improved gastric intra-mucosal pH (pH_i) compared with 20% albumin [21] or avoided a decline in pH_i observed in 20% albumin recipients [19]. On the other hand, gelatin raised pH_i and decreased CO_2 gastric mucosal arterial gradient, while HES 200/0.62 did not display these beneficial effects [23].

HES 450/0.7 impaired coagulation, as judged by prolonged partial thromboplastin time, and decreased platelet count [9]. These undesirable effects were not encountered in patients receiving 5% albumin. HES 200/0.5 diminished factor VIII levels compared with 5% albumin [7]. Differences in coagulation and platelet count between HES 200/0.5 and 20% albumin were not observed in one trial [22]. Compared with crystalloid, HES 200/0.5 interfered with coagulation as indicated by a higher sequential organ failure assessment (SOFA) coagulation subscore ($p < 0.001$) and greater median red blood cell transfusion requirement of 6 units (IQR, 4–12 units) vs. 4 units (IQR, 2–8 units) for the control group ($p < 0.001$) [27].

Table 1. Characteristics of included randomized trials

Trial	n [†]	Indication	Fluid Regimen [‡]	Follow-Up	Endpoints
Falk et al., 1988 [9]	12	Septic shock	6% HES 450/0.7 or 5% albumin to 15 mm Hg target PAWP	24 h	Coagulation
Rackow et al., 1989 [7]	20	Severe sepsis and systemic hypoperfusion	10% HES 200/0.5 or 5% albumin to 15 mm Hg target PAWP or 2000 mL maximum	45 min	Cardiorespiratory function and coagulation
Boldt et al., 1995 [17,18]	30	Sepsis after major surgery	10% HES 200/0.5 or 20% albumin to 12–16 mm Hg target CVP, PCWP or both	5 days	Endothelial-related coagulation and platelet function
Boldt et al., 1996 [19]	30	Sepsis secondary to major general surgery	10% HES 200/0.5 or 20% albumin to 12–18 mm Hg target PCWP	5 days	Cardiorespiratory and circulatory variables
Boldt et al., 1996 [20]	42	Sepsis secondary to major surgery	6% HES 200/0.5, 20% albumin or pentoxifylline	5 days	Circulating soluble adhesion molecules
Boldt et al., 1996 [21]	28	Sepsis secondary to major surgery	10% HES 200/0.5 or 20% albumin to 10–15 mm Hg target PCWP	5 days	Circulatory variables
Boldt et al., 1998 [22]	150	Postoperative sepsis	10% HES 200/0.5 or 20% albumin to 12–15 mm Hg target PCWP	5 days	Hemodynamics, laboratory data and organ function
Asfar et al., 2000 [23]	34	Sepsis and hypovolemia in ventilated and hemodynamically controlled patients	500 mL 6% HES 200/0.62 or 4% succinylated modified fluid gelatin	60 min	Hemodynamics and gastric mucosal acidosis
Schortgen et al., 2001 [24]	129	Severe sepsis or septic shock	6% HES 200/0.62 up to 4 days or 80 mL·kg ⁻¹ cumulative dose or 3% gelatin	34 days	ARF
Molnár et al., 2004 [25]	30	Septic shock with hypovolemia and acute lung injury	6% HES 200/0.5 or 4% modified fluid gelatin to achieve ITBVI > 900 mL·m ⁻²	60 min	Hemodynamics, EVLW and oxygenation
Palumbo et al., 2006 [26]	20	Severe sepsis in mechanically ventilated patients	6% HES 130/0.4 or 20% albumin to maintain PCWP of 15–18 mm Hg	5 days	Hemodynamic and oxygenation parameters
Brunkhorst et al., 2008 [27]	537	Severe sepsis or septic shock	10% HES 200/0.5 (to 20 mL·kg ⁻¹ ·day ⁻¹ limit) or Ringer's lactate to target of ≥ 8 mm Hg CVP	90 days	Morbidity and mortality

Abbreviations: ARF, acute renal failure; CVP, central venous pressure; EVLW, extravascular lung water; HES, hydroxyethyl starch; ICU, intensive care unit; ITBVI, intrathoracic blood volume index; PAWP, pulmonary arterial wedge pressure; PCWP, pulmonary capillary wedge pressure

[†]For trials with more than one indication, includes only patients with sepsis.

[‡]HES solutions specified by molecular weight/molar substitution.

In a trial of 129 patients with severe sepsis or septic shock by Schortgen et al. [24], the groups randomized to receive HES 200/0.62 or gelatin were similar at baseline in severity of illness and serum creatinine. However, over the 34 day study observation period the incidence of ARF was increased in the HES 200/0.62 recipients ($p = 0.018$). In a multivariate analysis with adjustment for fluid loading before inclusion and mechanical ventilation at inclusion, HES 200/0.62 exposure was shown to be an independent risk factor for ARF (Table 2). At the conclusion of the study, ARF incidence in the HES 200/0.62 group (61%) exceeded that in the gelatin group (31%) by 30% based on Kaplan-Meier analysis. The median time to ARF

among patients receiving HES 200/0.62 was 16 days. An earlier trial by Boldt and co-workers [22] failed to detect an effect of HES 200/0.5 on incidence of renal failure, possibly as a result of the short 5 day observation period. In the trial of Schortgen et al., a between-group difference in ARF incidence of only 11% was evident at the 5 day time point.

The recent multicenter VISEP trial assessing morbidity and mortality up to 90 days in 537 patients with severe sepsis or septic shock is the first large-scale outcome study of HES 200/0.5 in any clinical indication [27]. The HES 200/0.5 and crystalloid groups were well-matched at baseline in severity of illness and serum creatinine. HES

200/0.5 infusion compromised renal function ($p = 0.02$) as reflected by a higher SOFA renal subscore than that of the control group. The incidence of ARF and use of renal replacement therapy (RRT) were both increased by HES 200/0.5 (Fig. 2). RRT usage was positively correlated with cumulative HES 200/0.5 dose ($p < 0.001$). Even in the subset of patients receiving exclusively lower HES 200/0.5 doses ($\leq 22 \text{ mL}\cdot\text{kg}^{-1}$), higher ARF incidence ($p = 0.04$) and RRT utiliza-

tion ($p = 0.03$) were demonstrated in comparison with the crystalloid control group.

In the VISEP trial there was also an overall trend toward increased mortality among HES 200/0.5 recipients (Fig. 2). Mortality at 90 days was correlated with cumulative HES 200/0.5 dose ($p = 0.001$) and significantly increased ($p < 0.001$) in patients receiving $> 22 \text{ mL}\cdot\text{kg}^{-1}$ HES 200/0.5 (58%) for at least one day than lower doses (31%).

Table 2. HES dose administered and major findings of included randomized trials

Trial	Days on HES	Mean $\text{mL}\cdot\text{kg}^{-1}$ HES		Major Findings
		Daily	Cumulative	
Falk et al., 1988 [9]	1	70.5†	70.5†	In HES 450/0.7 group PTT increased by 20 s ($p = 0.01$) and platelet count decreased by $158 \times 10^3 \text{ mm}^{-3}$ ($p = 0.01$); no significant PTT or platelet count change in albumin group
Rackow et al., 1989 [7]	1	12.9†	12.9†	FVIII:c declined 45% in the HES 200/0.5 group compared with 5% in the albumin group ($p = 0.05$)
Boldt et al., 1995 [17,18]	5	8.5	42.3	Plasma thrombomodulin increased in the albumin group and remained unchanged in the HES 200/0.5 group ($p < 0.05$); plasma protein C among HES 200/0.5 recipients increased on days 4 and 5 without corresponding change in the albumin group ($p < 0.05$); maximum platelet aggregation declined in both groups ($p < 0.05$)
Boldt et al., 1996 [19]	5	11.0	55.2	HES 200/0.5 but not albumin increased cardiac index, RVEF, $\text{Pao}_2/\text{Fio}_2$, Do_2I and Vo_2I and decreased SVRI ($p < 0.05$ for all comparisons); pH_i decreased in albumin but not HES 200/0.5 group ($p < 0.05$)
Boldt et al., 1996 [20]	5	12.7	63.7	Circulating sELAM-I and sICAM-I concentrations reduced by HES 200/0.5 compared with albumin ($p < 0.05$ for both comparisons)
Boldt et al., 1996 [21]	5	11.0	49.8	Vasopressin, endothelin-1 and norepinephrine decreased and pH_i increased in HES 200/0.5 but not albumin group ($p < 0.05$ for all comparisons); ANP increased by albumin but not HES 200/0.5 ($p < 0.05$)
Boldt et al., 1998 [22]	5	12.5	62.4	$\text{Pao}_2/\text{Fio}_2$, Do_2I and Vo_2I increased and lactate decreased by HES 200/0.5 but not albumin ($p < 0.05$ for all comparisons); no differences in incidence of renal failure, platelet count, PT or aPTT
Asfar et al., 2000 [23]	1	7.9	7.9	Gelatin but not HES 200/0.62 increased pH_i ($p < 0.001$) and decreased CO_2 gastric mucosal arterial gradient ($p < 0.0005$)
Schortgen et al., 2001 [24]	4‡	14.0‡	31.0‡	HES 200/0.62 exposure an independent risk factor for ARF (adjusted odds ratio, 2.57; CI 1.13–5.83)
Molnár et al., 2004 [25]	1	14.3‡	14.3‡	No differences detected in ITBVI, EVLW or $\text{Pao}_2/\text{Fio}_2$
Palumbo et al., 2006 [26]	5	--§	--§	Target PCWP of 15–18 mm Hg maintained by both colloids; temperature, MAP, PAP, CVP, heart rate and urine output remained stable without differences between groups; HES 130/0.4, but not albumin, increased cardiac index and several oxygenation parameters ($\text{Pao}_2/\text{Fio}_2$, Do_2I and Vo_2I) and decreased APACHE II score ($p < 0.05$ for all within-group comparisons)
Brunkhorst et al., 2008 [27]	21	--§	70.4¶	Greater ARF incidence in HES 200/0.5 group (odds ratio, 1.81; CI, 1.22–2.71; $p = 0.002$); increased mortality at higher HES 200/0.5 doses (odds ratio, 3.08; CI, 1.78–5.37; $p < 0.001$)

Abbreviations: ANP, atrial natriuretic peptide; APACHE, Acute Physiology and Chronic Health Evaluation; aPTT, activated partial thromboplastin time; ARF, acute renal failure; CI, 95% confidence interval; CVP, central venous pressure; Do_2I , oxygen delivery index; EVLW, extravascular lung water; HES, hydroxyethyl starch; FVIII:c, factor VIII coagulant activity; ITBVI, intrathoracic blood volume index; MAP, mean arterial pressure; $\text{Pao}_2/\text{Fio}_2$, ratio of partial pressure of arterial oxygen to fraction of inspired oxygen; PAP, pulmonary artery pressure; PCWP, pulmonary capillary wedge pressure; pH_i , gastric intramucosal pH; PT, prothrombin time; PTT, partial thromboplastin time; RVEF, right ventricular ejection fraction; sELAM-I, soluble endothelial leucocyte adhesion molecule-I; sICAM-I, soluble intercellular adhesion molecule-I; SVRI, systemic vascular resistance index; Vo_2I , oxygen consumption index

†Calculated from reported volume administered assuming 70 kg body weight.

‡Actual days on HES not specified. Maximum of 4 days imposed after start of study, and percentage of patients receiving HES longer not indicated. Daily dose stated for day 1 only. Cumulative dose reported as median.

§Not reported.

¶Median.

Discussion

Until relatively recently, randomized trial evidence concerning HES for fluid management in sepsis patients has stemmed almost entirely from small acute studies, often focused on cardiorespiratory and hemodynamic end-points. These trials were thus not designed to evaluate safety or outcomes, and renal function in particular was not evaluated. The report of Schortgen et al. [24] was to first to raise serious concern that HES might adversely affect renal function in sepsis. The results of that trial should perhaps have been unsurprising in light of earlier randomized trials indicating deleterious effects of HES on the kidney in cardiac [31] and abdominal surgery [32] and renal transplantation [33]. The VISEP trial [27] has now furnished convincing confirmation that HES increases ARF incidence in sepsis.

The administration of HES 200/0.5 in the VISEP trial has also put to rest the argument that the adverse renal effects observed by Schortgen et al. might have been due to their use of the more highly substituted HES 200/0.62 solution. On the other hand it should be recognized that the results of sepsis trials involving repeated HES infusion over a period of several days or more cannot necessarily be extrapolated to other settings such

as postoperative fluid management involving lower HES doses for a shorter time.

The VISEP trial has also provided the first evidence that HES may increase mortality among sepsis patients. A trend toward higher mortality was observed among all recipients of HES compared with crystalloid, and mortality was significantly increased by higher HES doses. These data are in contrast to the results of the SAFE trial [34] comparing 4% albumin with normal saline. In the subset of 1218 SAFE trial patients with severe sepsis, a trend toward reduced mortality was evident in the albumin group (odds ratio, 0.81; 95% confidence interval, 0.63–1.04; $p = 0.09$). In light of these disparate survival trends, a need exists for an adequately powered outcome trial directly comparing HES and albumin in sepsis.

Schortgen et al. detected no effect of HES 200/0.62 on survival; however, the duration of follow-up in their trial was 34 days. In the VISEP trial the Kaplan-Meier survival curves for the two randomized groups began to diverge only at approximately 30 days and were clearly separated thereafter. It is thus possible that in the trial of Schortgen et al. a mortality difference might have become apparent with longer follow-up.

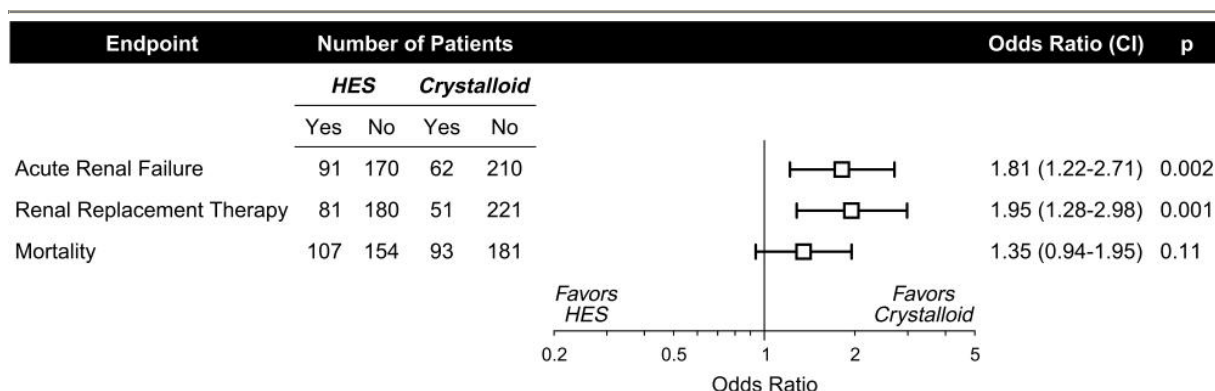


Figure 2. Incidence of acute renal failure, use of renal replacement therapy and mortality in patients receiving HES or crystalloid. Abbreviations: CI, 95% confidence interval; HES, hydroxyethyl starch. Based on the data of Brunkhorst et al. [27]

The mechanisms that might account for undesirable HES effects on kidney function and possibly survival in sepsis are not

understood. One putative mechanism is renal ischemia [24]. HES has been shown to increase plasma viscosity *in vitro* compared

with albumin [35]. In a rat model of severe hemorrhagic shock, both 6% HES and 5% albumin restored macrocirculatory function as measured by mean arterial pressure [36]. However, only albumin completely returned mesenteric microcirculatory blood flow to the baseline level. Furthermore, albumin was effective in restoring mesenteric lymphatic output, while HES was not ($p < 0.05$).

Since more than 30 years ago there has been evidence that HES might impair reticuloendothelial system (RES) function, thereby impairing host defenses against sepsis and possibly contributing to multiple organ failure, including ARF, and mortality [37]. A substantial proportion of administered HES cannot be metabolized acutely and undergoes uptake and storage by the RES, most notably in macrophages including those localized in the kidney [38-42]. In a quantitative necropsy specimen study of 12 young adult patients who had died due to sepsis and multi-organ failure after receiving a mean of $258 \text{ mL} \cdot \text{day}^{-1}$ HES 200/0.5, the highest mean major organ HES tissue concentration was measured in the kidney ($13.7 \text{ mg} \cdot \text{g}^{-1}$) [43]. The effects of plasma substitutes on RES function in mice were investigated by intraperitoneal injection of *Salmonella enteritidis* endotoxin [37]. Host defenses against this endotoxin are mediated by RES macrophages. Prior infusion of HES but not plasma increased the lethality of endotoxin injected either 1 h ($p < 0.05$) or 3 h ($p < 0.01$) subsequently. Similarly, in a murine hemorrhagic shock model no HES-resuscitated animal survived intraperitoneal injection of live *E. coli* at 1 h after resuscitation, whereas survival with shed blood resuscitation was 64% [44]. In contrast to these two studies involving acute septic challenge within 1–3 h after HES administration, a delayed challenge in the form of cecal ligation and puncture 48 h after HES infusion did not increase mortality in rats [45]. In any case, there is at present no clinical evidence indicating HES-mediated impairment of RES function in sepsis, and clinical studies will be required to delineate the role, if any, of the

RES in explaining the observed deleterious effects of HES among septic patients.

A variety of HES solutions are available that differ in average molecular weight, molar substitution, C2/C6 ratio and solvent. It has often been claimed that a particular HES solution may be devoid of safety problems displayed by others. Several recent evidence-based reviews have challenged this contention [16,46-48]. Similar types of complications, including impaired kidney function [48], have been encountered clinically across the entire spectrum of HES solutions. These adverse effects appear to reflect the intrinsic pharmacologic properties of the HES molecule rather than differences between individual HES solutions [49]. For instance, HES 130/0.4 was shown to impair renal function assessed by four sensitive markers in a randomized trial of elderly cardiac surgery patients [50]. HES 450/0.7 in Ringer's lactate vehicle was independently associated with reduced glomerular filtration rate in a retrospective study of 238 consecutive coronary artery bypass graft patients [51]. The safety of either solution for fluid management in sepsis would need to be demonstrated in clinical trials.

Conclusion

Compelling evidence is now at hand indicating that HES infusion places sepsis patients at increased risk for ARF. New data also suggest the possibility of poorer survival among sepsis patients receiving HES, especially higher doses. Clearly, HES 200/0.5 and HES 200/0.62 cannot now be recommended in sepsis. The effectiveness and safety of other HES solutions in this indication remain to be determined in future clinical trials.

List of abbreviations

ARDS: Adult respiratory distress syndrome; ARF: Acute renal failure; HES: Hydroxyethyl starch; IQR: Interquartile range; pH_i : Gastric intramucosal pH; RES: Reticuloendothelial system; RRT: Renal replacement therapy; SIRS: Systemic inflammatory response syndrome.

References:

1. Gong MN, Thompson BT, Williams P, Pothier L, Boyce PD, Christiani DC: **Clinical predictors**

of and mortality in acute respiratory distress syndrome: potential role of red cell transfusion. *Crit Care Med* 2005, **33**:1191-1198.

2. Pittet D, Thievent B, Wenzel RP, Li N, Auckenthaler R, Suter PM: **Bedsides prediction of mortality from bacteremic sepsis. A dynamic analysis of ICU patients.** *Am J Respir Crit Care Med* 1996, **153**:684-693.

3. Weycker D, Akhras KS, Edelsberg J, Angus DC, Oster G: **Long-term mortality and medical care charges in patients with severe sepsis.** *Crit Care Med* 2003, **31**:2316-2323.

4. Yu DT, Platt R, Lanken PN, Black E, Sands KE, Schwartz JS, Hibberd PL, Graman PS, Kahn KL, Snyderman DR, Parsonnet J, Moore R, Bates DW: **Relationship of pulmonary artery catheter use to mortality and resource utilization in patients with severe sepsis.** *Crit Care Med* 2003, **31**:2734-2741.

5. Braun L, Riedel AA, Cooper LM: **Severe sepsis in managed care: analysis of incidence, one-year mortality, and associated costs of care.** *J Manag Care Pharm* 2004, **10**:521-530.

6. van Biesen W, Yegenaga I, Vanholder R, Verbeke F, Hoste E, Colardyn F, Lameire N: **Relationship between fluid status and its management on acute renal failure (ARF) in intensive care unit (ICU) patients with sepsis: a prospective analysis.** *J Nephrol* 2005, **18**:54-60.

7. Rackow EC, Mecher C, Astiz ME, Griffel M, Falk JL, Weil MH: **Effects of pentastarch and albumin infusion on cardiorespiratory function and coagulation in patients with severe sepsis and systemic hypoperfusion.** *Crit Care Med* 1989, **17**:394-398.

8. Brun-Buisson C, Doyon F, Carlet J, Dellamonica P, Gouin F, Lepoutre A, Mercier JC, Offenscheidt G, Rignier B: **Incidence, risk factors, and outcome of severe sepsis and septic shock in adults. A multicenter prospective study in intensive care units. French ICU Group for Severe Sepsis.** *JAMA* 1995, **274**:968-974.

9. Falk JL, Rackow EC, Astiz ME, Weil MH: **Effects of hetastarch and albumin on coagulation in patients with septic shock.** *J Clin Pharmacol* 1988, **28**:412-415.

10. Groeneveld AB, Bronsveld W, Thijs LG: **Hemodynamic determinants of mortality in human septic shock.** *Surgery* 1986, **99**:140-153.

11. Marik PE, Iglesias J: **Would the colloid detractors please sit down!** *Crit Care Med* 2000, **28**:2652-2654.

12. Mangialardi RJ, Martin GS, Bernard GR, Wheeler AP, Christman BW, Dupont WD, Higgins SB, Swindell BB: **Hypoproteinemia predicts acute respiratory distress syndrome development, weight gain, and death in patients with sepsis. Ibuprofen in Sepsis Study Group.** *Crit Care Med* 2000, **28**:3137-3145.

13. Schortgen F, Deye N, Brochard L: **Preferred plasma volume expanders for critically ill patients: results of an international survey.** *Intensive Care Med* 2004, **30**:2222-2229.

14. Treib J, Haass A, Pindur G, Seyfert UT, Treib W, Grauer MT, Jung F, Wenzel E, Schimrigk K: **HES 200/0.5 is not HES 200/0.5. Influence of the C2/C6 hydroxyethylation ratio of hydroxyethyl starch (HES) on hemorheology, coagulation and elimination kinetics.** *Thromb Haemost* 1995, **74**:1452-1456.

15. Vincent JL: **Fluid management: the pharmacoeconomic dimension.** *Crit Care* 2000, **4**(Suppl 2):S33-35.

16. Wiedermann CJ: **Hydroxyethyl starch-can the safety problems be ignored?** *Wien Klin Wochenschr* 2004, **116**:583-594.

17. Boldt J, Heesen M, Welters I, Padberg W, Martin K, Hempelmann G: **Does the type of volume therapy influence endothelial-related coagulation in the critically ill?** *Br J Anaesth* 1995, **75**:740-746.

18. Boldt J, Muller M, Heesen M, Heyn O, Hempelmann G: **Influence of different volume therapies on platelet function in the critically ill.** *Intensive Care Med* 1996, **22**:1075-1081.

19. Boldt J, Heesen M, Muller M, Pabsdorf M, Hempelmann G: **The effects of albumin versus hydroxyethyl starch solution on cardiorespiratory and circulatory variables in critically ill patients.** *Anesth Analg* 1996, **83**:254-261.

20. Boldt J, Muller M, Heesen M, Neumann K, Hempelmann GG: **Influence of different volume therapies and pentoxifylline infusion on circulating soluble adhesion molecules in critically ill patients.** *Crit Care Med* 1996, **24**:385-391.

21. Boldt J, Mueller M, Menges T, Pabsdorf M, Hempelmann G: **Influence of different volume therapy regimens on regulators of the circulation in the critically ill.** *Br J Anaesth* 1996, **77**:480-487.

22. Boldt J, Muller M, Mentges D, Pabsdorf M, Hempelmann G: **Volume therapy in the critically ill: is there a difference?** *Intensive Care Med* 1998, **24**:28-36.

23. Asfar P, Kerkeni N, Labadie F, Gouillon JP, Brenet O, Alquier P: **Assessment of hemodynamic and gastric mucosal acidosis with modified fluid versus 6% hydroxyethyl starch: a prospective, randomized study.** *Intensive Care Med* 2000, **26**:1282-1287.

24. Schortgen F, Lacherade JC, Bruneel F, Cattaneo I, Hemery F, Lemaire F, Brochard L: **Effects of hydroxyethylstarch and gelatin on renal function in severe sepsis: a multicentre randomised study.** *Lancet* 2001, **357**:911-916.

25. Molnár Z, Mikor A, Leiner T, Szakmónyi T: **Fluid resuscitation with colloids of different molecular weight in septic shock.** *Intensive Care Med* 2004, **30**:1356-1360.

26. Palumbo D, Servillo G, D'Amato L, Volpe ML, Capogrosso G, De Robertis E, Piazza O, Tufano R: **The effects of hydroxyethyl starch solution in critically ill patients.** *Minerva Anesthesiol* 2006, **72**:655-664.
27. Brunkhorst FM, Engel C, Bloos F, Meier-Hellmann A, Ragaller M, Weiler N, Moerer O, Gruendling M, Oppert M, Grond S, Olthoff D, Jaschinski U, John S, Rossaint R, Welte T, Schaefer M, Kern P, Kuhnt E, Kiehntopf M, Hartog C, Natanson C, Loeffler M, Reinhart K: **Intensive insulin therapy and pentastarch resuscitation in severe sepsis. The German Competence Network Sepsis (SepNet).** *N Engl J Med* 2008, **358**:125-139.
28. Haupt MT, Rackow EC: **Colloid osmotic pressure and fluid resuscitation with hetastarch, albumin, and saline solutions.** *Crit Care Med* 1982, **10**:159-162.
29. Rackow EC, Falk JL, Fein IA, Siegel JS, Packman MI, Haupt MT, Kaufman BS, Putnam D: **Fluid resuscitation in circulatory shock: a comparison of the cardiorespiratory effects of albumin, hetastarch, and saline solutions in patients with hypovolemic and septic shock.** *Crit Care Med* 1983, **11**:839-850.
30. Veneman TF, Oude Nijhuis J, Woittiez AJ: **Human albumin and starch administration in critically ill patients: a prospective randomized clinical trial.** *Wien Klin Wochenschr* 2004, **116**:305-309.
31. Boldt J, Knothe C, Schindler E, Hammermann H, Dapper F, Hempelmann G: **Volume replacement with hydroxyethyl starch solution in children.** *Br J Anaesth* 1993, **70**:661-665.
32. Kumle B, Boldt J, Piper S, Schmidt C, Suttner S, Salopek S: **The influence of different intravascular volume replacement regimens on renal function in the elderly.** *Anesth Analg* 1999, **89**:1124-1130.
33. Cittanova ML, Leblanc I, Legendre C, Mouquet C, Riou B, Coriat P: **Effect of hydroxyethylstarch in brain-dead kidney donors on renal function in kidney-transplant recipients.** *Lancet* 1996, **348**:1620-1622.
34. SAFE Study Investigators: **A comparison of albumin and saline for fluid resuscitation in the intensive care unit.** *N Engl J Med* 2004, **350**:2247-2256.
35. Castro VJ, Astiz ME, Rackow EC: **Effect of crystalloid and colloid solutions on blood rheology in sepsis.** *Shock* 1997, **8**:104-107.
36. Paes-da-Silva F, Gonzalez AP, Tibiriz3 E: **Effects of fluid resuscitation on mesenteric microvascular blood flow and lymphatic activity after severe hemorrhagic shock in rats.** *Shock* 2003, **19**:55-60.
37. Schildt B, Bouveng R, Sollenberg M: **Plasma substitute induced impairment of the reticuloendothelial system function.** *Acta Chir Scand* 1975, **141**:7-13.
38. Thompson WL, Fukushima T, Rutherford RB, Walton RP: **Intravascular persistence, tissue storage, and excretion of hydroxyethyl starch.** *Surg Gynecol Obstet* 1970, **131**:965-972.
39. Pfeifer U, Kult J, Forster H: **Ascites als Komplikation hepatischer Speicherung von Hydroxyethylstärke (HES) bei Langzeitdialyse.** *Klin Wochenschr* 1984, **62**:862-866.
40. Dienes HP, Gerharz CD, Wagner R, Weber M, John HD: **Accumulation of hydroxyethyl starch (HES) in the liver of patients with renal failure and portal hypertension.** *J Hepatol* 1986, **3**:223-227.
41. Jurecka W, Szeplausi Z, Parth E, Schimetta W, Gebhart W, Scheiner O, Kraft D: **Hydroxyethylstarch deposits in human skin – a model for pruritus?** *Arch Dermatol Res* 1993, **285**:13-19.
42. Auwerda JJ, Wilson JH, Sonneveld P: **Foamy macrophage syndrome due to hydroxyethyl starch replacement: a severe side effect in plasmapheresis.** *Ann Intern Med* 2002, **137**:1013-1014.
43. Lukasewitz P, Kroh U, Lowenstein O, Krdmer M, Lennartz H: **Quantitative Untersuchungen zur Gewebsspeicherung von mittelmolekularer Hydroxyethylstärke 200/0,5 bei Patienten mit Multiorganversagen.** *J Anaesth Intensivbeh* 1998, **3**:42-46.
44. van Rijen EA, Ward JJ, Little RA: **Effects of colloidal resuscitation fluids on reticuloendothelial function and resistance to infection after hemorrhage.** *Clin Diagn Lab Immunol* 1998, **5**:543-549.
45. Shatney CH, Chaudry IH: **Hydroxyethylstarch administration does not depress reticuloendothelial function or increase mortality from sepsis.** *Circ Shock* 1984, **13**:21-26.
46. Barron ME, Wilkes MM, Navickis RJ: **A systematic review of the comparative safety of colloids.** *Arch Surg* 2004, **139**:552-563.
47. Bork K: **Pruritus precipitated by hydroxyethyl starch: a review.** *Br J Dermatol* 2005, **152**:3-12.
48. Davidson IJ: **Renal impact of fluid management with colloids: a comparative review.** *Eur J Anaesthesiol* 2006, **23**:721-738.
49. Wiedermann CJ: **Renal failure in septic patients receiving hydroxyethyl starch.** *Minerva Anesthesiol* 2007, **73**:441.
50. Boldt J, Brenner T, Lehmann A, Lang J, Kumle B, Werling C: **Influence of two different volume replacement regimens on renal function in elderly patients undergoing cardiac surgery: comparison of a new starch preparation with gelatin.** *Intensive Care Med* 2003, **29**:763-769.
51. Winkelmayer WC, Glynn RJ, Levin R, Avorn J: **Hydroxyethyl starch and change in renal function in patients undergoing coronary artery bypass graft surgery.** *Kidney Int* 2003, **64**:1046-1049.

*Materials of conferences***EXPERIMENTAL VALIDATION AND EFFICIENCY OF WHEAT BRAN BAS PHONOPHORESIS IN INTACT ANIMALS**

Gaydamaka I.I.

*The Lermontov SPA Hotel**Pyatigorsk, Russia*

Over a period of years we have been studying the effects of large molecular wheat bran (WB)BAS percutaneous introduction in vivo in the patients with common pathology using the energy of various pre-casted physical factors. A series of experimental studies for the purpose of proving the possibility of the WB active components' penetration through natural (Wistar rats' skin) and artificial (food cellophane) biological membranes under the influence of ultrasound was followed by the clinical experiment. First, the solids were defined in 100 ml of WB semi-spirituos tincture by means of vaporization of the last on boiling-water bath. The solids made 1,14 %. Then, by means of the silufol chromatography method the main active WB substances were detected in the solids: folic acid, vitamins B1, B2 and B6. The solids content amount in the phyto-ointment containing the WB tincture made 0,093 %, folic acid and vitamins B1, B2 and B6 being chromatographically detected there as well. Then, the WB BAS penetration power was studied. The study was carried out in vitro under the following conditions: 1 g of phyto-ointment was applied to the hair deprived skin and the last was affected by ultrasound with the power of 0,4 W/cm² in continuous mode for 10 min. The penetrative WB components were defined in clear water subcutaneously by the spectrophotometry method. At the same conditions the WB BAS were defined after ultrasonication of the phyto-ointment applied on an artificial membrane. The investigations showed that under the influence of ultrasound the WB BAS phoresis takes place; however, their content level in the liquid under the skin and cellophane considerably differs on quantitative factors (folic acid, vitamins B1, B2 and B6 content in the liquid under the skin made 0,01 %, under the cellophane – 0,0001 %). In the control experiment (the same conditions, but without ultrasound effect) there were no WB BAS found out under both natural and artificial membranes. The following stage of the experiment was the study of biochemical (glucose and cholesterol level) and immunological factors of blood in 48 intact Wistar male-rats under the influence of ultrasound and WB BAS phonophoresis. The influence was made on the skin of the neck posterior surface for 1 minute and 0,2 W/cm² intensive, N7, daily. As the contact medium mineral butter and WB BAS phyto-ointment were used. The blood analyses were carried out before the first and after the seventh procedure. The cervical department ultrasonication resulted in the glucose level decrease in blood from $8,85 \pm 0,29$ to $3,41 \pm$

0,21 mmol/l ($P < 0,0001$) and cholesterolemia level increase from $2,11 \pm 0,08$ to $3,08 \pm 0,19$ mmol/l ($P < 0,001$). The WB ointment phonophoresis resulted in the glucosemia decrease as well from $7,28 \pm 0,18$ to $4,59 \pm 0,25$ mmol/l ($P < 0,001$), increasing the cholesterolemia level thereat (a considerable change of the parameter from $2,61 \pm 0,13$ to $3,09 \pm 0,13$ mmol/l ($P < 0,02$). The immunological status studies testified that low-frequency ultrasound in the mentioned dosage has a stimulating effect towards phagocytic functions of neutrophils and macrophages, blast-cell transformation, following lymphocytes production and also energy supply of immunological responses (NBT). During the experiment in the group of 24 rats the immunological blood values dynamics under the influence of WB BAS ultraphonophoresis at the identical methods of the procedure was investigated.

The findings testify to:

- the activation of phagocytosis with neutrophil leukocytes (the increase of phagocytic activity of leukocytes (from $42,7 \pm 1,21$ to $50,4 \pm 1,61\%$; $P < 0,001$); the phagocytic index of leukocytes (from $1,15 \pm 0,02$ to $2,06 \pm 0,44$ units; $P < 0,02$); the index of phagocytosis completeness (from $47,2 \pm 1,23$ to $53,2 \pm 1,59\%$; $P < 0,02$);
- the activation of macrophages (from $46,8 \pm 1,56$ to $53,9 \pm 1,26\%$; $P < 0,001$), the increase of their phagocytic number (from $1,31 \pm 0,06$ to $1,69 \pm 0,09$ units.; $P < 0,001$), the index of phagocytosis completeness (from $44,3 \pm 1,29$ to $52,7 \pm 1,34\%$; $P < 0,001$);
- the decrease of leukocytes' number circulating in blood (from $12,1 \pm 0,49$ to $11,9 \pm 0,31 \times 10^9$ kl/ml; $P > 0,8$) and increase of lymphocytic level (from $47,8 \pm 1,28$ to $54,4 \pm 1,23\%$; $P < 0,001$);
- the mass reduction of the circulating immune complexes in blood (from $18,1 \pm 1,03$ to $13,1 \pm 0,59$ units; $P < 0,001$).
- the increase of the HBT-test factor level from $1,19 \pm 0,05$ to $1,25 \pm 0,04$ units. ($P < 0,01$);
- the increase of the BTR level to PHA from $1,19 \pm 0,04$ to $1,41 \pm 0,07$ units ($P < 0,001$) and BTR level to ConA from $1,11 \pm 0,02$ to $1,44 \pm 0,08$ units ($P < 0,001$).

Thus, the presence of the WB BAS phoresis through semi-permeable membranes under the influence of low intensity ultrasound has been proved. Compared to the ultrasound isolated influence the phytophonophoresis in the intact animals is characterized by more vivid hypoglycemizing and immunostimulating effects, the anti-inflammatory effect of the preparation being clearly manifested; its inhibitory influence on the circulating immune complexes (CIC) in blood testifies to the fact.

The work is submitted to the Scientific International Conference «Science, Technology, Innovation», Spain (Costa Daurada), September, 16-23, 2008., came to the editorial office on 28.07.2008.

BALNEOTHERAPY AS CHOLELITHIASIS DEVELOPMENT PREVENTION IN DIABETES PATIENTS

Danilova M.L., Trusov V.V.
Izhevsk State Medical Academy
Izhevsk, Russia

A high bile passages disease incidence, close anatomical and functional relation of the hepatobiliary system and pancreatic gland make the problem of biliary pathology clinical aspects study at diabetes (D) rather topical one.

