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HISTORY OF THE DISCOVERY OF ADRENERGIC AND CHOLINERGIC RECEPTORS AND THEIR SIGNIFICANCE

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Abstract. ***Introduction.*** The discovery of adrenergic and cholinergic receptors has led to the development of new drugs used to treat hypertension, coronary heart disease, asthma, and other conditions. ***Methods.*** A literature review was conducted in PubMed. ***Results.*** Particular attention has been given to the scientists who made key discoveries: Henry Dale and Otto Loewi (chemical transmission of nerve impulses, Nobel Prize 1936), Raymond Ahlquist (division of adrenergic receptors into α- and β-types, 1948), Alonzo Lands (subclassification of β-adrenergic receptors into β1 and β2, 1967), James Black (development of the first β-blocker propranolol, Nobel Prize 1988), Robert Lefkowitz and Brian Kobilka (structure of β-adrenergic receptors, Nobel Prize 2012). ***Conclusion.*** The contribution of adrenergic and cholinergic receptors research to both basic science and practical medicine is discussed.
Keywords: adrenergic receptors, cholinergic receptors.

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SEMANTIC MATRIX OF THE TERMINOLOGICAL APPARATUS FOR DESCRIBING THE FUNCTIONAL STATE OF BODY SYSTEMS IN BIOMEDICAL RESEARCH

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Abstract. ***Introduction.*** Terminological ambiguity is often observed in scientific publications on sports physiology and sports medicine, leading to logical errors in describing the functional state. The authors note the systemic nature of the problem associated with a violation of the hierarchical subordination of concepts. ***Methods.*** The work uses semantic analysis of scientific texts, conceptual analysis from the standpoint of formal logic, and an epistemological approach to distinguishing empirical, interpretative, and predictive levels of knowledge. ***Results.*** The terminological apparatus is grouped by functional and semantic categories, a hierarchical structure of levels of description of the functional state is developed, and a three-dimensional semantic matrix is constructed that allows unambiguously positioning terms in the coordinate system "empirical – abstract", "descriptive – predictive", "measurement – solution". A typology of typical mistakes in the use of terms is presented. ***Conclusion.*** The proposed approach helps to increase the semantic rigor of scientific texts and can serve as a practical tool for authors, as well as reviewers and editors.
Keywords: functional state, semantic analysis, terminological matrix, sports physiology, logical hierarchy of concepts, methodology of scientific research.

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AGE-RELATED FEATURES OF POSTURAL REGULATION IN PHYSICALLY ACTIVE INDIVIDUALS AGED 5-20 YEARS ACCORDING TO THE STABILOMETRY DATA

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Abstract. ***Introduction.*** The objective of the study – to identify age-related features of postural stability in healthy, physically active males aged 5-20 years. The subjects (n=267) were grouped by age according to the number of full years. ***Methods.*** Postural stability was assessed using stabilometry in a normal stance with eyes open and eyes closed. We analyzed linear mean velocity of the center of pressure displacement and confidence ellipse area. ***Results.*** It has been shown that postural stability is achieved by age 11 under both eyes-open and eyes-closed conditions. During puberty (13-14 years), a slight but statistically significant decrease in postural stability was observed. ***Conclusion.*** It has been established that final postural stability stabilization in physically active boys aged 5-20 years occurs at age 15. The preceding period from 5 to 14 years is characterized by relative stabilization by age 11 and a temporary decline at 13-14 years, coinciding with pubertal reorganization of the body.
Keywords: vertical posture, postural regulation, static balance, stabilometry, age-related development, children.

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ADAPTIVE CAPACITIES OF 5TH-GRADE URBAN AND RURAL SCHOOLCHILDREN ASSESSED BY CARDIOVASCULAR SYSTEM INDICATORS

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Abstract. ***Introduction.*** The transition to the fifth grade is associated with changes in educational conditions and an increased adaptive load, which underscores the relevance of assessing cardiovascular status in schoolchildren. ***Methods.*** A comparative analysis of cardiovascular indicators was conducted in 41 ten-year-old schoolchildren. We assessed basic hemodynamic parameters, central hemodynamic indices, and adaptive potential. ***Results.*** Urban schoolchildren have shown higher heart rate, diastolic blood pressure, and mean arterial pressure, as well as signs of adaptation mechanism strain. Rural schoolchildren have demonstrated higher stroke volume and a more economical circulation type. Stronger hemodynamic interrelationships were found in the urban group. ***Conclusion.*** The adaptive capacities of fifth-grade schoolchildren depend on learning and living conditions. Urban schoolchildren exhibit greater strain of regulatory mechanisms during adaptation.
Keywords: schoolchildren, adaptive capacities, cardiovascular system, hemodynamics, adaptive potential.

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COMPARATIVE ANALYSIS OF THE FUNCTIONAL STATE AND BODY COMPOSITION OF STUDENTS WITH DIFFERENT LEVELS OF PHYSICAL ACTIVITY

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Abstract. ***Introduction.*** In today's society, insufficient physical activity is becoming an increasingly serious problem, negatively affecting health at a young age. ***Methods.*** Body composition was assessed using the InBody 270 analyzer, and the functional state of the body was evaluated using the 4-channel Varicard 2.6 system. The level of physical activity among students (n=375) was identified according to the number of steps taken per week using smartphone and smartwatch apps. ***Results.*** Three groups of students with different physical activity levels were identified: low, medium, and high. We have also found significant differences in body composition and heart rate variability among students with different levels of physical activity, with greater differences in males. ***Conclusion.*** Students with increased physical activity levels have improved body composition and functional status. Significant correlations have been identified between certain parameters.
Keywords: students, body composition, bioimpedance analysis, heart rate variability, functional state, physical activity.

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INDEX ASSESSMENT OF ANTHROPOMETRIC INDICATORS OF YOUNG ADULTS AGED 18-20 RESIDING IN THE NORTHERN REGION

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Abstract. ***Introduction.*** Studying the impact of northern factors on the adolescent body is particularly relevant, since most anthropometric indicators complete their development and the individual's somatotype is fully formed at this age. ***Methods.*** We performed somatometry using the V.V. Bunak's method and calculated statistical indicators and indices. ***Results.*** The subjects are characterized by a normosthenic body type, weight gain from age 18 to 20 years, and growth stabilization. According to the sexual dimorphism index, young women aged 20 exhibit a predominantly andromorphic body type. ***Conclusion.*** The study's results can serve as indicative morphological criteria for assessing the physical development of young university students.
Keywords: adolescence, students, anthropometry, index indicators, northern region.

