14th annual Congress of the

EUROPEAN COLLEGE OF SPORT SCIENCE

Oslo/Norway, June 24-27, 2009

BOOK OF ABSTRACTS

Edited by:
Loland, S., Bø, K., Fasting, K., Hallén, J., Ommundsen, Y., Roberts, G., Tsolakidis, E.

Hosted by:
The Norwegian School of Sport Sciences

ISBN 978-82-502-0420-1

European College of Sport Science:
Book of Abstracts of the 14th Annual Congress of the
European College of Sport Science, Oslo/Norway, June 24-27, 2009.
Edited by Loland, S., Bø, K., Fasting, K., Hallén, J., Ommundsen, Y., Roberts, G., Tsolakidis E.
ISBN 978-82-502-0420-1

Copyright by European College of Sport Science

Conception & DTP: SporTools GmbH – Data management in sports
Cover: Elias Tsolakidis
Corrections: Patera, N., Tsianaka, G., Tsolakidis, K.
Printed by GAMLEBYEN GRAFISKE AS

supported by

SPORTOOLS
Data management in sports

Paul-Niessen-Str. 12, 50969 Cologne, Germany
www.SporTools.de

Organisation

Congress President

- Sigmund Loland, NO

ECSS Executive Board

- *President:* Albert Gollhofer, DE
- *President-Elect:* Hans Hoppeler, CH
- *Past President:* Erich Müller, AU
- *General Secretary:* Sigmund Loland, NO
- *Treasurer:* Romain Meeusen BE

ECSS Scientific Board

- *Chair:* Anton Wagenmakers, UK
- Peter Bärtsch, DE
- Jan Cabri, PT
- Flemming Dela, DK
- Paavo Komi, FI
- Gertrud Pfister, DK
- Tom Reilly, UK

ECSS Scientific Committee

- Natalia Balague, SP
- Daniela Caporossi, IT
- Hans-Hermann Dickhuth, DE
- Nenad Dikic, SRB
- Joan Duda, UK
- Michael Grey, DK
- Daniel Green, UK
- Steve Harridge, UK
- Werner Helsen, BE
- Luc van Loon, NL
- Mike McNamee, UK
- Caroline Nicol, FR
- Hermann Schwameder, DE
- Gisela Sjøgaard, DK
- Mark Williams, UK

Local Scientific Committee

- *Chair*: Sigmund Loland, NO
- Kari Bø, NO
- Kari Fasting, NO
- Jostein Hallén, NO
- Yngvar Ommundsen, NO
- Glyn C. Roberts, NO
- *Secretary*: Karen Christensen, NO

Additional reviewers

- Tor Einar Andersen, NO
- Sigmund A. Anderssen, NO
- Jens Boysen-Møller, NO
- Gunn Engelsrud, NO
- Ernst Albin Hansen, NO
- Jørgen Jensen, NO
- Tron Krosshaug, NO

- Grethe Myklebust, NO
- Lars Tore Ronglan, NO
- Ola Rønsen, NO
- Truls Raastad, NO
- Berit Skirstad, NO
- Jorunn Sundgot-Borgen, NO
- Marit Sørensen, NO

Organizing Committee

- *Chair:* Karen Christensen, NO
- Sigmund Loland, NO
- Gro Styrmo, NO
- Øivind Lie, NO
- Elias Tsolakidis, GR
- Thomas Delaveaux, DE
- Tobias Vogt, DE

MUSCLE FATIGUE IN ELITE CROSS COUNTRY SKIERS; A LINK BETWEEN SARCOPLASMIC RETICULUM FUNCTION AND GLYCOGEN AVAILABILITY?

ØRTENBLAD, N.

UNIVERSITY OF SOUTHERN DENMARK

The consistent observations that muscle glycogen (Gly) stores at the beginning of exercise are closely related to endurance capacity and that the point of exhaustion after prolonged exercise coincides with low muscle Gly levels clearly suggest a role for muscle Gly in fatigue (Hermansen et al. 1967). However, the link between Gly and impaired muscle function during fatigue is not well understood and a direct cause-and-effect relationship between Gly and muscle function remains to be established. Here presented a system where events in the excitation-contraction (E-C) coupling are affected by Gly content and localisation.

