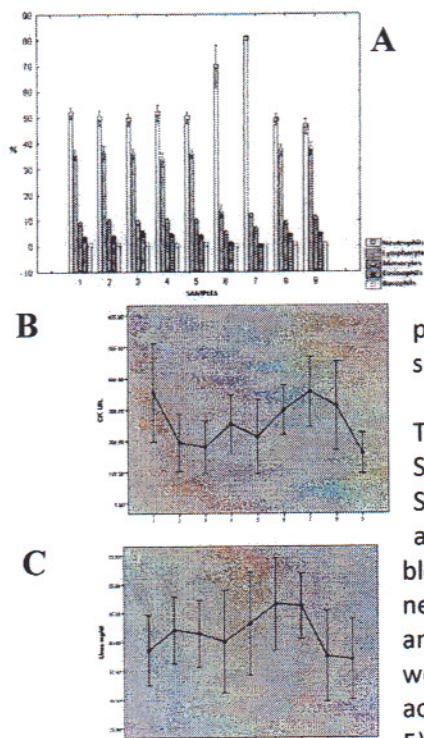


POST 1.5.3

Biological markers in the pre-competition and competition phases of triathlon

Blanca R. Rangel-Colmenero¹, Germán Hernández-Cruz¹, Fernando A. Ochoa-Ahmed¹, Adrián Rosas-Taraco², Hugo Zuazua-Aguirre¹, Oscar Salas-Fraire²

¹Faculty of Sport Organization, UANL, Nuevo León, México; ²Faculty of Medicine, UANL, Nuevo León, México



The physiological effects induced by the training process can be assessed by biological markers, which can be used for monitoring workloads in training to power up sport performance. In the present study the creatine kinase, urea and immune response behavior was analyzed, during the precompetitive and competitive phases of a master category triathlon team in Monterrey, Mexico, with the main objective of establishing the biological standards for our Mexican athletes and with this to develop personalized training programs in order to accomplish better results in this particular sport.

The sample was composed of twelve male athletes (age M=36.41, SD=5.51; height M=179.33 cm, SD=8.02; weight M=81.84 Kg, SD=10.97; Body mass index M=25.25 Kg/m², SD=1.11), the athletes participation was voluntary with a consent letter. Total blood and serum samples were taken, for the quantification of neutrophils, eosinophils, basophils, lymphocytes and monocytes and also for creatine kinase and urea. The samples were taken weekly in the first hour before the athlete started the physical activity during five weeks in the precompetitive training (samples 1-5), during the competition the samples were taken in the next

order: immediately after de competition (sample 6), two hours after the competition (sample 7), 48 hours after competition (sample 8) and one week after the competition when the triathletes performed soft physical activity, for recovery (sample 9).

During the training period a constant concentration of urea and the analyzed cells (neutrophils, eosinophils, basophils, lymphocytes and monocytes) (fig. A and D); and for creatine kinase a concentration increase was observed in the samples 1 and 4 because the athletes had an important physical wear due to the increase of the training intensity in their preparation process for competition. All the variables analyzed in the study presented a high significance difference ($P < 0.1$) among the samples; the creatine kinase, urea and neutrophils during the post competition phase (samples 6 and 7) showed a high significant value followed by a return to normal level values in sample 8 and 9 (fig. A, B, and C). The lymphocytes, eosinophils, monocytes and basophils showed a contrary behavior to what mentioned before, when the triathlon competition was over, the concentration of the analyzed cells diminished on a high significance way, and it recovered in the week after competition (fig. A). The creatine kinase, urea and immune response values reflected changes after performing an exhausting physical activity followed by a recovery to basal values after a week period, which represents an elevation or diminishment towards the physiological boundaries of training. It is important to point that the results presented in this study were an average; however it is also important to mention that in individual way each athlete showed a different response to training, concluding that an integral and personal physical preparation is strictly necessary in this discipline to avoid any overtraining risk, muscle skeletal injuries and myocardial damage.



Publisher: [University of Wales Institute, Cardiff](#)

[More about this publication?](#)

[Related content](#)

Volume 12, Number 3, December 2012

[Purchase this issue](#)

[< previous issue](#) | [all issues](#)

[Update marked list](#)

- [Editorial](#)
pp. i-i(1)
- [Acute effects of static stretching exercises on short-distance flutter kicking time in child swimmers](#)
pp. 484-497(14)
Authors: *Agopyan, Ani; Bozdogan, Fatma Seda; Tekin, Demet; Yetgin, Meral Kucuk; Guler, Cigil Gun*
- [A computer-based observational analysis of physical education teachers and youth sport coaches pedagogic behaviour](#)
pp. 498-506(9)
Authors: *Roberts, Simon J.; Fairclough, Stuart J.; Ryrie, Gus; Sharpe, Lewis*
- [Physiological responses and match analysis of Muay Thai fighting](#)
pp. 507-516(10)
Authors: *Cappai, Ivo; Pierantozzi, Emanuela; Tam, Enrico; Tocco, Filippo; Angius, Luca; Milia, Raffaele; Squatrito, Salvatore; Concu, Alberto; Crisafulli, Antonio*
- [A Statistical Analysis of Tackling Performance during International Rugby Union Matches from 2011](#)
pp. 517-530(14)
Author: *van Rooyen, Michele K.*
- [Game movements and player performance in the Australian Football League](#)
pp. 531-545(15)
Authors: *Hiscock, Daniel; Dawson, Brian; Heasman, Jarryd; Peeling, Peter*
- [The effect of artificial side wind on the serve of competitive tennis players](#)
pp. 546-562(17)
Authors: *Mendes, Pedro C.; Dias, Gonçalo; Mendes, Rui; Martins, Fernando M.L.; Couceiro, Micael S.; Araújo, Duarte*
- [Relative age effect in Brazilian soccer players: a historical analysis](#)
pp. 563-570(8)
Authors: *Costa, Israel Teoldo Da; Albuquerque, Maicon R.; Garganta, Júlio*
- [The Dynamics of Psychological Momentum: A Quantitative Study in Natural Sport Situations](#)
pp. 573-592(20)
Authors: *Briki, Walid; Den Hartigh, Ruud J.R.; Bakker, Frank C.; Gemigon, Christophe*
- [Analysis of the effect of alternating home and away field advantage during the Six Nations Rugby](#)