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BIOELECTRIC CHARACTERISTICS OF M. GASTROCNEMIUS MEDIALIS IN PROVIDING POSTURAL CONTROL OF HIGHLY QUALIFIED FIGURE SKATERS PERFORMING STABILOMETRIC TESTS

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Abstract. ***Introduction.*** The results of a study on bioelectrical activity of the m. gastrocnemius medialis in 24 highly qualified figure skaters performing stabilometric tests are presented. ***Methods.*** Computer stabilometry, surface electromyography, and psychophysiological testing (reaction to a moving object, segment estimation, "URA" test) were used. According to the strategy of balance, athletes were divided into group 1 (ankle) and group 2 (hip). ***Results.*** The data from group 2 has demonstrated higher RMS, RMS/t, more electromyography bursts, and increased high-frequency stabilogram components with reduced low-frequency power ($p<0.05$). 100% of group 2 had a history of musculoskeletal injuries. ***Conclusion.*** The ankle strategy is more efficient and stable, while the hip strategy is more energy consuming and injury-associated. Psychophysiological differences between groups indicate unevenness of regulatory mechanisms. The data received may be applied in monitoring and prevention of musculoskeletal injuries.

Keywords: figure skating, stabilometry, electromyography, m. gastrocnemius medialis, postural control, balance strategies, sports injuries, myoactivity.

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THE IMPACT OF DIGITAL LEARNING TECHNOLOGIES ON STUDENTS' PSYCHOPHYSIOLOGICAL CHARACTERISTICS

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Abstract. ***Introduction.*** The psychophysiological characteristics of students were studied during learning assessment in a digital environment, including the use of neural networks. ***Methods.*** One hundred first-year students were examined as they completed three tasks in turn: on paper, online, and using generative artificial intelligence. A series of physiological and psychophysiological measurements were conducted immediately before and after each task. ***Results.*** It has been revealed that online work has the greatest impact on psychophysiological characteristics, especially with the use of neural networks. At the same time, the indicators characterizing stress levels and autonomic balance change to a greater extent in the traditional form of taking the test. ***Conclusion.*** The results suggest that two partially or completely independent mechanisms are involved in students' adaptation to knowledge assessment, with the degree of their involvement varying under different assessment conditions.

Keywords: digital learning, artificial intelligence, students, psychophysiology, electroencephalography.

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REAL-TIME ADJUSTMENT OF RECOVERY PROCESSES AND REDUCTION OF MUSCLE PAIN WITH OXYGENATION TECHNOLOGY EQUIPMENT

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Abstract. ***Introduction.*** Objective – to study the effect of the SportDots sports equipment (hip braces) on the functional state of the lower limb muscles of athletes during power loads. ***Methods.*** The study involved 10 male athletes aged 26 [20; 33] years. We conducted two sessions of load testing of the thigh muscles on the CON-TREX MJ robotic biomechanical complex: in session 1, we placed SportDots sports equipment (hip braces) on the athlete's right leg, the placebo was placed on the left leg. Session 2 was held under alternative conditions. The rest period between sessions lasted 7 days. In each session, all athletes underwent stimulation rheovasography of lower limbs both before and after the test, and individual load perception was identified using the Borg scale, as well as pain intensity on a visual analog scale. ***Results.*** The positive effects of using the SportDots equipment have been revealed, manifested in optimizing peripheral hemodynamics (venous outflow, vascular filling time), reducing the development of fatigue and the perception of the load magnitude and muscle pain after it. ***Conclusion.*** Based on the proven ability of the SportDots equipment to normalize peripheral hemodynamics and accelerate recovery processes, it is recommended to use the equipment immediately after any physical activity. This makes SportDots gaiters, tights, and knee pads a scientifically proven, non-medicinal tool for solving the problem of "leg recovery" for marathon runners and representatives of other sports.

Keywords: sports equipment, SportDots, functional state, recovery, musculoskeletal system, dynamometry, hemodynamics, muscle pain.

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ASSESSMENT OF DELAYED BEHAVIORAL RESPONSES IN RAT PUPS SUBJECTED TO ACUTE NORMOBARIC HYPOXIA IN THE OPEN FIELD TEST

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Abstract. ***Introduction.*** Perinatal hypoxia is a leading etiologic factor in long-term neurological deficit and disability in offspring. Objective: to evaluate the long-term impact of acute normobaric hypoxia on the dynamics of physical development, exploratory activity, and anxiety level in rat pups using the open field behavioral test. ***Methods.*** The study was performed on the first-generation offspring of Wistar rats, which were divided into 2 groups: Group 1 – control, Group 2 – simulated the state of human premature pregnancy by exposure to acute normobaric hypoxia on the second postnatal day. On the 30th day of life, the rat pups underwent the open field test. ***Results.*** Severe deformation of the ethological profile was recorded in animals of both sexes that had undergone hypoxia and suppression of the orienting reflex's cognitive component against the background of an anxious and compulsive state. ***Conclusions.*** Hypoxia leads to the development of juvenile hyperdynamic syndrome in adolescent rats. The severity of the psychoemotional and cognitive deviations is tightly modulated by sexual dimorphism, with the greatest manifestation of maladaptation signs in females.

Keywords: perinatal hypoxia, rats, acute normobaric hypoxia, open field.

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PSYCHOLOGICAL PREDICTORS OF BODY FAT MASS IN THE MIDDLE OB MEDICAL INSTITUTE STUDENTS

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Abstract. ***Introduction.*** The relationship between eating behavior and eating habits with the development of obesity has been confirmed by many researchers. Objective – to study the psychological predictors of body fat mass in medical institute students aged 19-20, taking into account gender differences. ***Methods.*** We used bioimpedance analysis to assess the fat component of body mass, as well as questionnaires to evaluate eating behavior and body acceptance in 74 medical institute students. We also carried out statistical analysis using multiple linear regression. ***Results.*** Psychological factors explain 65% of the fat mass variance. We have also revealed pronounced gender differences. Significant indicators for the male students were "weight assessment" (B=6.38) and "appearance-oriented" (B=3.47), while for the female students – "weight assessment" (B=9.34) and "body acceptance" (B=2.90). ***Conclusion.*** Obesity prevention programs in the North should take into account the gender specificity of psychological factors determining the fat component of body mass.
Keywords: body fat mass, psychological predictors, medical students, eating behavior, body acceptance, the Northern region.