We examined the effect of Gly content on the sarcoplasmic reticulum (SR) function in the arm and leg muscles of elite cross country skiers (n=10, VO2max 72 ml kg-1 min-1), before, immediately after, and 4h and 20h after a fatiguing 15-km race. During the first 4hrs of recovery the skiers received either water or carbohydrate (CHO), and thereafter the same CHO enriched food. Straight after the race arm Gly was reduced to 31±4% and the SR Ca2+ release rate had decreased to 85±2% of their initial levels. After a 4h recovery with CHO, the SR Ca2+ release rate was fully normalized and Gly had noticeably recovered (59±5% initial). However, if CHO was absent during the first 4h recovery, the muscle Gly and the SR Ca2+ release rate remained low and reduced (29±2% and 77±8%, respectively), with both parameters being normalized after the remaining 16h recovery with CHO. Leg muscle Gly decreased to a lesser extent (71±10% initial) and there were no effects on the SR Ca2+ release rate. Importantly, these data demonstrate a strong association between low Gly levels and muscle E-C coupling even after long recovery periods where adenine nucleotide levels may be normalised. Additionally, SR function is estimated in vitro under constant energy levels. Thus, although related to muscle Gly levels, the impaired SR function is not due to a diminished energy metabolism at low Gly levels.

In line with this, transmission electron microscopy (TEM) reveals that Gly is located in distinct compartments close to different sites of E-C coupling (Marchand et al. 2002). We have shown that 72±3% of intramuscular Gly is located in the intermyofibrillar space (between the myofibrils) and 28 ± 3% in the intramyofibrillar space. Additionally, in single fibres the intramyofibrillar Gly content is positively correlated with fatigue resistance capacity, and intermyofibrillar Gly is inversely correlated with tetanic half relaxation time.

Together, these results demonstrate that two distinct subcellular populations of Gly have different roles in contracting single muscle fibres. This is consistent with the idea that the Gly localisation modulates the E-C coupling, thereby affecting muscle contractility and fatigability.

References

Hermansen, Hultman & Saltin (1967). Acta Physiol Scand 71, 129-139.

Marchand, Chorneyko, Tarnopolsky, Hamilton, Shearer, Potvin & Graham (2002). J Appl Physiol 93, 1598-607.

15:15 - 16:45

Oral presentations

OP-ST01 Sports 1

EFFECTS OF MATURATION ON THE RELATIONSHIP BETWEEN SPEED AND ENDURANCE IN CIRCUM-PUBERTAL SOCCER PLAYERS

MENDEZ-VILLANUEVA, A.

ASPIRE, ACADEMY FOR SPORTS ACADEMY

Effects of maturation on the relationship between speed and endurance in circum-pubertal soccer players

Mendez-Villanueva, A.1, Kuitunen, S.1, Peltola, E.1, Poon,TK.1, Simpson, B.1

1: Performance Enhancement and Talent Identification Section, ASPIRE Academy for Sports Excellence (Doha, Qatar)

Introduction: Morphological and physiological considerations suggest that sprinting ability and endurance capacity put conflicting demands on the design of a human's locomotor apparatus and therefore cannot be maximized simultaneously (Van Damme et al., 2002). However, in children the ability to demonstrate this specialization is less apparent (Rowland, 2002). That is, children who perform well in sprinting tasks also perform well in endurance activities. In this regard, it has been suggested that specialization into endurance or sprinting "types" occurs during late-puberty stages (Falk and Bar-Or, 1993). However, few studies have assessed these associations in children and adolescents of different maturational levels spanning a wide circum-pubertal spectrum. Moreover, the ability to demonstrate this specialization has yet to be tested in young soccer players where players are expected to be selected and/or trained to develop both qualities (i.e., speed and endurance) (Reilly et al., 2000). In the present study we aimed at determining whether maturation affects the relationship between sprinting speed and endurance in a group of circum-pubertal soccer players.

Methods: Sprinting speed and endurance capacity were measured in 14 early-pubertal male soccer players (16.9 ± 0.7 yr old; mean ± SD), mid-pubertal male soccer players (14.3 ± 0.9 yr old) and 26 late-pubertal male soccer players (12.3 ± 0.7 yr old). Each player performed an incremental field test to exhaustion for the determination of maximal aerobic speed (MAS) (i.e., endurance capacity) and a 40-m running sprint test for the assessment of maximum sprinting speed (MSS). Relationships between size-corrected MSS and MAS measures were examined.