In this connection the hepatobiliary system morphofunctional state estimation and "Metallurgist" sanatorium mineral water study have been of a certain scientific interest.

260 I and II D type patients with the concomitant biliary pathology confirmed by laboratory-instrumental methods of diagnostics were included into the examination. The obtained results of the carried out research testify that in 52% of the diabetes concomitant biliary pathology cases the chronic non-calculolitis cholecystitis (CNC) has been detected. It is important to note that cholelithiasis and cholecystectomy after condition made the rest considerable part (48%). In connection with this the study of the clinical picture of CNC taking course against diabetes is of great interest, as it is this very stage when the prevention of concrement formation in the biliary tract is possible. A greater value of this problem is found among the patients with II type diabetes, as it is among them CNC was registered in 59% of the cases.

For the purpose of cholelithiasis development prevention all the II type diabetes associated CNC patients were individually prescribed the "Metallurgist" sanatorium sulphate-chloride-sodium low-mineralized mineral water together with the traditional drug therapy. At the efficiency analysis of the carried out course mineral water treatment a great attention was paid to the dynamics of clinical presentations and laboratory-instrumental research methods data. A durable positive curative effect, which was achieved in shorter terms than in the patients having got the drug therapy only, is marked. At the duodenal drainage carrying out after the treatment the bile lithogenicity decrease, disappearance of inflammation signs in the bile passages are registered. The dynamic hepatobiliscintigraphy results showed that drinking spa treatment promotes the hepatocytes' absorbing-excretive function improvement. According to the dynamic echo-cholecystography data the evacuation function of the bile cyst improves authentically ($K_{\text{eff}} = 52,33 \pm 1,19\%$, $p < 0,01$) after the mineral water course treatment, and, as a consequence, the rest amount of bilis decreases ($V_k = 15,46 \pm 0,42 \text{ cm}^3$, $p < 0,01$).

The work was submitted to the International Scientific Conference «Diagnostics, therapy, prevention of socially significant diseases rights». Turkey (Antalya),

August, 16-23, 2008, came to the editorial office on 23.06.2008.

AGE-RELATED CHANGES IN THE STRUCTURE OF ADENOHYPOPHYSIS DURING EARLY POSTNATAL ONTOGENESIS

Degtyar Yu.V., Kapitonova M.Yu., Pratama E.,
Khlebnikov V.V.

Volgograd State Medical University, Russia; UiTM
Medical Faculty, Shah Alam, Malaysia

The hypothalamo-pituitary-adrenocortical axis plays a vital role in adaptation of the organism to homeostatic challenge (J.P.Herman et al., 2003). During most of infancy, from approximately postnatal day 4 to 14, the rat displays a stress hyporesponsive period in the form of markedly attenuated adrenocorticotropin and corticosterone responses to environmental stressors that elicit pronounced elevation of ACTH and corticosterone in pre- and post-stress-hyporesponsive period rats (J.Lehman et al., 2002). After that the pituitary gland undergoes the prominent age-related adaptation changes. The different cell types in the anterior pituitary behave as dynamic populations, as the hypophysis maintains a continuous renewal of cells to ensure a balance between cell division, differentiation, growth arrest and apoptosis (L.Claudius et al., 2006). Numerous discrepancies in the evaluation of activation, hyporesponsiveness, facilitation and dissociation of the hypothalamo-pituitary-adrenocortical axis in the early age may be explained by a very limited information available in the literature on the age-related structural changes in the central link of the axis - adenohypophysis - during early postnatal development (C.Kaur et al., 2002; A.Armario et al., 2004; X.Belda et al., 2004; C.Marquez et al., 2005).

The objective of this study was to evaluate the developmental changes in the pituitary gland of the growing rats during early postnatal development using the modern methods of the quantitative immunohistochemistry.

Prewaning, weaning and early postweaning Sprague-Dawley rats aged 14, 21 and 30 days after birth (1st, 2nd and 3rd age groups accordingly) were weighed and sacrificed by cervical dislocation, their pituitary glands were removed, weighed, fixed in formalin and embedded in paraffin. Serial sections 4 mcm thick were stained with hematoxylin-eosin and immunohistochemically with monoclonal antibodies against ACTH and PCNA using streptavidin-biotin-peroxidase method with subsequent DAB-staining and image-analysis of the immunohistochemically stained slides. Image Pro Plus 4.5 software was utilized to evaluate the volume and numeric density of the immunoreactive cells.

The results obtained in the present investigation demonstrated that the pituitary gland mass in-

creased with age while the relative pituitary gland mass decreased from preweaning to postweaning age, with a difference reaching the level of significance between the 1st and the 3rd age groups ($p < 0,05$).

Routine histological staining demonstrated that in the pituitary gland of the growing rats adenohypophysis and neurohypophysis were clearly demarcated with a distinct subdivision of the adenohypophysis into pars distalis and pars intermedia. The pars distalis was dominated by the chromophobic cells which were distributed in clusters with their nuclei located very close to each other in the groups. Among the chromatophylic cells the share of the oxyphilic cells was higher compared to the basophilic adenocytes, the latter being increased by peripubertal age. Most of the oxyphilic cells were concentrated in the lateral wings of the adenohypophysis while the central part of pars distalis contained comparatively more basophils.

The immunohistochemical staining demonstrated that on the contrary to the hematoxylin-eosin, staining for ACTH revealed concentration of the immunopositive cells in the lateral wings of the hypophyseal anterior part and not in the basophilic center of the pars distalis, though it is known that corticotrophs are basophilic when stained by hematoxylin eosin. This allowed us to presume that the basophilic staining of the central part of the pars distalis in rats was due to the presence of the other types of basophils rather than corticotrophs, which might be either thyrotrophs or gonadotrophs.

The immunohistochemical staining for PCNA showed that share of the immunoreactive cells was small in all the three age groups and it appeared to decrease with age.

Image analysis demonstrated that the volume density of the ACTH- immunoreactive cells did not change during preweaning period, remaining almost at the same level, with its mild reduction by the beginning of the infant period of life ($p > 0,05$), while staining for PCNA showed significant decrease of the immunoreactive cells volume density ($p < 0,05$) in the peripubertal age. This finding may be explained by the increased rate of differentiation of the corticotrophs with age during early prenatal development which compensated the relatively reduced proliferative potential of the adenocytes.

The results obtained provide evidence that in prepubertal rats the population of the corticotrophs in the adenohypophysis undergoes dynamic changes which predetermine age-related modulation in the hypothalamo-hypophyseal-adrenal axis in rats during early postnatal development and promotes better understanding of its activation potential in the growing body of experimental animals.

The work is submitted to the International scientific conference "Modern science technology", Tenerife, Spain, November, 20-27, 2008, came to the editorial office on 22.08.2008.

MYORELAXATION IN EXTREME CONDITIONS OF LIFE ACTIVITY

Denisenko Yu.P., Vysochin Yu.V., Lukoyanov V.V.,
Yatsenko L.G.

*Kama State Academy of Physical Culture,
Sport and Tourism, Naberezhnyye Chelny
Saint Petersburg State University, Saint Petersburg*

Professional tendencies of the last years are connected with steady growth of loadings in practically all kinds of human professional activities. The consequence of this is often the disturbance in the work of regulatory mechanisms, that essentially decreases the level of physical capability and can result in various unfavorable vegetative shifts in health state [3, 6, 12], the problem of providing effective training of sportpersons in extreme conditions of life activity and creating functional preconditions for health saving being more and more topical. One of the ways to solve this problem is attracting modern effective and physiologically substantiated technologies with the simultaneous use of the functional state correction and complex diagnostics rational system. Such an approach allows widening the diapason of compensatory abilities of the body against the maximal volume and intensity of professional and psycho-emotional loadings. The provision of optimal adaptation to muscular loadings can appear one of the conditions for the health level maintenance and professional mastery quality increase [6, 10].

Certainly, the given problem acquires a special meaning in modern conditions of the human professional activity. It finds its reflection in a series of works connected with the idea of loading criticism both in sport and other areas of professional activity [7, 10].

Together with traditional approaches a great experience of using a whole range of non-traditional means (srednegorye, baro-chamber, hypoxic and hyper-pyretic effects, special breathing exercises, methods of biological feedback, methods of active self-adjustment and relaxation, etc.) within the system of sport training has been accumulated.

Together with that it is necessary to note that among the non-traditional means of effect on the functional state of the human body a careful attention has lately been paid to myorelaxation methods, which such features as action safety, relative easiness of effect achieving and not high financial expenditures are typical of. Relaxation, on some authors' opinion, is considered as an alternative or compliment to the functional state correction [1, 11, 16]. That is why it is often presented as a means of prophylaxis, correction and emotional stresses elimination. Thereat, as many note [13 and others], it is the leading one in the series of methods allowing achieving necessary changes in the body's functional state.

In physiology an active process of muscular tone and psycho-emotional tension decrease [8, 14]

are meant by relaxation. At relaxation there appears a trophotropic state, the level of anxiety, psychological and physiological response to stress effects decreases. Besides, relaxation is attended by a considerable reduction of afferent and efferent impulsation. As a consequence we can speak on the fact that the introduction of relaxation methods aimed at the prophylaxis, correction and negative psycho-emotional states elimination into practice can promote adaptive capabilities of the body [6, 9, 15].

The relaxation methods have also found their application in the correction of a range of pathological states, hypertensive disease treatment, acute and chronic painful states taking down inclusive of sport activity [2, 4, 13].

The state of relaxation lies in the foundation of Meditative methods. Meditation and relaxation exercises have a wide diapason of application, most often they are used in transcendental medicine [17].

The value of muscles relaxation function in human sport and labour activities is difficult to overestimate. In a series of works [1, 6, 9 and others] a healthy influence of special exercises enhancing the function of skeletal muscles relaxation on the central nervous system, visceral organs' and systems' activities, rational blood circulation types formation, motion coordination, tempo, stamina, technical skills, special physical working capacity and sport results growth were proved.

The investigations proving the leading role of inhibitory systems of the central nervous system and skeletal muscles' arbitrary relaxation rate (ARR) in the most important manifestations of life activity of the whole body: in the mechanisms of timed and long-term adaptation to more physical, hypoxic and hyperpyretic loadings; in the mechanisms of heart adaptation and various blood circulation types formation; in the mechanisms of muscles blood supply and muscular activity energy supply; in the mechanisms of physical overwork stability improving, prevention of risks, traumas and diseases, and also in the body's mechanisms of defence from extreme conditions or factors and sportspersons rehabilitation [4, 5, 7, 13], are especially meaningful, in our opinion.

It should also be noted that all the most effective methods of psycho-regulation, self-adjustment and auto-training used in special psychological preparation of sportspersons and the latest health-improving technologies [8, 14, 15] are based on relaxation.

At the present time a number of various ways of sportspersons' special physical capability (SPC) based mainly on training and competitive loadings ramp up. They are effective enough to reach the main goal, but none of them provides sportspersons' health safety. Moreover, with the increase in volume and intensity of the loadings, which in sport have almost reached their limits, the sport traumatism and morbidity rate grow progressively. Proceeding from this, there was an evident necessity for the search of con-

ceptually new ways for a simultaneous solution of these two the most complex and, in the opinion of many research workers, almost incompatible problems – the problem of achieving the highest levels of special physical working capacity, and the problem of sportspersons' health maintenance and improving – associated by us into one general problem of human motor activity efficiency enhancement.

It should also be said here about the ARR highly authentic correlation relationships with all the principal components of motion coordination and sport results in various sports. The data for a significant influence of the ARR on the contractile muscles' properties realization degree also deserve attention. The enumerated facts, from our point of view, are meaningful enough to understand that important role, which is played by myorelaxation in the SPC growth in all kinds of sport activity and sportspersons' health maintenance.

References:

1. Aivazyan T.A. Relaxation therapy using biological feedback in treatment of hypertension patients // *Biomangement // Theory and practice* – Novosibirsk, 1988, pp. 133-141.
2. Bayevsky R.M., Motylyanskaya R.Ye. Cardiac rhythm in sportspersons – M.: P&S, 1986, p. 144.
3. Balsevich V.K. Human ontokinesiology – M.: Theory and practice of physical culture, 2000, p. 275.
4. Vysochin Yu.V. Relaxation skill // *Track and field athletics* – 1975, N10, pp. 26-27.
5. Vysochin Yu.V. Myorelaxation in mechanisms of orthopedic injuries // *Sport and Nation's health: Collection of scientific works*, SPb, 2001, pp. 74-84.
6. Vysochin Yu.V. Physiological mechanisms of defence, stability and physical working capacity improving in extreme conditions of sport and professional activity: Thesis of Dr. Sc. (Medicine) - L.: HMA named after S.M. Kirov, 1988, p. 550.
7. Vysochin Yu.V., Denisenko Yu.P. Modern ideas on physiological mechanisms of terminable adaptation of sportspersons' body to physical loadings effects // *Theory and practice of physical culture* – 2002, N7, pp. 2-6.
8. Vysochin Yu.V., Lukoyanov V.V. Active myorelaxation and self-adjustment in sport: Monograph – SPb.: SAPC named after P.F. Lesgaft, 1997, p. 85.
9. Denisenko Yu.P. Myorelaxation in football players' training system: Synopsis of thesis of Dr. Sc. (Biology) – M., 2007, p. 48.
10. Platonov V.N. Adaptation in sport – Kiev: Zdorovye, 1988, p. 257.
11. Sentyabrev N.N. Body's directed relaxation at intensive human muscular activity – Volgograd: VSAPC, 2004, p. 142.
12. Sudakov K.V. Main principles of functional systems' general theory // *Functional systems of the body: Guidance / under the editorship of Sudakov K.V.* – M.: Medicine, 1987, pp. 26-49.

13. Tkharevsky V.I. Blood supply of skeletal muscles at static and dynamic work: Synopsis of thesis of Cand. Sc. (Medicine) – M., 1967, p. 24.

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 13.08.2008.

CLINICAL MEANING OF RAPID GROWTH HYSTEROMYOMA, APPROACHES TO THE DIAGNOSTICS

Dikariova L.V., Shvarev E.G., Shvarev G.E.
Obstetrics and Gynecology Department of Astrakhan
State Medical Academy
Astrakhan, Russia

Introduction

Hysteromyoma is known as one of the leading points in the structure of gynecological morbidity rate in Russia; recently the growth of hysteromyoma incidence has been marked in women of reproductive age, as well as the tendency to the rejuvenation of sick women contingent [11, 18, 21]. The actuality of growing morbidity rate in women of reproductive age is considered because of preservation or restoration of reproductive function and in connection with frequent combination of hysteromyoma with pregnancy and hyperplastic processes of endometrium [10, 12, 24].

In modern literature two causes of rapidly growing hysteromyoma have been marked out: *true*, which is connected with activation of proliferative processes of myometrium, and *false*, which appears as a result of inflammation and edema of nodes [3, 11]. Thus, rapidly growing hysteromyoma demands the increased oncological suspicion because of the possibility of its combination with hyperplastic processes of endometrium, precancer and cancer of endometrium, ovary tumors and transformation to leiomyosarcoma [1, 16]. The performance of nonadequate operation in such cases significantly impairs the prognosis for a patient [1, 12, 16].

Timely and correct clinical assessment of various types of rapidly growing hysteromyoma often helps to specify the diagnosis and to determine the adequate treatment of such patients. That is why it is actual to search the criteria allowing to objectivize exactly the diagnosis of rapidly growing hysteromyoma in combination with endometrium pathology.

Methods of the investigation

For the achievements of the aim we have analyzed clinico-laboratory data of 978 women at the age of 24-56. The control group consisted of 268 (27,4%) patients without tumors of reproductive organs. All the rest were divided into two groups: the first one consisted of 478 (48,8%) patients with slowly growing hysteromyoma; the second group included 232 (23,7%) patients with rapidly growing hysteromyoma

(the increase of uterus sizes was as ≥ 4 weeks of pregnancy during a year).

All the patients had ultrasound examination of mammary glands and organs of pelvis minor (with transvaginal detector), along with traditional clinico-laboratory examination; according to showings some of them had mammography, cytologic examination of material from ecto- and endocervix, aspirate from the uterus cavity and hysteroscopy.

In addition to the listed above methods we worked out and used the specifying method of diagnostics of rapidly growing hysteromyoma. This method is based on the comparative estimating of uterus volume and making structural analysis of endometrial washes or menstrual discharges which flow from the organ with tumor.

The estimating in these biological fluids the final and interstitial products of peroxide lipid oxidation (malon dialdehyde in particular, which has the property of cellular toxin) reflected the level of free radical processes. The detection of malon dialdehyde was carrying out according to the technique of J.A.Stroev and J.G.Makarov (1986).

Recently the method of structural analysis (wedge-shaped dehydration) of biological fluids has been widely spread in clinical medicine; it is based on the extraction of information of overmolecular level in phase of transformation of biological fluid into solid condition [14, 19, 20].

For carrying out the morphostructural analysis 0,2 ml of supernatant of endometrial wash or menstrual discharge was put on the glass. The drop was dried at room temperature, at relative air humidity 60-70% and at minimal mobility of air during 18-24 hours. The studying of structure forming elements of the dehydrated drop (facii) and their photographs was carried out with magnifying from x10 till x160, with stereomicroscope Mz-12 (Leica) and colour digital camera "Pixera" (USA). Morphometrical showings of facii of endometrial wash were assessed with the programme Image Tool.

The size of uterus with hysteromyoma is one of the basic parameters in diagnostics and treatment. Its assessment according to weeks of pregnancy in the process of dispensary observation can be understood by physicians rather subjectively, this makes difficult to diagnose rapidly growing hysteromyoma.

For the objectification of uterus size and rate of growth of hysteromyoma the ultrasound showings were undergone the mathematical processing with the formula offered by A.N. Strizhakov et al.(2000) and J.M. Vikhlijeva (2004). The formula of drawn out ellipsoid was taken as a basis of calculation of uterus volume:

$V_0 = 5236 \cdot A \cdot B \cdot C$; A – the length of the uterus, B- its anteroposterior size, C – its width.

Because of hysteromyoma nodes the calculation of uterus volume was carried out according to the modified formula (the volume of separate hysteromyoma nodes was subtracted from the total volume).

myoma nodes of any localization was added to the volume (V_0). Each hysteromyoma node was considered as a sphere, the maximal diameter of which was also assessed in ultrasound examination:

$V_i = 0,5236 (D_i)^3$, where V_i is the volume of 1, 2, 3 nodes etc.

$$V = V_0 + V_1 + V_2 + V_3 \text{ etc.}$$

For the assessment of power of statistical interconnection between the investigated showings (V – uterus volume; V_i – hysteromyoma nodes) the correlation-regressive analysis was carried out and the coefficient of determination was defined.

The showings of malon dialdehyde content and morphostructural features of endometrial washes or menstrual discharges were compared with the results of echographic examination of uterus sizes, cytological analysis of aspirates from uterus cavity and pathohistological results of endometrial cytologic brushings.

The results of the investigation and their discussion

The analysis of questionnaires showed that 80 (34,5%) of women with rapidly growing hysteromyoma complained of menometrorrhagia, 75 (32,3%) complained of pelvis pain, 12 (5,2%) had functional disturbance of adjacent organs, 45 (19,4%) had combination of symptoms, 20 (8,6%) didn't complain of anything. 232 (48,5%) women with slowly growing hysteromyoma complained of menometrorrhagia, 101 (21,1%) had pelvis pain, 77 (16,1%) had combination of symptoms, 8 (1,6%) had functional disturbance of adjacent organs, 60 (12,2%) had no complaints.

The duration of the disease for 5 years was marked in 58,4 % women with slowly growing hysteromyoma and in 75,9 % with its rapid growth ($p < 0,01$). All the rest patients in both groups had the duration of the disease more than 6 years. The uterus sizes (according to pregnancy weeks) were normal in the control group; $7,8 \pm 0,73$ in women with slowly growing hysteromyoma, $13,7 \pm 1,14$ in women with rapid growth ($p < 0,01$). Operations in women with rapid hysteromyoma growth were performed in 97,8% of cases, in women with its slow growth in 74,9 %; all the rest had conservative therapy.

In addition the analysis of the number of nodes and the peculiarities of their localization was carried out. Submucous nodes were registered equally in both groups ($p \geq 0,05$). Multiple hysteromyoma nodes were two times more often in women with rapid growth – 84 (36,2%) in comparison with the group with slow growth – 81 (16,9 % $\pm 1,7$ %, $p < 0,01$).

The preferential localization of nodes among the patients of both groups were the fundus and the body of uterus: in 88, $1 \pm 1,48\%$ with slow growth and in $74,6 \pm 2,8$ with rapid growth. The localization of nodes in the area of uterus ribs was marked more often in women with rapid hysteromyoma growth ($p < 0,05$). In patients with slow growth the average size of

the biggest node was $3,5 \pm 0,12$ cm, and in the group with rapid growth it was $6,9 \pm 0,22$ ($p < 0,001$).

The important factor which defined the treatment of women having hysteromyoma is the condition of endometrium. In 61 (26,3%) patients with rapidly growing nodes the structure of endometrium was normal, in 127 (54,7%) women the glandular hyperplasia was revealed, 3 (1,29%) had atypical hyperplasia, in 41 (17,6%) women the endometrium was diagnosed. Besides, 1 patient (0,4%) had carcinosarcoma, 5 patients ($2,2 \pm 0,95\%$) had proliferated hysteromyoma, 37 patients ($15,9 \pm 2,4\%$) had combination of hysteromyoma with adenomyosis, and 11 patients (47,8%) had hysteromyoma with ovary tumors.

In patients having slowly growing hysteromyoma normal endometrium structure was revealed in 231 (48,3%) cases, glandular hyperplasia was diagnosed in 79 (16,5%), atypical hyperplasia in 4 (0,8%) cases, 87 (18,2%) patients had endometritis. It is important to note that 23 (4,8%) cases of endometrium cancer were revealed in patients of this group.

The duration of hysteromyoma in patients with cancer fluctuated from 6 to 27 years, it was $15,5 \pm 0,25$ years, in average. The frequency of revealing carcinosarcoma and ovary tumors in this group corresponded to the frequency of their revealing in patients having rapidly growing hysteromyoma: 3 (0,6%) and 213 (44,6%) cases. The frequency of proliferated hysteromyoma and adenomyosis in patients with slowly growing hysteromyoma was less: 1 ($0,2 \pm 0,08\%$) and 50 ($10,5 \pm 1,6\%$) cases ($p < 0,05$).

The received data allow to consider hysteromyoma as one of the main risk factors of tumors of reproductive organs (multiple primary tumors among them).

Nowadays, a lot of factors have been gathered which show the excessive activation of peroxide lipid oxidation and activity changing of antioxidant protection enzymes in some pathologic processes [6, 7, 9, 13]. The activation of peroxide lipid oxidation is considered as a mechanism of cellular pathology development and the reason of many cardiovascular, oncological, autoimmune diseases. The most aggressive are final and intermediate products of peroxide lipid oxidation, malon dialdehyde in particular. It is possible that the increasing in number of oxidated proteins change cell functions, especially the receptor apparatus of membranes. The damage of antioxidant protection and the growth of peroxide lipid oxidation products leads to the changes in genetic apparatus and the disturbance in regulation of apoptosis and to the decreasing of cell activity limits [13]. The accumulation of malon dialdehyde changes the receptor apparatus of the organ and promotes the intensification of pathologic process in tissues in connection with the loss of their sensitivity to humoral influence [15]. In rapidly growing hysteromyoma nodes biochemical changes take place: the aerobic and anaerobic rate glycolysis is increased [16]. It is possible that the development of

hyperplastic endometriosis arises due to intensification of peroxide lipid oxidation reactions, which are evident in the increasing of lipid peroxidation products level [2, 22].

The determination of malon dialdehyde was carried out in blood serum and menstrual discharges, and in these biological liquids the received results were the most evident.

Table 1. Uterus volume and malon dialdehyde level in rapid and slow growing of hysteromyoma.

The investigated groups	Uterus volume (cm ³), M±m	Malon dialdehyde, peripheral blood (nmol), M±m	Malon dialdehyde, endometrial washes (nmol), M±m	Malon dialdehyde, menstrual discharges, (nmol), M±m
Control (n= 268)	50,5 ± 1,0	0,71 ± 0,02	0,37 ± 0,01	0,62 ± 0,07
Slowly growing hysteromyoma (n = 478)	243,7 ± 21,32 ²	0,85 ± 0,04	0,49 ± 0,06 ¹	1,59 ± 0,04 ²
Rapidly growing hysteromyoma, true growth (n=191)	1636,0 ± 79,6 ^{3,6}	1,74 ± 0,07 ^{3,6}	2,6 ± 0,05 ^{3,4}	2,81 ± 0,08 ^{3,6}
Rapidly growing hysteromyoma, false growth (n=41)	826,0 ± 21,2 ^{3,6}	1,31 ± 0,07 ^{2,5}	1,45 ± 0,05 ^{3,4}	1,61 ± 0,07 ^{2,5}

The differences are true:

¹p<0,05, ²p<0,01, ³p<0,001 – in comparison with the control group; ⁴p<0,05, ⁵p<0,01, ⁶p<0,001 – between the showings in the subgroups.

The table shows that the uterus volume in patients from the control group didn't differ from the normal meanings. The coefficient of determination, calculated between the volume of hysteromyoma nodes and the uterus volume was 0,77 with slow growth and 0,65 with true rapid growth of hysteromyoma, this fact reveals the presence of strong and middle connection between the investigated parameters.

In the assessment of growth rate due to the received data for slowly growing hysteromyoma the average increasing of the organ during a year didn't exceed 21,3 % (p < 0,05). In this given case the critical level of meaning (p) was defined concerning patients with slowly growing hysteromyoma. Along with the increasing in number and diameter of hysteromyoma nodes and uterus size the level of malon dialdehyde in endometrial washes or menstrual discharges also increased.

In patients with preserver menstrual cycle the determination of malon dialdehyde was carried out both in the stage of proliferation and secretion. From 231 women with slow hysteromyoma growth (having normal structure of endometrium), 131 (56,7%) patients were observed, and in the phase of secretion 100 (43,7%) patients were observed. Showing of malon dialdehyde in the phase of proliferation was 0,5 ± 0,02 nmol, in the phase of secretion – 0,6 ± 0,02 nmol (p > 0,05).

Thus, the showings of malon dialdehyde received both in the phase of proliferation and in the

phase of secretion in women with hysteromyoma having normal structure of endometrium had small differences and didn't depend on the phase of menstrual cycle.

The most demonstrative was the dynamics of malon dialdehyde content in endometrial washes according to the increasing of endometrium pathology. Patients having hysteromyoma with normal structure of endometrium the investigated showing was 0,4 ± 0,05 nmol, and patients having hysteromyoma in combination with hyperplastic endometrium processes it was 1,7 ± 0,23 nmol (p < 0,01). Even more significant increasing was marked in patients having rapidly growing hysteromyoma in combination with atypical hyperplasia, the meanings were 3,0 ± 0,85 nmol (p < 0,05).

In patients having hysteromyoma with endometrium cancer the level of malon dialdehyde was variable, it depended on the depth of invasias and differentiation of tumor. On the first and second stage of the disease (T1-2NoMo, G1) the level of malon dialdehyde in endometrium washes was 0,61 ± 0,21 nmol, with T1-2 and G2 the maximum meaning of malon dialdehyde was 1,11 ± 0,3 nmol (p < 0,01). In patients having the third stage of the disease (T1-3, Nx-1, Mo G3) the meaning was 3,02 ± 0,15 nmol (p < 0,001).

The analysis of structure forming elements which were revealed by the method of wedge-shaped dehydration of endometrial washes allowed to determine 3 types of facii, characterizing the condition of endometrium. The radial type, forming the so-called

“separate parts”, was always registered in women of control group (during both phases of menstrual cycle) and in 48,4 % cases in patients having hysteromyoma with normal structure of endometrium. The combined type was found in patient having hysteromyoma in combination with hyperplastic endometrium processes, the radiallyity was preserved, but a number of three ray fissures appeared; and then the three ray type appeared, which was specific for women with atypical hyperplasia and endometrium cancer. In the investigated material of women with endometrium cancer on the whole area of facii of endometrial washes the net of three ray fissures appeared.

Thus, pathognomonic sign of the increasing of endometrium pathology (in patients with rapidly growing hysteromyoma among them) is the increasing of specific proportion of area of three ray fissures (Str) and the decreasing of radiallyity area (Srad).

Thus, in patients of control group Str was $0,4 \pm 0,06 \text{ mm}^2$, in patients having hysteromyoma with normal endometrium structure it was $1,1 \pm 0,08 \text{ mm}^2$, and in patients having glandular hyperplasia and atypical hyperplasia of endometrium it was $2,1 \pm 0,11 \text{ mm}^2$ and $3,2 \pm 0,58 \text{ mm}^2$. This showing was maximal in patients having hysteromyoma in combination with endometrium cancer $6,7 \pm 0,6 \text{ mm}^2$ ($p < 0,05$).

To determine the strength of interconnection between Srad and Str the tetrachoric Pirson coefficient was calculated, which was increased with the increasing of pathology of myoendometrium from 0,3 in the control group to 0,8 in patient having endometrium cancer.

The presented diagnostic approach providing nontraumatic method of taking material allows to get the information of tumor growth and endometrium condition in out-patient clinic with small amount of biological fluid (with minimal financial expenditures and in short terms). It helps to make the proper plan of treatment. Another important characteristics of this approach is the possibility of simultaneous carrying out of cytological biochemical and crystallographic methods of research which increases the exactness of diagnostics. It should be noted, that the given parameters must be assessed regularly due to normative documents; only this approach allows to make conclusions about slow or rapid growth of hysteromyoma.

The results of the investigation are the patent for the invention (Russian Federation) №2290639, given 27.12.2006. “Method of the evaluation of endometrium condition in female genitals neoplasms”, and the positive reply for the patent №2007106294 (006840) given 19.01.2008 “Method of the diagnostics of rapidly growing hysteromyoma”.

Conclusions:

1) Rapidly growing hysteromyoma is the disease which decreases reproductive possibilities of women; it is a risk factor of multiple primary tumors (hyperplastic processes of endometrium and endo-

metrium cancer among them) of hormonodependent organs.

2) Mathematical analysis of uterus sizes received in ultrasound examination allows to specify the rate of hysteromyoma growth. In average annual increase of uterus volume not exceeding 12,5 % the slow tumor growth takes place; in the increase of uterus volume to 14,9% there is a possibility of false hysteromyoma growth; in average annual increase of volume more than 21,3 % we should consider true rapid hysteromyoma growth.

3) The level of malon dialdehyde in endometrial washes or menstrual discharges correlates also with the degree of hyperplastic processes; the evaluation of this showing increases the effectiveness of the diagnostics.

4) For the more exact evaluation of endometrium in patients with hysteromyoma the traditional cytologic investigation of aspirate from the uterus volume should be supplemented with the structural analysis of facii of endometrial wash (or menstrual discharge) which reveals pathognomonic signs of the increasing endometrium pathology, the increasing of area of three ray fissures on the surface of facii in particular.

References:

1. Bokhman J.V., Urmanchejeva A.F. Uterus sarcoma / Bokhman J.V., Urmanchejeva A.F.// .: SPb “Gippokrat”, 1996. – 124 p.
2. Brekhova I.S. Diagnostical and prognostical meaning of evaluation of oxidant and anti-oxidant status in benign hyperplastic processes in endometrium in women of reproductive age./Brekhova I.S. – Barnaul, 2000. – 22 p.
3. Vikhlijaeva E.M. Uterus leiomyoma. Guidance on diagnostics and treatment./Vikhlijaeva E.M.//M.: “MEDpress-inform.”, 2004, 164 p.
4. Grinkhalkh T. Basis of proved medicine/ T.Grinkhalkh.-M.,2004, p.234
5. Kashulina A.P. Peculiarities of freeradical processes, in multiple primary malignant diseases/Kashulina A.P.//Med.Consultation, 2000. - №3 p.4-7 p.
6. Kerimova G.I. Processes of peroxide lipid oxidation and prostaglandin in malignant and benign tumors of ovaries/Kerimova G.I., 1996. – 28 p.
7. Klebanov G.I., Teselkin J.O., Babenkov I.V. et al.//RAMN Vestnik.-2000, №11, p. 15-22.
8. Klucharov I.V. Clinico-laboratory criteria of proliferative hysteromyoma activity/Klucharov I.V., Kazan, 2002, 18 p.
9. Korotkina R.N., Matskevich G.N., Devlikanova A.Sh. Comparative research of the activity of enzymes of glutathione and antioxidant enzymes change in malignant and benign tumors.//Bulletin of experimental biology and medicine, 2002, №6, p. 697-700.

10. Kulakov V.I., Shmakov G.S. Myomectomy and pregnancy.//Kulakov V.I., Shmakov G.S.//M.: "MEDpressinform", 2001, p. 342.

11. Kurashvily J.V. Clinico-morphological type of "false growth" hysteromyoma in women of reproductive age. /Kurashvily J.B., Vestnik RAMN//1997, p. 21.

12. Lazareva N.I. Malignant mesenchymal tumors of female reproductive organs./Lazareva N.I., Kuznetsov V.V., Zakharova T.I. et al.//Obstetrics and gynecology.-2003, № 1, p. 7-11.

13. Pavliuchenko I.I. Oxidant stress, its monitoring and criteria of evaluation of antioxidant activity of drugs./Pavliuchenko I.I.//Vestnik RAMN, 2005, p. 34.

14. Potekhina J.P. Meaning of the morphological picture of biological fluids in diagnostics and control of effectiveness of treatment of some widespread diseases in people of old age./Potekhina J.P.//Vestnik RAMN – M., 2004, p.40.

15. Sarkisyan O.G. Peculiarities of metabolic processes in atrophic colpits and their correction./Sarkisyan O.G. Vestnik RAMN// M., 2003. – p. 8-18.

16. Sidorova I.S. Hysteromyoma/Sidorova I.S.//Medical Inform Agency, 2003, p. 127-148.

17. Strizhakov A.N. Clinical lectures in obstetrics and gynecology (Strizhakov A.N., Davydov A.I., Belotserkovtseva L.D.//M.: Medicine, 2000, 161 p.

18. Tikhomirov L.A. Organ saving treatment of hysteromyoma./Tikhomirov L.A.//Modern Achievements. Problem patient. №9, 2007, p. 4-6.

19. Shabalin V.N. Systemical selforganization of biological fluids of organism in aging./Shabalin V.N., Shatokhina S.N.//Collection of works. Russian Congress of gerontologists and geriatricians.-Samara, 1999. – p. 502-505.

20. Shabalin V.N. Morphology of biological fluids of people/Shabalin V.N., Shatokhina S.N.,-M.:2001, p.304.

21. Shvariov J.G. Tumor markers in diagnostics and evaluation of the effectiveness of hormonotherapy of endometrium cancer/Shvariov J.G.//Vestnik RAMN SPb., 1993, p.34.

22. Shtoda A.A. Condition of peroxide lipid oxidation reactions of lipids and glutathione redox-system in benign and malignant hyperplastic processes of endometrium/Shtoda A.A.//Vestnik RAMN.-M., 2005, p.24.

23. Fletcher R. Clinical Epidemology./Fletcher R., Fletcher. S., Vagner E.//M., Media Sphere – 2004, p. 347.

24. Anastadiadis P. G., Skaphida P.G., Koutlaki N.G., Galasions G.C. Descriptive Epidemiologie of endometrial hyperplasia in patients with abnormal uterine bleating./ Anastadiadis P. G., Skaphida P.G., Koutlaki N.G., Galasions G.C. // Eur. J. Gynaecol. – Oncol. - 2000. - № 21. - P. 131-134.

The work was submitted to international scientific conference «Engineering sciences and present-day

production», China (November, 26 – December, 4, 2007, came to the editorial office on 07.08.2008

THE TOPICAL AND TEMPORAL CHANGES IN QUANTITATIVE ELECTROENCEPHALOGRAPHY OF HIGH QUALIFICATION ATHLETES OF DIFFERENT SPECIALIZATIONS DURING ONE YEAR TRAINING PROCESS

Eremeyev S.I., Eremeyeva O.V., Kormilets V.C.
*Ugorsky state university, institute of sport and tourism
Khanty-Mansiysk, Russia*

The Sports Council (London) on behalf of the Open Section of the British Association of Sports Sciences commissioned a review to provide information pertinent to the formulation of a strategy that would guide fundamental sports science research in the UK and propose directions for future research. The four topics were peaking, talent identification, adherence and injuries (Burwitz L. et al., 1994). Neurobiofeedback has used since 1967 with the aim to treat some illness and with the aim to achieve the peak performance in athletes (Angelakis E. et al., 2007).