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INTEGRAL STABILOGRAPHIC INDICATORS OF STATOKINETIC STABILITY OF ATHLETES IN RESPONSE TO VARIOUS FUNCTIONAL LOADS

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Abstract. Introduction. The effectiveness of maintaining balance is determined not so much by the state of individual sensory systems (visual, proprioceptive, vestibular) as by their interaction, which makes it possible to compensate for the data deficit of one modality at the expense of others. In this regard, it is proposed to use averaged stabilographic indicators recorded after several different functional tests as an integral characteristic of the adaptation of the statokinetic system to real sports activities. The objective of the work is to assess changes in the average stabilographic indicators of statokinetic stability in athletes under the influence of various functional loads. ***Methods.*** We examined athletes and non-athletes aged 18 to 22 years (297 people in total), who had their stabilographic parameters assessed before and after various functional tests. ***Results.*** The article presents the results of a comparative analysis of statokinetic stability in athletes of situational, cyclic and targeted sports, as well as in non-athletes. ***Conclusion.*** We have found that sensory systems function integratively, and systematic training increases the threshold of sensitivity to stimuli, which indicates a high plasticity of the nervous system.
Keywords: statokinetic system, balance function, stabilographic indicators, functional tests, athletes.

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PSYCHOPHYSIOLOGICAL CHARACTERISTICS AND STRESS RESISTANCE IN NORTHERN INDIGENOUS ADOLESCENTS UNDER HEALTH-PRESERVING TECHNOLOGIES IN BOARDING SCHOOLS

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Abstract. ***Introduction.*** The study of psychophysiological characteristics and stress resistance of adolescents from the indigenous people of the North in the context of education in boarding schools is important for assessing the effectiveness of health-preserving technologies (centile increase in physical activity), since it allows identifying risk factors and adaptive reserves in educational activity. ***Methods.*** We conducted a comparative analysis of data collected from 122 healthy adolescents aged 13-15 years from the beginning and the end of the school year. Group 1 (n=39) – sedentary, group 2 (n=83) – nomads, subgroups: 2A (normal regime), 2B (a set of health-preserving technologies was introduced). We used pedometer, cardiointervalography, and the State-Trait Anxiety Inventory as the main methods of the study. ***Results.*** By the end of the year, adolescents in the subgroup 2A have demonstrated less physical activity, increased levels of stress and anxiety, and lower levels of stress resistance compared to those in the subgroup 2B. The least pronounced changes were observed in the group 1. ***Conclusion.*** Psychophysiological support for adolescents from indigenous minorities in boarding schools can help to evaluate the effectiveness of technologies and optimize the educational process.
Keywords: indigenous people of the North, boarding school education, cardiointervalography, stress resistance, health-preserving technologies.

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DIGITAL HUMAN PHYSIOLOGICAL PROFILE: A CONCEPT OF AN INTEGRAL PHYSIOLOGICAL AGE INDEX

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Abstract. ***Introduction.*** Existing biological age measures reflect separate levels of biological organization and do not simultaneously characterize intersystem heterogeneity, functional reserve, and the individual rate of change. Objective: to substantiate the concept of a digital human physiological profile and formulate principles for constructing and validating an integral physiological age index. ***Methods.*** An analytical review is conducted of 20 peer-reviewed publications from 2006-2025 selected from more than 50 sources indexed or available in PubMed, Google Scholar, eLibrary.ru, and CyberLeninka. ***Results.*** A digital physiological profile is defined as a longitudinal multimodal representation of functional system status, reserve, dynamics, and measurement context. The proposed architecture integrates domain-specific age equivalents, data-quality indicators, result uncertainty, and recovery characteristics after a standardized challenge. Requirements are formulated for data splitting, external and longitudinal validation, calibration, bias assessment, and clinical utility. ***Conclusion.*** Until prognostic and clinical value is confirmed in independent prospective studies, the index should be regarded as a research-oriented interpretation-support tool rather than a stand-alone diagnosis or a basis for treatment decisions.
Keywords: physiological age, biological age, digital physiological profile, digital biomarkers, functional reserve, aging.

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PHYSIOLOGICAL AND PSYCHOLOGICAL DETERMINANTS OF MALADAPTATION IN NORTHERN UNIVERSITY STUDENTS EXPOSED TO PSYCHOSOCIAL STRESS

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Abstract. ***Introduction.*** The article presents an analysis of physiological and psychological determinants of maladaptation in northern university students under the combined impact of climatic-geographical factors and psychosocial stress. ***Methods.*** We conducted a prospective observation of 158 students (84 males, 74 females) aged 17-22 years in 2019-2023. Heart rate variability, hemodynamics, functional state of the central nervous system, anxiety, depression, personal adaptive potential, neuropsychic stability, and quality of life were assessed. ***Results.*** Key markers of stress-induced dysfunctions were identified: autonomic nervous system imbalance with sympathicotonia predominance, decreased total spectral power of heart rate variability, increased levels of anxiety and depression. Gender-specific features: hemodynamic changes (elevated blood pressure, sympathicotonia) dominate in males, while psychological reactivity (anxiety) prevails in females. ***Conclusion.*** Low personal adaptive potential is an integral predictor of stress tolerance.
Keywords: adaptation, students, North, psychosocial stress, heart rate variability, personal adaptive potential, anxiety, depression, autonomic regulation, maladaptation..

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ADAPTIVE MODIFICATIONS OF MOTOR AND AUTONOMIC FUNCTIONS IN ELITE KICKBOXERS

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Abstract. ***Introduction.*** Objective – to identify adaptive modifications of motor and autonomic functions in elite kickboxers. ***Methods.*** The study involved elite kickboxers (n=16). The dynamics of heart rate, oxygen consumption, carbon dioxide release and statokinetic stability before and after the training cycle were analyzed. ***Results.*** After the training cycle, kickboxers in the testing load have shown autonomic shifts in the testing load with significant changes in heart rate, oxygen consumption, carbon dioxide release and increased vestibular stability. ***Conclusion.*** The combination of intense interval, anaerobic and stress inducing loads used in training activity forms a unique adaptive kickboxer profile, expressed in specific connections between motor and autonomic functions.
Keywords: adaptive modifications, oxygen consumption, carbon dioxide release, vestibular stability, kickboxers.

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ANALYSIS OF FUNCTIONAL RELATIONSHIPS BETWEEN ELECTRO-ENCEPHALOGRAM COHERENCE AND POSTURAL STABILITY IN HIGH- AND LOW-SKILLED KICKBOXERS

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Abstract. ***Introduction.*** The neurophysiological mechanisms of ensuring postural stability in athletes of different qualifications remain insufficiently studied. ***Methods.*** 20 kickboxers (10 masters of sports and 10 first-class athletes) underwent stabilometry in the scope of the classical protocol and electroencephalogram recording in the background sample and during hyperventilation. A correlation analysis was performed between electroencephalogram coherence indices and integral indices of postural stability. An intergroup comparison of correlation coefficients was performed using the Fisher Z-test. ***Results.*** In the vestibular load conditions, low-skilled athletes have revealed close links between frontotemporal coherence and stabilometric indices, whereas these links are weakened or absent in high-skilled athletes. ***Conclusion.*** The data obtained indicate automation of postural control in high-skilled kickboxers, manifested in the weakening of cortical and postural connections, as well as the control transition to the subcortical level.
Keywords: kickboxers, electroencephalogram coherence, postural stability, sports qualification, neurophysiological mechanisms, motor automation, correlation analysis.
conditions, students.

