

## **SPORTS MEDICINE**

# **NEW TECHNOLOGIES FOR THE REHABILITATION OF ATHLETES ON THE TRAINING CAMP IN THE CONDITIONS OF MIDDLE ALTITUDE**

G.N. Ter-Akopov

The Federal State-Financed Institution «North Caucasian Research and Clinical Center» under the Federal Medical Biological Agency, Yessentuki, Russia

**Key words:** recovery, fatigue, athletes, training process, middle mountains, hypoxia.

**Annotation.** In the article features of physiological reactions, strategies of adaptation and training, processes of fatigue and recovery of highly skilled sportsmen in the period of preparation at the training base in the mid-mountain conditions are considered. New approaches and methods of restorative measures for athletes, applied in medical and biological accompaniment of athletes in the Federal State Budgetary Institution «North-Caucasian Federal Scientific and Clinical Center of the Federal Medical and Biological Agency» on the basis of training in Kislovodsk are presented.

## **PULSE VALUE PERFORMANCE AS A CRITERION OF METABOLIC STATES AT PHYSICAL LOADS AT HIGH QUALIFICATION COMPETITORS**

R.V. Tambovtseva

The Russian State University of Physical Culture, Sports, Youth and Tourism (GTSOLIFK), Moscow, Russia

**Key words:** metabolic states, pulse value index, physical load, heart rate.

**Annotation.** The purpose of this study was to study the pulse parameters and the energy cost of the exercises. The experiment involved highly skilled athletes and skaters. Athletes performed standardized laboratory tests. A special computer program was used to calculate the value of the O<sub>2</sub> arrival during the exercise, the oxygen debt, the oxygen demand, the parameters of energy production in aerobic and anaerobic processes. Pulse value indicators sufficiently accurately reproduce the main dependencies on the values of the relative power and the maximum operating

time set for the parameters of the oxygen request and the energy cost of the exercise, and allow the training loads to be quantified with high accuracy, taking into account the individual characteristics of the athlete.

## **THE METHOD OF OPTIMIZATION OF THE NEURO-MUSCULAR BALANCE OF THE MUSCULAR CORPSET OF THE SPINE IN ATHLETES AT THE ROBOTYZED SYSTEM «CENTAUR»**

E.V. Kostyuk, Yu.V. Koryagina

The Federal State-Financed Institution «North Caucasian Research and Clinical Center» under the Federal Medical Biological Agency, Essentuki, Russia

**Key words:** muscle strength, biofeedback, neuromuscular balance, spine muscles, athletes, weightlifting, therapeutic physical training.

**Annotation.** The article presents the results of the application of the CENTAUR treatment and diagnostic computerized system for optimizing and correcting the neuromuscular balance of the muscular corset of the spine in elite male weightlifters. The analysis of the obtained results made it possible to reveal the features of the development of the spinal muscles and the imbalance of individual muscle groups as a result of the long-term adaptation of athletes to the working posture when performing a specific physical load. The formed kinetic stereotype can lead to persistent disruptions in the musculoskeletal system, imbalance of various muscle groups, and the formation of latent trigger points and functional blocks. The use of the Centaur system in the rehabilitation of elite athletes makes it possible to identify the features of the muscular corset of the spine, to identify the «risk zones» associated with the neuromuscular imbalance, make recommendations and correct for the prevention of biomechanical violations of the kinetic stereotype of athletes.

## **CHANGE IN THE ENDURANCE LEVEL OF ATHLETES ENGAGED IN CYCLING WITH THE USE OF CREATINE**

<sup>1</sup> V.N. Avsiyevich, <sup>2</sup> A.I. Fyodorov, <sup>3</sup> Zh.S. Issayeva

<sup>1</sup>Kazakh academy of sport and tourism, Kazakhstan

<sup>2</sup> Al-Farabi Kazakh National University, Kazakhstan

<sup>3</sup> South Ural State University, Russia

**Key words:** cycling, creatine, endurance, athletes, functional state.

**Annotation.** The article presents data on the experimental determination of the influence of creatine on increasing the endurance level of cyclists in the

individual road race in the mid-mountain conditions. As a result of the study, it was proved that the use of creatine had a positive effect on the change in endurance in cyclists. Creatine monohydrate was used in the study. Athletes who used creatine significantly and statistically significantly improved the result of the time of passage of a given distance. At the same time, there was also an improvement in the respiratory system.

