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European Journal of Sports Medicine

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• Sports Injuries
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• Drug testing and Doping
• Athletic Performance Enhancement
• Physiotherapy and Rehabilitation in Sports
• Exercise in special populations (children, women, elderly, disabled athletes)
• Sports and the Environment
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Original articles: Clinical, theoretical or experimental (basic or applied) research or practical applications in the field of Sports Medicine. Original articles should not exceed 10 pages or 15,000 characters, including tables, figures and references. References should be limited to 50.
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Materials & Methods: Provide sufficient information in the text or by reference to other work to permit the submitted work to be repeated without the need to communicate with the authors. Relevant validity and reliability data should be provided for critical methods. State the type of
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   Figures (if any) are submitted as separate image files, one figure per file in TIF file format, with an analysis of at least 300 dpi.
   Tables (if any) are included in the manuscript, after the References section.
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ABSTRACTS OF 10TH INTERNATIONAL BALTIC SPORTS MEDICINE CONGRESS

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Dear Colleagues,

The present supplement is the 2nd Supplement of the 5th Volume of the European Journal of Sports Medicine and hosts the abstracts from the 10th International Baltic Sports Medicine Congress, taking place in Riga, Latvia on April 20-21, 2018.

We look forward to a well-organized educational activity, with high-level scientific contributions and practical take-home messages for the everyday application. I hope all of you find useful the collection of these abstracts.

With honor

Prof. Konstantinos Natsis
Editor-In-Chief
The keystones of effective collaboration between the Sports medicine doctor and the athlete are the preparation, communication, reaction, loyalty and education. The central person is an athlete with his personality and individuality: unique heredity, physical, psychological and social features, requirements, knowledge, motivation, health condition, abilities, lifestyle and specificity of sport. The development of the trustful and open relationships is a long-term process.

The Sports medicine doctor is responsible for treating and coordinating the medical care of athlete, providing for the well-being of individual athlete, carrying out a full risk management, examining the athlete’s health condition, doing a pre-competition examination, prevention and treatment of different diseases and injuries, promote successful return to sport, recognizes other issues that affect athletic performance, understanding the psychological component, support confidentiality, respect athlete’s autonomy, informed consent and patient choice.

Regular pre-competition examination with objective cardiopulmonary exercise testing results proves the sports medicine doctor consultation value if the athlete integrates recommendations in training program. Sports medicine doctor recommendations are based on the evaluation of the physical working capacity, functional parameters, adaptation to the physical load and adequate recovery.

The final word in decision making about athlete participation or limitations has to be made by sports medicine doctor with support of the sports trainer and sports organization. In 21th century by Worlds Health Organization data the physical inactivity has been identified as the fourth leading risk factor for global mortality therefore sports medicine doctors’ knowledge, capabilities and opportunities are significant tools that are appropriate for athletes and whole society to increase public health.
LUMBOSACRAL STRESS FRACTURE IN YOUNG ATHLETES. CASES REPORTS.
BRIUKS K.
*Hospital of Traumatology and Orthopaedics of Latvia, Riga, Latvia*
OrtoMed clinic, Riga, Latvia

Stress fractures in pars interarticularis (spondylolysis) of L4 and L5 are common in athletes who participate in sports demanding repetitive lumbar hyperextension, truncal rotation or axial loading. Prevalence in the general population is between 3% to 7% but amongst young athletes it reaches as high as 40%, depending on sport.

The cause of spondylolysis is repetitive movement such as hyperextension in gymnastics, football, weightlifting, wrestling and diving. At first sight spinal fracture might be diagnosed as muscle sprain. MRI is essential in early detection of stress injury as well as to improve the outcome of treatment.

Analysing case reports of young football players (age 15-21), all suffered from non-specific, progressive back pain. Patients were presented with an insidious onset of lower back pain that worsen when the patient was playing football or arching back and improved when the patient was resting or leaning forward. Fracture was confirmed by the MRI as bone edema. Predisposing factor was specific spine anatomy of pelvis and lumbar spine segments.

All patients stopped playing football and continued physiotherapy for 3 months after which CT scan control confirmed lysis. Patients returned to their previous training routine without back pain despite having spondylolysis 21.04.2018; 16:30 - 17:15 Workshop.

REGULAR PHYSICAL EXERCISES THROUGHOUT LIFESPAN AS AN ESSENTIAL FACTOR IN ALZHEIMER’S DISEASE PREVENTION
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As the population ages due to gains in lifespan, the frequency and prevalence of dementia increase. Alzheimer’s disease (AD) is irreversible neurodegenerative disorder and the most common form of dementia. Currently, there are 47 million dementia patients and no effective treatment available.
Symptomatic treatment only helps in specific instances and does not prevent progression of this devastating disorder (1). Scientists are working to discover the treatment for the prevention of neurodegenerative diseases, but still AD research is in the need of novel ideas. As effective treatment to reduce progression of neurodegenerative diseases are largely unknown, therefore scientific focus has broadened from treatment to prevention strategies.

Physical activity as one of the prevention options helps to avoid or delay of cognitive impairment of AD (2). It optimizes multiplicity mechanisms that affect the development of cognitive disturbance in dementia patients. Recently, data presented that physical exercises can be recommended as a preventive tool for people with clinically proven cognitive impairments. Scientific reports describe that regular physical activity promotes various mechanisms to improve brain function: enhanced antioxidants activity, regulation of neurotrophins involved in neurogenesis, improving memory and brain plasticity, increase resistance to stress and depression, intensify vascularization and energy metabolism in various brain regions (3). It is known that volume of the hippocampus of AD patients is markedly reduced, whereas prolonged average physical activity increases the hippocampal volume in people with mild cognitive impairment by providing the compensatory mechanisms in the brain (4). It is important to highlight that physical activity can be adaptable for each patient individually considering the age, muscle tone, body movement, and progression of disease. Currently, specific guidelines for physical activity, their regularity in the daily lives of patients suffering with neurodegenerative diseases are not available. Such a guidelines would be beneficial for the improvement of cognitive function, for these patients as well as at the early stage of the development of neurodegenerative disorders.

Overall, huge amount of scientific evidence shows that lifestyle interventions’ such as regular physical exercise might open new avenues for preventive and new combined therapeutic strategies to treat aging-related diseases.

References

PLenary Session II –
16:30 – 18:30 Implement Strategies for Known Diagnoses in Sports Medicine

A4
SPORTS CARDIOLOGY: ROLE IN SPORTS MEDICINE, THE PRESENT AND THE FUTURE
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There are many subdisciplines in sports medicine which nowadays are concerned with sports and
physical activity such e.g. traumatology, pediatrics or oncology among many others. However, sports cardiology is one of the central issues in sports medicine due to many cardiac problems in the evaluation, treatment or management of athletes. The central objective of sports cardiology, however, is the protection of the athletes’ heart, the wise treatment of symptoms, enhancement of performance without drugs and care for return to play after specific diseases.

Sports cardiology comprises preparticipation examination of athletes of all categories, a stepwise increase of instrument-based examination, counseling for eligibility, training and regeneration. Cardiac symptoms such as syncope, collapse, dyspnea and chest pain in athletes require specific knowledge in cardiology as compared to normal patients. The heart of trained athletes differs significantly form that of sedentary subjects. Also, counseling of athletes with cardiac diseases is one of the main topics in sports cardiology. This comprises people with heart failure, congenital or coronary heart disease and diseases like hypertension or diabetes. However, the most important field of sports cardiology is the recognition of occult diseases such as all kinds of cardiomyopathy and electric diseases such as long QT-syndrome, chanelopathies or WPW syndrome. Therefore, sports cardiology is an important field of medicine which has to be taught “on top" of the regular sports medicine core curriculum. In specific details this includes the implementation of special courses for all sports physicians interested in this field. In addition, there will be some more aspects such as genomics, personalisation, digitisation and consultation for inpatient's care by exercise prescription to be included into the curriculum in the future.

SATURDAY, 21 APRIL 2018

PARALLEL SESSION 3.1
09:00 – 10:45   Prevention Principles

A5

MELDONIUM CASES AND OUTCOMES
RUTA BANYTE
Lithuanian antidoping agency

Meldonium- Latvian medication, which can used to treat coronary artery disease. Meldonium was added to the Worls Anti-doping Agency (WADA) list of banned substances effective 1 January 2016 because of evidence of its use by athletes with the intention of enhancing performance. It was on the 2015 WADA’s list of drugs to be monitored. An alarmingly high prevalence of meldonium use by athletes in sport was demonstrated by the laboratory findings at the Baku 2015 European Games.

The aim of this study was to observe meldonium spread in the world and compare difference between Eastern Europe and other countries. Also to compare meldonium cases in 2016 and 2017 years. We created questionnaire and sent it to 56 antidoping agency. We got answers from 21 of them (n – 37,5 %). In all answers was marked that 9 national antidoping agency got meldonium cases in 2016 year (n – 42,8%) and in 2017 year only 3 (n – 14,2). Comparing meldonium uses in Eastern Europe and other countries, in Eastern Europe was 5: 2 meldonium cases (n – 23,8: 9,5%). Conclusion: meldonium mostly was used in Eastern Europe countries and in 2016 year was peak of meldonium cases.
Purpose. In US is stated that in professional basketball women sustained 60% more injuries and have a higher risk of injury to the knee and ankle than men. There is a lack of epidemiological studies about the incidence of sports injuries in women basketball in Europe. No consensus statement about the prediction of sport specific musculoskeletal injuries leads to the search of evidence-based injury risk criteria that could be implemented into prevention. The aim of this study is to determine the prevalence of sports injuries in professional female basketball players and to identify the best predictors of lower extremities sports injuries.

Methods. Lithuanian Women’s Basketball League (LWBL) represents the women’s Lithuanian first division basketball championship and includes the best 8 women basketball Lithuanian teams. One basketball season takes 7 months. All 8 teams, consisted of 12-14 players, were asked to participate in the survey. A total of 351 professional women basketball players were observed during 2013 – 2016 sports seasons. The sociodemographic variables such as age, height and weight were collected. Sports injuries were registered by the team physiotherapists and collected during the 4 sports seasons. Functional musculoskeletal performance tests were used in pre-season preparation: Functional Movement Screen (FMS), Y Balance test for lower quarter (YBT-LQ) and Landing Error Scoring System (LESS). Players were divided into two groups: healthy group and injury group.

Results. The most common sports injuries during the observed period in our population were: foot – 5%, ankle – 31%, calf – 2%, knee – 53%, thigh – 9%. The medical diagnosis of the injuries were: knee ACL, MCL, LCL injuries, tears, sprains - 21.7%; ankle ligaments strains, sprains, tears - 15.2%; ankle ligaments tendinopathy - 14.1%; knee cartilage, meniscal injuries, tears - 13%; patellar tendon tendinopathy - 6.5%, ankle fractures - 5.4%, thigh muscles strains, sprains, tears - 4.4%. Injury group players had lower quality of fundamental movements and lower Functional Movement Screen total score (p = 0.0001). Jump landing task was performed with lower quality in injury group (higher LESS score (p = 0.028)) than players of healthy group.

Conclusions. The most common injuries of professional basketball players were in lower extremities (the ankle and the knee). Quality of functional movement patterns and jump landing biomechanics were poor in those players, which sustained injury later in the same season. Dynamic stability of lower limbs was not associated with injury rates.
changes in the entire joint organs including cartilage, subchondral bone, synovium, ligaments and menisci. While most sports do not seem to raise the risk of knee OA, sports like soccer, long-distance running, weight lifting, wrestling are increasing risk of knee OA. The aim of this study was to compare the efficacy and safety of intra-articular platelet-rich plasma (PRP) and corticosteroids (CS) in the treatment of knee OA.

**Material and Methods:** 36 active patients, with symptomatic radiologically confirmed (II-III grade by Kellgren-Lawrence classification) knee OA, were enrolled in a prospective randomized study within the period from April 2016 to January 2018. Two groups were created by random selection: patients in PRP group (n=18) received intraarticular 8 cc of PRP, patients in CS group (n=18) received intra-articular 1 cc of 40mg/mL of triamcinolone acetonide and 5 cc of 2% of lidocaine. The severity of pain and the function of the affected knee were evaluated by International Knee Documentation Committee (IKDC) scale, by Visual Analogue Scale (VAS) and by Knee society score (KSS) in injection day (V1), one week (V2), one month (V3), three months (V4), six months (V5) and 1 year (V6).

**Results:** There were no significant differences between the two groups across age, sex, grade for osteoarthritis, or laterality. VAS initial values in both PRP and CS groups were equal (mean ± standard error [SE] 6±1) and improved at V2 identically (mean ± SE, 3±2). However, a significant interaction identified comparing the VAS score at V4 (mean ± SE, 1±1 vs. 4±2, respectively, p <0.001) as well as at V5 (mean ± SE, 1±2 vs. 5±2, respectively, p<0.001) and at V6 (mean ± SE, 3±2 vs. 5±3, respectively, p<0.001). A similar effect was observed evaluating IKDC score for comparison between PRP and CS groups at V2 (mean ± SE, 66±15 vs. 64±14, respectively, p<0.003) and at final follow-up V6 (mean ± SE, 65±23 vs. 45±23, respectively, p<0.002). Linear contrasts identified a higher KSS score in the PRP group compared with the CS group at V6 (mean ± SE, 78±16 vs. 64±22, respectively, p<0.006). No complications were recorded in the CS group, mild synovitis was observed in 78 % in PRP group after V1, however it absorbed spontaneously till V3.

**Conclusions:** Short-term results were similar of both intra-articular PRP and CS injections. Nonetheless, PRP demonstrated a statistically improvement over CS at V4, V5 and V6. Complications of PRP injections were insignificant and self-limited.

