

## Abstracts From the December 2020 Virtual International Sport + Exercise Nutrition Conference

### Effects of Multi-Ingredient Pre-Workout Supplementation Across a 5-Day Resistance and Endurance Training Microcycle in Middle-Aged Pre-Menopausal Women

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Pre-workout multi-ingredient admixtures are currently used to maximise subsequent exercise performance. The present double-blind, cross-over study compared the acute effects of ingesting a multi-ingredient (PREW) vs. maltodextrin (CHO) over a training week (microcycle) composed by three resistance training (RT) workouts alternated with two 30-min low-intensity endurance sessions (END) on total volume lifted (kg) during RT and substrate oxidation during END. Additionally, post-workout decreases of involuntary and voluntary muscle function, subjective measures of effort and feelings were analysed. Following a baseline performance assessment, seven recreationally trained middle-aged women ( $49 \pm 4$  years old) completed two identical microcycles separated by a 2-week washout period while receiving either PREW or CHO (15 minutes prior to workout). The exercise volume (kg lifted), per session (WVOL) and for the total three RT (WeeklyVol) was calculated. Fatty acid oxidation (FAO) during 30-min cycling corresponding to their individually-determined maximal fat oxidation was measured using expired gasses and indirect calorimetry. Assessments of strength and power performance, along with tensiomyography analysis, were conducted within 20 min after each RT. Under the PREW, the participants completed significantly ( $p = .001$ ) higher WeeklyVol and WVOL (for the three RT) and higher, but not significant FAO ( $p = .17$ ;  $d = 0.6$ ) during the first END workout. No other statistically significant differences were observed between conditions. Compared to CHO, a pre-workout multi-ingredient appears to increase resistance exercise volume and may suppose a tendency to favour fat oxidation during low-intensity endurance exercises.

### Factors Mediating the Effect of Caffeine Supplementation on the IL-6 and IL-10 Response to a Treadmill Exercise Test

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Caffeine is one of the most consumed ergogenic aids used by athletes. It has been previously reported that caffeine could modify the response of two essential cytokines, IL-6 and IL-10, to an acute bout of exercise. The aim of this study was to determine whether adrenaline, cortisol or cyclic adenosine monophosphate (cAMP) mediate this effect. In a randomized, crossover, double-blind study, thirteen healthy, well-trained amateur male athletes performed a treadmill exercise test (60 minutes at 70% VO<sub>2</sub>max),

on two different occasions, after ingesting 6 mg/kg body mass of caffeine or a placebo. Blood samples were taken before and immediately after exercising, as well as two hours after finishing the exercise. The plasma concentrations of IL-10, IL-6, adrenaline, cortisol and cAMP were determined, and multiple linear regression models for IL-10 and IL-6 were analysed. The independent variables considered were time (pre-exercise, post-exercise, recovery), condition (caffeine, placebo) and adrenaline, cortisol and cAMP concentrations. The IL-10 model also included IL-6 as an independent variable. Caffeine supplementation influenced IL-6 ( $3.04 \pm 0.40$  vs.  $3.89 \pm 0.62$  pg/mL,  $p = .003$ ) and IL-10 ( $2.42 \pm 0.54$  vs.  $3.47 \pm 0.72$  pg/mL,  $p = .01$ ) levels, with higher concentrations after exercise in the supplemented condition. The regression analysis showed that IL-6 was the main predictor for IL-10 plasma concentrations (R<sup>2</sup> change 0.435,  $p < .001$ ); time (R<sup>2</sup> change 0.083,  $p = .001$ ) and cAMP (R<sup>2</sup> change 0.051,  $p = .004$ ) were also found to be significant predictors. Adrenaline was found to be the main predictor for IL-6 concentrations (R<sup>2</sup> change 0.379,  $p < .001$ ); with the time factor also being a significant predictor (R<sup>2</sup> change 0.213,  $p < .001$ ). In conclusion, the results of this study point to IL-6 as the main factor for determining IL-10 response to exercise after caffeine supplementation. In turn, the effects of caffeine on the IL-6 response to exercise seem to be mainly dependent on adrenaline.

