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INTEGRATION OF PHYSIOLOGICAL FUNCTIONS OF THE BODY OF YOUNG SHORT-TRACK ATHLETES WHEN ACHIEVING VARIOUS RESULTS IN ANAEROBIC ENDURANCE INDICATORS

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Abstract. ***Introduction.*** The aim of the work is to identify the integration of physiological functions of the body of young athletes when achieving different results on the glycolytic load according to the leading markers of the functional state and special performance. ***Methods.*** The study involved 28 young short track athletes from Smolensk. Functional diagnostics included an assessment of neuronal metabolism, heart rate variability and blood microhemocirculation. Special performance consisted of field and bicycle ergometric testing. ***The results*** of the study showed that achieving a high result in anaerobic endurance in 13-year-old short track athletes was accompanied by smaller shifts in its "physiological cost" compared to 12-year-old athletes. ***Conclusion.*** The data obtained contributed to the construction of a model of integrative diagnostics of the current state of the body in young short track athletes of different ages.

Keywords: integration, heart rate variability, microhemocirculation, neuroenergy mapping, bicycle ergometry, anaerobic endurance, special performance, short track speed skating.

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PSYCHOPHYSIOLOGICAL INDICATORS OF STUDENT HOCKEY PLAYERS WITH DIFFERENT LEVELS OF SPORTS PERFORMANCE

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Abstract. ***Introduction.*** The "cost" of adaptation to loads in student hockey players is determined by the combined effect of physical and mental activity. In this regard, taking into account the research of the changes in psychophysiological indicators of student hockey players of various roles depending on the level of an athlete's performance in the competitive period, we have identified the objective of this study. ***Methods.*** The level of hockey players' performance was determined by a set of indicators, including an assessment of technical and tactical, special physical and general physical fitness and game statistics. Psychophysiological status diagnostics included the results of tests of simple visual-motor reaction, reaction to a moving object, assessment of attention, choice reaction, interference immunity, critical frequency of light flickering. ***Results.*** Based on the assessment of the performance level, three subgroups of athletes were identified: low-, medium- and high-performance hockey players of the defense and attack line, and a predominantly average level of psychophysiological state was identified in student hockey players. ***Conclusion***. High-performance hockey players were called up to the regional team and the league team, playing up to 10 additional matches, which contributed to the development of fatigue and the formation of stress in adaptation mechanisms.

Keywords: student hockey league, adaptation, psychophysiological indicators, sports performance.

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EVALUATION OF SOMATOMETRIC AND PHYSIOMETRIC INDICATORS OF 8-12-YEAR-OLD CHILDREN IN THE MOSCOW REGION

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Abstract. ***Introduction.*** Evaluation of physiometric parameters, such as vital capacity and hand strength, with subsequent calculation of vital and strength indices, is an integral part of a comprehensive assessment of the level of a child's physical development, which is one of the main health criteria. The aim of the study was to evaluate somatometric and physiometric parameters of 8-12-year-old children in the Moscow region at the present stage. ***Methods.*** The examination included 228 2-5-graders of one of the Moscow comprehensive schools (101 girls and 127 boys); somatometric and physiometric parameters were assessed. ***Results.*** Somatometric and physiometric parameters of 8-12-year-old children increase naturally in accordance with the physiological laws of growth and development when moving from one age group to another, older one. Between boys and girls within the same age group in body length, body weight and body mass index, no reliable differences were identified, which indicates the similarity of morphological signs of physical development of the children we examined. ***Conclusion.*** Children examined in 2022 were taller and heavier, and their physiometric parameters were lower, indicating a decline in the functional capabilities of schoolchildren in the Moscow region today.
Keywords: physical development, somatometry, physiometry, functional parameters, 8-12-year-old children.

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SIGNIFICANCE OF TRANSFORMATION OF THE HEMOGLOBIN STRUCTURE IN THE NEONATAL PERIOD AS ADAPTATION AND MALADAPTATION FACTORS

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Abstract. ***Introduction.*** Currently, the role of physiological and pathological factors on the adaptation of the body in the neonatal period and the contribution of changes in blood hemoglobin levels and oxygen content to adaptation processes are actively studied. The effect of fetal hemoglobin in the neonatal period during the transition from placental to pulmonary gas exchange in premature infants remains unknown. ***Methods.*** To compare the values of hemoglobin dynamics in the process of body adaptation, an analysis of an array of clinical and laboratory data from full-term and premature neonatal infants (0-7 and 8-28 days) was used. ***Results.*** It was found that the amount of oxygen transported by total blood hemoglobin is negatively affected by a decrease in the fetal hemoglobin content with a high affinity for oxygen. In newborns, both full-term and premature, a decrease in oxygen is recorded with increasing age, the data differed in amplitude and speed with the same complex of changes in indicators. ***Conclusion.*** In age-related, physiological, or transfusion fetal hemoglobin depression, higher partial pressure of oxygen is required to form a 50% hemoglobin oxygen saturation level, which is not always achievable in hypoxia episodes and contributes to adaptation disorders. Consequently, the fetal hemoglobin content has a regulatory effect in the neonatal period on the adaptation processes of newborns and can cause maladaptation when it decreases, especially in premature infants.
Keywords: adaptation, fetal hemoglobin, hypoxia, maladaptation.

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ADAPTIVE CAPABILITIES OF THE CARDIORESPIRATORY SYSTEM OF GIRLS ENGAGED IN MOUNTAIN TOURISM IN THE MID-MOUNTAIN CONDITIONS

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Abstract. ***Introduction.*** The relevance of the present research is determined by the need to study the physiological mechanisms of adaptation to mid-mountain conditions in untrained tourists. ***Methods.*** The experiment involved girls from a sports club (n=8) involved in mountain tourism, they had not previously participated in mid-mountain ascents. The adaptive capabilities of the cardiorespiratory system were assessed using the parameters of stress testing using the respiratory tests on inhale and exhale, heart rate variability and central hemodynamic indicators were measured at each stage of the experiment. ***Results.*** During the period of passive acclimatization in the mid-mountain conditions, an increase in the number of examined (66.6% of all cases) with a pronounced predominance of the autonomous contour of the autonomic regulation of functions was revealed. At the same time, girls with the regulation type III and IV had a decrease in the adaptive capabilities of the functional systems of the body. The data analysis revealed an increase in the number of girls with the regulation type III (100% of all cases) relative to the second stage of the study. ***Conclusion.*** The results of the study have proven the effectiveness of gradual acclimatization in mid-mountain conditions to the period of high-mountain acclimatization.
Keywords: hypoxia, adaptation, heart rate variability, central hemodynamics, mid-mountain region, girls.

