

18th annual Congress of the
EUROPEAN COLLEGE OF SPORT SCIENCE
26th - 29th June 2013, Barcelona – Spain
BOOK OF ABSTRACTS

Edited by:

Balagué, N., Torrents, C., Vilanova, A., Cadefau, J., Tarragó, R., Tsolakidis, E.

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Edited by Balagué, N., Torrents, C., Vilanova, A., Cadefau, J., Tarragó, R., Tsolakidis, E.
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Welcome

Dear congress participant,

Since its creation one of the main aims of the ECSS has been to contribute to the unification of sport science. However, the tremendous growth in the field has produced further fragmentation. Is it possible to unify these fragmented areas? Are there common principles that bind them?

Reductionism has dominated research for over a century and has provided a wealth of knowledge, yet it is increasingly clear that a discrete biological function can only rarely be attributed to an individual molecule. Indeed, most biological characteristics arise from complex interactions: between proteins, cells, organisms, groups, societies, etc. A key challenge in the twenty-first century is therefore to understand the structure and dynamics of these complex interactions, as this will surely foster a new and better understanding between the different scientific disciplines.

The 2013 ECSS Congress in Barcelona seeks to help sport science make its own leap forward towards a comprehension of ourselves not as part of a technical world but as interacting parts of a consistent and coherent whole: nature. The 18th Annual Congress of the ECSS aims to contribute to the development of global approaches in the different specialized areas and to provide an even broader view of sport science. Hopefully, by moving from the whole to the parts and vice versa, sport scientists will be able to find the best paths through the field.

Barcelona is an open city: open to the sea, to culture, to the world and to science. What better place in which to join forces in unifying sport science.

Benvinguts a Barcelona,

Bienvenidos a Barcelona,

Welcome to Barcelona!

Natàlia Balagué & Carlota Torrents

Congress Presidents

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* Clinical track

Friday, June 28th, 2013

08:30 - 10:00

Oral presentations

OP-PM10 Health and Fitness [HF] 6

EFFECT OF "FUNCTIONAL FOOD" SUPPLEMENTATION ON MUSCLE GROWTH AND STRENGTH INDUCED BY 12 WEEKS OF RESISTANCE EXERCISE IN ELDERLY MEN

Hellelid, K.J., Bjørnsen, T., Salvesen, S., Berntsen, S., Stea, T.H., Lohne-Seiler, H., Paulsen, G.

University of Agder

Introduction Lack of dietary protein and micronutrients is often found amongst elderly. The aim of the present study was to investigate the effect of a mixed supplementation on muscle growth and strength after 12 weeks of strength training in elderly men. **METHODS** Thirty-three elderly males (60 – 81 yrs old) were included to either a supplemented group (N=16) or a placebo group (N=17) in a double blinded randomized placebo controlled trial. Muscle growth was assessed as changes in lean mass with DEXA and thickness of rectus femoris, vastus lateralis and arm flexors (brachialis and biceps brachii) with ultrasound imaging. Strength was measured as 1RM in leg press, knee extension and scott curl. A four day validated 18-page pre-coded food diary was completed. The supplementation was based on natural antioxidant-rich pomegranate juice with 22 g of carbohydrates, enriched with marine omega-3 fatty acids (900 mg), 15 µg vitamin D and 9 g whey protein isolate + 2 g of leucine and were administered twice daily. All participants conducted resistance exercise 3 times a week, following an undulating periodized program: 2/wk 8-10RM (1 min inter-set rest periods), 1/wk between 3-5RM (2 min rest) or 13-15RM (45 sec rest). The load was weekly adjusted, and the volume increased progressively throughout the 12 weeks of resistance exercise. Data was analyzed using non-parametric tests. **RESULTS** The supplemented group (mean±SD, 112g±39) had significantly higher protein intake at baseline compared to the placebo group (86g±20)(p=0.02), but not post. 1RM increased in the range of 15-20% in supplemented and placebo groups during 12 weeks of resistance exercise (p<0.001); no group differences were identified. Lean body mass increased for both the supplemented group (2.2 kg (median with 95% confidence intervals) (0.9-2.9)) and the placebo group (2.2 kg (1.5-3.3)) after 12 weeks of resistance training (p<0.01). However, the rectus femoris thickness increased more in the placebo group (16.2% (12.8-24.1)) than the supplemented group, (11% (4.1-17)) (p<0.05), while no significant differences between group were found for arm flexors and vastus lateralis thickness. **DISCUSSION** A mixed supplement with omega-3 fatty acids and whey protein did not have any additional effects on the adaptations to resistance exercise in elderly men. This might be due to an already sufficient intake of such nutrients, or insufficient levels of proteins in the supplementation to stimulate further muscle growth. Note: The Smartfish@ company partly financed this study.

A SIMPLE 45 SECOND SQUAT TEST CAN ACCURATELY PREDICT VO2MAX: PRELIMINARY RESULTS

Sartor, F., Bosio, A., Bonomi, A., Kubis, H.P.