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ASSOCIATION OF NUTRITIONAL STATUS WITH PHYSICAL FITNESS IN CHILDREN AGED 6-12 YEARS: A CROSS-SECTIONAL STUDY IN THE CONTEXT OF THE “READY FOR LABOR AND DEFENSE” STANDARDS

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Abstract. ***Introduction.*** Objective: to assess the impact of nutritional status on physical fitness indicators corresponding to the “Ready for Labor and Defense” standards in children aged 6-12 years. ***Methods.*** This cross-sectional study analyzed data from 9,910 children (50.2% boys) tested on 30 m sprint, standing long jump, 6-minute run, and sit-ups. Nutritional status was classified using body mass index Z-scores. Primary analysis was performed in SPSS (ANOVA with Bonferroni correction), secondary analysis – in Python included Cohen’s d with 95% confidence interval, Hedges’ g correction for small samples, and Z-score deviations. ***Results.*** A heterogeneous association between nutritional status and physical fitness was found: obesity most markedly impairs explosive leg power (Cohen’s d up to 0.80 in 10-year-old boys), moderately affects endurance (d up to 0.39), and minimally affects speed (d=0.24 in 9-year-old boys). Overweight was associated with significant declines only from age 10, limited to jump, 6-minute run, and sit-ups (d=0.18-0.30). Underweight was not associated with significant reduction in any fitness component. ***Conclusion.*** Differentiated correction coefficients for the “Ready for Labor and Defense” standards are proposed for children with obesity and overweight.
Keywords: nutritional status, obesity, overweight, underweight, physical fitness, children.

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DYNAMICS OF PHYSIOLOGICAL PARAMETERS OF ESPORTS ATHLETES DURING A COMPETITIVE TOURNAMENT

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Abstract. ***Introduction.*** Competitive eSports activity is accompanied by high sensorimotor, cognitive, and psychoemotional load, however, data on the complex response of athletes' functional systems remains limited. Objective: to evaluate the physiological and psychophysiological responses of eSports athletes to competitive load using the PhysioLab digital platform. ***Methods.*** Ten male athletes (18-23 years old) specializing in the tactical 3D combat discipline (Counter-Strike 2) were examined. We recorded heart rate variability, respiratory rate, brain bioelectrical activity, oculomotor, sensorimotor, cognitive, and psychoemotional indicators before and after the tournament. ***Results.*** Following the tournament, statistically significant changes were observed in all key performance indicators. The largest effects were observed for the Borg scale, working memory, Stroop test, LF/HF, alpha wave, and oculomotor indicators. ***Conclusion.*** Competitive stress in eSports athletes is accompanied by interconnected sympathetic, cortical, sensorimotor, and cognitive responses. Integrated assessment of several systems improves the information capacity of functional state monitoring.
Keywords: eSports, heart rate variability, electroencephalography, eye tracking, sensorimotor response, tapping test, cognitive tests, statistical significance, effect size, functional status

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RAT MODEL OF A FEMORAL CRITICAL DIAPHYSEAL DEFECT DEVELOPMENT TO EVALUATE THE OSTEOCONDUCTIVITY OF BONE SUBSTITUTION IMPLANTS

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Abstract. ***Introduction.*** Development of innovative bone-substituting implants is rapidly advancing. Researchers require a rapid, cost-effective, and easily reproducible method for evaluating the osteoconductivity of synthetic implants. ***Methods.*** During anesthesia, monocortical defect 3×7 mm was created in the middle third of the rat femur. The defect was left empty in the control group or filled with material block in the Chronos group, followed by fixation using a polymer plate and screws. Upon completion of the surgery, radiography of the femur was performed to verify implant positioning. At the end of observation period, we conducted histological examination. ***Results.*** In the control group, the relative area of newly formed tissue into the defect measured 0% and 4±1.2% at 3 and 6 weeks, respectively, whereas in the Chronos group, the corresponding values were 3.6±1.5 and 27±3.2%. ***Conclusion.*** The developed model results in the formation of a critical-size defect that shows no spontaneous bone healing in the control group, as confirmed, thereby demonstrating its feasibility for evaluating the osteoconductive properties of synthetic materials by radiological and histological assessments.
Keywords: critical bone defect, rats, osteoconductivity, osteoplastic materials.

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COMPARATIVE CHARACTERISTICS OF ADAPTIVE CHANGES IN THE AUTONOMIC NERVOUS SYSTEM DURING INTERVAL HYPOXIC TRAINING IN INDIVIDUALS LIVING IN DIFFERENT CLIMATIC AND GEOGRAPHICAL CONDITIONS

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Abstract. ***Introduction.*** Adaptation to hypoxic conditions is largely determined by the state of the cardiovascular system's autonomic regulation. Objective: to evaluate the characteristics of the of the cardiovascular system's autonomic regulation and its changes under the influence of interval hypoxic training in students formed in the conditions of middle mountains, lowlands and foothills. ***Methods.*** Residents of middle mountains, lowlands and foothills were examined. Heart rate variability, heart rate, blood pressure, oxygen saturation and integral indices were assessed before and after an interval hypoxic training course. Statistical processing was performed using Student's t-test at $p<0.05$. ***Results.*** After the course, improvement in autonomic regulation indices was revealed in all groups, especially in middle mountains residents. ***Conclusions.*** Living in mid-mountain conditions contributes to the formation of a more stable adaptive phenotype.
Keywords: autonomic regulation, heart rate variability, hypoxic resistance, interval hypoxic training, midland, adaptation.