Results: MSS was correlated with MAS (r = 0.66 ± 0.15; 95% confident limits, moderate to very large). The MSS/MAS ratio did not differ among the three groups; early-pubertal soccer players (1.16 ± 0.06; mean ± SD), mid-pubertal soccer players (1.18 ± 0.07) and late-pubertal soccer players (1.16 ± 0.06).

Discussion: Within this cohort of highly trained young soccer players, which spans a wide circum-pubertal spectrum, speed and endurance capacity coevolved. In conclusion, the development of sprint capacity appear not to be constrained by the need of endurance capacity and vice versa.

References

Falk B, Bar-Or O. (1993). Pediatr Exerc Sci, 5, 318-331.

Reilly T, Bangsbo J, ranks A. (2000). J Sports Sci, 18, 669–683.
Rowland T. (2002). Pediatr Exerc Sci, 14, 315-320.
Stølen T, Chamari K, Castagna C, Wisløff U. (2005). Sports Med, 35, 501–536.
Van Damme R, Wilson RS, Vanhooydonck B, Aerts P. (2002). Nature, 415, 755-756.

EFFECT OF EXTREME ENVIRONMENTAL CONDITIONS ON PHYSICAL ACTIVITY PATTERNS OF SOCCER PLAYERS

OZGUNEN, K., KURDAK, S., CIGDEM, Z., KORKMAZ, S., YAZICI, Z., ERSOZ, G., BINNET, M.
ÇUKUROVA UNIVERSITY, TURKEY, ANKARA UNIVERSITY, TURKEY

Soccer teams may sometimes be obliged to play under difficult environmental conditions. Activity patterns of players of different standards have been analyzed by time-motion analysis, but there is dearth of knowledge how the players' match performance is affected by environmental conditions.
Purpose: This study aimed to evaluate changes in the activity patterns during a soccer match played in different conditions of environmental temperature and humidity.
Methods: Non-acclimatized soccer players (n=10, the goal keeper was excluded, 20 ±2 y, V'O2max=63 ±7 ml/min/kg) played 2 matches in different environmental conditions. Players ingested telemetric core temperature (Tc) sensors prior to each match and wore a heart rate (HR) and global positioning system (GPS) monitor during the match. A computer based analysis program was used to evaluate heart rate and speed changes during the match. The following locomotor categories were used: standing (0 – 0.4 km/h), walking (0.5 – 7.5 km/h), jogging (7.6 – 14.5 km/h), low – moderate running (14.6 – 19.5 km/h), high speed running (19.6 – 25.5 km/h) and sprinting (> 25.6 km/h). These were later divided into five categories: (1) standing; (2) walking; (3) running, encompassing jogging and low – moderate intensity running and (4) high intensity running, consisting of high speed running and sprinting.
Results: The average ambient temperature for the June 2007 match was 34 ± 1 ⁰C with a relative humidity of 38 ± 2 %. In the July 2007 match, ambient temperature was recorded as 36 ± 0 ⁰C with a relative humidity of 61 ± 1 %. Peak Tc values recorded for June and July matches were 39.1 ± 0.4 ⁰C, and 39.6 ± 0.3 ⁰C respectively. Total distance covered during June and July matches was 8.6 ± 0.6 and 8.1 ± 0.7 km respectively. The total distance covered in the first and second halves were: 4.4 ± 0.4 and 4.2 ± 0.3 km for June and 4.3 ± 0.5 and 3.8 ± 0.4 km for July matches. The difference between the halves of the July match was significant. The running distance covered in the second half of the July match was significantly shorter than first half of July and second half of June matches (2.1 ± 0.4 and 1.9 ± 0.3 km for the first and second halves of June and 1.9 ± 0.5 and 1.3 ± 0.4 km for the first and second halves of July matches;p<0.05)
Conclusion: In soccer matches played in high environmental temperature and humidity, the physical performance of the players may decrease due to high thermal stress. In the present study, the players' increased body core temperature at half time was followed by a decrease in total distance covered in the second half of the game. This may point to a centrally-driven performance reduction.