The relation between humane performance and they functional condition described as parabolic curve and carried in practice the notion of optimum functional condition. However, in spite of conspicuity of practical value of the problem of the functional condition, methods of its diagnostics and optimization remain it is not enough studied (Danilova N.N., 2003). With reference to the training process of the elite athletes there is very small number of the studies intercoupling the functional condition and electrical activities of the cerebrum, executed by method visual-logical description of electroencephalogram (EEG). Study of the quantitative factors of electroencephalogram (QEEG) will allow to get elaborating dates about relationship of QEEG with functional condition of athlete and to get new predictors to the athlete's capacity.

The purpose of this investigation was to obtain the additional dates about QEEG of high qualification athletes during the large circle of there training and competition process.

The organization and the methods of investigation

The number of athletes have took participate in the study were 81. Athletic specialization was ski racing at 17 participant, biathletes were 6, hockey were 24, volleyball were 14, football were 10, box were 4, fight were 4, swimming was 1 and billiards was 1. The sportive qualifications of participants were following: the master of sport of international class – 3; the master of sport – 12; the candidate master of sport – 34; first category – 32. The participant's age was $20 \pm 1,7$ years. Male persons were 57 and female persons were 24. The survey at starting-up period was performed at

August - a September. The survey at competitive period was performed at November - February. The survey at transitional period was performed at March - a May.

The electroencephalogram was carried out with 21-channels electroencephalograph on standard method. The monopolar electrodes were mounting using 10-20 scheme with separate ear's referential electrodes. The statistical analysis includes the descriptive statistics, simple linear correlation (Pearson), non-parametric methods (sign test and Wilcoxon's matched pairs test), the t-test for dependent samples.

Results

The significant changes of the EEG alpha index in sportsmen were finding under F_3 , F_4 , T_5 , P_3 , P_4 , O_1 , O_2 electrodes from starting-up to competitive period of training year. The alpha index increased from 0,5% to 4,3% in F_3 point and from 2,1% to 8,0% in F_4 point. On the contrary the alpha index decreased from 12,3% to 3,2% in T_5 , from 21,4% to 13,5% in P_3 , from 24,0% to 3,1% in P_4 , from 17,0% to 4,1% in O_1 , from 24,7% to 2,5% in O_2 points. The value of alpha index returned to the former level from competitive to transitional period.

The positive correlation of alpha index had power at rate of +0,9 between the EEG electrodes in standard locations Fp_2 , F_z , F_4 , F_8 , and in locations C_4 , P_z , P_4 , T_6 , O_1 , O_2 , and in locations P_3 , P_z , P_4 , T_6 . The negative correlation of alpha index had power at rate of -0,8 between the EEG electrodes in standard locations C_4 , Fp_2 , F_8 , and in locations O_2 , Fp_2 , F_8 at the begin of the training year. The correlation of alpha index had only positive direction over the entire convex surface in the competitive period. The negative direction of correlation was not found in the competitive period.

The correlation of alpha index had both positive and negative directions again over the entire convex surface in the transitional period. Two pleiades of neuronal ensembles had formed with positive direction of correlation with power at rate of 0,6 to 0,9 in the transitional period. The largest pleiade merged occipitalis, parietalis, temporalis and some centralis neuronal ensembles (O_1 , O_2 , T_5 , P_3 , P_z , P_4 , T_6 , T_3 , C_4). The second one merged frontalis neuronal ensembles (Fp_2 , F_7 , F_z , F_4 , F_8). The negative correlation with power at rate of -0,6 to -0,8 had formed between rostral and caudal pleiades.

Conclusions

The EEG alpha index in sportsmen under frontal electrodes increased, and under some temporalis, parietalis and both occipitalis electrodes decreased from the starting-up to the competitive period of the training year. The value of alpha index returned to the former level from the competitive to the transitional period.

The number, direction and power of correlation between the neuronal ensembles under 19 standard electrodes had changed from starting-up to competitive period of training year.

The negative correlation between rostral and caudal neuronal ensembles became small in number and cease detecting at all in some categories of athletes. The positive correlation between neuronal ensembles under 19 standard electrodes became small in number. The recovering of number and direction of correlation was finding after 2 – 4 weeks of the transitional period passed.

It is supposed that certain QEEG factors characterized functional condition of athletes. The QEEG factors changing during large circle of training process make actual searching for additional facility for the athlete's functional condition regulation.

The work is submitted to the Scientific International Conference «Innovative Technology in Higher and Vocational Education», August, 2-9, 2008, Spain (Costa del Azaar), came to the editorial office on 01.07.2008.

COMBINED ACTION OF REMOTE EFFECTS OF RADIATION IN THE DOSE OF 2 GR AND ASBEST DUST ON ACTIVITY OF ENZYMES OF PURINE NUCLEOTIDES CYCLE

Ildebayev O.Z.

*Semipalatinsk state medical academy
Semey, Republic Kazakhstan*

Purpose: Is a study of combined influence of gamma-radiation in the remote period in the dose of 2 Gr and chrysotile-asbest dust on activity of enzymes of the purine's nucleotides metabolism – 5'-nucleotidasae (5'-NT), adenosindesaminasae (ADA), adenilatdesaminasae (AMF-asae) in different organs and tissues in experiment.

Material and methods: For achievement of the present aim we execute experiments on 45 out-breed sexually mature white male rats, which were subdivide on 3 groups: I intact group (n=15), II groups persecute chrysotil-asbestos dust (n=15), III group – combined influence of radiation and asbest dust (n=15). In the II and III groups at animals was simulated the black-lung disease (dust disease) to methods of E.N.Gorodetskaya (1954). The animals of the III d group were irradiated 90 days up to research on the radiotherapeutic installation Teragam ^{60}Co in a dose 2 Gr unitary. We used for the research lymphocytes of peripheral blood and prepared masses from the cells of liver, spleen, thymus and lymphatic nodes of small intestine, adrenal medulla. The results of research were processed by the standard methods of variational statistics with calculation of criteria by t-Student. Estimated the activity of 5'-NT, ADA, AMF-asae.

Results: It is estimated that the activity of 5'-NT and ADA in the spleen in the animals of III group in the remote period reduces to $0,136 \pm 0,026$ nmol/s mg protein ($p \leq 0,001$) and to $1,121 \pm 0,071$ nmol/s mg protein ($p \leq 0,01$) accordingly. The activity of 5'-NT in the lymphatic nodes of small intestine in animals of II

and III group was reduced (to $0,036 \pm 0,004$ and to $0,094 \pm 0,007$ nmol/s mg protein ($p \leq 0,001$)). The activity of AMF in the spleen of animals in III group was increased more than in 1,6 times ($p \leq 0,05$). I combined action of radiation and dust in the immune-responsible organs decreasing of 5'-NT activity occurred, which caused accumulation of adenosine with following changes of adaptive mechanisms. There are changes in purine metabolism in the thymus. The activity of 5'-NT of III group animals reduces to $0,102 \pm 0,007$ nmol/s mg protein, the activity of AMF-asae in the III-d group of animals reduces to $0,310 \pm 0,009$ nmol/s mg protein ($p \leq 0,05$). Results of research showed combined influence of chrysotile dust and ionizing radiation in the remote period causes increasing the activity of 5'-NT, ADA, AMF-asae in the liver. In combine action the activity of 5'-NT, ADA, AMF-asae increases in 1,6; in 2,5 and in 6,0 times ($p \leq 0,01$) accordingly. The activity of 5'-NT, AMF-desaminasae in adrenal medulla and lymphocytes of peripheral blood in the animals of III group reliable increased. The activity of ADA did not change. On the base of obtaining results we can say, that adrenal medulla tissues and lymphocytes of blood in combined action of radiation and dust responses considerable intensification of the processes of anabolism and catabolism in the remote period, which marked on the secondary character of changes.

Therefore, the combined action of radiation and asbest dust causes considerable interruption of enzymes of purine metabolism, which characterized the strain of adaptive-compensate mechanisms of an organism on influence of dust-radiative factor. The relative activation of catabolic processes occurs, that allows to assume opportunity of reparation of metabolic processes of an organism in the remote period at the expense of compensate possibilities of an organism.

The work was submitted to the International Scientific Conference «Diagnostics, therapy, prevention of socially significant diseases rights». Turkey (Antalya), August, 16-23, 2008, came to the editorial office on 08.07.2008.

IMMUNOMODULATORY CHANGES IN THE LYMPH NODES MEDIATED BY STRESS DURING EARLY POSTNATAL DEVELOPMENT

Kapitonova M.Yu., Gupalo S.P., Degtyar Yu.V.
UiTM Medical Faculty, Shah Alam, Malaysia
Volograd State Medical University, Russia

Stress is thought to be immunosuppressive but paradoxically exacerbates inflammatory and autoimmune diseases (K.Viswanathan et al., 2005). Many aspects of the stress-induced immunomodulation remain controversial especially in terms of the age-related aspects of the problem. Growing body in

known to be particularly vulnerable to the stress exposure but the details of the stress-mediated immunosuppression are mainly investigated at the level of the central lymphoid organs which is described as an accidental thymic involution, while the involvement of the peripheral immune organs remains underestimated (Q.Li et al., 2005; R.G.Tseng et al., 2005).

The links among the stress-associated increased level of plasma glucocorticoids, catecholamines and immunity were examined in a number of studies. As peripheral blood is generally the only "window" available through which the human immune response can be studied, it is difficult to assess the mechanisms by which neuroendocrine responses affect either the inductive or effector phases of immunity, as both generally occur in tissues and not in the blood, hence immunohistochemical methods of the tissue-specific changes evaluation are invaluable in getting information regarding the stress-associated immunomodulation at the level of the peripheral lymphoid organs (J.K. Kiecolt-Glaser et al., 1995; D.A. Padgett et al., 2003; J.Diao et al., 2006; M.E. Trukenmiller et al., 2006).

The objective of the present investigation was to reveal the stress-induced immunomodulatory changes in the growing body evaluated at the level of the secondary lymphoid organs (lymph nodes).

Prepubertal Sprague-Dawley rats aged 21 and 30 days corresponding to the weaning and infant periods accordingly, were exposed to the severe chronic (restraint) stress (R.Kvetnansky et al., 1970) with 7 daily 5-hour sessions. Each age group of the experimental animals contained 8 rats with another 8 rats serving as an age-matched control, with total number of the animals equal to 32 species.

After the last session of stress the animals were sacrificed, their thymus, spleen and inguinal lymph nodes were sampled, weighed, fixed in formalin and embedded in paraffin. Histological sections of the lymph nodes were stained with hematoxylin-eosin for routine histological examination and immunohistochemically processed for CD8 (T-suppressor/cytotoxic lymphocytes) and CD20 (B-lymphocytes) markers using streptavidin-biotin-peroxidase method with subsequent quantitative evaluation of the volume density and the numeric density of the immunopositive cells using NIKON image analyzer with Image Pro Plus 4.5 software.

It was demonstrated that chronic stress induced prominent immunosuppressive changes in the lymph nodes of the prepubertal rats of both age groups. They included considerable reduction of both T- and B-zones in the lymph nodes with increased number of apoptotic cells mainly in the B-zones. The diameter of the primary and secondary lymphoid nodules and the number of the secondary lymphoid nodules was reduced in the senior age group of the experimental animals while the width and the volume density of the

paracortical zone decreased in both experimental groups.

The immunohistochemical staining for the CD8 demonstrated that the immunoreactive cells were concentrated in the paracortical zone of the lymph nodes and were scanty in the mantle zone of the lymphoid nodules and in the medullary cords. After stress exposure the number of immunopositive cells in the paracortical zone decreased while single immunoreactive cells were present in the medullary cords and in the cortex of the lymph nodes.

The immunohistochemical staining for CD20 exhibited accumulation of the immunopositive cells in the lymphatic follicles being less densely distributed in the medullary cords of the lymph nodes.

Image analysis demonstrated that the volume density of the CD8+ immunoreactive cells was significantly reduced in the weaning and infant ($p < 0,01$) age groups of the experimental animals compared to the age-matched control rats, while the volume density of the CD20+ immunoreactive cells was significantly reduced in the weaning ($p < 0,001$) and infant ($p < 0,05$) age groups accordingly with a different level of significance.

All these changes were accompanied by a significant reduction of the body ($p < 0,05$), thymus ($p < 0,001$ and $p < 0,01$) and spleen ($p < 0,01$ and $p < 0,05$) mass in weaning and infant experimental animals accordingly.

The results of the investigation revealed considerable immunosuppressive changes in the lymphoid organs of the growing rats demonstrating prominent immunomodulation in the T-zones of the inguinal lymph nodes of both age groups of experimental animals and more severe changes in the B-zones of the lymph nodes of the junior animals of the present study. These findings allow to develop age-related strategies for the prophylaxis of the stress-associated immunosuppressive changes in the growing body.

The work is submitted to the IV Scientific International Conference "Basic research", Italy (Neapolitan Riviera), October, 11-18, 2008, came to the editorial office on 21.08.2008.

HEMATOLOGIC STATE OF ELDERLY DIABETES PATIENTS AGAINST METABOLIC DISORDERS

Lipunova Ye.A., Skorkina M.Yu., Tukin V.N.
*Belgorod State University
Belgorod, Russia*

The purpose of the work is to study the hematologic state and geometrical profile of blood cells against the background of metabolic disorders in elderly diabetes patients.

The blood of 68 II type diabetes (D-2) patients with concomitant metabolic disorders (Sland E., 2005) served as the subject of the investigation; among them

37 women and 31 men having got insulin; the average age - $63 \pm 0,7$, the disease duration - $15 \pm 1,0$ years. The control group was made up of 44 donors matching in sex and age without carbohydrate metabolism disorders.

The number of erythrocytes and leukocytes was calculated in blood, the concentration of hemoglobin, glucose, total protein and lipidic spectrum were defined by the unified methods accepted in the clinical hematology. The number of activated lymphocytes (Frolov A.K. and coauthors, 1990) as predictors of the pancreatic gland beta-cells destruction and diabetic angiopathies and negative disease course manifestation (Zhuk Ye.A., Galenok V.A., 1999) was defined in blood films; the white blood differential was derived. The video-registration and computer analysis of blood cells was carried out with the help of an image analyzer with the "Video-Test" software support. The mean corpuscular volume, membrane surface area and also nucleocytoplasmic index, leukocytic intoxication index (LII) and allergization index (AI) were calculated.

The basic hematologic factors (number of erythrocytes, leukocytes and total hemoglobin concentration) in all the examinees stayed within the physiological standard, but within the formed groups the number of erythrocytes and leukocytes in men is higher than that in women. In the D-2 patients there are fewer erythrocytes and more leukocytes than in the control group persons.

Hyperglycemia was detected in all the patients under the insulin therapy pressure. The glucose concentration in men's blood made $10,4 \pm 0,4$, in women - $9,9 \pm 0,3$ mmol•l⁻¹, that is authentically higher than in the donors of the control group. Under the conditions of glycemia decompensation the geometrical profile of erythrocytes and lymphocytes was characterized by an authentic increase of the mean diameter, membrane surface area and mean corpuscular volume. The specific surface area of erythrocytes (S/V) in men is higher than that in women; this dependence remained unchanged in D-2 patients. On the evidence of scientific literature the specific surface area increase is in close correlation relationship with the ability of erythrocytes to aggregation: it intensifies with the increase of lipids in blood (Katyukhin L.N., 2003). As our research showed, the red blood cells' geometrical profile changes were in close relationship with the concentration of glucose and atherogenic lipids in blood: the increase of cholesterol, triacylglycerols and low-density lipoproteins made 77 and 75; 44 and 34; 26 and 39% in men and women accordingly.

In the persons with metabolic disorders an authentic decrease of lymphocytic activated forms percentage was found out, maybe owing to cells' receptor apparatus disturbance (Kurayeva T. L. and coauthors, 2003). The increase of AI and LII reflect the presence of an allergic process and endogenous intoxication of mean severity.

Thus, in the D-2 patients with the concomitant metabolic disorders the mean diameter, mean corpuscular volume, membrane surface area of erythrocytes and lymphocytes is increased, the right neutrophilous shift is registered, the percentage of monocytes and lymphocytic activated forms is decreased against the increase of endogenous intoxication and allergization of the body.

The work was submitted to international scientific conference «Basic and applied research. Education, economics and law», September, 9-16, 2008, Italy (Rome, Florence), came to the editorial office on 23.06.2008.

DEVELOPMENT OF ENDOTHELIAL DYSFUNCTION IN SYSTEM MOTHER-PLACENTA-FETUS AT HYPERTENSIVE DISEASE IN GRAVIDAE

Pavlova T.V., Selivanova A.V.
*Belgorod State University
Belgorod, Russia*

The hypertensive disease takes one of the leading places among the diseases of gravidae. The frequency of this pathology during pregnancy makes 4-9%. The hypertensive disease as a systemic vascular pathology reflects negatively on the state of uterine-placental circulation, that, in its turn, results in the placental insufficiency and prenatal trouble of the fetus. It conditions the high indexes of perinatal disease incidence and death rate. The purpose of our investigation has been the study and comparison of functional parameters' states with the state of uterine muscle and placenta vascular layer at the hypertensive disease using innovation research methods.

There were 53 gravidae suffering from cardiovascular hypertension examined under the auspice of the Regional Labor House of Belgorod (2005-2008). 20 persons made the control group. Together with the conventional research methods a system monitoring of the arterial tension was carried out. The sampling of the material for photo- and electronic (scanning and transmission) microscopical investigation of myometrium and endometrium and placenta was carried out post partum. The samples were scanned and photographed in the optical microscope "TOPIC-T" CETI, scanning microscope FE-1 Quata 200 3D, transmission microscope JKM.

We testified that in 47% the gravidae had been aged 18-25 years old, in 54% - from 25 to 35 years old. 46% of the women were going to have the first baby. The genetic burden was detected in 28 gravidae. 20 women were overweight. The development of late toxicosis occurred in 37 women, among who the I degree nephropathy was registered in 15, II degree – in 2, III degree – in 3 women. The diagnosis of cardiovascular hypertension was established before the

pregnancy in 36 and during the pregnancy – in 17 of them.

The vascular affections developed at the hypertensive disease find their sequel in changing the blood stream in the endometrium and placenta, that is most acutely manifested in the combination with gestosis. The given changes are detected in the form of sclerosis, fibrinoid necrosis, disturbed circulation (repletion, stasis, hemorrhages, thrombosis) development and fine structures destruction. All this leads to the development of uterine-fetoplacental circulatory collapse and is attended by extremely stressful state of the fetus homeostasis.

The work was carried out in the center of multiple-access to the scientific equipment of the BelSU "Nanomaterials' Structure and Properties Diagnostics". Grand Prize RFP № 01.55.2.11 7032Ри

The work is submitted to the IV Scientific International Conference "Basic research", Italy (Neapolitan Riviera), October, 11-18, 2008, came to the editorial office on 05.09.2008.

ANALYSIS OF RELAPSES AND RE-OPERATIONS LASER DACRYOCYSTORHINOSTOMY

Valiyeva G.N., Babushkin A.E., Orenburkina O.I.
*Ufa R&D Institute of Ocular Diseases
Ufa, Russia*

Topicality

An unsuccessful outcome of dacryocystorhinostomy (DCRS) is usually conditioned by cicatrization of the newly formed lacrimal outflow tract. A variety of causes, such as an underestimate of examination data, wrong choice of surgical approach, surgical interference technique defects, nonobservance of recommended treatment by patients and their wrong aftercare, promotes it. However, the prime causes of ill lucks, in the estimation of most dacryo-surgeons, are the operation technology imperfection and adverse action of the concomitant rhino-pathology. An active practical application of new DCRS methods, including the transcanalicular approach and use of laser-endoscopic technology for the formation of inosculation, is going on. Compared to the external DCRS it provided certain advantages: traumatism and complications number reduction, operation technique simplification, cutaneous scar absence. However, according to our data, purulent dacryocystitis relapses often requiring reintervention occur in long terms after the transcanalicular laser endoscopic dacryocystorhinostomy (TLED) in 20% of the cases.

The investigation purpose – is to evaluate the efficiency of TLED reoperations at chronic purulent dacryocystitis, to carry out the disease relapses analysis and study the influence of the concomitant rhinopathology on their development.

Materials and methods

The purulent dacryocystitis returns analysis was carried out in 60 patients (62 eyes), who were primarily subjected to TLED. The patients' age varied from 15 to 80 years old. There were 43 females (71,7%), 17 males (28,3%). 48 patients (50 eyes) were reoperated. 34 patients (36 eyes) of them were operated without using drainage (on the basic method) and 14 patients (14 eyes) – with temporary (for 3 months) bi-canalicular silicon intubation. The follow-up of 40 patients (42 eyes) made 18,8±1,9 months at the average.

The operations were carried out using diode laser OME-1150, «Endo Optiks» (USA), and endoscopic apparatus, «Storz» (Germany). For the lacrimal passages intubation a lacrimal set of Ritleng (F.C.I., France) and silicon stent with the outer diameter of 0,64 mm were applied.

Results

The relapses analysis showed that they appeared no sooner than the 1st month and no later than three years after the original surgery. The highest percentage of the relapses fell within the 2nd and 3rd months – 29% (18 cases). In the following 3 months their number made 13 (21%), and in half a year more – 20 (32,3%). Thus, during the first year 82,3% of unsuccessful TLED outcomes were registered. Most patients (80% or 48 from 60 persons) clearly associated the development of the disease relapses with the previous acute respiratory infection attended with the running nose.

The concomitant rhino-pathology at the examination was detected in 31 patients (51,7%) with the disease relapses. To compare let us point out that in the patients with positive results of the primary operation (236 patients) the concomitant rhino-pathology was found out in 59 persons only (25% of the cases), i.e. 2,1 as seldom. The most often diagnosed rhino-pathology in the relapse patients was chronic rhinitis (which generally had of hypertrophic character) – in 35,5%, sinusitis (mainly supramaxillary one) – 25,8% and nasal septum deviation, which in all the cases was combined with vasomotor changes of nasal mucosa, – 25,8%.

Postoperative complications (the analysis of 50 operations) were observed significantly more often after the silicon intubation (28,6%, 4 cases – silicon allergy, intubation granuloma, drainage drop-out, splitting of lacrimal points and canaliculi by the silicon stent), than at the carrying out of repeated operations without using transient drainage (11,1%, 4 cases of nose bleed, which in one of them required tamponade).

In the long terms (from 6 months to 3,5 years) the reoperation results were followed in 40 patients (42 eyes). The positive effect of reoperations was registered in 76,2% (32 eyes), among them recovery – in 66,7% (28 eyes), improvement – in 9,5% (4 eyes). The purulent dacryocystitis relapses were registered in

23,8% (10 eyes). The reoperations carried out using bi-canalicular silicon intubation turned out to be more effective – 78,6% of recovery, than repeated operations without using transient drainage – 60,7% of recovery.

Conclusions

1. The highest number of purulent dacryocystitis relapses was registered during the year after the TLED operation (82,3%), but especially often – during the first three months (29%). 2. A significant influence on the development of relapses was rendered by the concomitant rhino-pathology. 3. A more steady and long effect of reoperations was registered in the patients, who the TLED was carried out using transient silicon drain of the formed inosculation. However, the use of bi-canalicular silicon intubation has led to the increase in number and seriousness of post operational complications.

The work is submitted to the Scientific International Conference «Current problems of education, October, 15-22, 2008, Greece (Athens-Delphi-Meteora-Mycenae-Nafplio-Epidaur), came to the editorial office on 25.08.2008.

THE MORPHOLOGICAL PARTICULARITIES OF GONAD OF ANDROGENLESS RATS

Zenkina V.G., Karedina V.S., Solodkova O.A.,
Yufereva A.L.

*Vladivostok State Medical University
Vladivostok, Russia*

At present reasons, bring about breaches of the follicle development, shaping the anomalous gametes, remain to be unclear at many moment. More studying importance in origin anomaly follicles, which growing is realized on background long frustration of hormones regulation of the reproductional process.

In connection with foregoing, we researched morphological and functional condition gonad rats after one-shot subdermal introduction 25 mkg of Testosterone Ptopionati on the second day of the lives (the model E.M. Kitaeva, 1986). The Overview study preparation has shown that cortex material gonad was reductioned in contrast with gonad of the checking group. Mikroskopiya of serial cut gonad has shown that total number of generativ element is vastly reduced in contrast with checking group. It Herewith is realistically reduced amount of primordial follicles, rising and mature yellow bodies. Many of follicles already on stage of primordial follicles bore the marks of atresia, which ruin begins with ruins of the ovule. The nucleus of the ovule shrivels, is subjected to pyknosis. Follicular hatches first save its wholeness, then disappear. Sensitive to action of the preparation turn out to be the increasing laminated hatches. The amount their is realistically reduced in contrast with checking (the table 1). Herewith main mass of rising follicles is found on the preantral stage. Amount of

cavity forms is beside 7%. On this background in many secondary follicles is noted mass ruin follicular epithelium, bulge of the brilliant shell, granulations and internal tegmen shells are not organized. On preparation, painted metil-blue, is defined condensation of chromatin, expressed fragmentation of follicular nucleus, in cellular cytoplasm big amount of invagination, but in some area are formed apoptosis bodies. All are these processes characterize the different stages of apoptosis in follicular epithelium, which well stand out on background of additional androgenisation. The Amount of atresik follicles beside androgenic animal in neonatal period realistically in contrast with checking group more. The Correlation rising and atresik follicles in given group animal has formed 0,18 that in 2,5 times less in contrast with checking group. Mature definitively formed follicles in gonad of the

females we have not revealed. Yellow bodies are revealed on middle cut in amount before 3-4 on one gonad, having type isle amongst interstitial fabrics. The Data of the structure, on our opinion, are not full-fledged yellow body, but imitate them, since we have not found the consequent stage of the development of yellow bodies on preparation, as well as were absent the preovular follicles, being their predecessor. Thereby, introduction of androgen rat in early neonatal period causes the long breaches of the growing and maturations of follicles, absence to ovulations, as well as hypertrophy of honad's strome with centre of luteinisation lasts.

The work was submitted to international scientific conference «Basic and applied problems meditsyny and biology», UAE (Dubai), 15-22 October 2008. Came to the editorial office 07.06.2008.

*Short reports***CHROMOSOMAL ABERRATIONS AND CONGENITAL MALFORMATION IN THE INHABITANTS OF INDUSTRIAL CITIES OF WESTERN SIBERIA**

Minina V.I., Gromov K.G.*, Likstanov V.I.*,
Druzhinin V.G.

*Establishment of the Russian Academy of Science
Institute of human ecology of the
Siberian Branch of the Russian Academy of Science*

**The Kemerovo state medical academy of Federal
agency on public health services and social
development
Kemerovo, Russia*

Background

The importance of the test for chromosomal aberrations for forecasting diseases of a human being has not been studied completely yet. Five epidemiologic studies, from Northern Europe, Italy, the Czech Republic, Taiwan and Central Europe have reported an association between high frequency of chromosomal aberrations and increased cancer risk [1-5]. Chromosomal aberrations which children have with various types of congenital malformation are actively investigated [6]. However interrelation between accumulation of chromosomal aberrations in the healthy donors and frequency of congenital anomaly occurrence in a population are still not studied completely. Similar researches get a special topicality in the populations living in the conditions of constant genetically-toxic pressure of the environmental factors.

Novokuznetsk and Kemerovo (Western Siberia, Russia) are of great interest for epidemiological and genetic researches. The environment of Novokuznetsk is influenced first of all by the metallurgical enterprises. Kemerovo is the center of chemical and coal-mining industries of Kuzbass. The total emissions of polluting substances in these cities are the highest in Kuzbass. According to this, the aim of the research is to study the frequency of chromosomal infringements in the populations and frequency of congenital developmental anomalies of children in these cities.

Materials and methods

Work is carried out on samples of blood of voluntary unrelated donors, the inhabitants of Kemerovo and Novokuznetsk. Venous blood was taken from each subject using heparinized tubes. Duplicate lymphocyte cultures were set up adding 0,5 ml of whole blood to 5 ml of RPMI medium, supplemented with 20% inactivated fetal calf serum, antibiotics and glutamine. Lymphocytes were stimulated by 1% phytohaemagglutinin. For the evaluation of chromosomal aberrations, the culture were incubated for 72 h at 37°C. A final concentration of 0,4 µg/ml of colchicine was added 2 h before fixation. Slide preparations and staining of chromosomes were carried out by standard cytogenetic methods [7]. Four categories of chromo-

somal aberrations were evaluated, i.e., chromatid and chromosome breaks, and chromatid and chromosome exchanges [8, 9]. All cells carrying breaks or exchanges were counted as aberrant cells (AB.C.). Gaps were not scored as aberrations. 100-500 well-spread metaphases has been scored.

Revealing children with congenital anomaly was carried out within the period from 1994 to 2005. The material for this research was taken from the data of the medical documentation of maternity hospitals, laboratory-diagnostic service of the zonal prenatal center, polyclinics, hospitals and prozection. All form of congenital anomaly of newborns, deadborn and foetuses were taken into account and placed in common computer database according to classification of WHO. The data on frequency of the congenital anomaly in Kemerovo were used for the comparative analysis [10]. Nonparametric methods were chosen for the data did not follow a normal distribution. The Mann-Whitney rank sum U-test for comparison of two samples were used.

Results and Discussion

The results concerning the frequency of chromosomal aberrations in group from industrial city western Siberian are presented in Table 1.

For comparison our last given the data about a background level of chromosomal aberrations in group of inhabitants of ecologically clean villages in the Kemerovo region [11].

From data Table 1 it follows, that the basic cytogenetic parameter – AB.C. is significantly increased in groups of Kemerovo and Novokuznetsk in comparison with basic control group ($p < 0,05$). Value of separate categories of aberrations: chromatid and chromosome breaks of inhabitants of industrial city also were significantly higher in comparison with basic control group. High values of cytogenetic damages specify, that a human population in industrial city is constantly influenced by genetically-toxic factors.

It is revealing, that the average value of metaphases with aberrations in group of the inhabitants of Kemerovo ($3,27 \pm 0,14$ %) coincides practically with the number of metaphases with aberrations, registered in the inhabitants of Novokuznetsk ($3,29 \pm 0,28$ %). So close there are also frequencies of separate types of aberrations in compared groups. The analysis of possible influence of such factors as a gender, age and addiction to smoking, made in the group of inhabitants of industrial cities revealed, that none of the listed factors had caused significant modification of frequencies of the studied parameters. This fact, and also the selection of the staff of the studied groups, except people with chronic pathologies, vaccination, allow to conclude, that the main cause of the increase of the frequency of chromosomal aberrations in the inhabitants of Kemerovo and Novokuznetsk is the influence of factors of the city environment.

Table 1. Chromosomal aberrations in groups of Kemerovo, Novokuznezk and basic control group

Group	No. of cells scored	A.B.C.(%).	breaks		exchanges	
			chromatid	chromosome	chromatid	chromosome
Kemerovo	27700	3,27 ± 0,14 ^{a*}	2,31 ± 0,12*	1,01 ± 0,08*	0,03 ±	0,07 ±
Novokuznezk	10100	3,29 ± 0,28*	2,21 ± 0,26*	1,09 ± 0,13*	0,01 ±	0,02 ±
Basic control group	11200	2,86 ± 0,26	2,08 ± 0,22	0,89 ± 0,14	0,02 ±	0,05 ±
					0,01 ±	0,02 ±
					0,04 ±	0,08 ±
					0,02 ±	0,03 ±

a - Mean ± SE

*-p<0,05

Congenital anomaly

The average frequency of congenital anomaly in Novokuznetsk was 23,1 ‰, and in Kemerovo - 17,6 ‰. The received results have appeared quite comparable to data of other cities of Russia and Europe [12, 13]. The analysis of dynamics of frequency congenital anomaly has shown significant fluctuations of average annual values. The maximal values have been marked in Novokuznetsk in 1996 (42,10 per 1000 newborns)

and in 2000 (33,10 ‰), to Kemerovo in 2000 (21,2 per 1000 newborns). The frequency of congenital anomaly among the inhabitants of rural areas of Kemerovo region is considerably lower and it is 2,21‰ in Yashkino area and 12,28‰ in Tashtagol area (Tolochko T.A. - the private messages, non published data).

Table 2. Frequency congenital malformation among newborns and fetuses of Novokuznetsk and Kemerovo (‰)

Anomaly Subgroup	Novokuznezk	Kemerovo	EUROCAT (1994-2004)
Anencephalus	0,44	0,37	0,03 – 0,64
Spina bifida	0,41	0,69	0,28 – 1,72
Encephalocele	0	0,36	0,02 – 0,29
Hydrocephaly	1,19	1,20	0,06 – 1,75
Microtia/Anotia	0	0,25	0,005 – 0,08
Cleft palate	0,55	0,52	0,29 – 1,37
Cleft lip with or without palate	0,03	0,30	0,46 – 1,68
Transposition of great vessels	0,08	-	0,12 – 0,52
Hypoplastic left heart	0,11	-	0,07 – 0,51
Oesophageal atresia	0,19	0,29	0,065 – 0,39
Ano-rectal atresia	0,19	0,18	0,13 – 0,78
Hypospadias	0,53	2,84	0,18 – 2,61
Congenital constriction bands/ amniotic band	0,14	1,32	0,002 – 0,15
Polydactyly	0,06	1,06	0,19 – 1,16
Diaphragmatic hernia	0,22	1,06	0,07 – 0,54
Bilateral renal agenesis including Potter Syndrome	0,39	0,29	0,05 – 0,57
Omphalocele	0,22	0,07	0,08 – 0,62
Gastroschisis	0,33	0,15	0,045 – 0,62
Down syndrom	0,44	0,69	0,80 – 3,60
Multiple congenital anomaly	1,41	1,64	0,90 – 2,40

In general structure of congenital anomaly in Novokuznetsk the defects of the development of the nervous system - 22,4 ‰; multiple congenital anomaly - 19,33 ‰, urinary anomaly - 16,94 ‰; musculo-

skeletal anomaly - 15,28 ‰ were predominated. In Kemerovo congenital heart disease (35 ‰) prevailed. Hypospadias took the second place (16 ‰), the third - multiple congenital anomaly (9 ‰). In Novokuznetsk

boys had congenital anomaly (61,58 %) more often, than girls (38,42 %). And predominance of male sex formed due to such forms, as hypospadias (boys have - 13,6 %, girls – don't have) and hydrocephaly (boys have - 16 %, girls have 7,7 %). In Kemerovo boys had congenital anomaly more often. The boys`average annual frequency of congenital anomaly made up - 23,89 cases per 1000 newborns, and at girls` average annual frequency of congenital anomaly - 14,58 cases per 1000 newborns. It was registered, that in Kemerovo boys had congenital defects incompatible to life (multiple congenital anomaly, hydrocephaly, spina bifida) more frequently. The comparison of frequency of occurrence of separate forms of congenital anomaly in Novokuznetsk, Kemerovo and other cities of Russia and Europe has shown the absence of significant differences for the majority of the given types of defects (table 2.) Plural developmental anomalies

(frequency - 1,41 ‰) and hydrocephaly (1,19 ‰) were registered more often in the structure of this congenital anomaly. In the formation of the congenital anomaly a special role is played by the accumulation of mutations in the sexual cells, leading to the appearance of foetuses with abnormal genotypes. The analysis of genotyps of abortuses in Novokuznetsk wich had been done from 2001-2005 showed that abnormal genotyps were met in 22 % of cases (62 from 282 analyses). The spectrum of the registered abnormal genotyps is presented in Figure 1. Among all the abnormal genotyps additional autosome: Down syndrome (+21), syndrome Patau (+13), Edwards's syndrome (+18) were met more often (46,7 %). Also the frequency of polyploidy (69, XXY; 69, XXX; 92, XXYY) was high (29,7 %). The prevalence of the other kinds of abnormal genotyps was not high.

