Antidoping agencija Republike Srbije / Antdoping Agency of Serbia

Udruženje za medicinu sporta Srbije / Sports Medicine Association of Serbia

Drugi kongres o prevenciji dopinga u sportu

Second Congress on Prevention of Doping in Sport

PROGRAM I KNJIGA SAŽETAKA

PROGRAMME AND ABSTRACT BOOK

Beograd, 21. 5. 2016

PRONAĐITE NA SAJTU ADAS

www.adas.org.rs

ZAHTEV ZA MIŠLJENJE O SUPLEMENTU

Od 2012. godine ADAS je izdao više stotina mišljenja o prisustvu zabranjenih supstanci u deklarisanom sastavu suplemenata. Ukoliko kao sportista želite sa smanjite rizik od doping pozitivnog rezultata usled upotrebe različitih preparata, nađite ovo mišljenje na sajtu ADAS i popunite zahtev. Pošto je sportista uvek odgovora za sve što unese u svoj organizam, čak i kada su u pitanju zabranjene supstance koje nisu deklarisane u sastavu preparata, sportistima se savetuje da ne koriste suplemente ako postoji bilo kakva sumnja u njegov sastav ili kontaminaciju.

ZAHTEV ZA MIŠLJENJE O LEKU

Svi sportisti koji podležu doping kontroli i koji moraju da koriste određeni lek zbog medicinskog stanja ili trenutne bolesti, trebalo bi prvo da popune zahtev za mišljenje o leku na sajtu ADAS. U najkraćem roku dobiće odgovor da li se u sastavu leka nalazi ili ne nalazi supstanca koja je na Listi zabranjenih doping sredstava. Kada je potrebno, sportista će biti savetovan da krene u proceduru odobravanja Izuzeća za terapeutsku upotrebu (TUE), što je i učinjeno u prethodnom periodu kada je ADAS primio preko 50 zahteva za mišljenje o leku.

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a) Допинг - Апстракти b) Спортисти - Допинг средства - Апстракти

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U pripremi za borbu uvek sam nailazio na beskorisne planove, baš zato je planiranje bilo neophodno.

Dvajt D. Ajzenhauer, Predsednik SAD

In preparing for battle I have always found that plans are useless, but planning is indispensable.

DWIGHT D. EISENHOWER, U.S. president

Poštovane kolege, Dragi prijatelji i sportisti,

Prvim kongresom o prevenciji dopinga u sportu uspeli smo da privučemo veliki broj učesnika i da ostvarimo jednu od najinteraktivnijih sesija od svih koje smo organizovali tokom poslednjih dvadeset godina. Naime, svedočenje Nikole Rađena ostaće upamćeno ne samo po kontroverznim stavovima učesnika, već i po tome što je to prvi put da je jedan sportista javno priznao da se dopingovao. Pored toga imali smo devet originalnih radova predstavljenih od kolega sa Farmaceutskog fakulteta, Medicinskog fakulteta u Kragujevcu. Medicinskog fakulteta u Kosovskoj Mitrovici, Vojnomedicinske akademije, Fakulteta sporta i fizičkog vaspitanja. Taj trend želimo da nastavimo, pa i pre nego što smo obajvili ovo obaveštenje imamo značajan broj prispelih radova.

Ove godine posebna tema će biti hrana kao doping, odnosno sve one dozvoljene stvari koje mogu da doprinesu poboljšanju sportskih rezultata, a nisu zabranjene. Tako ćemo govoriti o značaju mentalnog treninga, ali i dozvoljenim metodama u prevenciji i lečenju sportskih povreda. Čini nam se da je za obe teme značajno da ih sportisti razumeju i da ne dozvole da ih eventualno neznanje onih koji ih prate ugrozi. S druge strane današnji sport zahteva da svaki uspešan sportista iskoristi sve da bi na takmičenju ostvario najbolji rezultat. U 2015 objavili smo knjige *Sportski kuvar*, *Intolerancija na hranu u sportu* i *Probiotici u sportu*. Time smo samo potvrdili da nismo obična Antidoping agencija već institucija koja se sveobuhvatno brine o sportistima.

Kongres će biti mesto na kome ćemo i formalno predstaviti Mrežu za čistu igru kao jedinstvenu asocijaciju svih onih koji zajedno sa Antidoping agencijom Republike Srbije učestvuju u prevenciji dopinga u sportu ili kako je rečeno u memorandum svih onih kojima je važnija dobra utakmica nego pobednik, timska igra nego zakucavanje, fer plej nego rezultat.

Konačno na kongres ćemo pozvati sve kolege iz bivše Jugoslavije sa idejom da predstave svoje rezultate i razmene iskustvo sa doping kontrolorima ADAS. Uvodna misao izrečena od američkog predsednika Dvajta D. Ajzenhauera se ne odnosi samo na sukobe, već se odnosi na celokupnu ljudsku aktivnost, pre svega na sport, gde planove nije lako realizovati, a može se preneti i na rad Antidoping agencija koje da bi bile dostonje svojih sportista moraju da imaju plan, ali i da se brzo i lako prilagode novoj situaciji. Upravo 2016. godina predstavlja pravi izazov, jer suspenzija Rusije, Španije, Meksika i Izraela govori o problemima koji često ne mogu biti razrešeni bez pomoći. Očekujemo da će interakcija između antidoping agencija sa prostora bivše Jugoslavije uticati na kvalitet i ozbiljniju komunikaciju sa svim partnerima u poslu.

Prošle godine smo slavili 10 godina postojanja ADAS i 20 godina Udruženja za medicinu sporta Srbije. Ove godine nemamo formalni razlog za slavlje, ali imamo novi prostor u Hotelu Zira kao idelan prostor za *after congress party*. Dođite da naučite nešto novo i da se družimo.

Doc. dr Nenad Dikić
Predsednik Kongresa

Dear colleagues, friends and athletes,

The first congress on the prevention of doping in sport, we have managed to attract great number of participants and to achieve one of the most interactive sessions of all that we have organized in the last twenty years. The testimony of Nikola Radjen will be remembered not only because of controversial views of participants, but also because it was the first time that an athlete publicly admits that he used doping substance. In addition, we had nine original papers presented by colleagues from the Faculty of Pharmacy, Faculty of Medicine in Kragujevac. Faculty of Medicine in Kosovska Mitrovica, the Military Medical Academy, Faculty of Sport and Physical Education. This trend we want to continue, and even before we publish this this announcement, we have got a significant number of submitted papers.

This year the theme will be food as doping, or those permitted things, which can help improvement of athletic performance, and are not prohibited. So let's talk about the importance of mental training, but also allowed methods in the prevention of treatment of sports injuries. It seems that both topics are important for athletes to understand and not to allow that ignorance of sport entourage to endanger them. On the other hand today's sport requires that every successful athletes to take advantage of everything which will help them to achieve the best result. In 2015 we published Sporting Cookbook, Food intolerance in sport and Probiotics in the sport. That is a proof that we are not just ordinary Anti-Doping Agency, but institution that comprehensively cares of athletes.

The Congress will be a place where we will formally introduce the Network for a clean game, as a unique association of all those who, together with the Anti-Doping Agency of Serbia participating in the prevention of doping in sport, or as stated in a memorandum of all those who respect more good game then winning, a team game but jump shot, fair play than the result.

Finally, we will invite all colleagues from the former Yugoslavia with the idea to present their results and share experience with doping control officers of ADAS. The introductory note delivered by US President Dwight D. Eisenhower refers not only to the conflict, but applies to the entire human activity, primarily in sports, where plans always go differently, and can be transferred to the work of the Antidoping Agencies that they would be decent thier athletes must have a plan, but also to quickly and easily adapt to new situations. Exactly 2016. years represents a real challenge, because the suspension of the Russia, Spain, Mexico and Israel talks about the problems that often can not be resolved without assistance. We expect that interactions between antidoping agencies of the former Yugoslav countries, affect the quality and communication with all partners in the sport.

Last year we celebrated the 10th anniversary of ADAS and 20 years of Sports Medicine Association of Serbia. This year we do not have a formal reason to celebrate, but we have a new hotel venue of hotel Zira as an ideal space for the congress after party.

Come to learn something new and to have a fun.

Ass. Prof. dr. Nenad Dikic, MD, PhD
Congress Presiednt

Mreža za čistu igru

Doc. dr Nenad Dikić
Dr Milica Vukašnović-Vesić
Dr Marija Anđelković
Prof. dr Brižita Đorđević
Prof. dr Nenad Đurđević
Prof. dr Vladimir Jakovljević
Dr Valentina Mileusnić
Prof. dr Zdeslav Milinković
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Prof. dr Radan Stojanović
Prof. dr Slobodan Živanić
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This Congress is organized under the auspices of the Ministry of Youth and sports

Šema Kongresa / Congress scheme

PROGRAM KONGRESA / CONGRESS PROGRAM

vreme / time	Opis / Description
8:30	Registracija / Registration
09:45	Otvaranje / Openning
10:00	Radionica (paralelne sesije) / Workshop (paralel sessions) Mentalni trening kao dozvoljena pomoć u sportu / Mental training allowed support in sport – Đorđe Koldžić, Đorđe Ćurčić, Maja Čurčić, Milica Lazarević Sportske povrede prevencija, lečenje, oporavak – šta je dozvoljeno? / Sports injury prevention, treatment, recovery - what is allowed? - Tamara Stojmenović, Milan Mileusnić, Marija Anđelković Multivitamini i minerali - suplementacija prvog izbora u prevenciji i rehabilitaciji sportskih povreda / Multivitamins and multi-minerals – First choice supplementation for prevention and recovery of sport injures - Marija Anđelković, Nenad Dikić, Tamara Stojmenović, Milica Vukašinović Vesić Pregled fizioterapijiskih metoda u lečenju sportskih povreda / A review of physical therapy modalities in treating sports injuries - Milan Mileusnić
11:30	Kafe pauza / Coffee break
12:00	Radionica (paralelne sesije) / Workshop (paralel sessions) Mentalni trening kao dozvoljena pomoć u sportu / Mental training allowed support in sport – Đorđe Koldžić, Đorđe Ćurčić, Maja Čurčić, Milica Lazarević Sportske povrede prevencija, lečenje, oporavak – šta je dozvoljeno? / Sports injury prevention, treatment, recovery - what is allowed? - Tamara Stojmenović, Milan Mileusnić, Marija Anđelković Multivitamini i minerali - suplementacija prvog izbora u prevenciji i rehabilitaciji sportskih povreda / Multivitamins and multi-minerals – First choice supplementation for prevention and recovery of sport injures - Marija Anđelković, Nenad Dikić, Tamara Stojmenović, Milica Vukašinović Vesić Pregled fizioterapijiskih metoda u lečenju sportskih povreda / A review of physical therapy modalities in treating sports injuries - Milan Mileusnić
13:30	Ručak / Lunch break
14:00	Originalni radovi / Original papers 1. Banana kao izvor energije pri maksimalnom testu opterećenja / Banana as an energy source at the maximum stress test – Marija Anđelković 2. O banana lektinu, karakteristike i dejstvo na imunski sistem miševa / Of banana lectin, characteristics and effects on the immune system of mice – Rajna Minić 3. Kiseonik je dozvoljen u sportu? / Oxygen is allowed in sport? - Anja Lalić 4. Analiza Assault-a - suplement za pre vežbanja / Analysis of Assault – pre-work supplement – Radomir Čabarkapa 5. Zabranjene supstance u dijetetskim suplementima – slučajno ili namerno? / Prohibited substances in dietary supplaments – accidentaly or delibrately? – Biljana Stojanović 6. Kokain i etanol: Interakcije i efekti / Cocaine and ethanol: Interactions and effects – Snežana Đorđević 7. Podaci Nacionalnog centra za kontrolu trovanja Srbije o zloupotrebi psihostimulanasa u periodu 2010-2015 / Psychostimulant abuse – National Poison Control Centre of Serbia data for the period 2010-2015 – Marko Antunović 8. Poremećaji ishrane kod sportista / Eating disorders in athlets – Marija Đurović 9. Uticaj kofeina na sportsku sposobnost? / Influence of caffeine on sport performance – Milica Vukašinović-Vesić
15:30	Kafe pauza / Coffee break
16:00	Radionica / Workshop Saradnja antidoping agencija sa prostora bivše Jugoslavije Cooperation between anti-doping agencies from the countries of the former Yugoslavia 1. Da li nacionalne antidoping agencije iz regiona imaju razloga da počnu da bliže sarađuju u prevenciji i sprečavanju dopinga u sportu? / Whether the national anti-doping agencies in the region have reason to start closer to cooperate in the prevention and fighting against doping in sport? – Nenad Dikić 2. Pregled postupaka pred stegovnim tijelima Hrvatskog zavoda za toksikologiju i antidoping od 2012. – 2016. / Overview of proceedings before the disciplinary bodies of the Croatian Institute for Toxicology and Antidoping (2012 – 2016) – Zoran Manoljović 3. Dopingi i dodaci prehrani u Bosni i Hercegovini / Doping and food supplements in Bosnia and Herzegovina – Nihada Ahmetović 4. Model vršnjačke edukacije u prevenciji dopinga / Model of peer networking in doping prevention – Janko Dvoršak
20:00	After Congress party

DETALJAN SADRŽAJ PO SESIJAMA / DETAILED CONTENT PER SESSIONS

RADIONICA (PARALELNE SESIJE) / WORKSHOP (PARALEL SESSIONS)

ORIGINALNI RADOVI / ORIGINAL PAPERS

DETALJAN SADRŽAJ PO SESIJAMA

DETAILED CONTENT PER SESSIONS

RADIONICA (PARALELNE SESIJE)

WORKSHOP (PARALEL SESSIONS)

Đorđe Koldžić je diplomirao na Medicinskom fakultetu Univerziteta u Beogradu. Završio je specijalizaciju iz psihijatrije u Medicinskom centru Tafts univerziteta u Bostonu i subspecijalizaciju iz psihoanalitičke psihoterapije na programu Medicinskog fakulteta Harvard pri bolnici Folkner u Bostonu. Tokom post-doktorskih studija na Medicinskom fakultetu Harvard, bavio se istraživanjem problema neurodegeneracije u autoimunskim bolestima centralnog nervnog sistema. Poslednjih godina, bavi se neuro-psihološkim aspektima mentalnog traninga vrhunskih sportista. Osmislio je i od 2012. godine sprovodi program mentalnog treninga pedeset srpskih sportista, kandidata za Olimpijske igre u Rio de Žaneiru u pojedinačnim sportovima. Doktor Koldžić je trenutno docent na katedri za psihijatriju Medicinskog fakulteta Tafts u Bostonu. Nosilac je brojnih priznanja za svoj predavački i klinički rad na poljima psihijatrije, psihoterapije i sportske psihologije.

Djordje Koldzic is a graduate of Belgrade University School of Medicine. He trained in General Psychiatry at Tufts Medical Center's Residency Training Program in Boston, Massachusetts. He also completed his Adams House fellowship in psychoanalytic psychotherapy through Harvard Medical School's Faulkner Hospital. Dr. Koldzic's research interests included neuro-degenerative aspects of autoimmune diseases during his post-doctoral research fellowship in neuro-immunology at Harvard Medical School in Boston. Most recently, Dr. Koldzic has been interested in psycho-neurological underpinnings of mental- and peak performance-training of world-class athletes. Since 2012, through the mental training program he's developed, Dr. Koldzic has been training fifty Serbian Olympic athletes in seven individual sports with extraordinary results. Currently, Dr. Koldzic serves as Assistant Professor in Psychiatry with Tufts University School of Medicine. He is recipient of multiple teaching and exceptional practice awards during his training and subsequent clinical practice of psychiatry, psychotherapy and sport psychology.

Đorđe Ćurčić je diplomirao na Medicinskom fakultetu Univerziteta u Beogradu. Završio je specijalizaciju iz psihijatrije na istom fakultetu. Na završnoj godini doktorskih akademskih studija Medicinskog fakulteta Univerziteta u Kragujevcu, smer neuronauke. Tokom kliničkog i naučnog rada, bavio se proučavanjem benefita fizičke aktivnosti i vežbanja na mentalno zdravlje, kao i mentalnim zdravljem i mentalnim treningom sportista. U sportu je „od malih nogu". Trenirao je košarku, a zatim je 12 godina radio kao košarkaški sudija. Nakon završenih studija, radio je kao timski lekar u KK „FMP", a zatim KK „Crvena Zvezda". Doping kontrolor je Antidoping agencije Srbije od njenog osnivanja. Bio je učesnik Olimpijskih i paralimpijskih igara u Londonu 2012. godine, kao doping kontrolor. Aktivni je član Udruženja za medicinu sporta Srbije.

Konsultant je u Centru za ishranu i suplementaciju. Predavač je na brojnim međunarodnim kongresima i edukacijama.

Djordje Curcic is a graduate of Belgrade University School of Medicine. He trained in General Psychiatry at the same University. He is final year student of doctoral academic study of Kragujevac University school, neuroscience. Dr. Curcic's research and clinical interests included studying the benefits of physical activity and exercise on mental health as well as mental health and mental training of athletes. He is in sport "from an early age". He trained basketball, and then work 12 years as basketball referee. After graduation, he worked as a team doctor in BC "FMP", then BC "Crvena Zvezda". He is doping control officer in Anti-Doping Agency of Serbia since its establishment He was a participant of Olympic and Paralympic Games in London 2012, as a doping control officer. He is an active member of the Sports Medicine Association of Serbia. Consultant at Center for Nutrition and supplementation. He is a lecturer at numerous international conferences and training courses.

Maja Ćurčić, diplomirala na Filozofskom fakultetu Univerziteta u Beogradu, Odsek za psihologiju. Specijalizirala je Medicinsku psihologiju na Medicinskom fakultetu Univerziteta u Beogradu. Zaposlena u Klinici za psihijatriju „Dr Laza Lazarević". Ima višegodišnje iskustvo u psiho-dijagnostičkoj eksploraciji, savetovanju, te u individualnom i grupnom terapijskom radu. Član Društva psihologa Srbije. Aktivno učestvuje u radu sa sportistima u okviru Centra za mentalni trening.

Maja Curcic, graduated on the Department of Psychology, Faculty of Philosophy at the University of Belgrade. She is specialist in Medical Psychology (at the School of Medicine University of Belgrade). Employed at Clinic for the mental disorders "Dr Laza Lazarevic" in Belgrade. Has a long time experience in psychological assessment, psychological counselling, individual and group therapy. Member of Association of Psychologist of Serbia. Actively participate in work with athletes within the Centre for mental training.

Milica Lazarević, diplomirala je na Vebster Univerzitetu u Beču, Odsek za psihologiju. Završila je Master studije na Institutu za psihijatriju na Kings Koledžu u Londonu, smer sistemska porodična terapija, i stekla licencu za rad kao porodični psihoterapeut. Registrovana je u okviru Evropske psihoterapijske asocijacije. Zaposlena je u Institutu za mentalno zdravlje u Beogradu i ima višegodišnje iskustvo u individualnom, grupnom i porodičnom psihoterapijskom radu sa mladima i njihovim porodicama, kao i u psiho-dijagnostičkoj eksploraciji adolescenata i mladih odraslih. Radi kao edukator u procesu edukacije sistemskih

porodičnih terapeuta u okviru Asocijacije sistemskih terapeuta. Uključena je u pružanje podrške sportistima kroz mentalni trening u okviru Centra za mentalni trening.

Milica Lazarevic, graduated at the Department of Psychology, at Webster University Vienna. She gained MSc degree in systemic family therapy at the Institute of Psychiatry, King's College London, and became a licensed family psychotherapist. She is registered with the European Association for Psychotherapy. Employed at the Institute for Mental Health in Belgrade, and has a long time experience in individual, group and family psychotherapy with youth and their families, as well as the experience in psychological assessment of adolescents and young adults. Works as a trainer in process of the systemic family therapy training within the Association of systemic therapists. She is involved in providing support to athletes through mental training within the Center for mental training.

MENTALNI TRENING KAO DOZVOLJENA POMOĆ U SPORTU

Đorđe Koldžić, Đorđe Ćurčić, Maja Ćurčić, Milica Lazarević

Psihologija sporta i fizičkog treninga bavi se ne samo načinima poboljšanja sportskih rezultata, već i unapređenjem ličnosti sportiste kroz primenu pre svega tehnika zasnovanim na postulatima „pozitivne psihologije". Pokazano je da pozitivna psihologija, kao relativno nova grana psihologije, kroz izučavanje, unapređenje i izazivanje pozitivnih psiholoških osobina i emocija tokom procesa treninga i takmičenja, pozitivno utiče kako na poboljšanje sportskog rezultata, tako i na unapređenje opšteg zdravlja i dobrobiti sportiste.

S' obzirom da je sportista ponikao na domaćem podneblju bio posebno izložen negativnim uticajima sredine koja su nesvesno preslikana na negativan doživljaj sebe i sopstvenih mogućnosti u sportu, to su i nedostaci po raznim osnovama pozitivne psihologije, a pre svega na nivou uverenja, poverenja i vere u sebe, trenažni tim i trenažni proces, posebno izražena kod naših sportista, naročito u pojedinačnim sportovima. Ovi problemi po nekim istraživanjima čine i glavni razlog rezultatskog relativnog neuspeha merenog brojem medalja ostvarenih na olimpijskim igrama od kada Srbija ponovo nastupa kao nezavisna država.

Kao rešenje za uočene nedostatke, tim vrhunskih domaćih i stranih stručnjaka sastavljen od četiri psihologa i psihijatara i okupljen oko Anti-doping agencije Srbije, tokom devedeset minuta interaktivnog predavanja – radionice, ponudiće praktična i jednostavna rešenja koja će sportistima pomoći u efikasnom otklanjanju uočenih problema i osnaženju njihovih pozitivnih psiholoških osobina.