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ADAPTATION POTENTIAL OF THE BODY OF GIRLS ENGAGED IN EXTREME MOUNTAIN TOURISM, TAKING INTO ACCOUNT THE TYPOLOGICAL FEATURES OF AUTONOMIC REGULATION

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Abstract. ***Introduction.*** The relevance of this research is determined by the insufficient state of knowledge on the adaptive capacity of the functional systems of the body of young women engaged in tourism in the high altitude conditions, taking into account the type of autonomic regulation. ***Methods.*** The study involved girls (n=5) from the main health group who were engaged in mountain tourism in a sports club and had not previously performed high-altitude ascents. The body's adaptability was assessed using the parameters of heart rate variability, spirometry and psychophysiological testing methods. ***Results.*** The analysis of the obtained data, depending on the prevailing type of autonomic regulation, revealed the features of the adaptive and compensatory responses of the examined girls under physical stress in a high-altitude climate. Thus, the examined girls with the I type of autonomic regulation had an increase of respiratory volume and share of low-frequency waves in the heart rate variability spectrum. Optimal adaptive capabilities of the respiratory system were found in the girls with the III type. ***Conclusion.*** Moderate predominance of the central autonomic regulation contour was identified in 80% of the subjects at the second stage, and in 100% at the third stage, determining stress of adaptive capabilities of their bodies.
Keywords: adaptation, hypoxia, autonomic regulation, heart rate variability, spirometry, body composition, extroversion, neuroticism, anxiety, high-altitude climate, girls.

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PECULIARITIES OF VERTICAL STABILITY, PSYCHOPHYSIOLOGICAL CHARACTERISTICS AND PHYSICAL QUALITIES IN HIGHLY QUALIFIED DANCERS WITH DIFFERENT TYPES OF HEART HEMODYNAMICS

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Abstract. ***Introduction*.** Intense physical activity exceeding 20 hours per week induces adaptive functional changes in all physiological systems in athletes engaged in competitive ballroom dancing. However, the current literature lacks a complete understanding of how exactly the cardiovascular system of dancers responds to the specifics of dance loads, which determines the relevance of this article. ***Methods*:** tetrapolar rheoplethysmography, blood pressure and heart rate measurement, psychophysiological testing, dynamometry, stabilometry, PWC_{170}. ***Results*.** A comparative analysis has revealed statistically significant differences in psychomotor performance indicators in dancers with different types of heart hemodynamics, as well as in stabilographic testing indicators, maximum voluntary muscle strength of the right and left hands, and aerobic endurance according to the PWC_{170} test results. The study results highlight differences in vertical stability, psychomotor performance, and physical development, favoring dancers with the hypokinetic type. ***Conclusion*.** The data obtained during the study allow us to identify early physiological predictors of successful, highly qualified dancers based on central heart hemodynamic parameters and improve the selection of dancers for national ballroom dancing teams.

Keywords: heart hemodynamics, competitive ballroom dancing, highly qualified dancers, functional state, psychophysiology, vertical stability, stabilographic indices, physical qualities, aerobic endurance.

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MORPHOFUNCTIONAL STATUS, AEROBIC AND ANAEROBIC ENDURANCE OF ELITE COMPETITIVE BALLROOM DANCERS

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Abstract. ***Introduction.*** Competitive ballroom dancing places high demands on the athletes' bodies, especially at the peak performance level. Lack of adequate recovery negatively impacts adaptation and fitness development. The aim of this article was to identify gender differences in morphofunctional parameters, aerobic and anaerobic endurance in elite male and female competitive ballroom dancers. ***Methods***. Research methods included anthropometry, psychophysiological testing, spirometry, dynamometry, blood pressure measurement, and assessment of aerobic and anaerobic endurance using the Cooper, PWC_{170}, and Wingate tests. ***Results***. Advantages of male dancers were established in anthropometric parameters, muscle effort accuracy, cardiorespiratory system functioning, and fitness development. Male dancers demonstrated lower levels of trait and state anxiety compared to female dancers. Differences in blood pressure were also identified. ***Conclusion***. The study will allow us to optimize the training process to improve dancers' performance depending on their functional status.

Keywords: dancers, competitive ballroom dancing, aerobic endurance, anaerobic endurance, Wingate test, maximum alactic performance, maximum power, anaerobic power, aerobic power, maximum voluntary muscle strength, spirometry, respiratory test on inhale, anthropometry.

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MORPHOLOGICAL STATUS AND PHYSICAL FITNESS OF HIGHLY QUALIFIED CLIMBERS IN SPEED CLIMBING

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Abstract. ***Introduction.*** The article presents the analysis of the morphofunctional status and physical fitness indicators of athletes in speed climbing. ***Methods.*** Anthropometric measurement, flexibility tests, pull-ups on a horizontal bar, squat jump and counter movement jump, 10/5 repeat jump test, drop jump, wrist dynamometry, isometric traction of the upper block, isokinetic test of hip extensors and flexors, PWC-170 and Wingate tests were performed for 46 athletes (men = 26, women = 20) with qualification of Candidate for Master of Sport to International Master of Sport. ***Results.*** Significant qualification differences have been identified in morphofunctional status and motor abilities of athletes, which determine success in the speed climbing. ***Conclusion.*** The results of the comprehensive physical fitness testing reflect the orientation and specifics of the sports selection of highly qualified climbers in long-term training in speed climbing.
Keywords: highly qualified athletes, speed climbing, physical fitness, morphofunctional status.