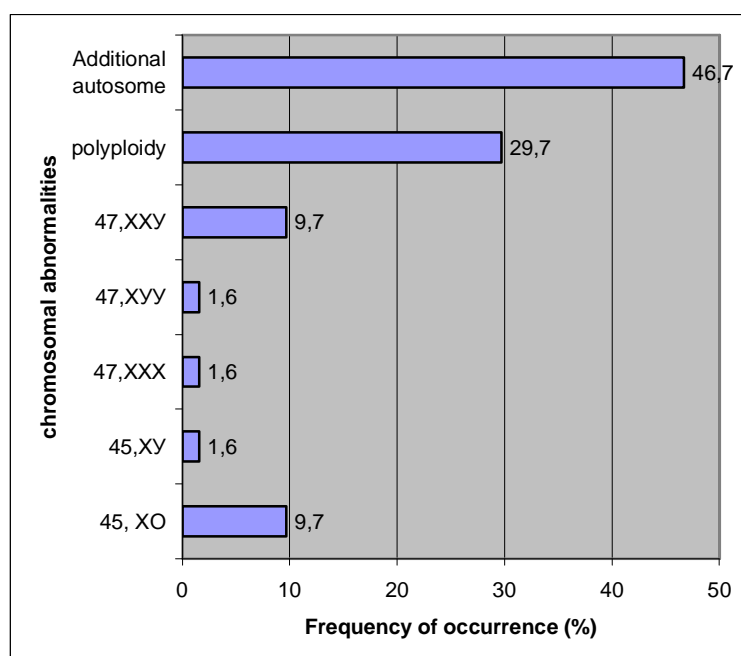


Figure 1. Anomal genotyps in abortus of Novokuznetsk

As a result of the work wich has been done it is possible to draw up the following conclusions:

1. The frequency of chromosomal infringements in the inhabitants of the industrial cities is significantly higher, than the control donors have living in a country side.

2. Among the genetic damages causing the congenital anomalies and spontaneous abortions, additional autosome and polyploidy are taking the leading part.

3. The Epidemiological analysis has shown the increase of frequency of congenital developmental anomalies of children and foetuses in population of Kemerovo and Novokuznetsk in comparison with the inhabitants of rural areas of Kuzbass.

The received results testify to a coordination of ecologically caused processes of teratogenesis and mutagenesis in the inhabitants of industrial cities. In our opinion, it gives the basis to consider a high level of chromosomal aberrations as one of factors of population risk of congenital anomaly formation.

References:

1. P. Boffetta, et. al., Chromosomal aberration and cancer risk: Results of a cohort study from central Europe, American Journal of Epidemiology. (2007) 165: 36 - 43.
2. Bonassi S., Znaor A., Norppa H, Hagmar L., Chromosomal aberrations and risk of cancer in humans: an epidemiologic perspective, Cytogenet. Genome Res. (2004) 104: 376-382.

3. Hagmar L., Brogger A., Hansteen I., Heim S. et al., Cancer risk in humans predicted by increased levels of chromosomal aberrations in lymphocytes: Nordic study group on the health risk of chromosome damage, *Cancer Res.* (1994) 54: 2919-2922.

4. Rossner P., Boffetta P., Ceppi M., Bonassi S. et al., Chromosomal aberrations in lymphocytes of healthy subjects and risk of cancer, *Environ. Health Perspect.* (2004) 113. №5: 517-520.

5. Liou S.H. Lung J.C. Chen Y.H., Yang T. et al., Increased chromosome-type chromosome aberration frequencies as biomarkers of cancer risk in a blackfoot endemic area, *Cancer Res.* (1999) 59: 1481-1484.

6. T. Kadotani, et al., Chromosomal study on congenital anomalies with mental retardation, *J. Hum. Genet.* (2003) 3: 155-158.

7. M. Sorsa, et al., Human biomonitoring of occupational exposure to 1,3 – butadiene, *Mutat. Res.* (1994) 307: 355-363.

8. WHO, Guidelines for the study of genetic effects in human populations, *Environ. Health Criter.* (1985) 46 Geneva.

9. A.V.Carrano, A.T.Natarajan, Considerations for populations monitoring using cytogenetic techniques, *Mutat Res.* (1988) 204: 379-406.

10. L.A. Glebova et al., Some epidemiological characteristics of congenital developmental anomalies of a fetuses and newborns in a Kemerovo, *Pediatrics.* (2004) 6: 86-87.

11. V.G. Druzhinin. Quantitative characteristics of the frequency of chromosomal aberrations in a group of residents of a large western Siberian industrial region, *Genetika.* (2003) 39: 1373-1380.

12. N.S. Demikova. Monitoring of congenital developmental anomalies and its value in their studying epidemiology // *Ros Vestn Perinatol Pediat.* (2003) 4: 13-17.

13. EUROCAT Central Registry, University of Ulster (2006) www.eurocat.ulster.ac.uk/pubdata.

SEARCH FOR ANTIOXIDANT THERAPY MEANS BY KINETIC METHODS

Zhuravleva L.A., Krainik V.V., Usmanova G.A.,
Ushkalova V.N.
Surgut State University
Surgut, Russia

At the present time the hypothesis about biomembranes' permeability disturbance due to the lipid peroxidation intensity change has been adopted as the molecular mechanism of many pathologies' development. A special attention is paid to the mechanism of free radical aging, adaptation to the silent epidemic, labour activity regime and also cancerous diseases development [2].

For prevention and treatment of various physiological states and pathologies an antioxidant therapy is widely used [1, 4]. It is evident that in the

progress of the therapy is possible on the basis of effective antioxidant testing methods development. All the known antioxidants are divided on their physico-chemical properties into hydrocarbon soluble ones and their water soluble derivatives. Kinetic approaches are developed for water insoluble antioxidants testing. For this purpose the chain interruption velocity constants in the inhibitor (K_i) or the induction time of ethyl benzene, cumene, styrene, decalin oxidation in the presence of phenols and aromatic amines [3, 5] are used. For lipid oxidation processes inhibition we offered a methyl linoleate model. For this purpose the methyl linoleate oxidation kinetics in the solution of benzene chloride at $60^\circ \pm 0,2^\circ \text{C}$ at the presence of the initiator depending on the concentration of 2,6-ditertbutyl-4-methyl phenol (ionol), 2, 5, 7, 8-tetra methyl-2-(4, 8, 12-trimethyl tridecyl)-6-oxichromane (α -tocopherol). The participation of ionol is shown in the chain interruption reaction only. The chain interruption velocity constant in ionol equal to $2,6 \pm 0,4 \cdot 10^4 \text{ l} \cdot \text{mol}^{-1} \cdot \text{s}^{-1}$ is defined by kinetic research methods. Similar calculations of K_i for α -tocopherol showed their changes depending on concentration and complicated mechanism of its action. For such inhibitors' efficiency estimation the method of mathematical treatment of kinetic curves (KC) by means of their approximation by functions and the following differentiation. As a result of this approach five kinetic parameters, which allow the inhibition efficiency to be evaluated on the initial velocity and inhibition time. On the maximum velocity, acceleration and acceleration time finish the mechanism of the inhibitor's action is evaluated.

However, the biomembranes' lipids conditioning the level of free-radical oxidation, the biomembranes' permeability change and the development of pathologies represent water-emulsion systems including amino acids, proteins and enzymes. That is why bio-adequate models are needed to search the means of antioxidant therapy. To select such a model the micelle formation of ethyl oleate has been investigated. For this purpose the micelle formation in two- and three-component systems has been studied first of all: ethyl oleate – water; ethyl oleate – water – emulsifier. On the minimal value of the critical concentration of micelle formation the composition of water-lipid substrate including ethyl oleate and water in the ratio 1:3 (in volume) and cetyl trimethyl ammonium bromide as emulsifier in the concentration of $(1-3) \cdot 10^{-3} \text{ mol/l}$ was defined.

Further, the kinetics of the water-lipid substrate oxidation at the presence of salts CuCl_2 , FeCl_2 , FeCl_3 , CoCl_2 , NiCl_2 depending on the concentration was studied. It was shown that the most active catalyst is cupric chloride, and the activity of other salts falls off in the series $\text{Cu}^{2+} > \text{Fe}^{2+} > \text{Fe}^{3+} > \text{Co}^{2+} > \text{Ni}^{2+}$. In further investigations cuprum cations in the concentration of $(1-3) \cdot 10^{-3} \text{ mol/l}$ were chosen as a catalyst.

For the estimation of antioxidant testing possibility in the water-lipid substrate the influence of ionol

depending on the concentration was studied first of all. It was shown that the chain interruption velocity constant (K_i) decreases regularly with the increase of ionol concentration, that testifies to its complicated mechanism of action. For the estimation of antioxidant properties of the compounds tested two approaches have been offered: the external standard and KC mathematical treatment methods, as it is described above. By the external standard method the character of substrates oxidation KC at the presence of ionol and the inhibitors tested is compared in similar conditions. With the help of the water-lipid model the testing of antioxidant properties of the following preparations was carried out: α -tocopherol, capoten, paracetamol, osalmide and emoxipine. It was shown that α -tocopherol in the water-lipid system demonstrates its buffer action: at concentrations from $1 \cdot 10^{-3}$ to $1 \cdot 10^{-1}$ mol/l it accelerates the process, at lower concentrations renders a weak inhibitory effect. Capoten manifests itself as a strong inhibitor - arrests the oxidation process, that corresponds to full inhibition period presence, then the acceleration of the process and production of control velocity take place. The full inhibition period is in proportion to the concentration of capoten. Osalmide also manifests itself as a strong inhibitor. Paracetamol and emoxipine act as weak inhibitors; they only inhibit the initial oxidation velocities without providing periods of full inhibition. But in the presence of paracetamol and emoxipine a decrease of the maximal velocity proportional to the concentration is registered, that testifies to the possibility of their oxidation products' participation in the chain interruption.

As far as microelements are represented in the cell in the form of coordination compounds (CC) with amino acids, for the development of antioxidant therapy means testing methods the inclusion of amino acids into the water-lipid system is of great interest [6].

For this purpose the water-lipid substrate kinetics at optimal pH in the presence of cuprum CC

with every of the amino acids: α -alanine, valine, threonine, lysine, phenyl alanine, leucine, serine, histidine - has been studied. Thereat the concentration of cuprum cations made $2 \cdot 10^{-3}$ mol/l, and that of an amino acid - $1 \cdot 10^{-2}$ mol/l. An amino acid abundance, which guarantees the complex stability in the substrate, was foreseen. As a result the lack of activity in threonine and lysine, weak inhibitory activity in histidine and serine, a stronger inhibitory activity in leucine and phenyl alanine were found out.

On the basis of these results a bio-adequate method of antioxidant therapy means testing with cuprum coordination compound and α -alanine participation is being developed.

References:

1. Dzhnashiya P.Kh., Nazarenko V.A., Ninkolenko S.A., Modern aspects of clinical application of angiotensin converting enzyme inhibitors. - M.: RSMU, 1999 - p. 48.
2. Zenkov N.K. Activated oxygen metabolites in biological systems / Zenkov N.K., Menshikova Ye.B. // Advances of modern biology - 1993 - V. 113 - N3 - pp. 286-297.
3. Denisov Ye.T. Chain reaction inhibition / Denisov Ye.T., Emanuel N.M., Azatyan V.V. - Chernogolovka: RAS, 1997 - p. 370.
4. Kobalova Zh.D., Kotovskaya Yu.V. Arterial hypertension: key aspects of differential diagnostics, prevention, clinical picture and treatment. M.: Forte - ART, 2001 - p. 208.
5. Kasaikina O.T. Inhibitory activity of natural phenol antioxidants in lipid substrates oxidation processes / Kasaikina O.T., Kortenska V.D., Marinova E.M., Rusina I.F., Yanishliyeva N.V. // RAS reporter - 1997 - N6 - pp. 1119-1122.
6. Yatsimirsky K.B. Stability constants of complexes of metals with bioligands: Reference book / Yatsimirsky K.B., Kriss Ye.YE., Gvyazdovskaya V.L. - Kiev: Naukova Dumka, 1979 - p. 228.

SEMIFIELDS AND SHEAVES

Vechtomov E.M.

Vyatka State University of Humanities
Kirov, Russia

The basis of the theory of sheaf representations of semifields is stated in this work. The analogs of Pierce's and Lambek's sheaves from the theory of rings are defined for semirings. Functional characterizations of biregular semifields are obtained.

Introduction

The theory of semifields is a perspective area of a modern algebra, which we can examine either as a component of the theory of semirings or as groups with a complementary binary operation. Golan's monograph covers the theory of semirings [9]. Some questions of the theory of semifields were examined in articles [4], [5], [8].

The theory of semirings and the theory of semifields have been investigated by the participants of the scientific algebraic seminar in Vyatka State University of Humanities since 1994.

The basis of the theory of sheaf representations of semifields, which was initiated in [11]–[15], is stated briefly in this work. In this connection the class of biregular semifields is examined more completely.

Semifield is an algebraic structure, which is a multiplicative group and, at the same time, an additive commutative semigroup, and multiplication is distributive concerning addition from both sides. Semifields with added zero are the semirings with division, which are not rings. As rings and distributive lattices semifields with zero form an important class of semirings, which plays an essential role in a structural theory of semirings. *Idempotent* semifields (semifields with identity $u+u=u$) correspond lattice ordered groups. Semifields are related to rings, because every semifield has a ring of differences. Let's notice, that *cancellable* semifields (semifields with quasi-identity $u+w=v+w \Rightarrow u=v$) are embedded in their rings of differences.

When investigating semifields we can use functional method: studied semifield is

realized as a semifield of sheaf's cross-sections of some semifields under the topological space. Many rings admit good functional (sheaf) representations [6], which in many things are transferred on semirings [7].

Let's introduce needed conceptions. The class of the unit of arbitrary congruence on semifield is called the *kernel* of semifield. The subset A of semifield U will be the kernel if and only if A is a normal subgroup of a multiplicative group U , satisfying condition: if $u, v \in U$, $u+v=1$, $a, b \in A$, then $ax+by \in A$. The lattice of all kernels (congruences) of semifield U is indicated $\text{Con}U$. The kernel of semifield U , generated by element u , is called *the main kernel* and indicated (u) . The kernel $A \in \text{Con}U$ is called *complemented*, if there is the kernel $B \in \text{Con}U$, when $AB=U$ и $A \cap B = \{1\}$.

The kernel A of semifield U is called *finitely generated*, if $A=(u_1) \cdot \dots \cdot (u_n)$ for the finite number of elements $u_1, \dots, u_n \in U$. The semifield $U=(u)$ is called the *semifield with generator* u . The kernel (2) of semifield U , where $2=1+1$, is the smallest subsemifield in U , which is a kernel. If $U=(2)$, semifield U is called *bounded*. Semifield is called *reduced*, if the quasi-identity $u^2+v^2=uv+vu \Rightarrow u=v$ is executed in it. Semifield U is called *distributive (chain, simple, indecomposable)*, if lattice $\text{Con}U$ is distributive (the lattice is a chain, two-element, has two complemented elements exactly).

The kernel P of semifield U is called *nonreducible*, if $A \cap B \subseteq P$ lead to $A \subseteq P$ or $B \subseteq P$ for every $A, B \in \text{Con}U$. Space $\text{Sp}(U)$ of all nonreducible kernels of semifield, examined with stone topology, is called the *nonreducible spectrum* of semifield U . Its subspace

$\text{Max}U$, which consists of all maximal kernels, is called the *maximal spectrum* of semifield U . The *pseudocomplement* of kernel $A \in \text{Con}U$ is the biggest kernel A^* , which gives $\{1\}$ in meet with A . Let's assume $O_P = \{u \in U: \exists v \in U \setminus P (u) \cap (v) = \{1\}\}$ for arbitrary nonreducible kernel P of semifield U

About the properties of semifields

Let's formulate some general properties of semifields [12].

Property 1. *Every finitely generated semifield is semifield with generator.*

Property 2. *Every semifield is embedded in semifield with generator.*

Property 3. *Maximal kernels of any semifield are nonreducible.*

Property 4. *If U is semifield with generator, then spaces $\text{Sp}(U)$ and $\text{Max}U$ are compact and every semifield U 's own kernel is included in some its maximal kernel.*

Property 5. *The opposite thing is right for distributive semifields U : if space $\text{Sp}(U)$ is compact, or space $\text{Max}U$ is compact and semifield U 's own kernels are included in maximal kernels, then U is semifield with generator.*

Property 6. *The set of all complemented kernels of every semifield U generates Boolean sublattice of lattice $\text{Con}U$.*

Property 7. *If semifield U is either distributive or reduced and bounded, then $\text{Con}U$ is lattice with pseudocomplements, and sets $O_P, P \in \text{Sp}(U)$, are kernels in U .*

The analog of Pierce's representation

Let's define the analog of Pierce's ring sheaf representation [1], [6, § 12] for any semifield U . Let's examine Boolean sublattice $B(U)$ in $\text{Con}U$ of all semifield U 's complemented kernels and space $M(U)$ of all maximal ideals of Boolean lattice $B(U)$ with stone topology. Disjunctive union Π of all factor semifields $U/\sim M$, where $M \in M(U)$, generates the structural sheaf of semifield U under zero-dimensional compact $M(U)$. Let's indicate the semifield of all stalks of sheaf Π as $\Gamma(M(U), \Pi)$.

Theorem 1. *Every semifield U is isomorphic to semifield $\Gamma(M(U), \Pi)$ of sections*

of sheaf Π of factor semifields of semifield U under zero-dimensional compact $M(U)$.

Consequence 1. *Every semifield with final set of kernels is isomorphic to direct product of finite number of indecomposable semifields.*

Semifield U is called *strongly Gelfand*, if there is its complemented kernel A , that $A \subseteq M$ and $A \not\subseteq N$ for every two different maximal kernels M and N in U . The semifield, all kernels (main kernels) of which are complemented, is called *Boolean (biregular)*. Biregular semifields are the analogs of biregular rings. It's clear, that biregular semifields are distributive.

If U is strongly Gelfand semifield, let's identify every maximal kernel $M \in \text{Max}U$ with maximal ideal $\{A \in B(U): A \subseteq M\}$ of Boolean lattice $B(U)$. Then zero-dimensional compact $M(U)$ will be the compactification of locally compact space $\text{Max}U$.

Proposition 1. *For strongly Gelfand semifield U space $\text{Max}U$ is embedded in $M(U)$ homeomorphically.*

Theorem 2. *Any semifield U is biregular if and only if it is isomorphic to the semifield of all sections of some sheaf of simple and trivial semifields $(U/\sim M)$ under zero-dimensional compact $M(U)$.*

Consequence 2. *Every biregular semifield is factorized in direct product of biregular idempotent semifield and biregular bounded commutative semifield, which are specified explicitly accurate within isomorphism.*

Consequence 3. *In every biregular semifield every kernel is the meet of maximal kernels, and finitely generated kernels are main.*

In every biregular semifield U nonreducible kernels are maximal: $\text{Spec}U = \text{Max}U$. Semifields with generator correspond to rings with unity, their maximal spectrum is compact.

Theorem 3. *Following states are equivalent for every biregular semifield U :*

- 1) $\text{Max}U$ is compact;
- 2) $\text{Max}U$ is homeomorphous to $M(U)$;
- 3) U is the semifield with generator.

Consequence 4. *Biregular semifield with generator is isomorphic to the semifield of all sections of Hausdorff sheaf of simple semifields under zero-dimensional compact, which is specified explicitly accurate within homeomorphism.*

Let's examine pseudocomplement $A^* = \{u \in U: (u) \cap A = \{1\}\}$ for kernel A of semifield U . In the case of distributive semifields U pseudocomplement A^* is the biggest kernel in U , the meet of which with this kernel is unit kernel $\{1\}$. Distributive semifield is called *Baer*, if the pseudocomplement of every its kernel is complemented.

Proposition 2. *Following states are right for kernel A of semifield Γ of all possible sections of the sheaf of simple semifields under zero-dimensional compact X , which has one generator:*

1) A is complemented in Γ if and only if set $\Delta A = \{x \in X: \forall s \in A \ s(x) = 1\}$ is closed-open in X ;

2) $A = B^*$ for some kernel B in Γ if and only if ΔA is canonically closed in X , or it coincides with the closure of its interior.

Topological space is called *extremally unconnected*, if the closure of any its open set is open again.

Theorem 4. *For biregular semifield with generator to be Baer, it's necessary and sufficient, that its maximal spectrum is extremally unconnected space.*

Theorem 5. *Semifield U is Boolean if and only if it is isomorphic to the semifield of all sections of the sheaf of simple and trivial semifields $(U/\vee M)$ under zero-dimensional compact $M(U)$, the set of isolated points of which $(\text{Max}U)$ is dense everywhere.*

Consequence 5. *If semifield U is Boolean, space $M(U)$ is the compactification of Stone-Cheh of a discrete space $\text{Max}U$: $M(U) \approx \beta \text{Max}U$.*

Consequence 6. *Boolean semifields with generator are direct products of the finite family of simple semifields accurate within isomorphism.*

Consequence 7. *Every Boolean semifield is isomorphic to direct product of Boolean idempotent semifield and finite direct*

product of reducible simple commutative semifield.

The semifields of sections of compact sheaves

Let sheaf Π of semifields U_x under topological space X is given.

Let's assume for point $x \in X$:

$\Gamma^x = \{s \in \Gamma: s(x) = 1 = 1_x \in U_x\}$ is the kernel of the semifield of sections $\Gamma = \Gamma(\Pi, X)$;

$\pi_x: \Gamma \rightarrow U_x$, $\pi_x(s) = s(x)$ для всех $s \in \Gamma$, is the homomorphism of semifields.

Sheaf Π is called a *compact sheaf*, if

1) X is compact;

2) Π is a *factor sheaf*, i.e. π_x is a surjective representation for every point $x \in X$;

3) $\Gamma^x \cdot \Gamma^y = \Gamma$ for every point $x \neq y$ from X .

Every compact sheaf Π has the following important **property**:

there is the cross-section $s \in \Gamma$ with values 1 on Y and $s(x) \notin P_x$ for every closed set Y in X , point $x \in X \setminus Y$ and an nonreducible kernel P_x of semifield U_x .

Proposition 3. *Every sheaf of semifields under zero-dimensional compact is compact.*

Proposition 4. *Kernels A and B of the semifield $\Gamma(X, \Pi)$ of sections of any semifields' sheaf Π under zero-dimensional compact X are equal if and only if $\pi_x(A) = \pi_x(B)$ for all points $x \in X$.*

Consequence 8. *The lattice of kernels of the direct product of finite number of semifields is isomorphic to the direct product of lattices of actors' kernels.*

Theorem 6. *The maximal kernels of the semifield $\Gamma(X, \Pi)$ of sections of semifields U_x 's compact sheaf are exactly kernels $\pi_x^{-1}(K_x)$, where $x \in X$ and K_x is a maximal kernel in U_x . If X is a zero-dimensional compact, it's also right for nonreducible kernels.*

Theorem 7. *The semifield $\Gamma(X, \Pi)$ of sections of any sheaf Π of semifields U_x under zero-dimensional compact X is distributive (bounded) if and only if all its stalks U_x are distributive (bounded).*

The semifield is called *Gelfand*, if there are elements $a \in M \setminus N$ and $b \in N \setminus M$, where $(a) \cap (b) = \{1\}$, for every its unequal

maximal kernels M and N . Maximal spectra of Gelfand semifields are Hausdorff, and every its nonreducible may be included into only one maximal kernel.

The semifield, which has the biggest own kernel, is called a *local* semifield. Bi-regular semifields and local semifields are strongly Gelfand, and strongly Gelfand semifields are Gelfand.

Theorem 8. *The following states are right for the semifield $\Gamma(X, \Pi)$ of cross-section of any compact sheaf of local semifields:*

- 1) Γ is Gelfand;
- 2) if Γ is semifield with generator, being strongly Gelfand Γ is equivalent to the zero-dimensionality of compact X , and $\text{Max}\Gamma$ is homeomorphous to X .

Theorem 6 and the state 2) of theorem 8 are sheaf variations of the classic theorem of Gelfand-Kolmogoroff about the rings of continuous functions.

The analog of Lambek's representation

The representation of Lambek [2], [5, § 11] is used in the theory of rings too. Let's spread this construction on semifields.

Let's assume that semifield U is distributive or reduced bounded semifield. Then sets $O_P, P \in \text{Spec}U$, will be kernels. Let's examine the family (O_P) of kernels of semifield U , which is indexed by points P of topological space $\text{Sp}(U)$. It is an open family of kernels, i.e. the set $\{P \in \text{Sp}(U): u \in O_P\}$ is open in a nonreducible spectrum $\text{Sp}(U)$, when every $u \in U$.

In reality,

$$\{P \in \text{Sp}(U): u \in O_P\} = \{P \in \text{Sp}(U): (u)^* \not\subseteq P\} = D((u)).$$

That's why [3] there is the sheaf $\Pi = \Pi(U)$ of factor semifields U/O_P of semifield U under compact T_0 -space $\text{Sp}(U)$. It's the structural sheaf of semifield U , which is analogous to the sheaf of Lambek for rings [5].

Theorem 9. *Distributive semifield U with generator is strongly Gelfand if and only if it's isomorphic to the semifield $\Gamma(X, \Pi)$ of sections of sheaf Π of local semifields U_x under zero-dimensional compact X .*

There we can take a maximal spectrum $\text{Max}U$ as X , and factor semifields U/O_M as stalks U_M .

Theorem 10. *The semifield is biregular if and only if it's isomorphic to the semifield of all sections with the compact carriers of Hausdorff sheaf of simple semifields under a zero-dimensional locally compact space.*

Consequence 9. *For semifield to be biregular semifield with generator, it's necessary and sufficient, that it is isomorphic to the semifield of all sections of Hausdorff sheaf of simple semifields under zero-dimensional compact.*

The representation of reduced bounded semifields

Every reducible semifield U embeds in its ring of differences $R = R(U)$. Every bounded semifield U is reducible and the lattice $\text{Con}U$ of its kernels is canonically isomorphic to the lattice $\text{Id}R$ of all ideals of the ring of differences R [10]. Following representations $\gamma: \text{Id}R \rightarrow \text{Con}U$ and $\delta: \text{Con}U \rightarrow \text{Id}R$ determine the isomorphism of lattices $\text{Id}R$ and $\text{Con}U$:

$$\begin{aligned}\gamma(I) &= (I+1) \cap U \text{ for all } I \in \text{Id}R, \\ \delta(A) &= (A-1)U \text{ for all } A \in \text{Con}U.\end{aligned}$$

Meanwhile $\gamma(I \cap J) = \gamma(I) \cap \gamma(J)$ и $\gamma(I+J) = \gamma(I) \cdot \gamma(J)$ for every $I, J \in \text{Id}R$.

To be reduced for reducible semifield U is equivalent to be reduced for its ring of differences R , i.e. to be absent in R nonzero

nilpotent elements. Reduced rings have the feature of symmetric property: if the multiplication of several elements of ring, taken in some order, is 0, the multiplication of these elements, taken in any other order, is 0 too.

Proposition 5. *The following states are equivalent for every nonreducible ideal Q of reduced ring T with unit:*

- 1) Q is a minimal nonreducible ideal;
- 2) Q is a minimal prime ideal,
- 3) $Q = O_Q$.

Then U is an arbitrary **reduced bounded semifield** and R is its ring of differences. Isomorphisms δ and γ retain irreducibility and keep kernels and ideals – the elements of lattices $\text{Con}U$ и $\text{Id}R$, respectively – finitely generated. Let's notice, that finitely generated kernels (ideals) of semifield U (ring R) are exactly compact elements of algebraic lattice $\text{Con}U$ ($\text{Id}R$) []. The following states are right for every $A, B \in \text{Con}U$, $I, J \in \text{Id}R$, $u, v \in U$:

$$A \cap B = \{1\} \Leftrightarrow \delta(A) \cap \delta(B) = \{0\} = 0 \Leftrightarrow \delta(A) \cdot \delta(B) = 0; \quad (1)$$

$$I^* = \text{Ann}I = \{r \in R: rI = \{0\}\} \text{ and } \delta(A^*) = \text{Ann}\delta(A); \quad (2)$$

$$\text{Ann}(I+J) = \text{Ann}I \cap \text{Ann}J \text{ and } (AB)^* = A^* \cap B^*; \quad (3)$$

$$\delta((u)) = R(u-1)R \text{ is the main ideal of ring } R; \quad (4)$$

$$(u) \cap (v) = \{1\} \Leftrightarrow (u-1)(v-1) = 0 \Leftrightarrow uv+1 = u+v; \quad (5)$$

$$\delta(O_P) = O_{\delta(P)}. \quad (6)$$

Proposition 6. *If every finitely generated kernel of semifield U is the main kernel, all finitely generated ideals of its ring of differences are main.*

Proposition 7. *$\text{Con}U$ is lattice with pseudocomplements, for every nonreducible kernel P of semifield U set O_P is kernel in U . Furthermore,*

$$\cap \{O_P: P \in \text{Sp}(U)\} = \{1\}. \quad (7)$$

Proposition 8. *The minimum of nonreducible kernel P of semifield U is equivalent to equality $P = O_P$.*

Let's assume, that $\Gamma = \Gamma(\text{Sp}(U), \Pi)$ is the semifield of all sections of sheaf Π with point-wise determined operations of addition

and multiplication. We would remind you that the section of sheaf Π is every continuous representation $s: \text{Sp}(U) \rightarrow \Pi$, where $s(P) \in U/O_P$ for every $P \in \text{Sp}(U)$. Let's set the representation $\alpha: U \rightarrow \Gamma$ by the formula

$$\alpha(u)(P) = uO_P \in U/O_P \text{ for all } P \in \text{Sp}(U).$$

It's clear, that α will be the homomorphism of semifields, and because of (7) – the homomorphic embedding of semifield U in the semifield of sections Γ . The homomorphism α is required functional representation of this semifield U by the sections of sheaf Π .

There is isomorphic Lambek's sheaf representation \wedge of reduced ring of differences R under prime spectrum $\text{Spec}R$. The functional representation $\alpha': R \rightarrow \Gamma(\text{Sp}(R), \Pi')$ is built as for semifield U . Factor rings R/O_Q of ring R for arbitrary nonreducible ideal Q

in R are the layers of sheaf Π' . There is $\alpha'(r) = r^\wedge$ on $\text{Spec}R \subseteq \text{Sp}(R)$ for $r \in R$.

Proposition 9. *Representation α' is isomorphism.*

Proposition 10. *Factor ring $R/O_{\delta(P)}$ is the ring of differences of factor semifield U/O_P for every nonreducible kernel P of semifield U , semifield is reduced, bounded and $O_{P/O_P} = \{1\}$.*

Proposition 11. *Every reduced bounded semifield U is isomorphic to "dense" sub-semifield of semifield $\Gamma(\text{Spec}U, \Pi)$ of sections of the sheaf Π of fac-*

tor semifields U/O_P under nonreducible spectrum $\text{Spec} U$.

Theorem 11. *Commutative semifield is isomorphic to the semifield of all sections of the sheaf of chain bounded commutative semifields under zero-dimensional compact if and only if it is strongly Gelfand distributive, reduced and bounded.*

References:

1. Pierce R.S. Modules over commutative regular rings // Mem. Amer. Math. Soc. – 1967. – V. 70. – P. 1–112.
2. Lambek J. On representations of modules by sheaves of factor modules // Can. Math. Bull. – 1971. – V. 14. № 3. – P. 359–368.
3. Davey B.A. Sheaf spaces and sheaves of universal algebras // Math. Z – 1973. – V. 134. – № 4. – P. 375–390.
4. Polin S.V. Prime semifields and commutative semifields // Siberian Mathematical Journal [in Russian]. – 1974. – Vol. 15. – № 1. – P. 90–101.
5. Hutchins H. C., Weinert H. J. Homomorphisms and kernels of semifields // Periodica Mathematica Hungarica. – 1990. – V. 21 (2). – P. 113–152.
6. Vechtomov E.M. Fuctional representations of rings: monograph [in Russian]. – Moscow, MPSU, 1993. – 191 p.
7. Chermnych V.V. Semirings [in Russian]. – Kirov: VSPU, 1997. – 131 p.
8. Varankina V.I., Vechtomov E.M., Semenova I.A. Semirings of continuous nonnegative functions: divisibility, ideals, congruencies // Fundamental And Applied Mathematics [in Russian]. – 1998. – V. 4. – № 2. – P. 493–510
9. Golan J. S. Semirings and their applications. Kluwer Academic Publishers. – Dordrecht-Boston-London, 1999. – 381 p.
10. Cheraneva A.V. About congruencies on semifields // Chebyshevskii Sbornik [in Russian]. – 2005. – V. 6. – № 4 (16). – P. 164–171.
11. Vechtomov E.M., Cheraneva A.V. On the theory of semifields // Uspehy of Mathematical Sciences [in Russian]. – 2008. – V. 63. – № 2. – P. 161–162.
12. Vechtomov E.M., Cheraneva A.V. Nonreducible kernels of semifields // Mathematical Vestnik of pedagogical institutes and universities of Volgo-Vyatskii region [in Russian]. – 2008. – № 10. – P. 25–31.
13. Vechtomov E.M., Cheraneva A.V. Sheaves of semifields under zero-dimensional compact // Mathematical Vestnik of pedagogical institutes and universities of Volgo-Vyatskii region [in Russian]. – 2008. – № 10. – P. 32–44.
14. Vechtomov E.M., Cheraneva A.V. Analog of Pierce's sheaf representation for semifields // Modern mathematics and mathematical education, problems of history and philosophy of mathematics. International scientific conference [in Russian]. – Tambov: Tambov University, 2008. – P. 24–27.
15. Vechtomov E.M. Semifields and their sheaves representations // Modern scientific technologies. – 2008. – № 4. – P. 106–109.

Materials of Conferences

**THE GENESIS OF THE PROBLEM
CONSIDERING THE CONTROL OF FURTHER
VOCATIONAL TRAINING QUALITY UNDER
THE CONDITIONS OF MODERNIZATION IN
RUSSIAN EDUCATION**

Korytov V.A.

*Bashkirian across-the-board institute of in-service
training in the field of labour protection, industrial
safety, road accident prevention, fire proof, electrical
safe, energy saving
Ufa, Russia*

The acceleration of socio-economic, scientific and technical progress influences greatly in all sides of material and spiritual production; on the system of social relations; on a person him/herself. It is the dynamism of society development that caused the necessity and urgency of education reformation.

In former historical periods relatively slow evolution of social production stipulated the structural and content constancy of education. There formed the **'ultimate' educational type** presupposed that once obtained knowledge preserves its value during the whole professional activity of a person.

Under the conditions of scientific and technical revolution the renovation rate of technique and technologies as well as the forms of labour organization became superior to the role of generation replacement. There appeared unprecedented mobility and changeability of social production demanding constant change of content, character and direction of professional activity.

The efficient execution of duties became embarrassing of practically impossible for a number of working categories – from employers.

The **'ultimate' education aggravates the problems of functional (professional) ignorance** and technological unemployment. There appeared the deficiency of political, economical, legal, technical, socio-psychological and ecological knowledge – so the **human estrangement from labour, nature, society and other people** has intensified.

The established system of education intensifies social , contradictions as well. Professional incompetence, low legal conscience, inability to carry on political dialogue, social irresponsibility, economic and political illiteracy along with ignoring Russian and world cultural and historical experience impedes the choice for many members of the society.

The education's lagging behind new life realities caused **the devaluation of its social significance**. The gap between constantly increasing volume of necessary knowledge, skills, understanding and limited (in any **'ultimate'** educational system) conditions to get it permanently deepens. The traditional system of education has practically reached its limit.

The demand for permanent renovation of knowledge, for maintenance (at the required level) the readiness to execute sophisticated social and professional functions gave rise to different kinds of informal, in-service training, self-education and so on, which to a certain extent compensate the shortages of the established system of education.

Thus, there have formed objective preconditions for transition to continuous education realized in the system of further vocational training; in-service training, retraining and refreshment courses as well as other target-oriented ones. But the **orientation to the 'ultimate' education** and the established links of comprehensive and vocational training **remained** unchanged.

It is obvious that adult training is the top of the **'iceberg'** rooted to the secondary school and childhood.

The compensatory training unfortunately doesn't lead to the integrity of the educational system. Simple addition of new links to the existing ones without qualitative changes in content and form of their work can't make the education continuous neither can it solve the arising contradictions thus causing overloading of students.

It is necessary to re-interpret the **target functions of educational system**, the tasks of its separate stages and links; to revise traditional conceptions concerning social essence of education, correlation with other sorts and forms of social practice; to comprehend the place and role of education as a social institution in life of human being and society.

The dynamism of modern civilization, growth of the cultural layer the strengthening of a personal social role, raising humanization, democratization of society, rapid change of technique and technologies presuppose **to replace the formula 'education for life' to 'education through the whole life'**.

However, the outlining approaches to understanding the essence of continual education are rather contradicting. In some cases they are identified with infinite training considering that mechanical unification of all stages of education process will eliminate existing contradictions and deadlocks in education. In other cases, the simple addition of some new links to the existing system is assumed to be enough.

The qualitative improvement in public conscience, new political and pedagogical thinking are highly demanded being sine qua non of changes efficiency in the sphere of social educational practice.

The central idea of continual education concerns the development of human being as a personality, subject of activity and communication during all his/her life.

The education can be called **'continual'** if it is general in its completeness and is individualized in time, rate and direction, thus giving everyone the pos-

sibilities to follow one's own program to get education.