Philips Research

Introduction VO₂max is an important parameter to determine the functional capacity of the cardio-respiratory system. Its direct determination via maximal exercise testing may result not always feasible to perform, in particular in subjects with increased risk of cardiovascular diseases. Thus we have validated a simple and short sub-maximal test which does not require any type of equipment other than a heart rate (HR) monitor and a metronome and can be performed by anybody with no lower limbs limitations. **Methods** Eight male cyclists (Age: 19 ± 2 yrs; Height: 177 ± 7 cm; Weight: 65.4 ± 4.5 kg; Body Fat %: 8.36 ± 2.00%) underwent a Ruffier-Dickson test. This consisted of resting supine for 5 min, then standing up, and once the HR was stable, performing 30 squats in 45 s following a metronome set at 80 bpm. Once the squatting exercise was completed the participants laid down supine to recover for 3 min. HR was recorded throughout. After 3 min when HR ≤ initial resting HR the participants underwent a Vo₂max test on the cycle ergometer. Body fat % was estimated via plicometry. **Results** The cyclists had a mean VO₂max of 4.36 ± 0.44 L/min, 67.2 ± 6.2 mL/kg/min. Their VO₂max significantly correlated with their height (r = 0.746, p = 0.03), and slope of HR increase during the squats (r = 0.705, p = 0.05). The best VO₂max prediction via multiple linear regression showed high r = 0.977 and adjusted r² = 0.892, and small inaccuracy, Standard Error of Estimate (SEE) = 0.145 L/min, SEE% = 3.3. Eq.1: VO₂max (L/min) = -2.489 + (0.0436 * height (cm)) + (1.458 * Slope Sq HR) - (0.00234 * Recovery DeltaHR120 (bpm)) - (0.170 * Fat %). If body fat % via plicometry is not available VO₂max can be still predicted accurately using Eq.2: VO₂max (L/min) = -1.788 + (0.0317 * height (cm)) + (1.812 * Slope Sq HR) - (0.00834 * Recovery DeltaHR120 (bpm)); r = 0.812, adjusted r² = 0.405, SEE = 0.340 L/min, SEE% = 7.8. **Discussion** We have developed a model (Eq.1), which can accurately (3% error) predict VO₂max in young male athletes from a simple 45s squat test. Although body fat % increases the prediction accuracy, if not available the accuracy of an alternative model (Eq.2) (7.8% error) is still in line with other sub-maximal tests (e.g. 9% Astrand-Rhyming cycling test, 11.4% Ebbeling treadmill test, 8% McArdle step test). We are currently testing more sedentary individuals to see whether these results can be generalized. Although these are preliminary results on only 8 participants and the error might increase when a large sample is considered, this 45s squat test seems to be very promising.

ASSOCIATION BETWEEN MOTOR COMPETENCE AND PHYSICAL ACTIVITY. A LONGITUDINAL STUDY IN CHILDREN

Lopes, V.P., Sousa, J.F.D., Rodrigues, L.P.

Polytechnic Institute of Braganca

Introduction: The aim of this study was to analyze the influence of motor competence on children's physical activity levels (PA). Motor skills proficiency and coordination levels were studied as predictors of children's PA levels during 4 years. **Methods:** This longitudinal study took place between 2009 and 2012, with a sample of 98 children. At the beginning of the study the sample was composed of 24 children with

six years old, 40 children with seven years and 34 children with eight years, who were followed over 4 consecutive years, performing annual assessments of anthropometric variables, PA, motor coordination and fundamental motor skills. Pedometer was used as an objective instrument for assessing PA, test of Körperkoordination Test für Kinder (KTK) to assess motor coordination and test of Gross Motor Development (TGMD-2) to assess the fundamental movement skills, composed by objects control skills and locomotor skills. For data analysis we used the hierarchical or multilevel modeling, in order to determine the predictors of PA through five successive adjustment models. Results: The children's PA levels significantly decreased over time. At baseline the girls had a PA level significantly lower than boys. The magnitude of the differences in PA levels between boys and girls has not changed significantly over the observations. Motor coordination levels and proficiency in object control skill were not predictors of PA, whereas the proficiency in locomotor skills was the only significant predictor of PA. There were a large percentage of children who did not comply with the minimum recommendations in the number of daily steps and this situation tends to worsen with increasing age, especially in girls. Conclusions: The locomotor motor skills were a significant predictor of children's PA levels along 4 years.

EXERCISE HYDRATION KNOWLEDGE OF SINGAPOREAN YOUTH COACHES AND PHYSICAL EDUCATION TEACHERS

Chia, M., Mukherjee, S., Huang, S.H.