PSYCHOPHYSIOLOGY

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PSYCHOLOGICAL AND PSYCHOPHYSIOLOGICAL PREDICTORS OF THE NUMBER OF IN VITRO FERTILIZATION CYCLES IN WOMEN

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Abstract. ***Introduction.*** This article presents results of empirical research aimed at identifying psychological and psychophysiological predictors of the number of *in vitro* fertilization cycles in women. ***Methods.*** A cross-sectional study of 120 women was conducted using psychological (questionnaires) and psychophysiological (electroencephalogram analysis, imaging diagnostics of executive functions) methods. ***Results.*** Predictors of the number of cycles were identified: diffuse asynchronous beta activity (Exp(B)=6.6, p=0.03), alpha rhythm frequency (Exp(B)=2.04, p=0.006) and amplitude (Exp(B)=1.03, p=0.002), psychoemotional distress (Exp(B)=1.34, p=0.049), go/no-go misses (Exp(B)=1.47, p=0.03), and age (Exp(B)=1.16, p=0.001). ***Conclusion.*** The integrated psycho-psychophysiological approach enables prediction of treatment trajectory and development of personalized support programs.
Keywords: infertility, *in vitro* fertilization, electroencephalography, executive functions, stress.

BALNEOLOGY AND REHABILITATION

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LONG-TERM OUTCOMES OF SPA TREATMENT OF VARIOUS DURATION FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Abstract. ***Introduction.*** A pressing issue in balneology is determining the optimal duration of spa treatment for chronic obstructive pulmonary disease. ***Methods.*** In 2024–2025, a prospective, randomized clinical trial was conducted at the National Medical Research Center of Rehabilitation of Balneology. The trial included 81 patients with chronic obstructive pulmonary disease, and an observation period of 10-12 months. Depending on spa treatment the duration (7, 14, 18, and 21 days), patients were divided into 4 groups. Long-term outcomes of the study were collected, including the number of hospitalizations, frequency of ambulance calls, and visits to a pulmonologist or general practitioner due to disease exacerbations. ***Results.*** In case of 18- and 21-day spa treatment, the number of exacerbations decreases over the following year. In case of 14-, 18-, and 21-day spa treatment, the number of hospitalizations due to exacerbations of comorbidities, ambulance calls, and outpatient visits due to disease exacerbations decreases ($p<0.05$ according to the Pearson test). ***Conclusions.*** Spa treatment periods of 14, 18 and 21 days improve long-term results of chronic obstructive pulmonary disease treatment.
Keywords: chronic obstructive pulmonary disease, prospective study, treatment outcomes, hospitalization.

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THE EVOLUTION OF HISTORICAL APPROACHES TO THE REHABILITATION OF CHILDREN WITH CONGENITAL CATARACT

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Abstract. ***Introduction.*** The clinical significance of the issue of congenital cataract stems from its role as a cause of childhood blindness and low vision; consequently, the gradual restoration of visual function in congenital cataracts cases depends on surgical intervention and medical care. Aim – to examine the evolution of approaches to managing children with congenital cataract. ***Methods.*** Differential analysis methods were applied to data from electronic scientific databases regarding the surgical treatment and rehabilitation of congenital cataract in children, taking into account the level of evidence. ***Results.*** Of the scientific sources we reviewed, 25 were fully relevant to the topic; they demonstrated that the treatment of patients with congenital cataract has evolved significantly over time – progressing from empirical approaches to surgical intervention and early postoperative rehabilitation that incorporates innovative equipment, methodological approaches, and psychological support. ***Conclusion.*** The analysis of scientific publications highlights the need to refine surgical interventions and develop a phased, ultra-early postoperative medical rehabilitation program for children with congenital cataracts; such an approach ensures lasting functional outcomes, social adaptation, and a good quality of life for the child.
Keywords: congenital cataract, treatment evolution, medical postoperative rehabilitation.

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THERAPEUTIC AND RECREATION POTENTIAL OF THE VORONEZH OBLAST

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Abstract. ***Introduction.*** The article is devoted to a comprehensive assessment of the therapeutic, recreation and bioclimatic potential of the Voronezh Oblast on the example of the Gorky Clinical Sanatorium, the F.E. Dzerzhinsky Sanatorium and the Tsyurupa Sanatorium. ***Methods.*** The study materials included the results of route landscape and climatic observations, reference data on climate, guidance documents, government reports and scientific articles. **Results.** According to the analysis, the microclimatic indicators in all the surveyed areas were within the normal values: average air temperature – 23.34-23.99 °C, relative humidity – 63.8-74.6%, oxygen content – over 20.6%, CO_2 concentration did not exceed 450 ppm. A favorable ionic mode was identified (total background air ionization – 1133-1297 ions/cm³ with a low unipolarity coefficient – 0.5-0.7), along with exceptionally low levels of aerosol pollution (PM2.5 – 2.7 μg/m³, PM10 – 4.0 μg/m³), and background values of the γ-radiation ambient dose equivalent rate (0.048-0.061 μSv/h). The bioclimatic potential of the Voronezh Oblast, according to the modular technology, reaches 1.85 points out of 3 possible, corresponding to a high category of medical and climatic conditions and a rank 1 area. ***Conclusion.*** The data obtained confirm favorable conditions for health treatment using various types of climate therapy and substantiate the high landscape and recreation potential of the Voronezh Oblast for spa treatment and recreational tourism.

Keywords: Voronezh Oblast, climate, microclimatic indicators, bioclimate, recreation potential, spa treatment, health tourism, climate therapy.

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THE EFFECT OF SPLENECTOMY AND SPLEEN RESECTION ON THE ACTIVITY OF CERTAIN LIVER ENZYMES

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Abstract. ***Introduction.*** Modern advances in the body physiology study have shown that the spleen plays a significant role in metabolic processes (mineral metabolism, carbohydrate metabolism, cholesterol and iron metabolism, and bilirubin formation), and stimulates protein synthesis. In addition to its involvement in hematopoiesis, immune defense, and the hemostatic system, the spleen also performs metabolic and hormonal functions in the body. The spleen also indirectly affects the liver functioning. ***Methods.*** On 44 chinchilla rabbits with a body weight of 1.5 to 3.0 kg, some indicators of liver enzyme activity were studied after splenectomy and resection of the spleen. Nonparametric criteria were used for statistical analysis. ***Results.*** Removal of the spleen leads to a statistically significant decrease in the activity of certain liver enzymes, such as acid and alkaline phosphatases, as well as aspartate and alanine aminotransferases, up to 3 weeks after surgery, followed by recovery. During the 3 weeks following resection of 1/3 and 2/3 of the spleen, an increase in the levels of these enzymes was observed, leading to the development of cytolysis syndrome and a subsequent trend towards normalization. ***Conclusion.*** The data obtained confirm the expediency of preserving the spleen in case of its damage.

Keywords: splenectomy, resection, effect, enzymes, activity, liver.