The **dim** of continual education naturally results in **personal development** both in the periods of the physical and socio-psychological maturity, prime and stability and in the period of organism ageing when the idea of removing functions and possibilities compensation acquired vital importance.

We should here unite the understanding the development as a continual process with the principle of developing education whose tutorial activity is oriented **not only to cognition but also to the transformation of the reality**. That causes the transition from information to productive education, from memory school to the school of thinking, feeling and social activity.

The deliberate social demand in constant personal development or every human being serves as a **system-forming factor** of a continual education. It defined the ordered sets of educational structure – principle and parallel, basic and additional, state and public, formal and informal.

Their correlation and interconditionality, the system of mutual seniority of levels, coordination on direction and purpose and provision **of co-assistance** relations turn the complex of those structure into the integral system.

Continual education as a pedagogic system is an integral aggregation of means, ways and forms of obtaining, deepening and broadening the comprehensive education, professional competence, culture, upbringing of civic and moral maturity, aesthetic attitude towards reality.

For every person the continual education is a process of forming and satisfying the cognitive demands and spiritual needs, of inclinations and abilities development in the system of state and public educational institutions and by self-study, which guarantees the reservation in his/her personal and professional integrity in a dynamically changing society ('Concept of continual education'(extract). Approved by USSR State Committee on Public Education March 18, 1989).

The role of education on the modern stage of Russian development of defined: 1) by the tasks of State transition: a) **to the democratic and legal state**; b) **to the market economy**; 2) by the necessity of **overcoming the danger of lagging behind the world trends**: a) in economy; b) in social development.

In the modern world the meaning of education as the most important factor contributing to the formation of new quality of economics and society is constantly increasing together with the **growth of the influence of human capital**. Russian system of education is apple to compete with developed countries educational systems. In this case broad public **support of educational policy**, restoration of **responsible and active role of state** in this sphere, deep and **thorough modernization of education** provided with all neces-

sary resources and mechanisms for the efficient usage – are highly needed.

The general tendencies of world development which stipulate the necessity of considerable changes in educational system are as follow: 1) the acceleration of social development rate, broadening possibilities of political and social choice caused the necessary increase of **civic readiness to make this choice**; 2) transition to post-industrial information society, substantial expansion of **intercultural cooperation** due to which the **factors of communicativeness and tolerance** obtain vital importance; 3) occurring and increasing of global problems that could by solved only as a result of collaboration on international level which in its turn required cultivation of **modern thinking among young generation**; 4) dynamic economics progress, competition growth, **reduction of unskilled and unqualified labour**, sufficient structural changes in an employment area, **demanding persistent training and retraining of employees as well as growth of their professional mobility**; 5) **increase of a human capital role** standing for 70-80 percent of national wealth (in developed countries) stipulated intensive, outstripping education progress both young people and adults.

The Russian system of education is an important factor that could help **reserve Russia in the row of leading countries**, increase the prestige of the country with high cultural, scientific and educational level.

School – in its broad sense – must become the most significant factor of the **humanization of socio-economic relations** and formation of **new personal life aims**. The developing society requires up-to-date educational, moral, enterprising people able **to take responsible decisions in critical situation** and predict the possible consequences, able to collaborate; are mobile, dynamic and constructive, feel responsibility for their country.

On the present stage of Russian development education becomes more and more powerful driving force for **economic** growth, increase of **efficiency and competitiveness** in national economy which is important for a: a) **national security**; b) **national wealth**; c) **well-being** of every person.

The potential of education has to be used in full measure: 1) to consolidate the society; 2) the reserve indivisible socio-cultural space of the country; 3) to overcome ethno-national tension and national conflicts paying attention to: a) the priority of human rights; b) equality of national cultures and confession; c) limitation of social inequality.

Multinational Russian school has to conserve and elaborate both Russian and mother tongue, form Russian self-consciousness and self-identity.

The renewed education should play the key role, in national self-preservation, in maintenance if the gene pool, in providing stable, dynamic progress of Russian society – society with high living stan-

dards, civil and legal, professional and everyday culture.

It is essential to provide **equal access** of young people to **appreciated qualitative educational** 1) according to person's: a) interests; b) inclinations; 2) irrespective of a) family income; b) place of residence; c) nationality; d) state of health.

It is necessary to use all the possibilities for social defence of parentless children and teenagers. It is also important to form the professional **elite**, single out and support **most talented and able** children and youth.

In case of prior state support the system of education must secure the **efficient utilization of the resources**: human; in formation; material; and financial.

National-political and socio-economic reforms of late 1980's influenced dramatically on Russian education having allowed to realize **economic self-sufficiency** of higher educational institutions; secure the **diversity** of educational institutions and the **variety** of curricula; elaborate **multinational** Russian school and **non-state** educational sector.

These processes were reflected in Russian Federation Law 'On Education' and Federal Law 'On higher and postgraduate professional education'. However, the **total socio-economic crisis** of 1990's slowed down the positive changes. The state almost left the educational sector which had merely to **survive** being disengaged from actual country demands. In present-day situation no more can stick to the position of **isolation and self-sufficiency**.

Outdated and overloaded curricula of school education do not provide graduates with fundamental knowledge: 1) as significant components of **advanced educational standards** in: a) Maths; b) informatics (including the ability to search and select information); c) Russian and foreign languages; 2) as **basic social and humanities** subjects: a) economics; b) history; c) law.

Vocational training, in its turn, is not yet able to solve the problem of 'human resources hunger' caused by **new demands on employer's professional skills**. At the same time a lot of graduated from vocational schools **can't get a job** and determine in modern economic life.

In transitional periods of its development a country must not solve its own critical social and economic problems by economizing on comprehensive and vocational schools, but must consider education as a future of a country where state and society, enterprises and organizations – all those interested in qualitative education – take part.

In this connection it is required to guarantee advanced growth of expenditures on: 1) education (training, upbringing, progress); 2) substantial rise of educator's salaries; 3) stimulation of quality and outcome of pedagogical efforts.

There must occur: 1) raising of the investing appeal of education allowing to invest assets of enterprises, organizations and citizens; 2) modernization of existing organizational-economic mechanisms permitting: a) to increase the volume of extra-budgetary means in education; b) to improve cardinally the use of this means by sending in directly the educational institutions.

Under the conditions if foreseen demographic decrease a number of students are supposed to reduce to one-third thus creating the situational reserve for in-system manoeuvre of resources seeking to rationalization of comprehensive institutions network; the support of innovative schools and other 'growth points' in education.

The principle aim of Russian educational policy is to secure the up-to-date quality of education preserving its fundamental nature and correspondence with urgent and prospective individual, social and state demands.

Social and state demands do not always coincide with the branch interests of the educational system itself, so the direction of educational **modernization and progress** can't be defined within the bounds of educational association and department. The social destination and balanced social interests are the basis of present-day educational policy.

All Russian citizens must become active subjects of educational policy. Strategic goals of modernization of education could be achieved only during the permanent interaction of educational system with the representatives of national economics, science, culture, health organization, all interested departments and public organizations together with parents and employers. The purpose of modernization of education is to **create a mechanism of stable progress** in educational system.

In order to achieve the above-mentioned purpose the following **top** inter-correlated **problems** should be solved: 1) provision with state guarantee if **accessibility, availability and equality** to get a qualitative education; 2) achievement of **novel advanced quality** of primary, secondary and vocational education; 3) creating the normative-legal and organizational and economic mechanisms for appealing and **utilizing extra-budgetary means** in the educational system; 4) **increase of social status and professionalism** of educators strengthening their state and public support; 5) development of education as an open state and public system on the basis of: a) **diversification of responsibilities between the subjects of educational policy** and b) growth of significance of all participants of educational process – students, teachers, parents, educational institutions.

Having created legal and economic conditions, the government of Russian Federation will have to: 1) secure **free** secondary comprehensive education within the limits of state educational standards; secure free education of other levels within the bounds de-

terminated by the legislation of Russian Federation; 2) **guarantee equal access** of all Russian citizens to education of different levels irrespective of place of residence in accord with the state educational standards which guarantee the requires **quality of education**.

The availability of qualitative education also means the state guarantee of: 1) teaching and material **resources, modern** laboratory equipment and literature; 2) conditions, **protecting human rights** of a student, his/her **psychological and physical safety**; 3) socio-pedagogical and psycho-pedagogical aid to families; **early diagnostics of a child's reserves** (both physical and psychological); 4) **free** state, municipal and academic **library funds available**.

The set of socio-economic measures securing education availability and accessibility on all levels, is as follow: 1) **differentiation of powers and responsibilities** between federal organs, federative subjects organs and local authorities; 2) transfer the salary payments and maintenance of teaching process in municipal comprehensive schools under the jurisdiction of subjects of Russian Federation giving them the status of state educational institutions; 3) input of **address and payments for low-income students** and creation other backing up mechanisms on the regional and municipal levels to help children needed in special social security giving them the possibility to attend the educational institution of advanced level; 4) creation of **state educational credit system**, subsidies for children from low-income families giving them a chance to get secondary of higher vocational training, providing different ways of repayment of credits and subsidies, the same measure – to train students on professions of vital necessity for economic and social state progress; 5) **normative legal regulation** of terms and conditions to appeal extra-budgetary means into the sphere of education; to secure the rights of users of payable educational services; 6) successive **increase** is academic and social **students grant** bringing it up to the minimum of subsistence; 7) simulation of setting up **the funds** of part-time **jobs** for students.

The work is submitted to the Scientific International Conference «Current problems of education, October, 15-22, 2008, Greece (Athens-Delphi-Meteor-Mycenae-Nafplio-Epidavr), came to the editorial office on 17.06.2008.

MODULAR-RATING TECHNIQUE AS MEANS OF EDUCATIONAL PROCESS IMPROVEMENT AT UNIVERSITY

Maslennikov A.S., Shebashev V.E.

Mari State Technical University

Yoshkar-Ola, Russia

At the Mari State Technical University the academic activity transfer to the modular-rating technology as a means of students' training quality improvement is being considered. For four years of the

experiment performance the teaching of all the disciplines has been transferred to this technology.

The rating system of students' knowledge evaluation respects the current valuation principle based on the four-point system, but significantly widens its opportunities, promotes a more accurate, objective estimation. Thereat, the evaluation of every separate student's knowledge is performed in public, on the objective criteria established on the basis of the obligatory knowledge minimum defined by the state educational standards.

The most important element of the students' knowledge evaluation rating system is the acknowledgement of the fact that all the disciplines are equal, equisignificant in terms of their influence on the formation of knowledge, abilities and skills. That is why at the development of standard provisions on the RHYTHM system all the disciplines irrespective of their volume in hours according to the curriculum, the availability of an examination or pre-exam were evaluated equally – on the 100-point scale.

The principle of the modular-rating system is the rating on the discipline. The appraisal on every discipline is defined as the sum of points gained by the students as a result of their work in the semester (current performance) and on the pre-exam and examination (interim attestation). While filling out the pre-exam and exam records the students' semester work result on the 100-point scale is put down in to a special graph.

The process of academic disciplines study based on the modular-rating technology is performed on the modular principle, when the academic disciplines' content is divided into logically complete parts (modules) finished with a control action (a quiz, calculation-graphic job, colloquium, test). Every module includes obligatory activity types – laboratorial and practical works, seminars, individual home works. Besides the obligatory activity types students can implement extraordinary works on their choice (participating in an academic competition, writing an abstract, reporting at a conference, solving advanced complexity problems beyond the obligatory level, performing complex laboratory research).

The modular-rating principal conditions are the same for all the academic disciplines and all the Departments of the University. The development of flow process sheets for every separate discipline, the choice of methods, review procedures used, current and interim attestation procedure, admittance conditions, rating scale on separate modules, units and tasks is the creative prerogative of the Department Faculty.

While working on the modular-rating system there is a possibility to evaluate students' knowledge without examinations or a special pre-exam. A feature of the modular-rating technology realization at the University is that this condition works in the case of a successful passing through the final control test. The students carried out the semester program to the full

extent are admitted to the final control test. The control test is of generalizing character and must show how well the student has digested the facts on the program of the whole semester. The control test assignments comprise the whole material studied during the semester. On the complexity the assignments are focused on the level of requirements formed in the National Educational Standards on the given discipline.

The technology of Internet-Testing of students is a quite promising direction of the education quality system development and is logically fit in the realized organization scheme of the academic activity. The Internet-examination results on many academic disciplines are used as the final control test, and also are taken into consideration as extra points when summarizing the students' work.

Our University is one of the few Russian higher educational institutions having taken part in all seven sessions of the Internet-examination, both number of the students taking part in the Internet-examination and that of the subjects for testing being growing from time to time. During the FEPE-6 more than 7000 students of the University passed the Internet-examination on 18 academic disciplines.

With due consideration of our regular participation in the Internet-examination procedures the results showed by our students in the Internet-examination were recognized as official ones at the integrated checkout of the University in February, 2008.

The modular-rating system allows getting information about the rating of any student in all the disciplines both for the semester and the whole time of study. The general rating can be considered as a quantitative criterion, which can influence the scholarship award, the opportunity to continue the education at the magistracy and postgraduate school.

The information system created at the University makes the continuous monitoring of the students' current performance possible. The leadership of the University and its Departments can get the information about every student's work results in all the academic disciplines at any moment, that allows taking correct managerial decisions. The organization of the academic process on the modular-rating technology has allowed:

a) the students - to organize a regular smooth work on the material assimilation; to evaluate the state of their work on the study of a concrete academic discipline every day of the semester; to adjust the current individual work during the semester; to know objective indexes of their knowledge in individual modules of a discipline and forecast the final appraisal in the discipline;

b) the teachers - to plan the academic activity in the discipline rationally; to know the course of the material assimilation by the students and training teams; to adjust the academic process organization on the current control results timely; to define the final

appraisal accurately and objectively with due account for the current performance and the examination;

c) the Deaneries and Departments - to search for possibilities to perfect methods and means of training and control; to analyze the teachers' work; to improve the control over the academic process course; to evaluate the work of every student and training team on the current control results and adjust the academic process organization swiftly, and also to work out disciplinary measures;

d) the University administration - to get operative information about the current and final performance of the students and take correct managerial decisions.

The transfer of the University to the new educational technology has allowed achieving the following fundamental results:

1) normative documents on the modular-rating system introduction have been developed;

2) general methods of modular training technology building at the large-scale system implementation have been worked out;

3) the program module of research and information system management has been elaborated, a new information medium has been created to provide the academic process and control its results on the basis of information-communication technologies;

4) The system of students' computer testing has been implemented;

5) The approaches to the students' academic activity evaluation have been defined.

The work was submitted to the International Scientific Conference «The problems of quality education», August, 16-23, 2008, Antalya (Turkey), came to the editorial office on 20.06.2008.

OVEROBJECTIVE INVESTIGATION: FORGOTTEN FORM OR REGENERATING PROJECTS?

Mushich-Gromyko A.V.
Novosibirsk, Russia

"The situation is in the ability to hear; and the more unexpected and newer the said is, the more attention should be paid to it."

Jose Ortega-and-Gasset

The "investigation" idea itself in its substantial explanation can be considered within the amplitude, where the polar tension is the ideas of an investigation as an active (creative) observation over life and, accordingly, as a specialized kind of scientific work.

From the specified wide range of social associations of the "investigation" notion we are interested in the metaphoric vertical, which can be represented in the form of an overobjective research, i.e. the vertical of cooperation in its traditional, having excellently recommended itself interaction - "teacher and student". As the foundation of the consideration of such

interaction let us take the statement that in this context the question is about creative personalities performing overobjective investigations of various kinds.

Giving a philosophical horizon to the idea of “creative personality”, let us rely in our assertions on the inference of M. Heidegger that entering of a personality into the world of life senses and progressive activity will reach its performance only on the ways of self-understanding, self-awareness, self-esteem, empathy and inclusion of joint creative work resulting in the creation of authentic and harmonic relations within the system “Human – World”; “Human – Another Human”; “Human – Human-Himself” [1, p. 445].

As it is seen, the notion “creative personality” enriched with a comprehensive existential inference of the great German philosopher (into which the pedagogical views of Heidegger are interwoven so naturally) sets a necessary dynamics of consideration of our work’s key terms brought into the title.

After a necessary potential introduction let us dwell on the desired notion “overobjective investigation” more detailed. First of all, proceeding from the abovementioned interaction within this project, let us point at those social-pedagogical connotations that discover the content of this project. They can be: informal relationships (for example, the teacher’s and students’ friendship and effective cooperation stories well described in historical, scientific and didactic literature); out-of-school education in whole as an educational project of social organizations and private persons as it was common in Russia. The first experts of this form of activity were, as it is known, Tolstoy L.N., Ushinsky K.D., Ventsel K.N., Kaptrev P.F., Lesgaft P.F., Bekhterev V.M., Pirogov N.I., Kareyev N.I., Yanovsky K.P. and others.

Having concentrated our attention in favour of the second statement, let us concretize it in a modern aspect. The idea of “out-of-school education” itself, having become the leading one in the system of Vakhtyrov at the very end of XIX century, has evolved today up to the idea of “extended education” within the children’s and adults’ (acmeological) one.

It is quite natural to suppose that an overobjective research has a whole range of special features in this very field of social relationships within the system “teacher-student”, and we would like to dwell on them.

But first (with some excusable delay), let us define the notion itself. Let’s start with the fact that the review of special literature didn’t give us any clear definition. Moreover, among the variety of basic definitions of the notion “research” there was no disclosure of the given idea.

Proceeding from the available information base, let us dwell on the definition found out by us in the article of Lukonina Ye.P. “Investigative activity of secondary and high school learners applicable to arts and humanities”. Going into artistic-aesthetic aspects of the notions of objective and intersubject research in

her work, the author gives a short, but capacious definition of the notion interesting for us here. Because of the specific importance and non-competitive conditions for the citations, we shall give it in full: “The *overobjective research* (marked by L.Ye.P.) supposes the teacher’s and the student’s joint activity directed at the investigation of concrete personally meaningful problems for the learner. The results of such an investigation performance are outside the framework of the academic program. The overobjective investigation appears to be the means of integration of formal education, extended education, self-education, social activity of learners and occupational self-determination” [2, p. 467].

As it is seen, the definition is functional and informative at the same time. Considering it from the theoretic-methodological strategy positions, let us confer the status of innovative activity growing far out of the educational work standards upon it. It is the status of the innovation consolidated with an old classical tradition of the “teacher – student” relationship, enriched by the modern search for innovative approaches within the system of education understood now as continuous one, that allows us to emphasize the most important features and purposes in the overobjective research:

- an opportunity to participate in projecting own life plans, scenarios and strategies (on the part of the student);
- organization of legitimist conditions for presentation of scientific and creative activity of the student;
- mutual orientation in social, economical and informational conditions of the first two statements’ development.

It seems that a project pretending to the “mighty program” definition can come true at the harmonic, regardful and really interested approach to the realization of these statements. The tutorage of M. Buber, P. Burdieu, M. Heidegger, E. Giddens, B. Malinovsky and a whole range of other social scientists and philosophers having brought-up a galaxy of talented followers, and whose pedagogical (subject) lectures allowing the following generations already to get involved into their “overobjective field” had become the sample of concrete and intersubject research long ago, can serve samples of such mighty projects. The main, in our opinion, thing ought to be remarked here – the team-work on the investigation of personally meaningful problems for the learner is not the solution of his (and instead of him) various subjectivations, but, first of all, the fosterage of evident and consistent interest in some or other area of knowledge. It is the figure of the Tutor (who finds himself in such a reality situation is happy), who allows the student to see the integral picture of his own ideas breaking away: from the intention and theoretical methods of perception to recommendations and proposals on practical applications of his ideas.

In the conclusion of our work disclaiming for precise formulations and verified utterances and demonstrating most definitely states of mind, and that is why, as we think, being familiarly reflexive it is worth saying that the following three fundamental principles, which are difficult to argue with, can serve the final of such Tutor's overobjective activity (forgot or regenerating?):

- the principle of investigative activity subject formation, in other words – the formation of an investigative position;

- the principle of comparison (with other subjects and investigative positions), i.e. the development of the ability to grow out of the private view, understanding the sense and significance of the joint research work;

- the principle of defence (of one's investigative position), i.e. the development of the ability to take one's strong stand, to formulate the findings worthily, to tune on victories and defeats, knowing how much they mean in the research biography of both Tutor-innovator and his grateful followers.

References:

1. Heidegger M. Time and Objective Reality. – M., 1993.
2. Lukonina Ye.P. Investigative activity of secondary and high school learners applicable to arts and humanities // Investigative activity of learners. Scientific and methodical collection in two volumes / under general reduction of A.S. Obukhov. V 2: Organizational practice. – M.: All-Russia social movement of creative pedagogues "Investigator", 2007 – p. 495 – pp. 466-470.
3. Jose Ortega-and-Gasset, Selected Works, Speculations on Techniques / Translation from German. Preface author and general redaction of Rutkevich A.M. 2 Edition – M.: Mir, 2000 – p.704 - p. 208.

The work is submitted to the Scientific International Conference «Innovative Technology in Higher and Vocational Education», August, 2-9, 2008, Spain (Costa del Azaar), came to the editorial office on 28.06.2008.

TAKING EXAMINATIONS ON PALAEONTOLOGY AND SEDIMENTOLOGY ON THE «SEA BOTTOM» IN THE CORRIDORS OF PERM UNIVERSITY BUILDING

Ozhgibesov V.P., Kolchanova N.G., Kalinina T.A.

Perm State University

Perm, Russia

The new building of Perm University was built a few years ago. The marble plates of the walls and the marble steps of the stairs can tell us a lot of interesting things. What we can see in these plates is not only a chaotic pattern of marble. We can clearly see the skeleton remains of sea invertebrate animals.

In the distant geological past (about 350 – 300 mln years ago), namely in the Carboniferous period of Paleozoic era the sea with this fauna covered a greater part of the Eastern European Platform from Smolensk and Moscow to the Eastern Urals. Numerous samples of the Paleozoic fauna with similar regular structure and of similar geologic age extracted from boreholes and natural outcrops is a convincing proof of the carboniferous sea extensive spreading.

The ancient carboniferous sea used to splash on the big territory of Perm Region. This carboniferous sea occupied a much larger territory which may be proved by the investigations of one of the authors (V.P. Ozhgibesov) and Professor of Eastern Washington University Dr. Ernest H. Gilmour. We arrived at the conclusion that the thickets of the sea lilies on the bottom of carboniferous sea in North America is similar to those of the Urals.

While taking exams on Palaeontology and Sedimentology the 2-nd year students of Geological faculty are given tasks to determine the systematic belonging of the fossils and their paleogeography. They do it studying the fragments of colonial and individual corals (Coelenterata, Tetracoralla) and the fragments of bryozoans (Bryozoa, Fenestellida) with magnifying glass at the marble plates on the floor and walls of the geological faculty building.

In the thickets of Crinoidea one may see corals, brachiopods, bryozoans. We can often find the samples of Crinoidea, Bryozoa and other remains in the Permian Sylva reefs and in the carboniferous limestones near Gubakha. Students can investigate these paleontological remains in the natural outcrops in the Perm Region too.

Acknowledgements

The authors are grateful to Dr. Ernest H. Gilmour (Eastern Washington University) for the support to have organized the visit of Dr. Vladimir P. Ozhgibesov to the USA and provided an interesting geological programme and Geological Faculty of Perm State University for the support of our participation in the project of the Russian and European Academies of Natural History.

The work is submitted to the Scientific International Conference «Innovative Technology in Higher and Vocational Education», August, 2-9, 2008, Spain (Costa del Azaar), came to the editorial office on 30.06.2008.

SOME ELEMENTS OF INNOVATION TEACHING PROCESS IN THE UNIVERSITY OF READING BEING IMPLEMENTED IN PERM UNIVERSITY

Ozhgibesov V.P., Kalinina T.A.
Perm State University
Perm, Russia

The team of Perm University teachers visited the University of Reading (UK) for the purpose of studying on a short course in Computer Based Technologies. The experience of English colleagues in using author's sites and e-mail helped us to stimulate using Internet-technologies in organizing student scientific work and distant teaching / learning process.

In the University of Reading each student and teacher have a free access to computers to communicate via e-mail while at Perm University not all students are ready to use e-mail to communicate with the teacher.

To get the process going each student who needed it was given an individual electronic address. Besides, everyone was given a pattern of electronic letter registration since because of the differences in post programme adjustment and servers the texts written in Cyrillic alphabet can be presented by unreadable symbols. To avoid it, the text is duplicated by the attached RTF file.

Example of electronic letter registration:

TO: Kalinina@psu.ru
FOR: Tatyana A. Kalinina
FROM: Perm State University
FROM: Dr. Vladimir P. Ozhgibesov
FROM: regional@psu.ru
SUBJECT: For conference
ATTACHMENT: (In sum – 5).
DATE: 26-06-2008 (Local time:12-21)

The offered electronic registration pattern helps to avoid the loss of information on the intensification of teaching process with the usage of Computer Based Technologies.

Acknowledgements

The authors are grateful to Dr. Trevor C. Davies (University of Reading) for providing consultations and Geological Faculty of Perm State University for the support of our participation in the project of the Russian and European Academies of Natural History.

The work is submitted to the Scientific International Conference «Innovative Technology in Higher and Vocational Education», August, 2-9, 2008, Spain (Costa del Azaar), came to the editorial office on 30.06.2008.

CASE STUDY IN PRACTICE OF TEACHING OF POLITICAL MANAGEMENT

Sashchenko N.P.

*The Russian academy of public service
at the President of the Russian Federation
Moscow, Russia*

It is known, that the logic of educational process assumes presence of three interconnected its the basic making - training, education and development. Not going deep into pedagogical "cunnings" of educational process, we shall note importance of the psychological nature of process of fastening of knowledge. The knowledge can be acquired by the person only when it is realized, пережито and is finished with a level of skills. Process of comprehension, experience and repeated recurrence of available knowledge is realized in active forms of employment. These forms are various and differ from each other not only methodical and didactic security, but also object of influence, to be exact, side of structure of the person on which influence of the teacher is directed.

The methods practically focused, fixing behavioral skills, skills, by virtue of the specificity are innovative. Games concern to them, business, role games, dialogues of personnel's, creative works, role training, case study, etc.

Case study is a method of the analysis of concrete situations. The purpose case study is fastening knowledge by means of working off of skills of practical use of conceptual circuits, and also skills of the group analysis of problems and decision-making.

The purpose of an audience is development on the basis of the analysis of a concrete situation and offered analytical materials of the optimal the political decision, and also offers on its support with application of methods of political technologies. With this purpose specially picked up actual material on one concrete event is given students.

Preliminary remarks, which should be meant at case studying.

Studying materials case, the student can meet difficulties of perception and the analysis of the big material on volume. It is not necessary to be afraid of huge quantity of an actual material. The teacher suggests, as a rule, the greatest possible volume of the information with purpose to help to make own representation about the political project.

The task of the student, the student to be adjusted for work with the information in design, instead of in the current mode of the reporter. The student is not obliged to remember all facts and figures. He should learn after great volume of the information, which is offered by authors (and the life shows this information in the even greater volume, in the "crude" kind) to see the tendency to catch a direction to feel nuances and to plan the basic algorithm of actions. It, as to the rational side.

Besides it is important for student or student to be able to present itself the artist who is going to write a cloth; to be able to look at a material from height of the bird's flight. Especially it is important for the PR-expert, which work - creative. One of the basic features of the political scientist, and in particular *the PR-expert* will be what to work to him falls a mental level - with installations, stereotypes, social representations of the population. The purpose and a professional duty of the expert on *Public Relations* is not limited only to creation something such, that will strongly be printed in public consciousness. He should not only think up and create, but also realize all consequences of the creativity.

Technology case study

Employment is carried out depending on type chosen the teacher case. Types case study are subdivided:

By result of carrying out of the analysis on analytical (allocation of problems, construction of a field of problems) and design (development of projects and scheduling);

As a source of the information - on empirical (experience of the teacher, practical activities of students, the description real cases in the literature) and theoretical (construction of model of a situation on the basis of theoretical positions);

On the subject of representation of the information - on student's (individual experience, group designing) and teaching (if there is an experience of practical or consulting activity).

The teacher shows to students the concrete situation demanding a collective estimation and collective decision-making. The end result of work of group also is subject mark with the help of a reflection.

The technology case study is good check of the theory, synthesis of the theory with practice. Therefore case study theoretical preparation on problems which are present at it should precede discussion.

One day prior to employment (as a rule, in the evening) case study it is distributed to students who get acquainted with it individually. Then for other day educational group (at 15-20 the person) break into 3-4 subgroups (on 4-5 person in everyone). Within 1,5-2 hours per subgroups in different audiences it is discussed case study and collectively solve its tasks. After that the group gathers again with its full complement and discussion begins. From each subgroup students act and give reason for a position. Each subgroup discusses the point of view not only the, but also the colleagues. The teacher coordinates a course of discussion, directing it, necessarily, on the decision of the put educational purpose. At the end of discussion the teacher assesses each subgroup and each student.

So, as it is seen, it is possible to allocate two major stages of the analysis case is: a) individual

preparation; 6) discussion in a subgroup and discussion in group.

Recommendations and advice to students

a) Individual preparation

1) In the evening before employment to read methodical material first time fluently to receive the general representation about sequence of events and about a stated problem.

2) To re-read methodical material it is so much times, how many it is necessary to isolate a problem, to define the responsibility, sights, positions and mutual relations of the characters working in methodical material; to understand economic and political conditions in which the plot methodical material is developed. It is useful to do thus notes which then will help at discussion case with an audience.

3) To fix in writing those questions which can be lifted during discussion case in an audience.

4) To reveal attitudes{relations} between the events described in case, and behaviour of characters case, with concepts and the theories stated in lectures and textbooks. Cases enable to check up and better to understand applicability and limitation of concepts and theories by the appendix of abstract ideas to real situations.

5) To formulate alternative ways of the decision of the problems described in case; to name possible priorities of these alternatives, switching and possible barrier on a way of their successful realization; to specify the most comprehensible way of the decision of the problem described in case.

6) Discussion in a subgroup and discussion in group

Cases should be discussed in an atmosphere which allows to exchange ideas and sights freely and frankly. The teacher directly is responsible for a course and an atmosphere of discussion. The problem to object or criticize opinions discussing is assigned to students. However, the teacher can interfere with discussion with the purpose to clear that - or, to encourage timid members of group to participation in discussion, to stop monopoly the right on statements.

Students in turn, should be active participants of discussion, instead of simply passively be present on discussion. One of the main advantages case study will be, that in discussion the various points of view and participants positions collide try to assert.

Participation in discussion in an informal friendly atmosphere - good training for those who behind thresholds of a class room will deal with complex peripetias of a real life. Well prepared students actively participating in discussion, receive an opportunity not only to raise the skill to communicate and develop analytical abilities, but also to raise the creative potential and to develop the intuition, so necessary politics, to the head, the manager.

3) Students should not concentrate only on searches of one variant of the decision of a problem. As a rule, it does not happen it is unique the true deci-

sion or the simple answer on put in case questions. It is not necessary to limit also discussion concerning case only to criticism of its characters. Students should find out, that was correct, and that is not present and why; after that it is important to offer the decision on the basis of knowledge and the got experience.

So, Case study as the method of the analysis of concrete situations, is not game, but includes game elements: breakdown at commands, reviewing, competition on effective decision-making. This method has the specificity: at collective development of the decision there are no the roles modelling activity of separate persons.

Participation in discussion in an informal friendly atmosphere - good training for those who behind thresholds of a class room will deal with complex peripetias of a real political life.

Following the innovative purpose of education, it is important *for teacher* to give not so much concrete knowledge, how many, having armed with them to help the student to learn better itself, the opportunities to adapt for a dynamical reality and to realize the creative potential.

To the student as active part, the subject of educational process, important, operating the received information, to apply the knowledge in a concrete educational, game situation and to fulfil professional skills. Thus the student possesses a unique opportunity - at each grade level he checks own forces, abilities, opportunities.

The work is submitted to the Scientific International Conference «The new educational technology and the organization of training», Italy (Rimini - Rome - San Marino), March 29 - April 5, 2008, came to the editorial office on 28.05.2008.

ORGANIZATION PRINCIPLES OF STUDENTS' SOCIAL AND ENVIRONMENTAL EDUCATION PROCESS

Shilova V.S.

*Belgorod State University
Belgorod, Russia*

Our research in the area of students' social and environmental education required establishing and formulating the principles of its functioning. By the present time two main groups have been segregated: the principles of the investigated process organization and those of its management. The analysis of the philosophic science achievements allowed establishing general (fundamental) principles as parent ones: unity, consistency, development, historicism, account of geographical factor, humanism. They, and also the specific principles of general education (Krayevsky V.V., Skatkin M.N.), general ecological (Zverev I.D., Suravegina I.T.) and social-and-ecological education of school children, formulated by us, instructions of

Mamedov N.M. and the principles of occupational activities (Shadrikov V.D.) allowed establishing some principles of students' social and ecological education organization (SSEE). The following principles are referred to them: interrelation of vocational and socio-ecological training; integration and disintegration; achievement of social and ecological harmony in the future professional activity; consideration of socio-ecological relations in the context of stable development strategy; self-regulation.

Let us discover those of them, which are advisable to be observed by the teacher in the interaction with students in terms of the formation of their attitude to the natural environment in the process of acquirement of a certain speciality. So, the **principle of occupational and social-ecological training interrelation** supposes the necessity such a pedagogical process organization, whereat the becoming of the occupational readiness of the student's personality is associated with the formation of his socio-ecological readiness as well. It means that every readiness element – the one of integrative personality quality – in particular, conative, orientational, operational, volitional and evaluative – should be filled with a special vocational and social and ecological content. The last involves the vocational and social-and-ecological knowledge, the skills conforming to it, the experience of creativity in the vocational activity realized in the relationships with the natural environment; the emotional-and-axiological attitude to it.

The filling of the elements of the considered readiness with a complex content is conditioned by the fact that the occupational-professional activity is a link in the system "society-nature", that it is the process of labour where the natural conditions and resources are used, and it is the result of labour activity that cause irreparable damage to the natural environment. On the other hand, a significant moment of the labour activity is its positive orientation consisting in not only the use of natural riches for the society's good, but in their protection, restoration and renewal. In connection with this, in the process of students' training not only their vocational readiness for labour, but also stable establishments, motives, the specialist's traits defining their normative behavior in the natural environment are taken into account.

Another necessary principle of the social-and-ecological educational activity appears the **requirement of integration and disintegration**. Let us remind that integration (from Latin Integer – full, whole, unbroken) represents a process (or activity) having integrity; unification; combination; restoration of the unity, as its result. By the present time several types of integration are distinguished, in the social sphere, in particular: power integration, political integration, social integration, economical integration, language integration. The integration principle is one of the main principles in the investigation of socio-natural processes and phenomena, their reflection in various forms

of social consciousness, for example, education content. So, in their time, Zverev I.D. and Suravegina I.T. formulated the principles of the general ecological education of school-children, the interdisciplinary approach in the formation of the ecological culture of school-children being fairly named among them. Its essence consists in the fact that ecological education is considered as an ideal, integrated idea (tendency), which allows overcoming the fragmentation of the knowledge being formed, the disconnection of school disciplines, their dissociation. The ecological education appears not as a competitive subject, but as a means providing the unity of the school-children's education and upbringing.

As for the disintegration, it is revealed as dispersion, division, partition, divarication, error, separation of the whole into parts. In the context of disintegration the social-and ecological education represents a self-dependent education (elementary, secondary, higher and after-graduate) system element developing in the compliance with its rules, according to its principles, achieves its goals and tasks. Within the framework of the vocational-ecological training the integration/disintegration principle supposes, on the one hand, the unification of all the specialist's training components about the idea of the country's stable development, the basis of which make new ecological knowledge explaining not only the unknown reality sides, but also appeal to implement the prescribing functions concerning human activity, to labour, first of all (Mamedov N.M.). On the other hand, this principle supposes the students' socio-ecological education process consideration as a special trend of their professional training, an element of general culture, the fundament of practical activity in the natural environment. The realization of the principle supposes also the definition of functions of every discipline in the whole system of the socio-ecological education, segregation of interdisciplinary relations; the agreement of methods, means and forms of the pedagogical process organization, the definition of new ways of higher education ecologization. Together with that the students' socio-ecological education requires its own special studying conditioned by the demands of the society for specialists able to establish harmonic relations between the environment in the labour activity and life, promote a stable development of the society.