Polaznici će imati priliku da koristeći za njih posebno prilagođen psihološki test, prvo „dijagnostikuju" svoje psihološke osobine po ukupno sedam osnova: prevazilaženje problema; prijemčljivost treningu; koncetracija; samouverenost i motivacija za uspeh; postavljanje ciljeva i mentalna priprema; ostvarenje rezultata pod pritiskom; suočavanje sa brigama.

Kroz konkretne pozitivne i negativne primere iz sveta vrhunskog sporta, polaznicima će se na interaktivan način pomoći da shvate razliku između dobrog i lošeg pristupa prevazilaženju konkretnih psiho-nedostataka. Oni će takođe saznati kako ka-

rakteristike njihovih ličnosti kroz odnose u okviru tima i sa drugim sportistima, mogu pozitivno ili negativno da utiču na njihov rezultat. Na kraju, polaznici će imati priliku da kroz pokaznu obuku u najsavremenijim metodama mentalnog treninga, sami pronađu kreativno rešenje za svoj, uz pomoć početnog psiho-testa uočeni, nedostatak.

Ceo program predavanja – radionice, biće posebno prilagođen sportisti poniklom na domaćem podneblju i stoga će tehnika rada predavača biti ciljano zasnovana na postulatima pozitivne psihologije, sa posebnim osvrtom na osnaženje pozitivnih psiholoških osobina, razmišljanja i emocija polaznika.

MENTAL TRAINING ALLOWED SUPPORT IN SPORT

Djordje Koldzic, Djordje Curcic, Maja Curcic, Milica Lazarevic

Sports and physical training psychology is dealing not only with ways to improve sports results, but also with the enhancement of athletes personality through the use of techniques based primarily on principles of "positive psychology". It has been shown that positive psychology, a relatively new branch of psychology, through study, improvement and provoking of positive psychological traits and emotions during the process of training and competition, positively affects the improvement of sports results as well as the general health and well-being of athletes.

Given that an athlete originated from the domestic environment and was particularly exposed to the negative influences of it, which are unconsciously mapped in the negative experience of him/her-self and his/her sport's potentials, and these are also disadvantages on various grounds of positive psychology, primarily at the level of beliefs, trust and faith in themselves, in training team and training process, which are especially expressed in our athletes, especially in individual sports. These problems, according to some studies constitute the main reason for the relative score failure measured in the number of medals awarded at the Olympic Games since Serbia is once again performing as an independent state.

As a solution to the observed drawbacks the team of local and foreign experts made up of four people (psychologists and a psychiatrists), who have gathered around the Anti-doping Agency of Serbia, will offer ninety minutes of interactive lectures and workshops with practical and simple solutions that will help athletes in the effective elimination of identified problems and in the empowerment of their positive psychological characteristics.

Participants will have the opportunity to use a specially modified psychological test to first "diagnose" their psychological traits on seven areas: coping with adversity; coachability; concentration; confidence and achievement motivation; goal setting and mental preparation; peaking under pressure; freedom from worry.

Through the use of specific positive and negative examples from the world of professional sport, the participants will be helped interactively to understand the difference between good and bad approaches to overcoming specific psychosocial disadvantages. They will also learn how their personality characteristics in relationships within the team and with other athletes can positively or negatively affect their results. At the end, participants will

have the opportunity through demonstration training in the latest methods of mental training to find their own creative solution for their disadvantage initially defined with psychological test.

The entire program of lecture- workshop will be specifically tailored to athletes originating from domestic environment and therefore lecturers' work techniques will be specifically designed on the principles of positive psychology, with the special emphasis on strengthening positive psychological traits, thoughts and emotions of the participants.

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SPORTSKE POVREDE PREVENCIJA, LEČENJE, OPORAVAK – ŠTA JE DOZVOLJENO?

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Uvod

Aktivno bavljenje sportom, a naročito na vrhunskom, tj. profesionalnom nivou, sa sobom nosi veliki rizik povređivanja mišićno-skeletnog sistema. Svaka povreda, čak i ona manjeg stepena, vrlo često podrazumeva odsustvo sa treninga i utakmica, uz posledičan pad opšte forme, a danas, kada je sport postao i globalni biznis, to predstavlja veliki gubitak za samog sportistu, tim za koji nastupa, sponzore, javno mnjenje i sl.

Ono čime se danas bavi moderna sportska medicina jeste, ne samo lečenje, već i prevencija sportskih povreda. Na prvom mestu, cilj svakog postupka u pogledu tretiranja povreda u sportu, jeste da do povrede uopšte i ne dođe, ili ukoliko se povreda ipak desi, da klinička slika iste bude što manje izražena, a samim tim oporavak brži. U slučaju sportske povrede, bitno je adekvatno lečenje, koje se danas najefikasnije postiže funkcionalnim vežbama, u kombinaciji sa odgovarajućom farmakoterapijom. Funckionalna rehabilitacija za cilj ima postepno uvođenje sportiste u normalan trenažni i takmičarski proces.

Cilj ovog rada je da izloži osnovne preporuke u pogledu prevencije sportskih povreda, tj. funkcionalne rehabilitacije i primene različitih lekova, u situacijama kada se povreda ipak desi.

Prevencija povreda

Mehanizmi nastanka povreda mogu biti različiti, ali je najbitnije znati da povreda nastaje onda kada je organizam nedovoljno utreniran ili pretreniran. Iz ovoga sledi, da optimalna utreniranost – ni premalo, ali ni previše, podrazumeva postizanje najboljih sportskih rezultata, pa samim tim i sprečavanje nastanka sportskih povreda. Adekvatno zagrevanje, sa akcentom na istezanju, pravilan završetak treninga, dovoljno vreme za oporavak između pojedinačnih treninga i tokom samog makrociklusa, korišćenje zaštitne opreme, optimalno razvijene bazične motoričke veštine i veštine specifične za dati sport, i na kraju kontinuiran proprioceptivni trening, predstavljaju mere u prevenciji sportskih povreda. Od svih gore navedenih mera, proprioceptivni ili neuromišićni trening predstavlja najefikasniju metodu u pogledu sprečavanja povreda.

Propriocepcija

Termin propriocepcija odnosi se na nervne impulse koji potiču iz proprioceptora (senzornih receptora) koji se nalaze u zglobovima, mišićima, tetivama i ligamentima, a koji se prenose nervnim putevima do centralnog nervnog sistema. Ovi nervni impulsi pružaju informacije o položaju, pokretima, vibracijama i pritisku u odgovarajućem zglobu, mišiću i/ili tetivi odakle potiču. Sama povreda dovodi do prekida transmisije nervnih impulsa i samim tim narušene koordinacije, nestabilnosti i gubitka funkcije povređenog zgloba ili mišićno-tetivne i ligamentarne strukture, kao i izmenjenih refleksa prilikom izvođenja pokreta specifičnih za dati sport.

Smatra se da redovno upražnjavanje proprioceptivnog programa u velikoj meri smanjuje incidencu povređivanja sportista, a ukoliko se povreda i desi, ozbiljnost iste je znatno manja, a samim tim povratak na teren brži.

Proprioceptivni trening obuhvata vežbe balansa, pliometriju, izokinetičke vežbe, vežbe zatvorenog i otvorenog kinetičkog lanca, trening za poboljšanje vremena reakcije, kao i rad na pokretima specifičnim za dati sport. Najčešće se primenjuje u cilju prevencije povreda ligamentarnog aparata skočnog zgloba i kolena, ali se može primenjivati i u cilju sprečavanja povreda gornjih ekstremiteta (naročito zgloba ramena). Program propriocepcije progredira od lakših ka težim vežbama. Smatra se da je dovoljno posvetiti svega 5-15 minuta treninga ovom programu kako bi se incidenca povređivanja smanjila i do 50% tokom jedne takmičarske sezone. Osnovne preporuke za primenu proprioceptivnog treninga u cilju prevencije povreda prikazane su u tabelama 1 i 2, a primeri pojedinih vežbi prikazani su na slikama 1-10.

VEŽBE NA OBE NOGE – lakša varijanta	VEŽBE NA JEDNOJ NOZI – teža varijanta
U stojećem položaju (ravna podloga)	Pokretne platforme i različite podloge (pneumatski ili penasti jastučići/lopte)
Pokreti u jednom pravcu (različiti tipovi balansera, daske za everziju/inverziju i fleksiju/ekstenziju stopala)	Pokreti u više pravaca (diskovi za zglob, mini-trampoline)
Otvorene oči	Zatvorene oči
Slobodne ruke	Fiksirani ruke (ukrštene preko grudnog koša)
Prava noga	Savijeno koleno
Manje ponavljanja i serija	Više ponavljanja i serija
Jednostavne vežbe (šetnja, silaženje, penjanje)	Komplikovanije vežbe (poskoci, skokovi, perturbacije, pliometrija)

Tabela 1. Napredovanje kroz program proprioceptivnih vežbi

Broj vežbi	2-5
Broj ponavljanja svake vežbe	10-15
Broj serija	1-3
Trajanje proprioceptivnog treninga	5-15 minuta (poželjno u sklopu svakog treninga, najmanje 3-5 x nedeljno)

Tabela 2. Osnovne preporuke za korišćenje proprioceptivnog programa

Funkcionalna rehabilitacija – „lečenje povreda treningom"

S`obzirom na to da savremeni profesionalni sport zahteva od sportiste što brži oporavak u situacijama kada do povrede dođe, danas je sve prihavćeniji stav da apsolutno mirovanje nakon povede nije adekvatan način zbrinjavanja iste. Smatra se da relativno mirovanje, uz adekvatanu funkcionalnu rehabilitaciju, vodi ka bržem oporavku i vraćanju u prvobitni trenažni proces.

Funkcionalna rehabilitacija predstavlja seriju bazičnih i za dati sport specifičnih motoričkih vežbi koje su gradirane prema težini izvođenja i trenutnoj kliničkoj slici same povrede, tj. sposobnosti sportiste da ih izvodi. Benefiti funkcionalne rehabilitacije, tj. progresije tokom oporavka, za sportistu mogu biti i fiziološki i psihološki. Tokom procesa oporavka, povređeno tkivo mora biti opterećeno na način na koji inače funkcioniše. Opterećenje mora biti dovoljno intenzivno kako bi se ubrzao proces oporavka, ali ne i preveliko, kako ne bi došlo do pogoršanja stanja ili ponovne povrede. Svaki sportista, koji adekvatno prođe kroz program funkcionalne rehabilitacije, često se vraća trenažnom procesu sa unapređenim performansama u odnosu na stanje pre same povrede. Ovaj način lečenja omogućava sportisti povratak na teren sa velikom dozom samopouzdanja, što je od vitalnog psihološkog značaja za svakog takmičara.

Vežbe funkcionalne progresije praktično premošćavaju jaz između osnovne kliničke rehabilitacije i za dati sport specifične funkcije. Sportista pristupa ovom vidu lečenja samo u situaciji kada su postignuti odgovarajući klinički ciljevi nakon same povrede (Tabela 3). Svaki program reha-

bilitacije započinje lakšim motoričkim zadacima koji predstavljaju osnovu za sve komplikovanije i za dati sport specifične vežbe (Tabela 4).

Zarastanje tkiva	Ne opterećivati tkivo u procesu zarastanja van granica mogućnosti
Otok	Poželjno je da nema otoka povređene regije, ili da postoji minimalni otok
Bol	Prisustvo bola tokom rehabilitacije ide u prilog preteranog opterećenja povređene regije
Opseg/obim pokreta	Isti kao i na nepovređenoj strani
Snaga	Snaga povređenog eksremiteta treba biti ista ili približno ista snazi nepovređenog ekstremiteta
Ispitivanje funkcionalnih pokreta	Duboki čučnjevi, koračanje preko prepona, iskoraci, pokreti u zglobu ramena, aktivno podizanje ispružene noge, stabilnost trupa, sklekovi i rotaciona stabilnost

Tabela 3. Kliničke smernice za program funkcionalne rehabilitacije

Sporije izvođenje pokreta → brže izvođenje pokreta	U početku akcenat se stavlja na tehniku i preciznost izvođenja pokreta, a brzina dolazi na kraju rehabilitacije
Jednostavne vežbe → komplikovane vežbe	Bazične motoričke veštine → specifične motoričke veštine
Kratke deonice/distance → duge deonice/distance	Razvoj aerobne i anaerobne izdržljivosti
Vežbe bez opterećenja → vežbe sa opterećenjem	Razvoj različitih tipova snage, sa i bez opterećenja (koncentrične/ekscentrične kontrakcije, izometrijske/izotonične/izokinetičke vežbe, vežbe zatvorenog i otvorenog kinetičkog lanca)

Tabela 4. Osnovne preporuke za sprovođenje programa funkcionalne rehabilitacije

Suštinski, cilj svake dobre rehabilitacije orijentisan je ka postizanju optimalnog nivoa izvođenja, kako osnovnih, tako i specifičnih motoričkih veština u što kraćem vremenskom roku, i na što bezbedniji način. Narušena nervnomišićna kontrola, snaga mišića, elastičnost tetiva i ligamenata, opšta kondicija i sportska funkcija moraju se restituisati adekvatnim sprovođenjem funkcionalnih vežbi. Adekvatno podrazumeva da se svaka vežba sprovodi na odgovarajući način i u određeno vreme, a shodno kliničkoj slici i trenutnom stanju sportiste vrši se i progresija tokom rehabilitacije (Figura 1).

Figura 1. Integracija individualnih komponenti oporavka u program funkcionalne progresije

Farmakoterapija – lečenje bola lekovima

Najčešće korišćeni lekovi u tretiranju povreda sportista su analgetici, nesteroidni antiinflamatorni lekovi (NSAIL) i kortikosteroidi (KS). Vrlo često sportisti nekritički koriste gore navedene lekove, u situacijama kada ovakav vid terapije nije opravdan, a vrlo često može biti i štetan, ili sa sobom može nositi rizik od doping pozitivnog rezultata. Shodno tome, u Tabelama 5 i 6 navedene su neke od osnovnih preporuka u pogledu farmakoterapije bola i inflamatornih procesa prouzrokovanih povredama.

KORTIKOSTEROIDNE INJEKCIJE – lečenje bola infiltracijom			
Kada?	**Koja stanja?**	**Kako?**	**Koliko?**
Samo u situacijama kada ostali načini lečenja (funkcionalna rehabilitacija, fizikalna terapija, infiltracija lokalnim anesteticima, metode suvom iglom, analgetici i NSAIL) nisu dali adekvatne rezultate. Izbegavati primenu KS injekcija odmah nakon akutne povrede, pred samo takmičenje, i u stanjima akutne infekcije.	Burzitisi Tenosinovitisi Paratenonitisi Sinovitis zglobova Osteoartritis Hronične mišićne povrede Triger tačke (miofascijalni sindromi)	1. Uvek peritendinozno – kortikosteroidi inhibiraju sintezu kolagena i smanjuju otpornost tetive na zadato opterećenje 2. Intraartikularne infiltracije treba da su ultrazvučno vođene (neadekvatna i prekomerna upotreba KS vodi ka oštećenju hrskavice zgloba) 3. Prijaviti upotrebu ovog vida lečenja nadležnoj Antidoping agenciji u cilju odobrenja Izuzeća radi terapeutske primene (TUE) kako bi se izbegao doping pozitivan rezultat	Maksimalno 3 infiltracije kortikosteroidima za lečenje odgovarajuće povrede - samo ukoliko je prva infiltracija dovela do redukcije simptoma (bar za 50%) – obavezno u razmacima od 3-4 nedelje između svake infiltracije.

Tabela 5. Osnovne preporuke za korišćenje kortikosteroida u lečenju sportskih povreda

ANALGETICI		NSAIL	
Aspirin	**Paracetamol**	**Brufen, Ibuprofen, Diclofenac**	
		Opravdana upotreba	**Neopravdana upotreba**
Ne preporučuje se upotreba nakon akutnih povreda jer sprečava agregaciju trombocita i sledstveno tome može da pogorša krvarenje povezano sa akutnom povredom, a samim tim i kliničku sliku iste.	Ima analgetsko i antipiretsko dejstvo, ali nema antiinflamatorno dejstvo i ne deluje na zgrušavanje krvi. Bezbedan je lek za sanaciju bola kod akutnih povreda – statički bol (bol koji je prisutan sve vreme, bez obzira na pokretanje povređenog ekstremiteta).	1. Konstantan bol (i u mirovanju – tzv. statički bol) 2. Hronični bol – mišići, tendinopatije, zglobovi)	1. Postojanje samo dinamičkog bola – bol koji se javlja samo pri pomeranju povređenog ekstremiteta 2. Akutne povrede sa blagom kliničkom slikom – blaže distorzije zglobova, istegnuća i parcijalne rupture mišića 3. Upala mišića bilo kog stepena

Tabela 6. Osnovne preporuke za korišćenje analgetika i NSAIL u lečenju sportskih povreda.

Zaključak

Kao što svaki sportista mora da poseduje urođeni talenat, osnovna znanja i veštine svoje sportske discipline da bi postao vrhunski, tako i svaka osoba koja učestvuje u razvojnom putu sportiste mora da poseduje isti takav talenat, znanja i veštine kako bi obezbedila sportisti da u potpunosti ostvari svoj genetski potencijal. Samo su vrhunski oni treneri koji imaju i znanja i osećaja da optimalno utreniraju svoje igrače i time obezbede postizanje vrhunskih rezultata. Isto tako, vrhunski su samo oni lekari koji poseduju dovoljno stručnosti, uticaja i talenta da vode trenere i same sportiste kroz programe propriocepcije, funkcionalne rehabilitacije i farmakoterapije, a sve u cilju prevencije i što bolje rehabilitacije sportskih povreda.

SPORTS INJURIES – PREVENTION, FUNCTIONAL REHABILITATION AND PHARMACOTHERAPY – BASIC GUIDELINES

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Introduction

Active participation in sport, especially on top professional level, carries a great risk of musculoskeletal injuries. Every sports injury, even one of lesser degree, very often implies absence from training and competition, with consequential decline in general fitness. This represents a loss, not only for the athlete, but for the entire team, public, sponsors and media, since modern sport has become a global business.

The task of sports medicine today is not only treatment, but also prevention of sports injuries. The first goal of every sports injury treatment is to prevent an injury, or if injury still occurs, that it's clinical presentation is of an lower degree, which means faster return to sport. In the case of sports injury the adequate treatment is very important. Today, the most efficient way to treat the injury is actually engaging in functional exercises in combination with proper pharmacotherapy. Functional exercises provide gradual progression in rehabilitation and finally return to sport for an athlete.

The aim of this paper is to provide basic guidelines in terms of injury prevention, i.e. functional rehabilitation and pharmacotherapy, in situations when injury still occurs.

Injury prevention

Mechanisms of injury are different, but it is of great importance to know that injuries occur when a person is undertrained or overtrained. From this it follows that the optimal training – neither too little, nor too much, means achieving the best sports results, and consequently preventing sports injuries. Adequate worm-up sessions, with emphasizes on stretching, proper cull-down, enough time for recovery between training sessions and during macrocycle, protective equipment, optimal developing of basic and specific motoric abilities, and in the end, continuous proprioceptive training, are all the measures used in injury prevention. Of all the above, proprioceptive or neuromuscular training is the most efficient method in terms of preventing injuries to occur.

Proprioception

Term proprioception refers to nerve impulses originating from proprioceptors (sensory receptors) in joints, muscles, tendons and ligaments, which are then processed in the central nervous system to provide information about position, motion, vibration and pressure of the above mentioned structures. The injury itself leads to damage of nerve endings and nerve pathways, and thus impaired segmental transmission of nerve impulses in a reflex action. This may result in impaired balance, decreased coordination, instability and function loss of injured ankle, muscle, tendon or ligament.

It is proven that regular engagement in proprioceptive training in great manner decreases the incidence of sports injuries, and even though an injury occurs, the severity of one is much less, and return to sport much easier and faster.

Proprioceptive training includes balance training, plyometric exercises, isokinetic training, open and closed chain exercises, improvement of reaction time, and sport-specific maneuvers. The most common application of this training is prevention of ligament injuries of knee and ankle, but it is also very useful for preventing upper extremity injuries (especially for shoulder joint). Proprioceptive program progresses from easier to more difficult exercises. If it is incorporated in each training for 5 to 15 minutes, the incidence of sports injuries could be reduced up to 50% during one competing season. Basic guidelines for application of proprioceptive program are presented in Tables 1 and 2, respectively, and examples of some exercises are shown in Pictures 1-10.

DUOBLE LEG – easy	**SINGLE LEG – difficult**
Standing position (on the floor)	Moving platforms and different surfaces (pneumatic or foam pads)
Single direction (rocker board, ankle inversion-eversion boards, ankle flexion-extension boards)	Multidirection (ankle disc, mini trampoline)
Eyes open	Eyes closed
Free hands	Fixed arms (crossed over the chest)
Straight leg	Flexed knee
Fewer repetitions and sets	More repetitions and sets
Simple drills (walking, stepping down and up)	Complicated drills (hops, jumps, perturbations, and plyometric drills)

Table 1. Progression of proprioception exercises

Number of exercises	2-5
Number of repetitions of exercises	10-15
Number of sets	1-3
Duration of total proprioceptive program	5-15 minutes (preferably every training, at least 3-5 days a week)

Table 2. General principles of a proprioceptive training program

Functional rehabilitation – ``treating injuries with training``

Considering the fact that professional sport demands as quick recovery after injury as possible, absolute rest after an injury is wrong. It is thought that relative rest, with proper functional rehabilitation, leads to better recovery and faster return to sport.