## **DEVELOPMENT OF THE COMPUTER PROGRAM » SPORTS ORIENTATION OF CHILDREN AND ADOLESCENTS »**

S.V. Nopin, Yu.V. Koryagina, G.N. Ter-Akopov

The Federal State-Financed Institution «North Caucasian Research and Clinical Center» under the Federal Medical Biological Agency, Essentuki, Russia

**Key words:** sports, information technology, testing, functional condition, automated systems, sports selection.

**Annotation.** The purpose of this work is the development of an automated testing system for the sports orientation of children and adolescents. The developed program for the computer «Sport orientation of children and adolescents» allows you to test and evaluate psychophysiological, psychological characteristics, physical performance, morphological status and the level of development of physical qualities. On the basis of these indicators, give an integral assessment and recommendations on sports orientation and the successful implementation of the abilities of children in a specific sport. The system is characterized by the ability to quickly obtain information and save results.

## **NEUROBIOFEEDBACK'S EFFECTS AT ATHLETES WITH DIFFERENT KINEMATIC PERFORMED MOVEMENTS' CHARACTERISTICS**

<sup>1</sup>Cherapkina L.P.1, <sup>2</sup>Tristan V.G.2,

<sup>1</sup> Siberian State University of Physical Education and Sports, Omsk, Russia

<sup>2</sup>Moscow sports training center Physical Culture and Sports Department, Moscow, Russia

**Key words:** neurobiofeedback, EEG, non-standard variables sports, standard variables sports, cyclic sports.

**Annotation.** The paper presents the comparative analysis of the effects of 15-daylong neurobiofeedback course aimed at increasing power in the alpha band EEG at athletes doing different in general kinematic motion characteristics (cyclic sports (n = 52); acyclic standard variables sports (n = 96); acyclic non-standard variables

sports (n = 68)). The average age of the surveyed participants is  $19 \pm 0,1$  years. Their sport qualification is from the II adult category to the master of international class sports. The period of doing sports is 5 years or more. Among the surveyed participants there were 92 girls and 124 boys. The study found that the psycho-emotional state of cyclic sports athletes became most altered by the neurobiofeedback's course; the most changeable is the standard-variable sports athletes' state. The main changes under the influence of physiological parameters were observed in the neurobiofeedback's course representatives of non-standard variables sports.

## **CHRONOBIOLOGICAL MARKERS OF THE FUNCTIONAL STATE AND PROCESSES OF ATTEMPTING SPORTSMEN**

Yu.P. Salova

Siberian state University of physical education and sports, Omsk, Russia

**Key words:** athletes, chronobiology, functional state, fatigue, desichronosis, biological rhythms.

**Annotation.** The aim of the work was to reveal the chronobiological features of the adaptation of the functional systems of skiers. Research and monitoring of the functional state of the athlete's organism at different stages of training from the chronobiology standpoint (rhythmic organization of physiological systems) allows to determine the individual course of adaptation and choose the most optimal training regime for reaching the peak of the sports form, which is important in preparing for responsible competitions and demonstrating high sports results.

## **PROSPECTS OF USING DRY CARBONIC ACID BATH IN SPORTS OF HIGHER ACHIEVEMENTS**

G.N. Ter-Akopov, Yu.A. Belkin, S.K. Mesropyan

<sup>1</sup>The Federal State-Financed Institution «North Caucasian Research and Clinical Center» under the Federal Medical Biological Agency, Essentuki, Russia

<sup>2</sup> Reaboks, Limited Liability Company, Moscow, Russia

**Key words:** recovery, balneotherapy, athletes, carbonic baths, functional state, working capacity.

**Annotation.** The paper shows the prospects of the direction in the restoration of highly qualified athletes and the increase of their functionality with the use of dry carbonic baths. Unresolved issues have been identified and the tasks to be accomplished for the effective implementation of the dry carbon dioxide bath project in the sport of higher achievements have been set.

## **BALNEOLOGY AND REHABILITATION**

### **BALNEOTHERAPY IN INTEGRATED SPA TREATMENT OF CHILDREN WITH ECOLOGICAL DISODAPTATION SYNDROME**

Khodova T.V.

Children's Sanatorium named after NK Krupskaya branch of The Federal State-Financed Institution «North Caucasian Research and Clinical Center» under the Federal Medical Biological Agency, Zheleznovodsk, Russia

**Key words:** children, resort treatment, ecology, mineral water.

**Resume:** Under supervision there were 150 children with a syndrome ecological desadaptation. At all recipients under the influence of drinking mineral waters clinical and paraclinical indicators were studied. As a result of the spent treatment beneficial effect on children of reception of mineral waters of a small and average mineralization is established. Advantage of appointment of the specified mineral waters in a dose of 6-10 ml/kg (by the standard technique the dose makes 3—5 ml/kg) is revealed.

## **MODERN ASPECTS OF MEDICAL REHABILITATION**

A.F. Khechumyan

Scientific Research Center of balneology and rehabilitation of the branch of The Federal State-Financed Institution «North Caucasian Research and Clinical Center» under the Federal Medical Biological Agency, Sochi, Russia

**Key words:** medical rehabilitation, sanatorium treatment, balneotherapy, screening diagnostics, health, resort business.