The following SSEE organization principle conditioned by the general science development principle - is the **principle of achievement of social and ecological harmony in the future professional activity**. Harmony in the translation from Greek means the concordance, proportion in combination of something. In the relationships of nature and society, in the opinion of Khatskevich D.Kh., harmony appears as one of the forms of these relationships, is objectivized as a result of people's purposeful activity and has an immediate practical value for various crisis social-and-ecological situations' solution. The author fairly states

that against the concepts confirming the global catastrophe inevitability as a result of socio-natural interactions, the theory of harmony allows modeling such geo-, eco-, and socio-systems' connections and relations, which would promote the solution of ecological situations in the progressive direction. However, it is necessary to get specially prepared to the harmony principle realization within the system of "society-nature", and not only within the system of general educational development, but also within the system of vocational education.

At the graduate education stage this principle supposes the consistency of the purposes and content of vocational and social-and-ecological training, the use of methods, means and forms of these directions on general basis, the attachment of harmony to the pedagogical process implementing goals and tasks of students' special and socio-ecological readiness formation. Within the frame of the present principle the harmony of basic components of the integral pedagogical process is also advisable: teaching and upbringing, involving of student youth into active cognitive and practical activity on the development of their vocational and socio-ecological experience, the adoption of rules and guidelines of the interaction with nature in the process of work on the chosen speciality; the demonstration of their own initiative and creativity in establishing harmonic relations with nature.

One more necessary requirement in the organization of the students' socio-ecological education process is the **principle of social-and-ecological relations consideration in the context of stable development strategy**. Let us remind that the strategy of stable development was offered in 1992 in Rio de Janeiro at the conference of the United Nations on the environment and development, where the conclusions about the necessity of the mankind to transfer to the way of stable (sustained) development were made. In a general sense this strategy is aimed at the achieving of harmony in the relations of the human, society and nature. On the reasonable opinion of Mamedov N.M. the stable development of the society is understood as a long and sustainable development of the "society-nature" system, which is supported by the society in the aid of not only present, but also future generations. The future generations' development should not be broken today, that requires from the contemporaries a new and reasonable consumption culture, a wider preservation and support of system qualities of biosphere, its ability to reproduce its resources. This concept connects the ideas of evolution, historicism with prognostics, aggregating to the care of the future. From these very positions the offered principle obliges to study, restore and reproduce the natural conditions and resources included into the context of vocational activity, reveal and use its potential for the harmonization of socio-natural relationships. Acquiring the chosen speciality, students make sure about the objective unity of nature, society and culture, historical charac-

ter of their relations; about the unity of theoretical and practical levels of cognition and activity. On the other hand, this principle supposes the consciousness of such phenomena of the reality as: disharmony, socio-ecological contrasts, crises, catastrophes conditioned by the irrational human activity; the consciousness of measure, when using natural resources in the labour process; the necessity of personal participation in the sustained (stable) development of the society at the global, regional and local levels – by the society, by every human being. Moreover, the considered principle requires a special activity within the vocational one – a prognostic activity, the essence of which consists in the ability to foresee, predict the results of not only its own professional activity, but also the state of the environment involved into the production process, its participation in the development of concrete socio-natural interrelations conditioned by the chosen speciality.

Not less meaningful in the organization of students' socio-ecological education process is also the principle of **self-regulation**. Self-regulation (from Latin – *regulare* – to put in order, adjust) supposes a reasonable functioning of living systems of various organization and complexity levels. This principle, within the framework of preparation of students for socio-ecological relations, requires from every subject the development of skills to take the harmonic interaction with natural objects in the course of labour activity as a goal; the development of the program of ecologically rational activities, the model of attendant conditions (basic and secondary); the definition of efficiency criteria system of vocational and socio-ecological activity; the ways of getting information about its results; the evaluation of findings with a concrete production purpose and harmony in concrete socio-ecological interactions as an ideal purpose of these interactions; the ability to make decisions concerning the necessity and correction character of professional and socio-ecological activities. The importance of self-regulation in the interaction with natural medium, including also the labour activity consists in the fact that it supposes, first of all, an active position

of the subject himself, when solving any problems conditioned by the connections of processes and phenomena of the real world, is realized individually, gives diversity to the external socio-natural processes, influences their results. Because of the fact that self-regulation is formed within a pedagogical process directed at the acquirement of a certain profession by students, the formulated principle requires also the teacher's activity in the interaction with the students; the experience of ecologically reasonable activity aimed at the use of the chosen speciality potential in solving problems of protection and restoration of natural conditions and resources, further sustained development of the society and nature.

To conclude, let us emphasize once more that the specified principles are taken into account in the process of students' socio-ecological education *organization*. It is also necessary to take into account the other group of principles – the ones of *management* of the considered process.

References:

1. Secondary school didactics / under the reduction of Skatkin M.N. Monograph. – M., 1982.
2. Zverev I.D., Suravegina I.T. Ecological education of school children. Monograph. – M., 1983.
3. Krayevsky V.V., Brezhnova Ye.V. Methodology of pedagogy. New stage. – M., 2006.
4. Mamedov N.M. Culture, ecology, education. – M., 1996.
5. Philosophy of ecological education / under the reduction of Liseyev I.K. – M., 2001.
6. Khatskevich D.Kh. Nature as esthetic value – M., 1995.
7. Shadrikov V.D. Activity psychology and human abilities – M., 1996.
8. Shilova V.S. Socio-ecological education of school children. Monograph. – M. – Belgorod, 1999.

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 08.07.2008.

Short reports

**THE SEQUENCE OF TRAINING TO THE
BASIC SECTIONS OF BASE TECHNICAL-
TACTICAL PREPARATION ON SPORTS
HAND-TO-HAND FIGHT**

Glazistov A.V.

*Kama state academy of physical culture,
sports and tourism*

Naberezhnye Chelny, Russia

Up to J.A. Shulika (2004), all techniques of hand-to-hand fight in the special literature and self-defenses are known for a long time and nowadays the most effective system of preparation is only to be set.

Up to I.A. Bushin's (2005) opinion, the program of long-term preparation in hand-to-hand fight (1997) and methodical manuals (1998; 2003) do not provide high-grade technical-tactical preparation of fighters fully.

Therefore we developed the method of the base technical-tactical preparation in sports and offered original sequence of studying the material.

E.M. Chumakov, S.F. Ionov (1978) is marked the two main basic ways of sequence of studying of technics of wrestling:

- Linear studying - engaged all technics from the first group and then all technics from the second group, etc.

- Concentric (circular) studying, i.e. consecutive studying of technics from various groups of technical actions while studying the basic technics from all groups, coming back to initial group and studying in the same sequence but another technics of these groups.

We define following basic sections of base technical-tactical preparation on sports technics of movement, technics of impacts by hands and legs, technics of protection against impacts, technics of laying wrestling, technics of standing wrestling and technical fighting.

The presented sections of base technical-tactical preparation are allocated in a week microcycle consistently to study it they based the education on a principle of concentric (circular) training.

The stage of initial preparation has three times a week employment. Each educational employment includes two sections of the base technical-tactical preparation.

The first lesson the technics of movement, technics of impacts of hands and legs are studied of the week microcycle.

The second - technics of laying wrestling, technics of standing wrestling.

The third - technics of protection against impacts and technical fighting.

Next week microcycle sections repeat. Studying the new material is under construction on the basis of earlier studied in each section.

Thus, this scheme of construction of educational process allows to learn shock technics, technics of wrestling, tactics of learnt material in parallel and to master harmoniously.

In a basis of the technique developed by us the principle of training to base movements lays. The program material is given in parallel in all sections of technical-tactical preparation and becomes complicated at each subsequent level by a principle of concentric training.

The technique of base technical-tactical preparation of young at the age of 10-12 years lets us to increase the quality of studying the technics and efficiency of competitive activity of young fighters.

References:

1. Bushin I.A. The formation of technics of receptions of wrestling at fighters of «sports hand-to-hand fight» at a stage of initial preparation. - Krasnodar, 2005. - 186 p.
2. Ivanov S.A., Kasyanov T.R. The basic of hand-to-hand fight.-M.: a Terra. Sports, 1998. - 368 p.
3. Ivanov-Katanskij S.A., Kasyanov T.R. hand-to-hand fight: the Theory and practice. - Moscow, 2003. - 560 p.
4. Hand-to-hand fight: the Program of preparation of sportsmen of hand-to-hand fight and traditional karate / T.R.Kasjanov, S.T.Kasjanova, 1997. - 62 p.
5. Chumakov E.M., Ionov S.F. About ordering concepts and sequence of studying of technics of sambo-wrestling // Wrestling. - Moscow: Physical culture and sports, 1978. - p. 14-18.
6. Shulika J.A. The fighting of sambo-wrestling and applied single combats. - Rostov-n/Donu: the Phoenix, 2004. - 224 p.

**TECHNIQUE OF TECHNICAL-TACTICAL
PREPARATION IN SPORTS HAND-TO-HAND
FIGHT AT THE STAGE OF ELEMENTARY
EDUCATION**

Glazistov A.V.

*Kama state academy of physical training,
sports and tourism,*

Naberezhnye Chelny, Russia

Sports hand-to-hand fight - the complex combat including a technical arsenal, both various shock single combats, and wrestling (A.M. Gorbylev, 2003).

Competitive activity is total of efficiency of training process (V.N. Platonov, 2005).

It is developed, the monotony and small variability of technical-tactical actions take place in sports hand-to-hand fight at the initial stage of competitive activity of young men at the age of 12-14. It means that there are lacks of base technical-tactical preparation of young sportsmen at the age of 10-12 years in

earlier stage of initial preparation (A.V. Glazistov, A.S. Kuznetsov, 2007).

According to questioning experts on sports hand-to-hand fight nowadays there is no common technique of the base technical-tactical preparation due to the requirements of competitive activity.

These facts demand formation at a stage of initial preparation of the accessible and optimum maintenance of a teaching material, and also development of a technique of training which is able to provide the high-grade technical-tactical preparation and a long-term motivation of pupils for good quality skills and knowledge.

It is necessary to note, that according to normative documents on sports hand-to-hand fight, competitive activity starts at the age of 12, after a pupils has had the initial preparation from 10 to 12.

Thus, at the age from 10-12 the motivation of the sportsmen is lost in the reason of absence of competitions and rewards.

In oriental combat sports at the initial stage of training qualifying categories (a belt of various colors) are given for demonstration of the list of technical actions established for each category and only after that the system of competitive qualification of sportsmen (D.Kano, 2000).

It provides mastering all kinds of technical actions at the initial stage of the training, stipulated with the program, and, which is more important, provides motivation to better quality of skills and knowledge.

The main point of this system is that a sportsman should show everything he learnt up to the program of the given category.

At the early stages of the development the main stimulus to attend the lessons of the certain sort of activity is the requirement of the direct or indirect social encouragements (B.B.Kossov, 1989).

Therefore in curriculums stimulating conditions of training and qualifying requirements should be created.

In J.A.Shulika's opinion (1993) and A.S.Kuznetsov's (2002), at a stage of elementary education of sportsmen the primary goal is the base of technical training with the purpose of acquaintance with median structures of receptions technical movements incase not to be back starter level on the further steps of education.

Competitive activity should begin right after passages of a stage of initial preparation. The stage of initial preparation should include elementary tactical preparation.

So we represent the most optimal as follows base technical-tactical on sports hand-to-hand fight construction is:

- the 1st year of training - base and fundamental technical training - studying of base movements and « median structures » technical actions;

- the 2nd year of training - the base expanded technical training - detailed elaboration and complication of technical actions without forcing down factors;

- the 3rd year of training - base technical-tactical preparation - studying of the basic tactical manners of conducting fight, studying of combinations of technical actions, and also formation of skills to use learnt technics in forcing down factors situations.

Our created technique offers study material which divided in to nine "levels", given in parallel in all sections of technical-tactical preparation and becomes meshing at each subsequent level.

The exam to the next "level" of development of base technical-tactical preparation is provided after three months of training in the form of competitive demonstration of the studied technics.

So they are able to learn the first level from September to November, from December to February - the second, from March till May - the third during the academy year.

The steps take place the same way of training till they reach ninth "level".

The control includes: the operative control - during the lessons, the current control after the phase of lessons, and also the final control - every three month training.

The technique of base technical-tactical preparation of young at the age of 10-12 years lets us to increase the quality of studying the technics and efficiency of competitive activity of young fighters and provides long-term motivation of pupils to qualitative mastering knowledge and impellent skills, reduces number of children who left sports school.

References:

1. Glazistov A.V., Kuznetsov A.S. The technic's analysis of competitive activity of young men of 12 years in duels on sports hand-to-hand fight // Physical training: education, education, training. - 2007. - № 2. - P. 46-50.
2. Gorbylev A.M. The duel during a life // Dojo. Fighting arts of Japan: Popular scientific methodical magazine. 2003, № 6, - P. 1-8.
3. Kano D. Codocan judo. Rostov-on-Don: The Phenix, 2000. - 222 p.
4. Kossov B.B. Psychomotor development of schoolboys of younger age. - Moscow, 1989. - 109 p.
5. Kuznetsov A.S. The organization's of long-term technical-tactical preparation in the Greco-Roman wrestling. - emb. Boats: Publishing house KamPi. 2002. - 325 p.
6. Platonov V.N. The system of preparation of sportsmen in Olympic sports. The general theory and its practical appendices [Text] / V.N. Platonov. - M.: The Soviet sports, 2005. - 820 p.
7. Shulika J.A. The long-term technical-tactical preparation in wrestling: the Dissertation of the doctor of pedagogical sciences. - Krasnodar, 1993. - 452 p.

INSTITUTIONS IN MARKET MECHANISM FORMATION

Ainabek K.S., Iskakova Z.D.

Karaganda state university of economics

Karaganda, Republic of Kazakhstan

The market institutions modernization and legal mechanism perfection in the direction of conformity to the mechanism of market economy participants effective functioning for the transaction efficiency and cost saving and commodity circulation are considered in the article. The legal relations resulting from the demands of organically interdependent economic growth models will allow striking the national economy progressive development path. It will serve to the achievement of justice and satisfaction of personal benefit, which have been imposed by modern survival conditions.

The opinions that the system of market institutions is formed by a special infrastructure: state regulation and control authorities, consumers' associations, trade unions of wage earners and employers' associations, and also the legal system [1, c. 148-149], are commonly known statements.

The organizations and establishments, which serve and connect the manufacturers and consumers, are included into the market infrastructure itself. Thereat, the market infrastructure components are trading firms, commodity and stock exchanges, banks and public institutions, etc. Together with that every market has its own specificity and, consequently, the corresponding infrastructure.

At the initial stage of the transition economy of Kazakhstan there appeared some hundreds of commodity exchanges, commercial banks and insurance companies, but many of them left the functioning theatre, having been bankrupted. In the following years the number of insurance companies and credit banks optimized, and at the modern stage they fluctuate to the extent of several dozens.

In the market system structure there are still many discrepancies and disadvantages caused by the "shock therapy" carried out to a great extent by politicians and public officials at the suggestion of "school board economics" experts, - the quotation is borrowed from R. Coase - it truly characterizes modern economic theoreticians detached from life realia [2, c. 20].

Analyzing the switch of Eastern Europe countries to the market system rails, a Chinese scientist Chen Ping came to the following conclusion in the 90-s of the last century: "The policy of "shock therapy" was based on the suggestion formulated within the neoclassical theory framework that the refusal of centralized planning will create the conditions for free games market forces, the interaction of which will finally result in the system's equilibrium position. However, the practice of reforms in Eastern-European countries didn't confirm the correctness of the given suggestion, and the market transformation process turned out to be an extremely complicated, nonlinear and unpredictable one" [3, pp. 140-141].

The now existing deformations of the market infrastructure in the CIS countries, including Kazakhstan, are conditioned by the consequences of transition from the fully developed centralized and command-and-control economy to the market one in record short terms.

Many market system entities with their own infrastructure expand the scales of social activity. Under these circumstances an organized and effective regulation is possible together with the introduction of the legal system adequately reflecting the objective necessity. On the given occasion R. Coase writes: "When there is plenty of placing and their owners, and the interests of every of them differ, as it occurs in retail and wholesale commerce, the establishment and maintenance of the private system legal norms appear to be a very difficult thing to do. That is

why the activity in these markets should depend on the state legal system” [2, p. 12].

R. Coase clearly understands the complexity of the relations between the market participants and the necessity of their being regulated by the legal system. Hence, he recognizes market economic relations as the subject of economics and brings the mechanism of effective realization of these relations in the form of the legal system, which is a part of the mechanism of use of objectively acting economic laws and principles, into the investigation field.

Knowing the mechanism of action of economic principles and laws will allow creating an adequate use mechanism structure including economic and legal instruments and ways, norms and public production functioning standards.

A well-defined subject for study and a clear aim of the development subject allow finding adequate ways for the problem solution. R. Coase went farther than other neo-classic scientists in the market participants' economic activities aim definition. “The aim of economic policy”, he writes, “is in the creation of such a situation, when people, making decisions on their activities, would choose those ones, which provide the best results for the system as a whole” [2, p. 28].

The suggestion of R. Coase about the participant's and society's aims harmonization is conformable to a Chinese wisdom about the combination of “benefit” and “justice”. The “benefit” and “justice” correlation problem of had been already discussed by Confucianists in ancient times; it was a traditional economic science and was being discussed for a pretty long time by the leading scientists of the country” [4, p. 124].

Evaluating the original balanced common aim achievement ways and mechanisms offered by R. Coase, Chinese scientists Huan Chunsin and Gan' Suepin note: “The modern theory of property rights, as Coase emphasized, states that the property rights differentiation – is not the problem of rights distribution, but the one how to achieve common, and not private benefit only and create even

greater riches for the society. As far as the size of the benefit got by every of the sides after the bargain, this problem is not in the competence of the property rights differentiation and is solved, like in other bargains, by means of agreement between the two sides” [5, 415].

However, there are opponents to the benefit and justice combination principle. So, American scientists write: “Justice and effectiveness, and also their interrelation, were the subject of an economist Arthur O'Kane's classical work. Political sciences, according to O'Kane, are oriented to social justice, legality, power providing; economic disciplines – to the increase of effectiveness and optimization. As soon as the two approaches collide in the sphere of public production, the efficiency (productiveness) is usually reduced. Finally, the more the state interferes into the sphere of economy, the lower the effectiveness is” [6, p. 93]. As we can see, under “justice” the authors understand the state interests, which are far from the observation of measures of harmonization of “justice” relative to the society and personal “benefit” or “effectiveness”. Justice in the scale of macro-economy and the benefit of micro-economy are the contrasts in their integrity. Any justice and benefit ratio distortion is fraught with the productivity slowdown in the scale of macro-economy. Their optimal ratio is defined by the value law action mechanism.

The scientific novelty of R. Coase's works was supported by many representatives of economic science, as it was proved by the market economy development modern conditions, expansion of the public production and market scale, increase of the productive power development level, mobility of economic relations. The modern market system demands for organized decisions and actions both vertically and horizontally with the prevalence of rights in the last direction. That is why the creation of the mechanism of essential economic property relations by R.Coase by means of empiric treatment resulting in and having an outcome into prac-

tice immediately got a high mark among specialists.

In our opinion, the investigation of private examples by methods of perception and the use of legal science foundations allow R.Coase to split and structure economic relations and to find out the ways of their regulation and self-regulation mechanisms disclosure.

Defending his approach to the investigations of economic phenomena, R. Coase criticized neoclassics ruthlessly: "... when economists after all speak about the market structure, it has nothing in common with the market as an institution, but is referred to such things only as the number of firms, differentiation of products, etc., the influence of social institutions making the exchange easier being entirely ignored" [2, p. 10]. And on: "... for the existence of anything similar to the perfect competition a complex system of rules and limits is usually necessary. ... they are needed to reduce transaction costs and, consequently, to increase the volume of trade" [2, p. 11].

The definition of influence of the institutions and the legal framework action on the firms' (production or reversion) costs effectiveness mechanism formation is an immediate extension of R. Coase's research.

On the complexity of the problems set by R.Coase one can judge, proceeding from his following statement: "Of the retained problems the ones, which we find out in the new sphere – legal economics, seem to be the most frightening. The relations between the economical and legal systems are extremely complicated; the law revision has an effect on the economy, and many consequences of such changes are still concealed from us (and after all they form the essence of the economic policy itself)" [2, p. 46]. The empiric treatment domination, the participants' rights discrimination in the "market game" do not allow discovering the essential economic processes to the full extent. After all, affecting separate parts within the structure of economic relations, it is possible to violate the correlation of the derivative and essential re-

lations, and vice versa, as a whole. They should be combined with the study of mechanisms of essential, deeply concealed relations, economic laws, principles, that is based on the definition of the main link in the structure of economic processes, hierarchy and parameters of their interaction. Under this only condition it is possible to achieve the conformity of the created legal systems to the demands of economic laws and allowing avoiding the predominance of the negative and coming to the fruition of the just aim – the benefit for all. Having created the legal and institutional systems, one must not rest on the achieved objectives, for they are always behind the development of quickly changing economic events. The legal system is more conservative, as it is the product of subjective decisions. That is why some contradictions can appear between the economic and legal systems. The game rules should be constantly changed, corrected depending on the changing conditions of the economic processes' development. The legal system institutions' modernization, updating procedure foot dragging conditions the accumulation of the critical mass of contradictions and can direct the economic development into a negative mainstream. The time element consideration is necessary in this case. The faster and timely the transformations happen in the legal system in accordance with the demands of the objective economic necessity, the less losses will occur, the transaction costs will be reduced, the efficiency of firms' (production and reversion) expenditures will increase.

The mechanisms of essential economic relations use are more stable compared to the mechanisms of derivative ones, which are changeable and response quickly to any effects. So, the property "rights batch" consisting of 11 "branches" makes up the subjective aspect of the market economy mechanism main contents as the mechanism of the initial and constitutive relations of property, whereas other "game rules", which are more than 1500, - are secondary components. They should be constantly renovated to conform to

the demands of the changing economic situations and conditions. The change of the prevalent amount of the “game rights” of the derivative relations can influence the volume decrease or increase and qualitative content of the property “rights batch” as the mechanism of essential relations use.

Thus, for the transaction efficiency and cost saving and commodity circulation there appears a necessity for the market institutions modernization and legal mechanism perfection in the direction of conformity to the mechanism of market economy participants functioning. It will serve to the achievement of justice and satisfaction of personal benefit, which have been imposed by modern survival conditions. The legal relations resulting

from the demands of organically interdependent economic growth models will allow striking the national economy progressive development path.

References:

1. Marx K., Engels F. Works – II Edition. V. 12. – M., 1958.
2. Coase R. Firm, Market, Right. Translation from English. – M., 1993.
3. Chen Ping. China's Challenge to Economic Orthodoxy: Asian Reform as an Evolutionary, Self-Organizing Process. – CER. Vol.4. 1993, N2. P.12-25.
4. Borokh O.N. Present-day Chinese economic thought. – M., 1998.
5. Huan Chunsin, Gan' Suepin Principles of economic theory. V. 2. – Thaibay, 1994.
6. Grayson Jackson K. Junior, O'Dell Karla. American management into XXI century. - M., 1991.

EDUCATIONAL SERVICE MARKET DEVELOPMENT IN TVER REGION: TENDENCIES OF REGIONALIZATION AND INTEGRATION

Kuzmina A.A.

E-leaning Dean's Office of Eurasian Open Institute, Moscow, Russia

The educational complex, theoretically, should promote the labour resource formation and supply-and-demand equilibrium at the labour market (maintenance of labour force at the necessary level proceeding from the needs of regional economics), that is connected with the tendencies of regional economic development and forecasting the regional economy demand for specialists.

The labour force demand and supply existing on the regional labour market are generally formed under the influence of short-term interests of wage earners and employers. In the given situation the subjects for labour demand appear the owners of working places, i.e. the demand on the labour market depends on production volume and structure of economy branches. The subjects of personnel supply are vocational education establishments, which orient themselves not to the regional economics needs for specialists in their activity, but to the demand of the population for educational services. Under the circumstances the solution is not in the effective provision of graduates' employment, but the elimination of inconsistency between the need of employers and possibilities of educational establishments.

The labour market is in the state of persistent change: the needs of branches of economics in the professional-personnel structure, in the level of training specialists change, the aging of the personnel participating in economical processes of the regional economy takes place. Many factors influence the regional market development, among them:

1. Demographic ones – natural increase, dispersal movements, reproductive performance mode, etc.;
2. Economic ones – economy structure change, consumer's market formation, pricing policy, investment activity level, etc.;
3. Social ones – population income level, social security level, social partnership system functioning, etc.;
4. Managerial and engineering ones – production material and technical base development; labour, production and management organization level; organizational management of state employment agency, etc.;
5. National and ethnic ones – distribution of population on their national identity, national groups balance, etc.;
6. Administrative and legal ones – regulatory framework development, labour and other rights protection degree, employment, migrations, etc.

Let us consider the above-listed factors' interaction components affecting the in-

teraction of the labour market and the one of educational services.

The data quoted below are based on the conclusions obtained at the realization of the grant "Development and Implementation of Professional Education Service and Labour Markets Mutual Influence Monitoring Concept within Tver Region" (the program of young scientists' research activities under the assistance of the Committee for Matters Concerning Young Persons of the Tver Region within the framework of the target program "Youth of Upper Volga Region").

In the Tver Region the general population has a tendency to decrease in spite of the positive migration gain. The rates of the work-force size reduction testify to the growth of load on the economically active population of the Tver Region. The specified situation is dramatized by the newcomers' runoff to the Moscow Region, which is more economically reliable, than the Tver one.

In the traditional branches of the Tver Region a great shortage of specialists is registered, so the leading position is taken by the vacancies in such branches of economics as machine building, light industry, rural economy. The employers have to fill the vacancies both on account of disengaged personnel from other enterprises and attracting movers with no required professional characteristics. The theoretical evidence on the improvement

of the situation by means of specialists' target preparation introduction into practice with direct involvement of enterprises and organizations for the purpose of the future specialist's orientation to the problems and needs of the Region don't find proper realization in practice. It is explained by the fact that the enrollees' interests, when entering a professional education establishment, are based on stereotypes and not on the knowledge of the labour market demands.

For the period 2000-2015 (the current and forecast showings formed under the assistance of Executive Agencies of the Russian Federation Subjects are based on the data of the Budgetary Monitoring Center of the Petrozavodsk State University) the reception of applicants will be reduced by 25,7% in the establishments of higher vocational education, by 48% - in the establishments of intermediate vocational education and by 65,4% - in the establishments of elementary vocational education.

The graduation of specialists (the ratio of the data of 2015 to those of 2000) has the following characteristics: in higher vocational education – it will grow by 54%, in intermediate vocational education – will decrease by 37%, in elementary vocational education – will decrease by 68,2%.

If to correlate the proportions of reception of specialists for 2000-2015, the proportion 0,6:0,9:1 will change into 0,9:1:0,7 (higher:intermediate:elementary vocational education). The proportion of specialists' graduation are also shifted to the priority of higher vocational education: from 0,5:0,7:1 in 2006 to 1:0,6:0,4 in 2015 (higher:intermediate:elementary vocational education). The current trend of timing advance of the calculated demand of the labour market for higher vocational education specialists at the essential deficit of intermediate and elementary vocational education specialists testifies that the market of vocational education does not meet the regional economics requirements concerning the workforce training any more.

Today in the regional mass media the polemic on methods and forms of realization of one of the priority orientations of the regional economics development – workforce capacity, which is at the intersection “science - production”, is carried out. So that the partnership “educational institution – employer” was successful, both mutual interest of the partners and adequate system of interaction are needed, that supposes the necessity of combination of the educational institutions' and employers' representatives' activities for the maximal agreement and realization of all the participants' interests of the specified process (the indicator can be the satisfaction degree of the present employer's demand for human resource).

As a positive example of placement activity and graduates' adaptation to the labour market we can give the example of the Tver State University (TSU) concerning the creation of student job market. In accordance with the TSU Charter the University services provide the learners with the information about the population employment situation and render employment assistance at close cooperation with the Federal State Employment Service Administration of the Tver Region, Education Department of the Tver Region, Administrations of Education of Tver and other cities and districts of the Region, other state and municipal authorities, and also organizations-employers. A job bank founded on the claims from city's, Region's and other areas' employers and also from a range of recruiting agencies of Tver is created. At the disposal of the student job market there is the enterprises and organizations data bank, on the basis of which the demand behavior at the labour market is controlled, the recruitment by the orders of employers is carried out. Unfortunately, there are few examples of educational institutions' and enterprises' structural interaction in the Tver Region and they bear a singular, local character.

It is known that the potential of an organic whole is more than its parts' sum potential. So that the scheme “Educational institution – employer” was successful, both mu-

tual interest of the sides and definition of their status and functions, the use of quality monitoring data of the labour market and education service market and the degree of demand for various educational level and training directions specialists in practice. An objective analysis will allow finally defining the prospects for labour and education service markets development, tracing the ways of education service management development perfection for maximal satisfaction of education service consumers' interests and the need of regional economics for qualified workers in terms of personnel training scales and structure optimization at the regional level. For these measures realization it is possible to offer the following recommendations:

1. The popularization of the data on the labour market structure and economy sector share in the demand formation on the labour market.

The problem of applicants' low information awareness about the labour market development and tendencies, and also the competences, which a certain profession specialist should possess, can be solved by introducing a database or an applicant's support center at the regional level. In the specified direction a significant factor is the admittance of the population to the given database and timely updating of the information. Not only the information about educational institutions and the specialties offered by them, but also the clarification of job descriptions and the employment possibility in the Region, the labour market saturation with representatives of the specified profession for a short-term outlook will be in the competence of the center. It is possible to add an agreement about regular labour market tendencies survey, vacancy ratings and salary scales in all educational levels with a group of regional MSM editions.

2. A wide attraction and participation of employers in the formation of educational programs, introduction of specialties corresponding to the regional market demand.

The introduction of specialties as part of one specialization contributes to the competition of educational institutions at the education service market. The given direction promotes the education service market openness, educational programs result evaluation, assistance in internships and master-classes, acquaintance with advanced experience and technologies. It is necessary to remember that the educational infrastructure should set the labour market development vectors, and not only to serve the formed infrastructure of the regional economy. I.e. not to "tune" to the labour market, but also be a source of staff changes development. For example, the organization of business incubators, innovation centers by educational institutions, for the purpose of attracting students to realize concrete economy development projects of the Tver Region. In the market economy the action of objective economic laws forms a special medium, wherein the scientific-and-technological advance is permanently generated, and the connected with it opportunities allow the competitive struggle participants to pass the rivals by on the production costs level, product quality and the speed of adjustment to the changing demand.

Thus, the education service market commercialization promoted the formation of the branch being characterized by the increasing sales volume and consumers' capacity. The demand on the part of the population manifested itself in the education "mass scale", the tendency of "general" higher education, that provoked the imbalance of the education service and labour markets. Today the interests of the education service and labour markets lack the congruity with one another, the personnel training structure doesn't reflect modern economic needs. The absence of a systemic approach connected with the strategic plan of the Region's development finds its reflex in the absence of the structure of information about staff development prospects on branches, professions and educational level.

The abovementioned positions emphasize the fact that the student receiving voca-

tional education services seeks later to occupy a particular labour market niche corresponding to his level of education for the purpose of his further labour and social advance and development. But when receiving an education service it is necessary to remember that not only personal need for quality education, but at the same time – a social need for the labour force meeting the regional economy demands, is satisfied.

The education service market doesn't function locally and must respond to the re-

gional economy, predetermining priority branches in the regional economy development. Getting vocational education should be a condition for effective guaranteeing of the population employment, provision of competitive positions at the labour market and in production sphere. Therefore it is important that the structure, volumes and profiles of specialists' training were in agreement with the demands of the modern regional economy in the optimal way.

*Materials of Conferences***NECESSITY OF NEW REGIONAL SOCIAL AND ECONOMIC POLICY FOR RUSSIA**

Karakashyan E.M.

*Post-graduate student of SPS of Pedagogical institute SFU**Rostov-on-Don, Russia*

The current development of Russian regions is made difficult by the remained unchanged differences in their social and economic development. In the current regions' development the elements of the total socio-economic crisis of Russia are manifested. The disintegration of the economic area and different starting conditions of the Federation separate subjects at their entering the single market is manifested.

The development of a country in its entirety is impossible without regard to the status of its regional components [1, p. 3]. So, the main tasks of the regional policy of Russia in the period of becoming and development of the market economic relationship are in providing a desired level of public welfare in each individual region, and also in the quickest leveling of the living standard. One more important orientation of the regional socioeconomic policy is also the development of education and health protection systems, where the treasury funding runoff took place in the conditions of the passage to exchange relations [1, p.16].

It should also be stated that the primary target of the regional policy is in providing the integrity and unity of Russia, non-admitting its breakup into many independent territories. The basic term of this process - is to guarantee the balance of regional and all-Russia interests. For the implementation of the main regional policy task the prompt steps on the reforming of not only the system of public administration, but also the business life as a whole, are required.

If to estimate the last steps of the government on the national socioeconomic system reforming, it becomes apparent that the state hasn't made up its mind to the fact that it is not the main subject of the economic development already. There is a new force – an employer, who the uncommitted resources (profit, economically sound credits, etc.) should be open to.

In defiance of its declarations, the authority ignores all the initiatives of small and average entrepreneurship on the improvement of its development conditions: the tax charging alleviation; the elaboration of monetary policy meeting the national economy interests by the state; the formation of customs policy equaling the conditions of business struggle in the Russian market for native producers and import merchants as a minimum; the antitrust legislation support and others [2].

It is indisputable that the succession from directive relations to partner ones – is a complex and labour-intensive process. Its organization will need

much strain and time. However, it will surely give a positive result.

The carried out in recent years administrative reform resulted in some emerging role of the central authority in socioeconomic processes management. The taken steps are in many ways lived up to by the scale of infringement of interests of the society and population on the part of local “electoral” leaders. However, the presence of disadvantages and even abuses - is not a reason to change the strategy having refused the objectively necessary for Russia decentralization in control and realization of federal government norms and constitutional principles in practice [2].

The socioeconomic development of the society is one of the prior directions of the governmental authorities' activity [1, p. 3]. Therefore, if the steps taken by the bodies of power are a part of the system of actions preparing the population to a greater responsibility for the happening in the society, raising its judicial and political culture, really promoting the creation of a civil society in Russia, they are feasible in the least. It is the federal administration that should organize the elaboration of such a system and its materialization by the efforts of all levels of power. However, in that case the leadership of the country should declare its intensions and create mechanisms of control over the processes (changes) taking place on the part of the society including those on the duration of “extreme” conditions retaining. For the historic experience strongly says to the fact that without creating the system of an efficient balance the power will fail to hold down within the framework of “good intensions”, and we shall, finally, feel the centralized “rake” under the foot again. As a result, the opportunity of planned modernization of Russian economics on the basis of balanced change to decentralization (autonomy) in management and all-round development of the initiative will be lost again.

It is noteworthy that the introduction of structural changes into the carried out reforms can take place only in the context of elaboration of a new regional social and economic policy of the state. Such an approach would originally guarantee the solution of any problem in the federal context with a compulsory consultation of the oncoming purposeful behavior with government agencies of all levels. And only concerted actions of the power of all levels are able to promote the business activity everywhere and guarantee the long-awaited GDP growth acceleration. The development of such a policy – is a key aspect for the Russian state leadership.

There should be given comprehensive orientations:

- on the growth of the role and responsibility of the power of all levels for the results of the decisions made and reforms carried out – the federal level

should become responsible for the development of economics and reforms as a whole, that is impossible without the determination of the goal and priorities in the social and economic development of the country;

- on the reforming and strengthening of economical and financial (tax) foundations of the federal relations – the regional and local authorities should receive a sterling financial resource for an active effect on the course of the social and economic development and reforms carrying out in the confided territory, be directly concerned with their own tax revenues growth;

- on changing the model of taking managerial decisions by the authority, with the change to the support and development of successful entrepreneurial initiatives, the development of financial foundations of volume business development;

- on the change to partner relations between all power levels – decentralization of joint competence subjects management inclusive of the municipal government into this process;

- on the all-round restoration and development of human resources, the key element of the future economics: the improvement of life quality, the arrangement of conditions for creative, labour and business potential discovery of Russian citizens.

It should be noted also that the present-day national policy should have a firm basis under itself - the national economics development strategy, which takes into account its role and place in the present and future of the world economy. The power should precisely know the national economics state, its competitive advantages, have the whole poof that they are realizable and will provide its sound and quick development in the medium-term and long-term prospects.

References:

1. Karakashyan E.M. Role of state and municipal employees in socio-economic development: factors and criteria of socio-economic efficiency of state and municipal employees' activity. – Rostov-on-Don, 2007.

2. Samokhvalov A.F. Federalism, market and regional socio-economic policy of state // Tomskinvest, 20.06.05.

The work was submitted to III international scientific conference «Modern High Technologies», SAR, June, 5-15, 2008, came to the editorial office on 05.05.2008.