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THE EFFECT OF PAIRED ASSOCIATIVE STIMULATION WITH A TRANSCRANIAL STIMULUS ADVANCE ARRIVAL ON THE HUMAN'S VOLUNTARY CONTRACTION SPEED-STRENGTH CHARACTERISTICS

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Abstract. ***Introduction.*** The article shows the effect of a session of paired associative stimulation of the motor cortex and spinal cord, targeted to the spinal motor neurons and with arrival of a transcranial magnetic stimulus by 10 ms before the spinal one. The aim of the study was to determine the functional effect of the stimulation session on the speed-strength characteristics of the maximum voluntary plantar flexion. ***Methods.*** The study involved 9 short- and medium-distance runners. The participants performed maximum voluntary plantar flexion (isometric mode) on the Biodex System 3 complex. We conducted transcranial magnetic stimulation of the motor cortex and percutaneous electrical stimulation of the spinal cord roots at L2-L3 level. ***Results.*** The stimulation session led to a significant increase of the maximum voluntary isometric contraction and the effort developed by the subject during the first 100 ms of movement, as well as to a decrease in the time to achieve the maximal contraction and 50% of it. These changes can be explained by the working muscles electromyogram's amplitude and frequency increasing at the force developing phase when performing the maximal contraction. ***Conclusion.*** The paired associative stimulation session, consisting of 100 pairs of stimuli, can be used as an additional tool for developing of the human speed-strength abilities.
Keywords: paired associative stimulation, speed-strength abilities, transcranial magnetic stimulation, spinal cord stimulation.

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ASSESSMENT OF PSYCHOMOTOR ABILITIES IN HANDBALL PLAYERS WITH HEARING DEPRIVATION

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Abstract. ***Introduction.*** Information on the state of psychomotor abilities in qualified handball players with hearing deprivation seems important for an objective assessment of psychophysiological fitness and prediction of sports performance. ***Methods.*** Spatiotemporal abilities were tested in 10 healthy handball players and 10 athletes with hearing deprivation using the hardware and software complex "Researcher of temporal and spatial properties of a person. Version 2.1". ***Results.*** Comparative intergroup analysis of psychomotor parameters in handball players showed no statistically significant differences. The results of the quantitative distribution of the studied functions among handball players with hearing deprivation more often demonstrated low rates of temporal and spatial sensorimotor reactions. ***Conclusion.*** The study of psychophysiological parameters in highly qualified handball players with hearing deprivation allows to identify compensatory mechanisms, to make correction in the training process.
Keywords: psychomotor abilities, handball players, handball players with hearing deprivation.

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VARIABILITY OF MICROCIRCULATION MECHANISMS IN THE LOWER EXTREMITIES

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Abstract. ***Introduction.*** Tissue microcirculation is a complex, heterogeneous process. In this paper, the issue of blood circulation asymmetry in the lower extremities is investigated by measuring the integral perfusion index in the microcirculatory bed. ***Methods.*** 62 middle-aged volunteers (48.2±12.5 years old) were examined. The state of microcirculation in the skin at the level of the lower third of the shin was assessed using laser Doppler flowmetry. ***Results.*** The difference in blood flow of the right and left lower extremities was revealed, namely, perfusion indices relative to the average blood flow in the right limb were 7.7 peripheral units, in the left limb 6.1 peripheral units ($p<0.001$). The asymmetry of the microcirculation control processes and, in fact, the microcirculation parameters themselves in the right and left lower extremities was revealed. ***Conclusion.*** The mechanisms of regulation of microcirculation in the contralateral extremities are heterogeneous in nature, associated with anatomical and neuro-regulatory factors.
Keywords: microcirculation, active factors, passive factors, capillaries, laser Doppler flowmetry.

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INFLUENCE OF PROGRESSIVE PHYSICAL ACTIVITY ON HEART RATE VARIABILITY DEPENDING ON THE TYPE OF AUTONOMIC REGULATION DURING HEALTH-IMPROVING VOLLEYBALL EXERCISES

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Abstract. ***Introduction.*** The cardiovascular system participates in the formation of the body's homeostatic stability in response to physical activity of varying duration and intensity. The aim of the study was to identify differences in heart rate variability in women with progressive physical activity. ***Methods.*** The study involved 19 22-29-year-old women. The hardware and software complex "Varikard 2.51" was used to record heart rate variability. ***Results.*** Subjects with type III regulation demonstrate adaptive body stability when exposed to progressive physical activity. The subjects with type I revealed disorders of the autonomic and central regulatory mechanisms, which are based on a low level of functionality. ***Conclusion.*** Taking into the account the data obtained, the trainer has an objective tool to enhance the functional capabilities of those involved and prevent the development of pre-nosological changes considering individual and typological features of heart rate regulation.
Keywords: heart rate variability, volleyball, functional state, physical activity.

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THE REACTION OF STUDENTS OF DIFFERENT MORPHOFUNCTIONAL STATUS TO THE FIXED BREATHING TEST

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Abstract. ***Introduction.*** The article presents an assessment of the functional capabilities of the body using a technique with fixed resonant breathing, which allows us to study the reaction of the autonomic nervous system's departments. The aim of the study was to identify the characteristics of the reaction of students of different morphofunctional status to the fixed breathing test. ***Methods.*** The study involved 159 students whose rhythmocardiograms were analyzed while performing a fixed breathing test (6 times/min). The data was analyzed using Statistica 12.0 software. ***Results.*** A normal reaction to the resonant breathing test was detected in 34% of the students, a paradoxical reaction in 11%, hypo- and hyperreaction were found in 55% of the subjects. The normal reaction is most often found in mesomorphs with a predominance of the autonomous regulatory circuit (50%), and the paradoxical reaction in endomorphs with a predominance of the central circuit (24.2%). ***Conclusion.*** Constitutional features set the "base" for the autonomic response, and the type of autonomic regulation clarifies and specifies the propensity for a specific reaction within each somatotype.
Keywords: autonomic nervous system, heart rate variability, type of autonomic regulation, respiratory test, resonant breathing, body type, ectomorph, mesomorph, endomorph.

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CHANGES IN THE PARAMETERS OF THE CARDIOVASCULAR SYSTEM AND INDICATORS OF THE PSYCHOEMOTIONAL STATE OF MEDICAL STUDENTS DURING THE EDUCATIONAL PROCESS

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Abstract. ***Introduction.*** The educational process in the University is aimed at forming stable adaptation mechanisms both at the level of visceral systems, in particular the cardiovascular system, and at the level of higher nervous activity. The aim of the work: to study the dynamics of the cardiovascular system performance indicators and the parameters of the psychoemotional state of medical students during their 3rd year of study. ***Methods.*** The parameters of the cardiovascular system's performance, the level of state and trait anxiety, the level of development of social intelligence, and the level of work efficiency were recorded in 210 students during exam period and seminars. ***Results.*** An increase in systolic and diastolic pressure was established, while a decrease in the values of the adaptation potential, Robinson index, Kerdo autonomic index, as well as state and trait anxiety and work efficiency was noted. ***Conclusion.*** The obtained results can be explained by the ongoing process of formation of adaptive mechanisms, which ends at later stages of learning.
Keywords: adaptation potential, Kerdo autonomic index, Robinson index, Schulte tables.