Functional rehabilitation is a series of basic and sport-specific movements graduated according to the difficulty of the skill and the athlete`s tolerance. Benefits of a functional progression are both physiological and psychological. During the rehabilitation process, injured tissue must be stressed according to the manner in which it functions. Stress applied to the tissue must be sufficient to encourage healing, but not too stressful to inhibit it. If an athlete goes through the entire program in an adequate way, post injury performance enhancement is often present. This treatment method provides return to sport with high confidence, which is of vital psychological importance for every athlete.

Functional progression drills practically bridge the gap between clinic-based rehabilitation and sport function. The athlete is ready to advance from traditional to functional progression program when specific clinical goals are met (Table 3). Initiation of the functional rehabilitation begins with simple skills that are used as building blocks for the more advanced both basic and sport-specific drills (Table 4).

Tissue healing	Not to stress healing tissue beyond its tolerance
Swelling	Very minimal to no swelling
Pain	Determinant whether or not the activity is too strenuous during rehabilitation
Range of motion	Equal to that of the uninjured side
Strength	Strength should be symmetrical as much as possible
Functional movement evaluation	Deep squats, hurdle steps, in-line lunges, shoulder mobility exercises, active straight leg raises, trunk stability, push-ups, and rotatory stability exercises

Table 3. Clinical guidelines for functional progression

Slow speeds → fast speeds movements	Initially, speed should be kept slow, with emphasizes on proper form and skill execution, the speed comes last
Simple skills → difficult skills	Basic motoric exercises → specific motoric exercises
Short distances → longer distances	Work on aerobic and anaerobic endurance
Unloaded activities → loaded activities	Developing different strength types, with or without load (concentric/eccentric contractions, isometric/isotonic/isokinetic exercises, closed and open chain drills)

Table 4. Basic guidelines for initiating functional rehabilitation

In general, the goal of every good rehabilitation is oriented towards achievement of optimal performing of both basic and sport-specific movements, in the shortest period of time and in the safest way. Damaged neuromuscular control, muscle strength, tendon and ligament flexibility, general fitness and sports function, must be restituted by applying adequate functional rehabilitation program. Adequate means performing each drill in a right way at right time, and according to the current clinical condition and athlete's tolerance to perform certain exercises, the progression in rehabilitation is made (Figure 1).

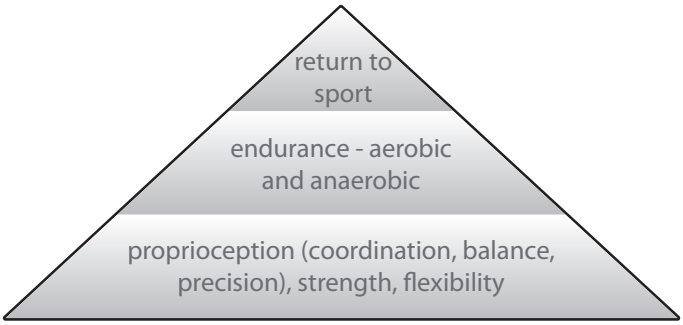

Figure 1. Integration of individual components into a progressive rehabilitation program

Pharmacotherapy – treatment of the pain with drugs

The most commonly used drugs in the sports injury treatment are analgesics, non-steroid anti-inflammatory drugs (NSAID) and corticosteroids (CS). The uncritical use of these medicines by athletes is seen too often, especially in situations when this way of treatment is unjustified, and very often can be harmful, or it carries a risk of doping positive result. Consequently, the basic recommendations in terms of pharmacotherapy for treating the pain and inflammation caused by sports injuries are shown in Tables 5 and 6.

CORTICOSTEROIDS INJECTIONS – treatment of pain with infiltration			
When?	**Which conditions?**	**How?**	**How much?**
Only in situations when other treatment methods (functional rehabilitation, physical therapy, infiltration with local anesthetics, dry needling, analgesics, and NSAID) did not give satisfactory results. Do not use CS injections right after acute injuries, before competition, and during acute infections.	Bursitis Tenosynovitis Paratenonitis Joint synovitis Osteoarthritis Chronic muscle injuries Trigger points (myofascial syndrome)	1. Always paratendinous application – CS inhibit collagen synthesis and reduce tendons resistance when work load is applied 2. Intraarticular infiltration should be guided by ultrasound (inappropriate CS application leads to cartilage damage) 3. Ask for Therapeutical Use Exemption (TUE) from National Antidoping Agency to prevent doping positive result	Maximally 3 CS infiltrations for treatment of particular injury, but only if the first injection has reduced the symptoms (at least for 50%) – spaced at least 3-4 weeks apart.

Table 5. Basic guidelines for corticosteroid injury treatment

ANALGESICS		**NSAID**	
Aspirin	**Paracetamol**	**Brufen, Ibuprofen, Diclofenac**	
It is not recommended to use it after acute injuries since it prevents platelets aggregation and consequently can worsen hemorrhage and clinical condition of an injury.	It has analgesic and antipyretic effect, but no anti-inflammatory and blood clotting effects. It is a safe drug for pain treatment – static pain (constant pain during the day, regardless of the movement of injured limb)	**Justified usage**	**Unjustified usage**
		1. Constant pain even during the rest – static pain) 2. Chronic pain – muscles, tendinopathies, joints)	1. Presence of dynamic pain – pain is present only when an injured limb is moving 2. Mild acute injuries – mild joint distortions, mild muscles injuries 3. Soar muscles

Table 6. Basic guidelines for use of analgesics and NSAIL in injury treatment

Conclusion

In order to become top level player, every athlete must possess natural talent, basic knowledge and perfect skills of his/her sports discipline. Likewise, every person who is involved in development of an athlete must possess the same natural talent, knowledge and skills in order to ensure that this athlete will fully utilized his or her genetic potential. Therefore, the best coaches are those who are able to optimally train their athletes and ensure the achievement of top results. Furthermore, the top sports medicine physicians are those who possess enough expertise, influence, and also natural talent to guide coaches and athletes through proprioceptive exercises, functional rehabilitation and pharmacotherapy in order to prevent and treat sports injuries in the best possible way.

Slika 1.
Stojeći položaj na ravnoj podlozi: dorzalna fleksija
Picture 1.
Standing positon on the floor: foot dorsiflextion

Slika 2.
Stojeći položaj na ravnoj podlozi: plantarna fleksija
Picture 2.
Standing position on the floor: foot plantarflexition

Slika 3.
Balans na jednoj nozi sa pravim kolenom
Picture 3.
Single straight leg balance on the rocker board

Slika 4.
Aktivnost sa opterećenjem: balans + izometrija
Picture 4.
Loaded activity: balance and isometric drill for left leg

Slika 5. Balans na obe noge sa fiksiranim rukama i savijenim kolenima
Picture 5. Double leg balance with fixed arms and flexed knees

Slika 6. Balans na jednoj nozi (zatvorene oči, savijeno koleno)
Picture 6. Single leg balance on platform (eyes shut, flexed knee)

Slika 7. Aktivnost sa opterećenjem: balans i izometrija za desnu nogu. Stabilnost trupa. Izometrijska vežba za levu glutealnu regiju
Picture 7. Loaded activity: balance and isometric drill for right leg. Core stability. Isometric drill for gluteal region of left limb

Slika 8. Funkcionalna vežba: balans, izometrijske kontrakcije. Izdržljivost u snazi. Stabilnost trupa i zgloba ramena.
Picture 8. Functional drill: balance, isometric contractions. Muscle endurance. Core and shoulder stability.

Slika 9. Čučnjevi na jednoj nozi sa fiksiranim rukama
Picture 9. One leg squats with fixed arms

Slika 10. Pliometrija na steperu
Picture 10. Stepper plyometrics

Marija Anđelković radi u Antidoping agenciji Republike Srbije od 2008. godine na poziciji samostalnog savetnika za RTG i TUE. Na Olimpijskim igrama (OG) u Vankuveru 2010. godine bila je u timu Svetske antidoping agencije gde je sprovodila edukaciju sportista iz oblasti dopinga i suplementacije, dok je na OG u Londonu 2012. godine bila doping kontrolor u ženskom fudbalu. U toku pisanja ovog apstrakta takođe sprovodi doping testiranje na prvim Evropskim olimpijskim igrama u Azerbejdžanu. Završila je dvogodišnji kurs Međunarodnog Olimpijskog komiteta za sportsku ishranu. Više od četiri godine vodi Centar za sportsku ishranu i suplementaciju. Trenutno se nalazi na doktorskim studijama iz sportske medicine i na specijalizaciji iz kliničke farmakologije. Aktivan je član Udruženja za medicinu sporta Srbije.

Marija Andjelkovic works in Anti-Doping Agency of Serbia from 2008 at the position of W/A and TUE manager. During the Olympic Games (OG) in Vancouver in year 2010 she was on the WADA team in charge for Athlete Outreach program and education in the field of doping and supplementation, while at the OG in London in 2012 she was a doping control officer in women's football. During the writing of this abstract she is also conducting doping controls at the first European Olympic Games in Azerbaijan. She completed a two-year course organized by International Olympic Committee and got diploma in sport nutrition. Over four years, she leads the Centre for sports nutrition and supplementation. He is currently at PhD in sports medicine and at the specialization in clinical pharmacology. She is an active member of the Sports Medicine Association of Serbia.

MULTIVITAMINI I MINERALI – SUPLEMENTACIJA PRVOG IZBORA U PREVENCIJI I REHABILITACIJI SPORTSKIH POVREDA

Marija Anđelković[1,2,3], Nenad Dikić[1,2,3], Tamara Stojmenović[1], Milica Vukašinović Vesić [1,2,3]

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Mnogobrojna naučna istraživanja koja su proučavala efekat suplementacije vitaminima i mineralima nisu donela jasan stav oko njihovog uticaja na sportsku sposobnost, ali su se usaglasila oko pozitivnog uticaja na opšte zdravlje i oporavak sportista. Vitamini i minerali su esencijalni za mnoge fiziološke funkcije u organizmu koje uključuju energetski metabolizam, rast i regeneraciju ćelija, funkciju mišića i nerava i zaštitu od slobodnih radikala. Neadekvatan unos vitamina i minerala može značajno da utiče na sportske sposobnosti i oporavak sportista.

Preporuka Američkog koledža za sportsku medicine (ACSM) je da suplementacija vitaminima i mineralima nije potrebna ako sportista poštuje raznovrsnu ishranu. Stav je da bi nutiritivne potrebe primarno trebalo da se zadovolje putem hrane. I tome naravno treba da teže svi sportisti kroz razvijanje pravilnih nutritivnih navika. Internacionalno

udruženje za sportsku ishranu (ISSN) takođe zastupa stav da raznovrsna ishrana obezbeđuje sve potrebne mikronutrijente.

Međutim, i istraživanja i iskustvo su dokazali da sportisti imaju problem da se hrane pravilno, redovno i raznovrsno. Uzroci su mnogobrojni: nedovoljna nutritivna edukacija, nedovoljno razvijene kulinarske veštine, nepovoljni uslovi stanovanja, česta putovanja i nepovoljna ekonomska situacija. Svi ovi, i mnogi drugi faktori, direktno dovode sportistu u rizik od deficita makro i mikronutrijenata, samim tim i rizik od povreda.

Postavlja se pitanje koje su to konkretne situacije kada sportista treba da koristi suplementaciju vitamina i minerala jer postoji rizik od deficita. Neke od njih su:

- kada postoji energetski deficit ili redukcija nekih nutrijenata (poštovanje različitih redukcionih i eliminacionih dijeta)
- kada sportista provodi dug period na putovnjima, pogotovo u zemljama sa neadekvatnom ili limitiranom ishranom na koju sportista nije navikao
- kada sportista ima energetski deficit duži period, gubitak telesne mase ili održavanje određene težinske kategorije
- kada sportista poštuje eliminacionu dijetu usled intolerancije na hranu i zbog toga se hrani monotono ili ograničeno
- kada sportista ima puno obaveza i dnevni raspored koji je prenatrpan, bez prostora za redovnu ishranu
- tokom dugotrajnih ili čestih takmičenja kada sportista nema vremena da se bavi svojom ishranom ili ima mali izbor namirnica
- sportisti koji su vegetarijanci
- sportisti koji se takmiče u sportovima sa težinskom kategorijom i imaju velike oscilacije u težini između takmičenja
- sportisti koji se oporavljaju od povreda ili su u periodu rehabilitacije

U radu pod nazivom "Dietary supplements and medications in elite sport – polypharmacy or real need?" koji je 2009.godine Antidoping agencija Republike Srbije objavila u prestižnom časopisu (Scand J Med Sci Sports), pokazano je da su sportisti i tada od svih suplemenata najviše koristili multivitamine i minerale, i to čak polovina njih u grupi od preko 900 profesionalnih domaćih i internacionalnih sportista. Autori ovog rada su doveli u sumnju fenomen polifarmacije i uticaj na sportsku sposobnost. Zaključili su, pozivajući se na literaturu, da korišćenje ovih multivitamina i multiminerala nije imalo ergogen efekat kod onih sportista koji su imali dovoljan unos prema PDU (preporučen dnevni unos).

Postavlja se pitanje zašto sportisti od svih suplemenata ipak najviše koriste multivitamine i multiminerale? Razlog tome možemo naći u radi koji je 2007.godine objavio profesor Ronald Mogan pod nazivom "The use of dietary supplements by athletes ". Pomoć u ubrzanju oporavka - naveden je kao najčešći razlog uzimanja suplemenata sa 71%, ispred poboljšanja sportskih performansi ili opšteg zdravlja.

Australijski institut za sport (AIS) je multivitamine i multiminerale upravo stavio u A grupu suplemenata koja po definiciji obuhvata suplemente za koje je u naučnim istraživanjima pokazano da utiču na sportsku sposobnost kada se koriste po određenom protokolu u specifičnoj sportskoj situaciji. Suplementi vitamina i mi-

nerala spadaju u medicinske suplemente koji služe za tretman medicinskih stanja uključujući dijagnostikovane nutritivne deficite. Zahtevaju individualnu primenu i nadzor medicinskog stručnog tima.

Ergogeno dejstvo multivitamin i minerala je očigledno potvrđeno kod sportista koji su bili u njihovom deficitu. Vitamini i minerali imaju značajnu funkciju u organizmu i zato njihov nedostatak realno može da utiče na sportske sposobnosti i poveća rizik od povreda. Npr. kompleks B vitamina je uključen u metabolizam ugljenih hidrata, proteina i masti, učestvuju u produkciji energije tokom vežbanja, utiču na rast tkiva, formiranje eritrocita, učestvuje kao koenzim u mnogim reakcijama itd. Vitamini C i E su jedni od najvažnijih antioksidanasa u našem organizmu koji sprečavaju štetno dejstvo slobodnih radikala koji nastaju tokom intezivnih treninga. Minerali učestvuju u mišićnim kontrakcijama, utiču na srčani rad, sprovođenje nervnih impulsa, transport kiseonika, učestvuju u oksidativnoj fosforilaciji, enzimskoj aktivaciji, stabilnosti imunog sistema, imaju antioksidativne funkcije, utiču na stabilnost kostiju, acidobaznu ravnotežu itd. Pošto su ovi procesi pojačanog inteziteta tokom fizičke aktivnosti, logično je da minerali značajno utiču na sportske sposobnosti. Gvođe i kalcijum su označeni kao minerali koji su najčešče deficitarni kod sportista jer njihov unos direktno zavisi od energetsko balansa, i to naročito kod mladih sportista i žena. Njihov deficit direktno utiče na smanjenje sportskih sposobnosti, pogotovo ako govorimo o anemiji kao posledici nedostatka gvožđa.

Iz svega navedenog možemo da zaključimo da su multivitamini i multiminerali suplementi prvog izbora kada govorimo o oporavku sportista i njihovoj pripremi za intezivne fizičke napore. Broj ovih suplemenata na tržištu je veliki i sportisti treba da vode računa o tome da ne pređu PDU, jer ih to može dovesti u opasnost od suficita vitamina i minerala i neželjenih efekata. Iako sportisti smatraju da je korišćenje vitamina i minerala bezbedno i legalno, ipak moraju da vode računa o tome kakav je kvalitet preparata koji kupuju. Rizik od kontaminacije uvek postoji i sportisti moraju da preuzmu i taj rizik. Zato uvek treba da koriste suplemente onih proizvođača koji imaju potvrdu o dobroj proizvodnji, nemaju u svom asortimanu suplemenata sa zabranjenim doping supstancama, kao i one preparate koje drugi sportisti preporučuju usled dobrog iskustva.

MULTIVITAMINS AND MULTIMINERALS – FIRST CHOICE SUPPLEMENTATION FOR PREVENTION AND RECOVERY OF SPORT INJURES

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Numerous scientific research that studied the effect of supplementation with vitamins and minerals are not adopted a clear stance on their impact on sport performance, but there is agreement about positive impact on general health and recovery in athletes. Vitamins and minerals are essential for a broad range of chemical reactions in the body, including those involved in energy metabolism, cell growth and repair, protection from free radical damage, and nerve and muscle function. Inadequate intake of vitamins and minerals will lead to a body or tissue

deficiency and will impair the athlete's health and performance.

The ACSM recommends that no additional vitamin and mineral supplementation is needed if an athlete obtains sufficient energy from a wide variety of foods. Nutritional needs should be met primarily from foods. Athletes should aim to meet their nutrient needs through healthy eating patterns. The ISSN recommends that a normal nutrient-rich diet that contains a variety of food groups should provide sufficient amounts of micronutrients in most cases.

However, research and experience have proven that athletes have a problem to feed properly, regular and varied. The causes are many: lack of nutritional education, underdeveloped culinary skills, unadequate living conditions, frequent travel and the unfavorable economic situation. All these, and many other factors directly lead sport in the risk of deficiency of macro and micronutrients.

What are the precise situation where athletes should use supplements of vitamins and minerals because there is risk of deficit. Some of this sutations are:

- when there is an unavoidable reduction in energy or dietary intake or the nutrient density
- a prolonged period of travel, particularly to countries with an inadequate or limited food
- A prolonged period of energy restriction or weight loss, or weight maintenance.
- Restricted dietary intake in fussy eaters or athletes with too much obligations during the day
- athletes respecting food intolerances and are unable/ unwilling to increase food range
- heavy competition schedule, involving disruption to normal eating patterns and reliance on a narrow range of foods
- athletes who are vegetarians
- when athlete is competing in weight control sports and has large difference in weight between competitions
- athletes who are recovery from sport injures

In a paper "Dietary supplements and medications in elite sport – polypharmacy or real need?" that Anti-doping agency published 2009. In reputable journal (Scand J Med Sci Sports) , it is showed that the most commonly used supplement were vitamins (multivitamins), taken by more than half of the athletes, and minerals (multiminerals). The authors concluded that supplementation has no performance effects for athletes whose vitamin and mineral RDA were met by a well-balanced diet.

Having in mind all the abovementioned facts, what is the reason for such a frequent use of multivitamins? The reason we can find in paper that professor Ronald Maughan published 2007 under name "The use of dietary supplements by athletes".

71% of athletes stated that they used supplement because of better recovery and on the second place was sport enhancement and health.

Australian institute for sport (AIS) approved multivitamin–multimineral (MVM) supplements in group A that supported supplements for use in specific situations in sport using evidence-based protocols. Multivi-

tamin/mineral are in the group of medical supplements that are used to treat clinical issues, including diagnosed nutrient deficiencies. They require individual dispensing and supervision by appropriate sports medicine/science practitioner.

Ergogenic influence of multivitamin and minerals are obviously approved in situation where there was deficiency in athletes. For example, many of the B-complex vitamins are involved in processing the carbohydrate and fats for energy production. Several B vitamins are also essential to help form hemoglobin in red blood cells, a major determinant of oxygen delivery to the muscles during aerobic endurance exercise. Additionally, vitamins C and E function as antioxidants, are important for preventing oxidative damage to cellular and subcellular structure and function during exercise training, theoretically optimizing preparation for competition. The physiological roles of minerals important to athletes are involved in muscle contraction, normal hearth rhythm, nerve impulse conduction, oxygen transport, oxidative phosphorylation, enzyme activation, immune functions, antioxidant activity, bone health, and acid base balance of the blood. Because many of these processes are accelerated during exercise, an adequate amount of minerals is necessary for optimal functioning. Investigators note that iron and calcium are the two micronutrients most likely to be low in the diet, particularly in young athletes. A mineral deficiency may impair performance. In particular, correcting an iron-deficiency anemia will improve aerobic endurance performance.

From all aboe we can conclude that multivitamin and multimineral supplements are the first choice when it comes to the recovery of athletes and preparetion for the intense physical effort. The number of these supplements on the market is huge and athletes should keep in mind not to cross the RDA, because it can result in a risk of surplus of vitamins and minerals and side effects. Although athletes believe that the use of vitamins and minerals are safely and legally, however, they must take care of quality of preparations they purchase. The risk of contamination still exists and athletes must take that risk. Therefore, they should always use the supplements from those producers who have confirmation of production, do not have the banned doping substances in its supplements, as well as those that other athletes can recommend because of the good experience.