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Introduction Dehydration has deleterious effects on sport performance and contributes to heat-related illnesses. Singapore youth athletes are at a greater risk of dehydration-associated ailments due to the tropical climate, especially when training outdoors. Coaches and Physical Education (PE) teachers must possess adequate hydration knowledge to ensure optimal performance and sports safety in the youth athletes. The present study examines the exercise hydration knowledge of Singapore coaches and PE teachers. Methods 193 coaches (Beginning coaches n=129, certified coaches n=64) and 164 PE teachers (Beginning teachers n= 102, graduating teachers n=62) participated in the study. Participants completed a questionnaire based upon ACSM and NATA guidelines on fluid replacement for athletes (Casa et al. 2000; Sawka et al. 2007). The questionnaire consisted of pre-exercise, during-exercise and post-exercise hydration knowledge sections. Adequate hydration knowledge was accepted as a score of 80% and above (Ransone and Dunn-Bennett 1999). Results 70.3% of participants were coaching youth athletes. Average knowledge scores were: beginning coaches (BC)-61.76±12.36%; certified coaches (CC)-68.09±12.30%; beginning PE teachers (BT)-62.46±10.24%; graduating PE teachers (GT)-67.01±9.46%. There was a significant difference in the passing rates between BC and CC (BC-3.1% vs CC-17.2%, $p < .05$). The difference in passing rates between BT and GT was not significant (BT-5.9% and GT-11.3%, $p = < .05$). Even at 80th percentile, none of the groups attained passing scores. At 90th percentile, only the CC and GT attained passing scores. Discussion Results showed that the majority of coaches and PE teachers in Singapore have inadequate hydration and fluid replacement knowledge and they were largely unfamiliar with the NATA and ACSM guidelines on fluid replacement. The lack of adequate exercise hydration knowledge among coaches and PE teachers puts the health and well-being of youth exercising in the hot and humid climate of Singapore at risk. It is important to bridge current hydration knowledge gaps among coaching and PE practitioners and step up education programmes to empower youths with appropriate exercise hydration knowledge. Future studies focusing on coaches' education on hydration and fluid replacement are essential. References Casa DJ, Armstrong LE, et al. (2000). *Journal of athletic training* 35(2): 212-224. Ransone J & Dunn-Bennett LR (1999). *Journal of athletic training* 34(3): 267-271. Sawka MN, Burke LM, et al. (2007). *Medicine and science in sports and exercise* 39(2): 377-390.

08:30 - 10:00

Oral presentations

OP-PM49 Training and Testing [TT] 3

COMPARING HEART RATE MONITOR AND ACCELEROMETER TO DETERMINE ENERGY EXPENDITURE

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Introduction Heart rate monitors are an accurate tool to measure heart rate response to physical activity. It has also become a common tool to measure energy expenditure. During the last 15 years accelerometers have become one of the most common objective methods to assess physical activity. Understanding how different tools measure physical activities differently is important in order to compare methods and interpret data correctly. The purpose of the study was therefore to compare the estimation of energy expenditure from heart rate monitors and accelerometer in interval running and zumba (a Latin dance-inspired fitness program). Methods A total of 26 sports students (15 females) with a mean age of 21.8±2.4 (SD) years, wearing both heart rate monitor and accelerometer, carried out two different training sessions: A 45 min interval running session containing 12 min warmup, 4x4 min running, 90-95% of max heart rate, with 3 min jogging, 70% of max heart rate between each interval, and 5 min cooldown. Zumba 60 min containing 5 min warmup, thereafter 50 min zumba, and 5 min cooldown. Polar RS 100 monitors with belts were used to measure the participants' heart rates. The participants measured their maximal and resting HR by a standardized protocol. ActiGraph GT3X was used to measure the participants' accelerometer counts, collected in 60-second epochs. The equations by Hiilloskorpi et al. (1999) and Sasaki et al. (2011) were used to determine the participants' activity energy expenditure from heart rate monitors and accelerometers, respectively. Results The mean vector magnitude counts per minute (cpm) were 8612±1101 cpm and 6704±1424 cpm for interval running and zumba, respectively. The mean working intensity in % of maximal heart rate was 82.5±3.3 % and 74.9±10.7 % for interval running and zumba, respectively. The mean energy expenditure during the running session was 11.51± 2.29 kcal/min and 9.26±1.86 kcal/min estimated by heart rate monitors and accelerometers, respectively ($p < 0.0001$). Corresponding energy expenditure for zumba were 9.86± 2.68 kcal/min for heart rate monitors and 7.22± 1.73 kcal/min for accelerometers ($p < 0.0001$). Discussion The main finding is the documentation of the large differences in the estimation of energy expenditure between heart rate monitor and accelerometer. Heart rate monitors estimated 24% and 37% higher energy expenditure in kcal/min than accelerometers in interval running and zumba, respectively. A greater difference during zumba could be explained by the fact that the participants perform large upper body movements not recorded by the accelerometer. References Hiilloskorpi H, Fogelholm M, Laukkanen R, Pasanen M, Oja P, Mantari A, Natri A. Factors affecting the relation between heart rate and