**Annotation.** The lecture examines modern aspects of medical rehabilitation aimed at preventing the progression of pathological processes and the development of their complications in socially significant chronic non-infectious and occupational diseases. The author outlined the basic principles of the organization of sanatorium-and-spa treatment of persons working in harmful production conditions, and also defined the main directions of development of sanatorium and rehabilitation and rehabilitation care for patients with occupational pathology. Improving the quality of rehabilitation and preventive measures will significantly reduce not only the costs of temporary disability but also improve the quality of life and professional longevity of the able-bodied population.

## **DEVELOPMENT OF THE LOCOMOTOR FUNCTION OF WALKING IN PRESCHOOL CHILDREN WITH A CHILDREN CEREMONAL PARALICOUS IN THE CONDITIONS OF SANATORIUM-SPA TREATMENT**

<sup>1</sup> L.V. Kharchenko, N.N. Litosh

<sup>1</sup> Omsk State University. F.M. Dostoevsky, Omsk, Russia

<sup>2</sup>Shadrinsk State Pedagogical University, Shadrinsk, Russia

**Key words:** therapeutic physical culture, cerebral palsy, medical rehabilitation, sanatorium-and-spa treatment.

**Annotation.** The aim of the work was the development and justification of the methods of therapeutic physical training with the use of physical exercises that promote the formation of the habit of straightening in preschool children with infantile cerebral palsy at the sanatorium-rehabilitation stage. The developed method, consisting of 3 stages, had an effective effect on the studied parameters of walking. At the first stage, exercises were applied to increase the mobility of the joints of the upper and lower extremities; - stimulation of the rectification reflex; - refinement of the step elements. At the 2 nd stage - the exercises for the formation of the correct foot support; - development of the ability to maintain static and dynamic balance; - Strengthening the muscles of the back and abdominal press. At the 3rd stage - exercises for learning to walk on your knees; - Development of coordination abilities; - learning to ride with support and independently.

## **PECULIARITIES OF COGNITIVE STYLE AND BIOELECTRIC ACTIVITY OF THE BRAIN OF CYBERSPORTSMEN**

<sup>1</sup> G.V. Strelnikova, <sup>1</sup> I.V. Strelnikova, <sup>2</sup> M.N. Rusalova

<sup>1</sup>Moscow State Academy of Physical education

Malakhovka, Russia

<sup>2</sup>Institute of Higher Nervous Activity and Neurophysiology RAS

Moscow, Russia

**Key words:** cognitive activity, e-sports, counter strike, interhemispheric interaction.

**Annotation.** The purpose of the study was to reveal the peculiarities of the cognitive style and bioelectrical activity of the brain of cyber-athletes performing in Counter Strike. The results of the research showed that the high activity of one of the hemispheres indicates the most demanded strategy of action in the competitive game. In this study, the strategy and cognitive style of the right hemisphere turned

out to be more in demand. The competitive performance of cyber sportsmen playing in Counter Strike is due to the well-developed ability to see the situation as a whole, to easily navigate in the game space formed by synthetic thinking, the ability to quickly orient oneself to external factors and interact in teamwork.

## **DYNAMIC CHARACTERISTICS OF VISUAL PERSPECTION IN ELITE BENCH SHOOTERS**

L.G. Roguleva, Yu.V. Koryagina

The Federal State-Financed Institution «North Caucasian Research and Clinical Center» under the Federal Medical Biological Agency, Essentuki, Russia

**Key words:** bench shooting, psychophysiological testing, peripheral perception, anticipation.

**Annotation.** The article presents the results of psycho-physiological testing of the dynamic characteristics of visual perception: spatial-temporal anticipation, peripheral perception in elite bench shooters. The analysis of the obtained results allowed to reveal a high level of abilities to anticipation, formed under the influence of specific sports activity. Peripheral perception of shooters characterized by a large field of view, with the predominance of the left-sided monocular field of view. In male athletes, unlike the female, the characteristics of visual perception are interrelated with the age indicator. Information on the dynamic characteristics of visual perception of athletes can have practical application in the organization of the training process of shooters for analysis and the necessary correction of the preparation and performance of shooting exercises.

## **CREATIVITY AS A FACTOR OF EFFICIENCY OF TACTICAL THINKING OF ATHLETES**

V. N. Smolentseva, N.A.Shakina

Siberian state University of physical education and sports, Omsk, Russia

**Key words:** creativity, tactical thinking, football players, training.

**Annotation.** The article presents the results of the forming experiment in order to increase the effectiveness of tactical (operational) thinking of football players in the process of training using psychological means aimed at improving the creativity (creativity) of athletes. We used conversations, psychotechnics, role games, ideomotor presentations, situation analysis.