Milan Mileusnić je rođen 25. jula 1970. godine u Senti. Osnovnu školu i gimnaziju je završio u Senti a Medicinski fakultet u Novom Sadu. Radio je u službi za Hitnu medicinsku pomoć, Zdravstvenog centra u Senti, bio je lekar lokalnih košarkaških timova a potom i honorarni saradnik u Srednjoj medicinskoj školi gde je predavao predmet Hirurgija u 3. i 4. godini. Završio je internacionalnu školu interventne kardiologije u Institutu za kardiovaskularne bolesti u Sremskoj Kamenici. Krajem 2002. godine prelazi u Zavod za rehabilitaciju „Banja Kanjiža". Specijalističke studije iz oblasti fizikalne medicine i rehabilitacije završava u Beogradu.

Završio je mnoge edukacije iz oblasti laseroterapije, kineziologije, ortootike; školu za primenu Platelet-Rich plazme u reparatornoj medicini i rehabilitaciji u Internacionalnom Institutu u Ajndhovenu, Holandija. Završio je obuku iz interventne ehosonografije muskuloskeletnog sistema u Beču. Shock-wave terapijom je počeo da se bavi 2004. godine a pre godinu dana je počeo sa intenzivnim uvođenjem SW terapije u svakodnevnoj terapiji u mnogim ustanovama, zavodima i klinikama u Srbiji, BiH, Albaniji i Makedoniji. Na Međunarodnom kongresu medicine sporta i sportskih nauka održanom u Beogradu 2012. godine, učestvovao je kao predavač.

Intenzivno pohađa i prati sve dostupne članke, radionice i on-line kurseve vezane za terapiju udarnim talasima i sportsku medicinu i rehabilitaciju u zemlji i inostranstvu. Član je Američkog udruženja fizijatara od 2008. godine, Fimsa od 2010. godine, Srpske asocijacije fizijatara od 2011. godine i UMSS-a od pre par dana. Direktor je Centra za rehabilitaciju i reparatornu medicinu „Sport Medical Alliance" u Beogradu i stalni konsultant u Plasma Medical Centru u Beogradu. Predsednik udruženja za regenerativnu medicinu i proloterapiju.

Milan Mileusnic was born on 25th July 1970 in Senta, Serbia, where he finished elementary and high school. He graduated from The University of Novi Sad, the Faculty of Medicine. He completed his residency in General Medicine at the Emergency Department of the Medical Centre in Senta. In the meantime, he worked as a doctor of the local basketball teams and a part-time lecturer at the Medical School where he taught the course Surgery to the 3rd and the 4th year students. After finishing the International School of Interventional Cardiology at the Institute for Cardiovascular Diseases in Sremska Kamenica in 2002, Dr Mileusnic started to work at the Specialized Rehabilitation Medical Institute of 'Banja Kanjiža'. Specialization in Physical Medicine and Rehabilitation, he completed in Belgrade.

Dr Mileusnic has successfully completed many training courses in the field of laser therapy, Kinesiology, Orthotics, the course in interventional musculoskeletal ultrasonography in Vienna and has finished the school for implementation of Platelet-Rich Plasma in regenerative medicine and rehabilitation at the International Institute in Eindhoven, the Netherlands. Dr Milan Mileusnic is one of the first physicians in Serbia who started the

application of Platelet-Rich Plasma. So far, he applied PRP for the repair of the knee, hip, ankle and shoulder cartilage, the meniscus, lateral ligaments of the knee, rotatory cuff of the shoulder, ruptured and degenerative muscles, and fibrosis; for acceleration of the fractured bone healing process, regeneration of peripheral nerves after a full or partial rupture and for regeneration of knee after distortion. In addition to regenerative medicine, he also applied RP for aesthetic purposes such as regeneration of hair growth and biofacial treatments.

Dr Mileusnic has lectured throughout Serbia and Bosnia. At the International Congress of Sports Medicine and Sports Science, held in Belgrade in 2012, he participated as a lecturer. Since 2004, he has been applying Shock-wave therapy and about a year ago he began introducing SW in a daily therapy procedures in many institutions, institutes and clinics in Serbia, Bosnia, Albania and Macedonia. He has published numerous articles in many journals. He attends all available workshops and online courses related to shock-wave therapy and physical medicine and rehabilitation in Serbia and abroad. Dr Mileusnic has been a member of the American Association of Physiatrists, Fimsa, the Serbian Association of Physiatrists and a member of UMSS. Dr Milan Mileusnic is a general director and the owner of the clinic for rehabilitation and reparative Medicine 'Sport Medical Alliance' and the outpatient department 'Plasma Medical by SMA', both located in Belgrade.

PREGLED FIZIOTERAPIJISKIH METODA U LEČENJU SPORTSKIH POVREDA

Milan Mileusnić

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Sportske povrede su neželjeni ali često neizbežni deo takmičarskog sporta. Tokom karijere veliki broj sportista će imati povredu koja će ih na određeno vreme odvojiti od trenažnog procesa ili samog takmičenja. Sportske povrede mogu da se definišu kao oštećenja tkiva koja se javljaju kao rezultat sportske aktivnosti (profesionalne ili rekrativne). Termin označava svako oštećenje nastalo kao posledica fizičke aktivnosti. One mogu biti podeljene na akutne povrede i tzv. "overuse" povrede u zavisnosti od mehanizma nastanka i vremena javljanja simptoma.

Uloga fizikalne medicine se sastoji ne samo u lečenju sportskih povreda već i u njihovoj prevenciji. Njeno mesto u algoritmu tretiranja nastale povrede je skoro sveprisutno, od samog događaja na terenu ili van njega koji zahteva primenu određenih fizikalnih agenasa, preko kliničkog pregleda i dijagnostičkih metoda, do samog sprovođenja terapijiskih procedura. Čak i ukoliko je za tretman povrede neophodno operativno lečenje uloga preoperativne pripreme muskulature i postoperativne rehabilitacije je ogromna.

Pregled fizioterapijiskih procedura za lečenje sportskih povreda biće predstavljen kroz periodizaciju traume u smislu podele na akutne, subakutne i hronične povrede. Za svaku metodu predstavićemo mehanizam dejstva, indikaciono područje kao i eventualne kontraindikacije.

U programu fizikalne terapije muskuloskeletnih povreda koriste se fizički agensi:

Termalni agensi (zagrevanje ili hlađenje dela ili celog tela), Mehanički (hidroterapija, trakcija, kompresija) i Elektromagnetni (magnetno polje, elektroterapija). Njihovom primenom smanjuje se bol i zapaljenjska reakcija, ubrzava se zarastanje tkiva, povećava se elastičnost vezivnog tkiva i deluje se na tonus mišića.

A REVIEW OF PHYSICAL THERAPY MODALITIES IN TREATING SPORTS INJURIES

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Sports injuries are undesirable but often unavoidable part of competitive sport. During their careers a number of athletes will suffer a sports injury that will keep them off the court for a certain time period. A sports injury may be defined as damage to the tissues of the body that occur as a result of sport (either recreational or professional). The term also describes every injury that is a result of physical activity. They can be divided into acute and overuse injuries, depending on the mechanism and onset of symptoms.

The role of physical medicine is not solely in treating these injuries once they occur, but also in preventing them. Its place in the treatment algorithm begins on field, right after the ill event, continues with a clinical examination and diagnostic procedures, all through the application of certain physical therapy modalities. Even if surgical treatment is necessary, the role of pre and postoperative rehabilitation is essential.

The review of modalities used in physical therapy will be presented regarding their use in acute, sub acute and chronic sports injuries. For each modality a mechanism of action, indications and contraindications will be presented.

Physical agents used in the treatment of musculoskeletal injuries are: Thermal agents (heating and cooling agents), Mechanical agents (hydrotherapy, traction, compression) and Electromagnetic agents (electrical currents, electromagnetic field). Their application reduces inflammation and pain, increases the elasticity of connective tissue and modifies muscle tone.

ORIGINALNI RADOVI

ORIGINAL PAPERS

Rajna Minić (devojačko Dimitrijević) Diplomirala je 2005. godine na smeru Biohemija, na Hemijskom fakultetu Univerziteta u Beogradu. Tokom 2006. i 2007. godine bila je stipendista Ministarstva za nauku i tehnološki razvoj, oblast Biotehnologija; 2008.-2009. zaposlena na Hemijskom fakultetu Univerziteta u Beogradu (OI 142020); 2009.- 2012. zaposlena u Inovacionom centru Hemijskog fakulteta Univerziteta u Beogradu (OI 142020, OI 172049). Februara 2010. godine odbranila doktorsku disertaciju pod naslovom „Ispitivanje strukturnih i funkcionalnih svojstava heterologo proizvedenog lektina banane", Hemijski fakultet Univerziteta u Beogradu, Katedra za biohemiju. Tokom 2010. i 2011. godine bila na posledoktorskom studijskom boravku na Norveškom Univerzitetu prirodnih nauka u Ås-u. Od 2012. do danas zaposlena na Institutu za virusologiju, vakcine i serume „Torlak" (OI 172049). Autor 18 M20 publikacija.

Rajna Minić (ex Dimitrijević) Graduated Biochemisty in 2005. at The Faculty of Chemistry, University of Belgrade. During 2006. and 2007. recieved schollarship from the Ministarstry of Science and Technologycal Development; 2008.-2009. worked at The Department of Biochemistry, Faculty of Chemistry, University of Belgrade (OI 142020); 2009.-2012. worked at Innovation Center of The Faculty of Chemistry, University of Belgrade (OI 142020, OI 172049). In February 2010. defended doctoral thesis:„Examination of structural and functional properties of the heterologously produced banana lectin", at The Faculty of Chemistry, University of Belgrade. During 2010 and 2011, been on a postdoctoral research study in Ås, at Norwegian university of life sciences. From 2012. - till today works at The Institute of Virology, Vaccines and Sera ''Torlak" (OI 172049). Authored 18 M20 publications.

O BANANA LEKTINU, KARAKTERISTIKE I DEJSTVO NA IMUNSKI SISTEM MIŠEVA

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Simultano sa razvijanjem tržišta banane razvijalo se i interesovanje za ovaj plod. Nutritivna vrednost, tj grubi hemijski sastav ploda banane je poznat vec više od stotinu godina. U prvobitnim studijama ispitivana je hranljivost, i sadržaj vitamina u cilju suplementacije novorođenčadi i slično. Sa razvojem nauke došlo je do akumulacije znanja, te je otkriveno da plod banane sadrži serotonin, norepinefrin i dopaminske metabolite. Ustanovljeno je da banana povećava rezistentnost gastrične mukoze i pospešuje zarastanje želudačnih ulcera.

Analize proteinskog sadržaja banane odnosile se uglavnom na različite enzime i na hemaglutinin nazvan banana lektin ili BanLec. Prvi put spominjan 80-ih godina danas je detaljno okarakterisan.

Radi olakšanog prečišćavanja i karakterizacije proizveden je rekombinantnom tehnologijom i nazvan rBanLec. Dobijeni protein je molekulske mase od oko 16 kDa i ima pI vrednost u opsegu 7,5-8. Termo-

dinamički parametri dobijeni diferencijalnom skenirajućom kalorimetrijom za denaturaciju rBanLec-a daju temperaturu denaturacije (Tm) od 60,8°C. rBanLec poseduje izuzetnu stabilnost prema pepsinu i tripsinu u *in vitro* uslovima.

Stabilnost u *in vivo* uslovima ispitivana je u mišjem model sistemu. Utvrđeno je da rBanLec može biti eluiran pomoću rastvora glukoze iz jejunuma u rasponu od 60-180 minuta nakon oralne gavaže. Time je zaključeno da je lektin stabilan i u in vivo uslovima i da se vezuje za epitel creva lektin – šećer interakcijom. Nalaz je potvrđen i histološkom analizom jejunuma, gde je lociran na mukoznoj, lumenskoj površini creva. Analize masenom spektrometrijom pokazale su da je lektin izolovan iz jejunuma potpuno intaktan.

rBanLec, slično kao i Con A izaziva nespecifičnu proliferaciju splenocita i izaziva maksimum proliferacije u opsegu koncentracija od 0,5-1,5 µg/ml, ali sa slabijim intenzitetom nego Con A.

Intramuskularnom injekcijom lektina, u relativno niskoj dozi i bez dodataka adjuvanasa dobija se rBanLec specifični IgM i IgG već posle prvog ubrizgavanja, a analizom potklasa ustanovljeno je da je glavnica dobijenog IgG-a IgG1 potklase. Dodatak lektina miševima oralno takođe dovodi do proizvodnje lektin specifičnih antitela čija količina raste nakon ponovljene administracije.

Na osnovu dobijenih rezultata i analize literaturnih podataka može se zaključiti da je banana lektin veoma potentni imunostimulatorni molekul, koji bi mogao terapeutski da se primenjuje u određenim patološkim stanjima.

OF BANANA LECTIN, CHARACTERISTICS AND EFFECTS ON THE IMMUNE SYSTEM OF MICE

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The interest in banana has grown simultaneously with the market development. Its' nutritional value, or rough chemical composition, has been known for over a hundred years. In the beginning most of the studies explored the nutritional value, and vitamin content in order to evaluate its supplementary potential in infants. With the development of science, it was found that banana fruit contains serotonin, norepinephrine and dopamine metabolites. It was found that banana consumption increases the resistance of gastric mucosa, and enhances the healing of peptic ulcers.

Analysis of the protein content of banana had been focused mostly on different enzymes and a haemaglutinin called banana lectin or BanLec. First mentioned during the 80s, it is now thoroughly characterized.

In order to simplify purification for characterization it has been produced by recombinant technology (rBanLec). rBanLec has a MW of about 16 kDa, and a pI value of around 7,5-8. Stability studies showed that it gets irreversibly denatured at temperatures of 60,8°C, and that it is remarkably stable to the action of pepsin and tripsin, in vitro.

In vivo stability has been tested in mice. It was determined that rBanLec can be eluted with glucose solution from the jejunum in the time frame of 60-180 min upon oral gavage. Meaning that the lectin is very stable in vivo as well, and that it interacts

with the epithelium by a lectin-sugar interaction. This was further corroborated by histology. Mass spectrometry analysis showed that the lectin was intact.

rBanLec, simmilary to Con A, induces nonspecific splenocyte proliferation, with maximal proliferation index in the range 0.5-1.5 µg rBanLec per ml medium, which is of lower intensity compared to Con A.

Intramuscular injection of a relatively small dose of rBanLec without adjuvants induces rBanLec specific IgM and IgG upon first injection, and the majority of the IgG is of the IgG1 subclass. Oral administration of rBanLec to mice also induces antibody formation which increases upon readministration.

Based on the obtained results, and literature data analysis it can be concluded that rBanLec is a potent immunostimulatory molecule which could be utilized therapeutically in certain pathological conditions.

BANANA KAO IZVOR ENERGIJE PRI MAKSIMALNOM TESTU OPTEREĆENJA

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Uvod

Banane predstavljaju dobar izvor energije. Jedna srednja banana (118 g) sadrži oko 27 g ugljenih hidrata, 3,1 g dijetetskih vlakana, 105 kilokalorija i značajnu koncentraciju kalijuma (422 mg) i vitamina B6 (0,43 mg). Banana predstavlja jedinstvenu mešavinu ugljenih hidrata, mikronutrijenta i antioksidanata koji mogu biti dobra podrška tokom dugotrajnog i intenzivnog vežbanja. Međutim, podaci iz studija sa sportistima nedostaju. Posebno je interesantno kakav je efekat uzimanja banana neposredno pred fizičku aktivnost.

Cilj rada

Cilj našeg rada je bio da analiziramo uticaj banane na aerobenu potrošnju tokom maksimalnog testa opterećenja, testa snage i fleksibilnosti prilikom rutinskog sprovođenja sportskomedicinskog testiranja fudbalera Prve lige Srbije.

Materijal i metode

Ukupno 100 fudbalera iz FK Partizan, FK Crvena Zvezda, OFK Beograd i FK Voždovac su tokom sportskomedicinskog pregleda randomizovani u dve grupe u zavisnosti od toga da li su pre testa uzimali banana. Pored standardnih ispitivanja koja spadaju u sportsokmedicinski pregled (internistički pregled, dinamometrija, ergosprometrija i ispitivanje fleksibilnosti) svim fudbalerima je izvađena krv deset minuta pre testa opterećenja, 3 minuta i 15 minuta nakon završetka testa. Pored toga dinamometrija i fleksibilnost su mereni i pre i nakon uzimanja banana. Grupa koja je uzimala bananu učinila je to neposredno nakon prvog vađenja krvi. Sve banane su bile podjednako zrele, slične veličine, nisu imale braon tačkice i bile su žute u potpunosti. Korišćen je novi Omnia softver (COSMED) koji pored svih standardnih ergospirometrijskih vrednosti daje i podatke o energetskoj potrošnji, odnosno procentualnom učešću ugljenih hidrata i masti u metabolizmu.

Rezultati

U ovoj studiji učešće je uzelo 100 profesionalnih fudbalera, koji spadaju u najbolje fudbalere Srbije. Analizom njihovih antropometrijskih i funkcionalnih karakteristika, možemo da formiramo profil srpskog profesionalnog fudbalera.

	minimum	maksimum	srednja vrednost (±SD)
godine	16	38	22,69±4.75
visina (cm)	165	196	182,56±6,37
telesna masa (kg)	58	93	77,20±7,21
procenat masti (F%)	2	19	10,75±3,26
HRmax (otkucaj/minuti)	126	198	182±10
VO2max (ml/kg/min)	23,3	67,1	57,0±6,4
fleksibilnost (cm)	-27,00	5,00	-11,67±5,98
stisak sake (kg)	52,00	131,00	94,03±14,40

Tabela 1. Osnovne karakteristike fudbalera prve lige Srbije

Rezultati našeg ispitivanja su pokazali da su aerobna sposobnost i energetska potrošnja bili statistički značajno veći u grupi koja je konzumirala bananu neposredno pred testiranje i to u trenutku kada se intenzitet opterećenja na testu povećavao i prelazio vrednosti 85% VO-2max, kao i da se sličan odnos održava i na 100% VO2 max. (55.16 ±5.75 vs. 57.26±4.30 mmol/kg/min). Najveći deo energije tokom testa je pripadao ugljenim hidratima i bio je proporcionalan povećanju intenziteta opterećenja, tako da se na maksimlanoj vrednosti aerobne sposobnosti skoro 100% energije dobijalo iz ugljenih hidrata. Potrošnja ugljenih hidrata bila je procentualno veća u grupi koja je pojela banana o odnosu na kontrolnu (91.92±10.59 vs. 94.030±8.98).

Trajanje testa (min)	VO2max (mmol/kg/min)		UH (%)		F (%)		EE (kcal)	
	K	B	K	B	K	B	K	B
00:00	13.29 ±4.55	13.93 ±3.12	29.41 ±26.57	22.76 ±23.47	71.13 ±26.36	77.20 ±23.47	91.44 ±32.67	95.04 ±20.97
00:10	15.16 ±4.92	16.02 ±2.89	22.12 ±23.77	18.35 ±22.47	81.64 ±22.47	78.07 ±23.79	103.71 ±35.15	108.89 ±19.31
00:20……	17.48 ±4.95	18.01 ±2.81	17.66 ±20.56	15.57 ±21.08	82.65 ±20.71	84.43 ±21.08	118.98 ±35.35	122.00 ±18.12
05:00	47.77 ±4.70	49.68 ±3.93*	70.79 ±14.94	69.16 ±15.89	31.08 ±13.18	31.50 ±15.38	337.56 ±32.67	350.70 ±27.58*
05:10	48.61 ±4.73	50.60 ±4.06*	73.33 ±16.12	71.71 ±15.78	28.96 ±14.63	28.89 ±15.38	344.15 ±32.93	357.70 ±28.37*
05:20….	49.57 ±4.13	51.54 ±3.93*	75.92 ±17.12	74.80 ±15.51	27.49 ±15.62	25.74 ±15.22	351.69 ±28.92	365.21 ±27.82*

Tabela 2. Pregled VO2 max, energetske potrošnje (EE) i procentualnog udela ugljenih hidrata (UH) i masti (F) u energetskoj potrošnji u grupi koja je konzumirala bananu (B) i kontrolnoj grupi (K) za određene segmente testa.

Vrednosti glikemije su statistički značajno bile veće u grupi koja je konzumirala bananu, i to prilikom drugog merenja u 3.minuti oporavka ($p < 0,05$). Praćenje glikemije je bilo značajno pre svega jer je pokazano da se ona ne razlikuje na početku i na kraju testiranja, ali da od 5. minuta opterećenja pa sve do 3. minuta nakon testa utiče na stvaranje energije tako što doprinosi većoj aerobnoj sposobnosti i većoj snazi.

	B	K	p
Glikemja 0. min (pre testa)	5.60 ± 0.99	5.62 ±1.159	0.926
Glikemija 3. min posle kraja testa	6.96 ±1.11	6.44 ± 1.11	0.021*
Glikemija 15. min posle kraja testa	6.12 ±1.21	6.82 ±1.45	0.453

Tabela 3. Glikemija u grupi koja je konzumirala bananu (B) i kontrolnoj grupi (K)

Dinamometrijom stiska šake pokazano je da se snaga u grupi koja je konzumirala bananu značajno povećala, za razliku od grupe koja je bila kontrolna, gde nije došlo do povećanja snage ($p < 0,05$).

	K	B
Stisak desne i leve šake pre testa opterećenja	96,40±13,915	91,66±14,630
Stisak desne i leve šake posle testa opterećenja	96,44±12,765	95,28±14,083
p	0,964	0,016*

Tabela 4. Test stiska sake u grupi koja je konzumirala bananu (B) i kontrolnoj grupi (K)

Zaključak

Konzumiranje banane neposredno pre maksimalnog opterećenja značajno je uticalo na poboljšanje sportske sposobnosti, optimalnu potrošnju ugljenih hidrata kao izvora energije i povećanje snage nakon opterećenja.