**SPORTS IN REHABILITATION PROCESS**

**NULLE A.**

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Sports and rehabilitation and sport medicine and physical and rehabilitation medicine is very closely related disciplines. Both specialities are multidisciplinary and interdisciplinary clinical and academic medical specialties concerned with promoting the health of the general population by stimulating a physically active lifestyle. Sport medicine is responsible for the prevention, diagnosis, treatment and rehabilitation management following injury from participation to physical activities and sport at all. Physical and rehabilitation medicine is responsible for the promotion of physical and cognitive functioning, activities, participation and modifying personal and environmental factors of people with disabling medical conditions and comorbidity across all ages. Both specialities deal with physical activity, which is means any bodily movement produced by skeletal muscles. Active rehabilitation process is not possible imagine without physical activities and every day exercises. Main purpose of this work is to explain importance of physical activities and sport in rehabilitation process.

Sport played an important part in rehabilitation since neurosurgeon Ludvig Guttmann started to work in Stoke Mandeville hospital after the second World war with young injured men. Guttmann recognised their competitive spirit and used this to help motivated them in to their recovery. That sporting
activities to overcome boredom in hospital and also promoted development of physical and cardio-respiratory endurance. They transitioned from bedside to active rehabilitation and competitive sport. Nowadays exercises and sports are standard components of an individual rehabilitation treatment. Rehabilitation outcomes are better when patients are more motivated and when their goals are clearly defined. Sport can improve motivation through competition with other or itself. The development of sporting activities requires better technologies and contributes to technological advancement. Sport stimulates functional capacities and active lifestyle of our patients after rehabilitation and overall activity with participating in life events.

A9

NUTRITIONAL STRATEGIES FOR RECOVERY
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As an important part of the training process, athlete’s recovery is significantly correlated with the level of physical performance and the health status. Recovery methods are restoring fluid balance, energy, minerals and vitamins consumed during effort and remove metabolic products. The aim of recovery is to reach an easier adaption to the training loads and to decrease the risk of injuries.

Nutritional and hydration strategies of the athletes are primordial elements of the recovery process. Post effort nutrition includes: • carbohydrates to replenish the glycogen storages • proteins to repair the tissue injuries • alkaline radicals to combat effort-induced acidosis.

The required volume of liquids, for post-effort rehydration, is 1.5 litters for each kilo of weight lost by the athlete, during effort.

Ingestion of carbohydrates with high or medium glycemic index (GI), during the first 30 minutes after exercise, leads to an accelerated recovery of glycogen and amplifies the body’s natural recovery process. A low carbohydrate intake causes a prolonged depletion of muscle glycogen storages, chronic fatigue and disruption of the training process. The role of proteins in post-effort recovery is to increase muscle proteins synthesis and secretion of anabolic hormones for anaerobic efforts and to increase haemoglobin, myoglobin glycogen synthesis for aerobic efforts.

Lack of administration of proteins post-effort may induce a negative protein balance after physical exercise. The recovery meal is served one hour after effort and includes carbohydrates and proteins, in a 4:1 ratio.

Athletes have a high risk of mineral deficiency (especially: Na, Ca, Mg) so it is important to replace them during recovery. Athletes and coaches may underestimate medical advises on how to optimize the quality of recovery. The outcome is the imbalance between training and recovery which leads to pathological fatigue, followed by decreased performance.

A10

HEALTHY AGING: EARLY FOCUS ON RISK FACTORS IN SPORADIC ALZHEIMER’S DISEASE
JANSONE B.
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In 2008, the World Health Organization has declared dementia as a priority condition through the Mental
(AD) - the most common cause of dementia in elderly population characterized by slowly progressive, irreversible memory loss and cognitive decline. During the last decades, life expectancy has raised in most of the developed countries, thus, increasing also a number of people who live with dementia. Currently, there are approximately 47 million AD patients worldwide and this number is estimated to increase to more than 131 million by 2050 (Cummings et al., 2016). Despite of enormous research efforts, presently, available treatment of AD is capable to affect only parts of the symptoms of this disease and does not slow progression of the disease (Schneider et al., 2009). Undoubtedly, it results in a huge economic impact pressing worldwide public-health, social, political and economic concern. The total estimated worldwide cost of dementia already are billions of US$ (over $817bn; https://www.alz.co.uk/research/world-report-2016). Currently, special attention is drawn towards the reduction of the major modifiable risk factors associated with both the onset and progression of AD. It includes the control of the cardiovascular risk factors, such as arterial hypertension and arteriosclerosis, giving up smoking, treating sleep disturbances and depression as well as effective management of diabetes (Bellou et al., 2017). The continuation of lifelong education and promotion of healthy lifestyles including the Mediterranean diet, the physical, intellectual and social activity may play a significant role in AD prevention. To conclude, the focus on controlling of AD risk factors and attention on prevention is recommended through the lifespan.

PARALLEL SESSION 4

16:30 – 17:15   Combinating of Heredity and Attitude in Sports Medicine

A11

OPTIMAL PHYSICAL TRAINING FOR MILITARY – “TRAIN FOR TEST” OR “FIT FOR BATTLE”?

ZAHARE A.

Latvian Armed Forces, MIBD, CSS, MED COY

Introduction: The physical fitness are key factor for being better soldiers. Large proportion of young people entering military service are not enough trained or trained only for a specific sport, as a result, comprehensive physical fitness has been neglected. Large differences in the initial physical performance of conscripts or recruits have led military units to develop more safe and effective training programs (Santtila, 2015).

Materials and methods: Reviewed fifty literature sources in the PubMed database with keywords - military plus training, endurance, physical fitness, training methods, low and high intensity and injury risk.

Results: Militaries from around the globe have predominantly used endurance training as their primary mode of aerobic conditioning, placing historical emphasis on the long distance run (Gibala, 2015). It has been proven that high volume of low-intensity physical activity combined with endurance-type military training during basic training interferes with optimal development of maximal oxygen uptake and muscle strength of the soldiers. Therefore, more progressive, periodized and individualized training programs are needed. Best practices show, that workouts which include low-intensity endurance, motor work capacity, high-intensity strength, the best mobility methods develop physical qualities required for military service.

Discussion: Unit leaders are responsible for improving fitness scores of their troops (Crowder, 2013). It is necessary to educate unit soldiers as training instructors’ who would be responsible for the physical health of unit soldiers, knowing the specifics tasks of each unit and the common requirements. In Latvia, as elsewhere in the world soldiers develop only those physical characteristics that will be tested once a year as endurance and strength. It is well known to everyone that the physical qualities required for military service are endurance, strength, speed, high-intensity conditioning, agility, coordination, power, mobility, military-related tasks - casualty evacuation, grenade throw, read crawl, etc. to be able to use the term “fit for battle”. 
Conclusion: Optimal training programs lead to higher training responses and lower risks for injuries and overloading. Quality of instruction during physical training session is relevant for soldiers fitness development in military training.

**A12**

**GENETICS OF SPORTS SCIENCE AND MEDICINE**

**GINEVICIENE V.**  
_Institute of biomedical science, Faculty of Medicine, Vilnius University, Lithuania_

Genetic is presently one of the most dynamically developing fields of science. Changes induced by genetics in individual spheres also concern sport, primarily in sport medicine and traumatology, individualization of the training process, and also in illegal doping, i.e. gene doping. Genetics has a great influence over components of the athletic performance such as strength, power, endurance, muscle fibre size and composition, flexibility, temperament and other phenotypes. The regular demands of training and competition make professional athletes highly susceptible to injury. Knowledge of the role of individual genes in the processes occurring in the human body can be applied to sport rehabilitation and injury prevention. Many genetic polymorphisms provide information about risk for sports-related injuries. Collagen-encoding genes (COL1A1, COL3A1, COL5A1, COL12A1, etc.) have been implicated with the risk of several connective tissue disorders or musculoskeletal injuries. The COL1A1 gene, for example, encodes the alpha chain of type I collagen, the major protein component of all tendons and ligaments. There is a DNA polymorphism (rs1800012) in this gene that affects its level of expression and associated with various complex disorders (e.g., osteoporotic fractures, osteoarthritis) and with athletic injuries (e.g., shoulder dislocations, muscle strain severity). The DNA polymorphisms currently used in sports were identified in studies that test a small number of candidate genes using relatively small athlete populations. However, a large source of additional genetic information based on genome-wide association studies, can examine over 1 million different polymorphisms. The results from these studies can provide key information to athletes about their risk for injury or nutritional needs. Understanding the genetic nutritional needs of an athlete provides an additional valuable tool in strategies to optimize sports performance. For example, associations of variants in genes responsible for the metabolism of vitamins B (MTHFR, MTR, etc.) dictate increased folic acid intake and appropriate supplementation. Nevertheless, any additional information about performance might be useful to help reduce injuries and maximize performance among elite athletes, who are typically early adopters of many medical treatments designed to speed recovery from injury or reduce pain so that they can return to sport activity as soon as possible.

**Workshop**

16:30 – 17:15 Combining of Heredity and Attitude in Sports Medicine

**A13**

**PARATHLETE CENTRED SPORTS MEDICAL CLASSIFICATION**

**ROZENSTOKA S.**  
_Latvian Paralympic committee_  
_Sports laboratory-sports medicine, sports traumatology and rehabilitation centre, Riga, Latvia_

The International Paralympic Committee (IPC) as the global governing body of the Paralympic Movement...
advances the evidence-based Sports Medical Classification system. This high standard, athlete centred and sports specific system works according with IPC International Standards. The Classification system is designed to minimise the impact of impairments on sport performance and to ensure that athlete's success is determined by skills, fitness, tactical ability and mental focus (IPC). Each athlete is to be evaluated at the beginning of his international career; further evaluations depend on the type of impairment and the impact on the sport.

The classification process consists of reviewing the medical documentation by International Sports federation; athlete's evaluation with physical assessment where determine the eligible impairment type and measure the impairment if it meets Minimum impairment criterion; technical assessment for the athlete's evaluation under sports specific conditions with best effort and observation assessment what confirm the findings. An athlete is allocated in a sport class with definitive sport class status. There are eight eligible physical impairment types: impaired muscle power, impaired passive range of movement, limb deficiency, leg length difference, short stature, hypertonia, ataxia, athetosis and visual impairment and also intellectual impairment originates before the age of 18.

The greatness of Paralympic movement demonstrated the 15th Summer Paralympic games (Rio de Janeiro, 2016) with 4342 athletes from 159 National Paralympic Committees, also from Baltic States: 11 athletes from Latvia, 6 athletes from Estonia and 13 athletes from Lithuania (IPC).

The International Classification system provides guidance on how to make the National classification system in the Baltic States in future. In Latvia, Estonia and Lithuania the Classification system is incomplete because there is only one International classifier in Latvia, it is implicate by the voluntary work without financial support of each country governing bodies.

The development of the National classification system in each country is important for increasing people with an impairment inclusion in para-sports and removing the social barriers and discrimination.

PLenary Session V
17:20 – 18:30   Principles of Good Teamwork in Sports Medicine

A14

A NEW ERA IN PRECISION SPORTS MEDICINE

PITSILADIS Y.
University of Brighton, Eastbourne United Kingdom

Despite numerous attempts to discover genetic variants associated with elite athletic performance, an individual’s trainability and injury predisposition, there has been limited progress to date. Past reliance on candidate gene studies focusing predominantly on genotyping a limited number of genetic variants in small, often heterogeneous cohorts has not generated results of practical significance. Hypothesis-free genome-wide approaches will in the future provide more comprehensive coverage and in-depth understanding of the biology underlying sports-related traits and related genetic mechanisms. Large, collaborative projects with sound experimental designs (e.g. clearly defined phenotypes, considerations and controls for sources of variability, and necessary replications) are required to produce meaningful results, especially when a hypothesis-free approach is used. It remains to be determined whether the novel approaches under current implementation will result in findings with real practical significance. This presentation will briefly summarize current and future directions in sports and exercise genetics and genomics.
INTRODUCTION: The aim of this study was to investigate the effect of serum leptin in rats performing various duration swimming exercises.

MATERIALS AND METHODS: In the study, 30 healthy albino wistar male rats with an average weight of 180-220 grams were divided into 5 groups including: control, water exercises, 15, 30 and 60 minutes swimming groups. Animals were swim-exercised for 90 days with 15, 30 and 60 minutes/day. At the end of 90 days, after performed urethane (1.25 g/kg) anesthesia, blood samples were taken by intracardiac way. Collected blood was centrifuged quickly, and transferred to eppendorf tubes for resulting serum biochemical analysis were stored in a freezer at -80°C. To analysis the leptin used elisa kit was performed according to procedures. Data were analyzed using SPSS version 15. One-way anova and tukey multiple comparison test were performed in the study. The homogeneity of the variances was examined by Levene’s statistic.

RESULTS: Results showed that the leptin levels were as follows: control (1480.00 pg/ml), water exercise (705.83 pg/ml), 15 (602.33 pg/ml), 30 (396.67 pg/ml) and 60 (435.83 pg/ml). When the control and 30 minutes swimming group (p<0.05, p=0.012), control and 60 minute swimming group (p<0.05, p=0.017) were compared, statistically significant difference was determined between them.

CONCLUSION: It is determined that 3 months of different terms (15, 30, 60 minute) of swimming exercise reduces the levels of leptin.
OP-02

NEUTROPHIL/LYMPHOCYTE RATIO IS ASSOCIATED WITH ELEVATION OF CARDIAC-TROPONIN AFTER LONG DISTANCE CYCLING (STUDY AT NORTH COAST AND TOUR DE BOROBUDUR 2017)

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3Public Health Nutrition Department, Faculty of Public Health, Universitas Diponegoro, Semarang, Indonesia
4Department of Cardiology and Cardiovascular Medicine, Faculty of Medicine, Universitas Diponegoro, Semarang, Indonesia

INTRODUCTION: Post-exercise troponin elevation occurs, nevertheless patomechanism is still not clear. Previous study found hematologic indexes were associated with the Coronary Artery Diseases (CAD). We aimed to explore the relation of neutrophil to lymphocyte ratio (NLR) with elevation of cardiac troponin I (cTnI) after long distance cycling (LDC).