### Sports Nutrition Knowledge Among Polish Athletes According to the Abridged Nutrition for Sport Knowledge Questionnaire (A-NSKQ)

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A well-planned nutrition strategy may promote training adaptations. Higher levels of sports nutrition knowledge may translate to better diet quality, increasing athletes' chances of success. Determining the level of nutritional knowledge in athletes can identify both areas for education and specific sports groups in need of educational intervention. In the study on 128 Polish athletes (77 males, 51 females, age: 17–32 y.), the nutrition knowledge was measured with the validated A-NSKQ. The A-NSKQ measures both general nutrition knowledge (GNK) and sport nutrition knowledge (SNK). Based on normality, the parametric t-test, or non-parametric Spearman correlation, the U-Mann-Whitney test were used. Significance was set at an alpha level of  $p \leq .05$ . In the whole group, the mean total A-NSKQ score was  $44 \pm 12\%$ , which was classified as "poor." The score of SNK was significantly lower than GNK ( $37 \pm 14\%$  vs.  $53 \pm 15\%$ ;  $p < .001$ ). There were no differences between male and female athletes in A-NSKQ total, GNK, and SNK score. The total A-NSKQ and SNK score were positively correlated to age ( $R = 0.27$ ,  $p = .002$ ;  $R = 0.29$ ,  $p = .001$ ; respectively), and the level of education ( $R = 0.31$ ,  $p < .001$ ;  $R = 0.37$ ,  $p < .001$ ; respectively). When stratified into two sport categories, individual-sport athletes got higher total ( $47 \pm 12\%$  vs.  $40 \pm 13\%$ ,  $p = .001$ ), GNK ( $56 \pm 14\%$  vs.  $49 \pm 16\%$ ,  $p = .022$ ) and SNK score ( $40 \pm 14\%$  vs.  $31 \pm 13\%$ ,  $p = .001$ ) than

team-sport athletes. Our results indicate the low level of nutritional knowledge in Polish athletes and, in particular, in individuals from team sports. The findings indicate the need to educate Polish athletes, particularly regarding current recommendations in sports nutrition.

### **An Investigation Into Changes in Cognitive Function of Irish Amateur Boxers as They Approach Their Weight Category Weight**

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Boxing is a combat sport which typically sees athletes competing at the lightest bodyweight possible to gain a competitive advantage. Several methods are used to reduce bodyweight and traditionally dehydration has played a significant role in rapid weight-loss. These rapid weight-loss methods have been shown to result in decrements in cognitive performance and can impact both short and long-term health and sports performance. 8 members of the Irish High-Performance boxing programme who were in the process of 'making-weight' participated in this research. Baseline hydration, body weight, skinfolds, (sum of 7), and cognitive assessments (simple and choice reaction time, attention, learning and memory) were completed six weeks prior to a targeted competition. These measurements were then repeated in the week of the targeted competition, as participants were 'making-weight'. There were statistically significant changes in body-weight ( $n = 8$ ), and in the corresponding weight above weight category, but no statistically significant changes in skinfolds ( $n = 5$ ) or hydration, ( $n = 8$ ) over the 6-week training block. At baseline, mean hydration levels were  $800 \text{ mOsm}\cdot\text{kg}^{-1}$  and this increased to  $>850 \text{ mOsm}\cdot\text{kg}^{-1}$  over the 6 weeks. There were no statistically significant changes found in the cognitive function measurements. Due to the wide variation in hydration levels, it cannot be ascertained if hydration status affected reaction times in this study. There is also the element of habitual dehydration that boxers go through whilst making weight, further research is warranted to see if the body does adapt to these situations. Even though there were no statistically significant changes found in simple and choice reaction time speeds; from a practical application, coaches may be interested to note that 6 of the 8 boxers were slower in both of these elements as they came closer to their targeted competition. This warrants further investigation to determine, if weight making practices were improved, could reaction times also improve.