COOLING INTERVENTION AND SOCCER UNDER EXTREME HEAT CONDITIONS

KURDAK, S.S., ÖZGÜNEN, K.T., MAUGHAN, R., ZEREN, Ç., KORKMAZ, S., YAZİCİ, Z., ERSÖZ, G., SHIRREFFS, S., DVORAK, J., BINNET, M.S.
1. ÇUKUROVA UNIVERSITY, TURKEY, 2. LOUGHBOROUGH UNIVERSITY, UNITED KINGDOM, 3. ANKARA UNIVERSITY, TURKEY, 4. FIFA/FMARC, SWITZERLAND

Whole body pre-cooling with fluid ingestion had been discusses as one of the main interventions to improve athletic performance in extreme heat conditions. Extensive research had been performed to evaluate the effect of precooling on athletic performance and body core temperature, but the influence on a soccer match had not been investigated. Purpose: The aim of this study was to investigate the effect of cooling intervention on athletic performance and body core temperature during a competitive soccer game. Methods: 11 soccer players aged 21 ± 2 y (mean ± SD) with V'O2max of 59.8 ± 5.0 ml/kg/min volunteered to play two matches (without – C and with cooling intervention-CI) for this study. The ambient temperature and humidity was 34.3 ± 0.6 oC and 64 ± 2 % for the first and 34.0 ± 0.5⁰C and 62 ± 0 % for the second game (CI) respectively. Players had opportunity to consume ad libitum plain water during the C, plain water or sports drink by choice during CI study. A cooling tent and icy water filled buckets placed beside the soccer field were used for cooling intervention. Match activity was recorded by a global positioning system. Thermosensor pills were used for body core temperature (Tc) measurements. Blood samples were withdrawn from an antecubiteal vein 5 hours before and immediately after the game to determine hematocrit (Htc), hemoglobin content (Hb), calculate plasma volume loss, and changes of serum electrolytes. ANOVA and paired sample t-test was used to evaluate the level of significance, and p values < 0.05 were accepted as significant. . Results: The highest Tc value recorded during the last ten minutes of the first half and the difference between C and CI groups was not significant (39.54 ± 0.5 vs 39.3 ± 0.5oC respectively). Total liquid consumption was measured as 1473±422 ml for C, and 1230±494 ml for CI group (926±604 ml plain water, and 304±240 ml sports drink). Post-match dehydration % was similar for both C (2.49±0.67) and CI match (2.54±1.21). Pre- and post-match Htc (48.9±3.3 vs 49.2±3.3 %) and Hb (161±14 vs 163±13 g/L) were used to calculate % plasma volume change (0.1±5.5 %) for the C match. The plasma volume loss for the CI group was calculated as -5.1±5.6 with pre- and post-match Htc (46.2±2.3 vs 46.9±2.1) and Hb (153±10 vs 156±9) content. Plasma volume loss for C and CI groups were not significant. Pre- and post-match difference of serum Na (145±2.5 vs 144±3 mmol/L), and K (5.4±0.4 vs 5.4±0.4 mmol/L) for C and CI groups were not significant. CI did not change distance covered during the game significantly (8298 ± 589 meters vs 8315±549 meters for C and CI groups respectively) Conclusion: Cooling intervention was not sufficient to reduce Tc and improve match performance significantly. Slight reduction of Tc that observed with whole body cooling, may be important for prevention of heath related problems that occur in extreme heat conditions.

PLAYING FOOTBALL <SOCCER> UNDER EXTREME HEAT CONDITIONS – EFFECT OF ACCLIMATISATION

ERSÖZ, G., KURDAK, S.S.., ÖZGÜNEN, K.T., MAUGHAN, R.J.., ZEREN, C., KORKMAZ, S., YAZICI, Z., BINNET, M.S.
1. ANKARA UNIVERSITY, 2. ÇUKUROVA UNIVERSITY, 3. LOUGHBOROUGH UNIVERSITY

Exercise intensity is an important factor to induce thermal strain, and soccer is a challenge for the players who have to play under extreme heat conditions. Acclimation is an important intervention to improve thermal tolerance and endurance capacity.
Purpose: We aimed to evaluate effect of acclimation on sportive performance during a game played under extreme heat conditions Methods: 11 male acclimated soccer players (age 23  2 y, VO2 max 61.8  1.1 ml.min-1.kg-1) and 10 unaccli-