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DAILY ORGANIZATION OF ARTERIAL PRESSURE RHYTHMS IN FEMALE STUDENTS WITH THE HYPERTENSIVE TYPE OF VEGETATIVE-VASCULAR DYSTONIA, WHO ARE ENGAGED IN FITBALL GYMNASTICS

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Abstract. ***Introduction.*** Vegetative-vascular dystonia is a common health disorder among students, which often occurs against the background of increased influence of the sympathetic division of the autonomic nervous system. The discrepancy between the functioning of organs / systems and circadian rhythms can lead to adaptation disorders. Physical exercise is applied as a corrective measure for health disorders of various origin. Objective: to determine the effect of fitball gymnastics on the organization of circadian rhythms of arterial pressure in female students with the hypertensive type of vegetative-vascular dystonia ***Methods.*** The cosinor analysis method was used to determine the organization of circadian rhythms. ***Results.*** In female students with the hypertensive type of vegetative vascular dystonia, the acrophases of the circadian rhythm of systolic and diastolic arterial pressure were recorded at night: 1:58 and 0:44 hours, respectively, which does not correspond to the arterial pressure rhythms of female students in the control group. ***Conclusion.*** After the fitball gymnastics course, the female students with vegetative-vascular dystonia experienced a shift in the blood pressure acrophases from night to daytime.
Keywords: vegetative-vascular dystonia, systolic arterial pressure, diastolic arterial pressure, pulse pressure, female students, fitball gymnastics.

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POSTURAL CONTROL IN CHILDREN AND ADOLESCENTS INVOLVED IN SPORTS, TAKING INTO ACCOUNT AGE AND AUTONOMIC ASPECTS

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Abstract. ***Introduction.*** Postural control is a key component of a child's motor development, ensuring stability and coordination of movements during active growth. The aim of the study was to evaluate the age-related dynamics of autonomic regulation and postural control in athletes, as well as the relationship between autonomic regulation and postural stability. ***Methods.*** A total of 110 athletes and non-athletes aged 7 to 19 years were examined, and heart rate variability and stabilometric parameters of postural control were assessed. ***Results.*** The correlation between autonomic regulation and postural control differed between the study groups. The results of discriminant analysis confirmed the presence of objective differences between athletes and non-athletes in the set of studied parameters. ***Conclusion.*** The age-related dynamics of autonomic support has different directions in athletes and non-athletes. In non-athletes, the low-frequency component in the heart rate variability spectrum increases with age, indicating a gradual strengthening of the sympathetic influence. Postural control shows a clear age-related improvement in athletes, while no such dynamics are observed in non-athletes.
Keywords: heart rate variability, adaptation, postural control, sensory systems, age, athletes.

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CHARACTERISTICS OF THE CHRONOBIOLOGICAL ORGANIZATION OF THE CARDIOVASCULAR SYSTEM IN MEDICAL STUDENTS

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Abstract. ***Introduction.*** In the human body, the functioning of most organs and tissues follows a strictly defined daily pattern. Changes in organ function throughout the day are controlled by a complex system of interacting genes. The aim of this study was to examine the chronobiological characteristics of the cardiovascular system in medical students. ***Methods.*** Forty male and female students aged 19 to 22 participated in the study. To determine the students' chronotype, the D. Horn-O. Ostberg test, modified by A.A. Putilov, was used. Blood pressure readings were recorded in a sitting position using the Korotkov method and a tonometer. Heart rate was measured at rest using a Little Doctor MD300 fingertip pulse oximeter. Based on the recorded data, the Kerdo autonomic index was calculated to assess the dominant nervous system function. The Shapiro-Wilk test and the Mann-Whitney U-test were used for statistical analysis. ***Results.*** The study found that the lowest hemodynamic parameters were observed in those with the morning chronotype, while the highest systolic and diastolic blood pressure parameters were observed in those with the "pigeon" chronotype. Throughout the day, sympathetic nervous system tone decreases in those with the morning chronotype. ***Conclusion.*** Based on the study, it can be concluded that the functioning of the cardiovascular system has a clearly defined biorhythmological organization throughout the day, which, among other things, depends on a person's chronotype.
Keywords: chronotype, circadian genes, blood pressure, heart rate, Kerdo autonomic index.

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HEMODYNAMIC EFFECTS OF THE CIRCULATORY SYSTEM AUTOREGULATION IN GAME SPORTS ATHLETES

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Abstract. ***Introduction.*** The features of hemodynamics in athletes of game sports have been studied, depending on the specialization and the ratio of the maximum static and dynamic components achieved during the competition. ***Methods.*** 64 athletes specializing in football, basketball, handball, volleyball participated, age – 19-21 years. To classify athletes into a certain group based on the predominance of the type of static or dynamic load, the classification of Mitchell J.H et al. was used. The functional state of the circulatory system was assessed according to the integrated approach, taking into account the peculiarities of central hemodynamics and autonomic heart rhythm regulation. ***Results.*** It was revealed that the cardiac type of blood circulation, as the most unfavorable in terms of hemodynamic and vegetative homeostasis, is more common in athletes specializing in volleyball (50%) and basketball (40%). ***Conclusion.*** The proposed methodological approach with the division of athletes according to the types of the circulatory system autoregulation makes it possible to optimize the biomedical control of the cardiovascular system of this category of individuals.
Keywords: game sports, type of the circulatory system autoregulation, functional state, hemodynamics, autonomic regulation of heart rhythm.