REGIONAL MECHANISM OF FOOD SUPPLY SECURITY

Lysochenko A.A.

Southern Federal University

Rostov-on-Don, Russia

The food safety of a region – is the ability of the food stuffs production system, storage, processing and distributive industries to supply all the population categories of the corresponding territories with them

steadily for a year to the consuming capacity extent satisfying the scientifically grounded medical norms. The food safety of regions is based on the rational territorial division of labour in the sphere of agro-industry, rational combination of local and imported products consumption and lack of any barriers at the interregional food trade.

Differences in natural, economical, demographic, social, national and other peculiarities in Russia lead to the division of its regions in solving the problem of food safety into three categories: agrarian – the ones with an expressed agricultural structure of production and the best farming conditions; industrial-agrarian – the ones with equal opportunities for industrial production and agricultural industry, with average farming conditions; industrial – wherein the agricultural industry either is missing at all or is developed extremely insignificantly.

The food supply security is not only the problem of the agro-industrial sector, but also a macroeconomic one connected with the efficiency of social production, the level and spread of personal income, unemployment, the food stuff consumption level, i.e. affects various economic and social aspects.

The leading role, while solving the problem of food safety, should be given to the regional management, the business mechanism of which should include the following aspects: the self-sufficiency of the region (the food stuff availability in the amount and assortment corresponding to the population size and medical consumption norms); the food stuff quality assurance and the degree of conformity of the unhealthy substances content in the food stuffs to their maximum allowable value; the economical availability of food stuffs.

The factors having an effect on the formation of a region's self-sufficiency are divided into three groups: the ones applied in the sphere of production (the capacity utilization improvement; the expansion of the existent and introduction of new manufacturing capacities; the ones applied in the consumption sphere (the initial level of the population demand of a region for food and the demand's level change in the forthcoming period); the ones applied in the distributive sphere (the level of the territorial specialization of agricultural and industrial production; the commodity market capacity).

The self-sufficiency mechanism of food security at the regional level should include the measures depending on the potential possibilities of the region itself on the agriproduct manufacturing and processing, its closeness to the territories manufacturing the missing products for the complete supply of the given region in the necessary scale. The regional measures on the development and efficiency upgrading of the agro-industry should include: the observation of zonal-sectorial farming systems; the preservation and restoration of soils' fertility; the mother seed production support; the stimulation of high-energy cultures

production expansion; the support of gardening and winegrowing; the introduction of energy-saving technologies; the upgrading of facilities; the livestock breeding support; the animal epidemic countermeasures carrying out; cushioning of risks in agriculture; the amelioration of short- and long-term credits availability for agricultural and processing organizations; the promotion of business solvency of small management forms in the country; a package of measures on the development of cooperation and integration with agricultural, APC processing enterprises; rendering of consultative aid to agrarian commodity producers and retraining of specialists for rural economy; the creation of state information support in the sphere of agriculture.

The problem of food safety in the market is closely related to the food manufacturing techniques, the availability of information about the safety and quality of the product. The problem of food stuff safety and quality can be referred to the food market zones of “failures”, and, as a consequence, their security – to the number of public goods delivered by the state. From the welfare economics point of view the problem of food safety and quality is referred to the number of the agrarian market functioning specific features conditioning its balance in the Pareto-ineffective state. This, in its turn, is the economic foundation of the need for the state policy of interference with the agrarian sphere and the possibility of the society’s financial resources secondary distribution for its development. The biomedical food products quality and safety level formation takes course in the wheels within wheels of technogenetic processes in the circuit “primary product – semi-finished products – finished product”. The food quality and security mechanism at the regional level should include the food security monitoring system in all the stages of its production and commercialization; the control over the arrival of substances into soils in the course of farm production.

The economical availability of food stuff is characterized by various population groups’ food products procurability in the market at the fully formed price and income situation (taking into account the arrival of food stuff from private plot) in the

amount of the minimum subsistence basket. Besides, the economical availability of food stuff is defined by the possibilities of the rural population to produce stuff for its own consumption in the private plot, and urban one – in the garden-truck patches.

The security mechanism of economic opportunity of the access to food stuffs at the regional level should include: measures on advance in the living standard of the population (wage, pension money, allowance hike); the formation and development of the internal food market (farm products, raw materials and food stuffs market regulations; the farm products wholesaling system development); the farm products and food stuffs shopping and retail prices control with due consideration of the normative commercial viability of their production and the minimum subsistence basket food stuff cost.

Nowadays in Russia the attention of federal and regional government authorities to rural economy has grown significantly, the state financing has increased. Beginning with 2005, the national “APC development” project, the federal law from 29.12.2006 №264-FL “On agricultural development”, “Government program of agricultural development and farm products, raw and food stuff market regulations for 2008-2012” formed the agro-industrial complex regulatory government base.

Though, there is no food safety integrated control system at the federal level. There is no law “On food safety” and it is necessary to note that the situation in Russia is as follows: the federal authorities do not guarantee the food security for every separate region – they do not carry out the nationwide policy of farm specialization development and interdistrict food exchange. Under these conditions the region should solve the problem of food safety within the limits of its own territory.

The work is submitted to the Scientific International Conference “Scientific Research of Higher School on Priority Orientations of Science and Technology”, June, 13-20, 2008, came to the editorial office on 01.05.2008.

*Short report***MONITORING OF EDUCATIONAL SERVICE MARKET AS INFORMATIVE FOUNDATION OF LABOUR FORCE DEMAND AND SUPPLY PATTERN OPTIMIZATION IN TVER REGION**

Kuzmina A.A.

*E-learning Dean's Office of Eurasian Open Institute
Moscow, Russia*

One of the key labour market microeconomical problems – is the structural discrepancy of labour force demand and supply on various characteristics (territorial, branch, professional, qualification, age, educational and other structures of labour supply are out of phase with the analogous structures of the current labour demand). The market appearance of vacant working places inadequate to the labour supply structure testifies that the market of vocational education does not meet the regional economics requirements concerning the workforce training any more.

One of the regional economics development priority orientations, which are at the intersection “science - production” is the need of systematized and integrated information on the mutual influence of educational complex and labour market. The lack of relevant information on the given problem is the factor restraining the processes of Russian education moderni-

zation at the regional level, preventing the labour resource demand and supply scaling and structure from being analyzed, evaluated and forecast in the right way, and also labour and educational service market regional features - from being studied and taken into account.

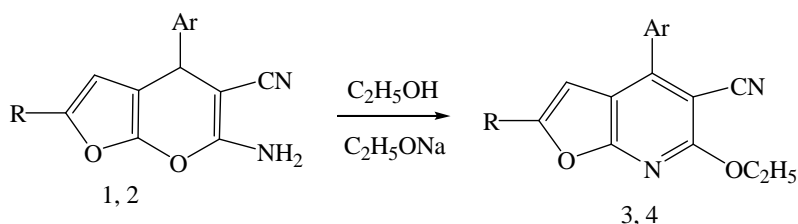
In the Tver Region within the framework of young scientists' research activities under the assistance of the Committee for Matters Concerning Young Persons the grant “Development and Implementation of Professional Education Service and Labour Markets Mutual Influence Monitoring Concept within Tver Region” is being realized. The monitoring database use affords ground for modeling and evaluating the labour resource demand and supply, projecting and correcting the regional strands of policy with regard to the solution of employment and unemployment problems, drawing attention to the priority-oriented demand for the personnel conforming to the labour market requirements. Thus, the data obtained can be used both for the minimization of possible disproportions, which emerge in the process of mutual influence of the educational service and labour markets, and making effective strategic and tactical managerial decisions on the development of the regional complex of professional education.

Materials of Conference

RECYCLIZATION OF 6-AMINO-5-CARBONITRILEFUOPYRANES UNDER THE ACTION OF NUCLEOPHILS

Anis'kova T.V., Timofeyeva Z.Yu., Yegorova A.Yu.
*Saratov State University named after
 N.G. Chernyshevsky
 Saratov, Russia*

6-Amino-4-aryl-2R-4H-furo[2,3-b]pyrane-5-carbonitriles are an important class of heterocyclic compounds of significant interest owing to their various chemical transformations and many opportunities of practical application (1, 2). These bifunctional compounds with cyano and amino groups



1,3 $R=C_6H_5$, $Ar=C_6H_4-Cl$ -2; **2,4** $R=C_6H_4-CH_3$ -3, $Ar=C_6H_4-Cl$ -2;

The reaction products were identified as 4-aryl-6-ethoxy-2R-furo [2,3-b] pyridine - 5-carbonitriles (3, 4) by their physicochemical and spectral characteristics.

The IR spectra of compounds 3, 4 contain the absorption bands of a cyano group ($2215-2210\text{ cm}^{-1}$), the absorption band of a -C-O-C- bond within $1130-1120\text{ cm}^{-1}$, and no amino group absorption band. In the NMR¹H spectrum a series of signals in a strong field is observed within 1.40-1.45 ppm and 3.90-4.00

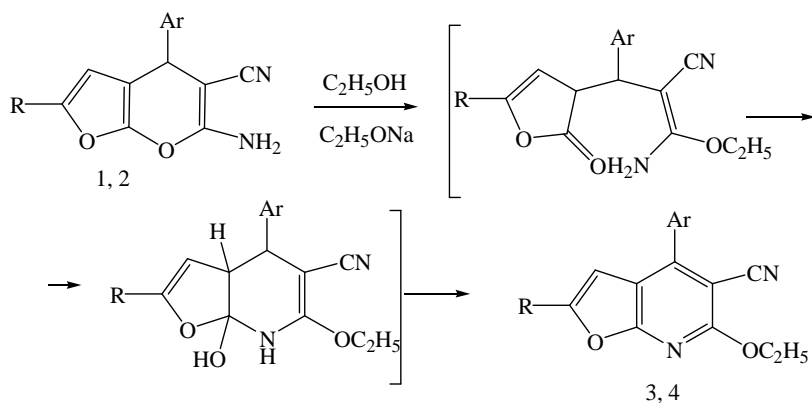
in the vicinal position are promising initial substances for synthesis of sophisticated annealed heterocyclic systems.

The synthesis of the said compounds is based on Michael's condensation of 5-aryl-3-arylmethylene-3H-furan-2-ones with malonic acid dinitrile under basic catalysis [1].

The behavior of fuopyranes 1, 2 under the action of a strong nucleophilic reagent (sodium alcoholate) was studied. The reaction was carried out at heating of equimolar amounts of sodium alcoholate and fuopyranes in an ethanol solution during 4 hr.

ppm, corresponding to the protons of an ester fragment, the singlet of a furan ring proton is shown at 6.3-6.4 ppm, the signal of the methyl group protons of the aromatic substituent (for compound 4) is about 2.35 ppm.

The formation of a pyrane cycle of compounds 1, 2 due to intramolecular interaction of the hydroxylic and cyano groups is a reversible process [2]; under certain conditions the pyrane cycle may open with subsequent cyclization.



First, nucleophilic addition of an alcoholate anion by the α carbon atom of the pyrane cycle occurs with subsequent opening of the heteroring. Further attack of the unshared electronic pair of the nitrogen atom by the electron-deficient carbon atom of the lac-

tonic system, cyclization, and aromatization result in formation of a pyridine structure.

EXPERIMENTAL

IR spectra were recorded on an FSM-1201 Fourier spectrometer in KBr tablets, the spectral range

being 400-4000 cm^{-1} . NMR¹H spectra were obtained on a Bruker MSL-400 spectrometer within 20-25°C in CDCl_3 , TMS being the internal reference. The working frequency was 400 MHz.

4-Aryl-6-ethoxy-2R-[2,3-b]-pyridine-5-carbonitriles (3, 4). A mixture of 0.01 mol of 6-amino-4-aryl-2R-4H-furo[2,3-b]pyrane-5-carbonitrile (1, 2) and 0.01 mol of sodium alcoholate in an ethanol solution was heated for 2-3 hr, poured out in cold water, and neutralized with diluted HCl. The precipitated crystals were filtered out on a Schott filter and recrystallized from a hexane-IPA 1:1 mixture.

For **3**: yield 75%; mp 160-162°C; ¹H NMR, δ : 6.50 (1H, s), 1.42 (3H, t, OCH_2CH_3), 4.20 (2H, m, OCH_2CH_3), 7.25-7.68 (9H, m, Ar). Found (%) C, 70.24; H, 4.33; N, 7.53. Calc. for $\text{C}_{22}\text{H}_{15}\text{ClN}_2\text{O}_2$ (%) C, 70.50; H, 4.03; N, 7.47

For **4**: yield 68%; mp 157-159°C; ¹H NMR, δ : 6.64 (1H, s), 1.47 (3H, t, OCH_2CH_3), 4.30 (2H, m, OCH_2CH_3), 7.15-7.50 (8H, m, Ar). Found (%) C,

70.86; H, 4.60; N, 7.05. Calc. for $\text{C}_{23}\text{H}_{17}\text{ClN}_2\text{O}_2$ (%) C, 71.04; H, 4.41; N, 7.20

The work was supported by grant No MK-2952.2007.3 of President of Russian Federation for state support of young Russian scientists.

References:

1. T.V. Anis'kova, A.Yu. Yegorova, and Z.Yu. Timofeyeva. Reactions of 3-arylmethylene-3H-furan-2-ones with malononitrile, a design method of furo-pyrane systems. Carbonylic Compounds in Heterocycle Synthesis. Coll. Book / Ed. Prof. A.P. Kriven'ko. Saratov, 2008. P. 36-38.

2. F.S. Babichev, Yu.Ya. Sharanin, V.P. Litvinov, V.K. Promonenkov, Yu.M. Volovenko. Intramolecular interaction of nitrile and C-H, O-H, and S-H groups. Naukova dumka, Kiev, 1985.

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 08.08.2008.

*Materials of Conferences***PROGRESSIVE METHOD OF CUTTING
STAINLESS AND HEATPROOF STEELS AND
ALLOYS**

Krainev D.V., Norchenko P.A., Ingemansson A.R.
*Volgograd State Technical University
Volgograd, Russia*

Stainless and heatproof steels and alloy (steels of austenite class) find more and more application in modern machine-building industry. Machine and constructions' parts made of these materials are characterized by durability and high service performance.

The steels of austenite class refer to hard-to-treat ones; their characteristic is the formation of cyclic chips, the increased wear of the instrument and the machined part surface coating low quality.

For the solution of the abovementioned problem it is offered to use the method of cutting with advanced plastic deformation. At the plastic materials machining process the intensive plastic deformation precedes the separation of the cut-down layer material from the blank part, i.e. the principle cutting work part is spent on the plastic deformation of the metal taken off. The essence of the cutting with advanced plastic deformation of the cut-down layer material consists in combining two processes – the preliminary plastic deformation and cutting itself. Thereat by the moment of the cutting instrument action on the cut-down material layer a part of the work spent on plastic deformations in the process of chip formation at usual cutting action is already performed by a supplementary rolling device making the depth and cold work degree necessary for the maximal efficiency of the following process.

It provides the cutting force, temperature, specific work decrease, process cyclicity, that results in the instrument's durability and processing capacity increase. The chip making process if treated with cutting the preliminary cold-worked layer cut down results in surface roughness decrease, some chip shrinkage reduction and friction conditions change.

The work was submitted to international scientific conference «Manufacturing Technology» (Italy - Rome, Florence, September, 9-16, 2008, came to the editorial office on 14.07.2008.

**THYRISTOR INVERTERS WITH AN IDLE
LIMITER FOR TRANSFORMER LOADS**

Magazinnik L.T.
*Ulyanovsk State Technical University
Ulyanovsk, Russia*

Electroarc welding sets of an inverter type, i.e. welders in which a welding transformer is operated from the inverter with frequency till 100 kHz, are widely used [1]. Inverters in such welders may be realized as the single-ended circuit as well as the push-

pull circuit. Single-ended inverters use the core of the welding transformer slightly worse than push-pull inverters. But push-pull bridge inverters form the supply voltage asymmetry of the welder transformer. When frequency increases this asymmetry increase too and result in the saturation of the transformer core that minimize advantages of bridge (push-pull circuit) inverters to single-ended inverter. The asymmetry is eliminated in push-pull circuits if condensers are used in the power circuit. Specifically, the asymmetry is lacked in the half-bridge inverter shown in [2]. The deficiency of such inverter is poor utilization of capacitor capacity. Utilization of the condenser is better fourfold, but a surge voltage is possible in the diagonal of the bridge load at the quiescent condition and light loads.

The general deficiency of half-bridge inverters as well as bridge inverters is the need to use gate-turn-off (GTO) keys, i.e. transistors or GTO thyristors. Transistors constraint a power range of welders, and GTO thyristors have the more complicated control system, and main, have large losses and lesser permissible switching frequency in comparison with ordinary (SCR) thyristors.

Inverters using ordinary (SCR) thyristors with coercive commutation by means of condensers ("C"-commutation) or of a combination of condensers and inductor ("L-C"-commutation) are known too. But coercive commutation complicates the power circuit of the inverter. A "classic" thyristor inverter using gate-turn-off thyristors or ordinary thyristors with coercive commutation is described in [3]. The circuit provides for the series condenser turn on with the primary winding of the transformer welder that may result in voltage surges in the condenser and the primary winding at the quiescent condition and light loads. Gate-turn-off thyristors are much expensive than ordinary thyristors and it losses are greater. The control system of it is more complex too. Frequency behaviors of gate-turn-off thyristors are worse than of ordinary thyristors too. Therefore such decision may used only for comparatively low frequencies that increase integrally the mass and gabarit characteristics of the device.

Decisions described in [4] permit to optimize the device. Specifically, gate-turn-off thyristors of the inverter are substitute for ordinary (SCR) thyristors; the inverse diode bridge is excluded from the thyristor inverter circuit, and a standard control circuit has in addition a current sensor, a resistance transducer of the "welding die - welding surface" gap, a delay cell, an AND element, a gate-tape diode and four keys. After primary winding current of the transformer welder was dropped the delay cell provided the interval was required to restore locking properties of the conducting current diagonal thyristor pair. If the welding electrode don't contact with a welding surface at the same time then current was missed in the circuit of the resis-

tance transducer and enable pulses were don't given from the control system to thyristors driving points of the inverter. I.e. the quiescent condition is excluded. Only after the electrode touch with a welding surface enable pulses were begun to give to driving points of thyristors. Those decisions permit to eliminate voltage surges at the circuit of the inverter load diagonal, to increase the frequency, to decrease losses of the inverter, to substitute gate-turn-off thyristors for ordinary thyristors, to exclude the inverse diode bridge from the power circuit.

In conclusion should note that the device was considered with the load in the form of a transformer welder. Though the proposed device is available for other electro technical transformer loads in which the quiescent condition isn't operating condition and may be excluded.

References:

1. «Invertec» - V – 130-S-Lincoln. USA, 1998.
2. V.A. Pryashnikov. Electronics. Saint-Petersburg, 1998, fig. 33.11.
3. I.L. Kaganov. Industrial electronics. «High school».-M.-1968.
4. L.T. Magazinnik, A.G. Magazinnik. Thyristor inverter. Patent RU 2314631 10.01.2008.

The work was submitted to international scientific conference «Priorities for Science, Technology and Innovation», Egypt (Sharm el-Sheikh), November, 20-27, 2008, came to the editorial office on 28.05.2008.

PROBLEMS AND PROSPECTS OF NATURAL STONE DEVELOPMENT

Tsygankov D.A.

*Mining Engineering Institute of Russian Academy's of Sciences Siberian branch
Novosibirsk, Russian Federation*

Stone is one of solid minerals involved by the human into the development and further use at the dawn of its existence.

For the Russian Federation and the countries of the Commonwealth of Independent States the tendency of cap stone production small volumes is indicative. First of all, it is connected with the prevailing architectural tradition, which doesn't suppose natural stone construction work large volumes, in our country and also with the undergrade raw material being handled and then used. The low level of rock mining operating enterprises' equipment with state-of-the-art technologies, mining methods and technologies' imperfection, lack of finished products permanent sale markets, and also the insufficient level of geological exploration of reserves, transport and personnel problems are evident; specific negative trends consisting in the presence of stone processors, the production capacity of which far exceed the possibilities of their raw material resources base, being typical of some regions of the Russian Federation (Ural). It stimulates

the production maintenance on account of procurement and subsequent processing of the foreign stone, increases the product cost and reduces the population employment. As a result of this, in the Russian Federation, not more than 1-2 kg of cap stone per caput a year are mined (the analogous factor for the Hellenic Republic makes about 50 kg of cap stone a year, 2007).

In spite of the presence of a great amount of disadvantages, the main consequence of which are useful minerals heavy tolls at the procurement, blasting technologies and cap stone breaking-out are widely used all over the world. Together with this the saw methods of monolith recovery find application. Cap stone breaking-out wedge methods used independently or in combination with other known methods are kept on being used at a great amount of cap stone open casts all over the world.

Despite of high labour intensity the drilling-and-wedge method is wide-spread as it doesn't need expensive equipment, specifies the lowest requirements to mining and geological conditions of development and provides the required quality of the procured units.

In the middle of the eighties of the last century N.G. Kyu offered the method of oriented rock failure using putty substances. This method cardinally differs from the one of hydraulic rock failure on the root principles of fracture, means of operating and areas of application, though it borrows some elements from it (the destruction through a shot hole, the possibility of static and dynamic fracture load application). The first experiments on brittle materials failure using putty substances were carried out under laboratory conditions in terms of a unit of organic glass and plasticine blown in into the crack being formed in the static mode [1].

The method of directed rock fracture using putty substances got further development in 2000-2002, when H.G. Kyu offered and tested the dynamic variant of rock failure by the mentioned method. Under his leadership the first well resulted brittle artificial materials impact fracture experiments under laboratory conditions were carried out. After that, the first full-scale experiments on the directed dynamic fracture of a granite unit by hand method were carried out on the "Green Hill" experimental polygon of the Mining Engineering Institute of the Siberian Branch of the Russian Academy of Sciences under the leadership of N.G. Kyu [2].

The possibility of crack evolution process control was proved in the course of the further carrying out of the experiments on brittle environment fracture with putties. The essence of the method consists in the fact that a shot hole is drilled in the brittle material and it is filled with putty. At the static fracture a sealer (granular material, for example) is laid over the putty. A wedge equipped with hard alloy metal inserts, which form linear antipodal furrows on the shot hole

walls, is embedded into the sealer. The stretching forces affecting on the part of the two meeting flat surfaces of the embedded wedge cause the concentration of tensions in the furrows until their size is sufficient to break the environment down and form the initial crack. The considered fracture method has a very wide application area, which is associated with any activity, for the implementation of which the oriented or non-oriented fracture of brittle materials of natural or man-made origin is needed.

Natural stone, being a valuable building material, possesses a range of peculiar properties distinguishing it from other kinds of solid minerals. These properties present special requirements to the development technologies and methods depending on: chemical composition of the stone; the natural or artificial origin crack system presence; the development waste materials future use possibility; life duration, strength, ornamentality, permeability to air, and also the future products' sizes and form directly connected with the possibility of the broken-out monoliths to the places of their processing.

The global leadership in the area of facing granite and marble production volumes belongs to the People's Republic of China, which is in the big margin from the nearest competitors with the tendency of further increase in production. The European countries keep the global leadership in terms of cap stone production volume distinct from granite and marble – touchstone, tuff, quartz, quartzite, sand rock, serpentine, shale rock and travertine. Among the countries of Africa and Near East the facing granite and marble production leader is the Islamic Republic of Iran, and other stones – the Republic of Turkey. The North and Central America countries are characterized with small production volumes of cap stone of various kinds and covering of domestic needs owing to the import from other countries. The South American region differs by all kinds cap stone production small volumes, which are restricted with its internal market wants.

All theoretically existing rock failure methods, which can be applied at cap stone recovery are used in the world's practice, inclusive those known from the earliest times. At the solid stone breaking-out the most promising and applied method is drilling-and-breaking-off (drilling-and-blasting and drilling-and-wedge ones) of average strength stone – cutting with rope saws, and that of low strength stone – cutting with jib saws. The world's experience testifies that at the large dimensions monoliths breaking-out the drilling-and-breaking-off (drilling-and-blasting and drilling mud methods) and rope sawing are preferable, at the average and small dimensions monoliths breaking-out – the drilling-and-breaking-off (drilling-and wedge method) and jib sawing.

The analogues of the rock failure method using putties are drilling-and-wedge and drilling mud ones (powdery inexplusive destroying compositions) as

they also destroy stone through shot holes, developing a directed crack gradually by means of creating thrust force affecting its walls. The introduction of the new rock failure method based on the destruction by putties in the mode of their dynamic driving out of the shot hole in combination with the known cap stone breaking-out methods into mining technologies will afford plenty of technological advantages. Compared to the analogous drilling-and wedge method these advantages consist in: the reduction of length and number of shot holes in the flat surface of the marked split-off; the main working operations performance time and labour intensity cutting; the reduction of solid waste output due to the split-off surface curvature decrease; the shape retention of the shot hole's estuarine part; the possibility of series-produced impact driver application, the driver being of another primary purpose at its insignificant implement. In comparison with powdery inexplusive destroying compositions these advantages consist in: the lack of requirements to the shot holes' mouths sealing; consistency of the failure results; solid wastes output reduction; little dependence on the work performance seasonal fluctuation; best work performance sanitary conditions guarantee.

Nowadays the mining technologies based on diamond-and-rope and jib sawing, drilling, and also hydraulic and hand wedges application together with thermal spalling or blasting got the maximal distribution at the procurement of cap stone all over the world. A differential peculiarity of the cap stone development is the application of several rock failure methods in the technology of monolith breaking-out, that distinguishes it from other kinds of solid minerals development. In the foreseeable future the existing tendency will retain. It will be supplemented by the invention and implementation of new rock failure methods at their being improved at the same time.

The common feature of the equipment used at the cap stone procurement is high efficiency and wide range of technical characteristics. There are broken-out monoliths' maximum dimensions tight constraints together with that, they are in strong interrelation with this equipment effective work area. These constraints are oriented to the monoliths of average and small dimensions; it is connected with the possibility of stone processing equipment effective work at plants.

The applied mining technology estimation on the environment and labour protection factors is necessary to carry out proceeding from the volumes of the coming pollution agents with due account for the applied collective protection means efficiency.

While estimating the danger level of the mining practice influence on the environment it is necessary to proceed from the premises that: various mining technologies affect differently on the main natural environments; each of these environments is characterized by two state levels – the required (high) and current (low) ones; the actions aimed to the required main

natural environments' state provision are defined by the mining technologies depending on the applied rock failure methods; compared to the natural environments' current state exponents the mining technology defining its best value is chosen.

While estimating the danger level of the mining practice influence on the labour conditions it is necessary to proceed from the premises that: the compared mining technologies affect differently on the industrial injury or occupational illness possibility; the labour conditions requirements are characterized by two state levels the required (high) and current (low) ones; the actions aimed to the required labour conditions' state provision are defined by the mining technologies and depend on the applied methods and means of their performance; at the heart of the labour conditions evaluation the mining technologies' possible versions comparison based on the minimum of negative effect on the human should lie.

The mining practice isn't referred to the number of productions characterized by the increased danger for the environment and labour conditions. The estimation of its level of effect on the environment and labour conditions should be carried out with due consideration of the constraints imposed on the mining manufacturing technologies.

References:

1. Academy of Sciences of the USSR. Siberian Branch. Mining Engineering Institute. – M.: Vneshtorgizdat, 1990 – p. 44.
2. Kyu N.G., Tsygankov D.A. Directed fracture by putty substance // HEI's News. Construction – 2003 – N2 – pp. 130-133.

The work is submitted to the Scientific International Conference «Research high school on the priority areas of science and technology», Australia (Sydney), December 24, 2008. - 12 January 2009, came to the editorial office on 07.07.2008.

SUBSTANTIATION OF PARAMETERS OF TECHNOLOGIES OF SHOCK DESTRUCTION OF FACING STONE WITH APPLICATION OF PLASTIC SUBSTANCES

Tsygankov D.A.

*Institute of mining of the Siberian branch
of the Russian Academy of Sciences
Novosibirsk, Russian Federation*

A complex of problems solved at rock fracture technologies designing using plastic substances, should include an obligatory consideration of the following items: the account of the applied putties' properties; the account of the fractured rocks properties; the account of the beaten monoliths' required dimensions (blocks); the crack formation features account consisting in the substantiation of their form and dimensions; the applied techniques' features account lying in the substantiation of geometrical parameters of

shot holes, stress concentrators on their walls or in face parts, sealing-in esturial parts or shot holes' walls, form and sizes of wedges, and also the energy of a single impact of the instrument.

At the mining technologies projecting it is necessary to take into account the fact that using a plastic substance characterized with low flowability will make the crack fronts intersection of natural or artificial origin and also the continuation of the formed crack formation even at their separate parts out on the free surface possible. The case demands the opening size of the intersected crack to be less than that of the crack formed using putties. Thereat it will not need a supplementary volume of the putty as in the fracture course it is not filtered through the fractured material.

The account of the properties of brittle materials fractured at the cap stone breaking-out using putties can be restricted by three basic rocks – granite, marble and limestone. Every of these rocks, being most commonly used, possesses a standard set of properties taken into account when projecting mining technologies (strength; volume of quarts; color (composition); structure; resistibility to mechanical effects, corrosion and environmental conditions; cold endurance; water absorption; wearability; maximal dimensions of monoliths (blocks) and their products. Other cap stone kinds breaking-out technologies can be considered as analogous ones to any of them.

The sizes of receiving sites of the facilities serving for rock sawing restrict the sizes of the cap stone monoliths. In this connection it is necessary to strain after the output of the monoliths (blocks) sized within the limits of the minimal to medium ones: width – 2-2,8 m; height - 1,2-1,7 m. For this purpose it is necessary to use the one-step breaking-out or to select the sizes of the broken-out monoliths multiple of these values due to their length variation. At the existing restrictions on sizes the weight of the monoliths (blocks) delivered to plants mustn't exceed 40 t, proceeding from the density of the rocks broken out.

When projecting mining technologies based on their fracture use with the help of putties, it must be born in mind that with the longitudinal crack growth their form gradually strains after the change from ellipse to circle. Together with this, the form of the cross cracks has a clearly defined circular character and doesn't depend on the size growth in the course of further delivery of putties. The impact or static origin cracks formation should happen at the possibly minimal consumption of the putty as its increase promotes the appearance of the flexural forces and differently directed curvature of the cracks' pattern.

The sizing of blind cracks obtained by the impact method depending on the volume of the introduced putties can be carried out on the basis of the computation founded on the principles of the quasistatic delivery of putties. The dimensions of the cracks obtained by the impact method and volumes of the putties necessary for this and calculated on the ba-

sis of the principles of the putties quasistatic delivery into the formed cracks will conform to the maximum magnitude of their values.

The role of the diameter of the shot hole filled with a putty substance, when projecting mining technologies, consists in the creation of preliminary conditions for providing a sufficient value of the breaking tension needed for the beginning of the crack's evolution. Thereat, it should be selected the minimal from the number of possible ones. The length of the shot hole, when projecting mining technologies, should be of the possibly maximal sizes. It is connected with the fact that the destruction mainly takes place in the area of the contact of the jib-stick and the putty. At this rate the maximal length of the shot hole will promote the maximum dimensions crack formation at the single introduction of this jib-stick. The following things depend on the shot hole diameter and length intercombination: the hole pitch in the line; the specific quantity of shot holes and specific consumption of the putty for the split-off surface; the diameter, internal design and length of the wedges applied; the possibility to perform the works with natural and artificial cracks re-drilling or without it. Thereat, the character of the possible spatial arrangement of the shot holes serving to form longitudinal cracks allows using intermediate

empty shot holes serving for the breaking-off works volumes reduction and the creation of an even main crack without cross ones.

The stress concentrators settled on the walls of the shot holes at the formation of longitudinal and cross cracks can be formed before the moment of the putties discharge from these holes, and also can be combined with it depending on the techniques and process solutions applied.

The total energy consumption to form the cracks of equal dimensions using putties will be as more as more the impact energy of the applied instrument is, on the condition that its size is sufficient for the beginning and continuation of the crack evolution.

The possibility of the beginning and continuation of the development process of the cross crack formed at the shot hole bottom level, all other things being equal, will be connected to the application necessity of the instrument with a greater single impact energy compared to the longitudinal crack gradually formed throughout the length of the shot hole.

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 15.07.2008.

*Short report***ANALYSIS OF PERSEIDS SHOWER METEOR CHARACTERISTICS ON THE BASIS OF PHOTOGRAPHIC OBSERVATION DATA**

Sedelnikov A.V., Serpukhova A.A.
*Samara State Aerospace University
 Samara, Russia*

Introduction

Arago considered astronomy the lucky science that does not need any embellishment. Astronomy is one of the most ancient and fascinating sciences. It dates back to the old times when the written language did not exist. Observing the stars and noting the regularities of celestial body apparent motions, man learned measuring time and created the prototype of the first calendar.

Throughout the whole human history the man tried to realize the mystery of the universe and create the consistent world view. The spyglass that was invented in Holland in 1609 and laid the conceptual basis for the modern giant telescopes, greatly facilitated the considerable extending of the Universe frontiers by the scientists.

However, in spite of the grand-scale scientific and technical revolution that also involved astronomy, it is practically the only science where the observations of the Universe phenomena are still urgent, spectacular and fascinating.

The present paper describes the characteristics of Perseids shower meteor basing upon the data of the photographic observations performed on August 13, 2007. The observations were performed with the application of ZENIT-EM camera featuring MIR-1B objective lens.

Perseids Meteoric Shower

The name Perseids comes from Perseus constellation that makes a source of these falling stars for the careful observer. If we plot the visible traces of meteors on the celestial map and draw the straight lines backward, we will see that for the most of the observed meteors these lines converge in Perseus. And their point of convergence is called the radiant. Thus, the meteors fly away in the various directions from the radiant. Actually the meteors of the shower move in parallel with each other, and the visual scatter from a single point of the coelosphere can be compared with the rails in the tangents. For the observer they seem to radiate from the far-off single point, but in fact they are laid strictly in parallel.

In summer 146 years ago a beautiful, previously unknown comet appeared in the sky. It was discovered in mid-July by American scientists L. Swift and H. Tuttle. During the rest of the summer this comet was seen high in the sky from the Northern hemisphere of the Earth. And during the last week of August the comet radiance reached its peak – the second stellar magnitude, moreover the comet had a long

bright tail. While examining this comet through the telescope one could see luminous nebulous jets radiating from the dense nucleus of a comet like the flower lobes. It was not by chance that Camille Flammarion, the greatest astronomy popularizer ranked Comet Swift-Tuttle among the ten most beautiful comets of the nineteenth century. Others called it simply the Great Comet of 1862. But it was the appearance of this comet that made the scientists notice the relation between the comets and meteoric showers. Thus, in 1867 Giovanni Скиапарелли, a well-known Italian astronomer stated that the comet orbit almost coincided with Perseids orbit and the comet itself had ejected the finest fragments of the particles generating Perseids meteoric shower. Nowadays the relation of most of the meteoric showers with comet remnants is proved.

In 2007 the radiance peak of Perseids meteoric shower – that is the most popular among amateur astronomers – fell on August 13. The bright meteors of this intensive shower (the hour number of meteors visible with the unaided eye amounts to 60) could hardly be mixed with any other shower or sporadic meteors.

Photographic Observations of Meteors

Photographic observations present one of the most important methods of studying meteors. They provide the maximum information scope for each meteor including its position, velocity and luminosity at any point of the visible trajectory.

Meteors can be photographed practically by any camera. It is not only the number of photographed meteors but also the image quality and the scale that matters.

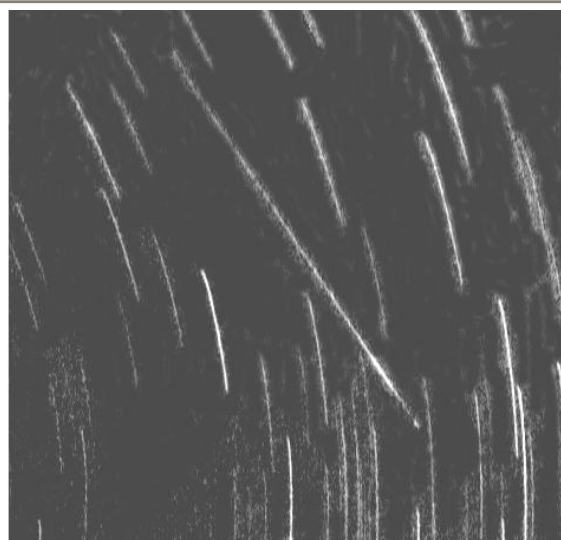


Figure 1. The processed snapshot of the meteor

In 2007 the conditions for Perseids observation from Samara were very favorable: clear sky during the whole period of the meteoric shower action (mid-July – mid-August), meteoric shower peak coincided with

the interlunar period. The photographic observations were performed with the application of ZENIT-EM camera featuring MIR-1V objective lens (37mm focal distance, 60° viewing angle, 1:2.8 relative aperture). Academia 200 film was used for photographing. The exposure was 2 hours. Fig. 1 presents the processed photograph of one of the shower meteors observed at 20^h25^m Universal Time on August 12, 2007.