Championship

pp. 593-607(15)

Authors: *Vaz, Luis; Carreras, David; Kraak, Wilbur*

Progression of Athletic Performance in Age-Group Swimmers in the Past 50 Years

pp. 608-613(6)

Authors: *Vavrek, Jackie; Machin, Daniel R.; Tanaka, Hirofumi*

Choosing the best Twenty20 cricket batsmen using ordered weighted averaging

pp. 614-628(15)

Authors: *Sharma, Sujeet Kumar; Amin, Gholam R.; Gattoufi, Said*

Is the ball velocity dependent on expertise? A multidimensional study in handball

pp. 629-642(14)

Authors: *Laffaye, Guillaume; Debanne, Thierry; Choukou, Mohamed A.*

World Congress of Performance Analysis of Sport IX

25th-28th July 2012, University of Worcester, UK

pp. 643-839(197)

[Update marked list](#)

[< previous issue](#) | [all issues](#)

The complete issue is available for purchase

\$30.00

Purchasing this issue will give you access to all of the articles listed above for 2 days. You may also purchase articles individually by visiting the abstract page of the article. The exact price (including tax) will be displayed in your shopping cart before you check out. You will be able to remove this item from your shopping cart at any time before you have completed check-out.

[Add to cart](#)

Website © 2013 Publishing Technology. Article copyright remains with the publisher, society or author(s) as specified within the article.

POST 1.4 SYSTEMS: (CHAIRS – Peter O'Donoghue & Arnold Baca)

POST 1.4.1 Use of barcode scanning for notational analysis

Donald B. Buchanan, David P. Cook & P. John Seeley (UK)

POST 1.4.2 An analysis of navigation patterns in rowing

Alessandro Pezzoli, Antonio Baldacci, Alda Cama, Marcello Faina, Dario Dalla Vedova, Maurizio Besi, Giuseppe Vercelli, Andrea Boscolo, Marco Dalessandro & Elena Cristofori (Italy)

POST 1.4.3 Predicting sports results using regression and neural models

Adam Maszczyk, Arkadiusz Stanula, Adam Zajac & Robert Rocznik (Poland)

POST 1.4.4 Comparing results of biomechanical analyses of raw data determined using AutoCAD software with those determined by AutoMatlab software for a number of athletic performances

Abi R. Al-bakri & Saadallah A. Rashid (Iraq)

POST 1.4.5 The use of taxonomic tools to analyse national team ice hockey game play

Robert Rocznik, Adam Maszczyk, Arkadiusz Stanula, Przemysław Pietraszewski & Miłosz Czuba (Poland)

POST 1.4.6 Feedback technology in performance analysis

Lucy A. Holmes (UK)

POST 1.4.7 Analysis of the factors of yield in professional basketball applied to an ACB equipment

Marcelo Alejandro Jove Tossi, Maria del Mar Silvestre García, Alfonso Penichet Tomás, Jose Manuel Jimenez Olmedo, Eliseo Cabrera Andreu, Concepción Suarez Llorca, Federico Carreres Ponsoda, Carbonell Martínez & Antonio Jose (Spain)

POST 1.4.8 Using kinematic measures to predict post flight time in the women's artistic gymnastics straight twisting Yurchenko vault

Rebecca Edginton (UK)

POST 1.4.9 Non-linear methods to analyze variability of indoor pedaling kinematics

Juan-Carlos Quintana-Duque (Germany)

POST 1.4.10 The accuracy of judging compared with objective computerised analysis in trampolining

Polly E. Johns & James W. Brouner (UK)

POST 1.5 SPORT SCIENCE & MEDICINE: (CHAIRS – Peter O'Donoghue & Arnold Baca)

POST 1.5.1 A comparison of lower limb strength and static balance in elite gymnasts and wrestlers with non-athletes

M. Reza Bahadoran, Yasser Ghasemzadeh & Tayebbeh Soleimani (Iran)

POST 1.5.2 The relationships between physical readiness and cardiovascular risk factors

Marjeta Mišigoj-Duraković, Daniel Bok, Dražan Dizdar, Zijad Duraković, Maroje Sorić, Igor Jukić & Dario Matika (Croatia)

POST 1.5.3 Biological markers in the pre-competition and competition phases of triathlon

Blanca R. Rangel-Colmenero, Germán Hernández-Cruz, Fernando A. Ochoa-Ahmed, Adrián Rosas-Taraco, Hugo Zuazua-Aguirre & Oscar Salas-Fraire (México)