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THE EFFECT OF SPLENECTOMY AND SPLEEN RESECTION ON HEMATOLOGY INDICATORS AND BLOOD COAGULATION SYSTEM

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Abstract. ***Introduction.*** The spleen plays an important role in hematopoiesis, the body's immune defense, and the hemostasis system. Traumatic injuries of the spleen rank 2-3 among all abdominal injuries. Ruptures of this organ occur in 20-25% of patients with abdominal trauma. Clinical experience shows that the preservation of the spleen is possible in 25-46% of cases. Many authors consider splenectomy to be the preferred surgical approach. ***Methods.*** On 30 mongrel dogs of both sexes weighing from 15 to 21 kg, some indicators of peripheral blood and hemostasis were studied after splenectomy and resection. Non-parametric criteria were used for statistical analysis. ***Results.*** Removal of the spleen leads to a statistically significant decrease in some peripheral blood parameters, such as the number of hemoglobin and red blood cells, and an increase in the number of white blood cells up to 2 weeks after surgery, with a further tendency towards normalization. There was also an activation of the blood clotting system during the first week after surgery, followed by recovery. In cases of spleen resection, these changes are less pronounced and recovery occurs faster than in cases of splenectomy. ***Conclusion.*** The obtained data confirm the expediency of preserving the spleen in case of its damage.
Keywords: splenectomy, resection, effect, indicators of hematology and blood coagulation system.

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PHYSICAL DEVELOPMENT AND MOTOR FITNESS OF CHILDREN AGED 5-6 YEARS OLD IN THE ARKHANGELSK, MOSCOW, AND PENZA REGIONS OF RUSSIA

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Abstract. ***Introduction.*** Physical development and motor fitness of children are important indicators of their overall development and readiness for learning. The study of regional and gender differences in these indicators allows us to take into account the influence of climatic and geographical factors on the development of preschoolers. ***Methods.*** A survey of 768 5-6-year-old children from preschool institutions in the Arkhangelsk, Moscow and Penza Regions was conducted. Anthropometric parameters (body length and weight, chest circumference) were measured, and the results of motor tests (6-minute run, standing long jump, forward tilt) were obtained. ***Results.*** It was found that the morphological features and age of children have a significant impact on the test results, while belonging to a medical health group does not generally determine the differences in basic anthropometric indicators. ***Conclusion.*** The results of the study confirm the need to develop regionally adapted standards of motor training for preschool children.

Keywords: physical development, motor fitness, gender differences, regional characteristics, endurance, flexibility, speed and strength, preschool educational organizations.

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THE EFFECT OF A SINGLE AUDIOVISUAL STIMULATION ON VISUAL WORKING MEMORY INDICATORS

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Abstract. ***Introduction.*** Physical education is associated with the activation of cognitive functions of the cerebral cortex. However, constant study, daily stress, insomnia, and fatigue can lead to a decrease in the cognitive functions of the cerebral cortex in students during physical education classes. The aim of the study was to examine the effect of a single audiovisual stimulation on the cognitive functions of the cerebral cortex in students during physical education classes. ***Methods.*** The study used the visual perception volume test, which evaluates the coverage of the visual field, the number of mistakes with the time of completing the task. After the assignment, an audiovisual stimulation device was used for the students of the main group to correct the cognitive functions of the brain. ***Results.*** The paper presents the results of a study of 117 female students of the control (n=59) and main (n=58) groups in physical education classes. ***Conclusion.*** It was found that after audiovisual stimulation, the participants in the main group (n=58) had improved visual perception volume test scores compared to the control group (n=59).

Keywords: cognitive functions of the brain, single audiovisual stimulation, visual perception volume, visual field coverage, short-term visual working memory, correction.

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FEATURES OF PHYSIOLOGICAL CORRECTION OF RESPIRATORY PATTERN AND VEGETATIVE PARAMETERS BY THE SENSORIMOTOR CONTROL OF BREATHING METHOD IN MODELING PHENOMENA SPECIFIC TO EXTRAPYRAMIDAL DISORDERS

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Abstract. ***Introduction.*** Specific changes in the respiratory pattern and decreased heart rate variability are early manifestations of extrapyramidal disorders. Functional respiratory disorders of a restrictive nature develop. It is advisable to use sensorimotor control of breathing to correct respiratory and autonomic changes. ***Methods.*** The study examined two groups of healthy individuals: a risk group with specific respiratory disorders and a control group without respiratory disorders. All participants were exposed to simulated breathing patterns associated with extrapyramidal disorders. Then each group was divided into two subgroups to compare the effectiveness of two methods for correcting altered breathing patterns: sensorimotor breathing control and a breathing exercise program. ***Results.*** In individuals of the risk group, correction with sensorimotor control of breathing demonstrated a recovery of most autonomic and respiratory parameters, close to the baseline values of the control group. In the control group, correction with a breathing exercise program also resulted in improvements in cardiorespiratory parameters, but at a slower rate than with sensorimotor control of breathing. In the risk group, recovery with breathing exercises was generally incomplete and unstable. ***Conclusion.*** The study results demonstrate the high efficiency of the sensorimotor control of breathing method based on biofeedback in the complex correction of altered breathing patterns and autonomic parameters characteristic of extrapyramidal disorders.

Keywords: modeling of respiratory biomechanics, chest excursion, autonomic nervous system, extrapyramidal disorders.

PSYCHOPHYSIOLOGY

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PSYCHOPHYSIOLOGICAL INDICATORS OF STUDENTS OF A TRANSPORT UNIVERSITY DEPENDING ON THE TYPE OF BODY CONSTITUTION

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Abstract. ***Introduction.*** In recent years, there has been a decline in the health of young people, including university students, due to a sedentary lifestyle and high academic workload. Particular attention is required to study the psychophysiological characteristics of students depending on their somatotype. ***Methods*.** The following parameters were assessed in the study: simple motor reaction time, speed of attention switching, reaction to a moving object, and the Bourdon test. The Pignet index was used to identify the somatotype. ***Results.*** Students with asthenic and normosthenic somatotypes showed a predominance of excitation processes over inhibition, therefore they demonstrated higher stability of reaction, stability of motor actions, and speed of attention switching compared to young men with the hypersthenic type. ***Conclusion.*** The obtained data made it possible to form an individual and typological "portrait" characterizing the psychophysiological characteristics of young men of each somatotype.

Keywords: individual and typological "portrait", type of body constitution, somatotype, psychophysiological indicators, students' health, university, education, attention, pedagogical physiology.