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BIOFEEDBACK MECHANICAL KINESIOTHERAPY USING A NEXT GENERATION FORCE PLATFORM IN MEDICAL REHABILITATION (SCIENTOMETRIC ANALYSIS)

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Abstract. ***Introduction.*** Objective: to conduct a scientometric analysis and systematize the world literature data on the use of the HUBER 360 device for neuromuscular activation in the rehabilitation of patients with various diseases and injuries. ***Methods.*** An analysis of scientific publications in the PubMed, Google Scholar, eLibrary.ru, CyberLeninka, and Cochrane Library databases was conducted for the period from 2006 to the first quarter of 2026. ***Results.*** Out of 40 publications, we selected 29 original studies (systematic reviews, randomized controlled trials). The analysis has revealed a steady increase in the number of studies and an expansion of their geography (France, Germany, Russia, China, Iran, etc.), as well as a diversification of clinical areas. The most studied areas are the use of HUBER equipment for dorsopathies, after the musculoskeletal system injuries and surgeries, in sports medicine, geriatrics, and cardiology. The main effects of the method are associated with improved postural control, regression of pain syndrome, and correction of sensorimotor function disorders. ***Conclusion.*** Current data confirm the effectiveness and safety of using HUBER 360 in comprehensive medical rehabilitation of patients. The method has an emerging evidence base, which requires further standardization of protocols and study of long-term results for its full integration into clinical practice.
Keywords: scientometric analysis, HUBER 360, neuromuscular activation, rehabilitation, postural control.

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THE ROLE OF THE REDCORD SLING SYSTEM IN COMPREHENSIVE REHABILITATION OF PATIENTS AFTER TOTAL HIP REPLACEMENT

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Abstract. ***Introduction.*** The article is devoted to the introduction of modern technologies of physical and rehabilitation medicine aimed at increasing the effectiveness of inpatient treatment. ***Methods.*** We carried out the analysis of the results of comprehensive rehabilitation of 74 patients after total hip replacement. The inpatient rehabilitation course lasted 14 days and included 10-12 specialized procedures, including hardware physiotherapy, rehabilitation therapy on the Balance-Master simulator, psychological correction, massage, physical therapy, and classes with the Redcord sling suspension system. The results were assessed with a visual analogue scale, assessment of the patient's pain intensity, gait speed measurement, analysis of physical activity and the risk of falls, goniometry, computer stabilometry, neuromuscular diagnostics on the LPG HUBER 360 MD simulator. ***Results.*** The obtained data indicated the need for additional prescription of training with the Redcord system to the standard of care for patients after total hip replacement, which is confirmed by a more complete and high-quality restoration of the physiological pattern of locomotions. ***Conclusion.*** Introduction of training with the Redcord sling system contributes to a more complete and high-quality restoration of the physiological pattern of locomotion, reducing walking asymmetry and maintaining optimal body balance.
Keywords: rehabilitation after hip replacement, clinical and instrumental tests.

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EVALUATION OF PATIENTS RECOVERY WITH COLORECTAL CANCER AFTER SURGERY

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Abstract. ***Introduction.*** Objective: to assess the recovery process of the patients with colorectal cancer in the postoperative period after stage 2 medical rehabilitation. ***Methods.*** 79 patients were randomized into 2 groups. The comparison group (n=39) had "standard" treatment; the main group (n=40) was prescribed additional drinking mineral water Psyzh, exercise therapy according to the author's method, and transcranial magnetic therapy. ***Results.*** After the medical rehabilitation course, the main group had a good quality of health recovery, which was 122.3±8.8 points according to the International Quality of Recovery Questionnaire, while in the comparison group this indicator amounted to 104.4±7.8 points, which was regarded as the average quality of recovery with significant intergroup differences ($p<0.05$). The same difference was maintained in the long-term follow-up. ***Conclusion.*** The implementation of the developed rehabilitation program for patients with colorectal cancer in the postoperative period ensures a significantly higher quality of health recovery compared to the control group.
Keywords: colorectal cancer, stage 2 medical rehabilitation, rehabilitation effectiveness, International Quality of Recovery Questionnaire.

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CURRENT CHALLENGES IN THE DIAGNOSIS OF SUBCLINICAL PRIMARY HYPOTHYROIDISM AND PROSPECTS FOR THE USE OF PROTEIN MARKERS

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Abstract. ***Introduction.*** Primary hypothyroidism is the most common thyroid pathology, with an incidence rate that is steadily increasing. The greatest challenge lies in its detection at the early subclinical stage, during which various concomitant disorders develop in the body. ***Methods.*** The sources analyzed primarily include PubMed, Scopus, and Web of Science databases. ***Results.*** The article highlights the key issues in the early diagnosis of hypothyroidism: the masking of clinical signs by symptoms of comorbid conditions, the existence of a "gray zone" for the upper reference limit, the spontaneous normalization of initially elevated thyroid-stimulating hormone levels, and cases of tissue thyroid deficiency despite normal laboratory values. A multiparametric diagnostic algorithm is proposed and theoretically substantiated; it includes the analysis of protein markers of tissue metabolism and regulatory proteins as a supplement to the standard examination protocol. ***Conclusion.*** The assessment of "blind spots" in the diagnosis of subclinical hypothyroidism demonstrates the need for additional verification methods, one of which could be the use of a multiparametric panel of protein markers.
Keywords: hypothyroidism, subclinical stage, diagnostics, protein markers.

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IMPROVING THE REHABILITATION PROGRAM FOR YOUNG ATHLETES WITH POST-COVID ASTHENIC SYNDROME

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Abstract. ***Introduction.*** The COVID-19 pandemic led to the development of various consequences, including post-COVID asthenic syndrome. ***Methods.*** At stage I, 80 individuals were examined to identify favorable and unfavorable courses of the syndrome. At stage II, 120 young patients with the syndrome received rehabilitation. Group A received Prospekta® + basic rehabilitation according to standards, group B – Prospekta® + carbonic therapy + basic rehabilitation, group C – carbonic therapy + basic rehabilitation; Group D received basic rehabilitation. ***Results.*** The prognostic value identified in the stage I of the study in the form of an increase in the syndrome's severity and duration with an increase in the S100B content and an imbalance in the lipid peroxidation – antioxidant system, prompted us to improve the rehabilitation program. ***Conclusion.*** The effectiveness of the use of carbonic therapy and affinity purified and modified anti-S100β antibodies (Prospekta®) in the rehabilitation program has been proven.
Keywords: post-COVID asthenic syndrome, athletes, rehabilitation, carbonic therapy.