### **Alkaline Diet Improves Vertical Jump Performance in Volleyball Players**

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Increased buffering capacity helps to maintain muscle contraction and delay muscle fatigue during high intensity exercise. In this regard various nutritional supplements increasing buffering capacity are used to improve high intensity exercise performance. In recent years, it has been postulated that an alkaline diet may also increase the exercise performance by creating a buffering effect. Therefore, the aim of the current research is to compare the acute effects of alkaline (ALD) and acidic diets (ACD) on anaerobic performance and hydration level in volleyball players. Eleven semi-professional male volleyball players (age =  $20 \pm 1$  y, training age =  $9 \pm 3$  y) voluntarily participated in the study in a randomized, single-blind, cross-over design. Each participant visited the laboratory three times: baseline (B) measurements were taken with their unmodified

usual diet, followed by two measurements following a 4-day ACD or ALD program with a 1-week washout period between. ACD and ALD contents were calculated individually and the participants were provided with packed daily meals. Measured variables included urine pH, 30 sec Wingate anaerobic exercise performance, countermovement jump (CMJ) and squat jump (SJ) performances, and blood lactate (La). Repeated measures ANOVA was used to analyse the data. Bonferroni correction was used as post-hoc analysis. No main effect of diet was found on Wingate anaerobic exercise performance ( $p > .05$ ). However, both SJ and CMJ performance increased significantly with the alkaline diet (CMJ (cm); ALD  $40.7 \pm 6.4$ , ACD  $39.9 \pm 5.9$ , baseline  $38.9 \pm 6.5$ ,  $p < .05$ ; SJ (cm); ALD  $37.6 \pm 5.7$ , ACD  $36.3 \pm 5.3$ , baseline  $35.4 \pm 6.0$ ,  $p < .05$ ). Hydration level (ALD  $1017 \pm 4$ , ACD  $1024 \pm 4$ , baseline  $1019 \pm 4.9$ ,  $p < .05$ ) and urine pH (ALD  $6.7 \pm 0.5$ , ACD  $5.1 \pm 0.3$ , baseline  $5.2 \pm 0.4$ ,  $p < .05$ ) were significantly different in favour of the ALD while no difference was found between BLA levels (mmol/L, ALD  $6.2 \pm 2.0$  ACD  $6.2 \pm 1.3$ , baseline  $6.8 \pm 1.8$ ,  $p > .05$ ). As a result; volleyball players may be advised to have an alkaline diet starting four days before the matches. An alkaline diet can be an easy and natural way to improve hydration and increase vertical jump performance for athletes. However, more studies are needed to elucidate the effect of alkaline diet on anaerobic performance.

### **Estimation of Athlete's Prevalence of Risk of Low Energy Availability at the 26th European Cross-Country Championships**

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Energy availability (EA) refers to the difference between energy intake and exercise energy expenditure divided by fat-free mass. Low EA (LEA) is linked with impaired physiological functioning such as menstrual function and bone health. Cross-country (CC) is a weight sensitive sport with high training loads and physiological demands. The risk of LEA in elite CC athletes is considered high but literature is still limited. The aim of this study was to estimate the prevalence of elite European CC athletes at risk of LEA and the presence of LEA related negative outcomes. Athletes  $\geq 18$  y competing at the 26th European CC Championships were invited to fill the LEA in Females Questionnaire (LEAF- Q). The LEAF-Q is a validated survey that identifies female athletes at risk of LEA. It has 3 sections: (i) injuries; (ii) gastrointestinal function; (iii) menstrual function and use of contraceptives. The LEAF- Q has also been applied in male athletes. A total of 207 valid surveys were collected (83 females,  $22 \pm 4$  y) plus 16 excluded. A high prevalence of athletes at risk of LEA (64%) was observed, with a higher percentage in women than men (80% and 54%,  $p < .001$ ). During the previous year, 52% reported missing training or competition due to injuries. Furthermore, 10 athletes (%) reported stress fractures. For gastrointestinal function, 54% reported evacuating once a week or more rarely. Regarding menstrual function, 43% reported having their first menstruation at 15 years or older, while 4% reported never having menstruated. Additionally, more than 40% reported not having normal menstruation while 50% reported changes of menstruation with training. Furthermore, athletes reported using contraceptive either to regulate menstrual cycle in relation to performance ( $n = 7$ ) or to prevent the cessation of menstruation ( $n = 3$ ). In