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ETIOPATHOGENETIC AND CLINICAL FEATURES OF CEREBRAL INFARCTION CAUSED BY A CORONAVIRUS INFECTION AMONG DISABLED ADULTS IN MOSCOW

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Abstract. ***Introduction.*** Ischemic stroke is a common consequence of COVID-19 and the leading cause of disability in Russia. ***Methods.*** Scope: 5.434 individuals with disabilities due to acute cerebrovascular accident, of whom 424 developed ischemic stroke within 6 months of COVID-19 in Moscow from 2020 to 2022. ***Results.*** The incidence of cryptogenic stroke was 35.1%, and multifocal stroke was 8.7%. Among clinical manifestations, pyramidal abnormalities were detected in 80% of patients, and vestibulo-ataxic syndrome was also high. Common comorbidities in stroke associated with COVID-19 include hypertension, atherosclerosis, obesity, and diabetes. ***Conclusion.*** Characteristics of patients who have suffered a cerebral infarction following COVID-19 include predominantly carotid system involvement, a predominance of the cryptogenic subtype, and a higher risk of multifocal brain tissue damage.
Keywords: coronavirus infection, COVID-19, post-COVID syndrome, primary disability, recurrent disability, ischemic stroke.

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ACCESSIBLE ENVIRONMENT IN RESORTOLOGY: CHALLENGES OF THE TIME

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Abstract. ***Introduction.*** Despite the sufficient number of regulatory frameworks for the development of an accessible social infrastructure environment, the issue of studying the effectiveness of adapting the conditions of health resort institutions and the feasibility of implementing socio-cultural programs remains relevant. Aim: to assess the accessibility of facilities on national routes when organizing socio-cultural rehabilitation in the context of health resort treatment. ***Methods.*** The assessment was conducted using a questionnaire that included criteria taking into account the needs of different disability categories on 10 national routes. The chi-square (χ^2) test was used to analyze the accessibility of display facilities for different groups of people with disabilities and to test the statistical significance of the differences. ***The results*** identified problem areas in terms of ensuring transport accessibility (30% availability) and the uneven distribution of display facilities. ***Conclusion.*** The development of uniform requirements for national routes will contribute to the realization of the potential of the health resort complex in solving the problems of health improvement and rehabilitation of the population of all categories.
Keywords: accessible environment, bioaudit, spa treatment, balneology, accessibility of infrastructure and services, people with disabilities.

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EFFICACY OF TRANSCRANIAL ELECTRICAL STIMULATION IN CHRONIC HEADACHE FOLLOWING COVID-19

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Abstract. ***Introduction.*** To evaluate the effect of transcranial electrical stimulation in addition to single-drug pharmacotherapy on headache relief and normalization of plasma β-endorphin levels in patients with long COVID. ***Methods.*** The study included 150 long COVID patients who were randomized into two groups (75 patients each): the main group received transcranial electrical stimulation in addition to single-drug pharmacotherapy, while the comparison group received single-drug pharmacotherapy alone. The treatment effectiveness was assessed with the Visual Analog Scale and plasma β-endorphin levels. ***Results.*** After 15 days of treatment, statistically significant differences were found between the groups in terms of median Visual Analog Scale pain scores ($p<0.001$) and β-endorphin levels ($p=0.001$). The addition of transcranial electrical stimulation to single-drug pharmacotherapy resulted in complete headache relief in 90.7% of long COVID patients. ***Conclusion.*** The obtained results support the use of transcranial electrical stimulation as an effective and pathogenetically justified component of comprehensive treatment in long COVID patients with chronic headache.
Keywords: long COVID, transcranial electrical stimulation, headache, β-endorphin.

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APPLICATION OF TRANSCRANIAL ELECTRICAL STIMULATION IN INTEGRATIVE REHABILITATION OF PATIENTS WITH POSTMASTECTOMY CHRONIC PAIN SYNDROME: ASSESSMENT OF PAIN AND QUALITY OF LIFE DYNAMICS

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Abstract. ***Introduction***. Objective of the study – to evaluate the effect of transcranial electrical stimulation as a non-drug alternative to antidepressants in patients with chronic post-mastectomy pain syndrome. ***Methods.*** The study included 90 patients who were randomized into two groups: the main group (n=45) – transcranial electrical stimulation was used as an alternative to venlafaxine, the comparison group (n=45) – an algorithm of integrative rehabilitation with venlafaxine. The effectiveness of rehabilitation after 56 days and the sustainability of the achieved results (6-month follow-up) were assessed using the Visual Analogue Scale and the Medical Research Council Scale, goniometry and the SF-36 quality of life questionnaire. ***Results.*** The patients of the main group demonstrated a significantly more pronounced effect: pain relief was achieved in 91.1% of patients ($p=0.002$), restoration of the full range of abduction in the shoulder joint – in 86.6% ($p=0.045$), muscle strength – in 84.4% ($p=0.044$). The differences in the dynamics of the integral index of quality of life between the main group and the comparison groups were also significantly significant ($p=0.044$). ***Conclusion.*** The inclusion of transcranial electrical stimulation in the algorithm of integral rehabilitation for chronic post-mastectomy pain syndrome provides higher clinical and functional effectiveness and can be considered as a reasonable alternative to venlafaxine.
Keywords: postmastectomy chronic pain syndrome, transcranial electrical stimulation, pain, functional status, quality of life.

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SUBSTANTIATION OF THE THERAPEUTIC AND RECREATIONAL POTENTIAL OF THE SAMARA OBLAST ON THE EXAMPLE OF THE SERGIEVSKY MINERAL WATERS RESORT

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Abstract. ***Introduction.*** The Samara Oblast's therapeutic potential is based on its reserves of therapeutic mud and mineral water, which, when combined with its climate and picturesque landscape, create ideal conditions for restoring health. The aim of the work was to investigate the therapeutic and recreational potential of the Samara Oblast on the example of the Sergievsky Mineral Waters resort. ***Methods.*** We conducted a practical part to identify microclimatic conditions in the area and calculated the bioclimatic potential using methodological guidelines. ***Results.*** Our findings show that the microclimatic parameters of the studied area fall within normal ranges and create favorable conditions for recreational activities. According to modular technology used in balneology, the bioclimatic potential of Samara Oblast reaches 1.76 points out of 3. ***Conclusion.*** The study confirms the therapeutic and recreational potential of Samara Oblast, demonstrating the benefits of its natural resources for health and recreation.
Keywords: Samara Oblast, Sergievsky Mineral Waters, climate, therapeutic potential, climate therapy.