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THERAPEUTIC EFFECTIVENESS OF NON-DRUG REHABILITATION METHODS FOR ATHLETES WITH PANIC DISORDERS

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Abstract. ***Introduction.*** This article presents a review and analysis of the therapeutic efficacy of non-drug approaches to the panic disorder treatment in athletes. ***Methods.*** A total of 128 athletes with panic disorder were examined. We used the Carbonic treatment and diagnostic complex for diagnosis and rehabilitation. Cerebral hemodynamics were assessed, and testing was performed using the Hospital Anxiety and Depression Scale. ***Results.*** The use of the Carbonic complex in rehabilitation has resulted in a reduction in anxiety and depression levels, reduction in the frequency of panic attacks, relief of muscle tone and hyperventilation symptoms, and restoration of venous outflow. ***Conclusion.*** The effectiveness of a non-drug approach to the rehabilitation of athletes with panic disorders has been proven.
Keywords: panic attacks, athletes, non-drug rehabilitation, breathing techniques, Carbonic therapy.

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DEVELOPMENT OF ENERGY POTENTIAL OF 9-11 YEAR-OLD CROSS-COUNTRY SKIERS AT THE INITIAL TRAINING STAGE

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Abstract. ***Introduction.*** This study aimed to investigate the formation of the energy potential of the energy supply systems of cross-country skiers aged 9-11 years during the initial training phase. ***Methods.*** A combination of methods was used to assess growth processes, including anthropometry, ergometry, gas analysis, blood biochemistry, and pulse oximetry. The obtained data were processed using appropriate methods of mathematical statistics. The study involved 20 athletes, divided into three groups depending on the duration of their training. ***Results.*** The obtained results indicate that 9-year-old athletes demonstrate low potential for the functional capabilities of the oxidative and lactic acid systems. 10-year-olds retain a lower VO_2 max, and differences in lactic acid system potential are offset by the elimination of differences in mechanical power in test 2, while in terms of the relative indicator, they surpass 11-year-olds. ***Conclusion.*** The reason for the established differences in the studied characteristics between 10 and 11-year-old athletes is the faster rate of increase in body weight in relation to the growth of the energy potential of energy supply systems.
Keywords: young cross-country skiers, age range 9-11 years, energy potential, oxidative and lactic acid systems, intersystem interactions, performance readiness.

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LONG-DISTANCE RUNNING EFFICIENCY AT THE SPORTS SPECIALIZATION STAGE: LABORATORY EVALUATION AND COMPARATIVE ANALYSIS

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Abstract. ***Introduction.*** Research into the factors that influence performance in long-distance running is an important task for improving the training process in conditions of significant competition. ***Methods.*** The study involved 6 runners 17-20 years old specializing in 1,500-5,000 m (III-I sports categories). Running efficiency was evaluated in the laboratory using a MetaLyzer 3B-R2 gas analyzer and an HP Cosmos Quasar treadmill in an 11-minute test with a 5-minute run at 16 km/h. ***Results.*** It has been found that the average value of running efficiency in runners at the sports specialization stage (3.95±0.06 J/kg/m) is higher than in non-athletes (4.19±0.10 J/kg/m), but much worse than in qualified athletes of this specialization. ***Conclusion.*** The results obtained indicate the effectiveness of improving athletic performance through pace optimization and reduced push-off time in long-distance running.
Keywords: running efficiency, long-distance running, sports specialization stage, aerobic performance, energy cost of running.

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DYNAMICS OF FUNCTIONAL FITNESS OF STUDENT BASKETBALL PLAYERS DURING BLOCK PERIODIZATION IN THE ANNUAL TRAINING CYCLE

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Abstract. ***Introduction.*** The peculiarities of the physical training organization in the student basketball creates methodological difficulties in planning physical training. The objective of the study is to assess the dynamics of the functional fitness of student basketball players during the block periodization of the annual cycle. ***Methods.*** The pedagogical experiment involved 15 athletes of the Winged Leopards basketball club. The dynamics of functional fitness were identified with a bioimpedance analyzer, a jumping test on a force plate, and a 5-second Wingate Test at the beginning, middle and end of the annual cycle. ***Results.*** In the experimental group, a statistically significant increase ($p<0.05$) was recorded for all the indicators. ***Conclusion.*** A study of the dynamics of the functional fitness of basketball players showed the effectiveness of block periodization of physical training in the annual cycle.

Keywords: physical fitness, college basketball, functional fitness.

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INDIVIDUALIZATION OF TACTICAL AND TECHNICAL TRAINING OF 13-14-YEAR-OLD BOXERS BASED ON COMPETITIVE ACTIVITY ANALYSIS

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Abstract. ***Introduction.*** For 13-14-year-old boxers, the content and technology of individualization based on competitive activity analysis remain insufficiently developed. The aim of the study was to develop and experimentally verify the content and technology of individualization of tactical and technical training of 13-14-year-old boxers. ***Methods.*** A survey of 39 elite boxers, video analysis of 54 bouts, expert evaluation, testing, and a pedagogical experiment (n=32). ***Results.*** Nine typical minimal situations of a bout were classified; criteria of individualization, an individual profile, and a five-level scale of action mastery were substantiated; a three-component technology was also developed. In the experimental group, the effectiveness of attacking actions increased by 31.8%, counterattacking actions – by 40.4%, the variability of decisions – by 64.5% (d=1.32-1.65). ***Conclusion.*** The technology significantly improves the tactical and technical fitness of 13-14-year-old boxers.

Keywords: boxing, 13-14-year-old boxers, individualization, tactical and technical actions, competitive activity, minimal situations, situational approach.

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A COMPREHENSIVE APPROACH FOR THE ASSESSMENT OF SHOOTING AND FUNCTIONAL FITNESS IN YOUNG BIATHLETES

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Abstract. ***Introduction.*** Currently, there is insufficient data regarding the factors limiting the shooting proficiency of young biathletes during physical activity of varying intensity. The research objective – to improve the comprehensive approach to assessing the shooting and functional fitness of young biathletes. ***Methods.*** Analysis of the current state of the issue according to scientific literature, analysis of the data from the "Scatt" shooting simulator, as well as biochemical markers (lactate) and heart rate, analysis of results of the power test on the Concept2 SkiErg ergometer, use of methods of mathematical statistics. ***Results.*** It has been shown that the stability of the "shooter-weapon" system in young biathletes during standing shooting is a key factor determining shot quality, both at rest and during physical activity. The correlation between the score and the length of the aiming line trajectory during standing shooting ranges from r=-0.69 to -0.74 ($p<0.05$). The correlation between weapon stability within the 6.0 zone (74 mm) and the length of the aiming line trajectory during standing shooting ranges from r=-0.91 to -0.92 ($p<0.05$). ***Conclusion***. The proposed comprehensive approach for the assessment of the shooting and functional fitness of young biathletes is informative and makes it possible to identify the limiting factors. Furthermore, this approach allows for the assessment of the level of integrated manifestation of functional and shooting fitness under specific activity of varying intensity.