After the chemical processing of the film with D-76 developer and acid fixer, the photographic image of the meteor was scanned with the help of Epson Perfection 1260 scanner slide-adapter featuring 2400 dpi resolution with subsequent Photoshop processing of the image.

Correlation of the meteor visible path with the horizontal frame dimension (60°) results in the following path length estimation:

$$l \cong 12^\circ.5$$

The comparison of the meteor photographic brightness with the stellar brightness of the stars observed in the same snapshot afforded plotting the approximate light curve (Fig.2).

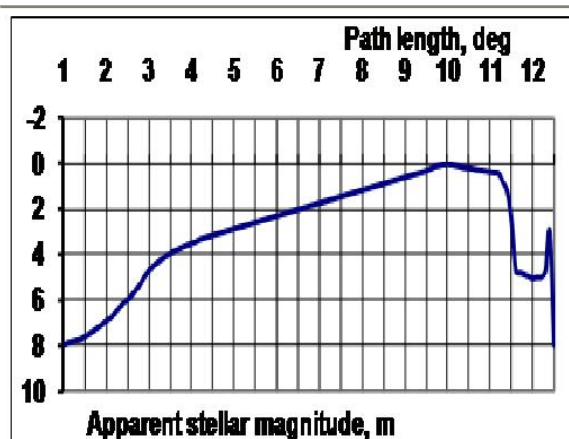


Figure 2. The meteor light curve

The maximum brightness was estimated as follows: $m_{\max} = 0^m.0$ (practically the same as for Vega (α Lyra, $m = +0^m.03$ [1]) also observed in the snapshot). Extra-atmospheric mass is defined basing upon the approximate functional connection for Perseids meteoric shower [2]:

$$m_{\max} = -4.5 - 2.35 \lg M_{\infty} - 2.31 \lg (\cos Z_R), \quad (1)$$

where M_{∞} is meteoroid extra-atmospheric mass, Z_R - its coaltitude at the moment of maximum brightness. The value of the extra-atmospheric mass at $Z_R = 30^\circ$ is as follows: $M_{\infty} \cong 0.014 \text{ g}$.

The meteoroid mass at the moment of maximum brightness was equal to the following value:

$$M_{\max} = \frac{8}{27} M_{\infty} \cong 0.004 \text{ g}.$$

The following equation is used for defining the meteoroid velocity at the maximum brightness moment:

$$M = M_{\infty} e^{-\frac{\sigma}{2}(v_{\infty}^2 - v^2)}, \quad (2)$$

where $\sigma \cong 3 \cdot 10^{-12} \text{ s}^2 / \text{cm}^2$ is ablation coefficient (meteoroid surface mass loss). Substituting M_{\max} instead of M , and 61 km/s [2] instead of v_{∞} into (2), we get the following:

$$v_{\max} = \sqrt{v_{\infty}^2 + \frac{2}{\sigma} \ln \frac{M_{\max}}{M_{\infty}}} = \sqrt{61^2 + \frac{2}{0.03} \ln \frac{8}{27}} \cong 60.332 \text{ km/s}$$

Thus, the meteoroid practically preserved its initial velocity.

Luminous intensity curve is plotted basing upon Fig.2 data with application of the following approximate functional relation:

$$\lg I = 9.72 - 0.4 m$$

This ratio is presented in Fig. 3.

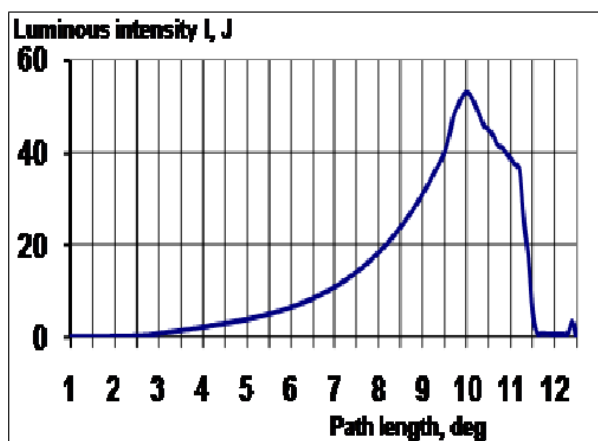


Figure 3. Meteor luminous intensity curve

Thus, within the scope of this work the photographic image of Perseids shower meteor was used for plotting the light curve and the luminous intensity curve, and for estimation of the meteoroid extra-atmospheric mass as well as its mass at maximum brightness and its velocity. The present study presents interest for investigation of shower meteors and background meteors.

References:

1. P.G. Kulikovskiy, *Stellar Astronomy*, Nauka, Moscow, 1985, p. 272.
2. P.B. Babadjanov, *Meteors and their Observation*, Nauka, Moscow, 1987, p. 202.

*Materials of Conferences***DEVELOPMENT OF SITUATIONAL SUPPORT CENTERS IN EDUCATIONAL DECISION-MAKING ACTIVITY**

Egorov A.I.

*Lipetsk Teachers' Training University
Lipetsk, Russia*

The solution of applied problems of management activity requires fresh approaches to the research and information supply and necessary methodic, program-instrumented and technical means. An effective form of these means integration is the situational centers (SC), which provide qualitative training, analysis, discussion and collective managerial decisions making owing to the conjunctive use of modern information display and processing soft- and hardware and find wider and wider application in the state and corporate bodies as an instrument of management activity support.

It conditions a wide introduction of situational centers into the state and corporate governance practice. Currently, the governmental authorities' analytical situational centers system is being developed: from the situational center of the Russian Federation President (SC RP) up to situational centers of Ministries, Agencies and Regulatory Bodies of the RF subjects.

The state administration bodies' development trends in our country and also the extensive world experience allow forecasting a substantial increase of the situational centers number and functional capabilities created, first of all, on behalf of Ministries' and Agencies' leaders, the RF territorial subjects' headmen, and also large-scale concerns' and organizations' directors in 2008-2010.

The adequate use of situational centers is possible only when leaders, managers and most of government employees taking part in the preparation of analytical and forecast materials will present the research and information capabilities of the situational centers fully enough.

The judgement training is a modern and topical direction in the general professional and extended education. The training of managerial personnel and all level managers is impossible without this kind of educational activity. The managerial decisions (especially team decisions on complex multi-factor problems) are made in the environment of the situational center with the use of intellectual information-and-communication technologies (ICT).

The use of SC is a new instrument for teaching. An individual training of specialists in some cases is less beneficial economically than collective training in an SC. In this connection there appears a need for the educational direction SC organization, inclusive of those on the basis of educational institutions. Thereat, the SC educational direction sets be-

fore the designers and teachers a series of absolutely new problems, such as the development of didactic foundations and technical approaches to the use of computer-aided design means, expert systems and multimedia at the formation of team decision making skills at an SC. It is connected with the act that there are very few situational centers meant for the educational process running in the country, and their work experience is little. It is explained by the expensive-ness of the SC technological and software environment and the lack of organizational, methodical and didactical developments for the SC use in the educational process.

The use of the idea "training situational center" or "*educational situational center*" (ESC) in connection with a few number of the SC used in the educational process requires separate consideration. In the SC definitions available the activity aspect generally pales into insignificance, making room for the technological one. The following, for example, can be quoted as a typical definition: "The aggregate of soft- and hardware means, scientific-mathematical methods and engineering decisions for the mapping and modeling process automation, case and administration analysis".

There are, at least, two approaches to the definition of the idea "training SC" or "educational SC". On the one hand, the ESC – is the means of team training of a great number of specialists able to work in the collective regime (on the solution of a general problem with due account of possible influences of their solutions on the colleagues' activity) under the condition of impossibility or economic unprofitability of individual training (at separate working places). In this context the educational function of the SC adds up to the training of the personnel itself of the present or future SC. On the other hand, the ESC – is a modern instrument to support active, activity- and medium-oriented kinds of education on the problems invoking powerful enough (in particular, intellectual, analytical) information-and-communication technologies.

At the present time there is no fully formed and approved ESC structure, but its technical component (audiovisual and communicative equipment) and also some technologies of situation analysis and modeling are used in education. Besides, there is a relatively small SC group, which can work in the educational regime.

One can mark out five basic characteristics distinguishing SC from other decision-making support and corporate information collection and registration systems, which are customary to be called the enterprise management systems; all these features are necessary to be taken into account and exercise actively in the real educational process in the ESC environment.

1. The assignation of *generalized information* to the users, the opportunity of aggregated data analysis.

2. The availability of *forecasting* means and means of detecting development trends of the investigated phenomenon or process. There are about 200 various forecasting algorithms, and it is necessary to develop complementary mechanisms, which will show if the given algorithm can work in the concrete situation.

3. *Situational (dynamical) modeling* as an opportunity to get an answer to the question “what if”. While forecasting allows getting the development scenario based on the current situation analysis, modeling allows perturbing and defining probable consequences connected with the beginning of this or that event.

4. The formation of recommendations for *choosing one from many alternate solutions*. The best solution search algorithms – are complex computational problems, so the problem is usually localized,

and then the best solution for a certain set of conditions is being found.

5. The opportunity of carrying out *risk assessments*, when estimating forecast implementation chances. These calculations are based on a special branch of mathematics – actuarial mathematics.

References:

1. Manushin A.E., Mitin A.I. Educational situational center as the environment for teaching team decision making: Methodological recommendations for the system of managerial staff professional development and advanced training – M.: RACC Publishing House, 2007, p.46.

2. Research and Practice Conference “Situational Centers – decisions and problems. Expert view”, October 30-31, 2002: Speech theses - M.: Polymedia, 2002.

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 01.08.2008.

Materials of Conferences

SOCIAL AND PHILOSOPHIC ANALYSIS OF
DEATH PHENOMENON

Kharitonova N.N.

SSPA

Sterlitamak, Russia

«Memento mori»

(«Remember that you must die!»)

The origin of life has been occupying the minds of naturalists, philosophers and religious speculators from the early times, while the prescription and essence of death had been drawn a veil over for a long time. Scientists, doctors, biologists were not concerned about it thinking that if nobody can avoid death, it isn't worth spending efforts on the perception of the meaning of this sad phenomenon. But indeed, death is inseparably connected with life. And more over, *there is no last without first*.

Greeks believed that only death gives life a finished look.

A human is born to die. That is the result of any coming into the world.

It is like the Moebius loop, a glued in the twisted state strip of paper. You pass your finger along the outer side of the surface, and it suddenly turns surely to be the inner one – having been born, a human is destined to die.

Nothing is everlasting. And every beginning has its end.

Death – is an important factor of the human existence. Only gazing into the face of death we begin valuing life seriously. If there were no death, life would have no sense. As early as in Classical Greek mythology, immortality was the most awful penalty, which gods could punish the human with. Immortality was the main dream of the humanity, but what can be more absurd and awful than immortality? If you once got this “gift” of life, imagine, what will come out of it: you grow up, gather momentum, your relatives die, then your friends, children, children of your children do, and you keep on living absolutely lonely and deserted in foreign, strange for you, time and culture. And it will go on forever. And it will be endless... That is why immortality is hard to be called a gift for a human.

Death is inevitable. It accompanies the human from the very moment of his birth. It is like a shadow, the most loyal and obtrusive. It follows him in tracks and can change its state from the shadow into the flesh at any time. Acquiring consciousness, the human learns about his future death immediately. In this regard – the human is the most unhappy one from all the animals. But at the same time everything in the nature has its own minuses and pluses. Knowing about his death gives the human a great privilege, as death or-

ganizes the human life, makes the human find its sense for a short period.

Death - is not the end, but the crown of life; it is in its picture as a life regulating element. It is a stimulus, which makes the human do something significant in life, and it means, it supposes the becoming of goals in the human's life. But often in everyday life the human lives as if he is immortal. We try not to think about death, fence off the thoughts about it in every possible way and suppose that death is very far from us. As far as ancient times wise men said: “Memento mori!” (Remember that you must die”). Why did they say like that? Why did one have to remember about death? Sure, it was not for the human to depress himself and be in low spirits for the whole life because of despair and certainty of death, to spoil his life and constantly suffer torments from fear. Not at all. These words should motive the thoughts in the human consciousness that he should live every day of his life as if it is his final day, though it can really turn to be the last one, as nothing must be excluded. It is supposed that the worst man will try to live righteously, humanly at least one final day of his life – not to lie, not to kill, not to steal.

It is unknown when and where death will catch the human. It can happen at any, even the most unexpected, moment. Either within four walls of the house, when you are peacefully reading a book, or in the open space of the nature. If a horse stumbles under you; if a tile drops from the roof; if you merely prick against a pin – all this can be expressed by the question: “What if it is death?” That is why it is impossible to be guessed, and it means it is impossible to know in what guise it will come; and so it is impossible to run away, escape or deceive from death. There is no need to be afraid of it. Everyone needs to manage to deprive it mystique, discover that concealed that it embosoms, view it closer, get used to it, speculate on it. “To think about death – means to speculate on freedom. Who has learned to die – has learned to be a slave. Readiness to die relieves us from any subjection and enforcement. And there is no evil in life for the one, who has comprehended that to loose life – is not evil”. (Monten' M.)

We are always under careful attention of death. You can feel its presence, its reality over every turn. Certainly, it is an albatross. The understanding of our mortality requires a considerable effort from us. Every day the human acts to avoid death. Hence, he realizes that one day death will draw up with him. Why then to put it off for such, it should seem, a short period? Maybe, 20, 40, 60 years... But what is this time compared to the time of the Universe, where there are light-years?... Where it seems that the time doesn't flow... Where the eternity exists...

And, perhaps, “the best philosophy is to dispute everything and not to express a definite opinion” (Cicero).

The work is submitted to the Scientific International Conference “Modern problems of science and educa-

tion», Russia (Moscow), May, 13-15, 2008, came to the editorial office on 23.04.2008.

Materials of Conferences

**THE RESEARCH OF RADIOACTIVITY
COMMERCIAL ICHTHYOFAUNE OF
RAZDOLNAYA RIVER ESTUARY
(PRIMORSKIY REGION)**

Borisenko G.S.

*Pacific Research Fisheries Centre (TINRO-Centre)
Vladivostok, Russia*

Fishing industry in seas, bays, rivers give the considerable share of protein in ration feed on population of the country. Water always contains definite quantity of natural radionuclides. At the same time, radioecological characteristic of reservoir abrupt deteriorate out of anthropogenic radiocontamination in consequence of development atomic power both military and peaceful aims. The anthropogenic radionuclides in ecosystems of Amursky bay and Razdolnaya River (Peter the Great Bay, Japan East Sea) generally have its origin from nuclear weapon tests pursued formerly. Cs-137 and Sr-90 are the most hazardous in regard to sanitary-hygienic aspect. Artificial radionuclides Cs-137 and Sr-90 are analogies to biogenic elements potassium and calcium accordingly and accompany them in nature. Entering hydrobionics by different ways Cs-137 accumulates mainly in muscular tissues and Sr-90 – in bone tissues. The objects of investigation were freshwaters fishes of Razdolnaya River such as Silver carp, Carp, Crusian carp and semipassing by species of fishery (Far Eastern dace, Asiatic smelt, Haarder). Razdolnaya estuary being the largest in Primorye in the same time is the transitive zone between the freshwater and seawater place for semipassing species of fish and their fatten getting from the river basin. To fix contamination of the radioisotopes in ichthyofauna the radiochemical method was used. Cs-137 was picked out as cesium bismuth iodide and Sr-90 was defined by its daughter's isotope Y-90 in the form of yttrium oxalate. During investigation it was ascertained that the lowest concentration of radionuclides have semi-passing fishes Cs-137 (1.9-2.9 Bk/kg) in muscles and Sr-90 (0.8-2.4 Bk/kg) in bone tissue, concentration of Cs-137 and Sr-90 in fresh water living fishes of Razdolnaya River was 3.5-5.6 and 2.7-6.6 Bk/kg respectively. It shows that the way of life of fishes determines its radionuclide concentration level essentially. Semi-passing fishes calling at Razdolnaya River to propagate mainly lives at sea and thus concentration of Cs-137 and Sr-90 in them are lower of fresh water ones. Adduced data shows that the low level of mineralization of Razdolnaya river water increase concentration of radionuclides in fish tissues.

According to existing standards, which prescribes "Hygienic requirements of food's safety and food's value" the Cs-137 contents in living fishes and in raw must not be more then 130 Bk/kg and Sr-90 contents – 100 Bk/kg. Obtained of artificial

radioactivity of fish in Japan Sea with sanitary norms for food production we can see that these levels considerably lower of permissible and consequently the fish safe in radiationally-hygienic terms.

The work was submitted to international scientific conference «Monitoring of Environment», September, 9-16, 2008, Italy (Rome, Florence), came to the editorial office on 21.07.2008.

**HYDROLOGICAL RISK ON KAMA WATER
BASINS AS CONSEQUENCE OF CHEMICAL
POLLUTION**

Kitaev A.B, Dvinskikh S.A.

*Perm State University
Perm, Russia*

Hydrological risk as variety and component part of ecological risk creates the danger of the disadvantage influence on organic and health of the people. The risk into the reservoirs formed the first to account of the contamination their water masses unset industrial enterprise that to account technical press on water objects.

In upper part of the Kama reservoir is located Solikamsko-Bereznikovskiy and in upper part of the Votkinsk reservoir - Permsko-Krasnokamskiy industrial complexes. They are the main source of water pollution, their contribution to technical load on basins more than 90%. For feature of the particularities hydro-chemical mode of the Kama and Votkinsk reservoirs analysed material removals reservoirs executed in 2003. The hydro chemical analysis was made in seven points:

- head range of Kamskoe reservoir (Tyulkino);
- two points near Solikamsko-Bereznikovskiy industrial complexes;
- point under Berezniki;
- point near entry in central enhanced part of water reservoir;
- point in bottom part of reservoir (Dobryanka);
- point in the dam area of Kamskoe reservoir (Kamskaya Hydroelectric station).

Value general salinity. At winter period in point Tyulkino amount ion were 150-160 mg/dm³, bottom software course (Solikamsko-Bereznikovskiy industrial complexes) it advanced to 240-480 mg/dm³, and later decreases to 320 mg/dm³. During the spring salinity falls and prepares 150-130-90-170 mg/dm³. It joint with ingress of snow water. In summer concentration was 160-560 mg/dm³. The maximum of year value salinity in this point was 560-220-140-160 mg/dm³ and wasn't excess the most possible concentration (MPC).

Chlorides. The concentration Cl^- in first point remainder 12-32 mg/dm^3 in winter, 2-4 mg/dm^3 in spring and 6-14 mg/dm^3 in summer and autumn. The maximum value of chlorides in points near Solikamsko-Bereznikovskiy industrial complexes: 170 mg/dm^3 in winter, 42 mg/dm^3 in spring and 69 mg/dm^3 in summer. Bottom software course contents remainder 130-110-100 mg/dm^3 in winter, 27-14-29 mg/dm^3 in spring, 68-31-20 mg/dm^3 in summer.

Biogene elements. The concentration of biogene elements changes: ammonium ion – from 0,32 mg/dm^3 in Tyulkino to 1,5 mg/dm^3 under Beresniki (3 MPC) to 0,6 mg/dm^3 (1,2 MPC) in dam area in winter, in spring it was 0,55 (1 MPC)-0,44-0,30 mg/dm^3 and in summer - 0,24-0,22-0,21 mg/dm^3 ; the concentration nitrate ion in all points is less than 1 mg/dm^3 , the contents of the nitrate nitrogen changes from 0,05-0,02-0,01-0,00 mg/dm^3 in winter to 0,04-0,03-0,01-0,00 mg/dm^3 in summer.

Iron (general). The Kama river has natural a high concentration of iron (1,2-1,6 mg/dm^3) and in all points the Kama reservoir was found the exceeding of MPC of these components (3-7 MPC).

Copper. The contents copper was enough stable and high in all time and whole length (2-4 mcg/dm^3). The exceeding of MPC of these components was found in all points (2-4 MPC).

Oxygen. The minimum of oxygen was less 6 mg/dm^3 in winter and it exceedingly unsafe. In points near Solikamsko-Bereznikovskiy industrial complexes concentration was 3,8-5,2 mg/dm^3 , bottom software course contents remainder 6,0-5,0-4,1 mg/dm^3 . Floor amount of oxygen was 9,4-8,9-9,6-8,7 mg/dm^3 in spring and 7,1-5,8-6,2-3,5 mg/dm^3 . The contents oxygen was quite low in winter and summer and excited misgiving as environmental risk.

The analysis of this material allow made next conclusion:

- Value general mineralization and the main ions in reservoir and in all time its water mode is found in rate.

- At winter period is noted excess the most possible concentration (MPC) in upper part ion ammonium in 2-3 times; on the whole length excess at most-possible concentration exists Fe (in 5-7 times), Cu (in 2-3 times), Mn (in 8-10 times), Zn (in 1,5-2 times), Pb (in 1,5-2 times), O_2 (before 1,8 times), the chemical consumption of the oxygen (CCO) (in 3 times), the biochemical consumption of the oxygen (BSO) (in 1,5-2 times).

- At period of the spring in region Solikamsk-Bereznikiy is noted excess MPC the NH_4 in 1,5 times; on the whole reservoir excess MPC the Fe in 3-5 times, Cu - 3-4 times, Mn - 5-6 once, BSO - 1,2-1,5 times, CCO - 2-3 times.

- In summer and autumn excess MPC exists on the whole reservoir on: Fe in 4-6 times, Cu - 3-4 times, Mn - 8-10 times, Zn - 1,5-2 times, BSO - 1,2-1,5 times, CCO - 3 times; in dam area of reservoir

contents of the oxygen have formed 3,5 mg/dm^3 at rate in 6,0 mg/dm^3 .

The General conclusion: the Kama reservoir in all time of the water mode as before subject to most strong technical influence and quality of its water far from requirements both for person, and for different branches facilities edges.

Monitoring observation in the area of Votkinsk reservoir is being conducted in next points now:

- two points lengthwise Perm industrial complexes;
- point below Perm (N.Muly);
- two points lengthwise Krasnokamsk industrial complexes;
- point near Ohansk;
- point near Elovo;
- point in the dam area of Votkinskoe reservoir (near Tchaikovsky).

Value general salinity. The composition of sum main ions doesn't exceed the most possible concentration (MPC), but changes on the length of the under investigation region significantly, so quantity near Perm was 310-430 mg/dm^3 , below Perm – 530 mg/dm^3 and decreases to 440 mg/dm^3 (below Krasnokamsk) - 390 mg/dm^3 (Ohansk) - 375 mg/dm^3 (Tchaikovsky) in winter. The contents of these elements insignificantly in spring - 78-105-101-82-79-83-92-95 mg/dm^3 (from Perm to dam area). The largest value salinity in summer was near Perm (380 mg/dm^3) and decreases to 200 mg/dm^3 (area Krasnokamsk-Ohansk) and 160-130 mg/dm^3 (area Elovo-Tchaikovsky).

Chlorides us dominant effect man-caused factor: the contents falls from 99 mg/dm^3 (near Perm and Krasnokamsk) to 61 mg/dm^3 (dam area) in winter, increases from 26 mg/dm^3 (above Perm) to 64 mg/dm^3 (bellow Perm) and falls from 25 mg/dm^3 (bellow Krasnokamsk) to 11 mg/dm^3 (Tchaikovsky) in summer.

Biogene elements. The contents of ammonium ion falls from 0,91 mg/dm^3 (Perm) to 0,51-0,65 mg/dm^3 (Krasnokamsk), 0,31 mg/dm^3 (dam area) in winter and exceed the MPC from 1,8 near Perm to 1,1 near Ohansk. The composition of this element in other period changes insignificantly: from 0,4 to 0,2 mg/dm^3 on the length of the under investigation region. The contents of nitrate ion doesn't exceed the most possible concentration. The value of the nitrate nitrogen exceeds the MPC near Perm in 1,8-2,0 times in winter and summer.

Iron (general). As in the Kama reservoir as in the Votkinsk reservoir contents of iron was high and found the exceeding of MPC in all time, so Fe falls from 0,91 mg/dm^3 (9 MPC) near Perm to 0,30 mg/dm^3 (3 MPC) near dam area in winter, increases from 0,43 mg/dm^3 (4 MPC) near Perm to 0,72 mg/dm^3 (7 MPC) near Elovo in spring and has minimum in summer (falls from 0,3 to 0,06 mg/dm^3 on the length of the re-

gion). The exceeding of MPC of these components was caused natural and industrial factors.

Copper. The concentration of copper exceeds the most possible concentration for water consumption, that caused hydrologic risk, so contents falls from 4-5 mcg/dm³ near Perm and Krasnokamsk to 2-3 mcg/dm³ in over area all time.

Oxygen. The contents of oxygen has minimum near Perm in winter (5,4 mg/dm³) and increase from 6,9 mg/dm³ (Krasnokamsk) to 9,2 mg/dm³ (Elovo) and to 7,3 mg/dm³ (dam area). During the spring concentration of these element was 8,4-8,9 mg/dm³. The contents of component exceed the most possible concentration in summer, so 5,7-6,0 mg/dm³ near Perm, 6,6-7,4 mg/dm³ in area Krasnokamsk-Ohansk and 3,6-6,6 mg/dm³ in area Elovo- Tchaikovsky. The low concentration of oxygen can be causes hydrologic risk.

Some main conclusion:

- Value general mineralization and the main ion chemical composition of water in all parts reservoir and in all phases its water mode is found in rate.

- Excess of the rates MPC on NH₄ is noted in winter (in 1,1-1,8 times). In this period concentration the NO₂ (in 2 times) in Perm; the Fe (in 3-9 times), the Cu (in 2-5 times), the Mn (in 12-20 times, increasing beside Perm before 40 time), Zn (in 1,5-2,0 times), phenols (in 1,5-2,0 times). The most possible concentration of oil products near Perm (in 2-9 times) and Krasnokamsk (in 2-3- times). Disadvantage situation formed on contents of the oxygen in upper part reservoir and all part in average (Ohansk). The MPC of BCO (in 1,4 times) was noted in Krasnokamsk. The value CCO on the whole reservoir has formed 2,2-3,2 times of MPC.

- At the spring the most-possible concentration contents: Fe - in 3-7 times, Cu - in 2-4 times, on Mn - in 5-8 times, CCO - in 1,8-3,2 times.

- In summer and autumn is noted excess MPC on: Fe - in 1,2-3,1 times, Cu - in 3-5 times, Mn - in 5-7 times, Zn - 1,5-2,0 times, phenols - 1,5-2,0 times, CCO - 1,8-2,2 times. Besides, excess the most possible of concentration is noted on NO₃ in region Perm (in 1,8 times). It is noted excess MPC the oil products (in 1,5-3 times). The disadvantage situation on contents of the dissolved oxygen formed in Perm and in average part of reservoir. In the dam area of reservoir is noted excess MPC on the BCO (in 1,2 times).

The General conclusion – the Votkinsk reservoir in all time its water mode, as before, subject to most strong technical influence and quality of its water far from presented requirements both for person, so for different made facility edge. Particularly, the disadvantage situation forms in region of the location Perm-Krasnokamsk industrial complex.

The called on studies have allowed to reveal the area of reservoirs the most subject to technical (first of all chemical contamination) influence; track the speaker and transformation of the contamination both in space, and at time; value the danger an hydrol-

ogy risk in different phases of the water mode under investigation reservoirs; reveal the components chemical composition water, which follows to consider made risk. The got results are a central to the following development wildlife action.

The work was submitted to the International Scientific Conference «Environmental monitoring», August, 16-23, 2008, Turkey (Antalya), came to the editorial office on 16.06.2008.

INVESTIGATION OF FIELD LAYER INFLUENCE ON REGENERATION CHARACTER OF CUT-OVER LANDS IN MIDDLE ANGARA REGION

Runova Ye.M., Savchenkova V.A.

Bratsk State University

Bratsk, Russia

The problems of environmentally safe forest use, forest reproduction, maintaining at the desired level or preservation of ecological functions of the forest deserve special attention and detailed study.

A burning problem is the reduction of terms for growing forest resources, the improvement of quality state of forest restoring measures. For its solution a detailed study of the most common types of cut-over lands of the Middle Angara Area, the dynamics of their structural changes, and also initial phases of forest formation.

Changes of environmental conditions, differences in the flora, and its change reflect on the duration of the forest restoration period, at the contraction of which the forest productivity increases.

For the Middle Angara Area, after felling the plantations with pine and larch prevalence, the following types of cut-over lands are indicative: fireweed, small reed, herb, gross grass, clusterberry-small reed with green mosses presence.

Considering that the field layer defines the environs for the regeneration and initial phases of forest formation, the research on permanent and temporary sample plots for the purpose of its change dynamics study has been carried out. Annual observations allow finding out the dynamics of ground covering with some or another species of plant, stating the regeneration principles connected with the dominant kinds of grassland vegetation.

The investigations are carried out by defining the occurrence of various kinds of suffrutescent-grassland and mossy-lichenous plants, their projective cover, abundance, vital power, distributional pattern by area. A comparative analysis was carried out on the estimate results. Annual observations allowed detecting some or other plant species coverage area dynamics, establishing regeneration regularities connected with the dominant kinds of grassland vegetation.

On fresh cut-over lands the forest herbs prevail, changes begin with the cut-over age increase.

The change of mossy and herb stratum in cut-over lands has a significant effect on the forest-regeneration processes. So, for example, the natural seeding of pine and fir trees occurs in the areas occupied with fire-

weed more often than in the areas covered with grass plants.

In table 1 the influence of grass cover representatives on the emergence of pine seedlings is shown.

Table 1. Influence of grass cover representatives on the emergence of pine seedlings

Grassland (dominant)	Type of soil conditions	Cut-over land type	Projective soil cover with herbs, %	Number of young seedlings, thousand of things
Small reed, leguminous	B ₂	Grassland, gross grass	70-85	3,5-5,0
Clusterberry, small reed, moss	A ₀ , A ₁ , B ₁ , B ₂	Clusterberry, clusterberry-small reed with green mosses presence	65-80	3,0-8,0
Fireweed, small reed	B ₂ , B ₃	Small reed, grassland	55-70	2,5-5,0
Moss, small reed	B ₂ , B ₃	green-moss-grassland	75-85	4,0-7,0
Fireweed	B ₂ , B ₃	Fireweed	80-90	0,5-2,0
Other kinds	B ₂ , B ₃	Grassland, gross grass, small reed	75-95	1,5-3,0

Thereat the fireweed coverage keeps the young pine and fir tree seedlings from dying off because of high and low temperatures.

In table 2 the average results of temperature and luminance measurements of the soil level during the vegetative season (the measurements were carried out from 12⁰⁰ to 13⁰⁰ on fair weather) are presented.

Table 2. Average results of temperature and luminance measurements of the soil level during the vegetative season

Cut-over land age	Soil level temperature, C ⁰	Soil level luminance, ths. of lx
First year after felling	29	89,3
Fourth year after felling	25	18
Eighth year after felling	23	14,8

But the fireweed thick cover influences negatively on growth. The grass plant cover influences especially negatively on the conifer young growth. It quickly affords a sod preventing the seeds from germination and seedlings from growth. Water soluble materials, which decrease the pine and fir tree seed vigor, growth and survival ability of the young plants, come into the soil and soil level together with precipitation from herb debris.

With the field layer thickness increase of the conditions for timber species emerging and growth get deteriorated. Thus, for example, the pine natural seeding increment made 5,6-6,6 cm per annum in the piny wood in the segments with herb stratum, and without the last - 7,3-9,9 cm per annum. Especially vividly this difference is manifested in the staddle growing near grass plant blocks. The clean felling in the areas, where relatively rich sabulous and loam soils, which are disorderly covered with herbaceous vegetation

rendering not only coniferous, but also hardwood species regeneration difficult after growing stock felling, prevail are repopulated least successfully. In various kinds of grass plants the sod is formed differently. So, in grassy small reed a heavy sod is formed on the soil level, and wood small reed interweaves and thickens the ground litter and mineral horizons' top with its rhizomes. That is why the influence of these species on forest regeneration will be different.

In the felling year the conditions for timber species seed germination are favourable due to the field layer, good warming, soil ventilation and enough dampness competitive influence weakening. In the triennial and older cut-over lands the small reed thick sod hinders the emergence of seedlings.

In the first year after summer harvesting of wood the ground vegetation of the cut-over land differs little from that of under the cover. From the second year the pratal weed-grown herbaceous plants

dominance (see Fig. 1) begins. After winter harvesting of wood the field layer change is observed in the first year after the felling already.

The regularity in the direction of mosses' dying off and herbaceous vegetation abundant development manifests itself in the cover change.

Changes take place in the ground vegetation and forest litter with the felling age increase.

For clusterberry-small reed, clusterberry-green moss and gross grass cut-over types a good natural regeneration (more than 6 ths./ha) of commercially valuable species is indicative. The restoration of the vegetation cover typical of the forest community occurs 6-10 years earlier than in small reed, grassland and fireweed types of cutovers.

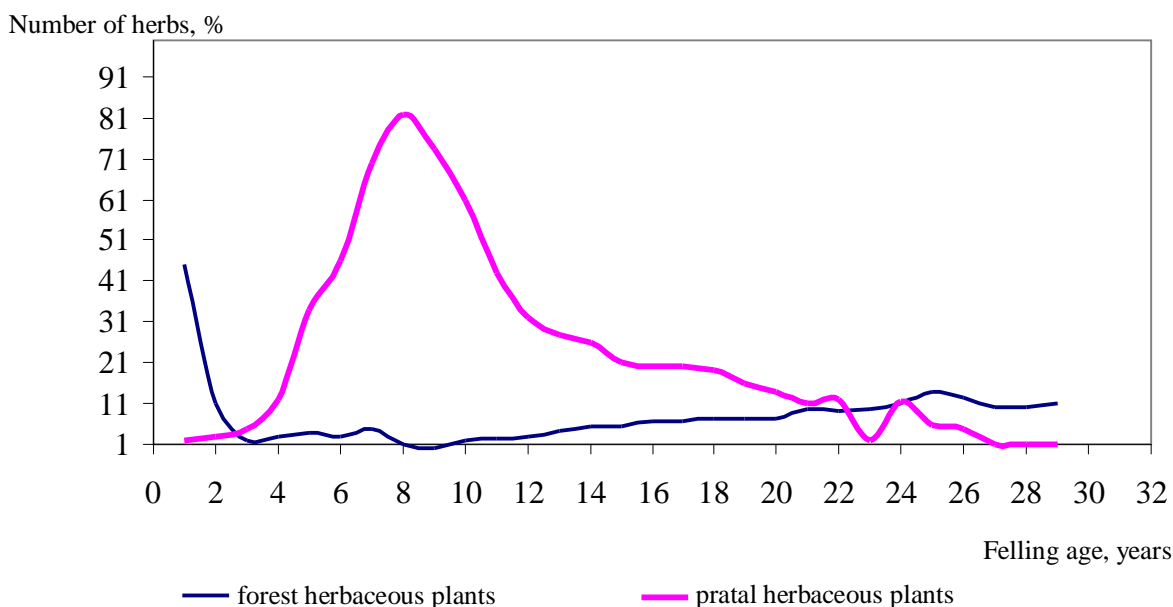


Fig. 1. Field layer time history after clear forest felling

Hardwood species defy competition with herbaceous plants forming no thick sods and prefer more humid soils.

On the research results one can come to a range of conclusions concerning the interrelation of forest associations, plant community structure and commercially valuable species regeneration:

- it is possible to judge on habitat conditions by herbaceous vegetation kinds;

- cut-over lands are subjected to heavy turf formation in places of relatively rich sabulous and loam soils (especially the places subjected to harvesting techniques), that hinders the development of natural regeneration;

- in some cases in apiarian runways a more successful regeneration than in the areas not subjected to skidding occurs;

- the most successful natural regeneration takes place in green-moss-grassland cutover types;

- the ground vegetation of derivative young growths is characterized by a greater, compared to the original forest type flora diversity due to the enrichment of the floristic composition with light-loving and meadow plants, retaining the species set peculiar to the original forest type.

The work is submitted to the Scientific International Conference "Scientific Research of Higher School on Priority Orientations of Science and Technology", June, 22-29, 2008, came to the editorial office on 22.05.2008.