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PREVENTION AND RESTORATION OF THE DENTITION USING 3D TECHNOLOGY IN MODERN DENTISTRY

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Abstract. ***Introduction.*** Digital transformation is a key trend in modern dentistry, fundamentally changing approaches to diagnosis, treatment planning and the manufacture of orthopedic structures. ***Methods.*** We have conducted an analytical review of scientific literature and clinical studies devoted to the application of intraoral scanning (IOS), computer modeling (CAD/CAM) and additive manufacturing (3D printing) technologies in various fields of dentistry. ***Results.*** The advantages of digital protocols and the main limitations have been analyzed, and a lack of long-term clinical studies has been identified. ***Conclusion.*** Further development of 3D technologies is associated with the improvement of materials, artificial intelligence algorithms and the reduction of equipment costs.
Keywords: digital dentistry, intraoral scanning, CAD/CAM, additive technologies, 3D printing, dental prosthetics, clinical efficiency.

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FEATURES OF THE SOMATOTYPOLOGICAL PROFILE OF FEMALE FIELD HOCKEY ATHLETES

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Abstract. ***Introduction.*** A morphological model incorporating both lean body mass, fat mass, and somatotypological profile indicators for female field hockey athletes has not yet been developed. Therefore, the aim of this study was to determine the specific features of the somatotypological profile of female field hockey athletes depending on their age and body fat content. ***Methods.*** The study involved 23 female field hockey athletes aged 12.0 to 20.5 years. Somatometric indicators were measured; body fat mass, fat mass indices, and the somatotypological profile according to the Heath-Carter scheme were registered using bioimpedance analysis on the ABC-01 Medass analyzer. ***Results.*** With increasing age, the somatotype of female athletes undergoes changes and transitions from a balanced mesomorphic to an endomesomorphic, and then to a central one. In the group of examined female athletes, muscle mass gain is extremely limited, and signs of hidden excess body weight are present. ***Conclusion.*** The identified somatotypological profile characteristics, depending on age and body fat content, can serve as a guide (morphological model) for assessing the physical development of female field hockey athletes.

Keywords: physical development, body fat mass, field hockey, somatometry, somatotypology, Heath-Carter scheme.

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ENERGY AND MACRONUTRIENT CONSUMPTION IN FEMALE FIELD HOCKEY ATHLETES

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Abstract. ***Introduction.*** The aim of the study was to analyze the energy and macronutrient consumption of female field hockey athletes during training camps. ***Methods.*** Twenty-three athletes participated in the study. A 24-hour dietary recall method was used, with data processed in the software and analytical module developed by the Federal Research Center of Nutrition, Biotechnology and Food Safety. ***Results.*** The diet structure was unbalanced: 96% of the athletes consumed a high proportion of fats, while 87% had an insufficient intake of carbohydrates. The specific protein and carbohydrate intake were below the recommended levels in 39% and 92% of the athletes, respectively. Statistically significant differences were observed in fat and carbohydrate consumption between the younger and older, and middle and older groups. ***Conclusion.*** Violations in the diet structure and energy consumption were identified, and personalized recommendations for dietary adjustments were developed. It is important to evaluate nutrition at different stages of preparation, taking into account seasonal changes and the level of energy expenditure.

Keywords: young athletes, nutrition, energy, macronutrients, field hockey.

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CONSUMPTION OF DIETARY SUPPLEMENTS BY RUSSIAN BOXERS

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Abstract. ***Introduction.*** The use of dietary supplements is actively discussed in the sports community. On the one hand, dietary supplements can have a beneficial effect on improving the athletic performance of athletes, but on the other hand, it is necessary to take into account the risks associated with the use of performance-enhancing substances. Objective: to study the dietary supplements used by Russian boxers; to determine whether boxers choose supplements in accordance with the principles of evidence-based medicine. ***Methods.*** The study was conducted at RUSADA. The object of the study was the doping control protocols of Russian athletes of various professional levels involved in boxing for the period of 2024. The sources of analytical information were the materials of the doping control protocols section "Drug/Food Supplement Statement". ***Results.*** 182 doping control protocols were analyzed. 115 (63.1%) athletes (men n=74, women n=41) declared the use of supplements. ***Conclusion.*** It has been found that some boxing athletes indicate in their doping control reports the use of dietary supplements that do not demonstrate a significant positive effect on athletic performance; their use may increase the risk of anti-doping rule violations.
Keywords: dietary supplements, sports, doping, boxing, evidence-based medicine.

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RESULTS OF THE HYGIENIC ASSESSMENT OF THE ACTUAL NUTRITION OF YOUNG FEMALE ATHLETES SPECIALIZING IN FIELD HOCKEY

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Abstract. ***Introduction.*** The aim of the study was to analyze the frequency of consumption of various food groups by young female athletes specializing in field hockey. ***Methods.*** The survey involved young female athletes specializing in field hockey (n=23). The analysis of actual nutrition was carried out using the computer program "Analysis of human nutrition status" version 1.2.4 of the State Research Institute of Nutrition of the Russian Academy of Medical Sciences, 2003-2006. ***Results.*** The analysis of the athletes' nutrition structure revealed that the consumption of meat, poultry, vegetables and fruits corresponded to the recommended amounts, while the consumption of grain products, baked goods, potatoes, fish, milk and dairy products was below the recommended values. The consumption of sugar and pastry exceeded the recommended amount by three to five times. ***Conclusion.*** As a result of the survey and analysis of the athletes' diet, violations in the consumption of the main food groups were revealed, which indicates ignorance about rational nutrition and emphasizes the need to introduce training programs on healthy eating.
Keywords: sports, young athletes, teenagers, nutrition, frequency of consumption, added sugar.

PHYSICAL CULTURE AND PROFESSIONAL PHYSICAL TRAINING

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IMPACT OF STRENGTH FITNESS CLASSES FOR DEVELOPING BASIC PHYSICAL QUALITIES 3-4-GRADE GIRLS

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Abstract. ***Introduction.*** It is known that there are many discussions about individual methods of developing physical qualities, for example about the possibility of introducing strength fitness classes in the process of developing basic physical qualities in 3-4-grade girls. The study aims to substantiate the impact of strength fitness classes on the development of basic physical qualities in 3-4-grade girls. ***Methods.*** A total of 24 3-4-grade girls took part in the six-month pedagogical experiment. They were divided into the experimental and the control groups. The girls of the experimental group practiced strength fitness lasting up to 40 minutes at least 3 times a week, while the control group of female peers with the same number of visits practiced classic aerobics. ***The results*** of the study confirm the effectiveness of the developed method for improving physical fitness of schoolgirls. ***Conclusion.*** Strength fitness classes have a significant impact on the development of physical qualities in 3-4-grade girls.
Keywords: 3-4-grade girls, strength fitness classes, physical qualities.