Banana spade u ekonomičnu i lako upotrebljivu sportsku hranu čija primena pre i tokom dugotrajne fizičke aktivnosti, ali i između kratkotrajnih napora na velikim takmičenjima, može značajno da utiče na poboljšanje sportske sposobnosti.

BANANA AS A ENERGY SOURCE DURING ERGOSPYROMETRY TEST

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Objectives

Bananas are a good source of energy. One medium banana (118 g) containing about 27 g of carbohydrates, 3.1 g of dietary fiber, 105 kilocalories, significant concentration of potassium (422 mg) and vitamin B6 (0.43 mg). Banana represents a unique blend of carbohydrates, micronutrients and antioxidants which can be a good support during long and intensive exercise. However, data from studies with athletes are missing. Especially interesting is what are the effects of taking a banana just before physical activity.

The aim of our study was to analyze the influence of bananas on the aerobic energy during ergospyrometry testing of soccer players representing First Serbian League.

Materials and Methods

A total of 100 soccer players from FC Partizan, FC Red Star, OFC Beograd and FC Vozdovac were randomized into two groups depending on whether they were eating banana before the testing. In addition to standard tests that are included into sport medical examination (internal examination, dynamometry, ergosprometry and flexibility), from all players blood was taken ten minutes before the test start, 3 minutes and 15 minutes after the test is completed. In addition, dinamometry and flexibility were measured before and after consuming banana. The group that took the banana did that immediately after the first blood taking. All the bananas were equally mature, similar size, without brown spots and were completely yellow. For this purpose, it is important that new Omnia software (COSMED) in addition to all the standard ergospirometry values, provided information abou energy consumption or the percentage utilization of carbohydrate and fat metabolism.

Results and Discussion

In this study we tested 100 football players that represent the best professional football players of Serbia. By analyzing their anthropometric and functional characteristics, we made a profile of Serbian professional football player.

	Minimum	Maximum	Mean (±SD)
Age	16	38	22,69±4.75
Height (cm)	165	196	182,56±6,37
Body weight (kg)	58	93	77,20±7,21
Fat percentage (F%)	2	19	10,75±3,26
HRmax (beats/min)	126	198	182±10
VO2max (ml/kg/min)	23,3	67,1	57,0±6,4
Flexibility (cm)	-27,00	5,00	-11,67±5,98
Hand grip dynamometry (kg)	52,00	131,00	94,03±14,40

Table 1. The characteristics of the football players in Serbian first league

The results of our study showed that the aerobic capacity and energy consumption were statistically significantly higher in the group that consumed the banana immediately before testing at a time when the intensity of the load on the test increased and exceeded 85% VO2max value (5th minute of the test), and that a similar relationship is maintained up to 100% VO2 max. (55.16 ±5.75 vs. 57.26±4.30 mmol/kg/min). Thanks to new COSMED Omnia software it was observed that most of the energy comes from carbohydrates and is proportional to the increasing the load At 100% VO2max value we recorded that all energy expenditure comes from carbohydrates. The percentage of carbohydrates consumption was higher in the group that ate the banana compared to the control group (91.92 ± 10:59 vs. 94,030 ± 8.98 %).

Test duration (min)	VO2max (mmol/kg/min)		CHO (%)		F (%)		EE (kcal)	
	K	B	K	B	K	B	K	B
00:00	13.29 ±4.55	13.93 ±3.12	29.41 ±26.57	22.76 ±23.47	71.13 ±26.36	77.20 ±23.47	91.44 ±32.67	95.04 ±20.97
00:10	15.16 ±4.92	16.02 ±2.89	22.12 ±23.77	18.35 ±22.47	81.64 ±22.47	78.07 ±23.79	103.71 ±35.15	108.89 ±19.31
00:20……	17.48 ±4.95	18.01 ±2.81	17.66 ±20.56	15.57 ±21.08	82.65 ±20.71	84.43 ±21.08	118.98 ±35.35	122.00 ±18.12
05:00	47.77 ±4.70	49.68 ±3.93*	70.79 ±14.94	69.16 ±15.89	31.08 ±13.18	31.50 ±15.38	337.56 ±32.67	350.70 ±27.58*
05:10	48.61 ±4.73	50.60 ±4.06*	73.33 ±16.12	71.71 ±15.78	28.96 ±14.63	28.89 ±15.38	344.15 ±32.93	357.70 ±28.37*
05:20….	49.57 ±4.13	51.54 ±3.93*	75.92 ±17.12	74.80 ±15.51	27.49 ±15.62	25.74 ±15.22	351.69 ±28.92	365.21 ±27.82*

Table 2. Overview of VO2max, energy consumption (EE) and percentage of carbohydrates (CHO) and fat (F) in energy consumption in the group that consumed the banana (B) and control group (K) for certain segments of the test.

Glycemia values were significantly higher in the group that consumed the banana, and on the second measurement at 3. min of recovery after the test (p <0.05). Monitoring of blood glucose was significant primarily because it has been shown that there is no diference at the beginning and at the end of the test. Actualluy, from the 5th minute of the test untill until 3 minutes after the test eating banana affects energy by contributing to greater aerobic capacity and the greater strength.

	B	K	p
Glycemia at 0. min (before test)	5.60 ± 0.99	5.62 ±1.159	0.926
Glycemia at 3. min after the test /recovery	6.96 ±1.11	6.44 ± 1.11	0.021*
Glycemia at 15. min after the test /recovery	6.12 ±1.21	6.82 ±1.45	0.453

Table 3. Glycemia in the group that consumed the banana (B) and control group (K)

Hand grip dynamometry has been shown that the strength of the group that consumed the banana has increased significantly (p <0.05), unlike to the control group, where there was no increase in power.

	K	B
Hand grip strength (right + left) before test	96.40±13.915	91.66±14.630
Hand grip strength (right + left) after test	96.44±12.765	95.28±14.083
p	0.964	0.016*

Table 4. Hand grip strenght n the group that consumed the banana (B) and control group (K)

Conclusion

Banana is a cost-effective and easy to use sports food whose application before and during prolonged physical activity, but also during a short-term effort in major competitions, can significantly affect the sport performance.

Eating bananas before the maximum load significantly influence the improvement of sports skills and the optimal consumption of carbohydrates as a source of energy and power increase.

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KISEONIK JE DOZVOLJEN U SPORTU?

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Upotreba kiseonika u sportu je od uvek bila predmet rasprave. Da li je kiseonik doping? Da li su dozvoljeni hipoksični uređaji? Da li je hiperbarični kiseonik zabranjen? su samo neka od pitanja na koja nije lako dati odgovor. Cilja našeg rada je da pokušamo da definišemo mesto kiseonika u sportu.

Sam kiseonik nije zabranjen u sportu, niti je ikad bio. Postoje specifični sportovi gde je upotreba kiseonika neophodna, ali istovremeno nameće velike etičke dileme. Tako u planinarenju mnogi nacionalni planinarski savezi ne priznaju rezultate penjanja na veliku visinu ako su postignuti korišćenjem kiseonika. (Tirolska dekleracija 2002) [1]. Inače, disanje kiseonika iz boce može da utiče na oporavak. Sportisti taj vid terapije često koriste, pa korišćenje nije zabranjeno čak ni na terenu [2]. Međutim, efekat je kratoktrajan i nema efekta na sportsku sposobnost.

S druge strane sportska sposobnost može da se poveća korišćenjem hipoksičnih naprava sa ciljem da se hipoksija iskoristi kao okidač kompleskog mehanizma sinteze hemoglobina i stvaranja crvenih krvnih zrnaca. Svetska antidoping agencija (WADA) je razmtrala stavljanja „artificial hypoxia devices" na Listu 2007. godine. Reakcijom 72 naučnika iz 22 zemlje koji se bave hipoksijom WADA je odustala od od ideje, pa su tako različiti hipokični tretmani dobili značajno mesto u sportu. Jedno od najubedljivijih objašnjenja hipokisičnih metoda je teza o fenotipskoj plastičnosti Prof. Hansa Hopelera [3]. Istovremeno je trening „train high, sleep low" postao popularan, isto koliko i spavanje u hipoksičnom šatoru. Iako hipoksične metode nisu na Listi zabranjenih supstanci i metoda, Međunarodni olimpijski komitet ja zabranio korišćenje hipoksičnih naprava tokom Olimpijskih igara u Riju 2016. godine.

Treća velika dilema vezana za kiseonik predstavlja korišćenje kiseonika pod povećanim atmosferskim pritiskom, tzv. hiperbarični kiseonik. Najčešći oblik terapije

je udisanje 100% kiseonika pod pristiskom većim od 2,0 tokom najmanje 60 minuta. Iako veliki broj sportista tu vrstu terapije doživljava kao izuzetno korisnu, ne postoje naučni dokazi koji ukazuju na dugotrajni efekat hierbaričnog kiseonika, odnosno povećanje sportske sposbosti. Kratotrajni efekti su zabeleženi i vezani su za oporavak, restauraciju tkiva nakon napornog treninga i lečenje sportskih povreda [4].

U zaključku treba reći da je kiseonik neophodan u procesu stvaranja energije u mišićima, u procesu oporavka i zalečenja sportskih povreda, da njegova upotreba nije zabranjena u sportu, ali da ne postoje dokazi da utiče na povećanje sportske sposbnosti. Konačno etičke dilme su uticale da se u planinarenju vrhunski rezultat ne priznaje ukoliko je korišćen kiseonik prilikom uspona.

OXYGEN IS ALLOWED IN SPORT?

Anja Lalic, Nenad Dikic
Antidoping agency of Serbia

The use of oxygen in the sport has always been a subject of debate. Is oxygen doping? Are hypoxic devices allowed? Is hyperbaric oxygen banned? ...are just some of the questions that are not easy to answer. The aim of our work is to try to define the role of oxygen in the sport.

Oxygen itself is not prohibited in sport, nor it has ever been. There are specific sports where the use of oxygen is necessary, but it also imposes high ethical dilemmas. For example, many mountaineering national associations do not recognize the results of climbing at high altitude if they are achieved by using oxygen. (Tyrol declarations 2002) [1]. Otherwise, breathing oxygen from a bottle can improve recovery. Athletes often use that type of therapy, so the use is not prohibited even on the court [2]. However, the effect doesn't last long and there is no effect on the sports performance.

On the other hand sporting performance can be increased by using hypoxic devices in order to use hypoxia as a trigger of complex mechanism of the synthesis of hemoglobin and the creation of red blood cells. World Anti-Doping Agency (WADA) has considered putting "artificial hypoxia devices" on the List in 2007. Reaction of 72 scientists from 22 countries who are dealing with hypoxia WADA had given up on the idea, but therefore different hypoxic treatments got a significant role in the sport. One of the most convincing explanations for hypoxic methods is the theory of phenotypic plasticity by Prof. Hans Hopeler [3]. At the same time training "train high, sleep low" became popular, as much as sleeping in a hypoxic tent. Although hypoxic methods are not on the List of Prohibited substances and methods, International Olympic Committee has banned the use of hypoxic devices during the Olympic Games in Rio in 2016.

The third major dilemma related to the use of oxygen represents oxygen under increased atmospheric pressure, so-called hyperbaric oxygen. The most common form of therapy is the inhalation of 100% oxygen under pressure higher than 2.0 ATA for at least 60 minutes. Although the large number of athletes this type of therapy consider as extremely useful, there are no scientific evidence that indicates that long-term effect of hyperbaric oxygen could increase sport performance. Short term effects are recorded and are related to the recovery, restoration of tissue after a hard training and healing of sports injuries [4].

In conclusion it should be noted that oxygen is essential in the process of creating energy in muscles, in the process of recovery and healing of sports injuries, that its use is not prohibited in sport, but there is no evidence that it affects on increasing sports performance. Finally, ethical dilemma affected that in mountain climbing high result is not recognized if the oxygen is used during ascent.

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Radomir Čabarkapa graduated from the Faculty of Medicine in Belgrade. He is currently physician on specializacion in the field of sports medicine at the Faculty of Medicine in Belgrade and works since 2011. as a team doctor in basketball club "FMP", wich is last three years champion in Serbian Basketbll League. He also works as a Doping Control Officer in Anti-Doping Agency of Serbia. An active member of Sports Medicine Associacion of Serbia from 2009.

ANALIZA ASSAULT-A – SUPLEMENT ZA PRE VEŽBANJA

Radomir Čabarkapa

Antidoping agencija Republike Srbije

Suplementi koji se koriste pre vežbanja su relativna novina na tržištu. U zadnjih nekoliko godina postaju popularni za korišćenje među ljudima koji se bave fizičkim aktivnostima, kao i među sportistima. Poznati su i kao NO reaktori. Oni tipično sadrže veći broj različitih ergogenih sastojaka. Kada se progutaju zajedno, ove komponente treba da deluju sinergijski na poboljšanju sportskih performansi.

Jedan od njih je i Assault.

Assault se promoviše kao suplement pre vežbanja koji će vam garantovati: mišićnu masu, snagu, izdržljivost, energiju, fokus i nakon vežbanja otklonit zamor u mišićima. Postoji više studija, nisu dugoročne i ne uključuju veliki broj učesnika, koje potvrđuju ove tvrdnje ali ne i o mogućim neželjenim dejstvima.

Glavni aktivni sastojak u Assault-u je sadržaj kofeina. Kofein je možda najrasprostranjenije korišćeni stimulans na svetu za povećanje fizičke snage i izdržljivosti, takođe je i sistemski vazokonstriktor. Između ostalih efekata on ubrzava sagorevanje masti.

Ostali ergogeni sastojci su B vitamini i azotni oksid. Prvi pomažu u energetskom metabolizmu, DNK sintezi i u stvaranju i popravci crvenih krvnih zrnaca.

Azotni oksid je molekul koji naše telo proizvodi da bi pomogao svim njegovim ćelijama da međusobno komuniciraju slanjem signala kroz celo telo, konkretno u ovom slučaju reguliše krvni pritisak dilatacijom arterija. Azotni oksid (kao što su L-citrulin i L-arginin) povećavaju protok krvi i dotok kiseonika u skeletne mišiće.

Za druge dve bitne komponente, kreatin i beta-alanin u suplementu, istraživači tvrde da oba zahtevaju „periode punjenja" unosa preko nekoliko nedelja kako bi se obezbedili najbolji efekti.

Kreatin je molekul u energetskom sistemu (kreatin fosfat) koji brzo može da proizvede energiju (ATP) da podrži ćelijsku funkciju. On je izvor energije za skeletne mišiće, to je ono što uzrokuje povećanje snage nakon suplementacije kreatinom.

Beta-alanin je amino kiselina koja deluje indirektno stvarajući karnozin koji se nalazi u mišićima i koristi se pri visoko intezivnim treninzima i mišićnom rastu. Visoka koncentracija karnozina pomaže u neutralizaciji efekata mlečne kiseline i kvalitetnijem i dužem treningu.

Imajući u vidu da postoji veliki broj komponenti u ovoj mešavini, trebalo bi sprovesti dugoročna i obimna istraživanja o neželjenim dejstvima, koja sigurno postoje ukoliko neko pretera sa dnevnom dozom i kontinuiranom konzumacijom.

Mogući rizici i neželjena dejstva su verovatno zbog prevelike doze kofeina (koji može izazvati i dehidraciju): povišeni puls i krvni pritisak, vrtoglavica, glavobolja, nesanica (uobičajeno korišćenje kofeina dovodi do tolerancije,često do tačke gde je jedina „korist" efekat nesanice. Ovo je „nepremostiva tolerancija", što znači više kofeina je neće prevazići. Mesec dana duga pauza od kofeina smanjuje toleranciju.), mučnina, povraćanje, napad panike, palpitacije… Za crvenilo i peckanje po koži je odgovoran beta-alanin, takođe i za gubitak osećaja u licu, usnama i ekstremitetima.

Postoji nekoliko stvari o kojima treba razmisliti pre upotrebe ovakvih suplemenata. Najbitniji razlog je zbog činjenice da FDA (Food and Drug Administration) ima vrlo malo nadzora nad većinom kompanija koje proizvode suplemente. Dovoljno je znati da kompanije ne moraju navesti sve sastojke. Mnoge od njih dopunjaju njihove proizvode i sakrivaju ih iza izraza „vlasnička mešavina". Dakle, tu mogu biti prisutne hemikalije u ovim suplementima, a da mi ne znamo o tome. Ne postoji 100 % garancija u smislu proizvođačkih sastojaka i propisa o bezbednosti. Dakle, sportisti moraju biti svesni šta tačno unose u svoje telo, sastojke, moguće kratkoročne i dugoročne neželjene efekte, doze i potencijalnog rizika od pozitivnog doping rezultata. Takođe, razlog za brigu je i to što su suplementi za pre vežbanja relativno novi i ne postoji mnogo dugoročnih studija o njima. Ne postoje jasne smernice: koliko vremenski ga možete koristiti, da li je potrebna pauza...

Obzirom da sportski lekari treba da poseduju znanje u vezi sa tim, sportisti očekuju savet od njih.

ANALYSIS OF ASSAULT - PRE-WORK SUPPLEMENT

Radomir Cabarkapa
Antidoping agency of Serbia

Pre-work supplements are relatively new on the market. In recent years become popular for use among people who are engaged in physical activity, as well as among athletes. They are also known as NO reactors. Pre-workout supplements typically have different ergogenic ingredients. When ingested together, these components are meant to affect synergistically to enhance athletic performance.

One of them is an *Assault*.

Assault is being promoted as a pre-work supplement, which will guarantee you: muscle mass, strength, endurance, energy, focus and eliminate the muscle fatigue

post work-out. There are several studies, not long-term and does not include a large number of participans, that confirm these claims but not about possible side effects.

The main active ingredient in Assault is the caffeine content. Caffeine may be the most widely used stimulant in the world, for improving physical strength and endurance, also and systemic vasoconstrictor. Among other effects it accelerating fat burning.

The other stimulants ingredients are the B-vitamins and nitric oxide. B-vitamins assist with energy metabolism, DNA synthesis, the formation and repair of red blood cells. Nitric oxide is a molecule that our body produces to help all its cells communicate with each other by transmitting signals throughout the entire body, concretely in this case regulate blood pressure by dilating arteries. Nitric oxide (such as L-citrulline and L-arginine) increases blood flow and oxygen supply to skeletal muscles.

For other two important components, the creatine and beta-alanine in the supplement, researchers state that both require "loading periods" of ingestion over several weeks in order to provide the best effects.

Creatine is a molecule in an energy system (creatine phosphate) that can rapidly produce energy (ATP) to support cellular function. It is an energy source for skeletal muscles, this is what causes strength increases after creatine supplementation.

Beta alanine is an amino acid that acts indirectly by creating carnosine, it is stored in the muscles and is used in high intensive training and muscle growth. High concentrations of carnosine helps to neutralize the effect of lactic acid and of a higher quality and longer training.

Bearing in mind that there are a large number of components in this mix, it should conduct a long-term and extensive research about side effects, which certainly exist if somebody goes too far with daily dose and continuous consumption.

Possible Risks and Side Effects probably due to the large dose of caffeine (wich can cause dehydration): Increased heart rate and blood pressure, dizziness, headaches, insomnia (Habitual caffeine use leads to tolerance, often to the point where the only "benefit" is anti-sleep effect. This is an 'insurmountable' tolerance, which means more caffeine will not overcome it. A month-long break from caffeine will reduce tolerance), nausea, vomiting, panic attacks, palpitations… For redness and tingling in the skin is responsible beta-alanine, also for loss of sensation in the face, lips and extremities.

There are several things to consider before using these supplements. The most important reason is due to the fact that the FDA has very little oversight of the majority of companies making supplements. Just know that the companies do not have to list all the ingredients. A lot of them load their product up and hide behind the term "proprietary blend". So there may be chemicals in these supplements that we don't know about. There is no 100% guarantee in regards to the manufacturer's ingredients and safety regulations. Therefore, athletes should be aware of exactly what they are putting into their body, the ingredients, the possible short and long side effects, the dosage and the potential risk of a positive doping result. Also, concern is that pre-workout supplements are relatively new and there hasn't been a lot of long term studies on them. There are no clear

guidelines: how long you can use, whether you need a break ...

Given that sports physicians need to have knowledge about it, athletes expect advice from them.

Biljana Stojanović, PhD. Specijalistički rad iz *Ispitivanja i kontrole lekova* odbranila je 2008. godine. Angažovana je u i izvođenju teorijske i praktične nastave u okviru dodiplomske i poslediplomske nastave na Farmaceutskom fakultetu Univerziteta u Beogradu. Koautor je udžbenika za praktičnu nastavu: *Farmaceutska analiza*, praktikum, Beograd, 2010. Recenzent je u 20 časopisa sa SCI liste, kao i u 1 časopisu nacionalnog značaja. Po pozivu, bila je gostujući urednik časopisa *Chromatographia* za specijalni broj pod nazivom *Chemometrcs in Chromatography* koji je izašao 2013. godine. Do sada je publikovala 81 naučni rad od kojih je 75 štampano časopisima sa SCI liste. Autor je 4 poglavlja u monografijama međunarodnog značaja. Učestvovala je sa 5 usmenih izlaganja na skupovima međunarodnog i nacionalnog značaja. Pored toga, ima 106 publikacija saopštenih na skupovima međunarodnog i nacionalnog značaja.Ekspert je Agencije za lekove i medicinska sredstva Crne Gore i Agencije za lekove i medicinska sredstva Srbije, kao i tehnički ekspert Akreditacionog tela Srbije. Član Saveza farmaceutskih udruženja Srbije i član Uredništva časopisa Arhiv za farmaciju.