When analyzing the results obtained after the experiment, the authors of the study state an increase in the effectiveness of tactical (operational) thinking of

athletes and recommend the introduction, above mentioned psychological means, in the training process of athletes.

## **PSYCHOMOTORIC ABILITIES OF YOUNG PERSONS OF GRECO-ROMAN STYLE**

D.V. Krivosheev

Siberian state University of physical education and sports, Omsk, Russia

**Key words:** wrestlers, psychomotorics, psychophysiology, time of reaction, children's and youth sports.

**Annotation.** The purpose of the study was to determine the level of development of psychomotor abilities of Greco-Roman wrestlers 12-14 years old. The results of the research show that young Greco-Roman wrestlers are characterized by a high speed of sensorimotor reactions, an average level of dynamics of nervous processes and a good sense of time. Among the fighters of adolescence, people with sanguine and choleric temperament predominate. Identified individual-typological characteristics of those involved should be taken into account in the training process and competitive activities.

## **FOREIGN EXPERIENCE**

### **NEW FOREIGN BIOMEDICAL TECHNOLOGIES FOR SPORTS TRAINING**

<sup>1</sup>Yu.V. Koryagina, <sup>1</sup>S.V. Nopin, <sup>2</sup>E.V. Lekontsev

<sup>1</sup>The Federal State-Financed Institution «North Caucasian Research and Clinical Center» under the Federal Medical Biological Agency, Yessentuki, Russia

<sup>2</sup>Ural State University of Physical Culture, Chelyabinsk, Russia

**Key words:** sport, sports training, sports medicine, biotechnology, genetics, psychology, neurophysiology, modeling.

**Annotation.** The article presents an analytical review of future studies for the period from 2010, performed in leading university laboratories of foreign countries on new biomedical technologies for the training elite athletes. The results of prospective studies of foreign laboratories on the problems of sports genetics, control of the vital activity of biological objects, the psychology and neurophysiology problems in sport, the motor control, biofeedback, artificial intelligence, computer modeling of biological processes, medical and biological



means of recovery and enhancement of performance are presented and systematized. The results of the work performed can be used in the system of training elite athletes, sports national teams, as well as their reserve, specialized centers for sports medicine and sports training.

## **EXTRALINGUISTIC ASPECTS OF CANISTERAPY**

K. Yu. Simonova, A.A. Saburtsev

Siberian State University of Physical Education and Sports, Omsk, Russia

**Key words:** Canistherapy, pet-therapy, tiertherapie, rehabilitation.

**Annotation:** this article examines the history of the origin of the technique canistherapy, its extra-linguistic formation. Systematization of the historical aspects, all manifestations and changes in the development of the term «canistherapy» is revealed.

## **ARTICLES BY YOUNG SCIENTISTS**

### **BOARD OF YOUNG SCIENTISTS AND SPECIALISTS OF FGBU SCFNC FMBA RUSSIA: FROM CREATION TO FIRST STEPS IN SCIENCE**

E.D. Efremova, Federal State Budgetary Institution «North-Caucasian Federal Scientific and Clinical Center of the Federal Medical and Biological Agency», Yessentuki, Russia

**Key words:** science, young scientists.

**Annotation.** The article presents information on the establishment of the Council of Young Scientists and Specialists in The Federal State Budgetary Institution «North-Caucasian Federal Scientific and Clinical Center of the Federal Medical and Biological Agency». The priority areas of the contemporary policy of the Russian Federation are the development of fundamental science and education. The most powerful scientific reserve is young scientists and specialists. In accordance with the youth policy of the Russian Federation, the leadership of the FMBA of Russia decided to establish a Council of Young Scientists and Specialists of FMBA Russia.

### **COMPARATIVE ANALYSIS OF APPLICATION OF INVASIVE AND NON-INVASIVE METHODS FOR THE DETERMINATION OF THE ANAEROBIC THRESHOLD (AT) IN ELITE CROSS-COUNTRY SKIERS**

E.A. Shagarova

Siberian state University of physical education and sports, Omsk, Russia

**Key words:** cross-country ski, load testing, anaerobic threshold, load intensity zones, blood lactate.

**Annotation.** In this paper, two methods for determining individual AT are justified, an estimate of the effectiveness of load utilization at the AT level and the optimal volumes of threshold loads, taking into account the preparedness of cross-country skiers. As shown by the individual AT research, determined by lactate in the blood and using the Conconi test - highly informative indices of cross-country skiers' preparedness, allowing to objectively evaluate the direction of the training load and determine the optimal volume of threshold loads for endurance development. The effectiveness of the impact of a threshold load depends on the accuracy of the determination and control of its intensity, which is possible only on the basis of an individual approach.