METHODS: Eighty eight LDC participants completing examination were analyzed in this prospective study. NLR was calculated by dividing monocytes count by lymphocyte count obtained from routine blood examination before the race. Before and after the race level of cTnI was measured. Based on the cut-off point cTnI levels as diagnosis of acute coronary syndrome (ACS), participants were categorized into two groups, i.e. first group participants with cTnI levels after race ≥10ng/dl and second group with cTnI levels <10ng/dl. Multivariate logistic analysis was performed to assess factors of cTnI elevation. Binary logistic regression analysis was used to assess the relationship between NLR and cTnI elevation after LDC.

RESULTS: NLR was found to be independent predictor of the presence of cTnI elevation after LDC (OR: 2.687 95% CI: 1.122-6.435). In the receiver-operating characteristic (ROC) curve analysis, NLR with an optimal cut-off value of 0.14, predicted the cTnI elevation after LDC with a sensitivity of 64.3% and specificity of 65%.

CONCLUSION: NLR was an independent predictor of cTnI elevation after LDC. Compared to MLR and recovery heart rate, NLR has better performance to reflect the cTnI elevation after LDC.

OP-03

THE POLYGENIC PROFILE OF UKRAINIAN ELITE TRACK AND FIELD ATHLETES

DROZDOVSKA S.,1 GONCHAROV S.,2 DOSENKO V.2
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2Bogomoletz Institute of Physiology, National Academy of Science, Kyiv, Ukraine

INTRODUCTION: Modern research on the molecular genetics of physical activity shows that increased physical performance is determined by the set of specific genes. The systematic genetic studies of elite
athletes for selection and training purposes exist in great amount however there are no studies for specific sports, which could have made the specialization choices easier. The aim of this study was to find molecular markers genetic predisposition to physical performance to different disciplines of track and field athletics for improving the selection and training processes of elite athletes.

**MATERIALS AND METHODS:** In total, DNA of 101 power-oriented and 76 endurance-oriented elite athletes involved in track and field athletics were examined. Using the polymerase chain reaction method 11 genes polymorphisms (I/D ACE, R577X ACTN3, Pro/Ala PPARG, G/C PPARA, G/A PGC1A, Ala/Val UCP2, A/T MCT1, G/T COL1A1, A/G, C/T COL12A1) were detected.

**RESULTS:** Due to the Binary Logistic Regression method, regression models reflecting genetic factors significance for estimation of inherited predisposition to different track and field athletics disciplines were created. It was found that the probable difference in the distribution of genotypes between athletes in jumps and long distances is the frequency of polymorphism of the gene MCT1 (p=0.028). Long distance runners differed from medium distance runners and sprinters with the frequency of polymorphism of the ACTN3 gene (p=0.04). The difference between the jumpers and sprinters was the frequency of GALNT13 (p=0.02), (p= 0.02), ACE (p=0.01) gene polymorphisms.

**DISCUSSION:** Our study provides evidence for the association of gene polymorphisms with elite athlete status. Athletes belonging to the different disciplines of one group of sports differ in the distribution of genotypes of gene that associate with elite performance.

**CONCLUSION:** Our data suggest that polymorphisms in ACTN3, GALNT13, MCT1, ACE genes associated with status of elite athletes in certain disciplines of track and field athletics.

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**OP-04**

**TOTAL HIP ARTHROPLASTY IN SENIOR BASKETBALL PLAYERS**

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2Hospital of Traumatology and Orthopedics, Riga, Latvia

**INTRODUCTION:** Total hip arthroplasty (THA) is a treatment method of end stage osteoarthritis of the hip joint. The number of performed THA each year increases due to the aging population. And the number of patients who wish to return not only to daily activities but also to sports after surgery is increasing. Therefore understanding, can patients return to high-activity sports after THA is becoming exceptionally important. The aim of our study was to analyse long-term outcomes of THA in senior basketball players.

**MATERIALS AND METHODS:** Six THA patients who are playing in a senior basketball club since year 1993 were included in the study. All patients are training twice a week and regularly participate in basketball championships. Patient pain level in hip joints and functional status was determined by using Numeric Pain Rating Scale (NPRS) and High Activity Arthroplasty Score (HAAS). Radiographs of hip joints were acquired to evaluate the mechanical condition of the prostheses.

**RESULTS:** Patient mean age was 76.1±2.0 (74-78) years. Three patients had undergone unilateral THA and three- bilateral THA. The mean time period after which patients returned to sports activities was 7.5±1.6 (6-9) months. After 11.8±3.8 (7-18) years from the THA procedure none of the patients had revision operations. The mean pain level during daily activities was- 1.3±1.75 (0-4) and during sports activities- 2.0±2.7 (0-6) points. Mean HAAS value was 15.3±2.2 (12-18) points. Radiographic assessment
showed optimal position of all the prostheses, there were no signs of prosthetic loosening and minimal polyethylene wear.

**DISCUSSION:** Increased stress forces on the prosthesis during high-level sports activities could theoretically increase the risk of prosthetic component wear, aseptic loosening and dislocations leading to poor long-term outcomes. In our study after 7 to 18 years post-surgery none of the patients had revision operations. No signs of prosthetic failure were detected on radiographs and there was only minimal polyethylene wear. All patients showed good clinical outcomes with only mild pain during sports activities and high functional results in walking, running, stair climbing, and general activities (included in HAAS).

**CONCLUSION:** Our study demonstrates that playing basketball after THA does not increase the risk of prosthesis failure after a mean time period of 12 years. The good functional and radiographic outcomes are promising and suggest that patients could return to regular basketball activities after THA.

**OP-05**

**DIFFERENCES IN MUSCLE REACTION PROPERTIES AND MORPHOLOGY BETWEEN BLACK AND WHITE RACES**

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**INTRODUCTION:** There are no known reports of differences in ankle sprain rates or their risk factors by ethnicity. The aims of this study were to explore the differences in peroneal and tibial muscle reaction properties to sudden ankle inversion and the differences in morphology of the peroneus longus and tibialis anterior muscles between black and white races.

**MATERIAL AND METHODS:** Twenty-five healthy recreational male individuals (12 Africans and 13 Caucasians) were enrolled to this study. Electromyographic activity parameters (muscle latency, muscle reaction duration and muscle reaction magnitude) of the peroneus longus and tibialis anterior muscles of the dominant leg were measured using an ankle supination tilting platform. On the platform ankle was suddenly supinated to 15° and 30° when participants stood at neutral (N15 and N30) or plantarflexion (P15 and P30). Morphology of these muscles was evaluated by ultrasonographic (pennation angle, fascicle length and muscle thickness) measurements.

**RESULTS:** Only the reaction duration of the tibialis anterior muscle in N15 (Caucasians=66.5msec; Africans=46.5msec, p=0.030) and N30 (Caucasians=52.2msec; Africans=35.5msec, p=0.039) condition and reaction magnitude of the peronealis longus (Caucasians=30.4%; Africans=18.8%, p=0.046) and tibialis anterior (Caucasians=11.9%; Africans=5.2%, p=0.003) muscles in N15 condition were significantly higher in Caucasian subjects. Similarly, except the different fascicle length values of the tibialis anterior muscle in the contracted state (Caucasians=50.6mm; Africans=41.9mm, p=0.011), all the other muscle morphological features were similar between the races (p>0.05).

**CONCLUSION:** The results of this study indicates, in general, that there is no race differences between Caucasian and Africans with the evaluation of the electromyographic activity and muscle morphology measures of the peronealis longus and tibialis anterior muscle.
OP-06

ELECTROMYOStIMULATION OF TIBIALIS ANTERIOR AND PERONEUS LONGUS: EFFECTS ON MUSCLE LATENCY TIME AND DYNAMIC BALANCE IN RECREATIONAL ATHLETES

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The aim of this study was to investigate the effects of two different electrostimulation protocols for the tibialis anterior (TA) and peroneus longus (PL) muscles on muscle reaction time, dynamic balance and isometric strength.

MATERIAL AND METHODS: Thirty-six healthy recreational athletes were randomly divided into standard electromyostimulation (SE) (n=13), personal electromyostimulation (pulse width was calculated according to reaction time) (PE) (n=13) and control (n=10) groups. Electrostimulation to SE and PE groups was performed for 20 minutes and 18 sessions (3 sessions/week). Stimulation was administered for TA and PL muscles. Muscle reaction times of peroneus longus and tibialis anterior were measured by electromyography using on the sudden ankle inversion tilting platform to 15° and 30° at neutral (N-15 and N-30) and plantarflexion (PF-15 and PF-30). Dynamic balance was measured by STAR excursion balance test (SEBT). Three directions (anterior (SEBT-A), posteromedial (SEBT-PM), and posterolateral (SEBT-PL)) were used in SEBT. Isometric strength of plantarflexor, dorsiflexor, invertor and evertor muscles was measured by isokinetic dynamometer. All tests were repeated after 6 week of electromyostimulation.

RESULTS: Latency times of the TA and PL muscles represented significant decreases for the PF-15 (SE: TA=-16% PL=-22%, PE: TA=-21% PL=-16%, control: TA=33% PL=39%; p<0.01-0.05) and PF-30 (SE: TA=-19% PL=-21%, PE: TA=-6% PL=-10% control: TA=15% PL=13%; p<0.001-0.05) conditions in the SE and PE groups compared to the control group. These were not significant different in N-15 and N-30 conditions between the groups. Similarly, SEBT-PM (SE: 8.1%, PE: 8.3, control: 0.2%; p<0.05) and SEBT-PL (SE: 8.3%, PE: 9.1, control: 0.3%; p<0.01-0.05) showed a significant increase following stimulation in the SE and PE groups compared to control group. No statistically significant differences were found for the isometric strength between groups.

CONCLUSION: This study showed a positive effect of electrostimulation of the dorsiflexor and evertor muscles on muscle latency time and dynamic balance. According to the present study it is possible to state that electrostimulation can be added to rehabilitation program for Functional Ankle Instability.

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OP-07

EFFECT OF TWO WEEK SPORT CAMP ON PARAMETERS OF PHYSICAL CAPACITY IN PERSONS AFTER SPINAL CORD INJURY

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INTRODUCTION: Insufficient physical activity of persons with SCI has negative effect on different...
functions, increases risk for health disorders, chronic disease morbidity and even mortality. Physical activity or physical active forms of recreation has positive effect not only on physical health or physical capacity, but also on psychoemotional status and quality of life. The goal of our work was to assess and to evaluate physical capacity components of persons after SCI and to determine the effect of different physical capacity parameters of 2 week training and active physical activities program in summer camp.

**METHODS:** 57 physically inactive persons after SCI participated in our study, 51 (91.1%) was male and 6 (10.7%) female, with age of 28.39±5.48 year. According level of spinal cord injury they were divided into two groups: 1 group 26 (46.4%) persons with tetraplegia, 2 group 31 (56.2%) person with paraplegia. Tests for different parameters of physical capacity: tapping test, Box/block test, wheelchair sprint, 30 sec for maximal speed, maneuvering in “eight” shape track, Cooper fitness test (12 min race by wheelchair) were evaluated on the first and last day of the camp, compared and analyzed.

**RESULTS:** After two week training program we found that velocity and endurance of arm movements assessed by Tapping test and Box/block test results have changed, and increased significantly in group of tetraplegics (p<0.05). Results from strength tests have not changed significantly in both groups (p>0.05). Results of tests in wheelchair (sprint of 20 meter distance, 30 sec for maximal speed, maneuvering in “eight” shape track) have showed significant improvement in both groups (p<0.05), changes of anaerobic capacity in group of tetraplegics were lower than in group of paraplegics (p<0.05). 2 week training program has improved components of aerobic performance and endurance, results of Cooper fitness test (12 min race by wheelchair) have showed significant changes in both groups (p<0.05).

**CONCLUSION:** 2 week training and physical activities camp program have changed positively most of parameters of physical capacity in persons after SCI: anaerobic capacity changes more in group of paraplegics, while components of aerobic performance and endurance, results of Cooper fitness test (12 min race by wheelchair) have showed significant changes in both groups.

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**OP-08**

**EFFECT OF SMARTPHONE DELIVERED INTERVAL WALKING TRAINING ON HEALTH VARIABLES FOR PATIENTS WITH TYPE 2 DIABETES: PROTOCOL FOR A PARALLEL GROUP TRIAL**

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**INTRODUCTION:** Regular physical activity (PA) is a keystone in type 2 diabetes (T2D) rehabilitation. While regular exercise improves glucose control in diabetes, there is need for effective long-term free living PA programs that allows patients to be physically active independently at a low-cost. Structured walking program supported by mobile technology and remote feedback might be the most effective strategy. This study aims to investigate whether mobile phone application InstaWalk designed for T2D patients is effective in increasing PA levels compared between two interventions: 1) controlled PA provided by physiotherapist while using InstaWalk and 2) free living PA while using InstaWalk smartphone application. In addition, third group is involved as control group where patients with T2D continue their habitual lifestyle.

**MATERIAL AND METHODS:** This is randomized control trial with 4 months intervention including 63
patients with T2D. The primary key outcome is change in moderate-and-vigorous PA. The key secondary outcomes are VO₂-peak, fasting insulin, HOMA. Exclusion criterion is medical contraindication to exercise. The Research Ethics Committee in Latvia has approved the trial.

