MEDICO­ECOLOGICAL PARADIGM OF A HEALTH RESORT AND RECREATIONAL TEBERDA RIVER BASIN OF THE KARACHAY­CHERKESS REPUBLIC

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Due to the intensive development of coastal zones of upper reaches of the Kuban River basin ­ the main waterway of the North Caucasian and the Southern Federal districts, pollution of surface water with chemical elements and connections takes place. It creates conditions for background development of various diseases, the water run­off decreases at the head of the main basin formation. Considering exclusive importance of health resort, recreational and climate mountain orographical system of Karachay­Cherkessia which is Kuban River "cradle" carrying out geoenvironmental and balneological monitoring is of main priority. This paper investigates the role of the mountain rivers from the point of view of water resources in medico­ecological comfort of a tourist and technogenic complex: Teberda – Dombai. Possibilities of qualitative assesment of these resources, as well as some related problems are discussed in this paper. Recommendations for effective management of a catchment basin while solving ecological­and­health problems of the mountain resort are provided.

**Keywords:** Teberda basin, surface water, hydrochemistry, pollution, prerequisites of diseases

ASSESSMENT OF POTENTIAL HAZARD OF NICKEL OXIDE NANOPARTICLES

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Examination and evaluation of physical and chemical parameters of nickel oxide powder (Nickel (II) oxide, product number 637130) have shown that the substance of the complex physical and chemical properties, such as size, shape and surface area of the particles relates to nanotechnology products. According to the analysis of the annotated scientific literature sources it has been found out that nickel oxide nanoparticles were able to interact with cell membranes, proteins, DNA, and affect on the proteomic and metabolomic profile, accumulate in cells, tissues and organs, have a cytotoxic effect, possess transforming activity and carcinogenic effect. The analysis of the potential environmental impacts of nickel oxide nanoparticles has shown that it can be attributed to large­capacity industrial products, and therefore there was a possibility of exposure of personnel in the workplace. Estimation of the potential dangers of nano­sized nickel oxide using the method of mathematical modeling has showen that the nano­sized nickel oxide had a high degree of potential danger. Confirmation of this is the calculated coefficient of danger (D) of the substance amounted to 1,825 with reliable degree of assessment of the available information. Obtained results are required for subsequent detailed assessment of the toxicity of nano­sized nickel oxide and ensure public safety.

**Keywords:** nickel oxide, nanoparticles, hazard estimation

PHENOTYPIC AND GENOTYPIC CHARACTERISTICS OF THE HEMOSTATIC SYSTEM   
IN ATHLETES FROM THE EUROPEAN NORTH

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Exercise is a stress factor, acting on the body, leads to changes in the hemostatic system and in particular ­ the fibrinolytic activity. The aim of the study was to compare the genetic characteristics of the athletes, the natives of the European north, with phenotypic markers of hemostasis. Method of sampling ­ continuous. The study involved athletes engaged in different sports, with sports category of the first and above, followed by the Arkhangelsk center of sports medicine. Using PCR and ELISA methods indicators of fibrinolysis and six polymorphisms of genes of the hemostatic system proteins have been evaluated. Research of hemostasiological status and genetic polymorphisms of some hemostatic system proteins in the group of athletes have revealed susceptibility to decreased activity of fibrinolysis and increase blood coagulation potential. The reason for the differences due to the higher, compared with the European, incidence of adverse associated trait in relation to polymorphisms of fibrinogen ­ 40.5 % in the athletes (CI: 30.3 ­ 51.1 %) against 20 % in the European population; platelet fibrinogen receptor ­ 25% (CI: 16.3 ­ 34.8 %) against 13 % in the European population, plasminogen activator inhibitor ­ 77.4 % in the athletes (CI: 67.9 ­ 85.7 %) against 53­61 % in the European population. A direct correlation between the presence of adverse gene polymorphism of plasminogen activator inhibitor­1 and this factor was revealed, which indicates the phenotypic expression of genetically determined depression of fibrinolysis.

**Keywords:** sport genetics, hemostasis in athletes, fibrinolysis in athletes, physical activity and hemostasis system, stress and hemostasis, hemostasis genes, pathology in sport

EEG reactions during heart rate variability biofeedback procedure   
in adolescents with different autonomic tone living in Northern areas

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The character of the electroencephalogram (EEG) changes during a once procedure of heart rate variability biofeedback was considered in adolescents 14–17 years with different autonomic nervous types living in the different geographical latitudes and climatic, ecological conditions of the European North: the Subpolar (64°30’ N) and Polar (67°40’ N) areas. More intensive reduction of theta EEG activity (p < 0,05­0,001) with a predominance of the dynamics in the right brain hemisphere (p < 0,05), which continues to decline after the procedure occurs in adolescents of Polar region, especially in the group with a predominance of sympathetic influences on the heart activity. A common increasing of EEG alpha activity over all areas of the cerebral cortex (p < 0,05­0,001) with some displacement gradient in the front and center brain parts revealed in adolescents from all groups. A spectral power increment of beta1 EEG activity occur primarily at the expense of the front and right center­temporal brain parts (p < 0,05­0,001) in adolescents of both areas, but the biggest changes were found in persons with a balanced (normal) autonomic nervous tone (p < 0,05).