Biljana Stojanovic PhD. 2008 she finished specialization in Investigation and quality control of drugs. For the best masther thesis, in 2005, she got annual prize from Chamber of Commerce and Industry of Serbia. She is actively participating in practical and theoretical studies for both undergraduate and postgraduate studies at University of Belgrade, Faculty of Pharmacy. She is a coauthor of the book for practical studies – Pharmaceutical Analysis, Belgrade, 2010. She is reviewer in 20 scientific journals from SCI list as well as in one journal of national interest. She was a guest editor by invitation in Chromatographia for the special issue Chemometrcs in Chromatography, printed in 2013. Untill the present day, she published 81 scientific papers from which 75 papers were printed in journals from the SCI list. She is an author of 4 chapters in books of international importance. She participated with 5 oral presentations at symposia of international and national significance. Besides those, she has 106 publications announced at symposia of international and national significance. She is an expert for Medicines and Medical Devices Agency of Serbia as well as for Medicines and Medical Devices Agency of Montenegro, but also she is a technical expert for the Accreditation body of Sebia. She is the member of Pharmaceutical Association of Serbia and the member of Editorial bord of the Archive for Pharmacy journal.

ZABRANJENE SUPSTANCE U DIJETETSKIM SUPLEMENTIMA – SLUČAJNO ILI NAMERNO?

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U današnje vreme teško je zamisliti sportsku aktivnost bez upotrebe dijetetskih suplemenata, ali ta upotreba može sa sobom doneti i brojne opasnosti. Poznato je da sportisti istovremeno unose više različitih suplemenata, kao i da su količine koje se unose relativno velike. Prisustvo nedozvoljenih supstanci i u najmanjim količinama može ugroziti zdravlje sportiste, ali usloviti i doping pozitivan rezultat. Jedan od najvećih problema jesu prohor-

moni koji su dozvoljeni u SAD i koji se na tom tržištu nalaze u slobodnoj prodaji. S druge strane, u EU nije dozvoljena njihova slobodna prodaja. Međutim, putem interneta mogu se naći širom sveta. Uz to, proizvođači prohormona proizvode i druge dijetetske suplemente pa se prohormoni kao onečišćenja mogu naći i u drugim preparatima. Podsetimo, prohormoni obećavaju mnogo ali pružaju jako malo, a uz to sasvim sigurno, kod sportiste daju doping pozitivan nalaz. Rezultati brojnih studija pokazali su da postoje značajna neslaganja između sastava proizvoda naznačenog na pakovanju i stvarnog sastava preparata. Pogrešna oznaka se ne odnosi samo na sastav već i na količinu, pa se dolazi do toga da je sastav proizvoda više nego diskutabilan. Na taj način, sportista je u velikom riziku od unošenja zabranjene supstance. Ovaj problem najčešće se javlja sa prohormonima ali i sa anaboličkoandrogenim steroidima, kao i stimulansima koji mogu biti prisutni, a da to nije naznačeno na pakovanju. Kao dodatak svemu ovome jeste i činjenica da sportista vrlo često i ne zna da se iza nekog naziva krije zabranjena supstanca. Na primer, iza naziva *Ma Huang* krije se biljka efedra koja sadrži zabranjeni stimulans *efedrin*. Brojni su primeri koji ukazuju na potencijalne rizike korišćenja dijetetskih proizvoda od neproverenih proizvođača. Idealno bi bilo da preparati budu uvek nabavljani od proverenih proizvođača mada je to danas veoma teško s obzirom na to da se veliki deo kupovine obavlja putem interneta. Pored toga, nemaju svi proizvođači uvedene odgovarajuće *sisteme obezbeđenja kvaliteta*. Usled unakrsne kontaminacije ili loše obezbeđenog skladištenja dolazi do mešanja različitih polaznih materijala. Sve to predstavlja rizike po zdravlje sportista, kako profesionalaca tako i sportista rekreativaca. Sasvim je sigurno da se do bezbednog preparata može doći, s jedne strane, poboljšanjem kvaliteta samog procesa proizvodnje a koji direktno zavisi od proizvođača i, s druge strane, naročito edukacijom samih sportista.

PROHIBITED SUBSTANCES IN DIETARY SUPPLAMENTS – ACCIDENTALY OR DELIBRATELY?

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Nowdays, it is hard to imagine sport without the usage of dietary supplements, but this usage could bring many risks. It is very well known that athletes simultaneously consume many different supplements, usually in very high doses. Presence of even small levels of prohibited substances could be a great risk for the athlete's health, but also for a doping positive result. One of the biggest problems are prohoromones, allowed only in USA where their distribution is not under restriction. On the other hand, in EU their distribution is not allowed. However, via the internet they are distributed easily all over the world. Besides that, manufacturers of prohormones usually produce some other dietary supplements as well, so prohormones could also be found in some other products. Let us remind, prohormones promise a lot but offer very little, also for sure causing doping positive results. Many studies show that there are significant disagreements between declared and the real composition of the product. Wrong information could be related not only to composition but also to the quantity. This leads us to conclusion that composition of product is very debatable. It also means that athletes are in huge risk of taking

a prohibited substance. This problem is mainly related to prohormones but also could be related to anabolic androgenic steroids and stimulants. These substances could be present in the product without being mentioned on the label. In addition, in some cases athletes do not know that beyond some names prohibited substances are actually hidden. For example, behind the name *Ma Huang* stands plant ephedra and thus ephedrine which is prohibited substance. There are many examples which show high risk from buying from untrustworthy suppliers. It would be ideal to buy from reliable manufacturers but, today it is not so easy taking into account the fact that the internet trading dominates. Besides, many manufactures do not have appropriate quality assurance system. So, cross contamination or non-adequate provided storage cause mixing of different raw materials. All of this presents risk for athletes' health, regardless of them being professional or amateur athletes. It is obvious that safe product could be obtained by improving the manufacturing process or by educating the athletes.

Snežana Đorđević, PhD. Radi u Odeljenju za toksikološku hemiiju Nacionalnog centra za kontrolu trovanja Vojnomedicinke akademije u Beogradu kao specijalista toksikološke hemije i kao Docent na predmetu Medicinska hemija na Medicinskom fakultetu Univerziteta odbrane. Objavila je dve monografije, 34 originalna rada u celini u nacionalnim i međunarodnim časopisima, kao i 83 sažetaka na domaćim i međunarodnim skupovima. Član je Farmaceutskog društva Srbije, Farmaceutske komore, Udruženja toksikologa Srbije i EUROTOX-a.

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KOKAIN I ETANOL: INTERAKCIJE I EFEKTI

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Kokain je alkaloid koji je prirodni sastojak biljke Erythroxylon coca. Po svom dejstvu pripada grupi psihostimulanasa, zbog čega se zloupotrebljava. Najčešći put zloupotrebe kokaina je ušmrkavanje, mada se može koristiti i intravenski ili pušenjem („crack"). Nakon resorpcije, kokain dovodi do euforije i pojačane fizičke i mentalne izdržljivosti. U organizmu se metabolišе u jetri do norkokaina (farmakološki najaktivniji), benzoilekgonina i kokain metil estra, koji pokazuju slične efekte. Neželjeni efekti kokaina, koji se ispoljavaju u vidu kardiotoksičnosti, zavise od unete doze i učestalosti primene. Ispoljavaju se u vidu hipertenzije, ventrikularnih aritmija, akutnog infarkta miokarda i hipertrofije leve komore. Smrt kod predoziranja kokainom može nastupiti usled kardiovaskularnih i cerebrovaskularnih poremećaja.

Poznato je da je etanol najčešće zloupotrebljavana psihoaktivna supstanca. Ukoliko se istovremeno zloupotrebljava sa kokainom, dovodi do produženja i pojačavanja efekata kokaina, ali povećava i verovatnoću ispoljavanja neželjenih efekata. Naime, u prisustu etanola dolazi do promene u metabolizmu kokaina, što se ogleda u stvaranju farmakološki aktivnog metabolita kokaetilena. Kokaetilen ima iste farmakološke efekte kao i kokain, s tim što je poluvreme eliminacije značajno duže u odnosu na kokain. Međutim, kokaetilen ima izraženije kardiotoksične i neurotoksične efekte u odnosu na sam kokain i odgovoran je za nasilničko i impulsivno ponašanje. Osim aditivnog farmakološkog efekta u smislu pojačanja euforije, ova kombinacija predstavlja „tempiranu bombu" jer veoma lako može da dovede do infarkta miokarda, pa čak i do iznenadne smrti. Istovremeno konzumiranje kokaina

i etanola povećeva verovatnoću zbrinjavanja otrovanih u jedinici intenzivne nege.

Zbog mogućih komplikacija u ovakvim trovanjima neophodno je kod uživaoca kokaina detektovati eventualno prisustvo kokaetilena u urinu ili krvi otrovanih.

COCAINE AND ETHANOL: INTERACTIONS AND EFFECTS

Snezana Djordjevic, Marko Antunovic, Vesna Kilibarda, Jasmina Jovic-Stosic, Slavica Vucinic

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Cocaine as an alkaloid is a natural ingredient of Erythroxylon coca plant. Thanks to its effects, it belongs to the group of psychostymulans, which is the reason of its abuse. The most frequent way of cocaine abuse is inhaling trough nostrils, although it can be used intravenously or by smoking ("crack"). After resorption, cocaine leads to euphoria and increases physical and mental endurance. In the body it is metabolized in the liver to norcocaine (pharmacologically most active), benzoylecgonine and the methyl ester of cocaine (whith similar effects). Side effects of cocaine, which are manifested in the form of cardiotoxicity, depend on the dose and frequency of administration. They are manifested in the form of hypertension, ventricular arrhythmia, acute myocardial infarction and left ventricular hypertrophy. Death induced by cocaine overdose can occur due to cardiovascular and cerebrovascular disorders.

It is known that ethanol is the most abused substance. Concurrent abuse of ethanol and cocaine, leading to potentiation and increase of cocaine effects, but it also raises the probability of adverse effects. Namely, there is a change in the metabolism of cocaine in the presence of ethanol, which is reflected in the creation of the pharmacologically active metabolite cocaethylene. Cocaethylene has the same pharmacological effects as cocaine, but it has significantly longer half-life compared to cocaine. However, cocaethylene has more intensive cardiotoxic and neurotoxic effects in comparison to cocaine itself and it is responsible for violent and impulsive behaviour. In addition to the additive pharmacological effect in terms of gained euphoria, this combination is a "time bomb" because it can easily lead to myocardial infarction, and even sudden death. Concurrent consumption of cocaine and ethanol increases the probability for treatment of poisoned patients in intensive care unit.

Because of possible complications in these poisonings, it is necessary to detect possible presence of cocaethylene in urine or blood of patients who abused cocaine and ethanol.

Marko Antunović završio je osnovne studije na Farmaceutskom fakultetu u Beogradu, smer magistar farmacije-medicinski biohemičar. Školske 2013/2014 upisao je doktorske studije na Medicinskom fakultetu Univerziteta odbrane na smeru farmakologija i toksikologija. Zaposlen je kao medicinski biohemičar u Odeljenju za toksikološku hemiju Nacionalnog centra za kontrolu trovanja Vojnomedicinske akademije u Beogradu i Medicinskom fakultetu Univerziteta odbrane kao saradnik u nastavi za predmet Medicinska hemija. Član je Komore medicinskih biohemičara, Udruženja toksikolaga Srbije i EUROTOX-a.

Marko Antunovic graduated at Faculty of Pharmacy, University of Belgrade, module pharmacy-medical biochemistry. In 2013/2014 school year he enrolled PhD studies, pharmacology and toxicology module. He works in Department of Toxicological Chemistry, National Poison Controle Centre, Military Medical Academy, Belgrade and as a teaching assistent in Medicinal chemistry course in Medicinal Faculty, University od Defence, Belgrade. He is a member of Serbian chamber of biochemist, Serbian Society of toxicology and EUROTOX.

PODACI NACIONALNOG CENTRA ZA KONTROLU TROVANJA SRBIJE O ZLOUPOTREBI PSIHOSTIMULANASA U PERIODU 2010-2015

Marko Antunović, Snežana Đorđević, Vesna Kilibarda, Jasmina Jović-Stošić, Slavica Vučinić

Nacionalni Centar za kontrolu trovanja, Vojnomedicinska akademija, Beograd

Stimulansi predstavljaju grupu jedinjenja koja potenciraju psihofizičke performanse pojedinca. Efekti uzimanja ovih jedinjenja su uvećan stepen budnosti, pažnje, energije, osećaj prijatnosti kao i povišenje krvnog pritiska i ubrzan rad srca. Ranije su se koristili u tretmanu različitih bolesti, ali se danas zbog očiglednog potencijala od zloupotrebe koriste u svega nekoliko stanja.

Iako su psihoaktivne supstance strogo kontrolisane u većini zemalja, njihova zloupotreba je i dalje veoma prisutna, što potvrđuju podaci centara iz celog sveta. Prema podacima Nacionalnog centra za kontrolu trovanja Srbije (NCKT), u poslednjih 5 godina došlo je do značajnog porasta zloupotrebe psihoaktivnih supstanci. Broj pacijenata pregledanih zbog sumnje na upotrebu ovih jedinjenja porastao je sa 162 u 2010. godini na 252 u 2015. godini. Najveći broj pregleda registrovan je u 2014. godini – 312 pacijenata. Od ukupnog broja, značajan procenat zauzima zloupotreba psihostimulanasa (pre svega kokaina, afmetamina i metafetamina). Tokom 2010. godine u ambulantu NCKT primljeno je 24 pacijenta zbog posledica uzimanja nekih od psihostimulanasa, dok je 2015. godine zabeleženo 50 slučajeva.

Neželjeni efekti korišćenja ovih supstanci su brojni i u većini slučajeva dozno zavisni (hipertenzija, aritmije, infarkt miokarda, visok stepen tolerancije i zavisnosti, anskioznost), od kojih neki mogu dovesti i do letalnog ishoda. Značajan podatak jeste da se u poslednje dve godine primećuje porast zloupotrebe psihostimulanasa kod mlađe populacije (15-24 godina života).

Danas, značajan problem predstavljaju i nove psihoaktivne supstance, koje se u nekim slučajevima mogu i legalno nabaviti. Takođe, njihova detekcija u biološkom materijalu je otežana, jer ne postoje testovi za njihovo rutinsko određivanje. Zloupotreba psihoaktivnih supstanci predstavlja rastući problem, zbog čega je neophodno uložiti mnogo više resursa u njegovo rešavanje.

PSYCHOSTIMULANT ABUSE – NATIONAL POISON CONTROL CENTRE OF SERBIA DATA FOR THE PERIOD 2010-2015

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Stimulants are a group of compounds which potentiate the psychophysical performance of an individual. The effects of these compounds are increased levels of alertness, attention, energy, a feeling of euphoria, as well as high blood pressure and rapid heartbeat. They were used in the treatment of different diseases, but because of the obvious abuse potential, nowadays they are used in only a few conditions.

Although psychoactive substances are strictly controlled in most countries, their abuse is still very present, which is confirmed by centers from around the world. According to the National Poison Control Center of Serbia (NCCP), in the last five years there has been a significant rise in the abuse of psychoactive substances. The number of patients examined because of suspicion of usage of these compounds rose from 162 in 2010 to 252 in 2015. The greatest number of patients was registered in 2014 – 312. Abuse of psychostimulants (cocaine, amphetamine and methamphetamine) represented a significant percentage of total number of examinations.

In 2010 there were 24 patients admitted to the NPCC infirmary as a consequence of taking some of the psychostimulants, while in 2015 there were 50 cases.

Nowadays, a significant problem are new psychoactive substances, which in some cases can be legally obtained. Also, their detection in biological material is difficult, because there are no tests for their routine determination. Abuse of psychoactive substances is a growing problem, which is why it is necessary to invest more resources in its resolve.

Marija Đurović, specijalista psihijatar. Svoju profesionalnu karijeru počela je u Bolnici za psihijatriju KBC „Dr Dragiša Mišović - Dedinje" Beograd. Najveći deo vremena tokom specijalizacije i profesionalne karijere provodi na Odseku za adolescentnu psihijatriju i psihoterapiju gde i stiče iskustva u radu sa ljudima koji boluju od različitih psihijatrijskih poremećaja. Od 2009. godine je na mestu šefa Odseka za adolescentnu psihijatriju. Pored zvanja specijaliste psihijatrije, doktorka ima i edukciju iz individualne psihoanalitičke psihoterapije. Aktuelno u edukaciji iz grupne analitičke psihoterapije.

Dr Marija Đurović je autor brojnih stručnih radova sa prezentacijom u zemlji i inostranstvu kao i dve monografije „Anoreksija nervoza" i „Bulimija nervoza". Jedan je od koautora „Enciklopedija straha" profesora Ljubomira Erića.

Marija Đurovic, a specialist psychiatrist. Her professional career began at the Hospital of Psychiatry, CHC "Dr Dragisa Mišović - Dedinje" Belgrade. Most of the time during specialization and professional career carried out at the Department of Adolescent Psychiatry and Psychotherapy, where she acquired experience in working with people suffering from various psychiatric disorders. Since 2009 she is Head of the Department of Adolescent Psychiatry and Psychotherapy. In addition to the title of a specialist psychiatrist, doctor Đurović has education of individual psychoanalytic psychotherapy. She is now in education of group analytic psychotherapy.

Dr Marija Đurovic is the author of numerous papers with the presentation at home and abroad as well as two monographs "Anorexia nervosa" and "Bulimia nervosa". She is one of the co-authors of "Encyclopedia of fear" by professor Ljubomir Erić.

Petar Radović, specijalizant dečje i adolescentne psihijatrije, aktuelno u KBC „Dr Dragiša Mišović - Dedinje" Beograd i na edukaciji iz REBT (Racionalno emotivno bihejvioralna terapija) dece i adolescenata.

Petar Radovic, MD - Child and Adolescent Psychiatry Specialization trainee, at the present time practicing in CHC "Dr Dragisa Mišović - Dedinje" Belgrade and currently in education of rational emotive behavior therapy (REBT) in child and adolescent population.

POREMEĆAJI ISHRANE KOD SPORTISTA

Marija Đurović, Petar Radović
Bolnica za psihijatriju, KBC „Dr Dragiša Mišović-Dedinje"

Poremećaji u ishrani su bolesti koje karakteriše neuobičajeni način ishrane koji s vremenom narušava fizičko i psihičko zdravlje ali i psihosocijalno funkcionisanje. Najčešće dijagnostikovani poremećaji ishrane su: anoreksija nervoza i bulimija nervoza. Anoreksija nervoza se odlikuje restirktivnim režimom ishrane, strahom od dobijanja na težini, strahom od hrane, raznim kompenzatornim ponašanjem koje pomaže održavanju male telesne težine i poremećajem telesne sheme. Za dijagnozu bulimije nervose određeni dijagnostički kriterijumi moraju biti ispunjeni: učestalo prejedanje, stalna kompenzatorna ponašanja u cilju sprečavanja debljanja (na primer indukovano povraćanje i prekomerna fizička aktivnost), i samoevaluaciju koja je pod uticajem težine.

Poremećaji u ishrani su ozbiljne, potencijalno opasne po život mentalne bolesti. Opasne su prvenstveno jer počinju u periodu puberteta i rane adolescencije i zato što pored psihičkih problema koje prouzrokuju dovode i do fizičkih smetnji. Stopa smrtnosti za osobe sa poremećajima ishrane je najviša od svih psihijatrijskih bolesti i preko 12 puta veća u odnosu na ostatak populacije.

Poremećaji u ishrani javljaju se i među sportistima. Kao i u opštoj populaciji, i među sportistima učestaliji su među ženskom populacijom i to posebno u sportovima gde se traži vitka figura ili određena telesna težina - atletika, gimnastika, rvanje.

Faktori rizika u sportskom okruženju:

1. Stereotipi i verovanje da će gubitak težine povećati sportski učinak,
2. Pritisak (stvarni ili prividni) od trenera i ostalih iz tima da treba izgubiti težinu,
3. „Kopiranje" načina ishrane saigrača ili drugih sportista,
4. Sportovi u kojima je oskudna sportska oprema.

Somatske posledice poremećaja ishrane:

1. Nasilno povraćanje dovodi do elektrolitnog disbalansa koji može voditi u poremećaj srčanog ritma i naprasnu smrt,
2. Prerana osteoporoza,
3. Peptički ulkus, pankreatitis i rupture želuca,
4. Hormonski disbalans - amenoreja,

Posledice na sportsku spremnost:

1. Dehidratacija, neuhranjenost, depresija, anksioznost, opsesija hranom,
2. Hormonski poremećaji, amenoreja, koji dovode do kompromitovanja gustine kostiju i povećanog rizika od povreda kostiju,
3. Ograničen unos ugljenih hidrata može da dovede do veće potrošnje glikogena, pa telo radi nadoknade pretvara protein u manje efikasan oblik energije i povećava rizik slabosti i povrede mišića.

Lečenje podrazumeva multidisiplinarni pristup: konsultaciju psihijatra, psihoterapiju, konsultaciju nutricioniste i neretko endokrinologa pa i kardiologa. U izvesnim slučajevima indikovana je farmakoterapija. Problem u lečenju sportista koji boluju je prvenstveno u tome što kriju svoju bolest (kao i ostali oboleli), nerado govore o njoj, te kada se lečenje započne ono traje duže.

EATING DISORDERS IN ATHLETS

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Hospital of Psychiatry, CHC "Dr Dragisa Mišović - Dedinje" Belgrade

Eating disorders are conditions characterized by a persistent disturbance of eating or an eating-related behavior that significantly impairs physical and mental health and also psychosocial functioning. The most often diagnosed eating disorders are: anorexia nervosa and bulimia nervosa.