RESULTS: 75% (30 women and 16 men) of participants had obesity. Aside from diabetes, the most commonly reported health problems were high blood pressure (46 participants), and high serum cholesterol (HDL cholesterol, LDL cholesterol and triglycerides were 5.3±1.1mmol/L, 1.3±0.3mmol/L, 3.2±1.1mmol/L, and 2.4±3.3mmol/L, respectively). The mean of HbA1c was 6.84±1.25% fasting glucose 7.5±2.4mmol/L and HOMA index 5.0±3.7 that were above the norms. Relative and Absolute VO₂max were 2.23±0.66mL/kg/min and 24.06±5.1mL/min. There was a significant correlation between HOMA (homeostasis model assessment) and HbA1c (p<0.01) in the baseline data. Participants with self-reported low level of weekly PA (1-2 times per week) had significantly higher relative VO₂max scores (p<0.05).

CONCLUSIONS: The baseline data outcomes suggest that higher level of the self-reported PA does not induce improvement of aerobic capacity. Therefore, we assume that InstaWalk intervention will contribute with important knowledge of the effect of structured PA on rehabilitation of patients with T2D. The IWT can be personalized to fit patient’s everyday life. All data from the InstaWalk application are electronically monitored.

The project (Nr. 2189) is implemented in collaboration with the University of Latvia Project Fund, funded by the Mikrotik.

OP-09

OPTIMISATION OF THE BIOMEDICAL SUPPORT OF YOUNG ATHLETES IN THE ELITE SPORTS

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INTRODUCTION: Data regarding drop-out from organized sport reasons among young athletes are lacking. The aim of our study was to point out the drop-out rate and drop-out reasons for Russian elite young athletes in the frame of Long Term Athletic Development during 2013-2017.

MATERIAL AND METHODS: Retrospective analysis of a medical record from 56 Russian sport schools was conducted. Materials of pre-participation screenings and in-depth medical examinations were used. A total of 836 clinical records were investigated. Final outcomes were queried from medical staff via a telephone interview. Most records focused on adolescents, and 69% of examined were male. A chi-square test was executed to find the most significant conditions forcing a physician to exclude an athlete from participating in sports.

RESULTS: The entire array of data was divided into groups according to International Classification of Diseases, Tenth Revision. Diseases of the musculoskeletal system and connective tissue (class XIII) consistently rank first among the identified diseases. This followed, by the degree of decrease, the diseases of the digestive system (class IV); class XI. Diseases of the endocrine system, eating disorders and metabolic disorders); diseases of the circulatory system (class IX); and unexplained underperformance syndrome.

CONCLUSIONS: A platform has been developed to classify the factors that lead to the medical denial of
admission to organized sports activities for young elite athletes. The complexity of this task was associated with intensive training for sport as a factor in the pubertal maturation that leading to dropout from sports. It was shown that a young athletes have relatively unfinished morphogenesis in the process of functional development.

**OP-10**

**INCIDENCE OF EXERCISE RELATED MUSCULOSKELETAL INJURIES IN LATVIAN INFANTRY SOLDIERS**

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**INTRODUCTION:** Load carriage, physical training and sports activities causes 90% of musculoskeletal injuries among soldiers. Musculoskeletal injuries (MSI) are commonly prevalent in infantry soldiers population. Epidemiologic data on soldiers exercise related MSI in Latvia is not available. The purpose of this study was to describe the physical exercise related MSI epidemiology of Latvian infantry soldiers in 2017.

**MATERIALS AND METHODS:** Self-reported data from active duty infantry soldiers was collected using survey; analysis of electronic outpatient medical record data was made during one year period (2017). Injuries were classified according to Barrel injury matrix body regions. Injuries were described using relative frequency. Injury incidence was calculated as the number of injured soldiers per 100 subjects per year. Riga Stradinš university Ethics committee approval (Nr.40/26.10.2017) for this research was admitted.

**RESULTS:** Self-reported exercise related injury data was obtained from 144 infantry soldiers, 94.4% men (N=136) and N=8 women; average age 31.1 years (SD=7.4) average service time 8.4 years (SD=6.8). During medical record analysis MSI cases N=419 that appeared during physical training were identified. The frequency of MSI found from medical records was 27.9 injuries per 100 soldiers per year for total injuries, which is almost two times higher comparing to self-reported data, where MSI rate is 51.7 per 100 soldiers. Most common locations for injuries found in medical records: the lower leg/ankle (such as ankle sprains, tibial stress fractures) with incidence 5.7 per 100 soldiers; non-contact knee ligament injuries – 4.3 per 100 soldiers and wrist/hand/fingers with incidence 5.6 per 100 soldiers per year. More than half of identified injuries among men (55%) and women (54%) are classified as non-duty exercise related injuries that appeared during leisure (also sports) activities.

**DISCUSSION:** the objective of this research was to describe the physical exercise related MSI epidemiology of Latvian infantry soldiers. Self-reported data and medical record analysis initially identified specific most common MSI anatomic locations. Overall, a majority of musculoskeletal injuries occurred during non-duty sports activity and are preventable in nature. Sports trauma prevention strategies should appear on physical training that involves running and landing.

**CONCLUSIONS:** Most common injuries identified in Latvian infantry soldier population are lower leg, ankle and non-contact knee injuries, and can be classified as preventable.
**OP-11**

DAID SMART SHIRT AS EXPERIMENTAL APPLICATION FOR BALLERINA SHOULDER GIRDLE MOTION CONTROL (PROOF OF CONCEPT)

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**INTRODUCTION:** Shoulder injuries of professional ballet dancers occurred in 2.5% of cases in women. Movement faults and changes in muscle function of the scapula are associated with shoulder symptoms. Shoulder impingement is the most common cause of shoulder pain. The ability to control the orientation and movement of the scapula is essential for optimal arm function and pain reduction in young adults with shoulder impingement signs. Smart garments find wide range of healthcare applications, including rehabilitation. One of the main parts of smart garment is the sensing system which can include one or several sensing elements for posture and joint motion control. The aim of present research was to verify the possibility of using DAid Smart shirt to capture and monitor shoulder girdle motion during motor control exercises and during training sessions out of laboratory environment for ballerina with shoulder impingement syndrome. Another aim was to develop method of this Smart shirt using in addition to conventional physiotherapy to reduce right side shoulder girdle elevation.

**MATERIAL AND METHODS:** As a monitoring tool specially, designed smart T-shirt had been used. Specifically, embodied textile strain sensors gave possibility to capture spatiotemporally motion, but acquisition system provided visual feedback on the screen of remote electronic device.

**CONCLUSIONS:** Designed DAid Smart shirt can be objective and convenient, tool for shoulder motion monitoring. Thus, it can be used as effective assisting device to conventional physiotherapy for shoulder girdle motion control.

**OP-12**

THE ATHLETE IN HEALTH CARE SYSTEM. ACUTE L5-S1 DISK PROTRUSION IN A YOUNG FEMALE BASKETBALL PLAYER

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**INTRODUCTION:** In competitive athletics low back pain is relatively common and it can require a multi-disciplinary treatment approach to maintain athlete physical abilities and prevent depression (Reiman MP et al., 2016).

**MATERIAL AND METHODS:** Patient, 18 years old female basketball player, in March of 2017, felt on her back and hit hard coccyx. Acute pain appeared in the area of the coccyx (L5-S1) – after numerical rating scale (NRS) 8 points. General Practitioner (GP) immediately assigns X-ray for sacrum/coccyx what did
not show pathology, Ibuprofen 400mg 1tab x 2 and rest. One week after injury the pain decreases to 5.5 NRS. GP by patient’s initiative implied for MRI diagnostic, what results: Initial lumbar spondylosis, L5-S1 vertebral discus central protrusion 3mm. Patient afterward has consultation with vertebrologist, who recommended for a month without exercise, magnotherapy, and diclofenac supp 100mg x 1. After 2 weeks patient had minor improvements. Since athlete wanted to prepare for the basketball tournament in July, she went to consultation with sports medicine doctor in April.

RESULTS: After the physical examination, functional assessment and MRI examinations, the Sports Medicine doctor determined for the athlete: exercise program for 1 week, kinesiotaping, diclofenac tab 50mg x 2, neurorubine (B1 200mg, B6 50mg, B12 1mg)1tab x1d. After 1-week athlete notes a decrease in pain. In 6 weeks period, every week athletes therapy was upgraded, designed to decrease pain and maintain physical fitness. After 6 weeks (at the end of May), the patient could do sprints and jump in the contact with the opponent, but the playing time was limited, discomfort was felt in the coccyx with sharp side-movements. In July athlete participated in a basketball tournament with no limitations and felt confident.

DISCUSSION: An athlete is a person with a particular lifestyle and highly motivated. Movement and exercise may have pain-relieving effects. Strength training and conditioning are effective rehabilitation tools after injury (IOC consensus statement on pain management in elite athletes).

CONCLUSIONS: This clinical case demonstrates that a sports doctor is the first choice where an athlete should seek help in such cases, but it is also important for other specialists to understand the athletes’ situation and give appropriate recommendations.
(13.3%), osteosynthesis with Kirschner wires for six patients (40%), and flap coverage for two patients (13.3%). The mean time of immobilization was 3.4 weeks (range 2-6). The mean deficit of extension after two weeks at the metacarpophalangeal (MCP) joint is 2.5°, PIP is 11° and distal interphalangeal (DIP) joint is 0.4° with the mean DASH score 45. After four weeks MCP 0°, PIP 30°, DIP 0° with the DASH score 30. After six weeks MCP 5.8°, PIP 14°, DIP 0° with the DASH score 31.6. After 12 weeks MCP 1.25°, PIP 9.75°, DIP 0° with the DASH score 4.2.

DISCUSSION: The PIP joint is prone to stiffness after injury. This disabling condition occurs frequently in patients after sustaining a fracture. The treatment was significantly associated with early poor functional outcomes in terms of the ROM and disability.

CONCLUSION. Short-term functional prognosis of finger joint ROM and disability is variable during the course of treatment. The PIP joint is prone to flexion contracture or active extension deficit in comparison to other finger joints.

OP-14

DIAGNOSIS OF ARRHYTHMOGENIC RIGHT VENTRICLE CARDIOMYOPATHY IN PROFESSIONAL ATHLETES: CASE REPORT – COOPERATION OF MULTIDISCIPLINARY APPROACH

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INTRODUCTION: Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a cause of sudden death in young people and athletes. ARVC is characterized by a broad phenotypic spectrum and characteristically by loss of myocytes in the right ventricular myocardium, with fatty or fibrofatty replacement, which results in segmental or diffuse wall thinning, but there is also frequent involvement of the LV [Ref.]. There is evidence in the experimental murine model that exercise increases the penetrance and arrhythmic risk in mutational carriers of ARVC, these data have been confirmed in genetically positive patients [Ref.], which is particularly relevant to the athlete, raising concern not only with regard to competitive sports, but also regarding participation in moderate to extreme recreational physical activities.

MATERIAL AND METHODS: Case report - male, 44 years old, do dynamic endurance sport for 20 years. On first admission complains of weakness and fatigue in the morning. No past medical history. No family history of cardiovascular pathology.

EXAMINATION: 1) ECG - no pathology; 2) Echocardiography - mild eccentric hypertrophy of left ventricle; 3) Holter monitoring - 1015 isolated premature ventricular complexes, 11 ventricular duplets, 9 isolated premature supraventricular complexes; 4) Exercise tolerance test - 4 short episodes of ventricular tachycardia originating from right ventricle, longest being 2 seconds; 5) Cardiac MRI - ARVC. Genetic testing is in progress.

CONCLUSION: Overtraining is common in professional sports and its role in development of pathology is well established. Complex evaluation of professional athletes is important and exercise test with ECG is irreplaceable. Although cardiac MRI is the “gold standard” in diagnosis of ARVC, many more modalities
are necessary in order to establish correct and precise diagnosis. This is why multidisciplinary approach is crucial.

REFERENCES: Eligibility and Disqualification Recommendations for Competitive Athletes With Cardiovascular Abnormalities: Task Force 3: Hypertrophic Cardiomyopathy, Arrhythmogenic Right Ventricular Cardiomyopathy and Other Cardiomyopathies, and Myocarditis
HEALTH-ENHANCING PHYSICAL ACTIVITY IN CARDIOVASCULAR RISK FACTORS MANAGEMENT IN ADULT MEN

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INTRODUCTION: Knowledge of risk factors and preventive measures play a critical role in the prevention of cardiovascular disease (CVD). The aim of this study was to identify the major risk factors for CVD in adult men in Ukraine and to establish the benefits of health-enhancing physical activity for their management.

MATERIALS AND METHODS: The methods of assessment of morbidity indicators, physical fitness, physical activity, and risk of developing CVD, sociological methods, and methods of mathematical statistics were used. The study involved 60 adult age men (40- to 50-year-old).

RESULTS: The most significant risk factors for CVD were identified, which include neuro-emotional overload, bad habits (smoking and inappropriate nutrition), arterial hypertension, overweight, and low physical activity. The simultaneous presence of multiple risk factors, most of which are interrelated, increases the overall risk of CVD. The risk of CVD was absent in 16.6% of the men, 59.1% of the men had minimum risk, 18.2% – obvious and 6.1% – significant risk to develop CVD. The main risk factors for CVD were found to belong to controlled group. To modify the risk factors for CVD, a program of physical activity was used, which included Nordic walking, strength training, and stretching. The workouts lasted for 60 minutes and were done three times a week over 6 months. Exercise programs were individualized based on the level of physical fitness through manipulation of the variables of training. Implementation of the program resulted in significant changes in physical health and reduced CVD risk, including reduced blood pressure and body weight, abandonment of bad habits, increased motor activity, and improved resistance to stress. Furthermore, the number of men who had more than one CVD risk factor decreased.

DISCUSSION: Our findings support previous data on the low level of physical activity, the structure of morbidity, the mode of motor activity, and the level of physical fitness of adult men and extend the data on the efficiency of using health-enhancing physical activity to reduce cardiovascular risk in adults.