**Keywords:** electroencephalography, heart rate variability, biofeedback, autonomic nervous tone, adolescents, North

FUNCTIONAL RESPONSE OF THE CARDIOVASCULAR SYSTEM OF NORTHERNERS   
TO COLD TEST IN TEMPERATURE CONTRAST YEAR SEASONS

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Cardio­hemodynamics and systemic hemocirculation of a person before and after cold test influence in contrast year seasons was investigated to study the influence of environmental temperature on various parts of the cardiovascular system. Heart rate, speed and time of transaortic blood flow in the aortic root were measured by echocardiography. Systolic and diastolic blood pressure was measured by tonometer on the stages of cardio­hemodynamics study. It was established that the person in clinostatic body position and in a state of relative rest had lower diastolic blood pressure, speed transaortic blood flow and performance of the heart in December than in June. The study showed that the body's response to cold test influence in the summer was characterized by decreased systolic blood pressure, increased heart rate and short­term reduction of cardio­hemodynamics. In winter, the period of low air temperature local freezing caused at first increase of systolic blood pressure, and in succeeding period decrease of systolic blood pressure relative to baseline values. Wherein, change in cardio­hemodynamics and chronotropic function of the heart was not found. The results showed reduced peripheral vascular tone, less venous return to the heart with a decrease of cardio­hemodynamics and myocardial performance of a person in the cold season. The reaction of the cardiovascular system to the local freeznig was more obvious in the summer and was accompanied by a positive chronotropic effect, decreased intracardiac and systemic hemodynamics during the period of circulatory homeostasis of the body after the test.

**Keywords:** cold test, cardio­hemodynamics, contrast year seasons

PSYCHOPHYSIOLOGICAL BASES OF HORME REGULATION ORGANIZATION   
(Literature review)

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The main approaches of psychophysiological investigations of horme regulation and their development from studying the connection of cognitive processes with the prevailing rhythms of the brain electric activity and the neurovegetative system manifestations to revealing the phase changes in the brain activity foci have been analyzed in the literature review. The data on the sex differences of psychophysiological activity provision have been summarized and the possibilities of its improvement through various methods of biological feedback have been shown. Special attention has been paid to the fact that while studying horme in the majority of cases its organization is estimated by the efficiency parameter, while at present regulation is regarded as the manifestation and the dynamics of various physiological processes. In this connection, it has been suggested: while studying the horme regulation consider it as a content independent, different in complexity and heterogeneity, prolonged system­information process of human activity organization. This process is supposed to reflect a certain condition, have its own individual characteristics and properties provided by neurophysiological mechanisms, the initial level of energy resources and connected with individual features of information management and energy expenditure. On the basis of the data on trainability and on using the biological feedback a conclusion has been drawn that the combined estimation of the efficiency of activity regulation in the conditions of absence or presence of an external feedback makes it possible to adequately estimate the adaptive abilities as well as to control, to predict and if necessary to correct the functional condition of the human body.

**Keywords:** regulation, horme, feedback, electroencephalography, functional condition of the body

Predicting the Emergence of Preclinical Mental Disorders   
to Combatants

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Nozologically formed borderline mental disorder (BMD) in combatants have a lower prevalence of mental disorders unlike a painful level. Blurred diagnostic criteria do not allow to attribute to the category of BMD the short­term outage of disturbance of mental adaptation ­ transient affective and behavioral reactions (TABR). In order to develop the expectancy model of TABR formation an analysis of personality characteristics of 649 combatants of the Interior Ministry have been carried out. Intermittent TABR in anamnesis revealed in 311 persons, such states and other violations of mental adaptation was not recorded in 338. Four years later, after the trip to zones with special service conditions, according to the I. Kotenev’s method and Bass­Dark’s test combatants revealed signs of maladjustment and high levels of physical aggression. Based on the data the TABR model has been designed using logistic regression and method of forced variables input. It was found that the risk of TABR formation increases with a decrease in the indicator "the invasion of the symptoms" scale and by increasing the parameters in the scale of "hyperactivity symptoms," "distress and maladjustment," "signs of post traumatic stress disorder" "physical aggression" and "verbal aggression". This shows that TABR more often appear in combatants with increased excitability in everyday life and a high level of physical aggression, while the symptoms of re­experiencing the traumatic event are not the triggering factor of TABR formation. This technique was proposed to use in medical and psychological support of personnel to prevent formation of TABR in combatants.

**Keywords:** transient affective and behavioral reactions, combatants, expectancy model

CHARACTERISTIC OF BRAIN ELECTROBIOLOGICAL ACTIVITY IN ELDERLY WOMEN WITH DIFFERENT LEVEL OF COGNITIVE DISORDERS

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The paper shows the study results of a brain electrobiological activity in elderly women with various level of cognitive impairment. Importance of early diagnostic of cognitive disorders and applicability of methods of functional brain imaging in revealing disorders in higher cortical functions are shown in the paper. To assess cognitive functions we applied express­method of evaluating of cognitive functions during normal aging. According to the test results three groups were formed: 1 ­ women without cognitive disorders, 2 ­ with mild cognitive impairment, and 3 ­ with moderate cognitive impairment. The EEG was registered for all participants by means of 128­channel system GES­300. Absolute spectral power for all bands was calculated. According to the spectral analysis it has been revealed that higher power of the slow­wave rhythms is characteristic of groups with disorders of cognitive functions. Prevalence of a delta rhythm in the general EEG has been also stated. These changes are perhaps caused by dysfunction of the activating cholinergic systems and cortical structures, and also both dyscirculatory and structural changes of brain matter.

**Keywords:** EEG, cognitive disorders, the elderly

PANEL­ AND TREND STUDIES IN MEDICINE AND PUBLIC HEALTH

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In this paper we present how to plan, carry out panel­ and trend studies as well as how to analyze the data obtained in these types of studies. Theoretical foundations of the abovementioned study designs, their similarities and differences, advantages and disadvantages are also presented. We also discuss research questions which are the most suitable for panel­ and trend studies as well as interpretation of the results. Examples of international and Russian panel­ and trend studies published in international and Russian literature are presented.

**Key words:** panel study, trend study, epidemiology, type of study, study design