Anorexia nervosa is characterized by persistent caloric intake restriction, fear of gaining weight/becoming fat, persistent behavior impeding weight gain and a disturbance in perceived weight or shape. To diagnose bulimia nervosa certain diagnostic criteria must be met: recurrent binge eating, recurrent inappropriate compensatory behaviors to prevent weight gain (for example, induced vomiting and excessive exercise) and self-evaluation unduly influenced by shape and weight.

Eating disorders are serious, potentially life threatening mental illnesses. Eating disorders defy classification solely as mental illnesses as they not only involve considerable psychological impairment and distress, but they are also associated with major wide-ranging and serious medical complications, which can affect every major organ in the body. The mortality rate for people with eating disorders is the highest of all psychiatric illnesses and over 12 times higher than that for people without eating disorders.

Eating disorders also appear in the sport environment. In sport, eating disorders occur more frequently in females than males, more frequently in "lean" sports such as athletics, gymnastics, but also in wrestling.

Risk factors in the sport environment:

1. Sport body stereotypes and belief that losing weight will increase sport performance
2. Pressure (real or perceived) from coaches and others to loose weight
3. Observed eating and exercise behaviors of teammates
4. Revealing uniforms

Health consequences

1. Purging behavior that cause electrolyte imbalance with possible irregular heartbeats and heart failure
2. Premature osteoporosis.
3. Peptic ulcers, pancreatitis and gastric rupture.

Performance consequences:

1. Dehydration,malnourishment,depression, anxiety, obsession with food and eating,
2. Hormonal disruptions, the absence of menstrual cycles, which lead to compromised bone density and increased risk of bone injuries
3. Restricting carbohydrates can lead to glycogen depletion, forcing the body to compensate by converting protein into less efficient form of energy and increasing risk of muscle injury and weakness.

Treatment of athletes suffering from eating disorders involves a multidisciplinary approach: psychotherapy, consultation with a nutritionist and endocrinologist, sometimes cardiologists. In certain cases, pharmacotherapy is indicated . The problem in the treatment of athletes suffering is primarily that they hide their illness more than the rest of sufferers and are reluctant to talk about it. When the treatment starts it can take months and years, so they are afraid it will affect their sport performance.

Milica Vukašinović Vesić je diplomirala na Medicinskom fakultetu Univerziteta u Beogradu. Specijalista je medicine sporta i na završnoj je godini doktorskih studija na Katedri za eksperimentalnu i primenjenu fiziologiju sa sportskom medicinom. Trenutno zaposlena na poziciji direktora Antidoping agencije Republike Srbije.

Milica Vukašinović Vesic graduated from the Faculty of Medicine, University of Belgrade. Sports medicine specialists and she is on the final year of doctoral studies in the Department of Experimental and Applied Physiology with sports medicine. Currently employed as a Head of Anti-Doping Agency of the Republic of Serbia.

UTICAJ KOFEINA NA SPORTSKU SPOSOBNOST?

Milica Vukašinović-Vesić , Marija Anđelković, Nenad Dikić

Antidoping agencija Republike Srbije

Kofein je prirodni alkaloid koji se dobija iz zrna kafe, listova čaja ili zrna kakaa. Prema klasifikaciji Australijskog instituta za sport, svrstan u grupu A suplemenata. Pored kofeina, u ovoj grupi se nalaze suplementi koji obezbeđuju korisne i pravovremene izvore energije i hranljive sastojke za ishranu sportiste i za koje se u naučnim istraživanjima pokazalo da poboljšavaju sposobnost, kada se koriste po određenom protokolu u specifičnoj sportskoj situaciji.

Upotreba kofeina povećava sportsku sposobnost kod raznih sportova, od onih koji su promenljivog inteziteta, preko sprinta, sportova izdržljivosti do timskih sportova. Postoje tri teorije koje objašnjavaju ergogeno dejstvo kofeina i one uključuju: (1) direktno dejstvo na CNS koje utiče na subjektivni osećaj zamora i/ili nervnu aktivaciju mišićne kontrakcije; (2) direktan efekat kofeina na performanse skeletnih mišića preko transporta jona, uključujući Ca 2+ i direktnog uticaja na ključne regulatorne enzime, uključujući i one koje kontrolišu razgradnju glikogena; i (3) povećanje oksidacije masti i smanjenje oksidacije ugljenih hidrata tako što kofein direktno povećava aktivnost enzima koji razlažu masti na masne kiseline ili indirektno preko povećanja cirkulišućeg epinefrina.

Tradicionalni protokoli za korišćenje kofeina uključuju unos kofeina 30 do 60 minuta pre vežbanja, u dozama ekvivalentnim ~6 mg/kg telesne težine. Važno je reći da se sportska sposobnost ne povećava sa povećanjem doze kofeina.

Iako mnogi sportisti uzimaju kofein iz kafe ona nije dobar izvor kofeina za suplementaciju, pre svega zbog različitosti i nepredvidljivosti sadržaja kofeina u kafi. Pored toga, postoje dokazi da drugi sastojci u kafi mogu smanjiti ergogene efekte kofeina. Sadržaj kofeina u čaju i kafi dosta varira, tako da npr. šolja instant kafe od 250 ml može imati kofeina u rasponu od 12 do 169 mg, šolja kuvane kafe od 250 ml može imati 40-110 mg kofeina, šoljica espreso kafe može imati 25-214 mg kofeina, 375 ml Coca-Cola ima 49 mg kofeina, dok 250 ml Red Bull, energetskog napitka, ima 80 mg kofeina. Neke franšize (na pri-

mer Starbucks) prodaju specijalne napitke koji dolaze u velikim količinama sa veoma jakim tipovima kafe. Neki od ovih napitaka mogu da sadrže od 500 do 1000 mg kofeina po jednom unosu.

Prilikom većeg unosa, kofein ima potencijal da izazove jače lupanje srca, pogorša ili promeni finu motoriku i tehniku i dovede do preteranog uzbuđenja i negativno utiče na oporavak i spavanje. Pogoršanje sposobnosti može se manifestovati u brojnim sportovima, a preterano uzbuđenje može uticati na mogućnost oporavka između sesija treninga ili višednevnih takmičenja. Ovo čini važnim pronalaženje i najmanje efektivne doze kofeina koja može dovesti do povećanja sportske sposobnosti. Duži unos većih količina kofeina (>500 mg/dan) generalno je kritikovan od strane zdravstvenih autoriteta i pokazao je neželjene efekte. Kofein, kao i alkohol, može da povećava diurezu i pića koja sadrže kofein nisu dobra pića za rehidraciju.

INFLUENCE OF CAFFEINE ON SPORT PERFORMANCE

Milica Vukasinovic-Vesic, Marija Andjelkovic, Nenad Dikic
Anti-Doping Agency of Serbia

Caffeine is natural alkaloid obtained from coffee bean, tea leaves or cacao grain. According to Australian Institute for Sport classification, caffeine is in A group of supplements. Beside caffeine in this group we can find other supplements which provide useful and timely source of energy and nutrients important for athletes and for which, in scientific researches, had been showed to increase sport performance when used according to specific protocol and in exact sport situation.

Use of caffeine increase sport performance of athletes in different sports, from ones with variable intensity, through sprint, endurance sports up to team sports. There are three theories which explain ergogenic effect of caffeine: (1) direct effect to CNS which influence subjective feeling of fatigue and/or nerve activation of muscle contraction; (2) direct effect of caffeine on skeletal muscle performance through ion transport including Ca 2+ and direct effect on key regulatory enzymes including ones which controls glycogen decomposition; (3) increase fat oxidation and decrease carbohydrate oxidation using caffeine ability to increase activity of enzyme which decompose fat to fat acids or indirectly in the way to increase quantity of epinephrine in circulation.

Traditional protocols for use of caffeine mean use of caffeine 30 to 60 minutes before exercise in dosage equivalent ~6 mg/kg of body mass. It is important to emphasize that athlete's performance will not increase with further increase of caffeine dosage.

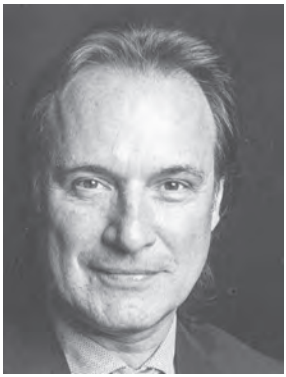
Although many athletes use caffeine from coffee, it is not good source of caffeine for supplementation, because volume of caffeine can vary a lot and be very unpredictable. Beside that, other ingredients of coffee can reduce ergogenic effect of caffeine. Volume of caffeine in tea and coffee can be very different, for example, one cup of 250 ml of instant coffee can have 12 to 169 mg of caffeine, cup of 250 ml boiled coffee can have from 40 to 110 mg of caffeine, cup of espresso coffee from 25 to 214 mg of caffeine, 375 ml of Coca Cola contains 49 mg and 250 ml of Red Bull energy drink contains 80 mg of caffeine. Some franchise (like Starbucks) sells special drinks in big volumes with very strong coffee types.

Some of this drinks can contain from 500 to 1000 mg of caffeine in just one drink.

With larger intake, caffeine has ability to cause heart arrhythmia, to deteriorate or change fine motor skills and technique and leads to over-excitement and to have negative influence on recovery and sleep. The deterioration of skills can be manifested in many sports and over-excitement can influence on ability to recover between trainings or competition which lasts for several days. That's why it is very important to identify the smallest effective dosage of caffeine which leads to increment of sport performance. Longer intake od larger volume of caffeine (>500 mg per day) is generally criticized from different health authorities and it showed negative effects. Caffeine, just like alcohol, can increase diuresis and drinks which contains caffeine are not good choice for rehydration.

RADIONICA: SARADNJA ANTIDOPING AGENCIJA SA PROSTORA BIVŠE JUGOSLAVIJE

WORKSHOP: COOPERATION BETWEEN ANTI-DOPING AGENCIES FROM THE COUNTRIES OF THE FORMER YUGOSLAVIA



Nenad Dikić je predsednik Odbora za doping kontrolu ADAS i docent na Fakultetu za fizičku kulturu i menadžment u sportu, Univerziteta Singidunum, Beograd, UEFA doping kontrolor, potpredsednik Medicinskog saveta FIBA Evrope, Predsednik Antidoping komisije Internacionalne asocijacije za planinarenje i penjanje (UIAA), Predsednik TUE komisije Internacionalne asocijacije za skijanje na vodi (IWWF) i član TUE komisije International Handball Federation. Dr Dikić je bio generalni sekretar Udruženja za medicinu sporta Srbije 10 godina (UMSS / SMAS), član Medicinske komisije Olimpijskog komiteta Srbije 8 godina, član Izvršnog odbora Bakanske asocijacije sportske medicine 8 godina (BSMA), član odbora za nauku i edukaciju Evropske federacije sportsko-medicinskih asocijacija 8 godina (EFSMA) i Evropskog koledža sportskih nauka 8 godina (ECSS). Član je skupštine Internacionalne federacije sportske medicine (FIMS). Takođe, bio je Predsednik 10. Evropskog koledža sporstkih nauka i FIBA Anti-doping simpozijuma na Eurobasketu 2005.

Završio je specijalizaciju iz interne medicine i baromedicine, a trenutno se nalazi na specijalizaciji iz Kliničke farmakologije. Magistrirao je iz oblasti kardiologije i reumatologije ne temu reumatske groznice. Doktorirao je iz sportskog menadžmenta. Osnivač je Jugoslovenskog udruženja za ultrazvuk srca, Mreže za pomoć roniocima (Divers Alert Network), Udruženja za sportsku kardiologiju Srbije, Centra za sportsku ishranu i suplementaciju. Autor je 40 knjiga, nekoliko popularnih izdanja od čega jednog filma i CD-roma o hiperbaričnoj medicini i velikog broja stručnih članaka i radova.

Nenad Dikic is the President of the Doping control board of ADAS and Assistant Professor at the Faculty of Physical Education and Sports Management, Singidunum University, Belgrade. He is UEFA and FIFA doping control officer, Vice President of the Medical Council of FIBA Europe, President of the Anti-Doping Commission of the International mountaineering and climbing federation (UIAA), President of the TUE committee of the International wakeboard and waterski federation (IWWF) and member of International Handball Federation (IHF). He was Secretary General of Sports Medicine Association of Serbia 10 years, a member of the Medical Commission of the Olympic Committee of Serbia 8 years, member of the Executive Committee of the Balkan Association of Sports Medicine (BSMA) 8 years, a member of the Board of Science and Education of the European Federation of Sportsmedicine Associations (EFSMA) 8 years and the European College of Sport Science (ECSS) 8 years and member of the Assembly of the International Federation of Sports Medicine (FIMS). Also, he was President of the 10th Congress of European College of Sports Science and the FIBA Anti-Doping Symposium on Eurobasket 2005.

He completed his residency in internal medicine cardiology and hyperbaric medicine and he is currently specializing Clinical Pharmacology. His master's degree is in cardiology and rheumatology regarding rheumatic fever and PhD in sports management. He is the founder of the Yugoslav Association of Echocardiography, the Divers Alert Network for Balkan, the Sports Cardiology Association of Serbia and the Centre for sports nu-

trition and supplementation. Author of 40 books, several popular editions, film about handicap scuba diving, CD-ROM about hyperbaric medicine and a large number of scientific abstracts and papers.

DA LI NACIONALNE ANTIDOPING AGENCIJE IZ REGIONA IMAJU RAZLOGA DA POČNU DA BLIŽE SARADUJU U PREVENCIJI I SPREČAVANJU DOPING U SPORTU?

Nenad Dikić, Milica Vukašinović-Vesić, Bojan Vajagić, Marija Anđelković

Antidoping agencija Republike Srbije

Novinar Politike Aleksandar Miletić napisao je u svom članku: „Ruski predsednik Vladimir Putin je nedavno oštro kritikovao vodeće ljude u sportu te zemlje što nisu na vreme upozorili svoje sportiste, trenere i lekare da je meldonijum od 1. januara na zabranjenoj listi Svetske anti-doping agencije (VADA). Vodeći svetski mediji su preneli njegovu izjavu, ali ne i to da su Rusi imali više nego dovoljno važnih informacija da mnogo bolje reaguju i tako sačuvaju obraz svoje najbolje teniserke Marije Šarapove."

Upravo to, „čuvanje obraza" nacionalnog sporta postaje podjednako važno kao i edukacija i sprovođenje doping kontrole. Naša teza da nacionalne antidoping agencije moraju da budu isto toliko uspešne koliko i sportisti date zemlje, ne samo na ovom slučaju, već i nakon suspenzije velikog broja zemlja, dobija na značaju.

Kako inače objasniti da činjenicu da su španski, meksički, izraleski a pogotovo ruski sportisti ugroženi nečinjenjem nacionalnih antidoping agencija ili da li je normalno da španske sportiste testiraju internacionale federacije da bi mogli da učestvuju na Olimpijskim igrama u Riju 2016.

U radu ćemo analizirati potrebu zajedničkog rada i saradnje nacionalnih antidoping agencija u narednom periodu ne samo da bi se odgovorilo na buduće ocenjivanje kvaliteta rada svake antidoping organizacije, već radi ispravnog sprovođenja specifičnih analiza za svaki sport, minimalnog nivoa analiza, biološkog pasoša i svih ostalih mandatornih zahteva Svetske antidoping agencije.

Verujemo da zaključak može da bude da saradnja nacionalnih antidoping agencija samo može da doprinese integritetu svake agencije pojedinačno, a posebno „čuvanju obraza" nacionalnog sporta.

WHETHER THE NATIONAL ANTI-DOPING AGENCIES IN THE REGION HAVE REASON TO START CLOSER TO COOPERATE IN THE PREVENTION AND FIGHTING AGAINST DOPING IN SPORT?

Nenad Dikic, Milica Vukasinovic-Vesic, Bojan Vajagic, Marija Anđelkovic

Antidoping agency of Republic of Serbia

Journalist of Politika, Aleksandar Miletic wrote in his article: "Russian President Vladimir Putin recently criticized the leading people in the sport of the country which are not in time warned their athletes, coaches and doctors that Meldonium from January 1, 2016 is on the List of the World Anti-Doping agency (WADA).

The world's leading media distributed Putin's statement, but not the fact that the

Russians had more than enough relevant information to better respond and save face of their best tennis player, Maria Sharapova."

Clearly what, "saving face" national sport becomes as important as the education and implementation of doping control. Our thesis is that the national anti-doping agencies must be as much successful as the country's athletes, not only because of Meldonium case, but also after the suspension of a large number of the country, is gaining in importance. How else to explain that the fact that the Spanish, Mexican Israeli, and especially the Russian athletes are jeopardize by not acting of national anti-doping agencies or is it normal that the Spanish athletes will be tested by International Federation to be able to participate in the Olympic Games in Rio 2016.

In this paper we will anlyaze need of joint work and cooperation of national anti--doping agencies in the coming period, not only to respond to future evaluation of performance of anti-doping organizations, but for proper implementation of the specific analysis for each sport, the minimum level of analysis, the biological passport and all other mandatory required anaysis by the World Anti-Doping Agency.

We believe that the conclusion that cooperation of the national anti-doping agency can only contribute to the integrity of each agency individually, especially in "saving face" of national sport.

Zoran Manojlović, predstojnik Službe za antidoping Hrvatskog zavoda za toksikologiju i antidoping. Diplomirao je na Medicinskom fakultetu Sveučilištu u Zagrebu 1979.

Obranio je tezu magistarskog rada s temom kvalitativne analize propisivanja lijekova kod bolesnika starije dobi 1989. Položio je specijalistički ispit iz kliničke farmakologije 1990. Tezu doktorske disertacije s temom nastanka nuspojava bromokriptina u zdravih muških ispitanika obranio je 2007.

Ministarstvo zdravstva i socijalne skrbi Republike Hrvatske 2007. godine dodijelilo mi je naslov „primarijus". Autor je 99 stručnih i znanstvenih radova publiciranih u časopisima, knjigama i stručnim izvješćima. Predavač je na dodiplomskoj i poslijediplomskoj nastavi na Medicinskom, Farmaceutskom i Kineziološkom fakultetu Sveučilišta u Zagrebu. Član je brojnih stručnih udruga u zemlji i inozemstvu.

Zoran Manojlović, Head of the Anti-Doping Department of the Croatian Institute for Toxicology and Anti - Doping.

He graduated from the School of Medicine of the University of Zagreb in 1979.

He defended his master's thesis on qualitative analysis of prescribing drugs to elderly patients in 1989. He passed his board exam in clinical pharmacology in 1990. He defended his doctoral thesis on the occurrence of side effects of bromocriptine in healthy male subjects in 2007.

The Ministry of Health and Social Welfare of the Republic of Croatia awarded him the title "primarius" in 2007. He is the author of 99 professional and scientific papers published in journals, books and technical reports. He teaches undergraduate and postgraduate courses at the School of Medicine, Faculty of Pharmacy and Biochemistry and Faculty of Kinesiology of the University of Zagreb. He is active in numerous professional organizations at home and abroad.

PREGLED POSTUPAKA PRED STEGOVNIM TIJELIMA HRVATSKOG ZAVODA ZA TOKSIKOLOGIJU I ANTIDOPING OD 2012. – 2016.

Zoran Manojlović, Vesna Barišić

Hrvatski zavod za toksikologiju i antidoping, Zagreb

Od 2012. godine kada je formirano Stegovno i Žalbeno vijeće Hrvatskog zavoda za toksikologiju i antidoping (HZTA), postupalo se u 32 slučaja kršenja Pravilnika za borbu protiv dopinga HZTA.

Izrečene stegovne mjere zabrane nastupanja i sudjelovanja na svim sportskim natjecanjima i aktivnostima u pojedinim slučajevima kretale su se u rasponu od tri mjeseca do osam godina u skladu s odredbama Pravilnika za borbu protiv dopinga HZTA, kojim se u Hrvatskoj prenose odred-

be Svjetskog antidopinškog kodeksa. U dva slučaja Stegovno i Žalbeno vijeće oslobodili su krivnje sportaše.

Najviše stegovnih postupaka bilo je u 2012. godini – dvanaest (12). Najveći broj postupaka (9) odnosio se na sportaše koji su bili pozitivni na THC. U preostalim slučajevima vezanim uz 2012. imali smo po 1 stimulans, 1 anabolički steroid i 1 glukokortikoid.

U 2013. godini od sedam pozitivnih slučajeva, samo dva odnosila su se na THC. Pojavljuju se slučajevi korištenja metilheksanamina i diuretika. Osnova za postupanje u dva stegovna postupka bilo je izbjegavanja davanja uzorka nakon uručene obavijesti o testiranju. U jednom stegovnom slučaju postupalo se zbog kršenja antidopinškog pravila od strane trenera koji potaknuo sportaša na primjenu zabranjene tvari.

U 2014. godini imamo šest stegovnih postupanja. Tvari s Popisa zabranjenih sredstava uključivale su: klasične anaboličke steroide i druga anabolička sredstva, uključujući selektivni modulator androgenih receptora, selektivni modulator estrogenskih receptora i stimulanse, a u jednom postupanju u pitanju je bilo posjedovanje zabranjene tvari te davanje te iste kolegi sportašu.

2015. godine imali smo pet stegovnih postupanja. Tvari zabranjene Popisom pripadale su kategorijama S1.1 a, S2.1 i S6.b (egzogeni anabolički androgeni steroidi, agonisti eritropoetinskih receptora , specificirani stimulansi). U jednom slučaju radilo se o izbjegavanju davanja uzorka. Prema sportovima, najviše dopinških prekršitelja bilo je u poweliftingu, beanch pressu i deadliftu, potom bodybuildingu i fitnessu te po jedan slučaj u atletici i hrvanju.