CONCLUSION: The major risk factors for CVD development were identified in Ukrainian population of adult men and the effectiveness of using health-enhancing physical activity for their management was confirmed.
THE SPORTS MEDICINE FIELD IN LATVIA – AFFECTING FACTORS ANALYSIS
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INTRODUCTION: The Sports medicine field is organized in each country differently. It is important to analyse and to assess the current situation and find solutions to improve the field performance.

MATERIAL AND METHODS: The National statistical reports 2016 and Reports of State Sports medicine institutions were analysed. The survey of Latvian Sports medicine association members – sports physicians with statistical analyses afterward was done in 2017.

RESULTS: In Latvia the Sports medicine field are regulated by the Regulations of Sports Physician Competency and Athletes medical care rules. 52 certified sports physicians are employed in the country, 65.8% with more than 20 years of work experience. 1206 Sports organizations operating in Latvia (266 professional-oriented sports schools and clubs) with more than 301786 athletes (15.4% of all inhabitants), including 72831 children under the age of 18 years. Consequently, there aren’t provided registration of all athletes’ medical care and sports injuries. In 2016 State Sports Medicine Centre provided state-funded Pre-competition examination for 15410 or 21.2% athletes aged 10-17 years old from 222 Sports organizations.

DISCUSSION: The lack of long-term strategies in Sports medicine field leaves 57421 or 78.8% athletes, in the age 10-17 years, without state-funded Pre-competition examination. Many Sports organizations operate without the supervision of a sports physician and medical care for athletes. During making strategy of Sports industry and the planning of new sports buildings in Latvia, there is no planned cooperation between Sports and Sports medicine industries. For solving the current situation we advise to make good cooperation between these two fields, to make State Strategy of the Sports medicine field with increase the number of Sports medicine residents per study year, to establish the Sports physician supervision in all Sports organizations, also during the Sports competitions for providing the medical care of Athletes, to develop the unified information system in the medical sector and the guidelines in Sports medicine field, equalization of the Sports physicians’ salary as it is in the medical sector.

CONCLUSIONS: The strategy of the Sports medicine field would provide a valuable quality increase in this industry, in the practice of sports physicians and improve the industry’s popularity.

ASSESSMENT OF BILATERAL DIFFERENCE OF MUSCLE MORPHOMETRIC PARAMETERS IN CYCLISTS, MODERATELY ACTIVE AND PHYSICALLY INACTIVE INDIVIDUALS
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INTRODUCTION: To reach high level in competition elite athletes require high intensity training, as it provides optimization of muscle and motor control, which in turn increases performance. However, in
some cases, in “asymmetric” sport disciplines intensive training can increase muscle functional asymmetry and imbalance, leading to high susceptibility to muscle and tendon injuries. The present pilot study was devoted to assessment of bilateral differences of muscle morphometric parameters in the group of persons with a different physical activity levels and exercise types. The aim of work was to assess the bilateral differences of m.quadriceps morphometric parameters in 3 different groups: cyclists, moderately active and physically inactive individuals.

**MATERIAL AND METHODS:** The pilot study comprised 28 young and healthy volunteers aged 19-34 years: 10 subjects in physically inactive group, 10 subjects in moderately active group and 8 in cyclist group. The morphometric (echogenicity, pennation angle, muscle thickness, physiological crossection area) and physiological parameters (MVC-maximal voluntary contraction force) of m.vastus lateralis and m.rectus femoris were acquired using ultrasonography, 3D scanning and knee-extension dynamometry technique, evaluation of muscle thickness, revealed following trend.

**RESULTS:** The smallest bilateral difference of muscle thickness was observed for sedentary group (1.6 mm), slightly larger for cyclists group (1.7 mm), and largest in moderately active group (1.8 mm). In turn bilateral asymmetry for echogenicity was subtle in all three groups, hence significant difference was observed for pennation angle in sedentary group. It has been concluded that subjects demonstrated small bilateral differences regardless of physical activity level and exercise type.

**CONCLUSION:** All subjects showed small individual differences in muscle morphometric parameters regardless of exercise type and intensity. And the most exercise dependent morphometric parameters were muscle thickness and thickness of muscle overlying subcutaneous fat.

**FEATRES OF PHYSICAL CHARACTERISTICS AND MUSCULOSKELETAL SYSTEM IN 16-17 YEARS OLD KARATE PRACTITIONERS**

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**INTRODUCTION:** Karate is considered one of the most popular martial art with its unique characteristics. It is important to evaluate this sport’s features as more people, especially children and adolescents want to participate in it. The aim of research: to evaluate physical characteristics and musculoskeletal system’s features in adolescents participating in kyokyshin karate and traditional karate.

**MATERIALS AND METHODS:** The study was conducted 2016-2017. There were 30 people involved – 15 of them were going to kyokushin karate trainings and 15 of them to traditional karate trainings. Anthropometric measurements, head, shoulders, scapula’s, upper arm’s position, muscle length were evaluated. Athlete’s physical characteristics – muscle strength, agility, and cardiovascular system were assessed.

**RESULTS:** 83.3% of all participants had significantly shortened pectoralis minor muscle. 76.6% of tested adolescents had significantly protracted scapulas for more than 7.5 cm. 60% of adolescents in both groups had at least one inferior scapula’s winging. Both groups statistically significantly differed from the norm in pectoralis minor muscle length’s evaluation. 83% of all athletes succeeded to reach the highest results in core muscle strength testing. Statistically significant difference between the groups was found in Rufje test results the first group had better results.
DISCUSSION: Our findings about shoulders and muscles status agree with data of Ruivo et al. (2015) and Burn et al. (2016). Our study shows importance of balance in athletes muscle mass and strength, harmony developments of physical peculiarities and physical capacity. Studies (Chaabene et al., 2012) state, that karate athletes have better agility that others duel athletes, we found high level of agility of athletes in our study. However, our athletes have worse cardiovascular capability, then mentioned in other studies (Mohamed, 2012).

CONCLUSIONS: 1. Adolescents going to kyokushin karate and traditional karate trainings had tensed upper trapezius muscles, bigger scapulas’ distance from the spine, scapula’s inferior angle winging and shortening of pectoralis minor muscle. 2. Traditional karate group had statistically significantly better results in agility test. 3. Statistically significant difference was found in cardiovascular system functional state’s with the kyokushin karate group having lower index’s average.

PP-05

STATIC STRETCHING HAS NO EFFECTS ON PERONEAL AND TIBIAL MUSCLE REACTION PROPERTIES

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INTRODUCTION: In this study our goal is to investigate both muscle architecture and muscle latency time of ankle dorsalflexor and evertor after static stretching. It is thought that stretching contributes to improvements in muscle strength and performance, and in reductions in musculoskeletal injuries. Recent investigations have shown contradictory results about the effects of different stretching types on muscle strength and performance. It is also stated that their effects on injuries are not much as to the known belief. Ankle inversion sprains are one of the most common injuries encountered in sport injuries. Studies are pointing that a longer peroneal reaction time may increase the risk of ankle sprain. Studies have shown improvements in the latency time following an eccentric strengthening program of ankle muscles. Since stretching has similar actions on muscle architecture their effects on muscle reaction time may be similar. However, this topic was not investigated in the literature.

MATERIAL AND METHODS: All the 23 participants were randomly divided to static (n=12) and control (n=11) groups. The subjects in the static stretching group performed stretching exercises to the ankle evertor and and dorsiflexor muscles 5 days a week for 6 weeks. Peroneal and tibial muscle reaction patterns were evaluated at the beginning (2 times for acute effect) and end of this period.

RESULTS: It was shown that static stretching exercises have no acute and chronic effects on peroneal and tibial muscle reaction time, reaction duration and muscle activity evaluated in 4 positions on the ankle inversion simulation platform (p>0.05).

CONCLUSION: It is obvious that static stretching exercises has no positive and negative effects on muscle reaction features. In light of these results, although there is no need to perform these stretching exercises chronically, it is possible to state that static stretching exercises can still be applied before sports activities.

ACKNOWLEDGEMENT: This research was supported by The Scientific and Technological Research Council (TUBITAK); Project Number: 115S811
THE ROLE OF LONG NON-CODING RNAS (LNCRNAS) IN CARDIAC HYPERTROPHY FORMATION DURING PHYSICAL EXERCISE

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INTRODUCTION: Recently, a new class of RNA, long non-coding RNA (lncRNA), associated with a wide range of biological processes in response to physical exercise that can act at different levels of gene expression, has been found. A number of authors demonstrated in experiments the important role of lncRNA in normal heart development and in the development of heart diseases, in particular, it has been shown that some long non-coding RNAs can act as cardiac hypertrophy factors. The aim of this study was to study the role of non-coding RNA in the molecular genetic mechanisms of adaptation and pathological processes in the myocardium prolonged intensive physical exercises and substantiation of the possibility of creating a method for assessing predisposition to the development of pathological and pre-pathologic states of the heart in athletes.

MATERIALS AND METHODS: The methods of meta-analysis of literary sources, echocardiography, electrocardiography, Real time PCR have been used. The study involved 30 endurance athletes.

RESULTS: It has been revealed that the important and most studied lncRNAs that affect the development of the myocardium during ontogenesis and adaptation to stress factors, involving physical loads, include: MIAT, NRON, MHRT, LIPCAR, CHRF, Chaer, ROR, H19, CHAST. Due to the modified procedure of lncRNA detection NRON and LIPCAR in athletes serum were found but not MIAT and MHRT.

DISCUSSION: The study of genes polymorphisms of these lncRNAs and the level of their expression in response to physical loads allow us to discover new aspects of the regulation mechanism of the adaptive response of the cardiovascular system to exercise stress. Conclusion: The predisposition to the development of myocardial hypertrophy under the influence of intense physical exertion is genetically determined and depends on the level of expression of lncRNAs. Expression of non-coding RNA genes is a potential informational marker of the course of adaptation processes to physical loads.

PREVALENCE OF RISK ALLELES OF COL1A1 AND COL3A1 GENETIC VARIANTS IN LITHUANIAN AND RUSSIAN ATHLETES

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INTRODUCTION: Collagens (types Iα-1 and IIIα-1 encoded by the COL1A1 and COL3A1 genes) are the major proteins of the extracellular matrix and provide the maintenance of the structural integrity of tissues and organs. The COL1A1 rs1800012 and COL3A1 rs1800255 genetic variants have been
associated with musculoskeletal injuries. The aim of this study was to examine prevalence of risk alleles of COL1A1 rs1800012, COL3A1 rs1800255 in Lithuanian and Russian professional athletes.

MATERIALS AND METHODS: 300 unrelated Lithuanian (150 male footballers (F), 150 sedentary controls (C_LT)) and 365 Russian (210 athletes including 98 sprint/power (S/P), 112 endurance (E) athletes and 155 sedentary controls (C_RU)) were genotyped using TaqMan RT-PCR assay.

RESULTS AND DISCUSSION: The genotypic frequencies of both variants were conformed to the Hardy-Weinberg equilibrium. The genotype/allele frequencies did not differ between Lithuanian and Russian controls and were similar to other Caucasian populations. Therefore, for the main analyses we used the combined control (C= C_LT+C_RU) data (COL1A1: MAF (A) 15.6; AA 2.3, AC 26.6, CC 71.1; COL3A1: MAF (A) 23.8; AA 7.2, AG 33.1, GG 59.7 (%)). Athletes F and E groups were combined taking into account the duration of sporting events. The genotype/allele frequencies of the COL1A1 did not differ between C and athletes groups. The genotypic frequencies of the COL3A1 differed between S/P vs C (p= .005) and between S/P vs F+E (p= .006); the frequency of A allele was higher for the S/P (28.8%) compare with the F+E (20.5%) and controls (23.8%). The odds ratio (OR) of S/P athlete harboring the AG vs (AA+GG) genotypes compared with C was 2.1 (95%CI: 1.33–3.34, p= .001). OR of a S/P athlete having the AG vs (AA+GG) genotypes compared with E+F athletes was 2.13 (95%CI: 1.33–3.42; p= .002). The findings indicated that the COL3A1 AG genotype is more prevalent in S/P athletes compared with E athletes and controls. Possible explanations for heterozygote advantage of COL3A1 variant for S/P athletes are influence on collagen III type thermal stability or its expression in skeletal muscle.

CONCLUSION: Our findings provide support for an association between COL3A1 rs1800255 and sprint/power athletic status. S/P athletes are more likely to have the injury risk allele A of COL3A1 compared to controls. These results suggest that some variants across the human genome have dual effect and may predispose sprint/power athletes to increased risk of injury.

PP-08

TYPE 1 GAUCHER DISEASE & PHYSICAL ACTIVITY – CASE REPORT

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INTRODUCTION: Gaucher disease is a familiar autosomal recessive disorder of lipid metabolism resulting in an accumulation of glucocerebroside molecules in reticuloendothelial cells and manifested clinically by hepatosplenomegaly, thrombocytopenia, anemia, skin pigmentation variation, skeletal lesions. Children with Gaucher disease may grow more slowly than other children. Three major clinical forms are categorized. Type 1, the chronic non-neuronopathic form, is the most common.

PURPOSE: To present that physical activity for a child with a severe genetic disease is not contraindicated, if the determination of diagnosis was not delayed, as well he regularly receives enzyme replacement therapy.

MATERIALS AND METHODS: A 12-year-old boy is playing football at local club since 2010. He is training 5 times a week for 1.5 hours each day. Since 2011 he is having yearly checks in the State Sports Medicine Center of Latvia. In the last check-up there was no complaining. His height is 159.5 cm and weight is 52.2 kg, that meets the over average scale for children his age. Physical fitness parameters after EUROFIT test
are average. Blood analysis, urine analysis, exercise electrocardiogram, echocardiography is normal. The boy has type 1 Gaucher disease. In May, 2007 he has been checked into the hospital for hepatosplenomegaly and thrombocytopenia periodically. Abdominal ultrasound examination revealed an enlarged liver and spleen. Laboratory analyzes and radiographic examination were normal. An appointment has been made at the Clinic for Medical Genetics and Prenatal Diagnosis, Riga, Latvia. Then the patient’s blood sample was sent to the Institute of Psychiatry and Neurology, Warsaw, Poland, for lysosomal enzyme test. On June 14th, 2007 Gaucher disease was confirmed. Since that he has been prescribed Cerezyme® (imiglucerase for injection) and is using it 2 times a month according to the dosing scheme. He also has been analyzed in specialized International Gaucher Outpatient Clinic of the University Medical Center Mainz, Germany. In the last check-up it was concluded that the patient is in excellent condition. Sports activities are not restricted.