Keywords: marksmanship training, young biathletes, aiming trajectory length, weapon stability, lactate, Concept2 SkiErg trainer, Scatt shooting simulator.

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BIBLIOMETRIC ANALYSIS OF FOREIGN PUBLICATIONS DEDICATED TO TECHNICAL TRAINING IN CYCLING

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Abstract. ***Introduction.*** Objective – to search and analyze modern trends in foreign publications, dedicated to relevant aspects of technics training and movement technique in cycling. ***Methods.*** The search of articles by the keyword "cycling" was conducted in the PubMed, Elsevier, Google scholar databases. The search depth was not limited. We also carried out a statistical analysis using the VOSviewer 1.6.20. ***Results.*** The main directions in foreign research on relevant issues of technical training in cycling have been identified, including: biomechanics of cycling, performance factors of professional cyclists, research on technical fitness. The leading foreign scientific schools engaged in research in the field of biomechanics and technical training of cyclists are the Austrian and Spanish. ***Conclusion.*** Scientists consider the cyclist's movement technique as a fundamental property of the nervous system for movement control. Particular topical issues of cycling technique that are under the targeted study of researchers are cadence parameters, the riding position of the cyclist, the work of the knee and hip joints, the ability of muscles to activate and relax in a timely manner. The presented analysis of scientific papers allowed us to formulate the following practical guidelines for improving the technical fitness of cyclists.

Keywords: cycling, bibliometric analysis, technical and tactical fitness of a cyclist, biomechanics of athletic movements, functional fitness, pedaling.

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A BLOCK-MODULAR APPROACH TO IMPROVING TECHNICAL AND TACTICAL TRAINING OF 15-16-YEAR-OLD HOCKEY GOALKEEPERS BASED ON THE ZONAL STRUCTURE OF SHOTS

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Abstract. ***Introduction.*** This article presents an analysis of the competitive performance of 15-16-year-old hockey goalkeepers, identifying the ice rink areas with the highest number of shots on goal and the number of goals against. Each zone has its own name depending on the effectiveness of the reflection of shots from this area. A week-long training cycle for hockey goalkeepers, used in the competition stage, is proposed. The structure of creating a separate training class using a block-modular approach was also developed. Examples of training tools for the technical and tactical training of goalkeepers are described, taking into account the zonal structure of shots. ***Methods.*** A summary of information from sources on the research problem, a method for recording competitive activity, a pedagogical experiment, and mathematical statistics methods. ***Results.*** A training methodology was developed and implemented into the training process, including five interconnected blocks aimed at reducing the number of goals against from different zones of the rink. The effectiveness the block-modular training approach was experimentally proven, demonstrating an increase in shot-stopping rates in young goalkeepers. ***Conclusion.*** It has been proven that taking into account the zonal structure of shots on goal allows for the most effective planning of the training process and the correction of weak points in goaltender training.
Keywords: block-modular approach, hockey goalkeepers, technical and tactical training, zonal structure of shots, training methods.

HEALTH AND ADAPTIVE PHYSICAL CULTURE

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THE INFLUENCE OF HEMISPHERIC DOMINANCE ON THE FEATURES OF POSTURAL STABILITY OF ACYCLIC SPORTS ATHLETES WITH SENSORY IMPAIRMENT

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Annotation. ***Introduction.*** Hemispheric dominance affects postural stability, but this mechanism is understudied in athletes with sensory impairment. The aim was to identify postural stability features in athletes with hearing impairment depending on hemispheric dominance. ***Methods.*** 39 acyclic sports athletes (26 deaf, 13 normal hearing) were examined. We assessed the dominance type using the Timchenko's test as well as the Romberg test with eyes open and closed for stabilometry. ***Results.*** The deaf athletes with left hemisphere dominance have a reduced statokinesiogram area (eyes closed), as well as increased path length, velocity and energy expenditure (visual-perceptive control). The deaf athletes with the mixed dominance type have an increase in all the parameters (visual control) with their eyes closed. ***Conclusion.*** The deaf athletes with left hemisphere dominance exhibit a unique proprioceptive profile with compensatory rearrangement. Hemispheric dominance should be taken into account in the design of balance training.
Keywords: hemispheric dominance, postural stability, sensory impairment, athletes, the disabled, acyclic sports.

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THE RELATIONSHIP BETWEEN NEUROMUSCULAR PARAMETERS IN TRACK-AND-FIELD ATHLETES WITH INTELLECTUAL DISABILITIES

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Abstract. ***Introduction.*** The objective of the study – to identify the relationship between bioelectrical activity indices, viscoelastic muscle properties, postural stability, and motor-cognitive responses in track-and-field athletes with intellectual disabilities to identify integral markers using a combination of methods. ***Methods.*** The study involved 16 highly skilled sprinters with mild intellectual disability, mean age – 21.4±2.3 years. We calculated Spearman's correlation coefficients. ***Results.*** Stabilometry indices in the Romberg test with eyes closed (speed of the pressure movement center, work expended on maintaining postural stability, statokinesiogram length) had positive correlations with running results. ***Conclusions.*** The athlete's statokinetic balance, which is ensured by the viscoelastic properties (tone and elasticity) and bioelectrical activity (maximum and mean amplitude) of the gastrocnemius muscle, plays a leading role in the movement control strategy.
Keywords: sport of persons with intellectual disabilities, correlations, electromyography, myotonometry, stabilometry.

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BIOFUNCTIONAL PROPERTIES OF COMPOSITE HYDROGELS BASED ON KAPPA-CARRAGEENAN AND SODIUM ALGINATE

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Abstract. ***Introduction.*** The study was conducted to evaluate the structural, mechanical, sorption-desorption, and biological properties of hydrogels based on kappa-carrageenan and sodium alginate (Car/Alg). ***Methods.*** The study employed texture analysis of materials, biochemical and enzyme linked immunosorbent assays for protein quantification, and flow cytometry to assess apoptotic cell numbers and cell cycle phase distribution. ***Results.*** The strength of the hydrogels decreased with a reduction in the carrageenan proportion; calcium crosslinking at an equal component ratio increased both strength and Young's modulus. Car/Alg hydrogels with a 3:1 component ratio did not affect fibroblast viability, apoptosis, or proliferative activity and preserved the functional activity of incorporated cytokines. ***Conclusion.*** The obtained results indicate the promise of further *in vivo* studies on the biofunctional properties of these hydrogels.
Keywords: hydrogels, kappa-carrageenan, sodium alginate, structural and mechanical properties, controlled delivery, fibroblasts, biocompatibility, regenerative medicine.