U 2016. godini bila su dva stegovna postupanja zbog rezultata testiranja s kraja 2015. Tijekom promatranog razdoblja HZTA je kao sportove rizične za uzimanje dopinga identificirao: powelifting, beanch press i deadlift, bodybuilding i fitness.

U prikazu stegovnih zasjedanja stavili smo naglasak na izjave sportaša koje su trebale poslužiti u korist njihove obrane. Uočena je jasna diskrepancija između deklariranih vrijednosti sporta (etičnost, fair-play, čestitost, zdravlje, izvrsnost u izvedbi, karakter i obrazovanje, zabava i veselje, timski rad, posvećenost i predanost, poštivanje zakona i propisa, poštivanje sebe i drugih sudionika, hrabrost te zajedništvo i solidarnost) i izjava i teza sportaša.

Autori smatraju da je ova diskrepancija još jedan pokazatelj postojanja krize identiteta suvremenog sporta.

OVERVIEW OF PROCEEDINGS BEFORE THE DISCIPLINARY BODIES OF THE CROATIAN INSTITUTE FOR TOXICOLOGY AND ANTIDOPING (2012 – 2016)

Zoran Manojlović, Vesna Barišić
Croatian Institute for Toxicology and Anti-Doping, Zagreb

The Hearing Panel and the Appeal Panel of the Croatian Institute for Toxicology and Antidoping (CITA) were established in 2012, and since then 32 proceedings were conducted on grounds of violations of the CITA Anti-Doping Rules.

The imposed disciplinary sanctions prohibiting competing and participation in all sports competitions and activities in individual cases ranged from three months

to eight years pursuant to the Articles of the CITA Anti-Doping Rules, which translates the Articles of the World Anti-Doping Code in Croatia. The Hearing Panel and the Appeal Panel exonerated athletes in two cases.

The highest number of disciplinary proceedings was held in 2012 – twelve (12). The majority of the proceedings (9) included athletes who tested positive for THC. The other cases in 2012 included one stimulant, one anabolic steroid and one glucocorticoid.

In 2013, out of seven positive cases, only two included THC. Cases of using methylhexaneamine and diuretics were recorded. Two disciplinary proceedings were conducted based on evading a sample collection after the notification about the testing was delivered. One disciplinary proceeding was held due to an anti-doping rule violation by a coach who encouraged an athlete to use a prohibited substance.

There were six disciplinary proceedings in 2014. The substances from the Prohibited list included: classical anabolic steroids and other anabolic agents, including a selective androgen receptor modulator, a selective estrogen receptor modulator and stimulants, and one case included the possession of prohibited substance and giving the same to a fellow athlete.

In 2015 there were five disciplinary proceedings. The substances from the Prohibited list were listed in categories S1.1 a, S2.1 and S6.b (Exogenous Anabolic Androgenic Steroids, Erythropoietin-Receptor agonists, Specified Stimulants). One case included an evasion of sample collection. Categorized according to sports, most of the doping offenders were found in powerlifting, bench press and deadlift, followed by bodybuilding and fitness, and one case was recorded in athletics and wrestling.

Two disciplinary proceedings were held in 2016 based on the results of testing conducted at the end of 2015. In the stated period, CITA identified the following sports as sports with a high risk of doping: powerlifting bench press and deadlift and bodybuilding and fitness.

The emphasis in the overview of the the disciplinary proceedings was put on the statements by the athletes, which should have been used for the benefit of their defence. There was an obvious discrepancy between the declared values of sport (ethics, fair-play, honesty, health, excellence in performance, character and education, fun and joy, teamwork, dedication and commitment, compliance with laws and regulations, respect for themselves and other participants, courage, and unity and solidarity) and the statements and claims of the athletes.

The authors believe the discrepancy is another indicator of an identity crisis of modern sport.

Nihada Ahmetović, Prof.dr med. sc., stručni savjetnik za doping kontrolu i TUE u Agenciji za antidoping kontrolu Bosne i Hercegovine, specijalista higijene-zdravstvene ekologije, subspecijalista higijene ishrane sa dijetetikom, vanredni profesor Medicinskog fakulteta Univerziteta u Tuzli. Jedan od autora univerzitetskog udžbenika i sedam vodiča/smjernica smjernica iz oblasti zdravstvene ekologije i sigurnosti hrane, jedan od autora 83 naučna i stručna rada publicirana u časopisima i zbornicima simpozija i kongresa, recenzent knjige i tri vodiča, učesnik 14 naučno-istraživačkih projekata, recenzent tri časopisa, učesnik preko 70 naučnih i stručnih skupova u zemlji i inostranstvu, član radnih grupa u oblasti okoliša, javnog zdravstva i sigurnosti hrane na nivou BiH. Bila imenovana za focal point INFOSAN WHO, focal point ICN+21 FAO/WHO i nacionalne focal point za Cartagena protokol i biosigurnost, koordinator izrade propisa iz oblasti hrane za posebne prehrambene potrebe, učesnik predpristupnih programa EFSA-e iz oblasti sigurnosti hrane u Italiji, Irskoj, Danskoj i Crnoj Gori, učesnik edukacija iz oblasti procjene rizika i laboratorijske kontrole hrane u referentnim laboratorijama u Italiji i Sloveniji. Mentor većeg broja diplomskih radova, pet magistarskih radova i jedne doktorske disertacije.

Nihada Ahmetovic, MD, MSc, PhD, advisor for doping control and TUE at the Agency for anti-doping control of Bosnia and Herzegovina, environmental health specialists, subspecialists hygiene diet with dietetics, Associate Professor at the Faculty of Medicine, University of Tuzla. One of the authors of university textbooks and seven manuals and guidelines in the field of environmental health and food safety, coauthor of 83 scientific and professional papers published in journals and proceedings of symposia and conferences, reviewer of a book and three guides, participant in 14 research projects, three magazines reviewer, participated in over 70 scientific and professional meetings at home and abroad, a member of the working groups in the field of environment, public health and food safety at the state level. She was appointed focal point INFOSAN WHO, focal point ICN + 21 FAO / WHO and national focal point for the Cartagena Protocol and Biosafety, drafting regulations coordinator in the field of food for special dietary needs, participant of the pre-accession programs EFSA in the field of food safety in Italy, Ireland, Denmark and Montenegro, training participant in the field of risk assessment and laboratory control of food in the reference laboratories in Italy and Slovenia. She was also a mentor of a large number of graduate theses, five master's theses and one doctoral dissertation.

Amir Avdagić, diplomirani kriminalist i pravnik, završava postdiplomske studije iz oblasti državnog i međunarodnog javnog prava. Radio je u privatnom sektoru, zatim u OSCE Diplmatskoj misiji za Bosnu i Hercegovinu, u Odjelu za demokratizaciju i reformu javne uprave. Obavljao je funkciju savjetnika zamjenika ministra pravde Bosne i Hercegovine, a od 2010. godine radi kao rukovodeći državni službenik-pomoćnik direktora u državnoj Agenciji za antidoping kontrolu Bosne i Hercegovine. Bio je dugogodišnji predsjednik, a sada dopredsjednik Udruženja medijatora Bosne i Hercegovine. Takođe, bio je član redakcije indeksiranog časopisa Pravna misao kojeg izdaje Federalno ministarstvo pravde Bosne i Hercegovine. Kao koautor objavio je izdanje „Leksikon upravnog prava", zatim naučni rad „Doping i prehrana" i druge. Urednik je „Vodiča za sportiste" u izdanju Agencije za antidoping kontrolu BiH.

Amir Avdagić, lawyer and criminalist, graduated the post-graduate studies in state and international public law. He used to work as private entrepreneur, than in the OSCE Diplomacy mission for Bosnia and Herzegovina, Department of Democratisation and Public Administration Reform. He was an advisor in the cabinet of the Ministry of Justice of Bosnia and Herzegovina Deputy Minister Office. Since 2010, Amir Avdagic has been employed as managing civil servant – deputy director in the Anti-Doping Agency of Bosnia and Herzegovina. He was the president of the Association of Mediator of Bosnia and Herzegovina, and he is the vice-president at present. He was a member of the indexed magazine "Legal Thought" issued by the Ministry of Justice of Bosnia and Herzegovina. As the co-author he published the "Civil Service Lexicon", and the scientific work "Doping and Diet" and other works. He is the editor in chief of "Athletes Guide" issued by the Anti-Doping Agency of Bosnia and Herzegovina.

DOPINGI I DODACI PREHRANI U BOSNI I HERCEGOVINI

Nihada Ahmetović, Amir Avdagić
Agenciji za antidoping kontrolu Bosne i Hercegovine

Sportisti, posebno zbog poboljšanja sportskih performansi, često pribjegavaju uzimanju raznih vrsta dodataka prehrani. Istraživanja u svijetu su pokazala najčešće prisustvo steroida i stimulanasa u ispitivanim dodacima prehrani, pa konzumiranje dodataka prehrani može dovesti do pozitivnog doping testa na prisustvo zabranjenih supstanci. S druge strane, prema WADA statistici, u uzorcima urina sportista uzetih tokom doping kontrole, najčešće je utvrđeno prisustvo anaboličkih agenasa i stumulanasa, pa se procenat uzoraka u kojima je utvrđeno prisustvo ovih zabranjenih supstanci u periodu 2009.-2014. godina kretao između 48 i 64,9% za anaboličke agense, odnosno između 6,4 i 15,5% za stimulanse. U BiH je također najčešće utvrđeno prisustvo anaboličkih agenasa i stimulanasa u uzorcima urina uzetih tokom doping kontrola: utvrđeno je 38,46% slučajeva doping pozitivnih na prisustvo anaboličkih agenasa i 46,15% doping pozitivnih na prisustvo stimulanasa. Obzirom na mogućnost da

se prisustvo zabranjenih supstanci može dovesti u vezu s mogućim konzumiranjem dodataka prehrani koji sadrže zabranjene supstance u radu su analizirane izjave sportista koji su bili doping pozitivni vezano za moguću konzumaciju dodataka prehrani, te su analizirani stavovi i poznavanje ove oblasti od strane sportista i pomoćnog sportaševog osoblja. Nizak nivo poznavanja ove oblasti uz zakonski nereguliranu oblast dodataka prehrani u BiH predstavlja značajan rizik za sportiste zbog mogućeg unosa zabranjenih supstanci.

DOPING AND FOOD SUPPLEMENTS IN BOSNIA AND HERZEGOVINA

Nihada Ahmetovic, Amir Avdagic

Anti-Doping Agency of Bosnia and Herzegovina

Atheletes often resort to taking different food supplements in order to improve their sport performance in particular. The research in the world have shown that the steroids and stimuli are the most common as food supplements, and, therefore, the consuming of food supplements can lead to positive doping test. On the other side, according to WADA statistics, in the urine samples taken from athletes in doping control, there were mostly anabolic agents and stimuli present, and the percentage of samples with the presence of these prohibited substances in the period 2009-2014 was between 48% and 64.9% for anabolic agents, and between 6.4% and 15.5% for stimuli. The presence of anabolic agents in athletes' urine in doping controls was found in Bosnia and Herzegovina as well: 38.46% of doping positive cases were with the presence of anabolic agents and 46.15% with the presence of stimuli. Considering the fact that the presence of prohibited substances can be related to the possible food supplements consumption, this work analysed the statements of the athletes who were doping positive and the relation of the doping positive tests with the possible food supplement consumption, and also the attitudes and the athletes' and athlete sport personnel's knowledge about this subject. The low level of knowledge about this subject matter with no regulatory rules about food supplements in Bosnia and Herzegovina represents a significant risk for the athletes, concerning the possible taking of prohibited substances.

Key words: food supplements, prohibited substances, doping

Janko Dvoršak, direktor Slovenske antidoping organizacije. Diplomirao je na Fakultetu za sport, Univerziteta u Ljubljani. Svoju profesionalnu i volontersku karijeru posvetio je sportu. Od 1984. do 1995. radio je u Sportskom savezu Ljubljane, da bi od 1995. do 2014. radio u Olimpijskom komitetu Slovenije kao sekretar odbora za vrhunski sport u čijoj nadležnosti bila i koordinacija rada sa sportskim savezima i organizacijama oko nastupa slovenačkih sportaša na olimpijskim igrama u Naganu, Solt Lejk Sitiju, Atini, Torinu i Pekingu. Sarađivao je u projektima Sarajevo 1984., te Atlanta 1996. i Vankuver 2010. Kao specijalista multisportskih takmičanja rukovodio je sa više od 30 međunarodonih projekta i bio član korodinacione komisije MOK za prve zimske olimpijske igre za mlade u Insbruku 2012. Kao međunarodni doping kontrolor učestvovao je u igrama u Sočiju.

Janko Dvoršak, director of the Slovenian Anti-Doping Organization. He graduated at the Faculty of Sport, University of Ljubljana. His professional and volunteer career is dedicated to the sport. From 1984 to 1995 he worked in Sports Association of Ljubljana and from 1995 to 2014 he worked in the Olympic Committee of Slovenia as secretary of the committee for professional sport in charge of the coordination of national federations regarding competition of the Slovenian athletes at the Olympic Games in Nagano, Salt Lake City, Athens, Turin and Beijing. He has worked on projects Sarajevo 1984, Atlanta1996 and Vancouver 2010. As a specialist in multi-sporting competitions he organised more than 30 international competitions. He was a member of the IOC Coordination Commission for the first Winter Youth Olympics in Innsbruck 2012. As an international Doping control officer he participated on the Olympic Games in Sochi.

MODEL VRŠNJAČKE EDUKACIJE U PREVENCIJI DOPINGA

Janko Dvoršak

Slovenska antidoping organizacija

Ako želimo da budemo uspešni u oblasti prevencije dopinga moramo da podstaknemo sportiste da govore o čistom sportu, da podele svoje mišljenje sa vršnjacima i da se bore za ono u šta veruju. Doping je tema o koji mnogi (posebno mladi) ljudi ne vole da pričaju. Vršnjačka edukacija u celini pruža mogućnosti da marginalizovane grupe mladih dobiju potrebne informacije, stvore pozitivne stavove prema određenom pitanju, kao što je doping. Edukacija daje određenu moć onima koji su uključeni.

Model vršnjačke edukacije je model stvaranja transnacionalne mreže (mladih) ljudi koji imaju saznanja o borbi protiv dopinga i koji su svesni posledica zloupotrebe zabranjenih supstanci i metoda. Preko vršnjačke mreže, ambasadori direktno i indirektno grade novu generaciju koja se bori za etičke i moralne vrednosti poštenog i fer učešća u sportu u cilju sprečavanja pro-doping culture.

U Sloveniji model vršnjačke edukacije se koristi od 2011. godine u svim programima

prevencije dopinga. SLOADO je počela sa 14 antidoping ambasadora u okviru međunarodnog projekat Evropske Antidoping inicijative (EADIn). Oni su započeli da sprovode preventivne aktivnosti u drugoj polovini 2011. godine Od tada, SLOADO nastavlja da povećava broj učesnika edukacije o prevenciji dopinga svake godine.

U ovom trenutku imamo oko 40 ambasadora koji obavljaju veliki broj preventivnih aktivnosti na osnovnom nivou sporta. U prezentaciji će biti predstavljen model vršnjačke edukacije u prevenciji dopinga, zajedno sa korisnim informacijama i provernim pristupima za sprovođenje prevencije dopinga i aktivnosti na podizanju svesti za doping - free kod učesnika na osnovnom nivou sporta.

MODEL OF PEER NETWORKING IN DOPING PREVENTION

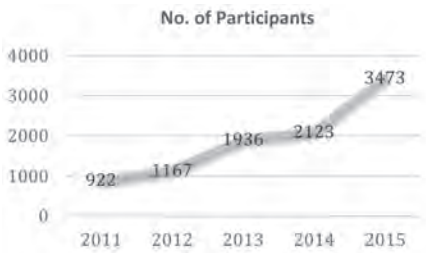
Janko Dvorsak
Slovenian Anti-Doping Organization

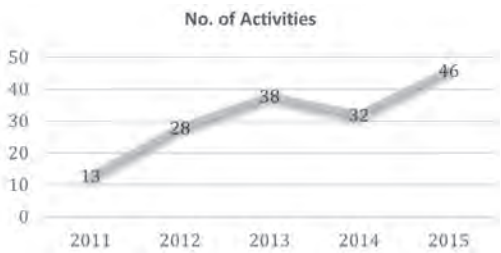
If we want to be successful in the field of doping prevention we have to encourage athletes to talk about clean sport, to share their opinion with their peers and to stand up for what they believe.

Doping is a subject that many (especially young) people do not like to talk about. Peer networking in general provides opportunities for marginalized youth to access required information, and help to foster positive attitudes towards a specific issue such as doping. It is empowering for those involved.

Model of peer networking is a model of creating a transnational network of (young) people who have the knowledge about fight against doping and are aware of consequences of the abuse of prohibited substances and methods. Through peer-to-peer network, ambassadors directly and indirectly build a new generation that fights for ethical and moral values of honest and fair participation in sports with the purpose of preventing a pro-doping culture.

In Slovenia ambassadors model of peer networking is used since 2011 in all doping prevention programs. SLOADO started with 14 anti-doping ambassadors as part of international project European Anti-Doping Initiative (EADIn). They begin to carry out prevention activities in the second half of the year 2011. Since then, SLOADO continues to increase the number of participants at doping prevention activities each year.





At the moment they have around 40 ambassadors which allows them to carry out numerus prevention activities at grassroots level of sport.

In the presentation the model of peer networking in doping prevention will be presented along with useful information and reliable approaches for implementing doping prevention and awareness-raising activities for doping-free sport targeting participants at grassroots level of sport.

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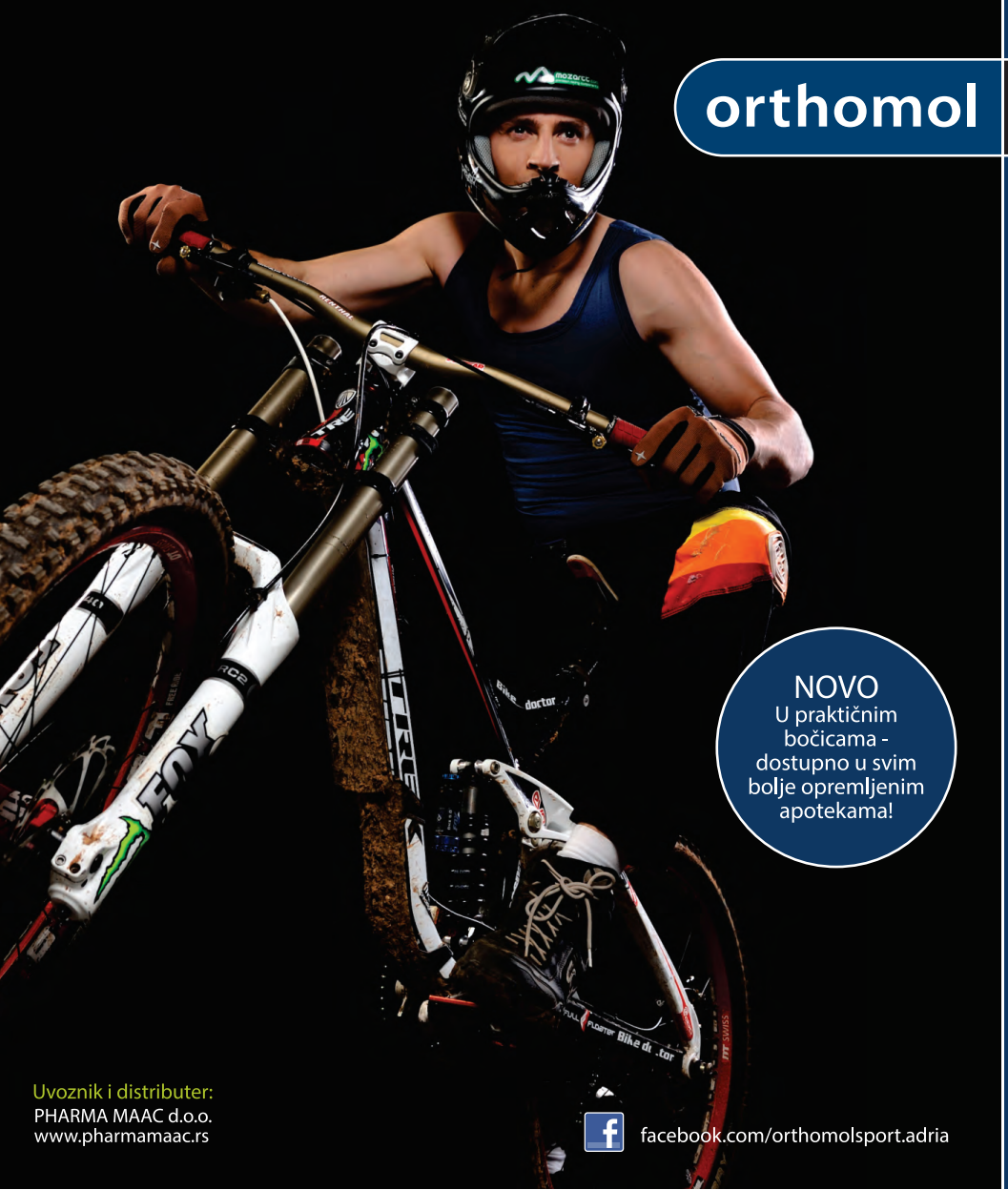

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