CONCLUSIONS: Children with type 1 Gaucher disease can play sports despite they have restrictions for the reason of the need of sticking to infusion schedules. Choosing contact sports should consider the severity of the disease, especially for children with a tendency towards bleeding, bone fractures or with an enlarged spleen. All pediatric patients with Gaucher disease should be monitored by doctors nonstop.

PP-09

RETURN TO SPORT DECISION AFTER KNEE INJURY. 2 YEARS FOLLOW UP.

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INTRODUCTION: Return to sport decision after knee injury need to be maken according on injury characteristics and socialdemographic factors. It is important to respect physical factor, psychological factors, social/contextual factors, as it is described in return to sport model in Consensus statement on return to sport from the First World Congress in Sports Physical Therapy. We need to make decision according to sport specific and injury specific test battery results. Return to sport need to consist from 3 each other following stages – return to participation, return to sport and return to competition.

In literature there are described different variations of protocols for functional testing after knee injury and/or surgery.

Belong on evidence based data we create our return to sport protocol after knee injury. In protocol was included: subjective outcome form, range of movement measurements with goniometer, quadriceps and hamstrings muscle strength measurement with hand held dynamometer, test battery - hop test for distance, triple hop test for distance, cross over hop test for distance, 6 meter timed hop test, Y balance test, step down test, one leg squat test, plyometrics testing.

RESULTS: During 2 years we tested 110 persons, all of them after knee surgery. There was no athlets succesfully completed test before 9 months after surgery. After 6 months after surgery there was big variation in testing results in cases, when athletes had different rehab protocols recomendation (when surgery was in other clinics).

DISCUSSION: Subjective outcome form, knee joint range of movement measurements, quadriceps and hamstrings muscle strength measurement with hand held dynamometer, test battery - hop test battery, Y balance test, step down test, one leg squat test and plyometrics testing. Is it enough? Do we need one standartized rehabilitaion protocol for each injury and/or surgery (in all clinics)? Do we need more specific testing for each sport?
CONCLUSIONS: 1. Time after surgery, full range of movements, good visual muscle mass and asymptomatic knee joint are not enough to make return to sport decision. 2. All athletes need to complete return to sport testing after knee injury and/or surgery before return to competition level.

**PP-10**

**THE IMPORTANCE OF TIME FACTOR IN ACL REHABILITATION**

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**INTRODUCTION:** The Rehabilitation plays very important role after obtaining sports injury. After the reconstruction of the rupture of Anterior Cruciate Ligament (ACL) the time factor is crucial. It could provide successful returning to functional activity after 4-6 months and in sports after 6-8 months (Zaffagnini, 2015).

**MATERIALS AND METHODS:** In sports doctor consultation 48 year old man complained about inability to walk down the stairs, because of left leg muscles weakness and fully straighten out left knee. Anamnesis: 3 months ago was injury of the left knee during physical activity. MRI left knee: full rupture of ACL, damage of lateral meniscus, severe synovitis, osteochondropathy III of Femur and Tibia bones. 1 month after injury was made reconstruction surgery. Post-surgery physiotherapy was done. Objectively there was local edema around the left knee, the difference in girths: left thigh was 7.6% thinner, left shank compensates it and was + 3% bigger. Knee flexion: left 95°, right 113°; extension: left 10°, right -9°. Decreased muscle strength of left leg, shortened muscle length, the active stability of left knee decreased, proprioception and neuromuscular disturbances and dynamic imbalance.

**RESULTS:** The patient started individual physiotherapy 2 times per week doing isometric and dynamic exercises, exercises to improve dynamic balance, proprioception, soft tissue techniques and active stretching exercises. After 1 year physiotherapy there was slight stiffness if compare with right knee and was not full flexion, increased muscle strength, normal muscles length, good active stability of left knee, developed proprioception and neuromuscular control and improved dynamic balance.

**DISCUSSION:** After ACL injury, it is important to start early rehabilitation before surgery, and restart it already at 7-10 postoperative days. Rehabilitation could be more successful if before surgery is reached 0° extension in the knee (Wright, 2015). It is proved also in practice. For this patient individual physiotherapy should be continued.

**CONCLUSION:** Early rehabilitation with individual approach in physiotherapy and with full patient cooperation is important to provide return to sports.

**PP-11**

**THE INFLUENCE OF THE PROTEIN-FAT DIET TO PROFESSIONAL HALF MARATHON AND MARATHON RUNNERS BEFORE COMPETITION**

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INTRODUCTION: In 2017, in the Lattelecom Riga Marathon, on the 42.195-km distance started 1940 competitors and on the 21.089-km distance started 4589 competitors, although only 38 of them are professional athletes, including foreign ones. A large scale sports activities are made up of non-professional class runners. To achieve greater results, the non-professional class athletes take for a model the professional athletes’ habits, the training processes and diet habits that are not suitable for a non-professional athlete. The main problem is that the professional athletes risk their health to achieve great results. There is a seven-day preparatory cycle before competitions. In the first day the athlete takes blood tests and starts to observe the protein-fat diet, on the fourth day the athlete takes a blood test again and starts the carbohydrate charge. The period of study is from 1st until 4th day. Aim: To define the influence of the protein-fat diet on athletes’ health before competitions.

MATERIAL AND METHODS: Quantitative cross-sectional study with descriptive analysis, for the statistical analysis average values are used. The study participants are ten leading Latvian women and eight leading Latvian men on half marathon and marathon distances, athletes in the age of 18 or older. The duration of the study is from 1.02.2016 until 10.04.2017. The laboratory blood tests have been taken (Glucose, Creatinine, Glomerular Filtration Rate, Creatinine phosphokinase, Urea) and submitted to certified Latvian laboratories, the E. Gulbja Laboratory and the Central Laboratory. The data are processed with MS Excel, SPSS, T-tests.

RESULTS: The total weight loss for men is 1.89kg, for women – 1.83kg in four days. Blood glucose decrease for men – 0.45mmol/L, for women – 0.46 mmol/L. Changes in creatinine amount are with variables, but total decrease for men is 0.6 μmol/L, for women – 0.5 μmol/L. Changes in glomerular filtration rate are with variables, but total decrease for men is 0.625mm/min/1.73 m², for women – 0.6mm/min/1.73m². Creatinine phosphokinase decrease for men is 267.4U/L, for women – 44U/L. Urea index in four days increased for men in 4.26mmol/L and for women in 3.91 mmol/L, and 16 from 18 respondents Urea index was above recommended norm of 1.7 – 8.3mmol/L.

CONCLUSIONS: For all athletes, there is noticeable weight loss in addition to already decreased body weight. Glucose index decrease for all athletes. Negative influence on kidney indexes which may leave permanent consequences or influence their further activity.

PP-12

GLENOHUMERAL JOINT, THE SHOULDER BLADE POSITION AND SHOULDER IMPINGEMENT SYNDROME RESEARCH FOR SWIMMERS

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INTRODUCTION: Pain in the shoulder joint are the most common injury among swimmers, it affects at least one out of three athletes; 92% of them received positive shoulder impingement syndrome (SIS) test results. Altered shoulder blade and humeral head positions are associated with the SIS. The main purpose of this study is to evaluate competitive swimmers glenohumeral joints, the shoulder blade positions and their relevance with SIS. Material and methods: Overall 48 competitive swimmers between 15 and 24 years old were examined by Kibler’s Lateral Scapular Slide Test (LSST); superior and inferior angle of shoulder blade measured in 3 positions - neutral, 45° and 90° shoulder elevation. Glenohumeral joint positions were determined by measuring the perpendicular distance from the acromion front edge to the humeral head front distal point. SIS was evaluated with 6 tests where at least 3 of them had to be positive.
RESULTS: 33.3% of study participants were diagnosed SIS and 75% of the cases were discovered in non-dominant side. Swimmers with SIS showed significant LSST Superior Kibler measurements in a neutral position (p=0.003) and at 45° shoulder elevation (p=0.083). The differences of humeral head position were significant for SIS in the dominant side (p=0.001). No relevance with SIS were found between the positioning of humeral head and shoulder blade.

DISCUSSION: One third of the study participants had SIS, which can seriously affect the athletic performance of the relatively young swimmers. In the future studies attention should be paid to activities besides swimming training, in order to exclude the possibility of pain caused by other factors.

CONCLUSION: Swimmers with SIS have a greater difference in the distance between humeral heads, indicating the asymmetrical position of the shoulders and the possible instability of the shoulder joint increasing the risk of injury.

PP-13

HAEMODYNAMIC INDICATORS OF OVERREACHING AND OVERTRAINING IN ATHLETES
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INTRODUCTION: Overtraining has been considered as one of the significant issues of present-day athletes of any age and level in any kind of sports. As training volume and intensity should be high enough to promote training effect overload is a common component of training process. Meanwhile intense long-term trainings frequently exceed athletes’ functional reserves. Taking into consideration that accumulation of training stress may entail non-functional overreaching (NFOR) and development of overtraining syndrome (OTS), both manifesting in decrement of performance capacity and maladaptation, there is a strong demand for relevant tools for early diagnosis of NFOR and OTS. The aim of the study is to identify early predictors of NFOR in athletes to prevent appearance of OTS.

MATERIALS AND METHODS: Results of haemodynamic measurements of 560 athletes of various age, level and kinds of sports including cross-country skiing (n=165), track-and-field (n= 80), triathlon (n=55), soccer (n=150), basketball (n=40) and ice hockey (n=70) were under consideration. Haemodynamic monitor MARG-10-01 (Microlux, Russia) was used for evaluation of hemodynamic parameters during active orthotest.

RESULTS AND DISCUSSIONS: We selected ΔHR in orthostatic test (HR standing – HR at supine), SBP, inotropy and correlation rhythmogram as NFOR predictors. We found that isolated increase of one of the above mentioned parameters could be affected by various non-specific stressors, including lifestyle and nutrition regimen nonadherence, psychological stress factors, hormonal and age peculiarities etc. However, deviation from normality (ΔHR > 20 bpm, SBP > 130/80 mm Hg, inotropy > 35 and correlation rhythmogram dispersion) in 2 indices and more served as reliable sensible indicators of NFOR. The obtained data primarily allowed to identify early markers of NFOR, which demonstrate changes in physiologic state, that occur before the establishment of OTS. These markers are non-invasive, easy to measure with a quick availability of the result and not too expensive.

CONCLUSIONS: Haemodynamic indicators are sensitive non-invasive markers of NFOR and OTS. When
these markers of NFOR are revealed it is essential to identify possible reasons with further implementation of amendments to trainings (reduce the volume or intensity of training loads).

**PP-14**

**DEVELOPMENT OF NOVEL POLYPRENOL BASED FOOD SUPPLEMENT AND ITS SAFETY AND EFFICACY IN WELL-TRAINED AMATEUR ATHLETES**

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**INTRODUCTION:** Conifer tree needles are an abundant source of polyprenols - long-chain linear polymers consisting of isoprene units. It is known that polyprenols protect cell membranes from peroxidation and reactive oxygen species. It has been shown that polyprenols improve muscle strength in rats, as well as act protectively in patients suffering from statin-induced myopathies. However, the effects of polyprenols in well-trained amateur floorball players have not been studied before. The objective of the study was to develop a novel and effective polyprenol formulation: liposomal polyprenol softgel caps as an appropriate delivery form, as well as determine polyprenol safety and their effects on athlete performance after 69±5 days of polyprenol use.

**MATERIAL AND METHOD:** 30 male floorball players participated in this study, 16 of them were taking polyprenol based food supplement and 14 did not receive anything. All participants did VO2max exhaustive incremental cycling test before and after use of polyprenols with each step 2 minutes and increment by 25W, where VO2peak (peak oxygen consumption) and series of other cardiorespiratory variables were measured. In the blood plasma samples full blood count and biochemical parameters like alanine aminotransferase, aspartate aminotransferase, γ-glutamyltransferase, alkaline phosphatase, phosphocreatine kinase, C-reactive protein and others were analysed before and after use of polyprenol based food supplement. Multilamellar polyprenol liposomes of average size 1360 nm were produced via ethanol injection method. Veloergometry tests showed that polyprenol intake in amateur floorball players increased VO2peak, O2/HR (oxygen pulse) and average cycling test time in polyprenol group compared to the control group.

**RESULTS:** Apart from that, SVc in polyprenol group increased by 2.9 ml, while it decreased by 7.4 ml in the control group (p=0.04). O2/HR increased by 0.9 ml/beat in polyprenol group while decreased by 0.4 ml/beat in control group (p=0.019).

**CONCLUSION:** We conclude that use of polyprenols improves high intensity exercise tolerance and increases oxygen consumption efficiency. Differences between polyprenol and control group are statistically significant. Use of liposomal polyprenol softgel caps in dose of 200 mg/day is safe, based on the analysed full blood count and various biomarkers in the amateur sportsmen blood plasma samples.
PP-15

NON INVASIVE DIAGNOSTIC TECHNOLOGY (RAMED) FOR EARLY DIAGNOSIS OF STRESS INDUCED DYSFUNCTIONS IN PERSONS EXPOSED TO INTENSE PHYSICAL AND EMOTIONAL LOAD

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INTRODUCTION: The psychological and emotional stress factors play significant role in military service environment. Impact of high-intensity exercise may favour the development of psychosomatic pathology that affects both physical and mental performance. Aim: The present study tests the innovative bio-informative medical technology RAMED for early diagnosis of stress induced dysfunctions in persons exposed to high-intensity physical and emotional load.