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DEVELOPMENT OF STRENGTH ENDURANCE IN 15-16-YEAR-OLD GIRLS USING BODY PUMP

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Abstract. ***Introduction.*** The objective of the study – to substantiate the effectiveness of the training content using the Body Pump fitness program aimed at increasing aerobic and anaerobic strength endurance in 15-16-year-old girls. ***Methods.*** The pedagogical experiment lasted for six months and took place in the fitness club of the Secondary School No. 2 in Krasnodar. The study involved 15-16-year-old girls, divided into the experimental (n=10) and the control (n=10) groups. For the experimental group of girls, Body Pump fitness classes were arranged at least twice a week for 50 minutes, while the control group had classes in the general physical training section. ***Results.*** Body Pump strength fitness classes have a significant impact on the development of various types of aerobic and anaerobic strength endurance in 15-16-year-old girls compared with general physical training classes. ***Conclusion.*** Application of the 6-month Body Pump program is an effective way to improve aerobic and anaerobic strength endurance of schoolgirls.
Keywords: aerobic-anaerobic and strength endurance, Body Pump fitness, 15-16-year-old girls.

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INDICATORS OF PSYCHOMOTOR ABILITIES OF QUALIFIED ATHLETES AS A TOOL FOR DIAGNOSTICS OF COMPETITIVE READINESS

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Abstract. ***Introduction.*** The materials of the article are aimed at studying the possibilities of using diagnostics of psychomotor indicators to assess the functional readiness of qualified athletes at different stages of the competitive period. ***Methods.*** The study included 38 athletes (BMX cyclists, n=18; road cyclists, n=20). The indicators of psychomotor abilities and indicators of functional state were recorded at different stages of the competitive period. ***Results.*** The data on the level of psychomotor indicators of qualified athletes at different stages of the competitive period in relation to the indicators of functional state were obtained. The changes in psychomotor indicators during the period of direct preparation for competitions were studied and analyzed. ***Conclusion.*** The conducted study showed the prospects of monitoring psychomotor indicators at different stages of preparation for competitions of qualified athletes, which is due to the revealed correlation of psychomotor indices with the indices of functional state of athletes, confirming their contribution to functional competitive fitness.
Keywords: psychomotor abilities, qualified athletes, BMX cyclists, competition period, functional state, competitive readiness.

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THE AGE OF THE STRONGEST POWERLIFTERS AND COMPETITIVE ACTIVITY AS A CRITERION FOR MAXIMIZING THE STRENGTH OF ATHLETES

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Abstract. ***Introduction.*** The article discusses the age characteristics and competitive activity of the strongest powerlifters as a possible criterion at the stage of maximum realization of one's strength capabilities. ***Methods.*** The analysis of literature and competition protocols was conducted to identify the age-related realization of the maximum capabilities of qualified powerlifters and the dynamics of sports performance. Non-parametric methods were used to compare the data. ***Results.*** A tendency towards an increase in the age of participants over the past 20 years has been revealed. Analysis of the competitive activity of the strongest powerlifters indicates a decrease in performance after the pandemic relative to time before. The implementation of attempts in powerlifting exercises is higher among champions compared to prizewinners. ***Conclusion.*** Analysis of athletic longevity and age characteristics of the strongest powerlifters indicates the possibility of a later maximum realization of the strength potential by athletes of both genders.
Keywords: powerlifting, age, performance, achievements, competitions.

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EFFECTIVENESS OF THE CONJUGATED IMPACT METHOD IN THE DEVELOPMENT OF JUMPING ABILITIES IN RHYTHMIC GYMNASTICS AT THE INITIAL TRAINING STAGE

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Abstract. ***Introduction.*** The relevance of the work is due to the need to find methods that ensure the simultaneous development of physical qualities and technical skills of young female athletes. ***Methods:*** testing according to the scale of jumping assessment by I.A. Viner, a 7-week pedagogical experiment. The author's technique based on a set of special exercises with weights of 250 grams was also tested. ***The results*** of the study have demonstrated a statistically significant improvement in jumping performance in the experimental group ($p \leq 0.01$). The average total score on the Viner scale increased from 4.3 to 7.4 points, while no significant changes were observed in the control group that followed the traditional program. The greatest increase was recorded in the exercises "vertical jump with two legs" up to 45-53 cm and "rope skipping" up to 7-10 times. ***Conclusion.*** The proposed method can be recommended for implementation in the training process of rhythmic gymnastics sports schools.
Keywords: rhythmic gymnastics, jumping ability, conjugated impact method, initial training, local weights, sports, I.A. Viner scale.

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AGE-RELATED DYNAMICS OF SPEED-STRENGTH CAPABILITIES OF THE LOWER AND UPPER LIMB MUSCLES IN 12-16-YEAR-OLD CROSS-COUNTRY SKIERS

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Abstract. ***Introduction.*** Speed-strength training plays a key role in the competitive result of cross-country skiers. The objective of the study: to study the features of changes in the indicators of speed-strength abilities of the muscles of the shoulder girdle and muscles of the lower limbs of 12-16-year-old cross-country skiers. ***Methods.*** The study involved 678 12-16-year-old skiers. Speed-strength abilities of the lower extremities were examined using jump tests on the Sporttlab contact platform. Speed-strength abilities of the shoulder girdle muscles were assessed using a test for assessing the maximum alactic power on a ski ergometer according to the D.V. Popov method. ***Results***. It was determined that the indicators of the relative maximum alactic power increased reliably from year to year, both in girls and boys. The maximum values were determined at 14, 15 years in boys and at 14 years in girls. The indicators in jump tests lag behind the growth rate of speed-strength fitness of the shoulder girdle muscles and do not change reliably from 12 to 16 years. ***Conclusion.*** The dynamics of age-related changes in the speed-strength fitness of the shoulder girdle muscles can be traced up to 15 years in young men and up to 14 years in girls, the fitness of the muscles of the lower limbs – up to 15 years and 14 years respectively, with a further slowdown in growth and a decrease by 16 years in girls.
Keywords: cross-country skiers, female cross-country skiers, training stage of preparation, speed-strength abilities, jumping tests, maximum alactic power, Concept SkiErg.