MATERIAL AND METHODS: Participants of ten days long Combat Training Course (n=59) performed military physical activities and field training exercises with high energy expenditure and physical load, with food limitation (one meal per day). Measurements of homeostasis deviation in biologically active points were performed before and after CTC by means of RAMED technology (high frequency and low intensity electromagnetic waves).

RESULTS: Measurements revealed different levels of psychological stress for participants: very high stress level was determined in 18.6% of participants, high level in 22.0%, moderate level in 30.5% and low level of psychological stress- in 23.7% of participants. RAMED technology measurements in biologically active points after the CTC revealed satisfactory compensatory abilities in 2/3 of participants and they showed good restoring capacity. There were fixed significant decrease of psychological stress level and indicated functional stability of the nervous system and the same time functional exhaustion of organ systems. The RAMED technology also allowed revealing individuals with excellent health capacity and stability of the nervous system.

CONCLUSION: Bio-resonance technology (RAMED) revealed homeostasis deviation in biologically active points detecting high and very high level of psycho-emotional stress in 40.6 % of participants before the CTC. After the CTC the bio-resonance measurements showed improvement in 63.4 % of participants with high level of psycho-emotional stress, but in 36.6 % of participants the stress induced homeostasis deviation remained unchanged. Bio-resonance technology (RAMED) is useful method to evaluate stress tolerance in persons submitted to intense psycho-emotional and physical load.

PP-16

DYNAMIC KNEE JOINT VALGUS CONDITION CHANGES ON WOMAN BASKETBALL PLAYERS IN AGE GROUP BETWEEN 18 TO 35 YEARS AFTER GLUTEAL MUSCLE TRAINING PROGRAM APPLICATION

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One of the most common injuries for European basketball players is the rupture of the cruciate ligaments
of the knee. Woman are more prone to this traumatic occurrence than men. Although there are several reasons for the anterior cruciate ligament rupture, research suggests that one of the main causes of this trauma is the increased dynamic knee joint valgus condition, which are associated with decreased gluteal muscle strength.

**AIM:** Determine the influence of the gluteal muscle strengthening training in dynamic knee joint valgus condition changes on woman basketball players during bilateral squat and drop-jump test.

**METHODS:** Quantitative experimental study. In the study participated 29 women basketball players, between the age of 18 to 35 years and they were split into two groups - study group and control group. All participants were tested by using bilateral squat and drop-jump tests to measure dynamic knee joint valgus angle. Both tests were filmed and the dynamic knee valgus angle measured at the largest hip and knee flexion. The angle was measured by connecting spinaca iliaca anterior superior and tibiofemoral joint midpoint and tibiofemoral joint midpoint and malleoulus midpoint, after author Herrington. Thus, a wide angle was obtained. To get dynamic knee joint valgus angle calculation was made – from an elongated angle (180°) was subtracted resulting wide angle. Study group participants were strengthening gluteal muscles for six weeks, three times a week by using training program which were prepared by new research-bases. After six weeks of training all participants were tested again.

**RESULTS:** Only one participant was observed increased dynamic knee valgus (>13°) in bilateral squat, but 61.2% participants it was increased in drop jump test. In study group average dynamic knee joint valgus angle in drop-jump test was 12.5° on right leg and 13.0° on left leg. After six week gluteal muscle training program, study group were not observed statistically significant dynamic knee joint valgus angle changes in bilateral squat, meanwhile in drop jump test dynamic knee joint valgus angle had been decreased 4.8° (p=0.004) for right leg and 5.4° (p=0.001) for left leg.

**DISCUSSION:** In this study participants performing bilateral squat and drop jump tests were not using sports shoes, which could affect test results due to ankle over pronation. To prove effectiveness to gluteal muscle strengthening program and get more reliable results, there should be needed more participants.

**CONCLUSION:** Study group participants dynamic knee joint valgus angle had been statistically significant decreased in drop jump test for both legs after performing a six week gluteal muscle strengthening program, this means that by increasing gluteal muscle strength decreases dynamic knee joint valgus angle and also to prevents knee joint injuries risks. Most studies participants were observed in increased dynamic knee joint valgus angle at least for one leg in drop-jump test, confirming that it is a common problem in basketball players, who participated study.

**PP-17**

**EFFECTS OF DYNAMIC STRETCHING ON MUSCLE REACTION PROPERTIES**

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The aim of this study is to investigate the acute and chronic effects of dynamic stretching on peroneal and tibialis anterior reaction properties, which are risk factors for ankle sprain.

**MATERIAL AND METHODS:** All 21 participants who volunteered for this study were randomly divided into dynamic (n=11) and control (n=10) groups. The subjects in the dynamic stretching group performed stretching exercises for the ankle evertor and dorsiflexor muscles 5 days a week for 6 weeks. Peroneal
and tibial muscle reaction properties and morphologic structures were evaluated at the beginning (2 times for acute effect) and end of this period. Reaction time, reaction duration and reaction magnitude of the muscles were tested on the ankle supination tilting platform. There were four different supination conditions: (a) ankle neutral, 15° inversion (0015), (b) ankle neutral, 30° inversion (0030), (c) ankle 20° plantarflexion, 15° inversion (2015), and (d) ankle 20° plantarflexion, 30° inversion (2030). To evaluate the muscle morphology (pennation angle, fascicle length and muscle thickness) ultrasonography was used.

RESULTS AND DISCUSSION: Either in terms of acute or chronic effects, no significant differences were found following dynamic stretching exercises for peroneal and tibial muscle reaction time, reaction duration and muscle activity evaluated in 4 positions on the ankle inversion simulation platform or for muscle morphology parameters evaluated with ultrasound (p>0.05). It can be concluded that dynamic stretching exercise doesn’t have any negative or positive effects on muscle reaction properties and muscle morphology. According to the literature it is known that dynamic stretching influences performance positively.

CONCLUSION: It is possible to state that before sports activities there is no obstacle to the application of dynamic stretching exercises.

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NECESSITY OF INDIVIDUAL PHYSIOTHERAPY PROGRAM FOR ADOLESCENT ATHLETE

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INTRODUCTION: In nowadays training methodology becomes intensive and to result oriented without individual approach to athlete. Growth period, between 12-15 years, increase the risk of sport injuries (Markel, 2013), because of immature musculoskeletal system, muscle imbalance and proprioception dysfunction.

MATERIAL AND METHODS: 13 years old man, height 1.97m, weight 69.1kg, BMI 18.1. Training regime: basketball trainings, since 7 years, 1.5h 4 times/week and individual physiotherapy 1h 2-3 times per week. Diagnosis: asymmetric posture, Valgus deformation of both legs. Complains: pain (1 month) in front, medial part of the knee while running, jumping and stopping in pain scale – Visual Analog Scale for pain6 and “X legs”. Methods: anthropometry, inspection, muscle strength testing by Kendall, muscles length testing, walk analysis, balance testing.

RESULTS: Physiotherapist first estimation: asymmetric posture without spine deformations, pelvis rotation to the right, 3rd (highest) level in legs valgus deformation scale) - 6cm, instability in knees and ankles joints, pronated feet, flat feet arches, muscle imbalance, proprioception dysfunction. The patient could do exercises precisely only with physiotherapist assistance. After 4 month individual physiotherapy program patient had no complains. Objectively he had more stable posture, 2nd (middle) level in legs valgus deformation scale) - 4cm, increased muscle strength, joint mobility and active stability, developed proprioception, could balance body weight on full foot. Athlete could precisely do exercises without assistance of physiotherapist.

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DISCUSSION: Sports trainers like physiotherapists should know and noticed the anatomical and physiological processes in fast growing athlete’s body and risk factors for sports injury. During the basketball team workouts is necessary to provide young athletes also with individual exercise program, because mechanical loading demands skeletal, muscle and tendon system adaptation (Mersmann, 2017). It has been proved that adolescent who attends individual sports physiotherapy has a significantly lower risk of sports injury in team sports. Conclusion: Physiological processes occurring in the adolescent body affect the physical working capacity. Individual physiotherapy program increase better practice in basketball.

THE IMPORTANCE OF CHANGES IN HAEMATOLOGICAL, BIOCHEMICAL AND INFLAMMATORY MARKERS AFTER FINISHING A MARATHON: A CASE REPORT

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INTRODUCTION: The number of amateur athletes participating in endurance running events is increasing. The effects of endurance exercise on athlete’s health condition and situations when we should raise concern are not well understood. The aim of the case report was to evaluate the effects of marathon running on haematological, biochemical and inflammatory markers in a healthy male athlete.

MATERIAL AND METHODS: 33 year old male athlete participated in a marathon. A written informed consent was obtained before the race. Blood samples were collected before and immediately after the race. 3 days before the first blood sample was taken, he finished a marathon at an average pace (moderate intensity).

RESULTS: There were no changes between both samples in red blood cell count, haemoglobin, haematocrit, C reactive protein and alanine aminotransferase. Leucocyte count increased from 6.64 to 14.56x10^9/L, neutrophils increased to 12.43x10^9/L. Aspartate aminotransferase (AST) increased from 43 to 50U/L. Creatinine increased 1.5 times, glomerular filtration rate decreased for 67%. Myoglobin increased 8 times, Tumour necrosis factor (TNF)- 2.5 times. Interleukin 6 (IL-6) increased to 38.5pg/ml.
Creatinine kinase (CK) increased from 446 U/L to 574U/L. Creatinine kinase MB isoenzyme (CK-MB) increased from 24 to 35U/L. Discussion: A rise in creatinine could indicate renal injury (Kyung-A Shin, 2016; Wei-Fong Kao, 2015). It usually is transient and creatinine normalizes without intervention. There is evidence of inflammatory reaction. Increased leukocyte count, IL-6, TNF-α and other inflammatory markers could be secreted locally in irritated exercising muscle (Nieman, 2007; Bernecker, 2011). A rise in CK, myoglobin, AST indicates muscle injury, a catabolic effect on exercising muscle (Kyung-A Shin, 2016). CK, AST and myoglobin were slightly elevated before the race, which could indicate muscle injury from previous marathon. CK-MB lacks in specificity as a cardiac marker, therefore cardiac troponins should be used (Shave, 2010).

CONCLUSIONS: Endurance exercise can induce changes in blood markers that indicate muscle damage, renal impairment and inflammatory reaction. Physicians should know about these changes and be able to differentiate between pathological conditions and physiological response to exercise in each individual case.
HAEMATOLOGICAL, BIOCHEMICAL AND CARDIAC MARKERS FOLLOWING AN ENDURANCE EXERCISE: PHYSIOLOGY OR PATHOLOGY?

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INTRODUCTION: It has been established that endurance running places extensive strain on human body, resulting in increasing cytokine levels, changes in muscle, cardiac, liver and kidney biomarkers. The consequences and risks of prolonged physical exercise are not well established. The aim of the research was to analyze the published studies on the effects of endurance running on inflammatory, haematological, biochemical and cardiac markers. Materials and methods: Articles published from 2008 to 2017 were identified by scanning electronic bibliographic database Medline using key words: inflammation, biochemical, haematological, cardiac markers, running, athlete. Studies investigating half-marathon (HM), marathon (M) and ultra-marathon (UM) runners were included.

RESULTS: 25 articles were reviewed and analyzed: 10 with UM runners, 6 - M, 4 - HM, 2 - UM and M, 3 - HM and M. Studies included female (n=135) and male (n=533) athletes with different training backgrounds. After the races raised leukocyte (neutrophil) count was showed in 9 studies. 7 studies demonstrated no changes in red blood cell count, haemoglobin and haematocrit values, 3 studies showed decreased haematocrit. Platelet count was increased in 4 studies, without changes in 3 studies. 16 studies investigated increased creatinine kinase; 10 studies-increased creatine kinase MB isoenzyme, 9 studies-increased serum creatinine; 8 studies-increased N-terminal pro B-type natriuretic peptide; 5 studies-increased aspartate aminotransferase, lactate dehydrogenase, myoglobin and interleukin 6; 4 studies-increased cardiac troponin I; 3 studies-increased alanine aminotransferase, tumor necrosis factor α, highly sensitive C reactive protein and highly sensitive troponin T; 2 studies-raised C reactive protein and cardiac troponin T levels.

CONCLUSIONS: Endurance running results in transient changes in haematological, biochemical and inflammatory markers. There is evidence of an inflammatory reaction that could result in transient renal impairment, muscular injury and increased cardiac biomarkers, but it is not clear whether such elevations represent inflammation or a physiological response to exercise. Research should be continued.

USE OF FACE MASK IN COMPLEX CARDIOPULMONARY EXERCISE TESTING CAN INFLUENCE ACQUIRED RESULTS FOR TESTED AMATEUR FEMALE ATHLETES

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INTRODUCTION: Cardiopulmonary exercise testing (CPET) is a non-invasive method for estimation of the cardiopulmonary system functionality during exercise. Individuals can have psychogenic reaction
from discomfort using a face mask in CPET, what can manifest as arrhythmic breathing, the onset of shortness of breath or other complaints and reflect on CPET results. The aim of this study was to analyze how psychological discomfort caused by face mask during CPET could influence the CPET results on amateur female athletes.

**MATERIALS AND METHODS:** Physically active and healthy 200 amateur female athletes for the first time did CPET. All included females had a goal to check their health and had the motivation to show their best effort, none of them had previous any respiratory complaints in their daily sporting activities. They were tested until maximal work-rate in CPET. Collected data from their CPET results were statistically analyzed in SPSS version 22.0 software.

**RESULTS:** Female group reached average physical working capacity 2.38±0.52W/kg. Individuals reached average maximal relative oxygen uptake 28.71±5.82ml/min/kg. During the CPET 53.0% of female group individuals had arrhythmic and heavy (speed up) breathing. Shortness of breath as the termination reason was found in 36.0% of the female group.

**DISCUSSION:** The respiratory center is located in the medulla oblongata and pons, in the brainstem. Face mask could provoke on healthy, but emotional individuals anxiety and reflect on CPET results. Dyspnea is a multidimensional sensation, it is affected by psychological changes, especially anxiety. (Hayen et al, 2013). Studies have shown that anxiety level is a very reliable indicator of difficulty encountered while wearing a respirator (Johnson, 2016).

**CONCLUSIONS:** Face mask during CPET can influence the CPET results especially in emotional individuals. Understanding athletes mental condition could be beneficial for better outcomes on given training and health recommendations. Educating, creating a psychological good communication, testing stress level, neuroimaging testing to identify specific neuronal mechanisms of the respiratory system, repeating CPET more times, or transform face mask in the more suitable form needs to be considered in CPET.
RESULTS: From October 2011 until October 2015, 375 male participants and 200 female participants who did CPET voluntarily, on their own initiative. Age in male group was mean ± SD age 42±13 years, and age in the female group was mean ± SD age, 40±12 years.

DISCUSSION: The present study’s results showed that people in their 40s want to do physical activity to improve their health and quality of life. Authors suggest that there is need to support people in their 40s and provide with knowledge from CPET in sports medicine, helping them to be more physically active and prevent common diseases which developing after the age of 40.

CONCLUSIONS: The complex cardiopulmonary exercise test (CPET) interpretation and sports medicine physicians knowledge for people in their 40s can provide for them better, healthier and more qualitative life, and decrease physical inactivity position as the fourth leading risk factor for global mortality.

INTRODUCTION: In athletic population Overtraining syndrome (OTS) is a complex clinical disorder that identified a maladaptive response to training. The recognition of OTS requires the identification of stress indicators. Heart rate recovery (HRR) after exercise could provide valuable information about the functional condition during the training and help to detect training associated dysbalances such as OTS (Lamberts et al., 2010). The aim of this study was to determine if sports medicine doctor recommendations for young female athletes have been used to prevent OTS, comparing HRR of athletes Cardiopulmonary exercise testing (CPET) data between their 1st and 2nd testing time.

MATERIALS AND METHODS: From 2015 till 2016, 50 young female athletes, 12-15 year old underwent CPET. Their 1st and 2nd (after 8 months later) testing time data were collected and compared. Statistical analysis was performed with SPSS version 22.0 statistic software.

RESULTS: From fifty young female athletes after 1st testing - evaluation of recovery phase for 24% (n=12) girls were satisfied, for 18% (n=9) girls good and for 58% (n=29) girls prolonged. After the 2nd testing time, eluvation of recovery phase for 205 (n=10) girls was satisfied, for 32% (n=16) girls good and for 48% (n=24) girls prolonged. Average post-exercise heart rate after 1st testing was 114±12 bpm, but after 2nd testing 106±16 bpm.

DISCUSSION: Successful training must involve overload with adequate recovery. If the balance between appropriate training stress and adequate recovery is disrupted, an abnormal training response may occur and OTS may develop. Based on International Olympic Committee published Consensus Statement “The Female Athlete Triad” young female athletes needs to be specially protected. HRR may be used as a quantifiable measure for recommendations for young female athletes to better protect this athlete’s group.

CONCLUSIONS: The results suggest that the recommendations of the sports doctors how to manage HRR are not entirely completed in young female athletes training routine, but it is important to make adjustments before the occurrence of OTS.
ADAPTATION TO EXERCISE LOADS IN ATHLETES WITH CONNECTIVE TISSUE DYSPLASIA

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INTRODUCTION: The level of exercise performance of athletes and sports safety depends on effective adaptation to exercise loads. The study was focused on investigation of adaptation to exercise loads in young athletes with connective tissue dysplasia (CTD).

MATERIAL AND METHODS: Forty four young swimmers (n=19) and skiers (n=25) (mean age 14.6±3.3 years, height 166.5±16.4 m, weight 56.8±15.2 kg), with more than 5 years of sport experience were recruited for the study. Hemodynamics measurements with the use of MARG10-01 ("Microlux", Russia) and exercise testing with VO2max measurements (RAMP-protocol) with the use of cycle ergometer (Schiller, Switzerland) and metabolic analyzer FitMatePro (COSMED, Italy) were conducted. Phenotypic markers of CTD were identified with the use of Kadurina scale.

RESULTS: The external parameters of exercise performance conformed to age-appropriate normal values for athletes (VO2max 51.1±10.3ml/kg/min, maximal relative attained power at VO2max 4.6±0.8W/kg). Hemodynamics study showed that athletes had low heart volume parameters (end-diastolic index 91.3±12.8ml/m2, N>100, stroke volume index (SI) 57.9±8.1ml/m2, N>70). Undifferentiated form of CTD was in 43 (97%) of athletes involved in the study; in 12 (32.4%) cases the severe degree of CTD was found. A significantly lower cardiac index (CI) (p=0.0001), heart rate (HR) (p=0.01), systolic blood pressure (p=0.001), double product (DP) (p=0.0005), SI (p=0.03) and higher peripheral vascular resistance (PVR) index (p=0.01) at rest were found in athletes with severe CTD in comparison with the main group. Although no significant differences in the level of VO2max and maximal HR at VO2max-test were revealed.

DISCUSSION: Athletes with severe CTD have peculiarities of hemodynamic compared with athletes from the main group, such as reduced SI. This trend may be associated with presence of false tendons in the left ventricle in athletes with CTD. It is interesting to note that despite significantly lower SI, these athletes had a high level of VO2max and successfully adapted to exercise loads. Considering that low level of DP and CI indicates the economization of contribution of the heart on circulation, it is suggested that maintenance of adequate circulation is due to increased PVR.

CONCLUSION: Athletes with severe CTD have lower heart volume parameters but normal level of exercise performance.

RIGA SUBURB ELEMENTARY SCHOOL SEVENTH TO NINTH GRADE STUDENTS MOTIVATION TO BE PHYSICALLY ACTIVE

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INTRODUCTION: Sedentary lifestyle is major problem for society health. Because of that, strategic plans...
are made, to increase part of society that does physical activities daily. Lack of motivation is one of the reasons why adolescent are not enough physically active daily and this is one of the main groups where healthy lifestyle habits should be promoted. The aim: is to research factors, which motivate Riga suburb elementary school seventh to ninth grade students to be physically active.

**MATERIAL AND METHODS:** 72 students (37 girls and 35 boys) who learn in seventh to ninth grade in one of Riga suburb elementary schools took part in the research. Research instrument was questionnaire „Sports motivation scale-II“ (SMS-II). Each statement need to evaluate with Likert type scale from one to seven. Authors of SMS-II offer a formula for calculating students relative autonomy index (RAI).

**RESULTS AND DISCUSSION:** World Health Organization guidelines say that students should do moderate to vigorous intensity physical activities at least 60 minutes a day, however none of the research participants reached such level of activity. Most of the students (25,0%) were physically active three days per week (boys more than girls). For one after school physical activity mostly (56,9%) zero to sixty minutes were spent. Seventh grade students were more physically active. Mostly students (21,3%) had introjected regulation, but less (45,8%) had amotivation. Seventh grade students had higher RAI (23,7), but ninth grade students had lowest (9,8). The higher RAI is, the more often physical activities are done (p<0,001; rho=0,595) and students are more motivated to be physically active. In this research was discovered that there is no statistically significant difference between gender of the participants and RAI or their answers in SMS-II questionnaire. However from data of the students could judge that girls have more introjected regulation, but boys have more identified regulation.

**CONCLUSIONS:** Mostly students were physically active three days per week. To be physically active, research participants are mostly motivated by other people, as well as to avoid feeling guilty. The higher RAI, the more active students are. Majority of participants RAI was positive, however it has tendency to decrease when students grow up, and they become less physically active.

**THE HEALTH EXAMINATION OF ADOLESCENT ATHLETES**

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**INTRODUCTION:** The periodic medical examinations helps in detection of premorbid diseases, which clinically are nonmanifested or less manifested, as well, in detection of the presence of latent, chronic outbreaks cases, unnoticed by athletes. The purpose of the work was assessment of adolescent athletes’ specific morbidity and elaboration of preventive measures.

**METHODS:** The retrospective analysis of adolescent athletes’ general morbidity has been carried out during the last 10 years (2007-2016), according to results of periodic medical examination, performed by specialists from National Center for Sports Medicine “Atletmed”. All statistical analyses were done using SPSS version 17. Descriptive statistics was performed, resulting in means, standard deviations, minimum and maximum values for quantitative variables and frequencies and percentages for the qualitative (categorical) variables.

**RESULTS:** The average of sportsmen’s morbidity, during the study period, according to the results of
medical examination, was 523.5±26.0 cases per 1000 sportsmen. The highest incidence is related to
circulatory system diseases 84.7±4.24% and the lowest is related to digestive system diseases
11.3±0.01%. Fairly high values were observed for the following classes of diseases: diseases of the
genitourinary system – 73.4±4.63%, dental diseases – 73.4±9.30%. The results of medical examination,
shows that every 4th case of illness of athletes of diseases of the circulatory system, every 6th case -
dental diseases, every 7th case - the genitourinary system diseases. Fairly high proportion of athletes’
morbidity structure has eye diseases 10%, ear diseases 8% and nervous system diseases 6%. Morbidity
due to circulatory system diseases remains at the high percentage values, mainly on account of
cardiomyopathy 41.5%, cardiac arrhythmias 33.4%, and overtraining with cardiac symptoms 25.1%.

The increased morbidity prevalence due to circulatory system diseases explains that it is the first
system that provides adjustment of the body to physical overload, but from another side, that athletes
have a careless attitude, irresponsible towards their own health. As a result we developed a set of
measures, in order to decrease the risk factors, to develop the capacity of specialized medical service
and to promote healthy lifestyle among young athletes.

CONCLUSIONS: Assessment of the adolescent athletes’ health status, we have noticed high incidence of
illness, especially circulatory system diseases, dental diseases, and genitourinary system diseases.
Knowing and compliance with the requirements for a healthy lifestyle are measures that contribute to
maintaining and enhancing the health, reducing athletes’ morbidity and trauma.

MEASURES OF FUNCTION OF ANTERIOR CRUCIATE LIGAMENT OF ELITE
BASKETBALL PLAYERS DURING THE SEASON

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INTRODUCTION: Anterior cruciate ligament (ACL) tears are one of the most common knee injuries of
basketball players. The evaluation of functions of ACL by using an arthrometer gives information both to
diagnose the severity of the ACL injury and to determine the risk of ACL trauma. Aim of the study was to
investigate dynamics of measures of ACL function of elite basketball players during the season.

MATERIAL AND METHODS: The study was done on 20 participants – male gender elite 19-30 years old
(23.3 SD 4.05) basketball players. They had average 15.15 (SD 4.64) years basketball experience. Most
of them (17 out of 20) had sport injuries of lower extremities and 2 of them had ACL injury before study.
ACL functions were measured with arthrometer GnRB (GenouROB, Laval, France) three times during the
season. The information about sport injuries during the season was collected by the questionnaire.

RESULTS AND CONCLUSIONS: The study results showed dynamics of measures of ACL function during
the competition season. The average differential laxity in the right knee decreased significantly (p= 0.04)
and insignificantly (p=0.17) in the left knee between the first (before the season) and the second (the
middle of the season) measurement. Risk for knee instability increased insignificantly by 0.10 at the end
of the season (p=0.75). The knee rotatory instability decreased significantly by 0.20 (p=0.05) in the
middle of the season. The analysis of results shows that the measures of ACL functions gained with
arthrometer GnRB are relevant for ACL injury risk evaluation.
BODY FAT, ENERGY INTAKE AND PHYSICAL FITNESS OF TOP BALLET SCHOOL STUDENTS

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INTRODUCTION: Children have particularly high nutritional requirements, as their fast growth and development contribute to their bodies’ increased demand for nutrients and energy. 12% body fat (% BF) has recently been suggested as the minimal level for female athlete adolescents, including ballet dancers and consumed energy 30–45 kcal/kg fat-free mass daily. Physical fitness is one of the most important health markers. The aim was to assess the energy intake and % BF and compare these results with physical fitness level.

MATERIAL AND METHOD: Thirty-nine female ballet dancers (median age 13 years, range 12–14) were selected for the study. Training volume at the time of study was 24.42±3.42 h/week. Body composition were measured using a multi frequency bioelectrical impedance analyser (X-Scan Plus II, Korea). Dietary intakes were assessed using a three-day estimated food record. Physical fitness was assessed by applying the European physical fitness test battery (Eurofit). For evaluation we used gender- and age- specific physical fitness normative values for young athletes.

RESULTS: Twenty two (56.4%) of young ballet dancers’ daily energy intake was less than the 35 kcal/kg fat free mass and 20 (51.3%) % BF was under 12 % level. We assessed general balance, coordination and speed of limb movement, flexibility, explosive strength, static strength, trunk strength and endurance, upper body strength and endurance. There were no statistically relevant differences in physical fitness level between those that consumed more or less energy than 35 kcal/kg fat free mass (p>0.05). We did not find statistically relevant differences in physical fitness level between those with more or less 12 % of body (p>0.05). Correlation was found between energy intake and flexibility (r=0.332, p<0.05).

CONCLUSION: Approximately half of young ballet dancers consume less energy than recommended for their health and have % body fat under 12%. Physical fitness level did not differ in a statistically significant way between these groups. Those who consume energy more than 35 kcal/kg fat free mass have better flexibility. Considering nutritional needs on adolescents and possible health hazards with nutritional deficiencies, special attention is needed for those ballet dancers who have an inadequate energy intake.
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