RESEARCH TO PRACTICE 2018
27-29 MARCH 2018
BRISBANE, QUEENSLAND

EARLY CAREER RESEARCHER AWARD SPORTS SCIENCE FINALISTS

Wednesday, 28 March 2018
3:30pm – 5:00pm

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Effect of training, β-alanine and NaHCO3 on repeat sprint ability and cycle capacity

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Introduction & Aims: This study investigated whether supplementation of *β*-alanine for 28 days, in conjunction with repeated sprint and sprint interval training (SIT) and when combined with a pre-exercise dose of $NaHCO_3$, could improve repeated-sprint ability and high intensity cycling capacity in healthy males.
Methods: A randomised, double-blind placebo-controlled four week training study was conducted with an additional cross-over component where $NaHCO_3$ and placebo was ingested before and after 28 days of either *β*-alanine (6.4 $g \cdot day^{-1}$) (n = 14) or placebo (n = 13) supplementation combined with repeated sprint and SIT. Participants completed a repeated sprint (5 x 6 sec sprint) and a time to fatigue test (~110% maximum cycling power output - $CCT_{110\%}$) twice before and after training; once following $NaHCO_3$ ingestion and once following placebo ingestion, provided in a random order.
Results: The training program resulted in a *'likely'* improvement (4.8%) in total work during the 5 x 6 sec sprints in the placebo group while the *β*-alanine group had a slightly larger, ***'almost certain',*** magnitude of improvement (7.7%); coingestion of *β*-alanine and $NaHCO_3$ resulted in a *'likely'* improvement (5.0%) in repeat sprint performance. During the $CCT_{110\%}$ test prior to the intervention, the likelihood of a meaningful change following $NaHCO_3$ was ***'almost certain',*** however, this change was not evident after the intervention. The likelihood of a meaningful change in time to exhaustion in the $CCT_{110\%}$ test in any of the conditions was similar in all groups (***'almost certain',*** ES = 1.05, 1.17 and 1.17, placebo, *β*-alanine alone, coingestion, respectively).
Conclusion: In summary, *β*-alanine supplementation in conjunction with high intensity training improved repeat sprint ability but did not alter high intensity cycle capacity. Furthermore, acute $NaHCO_3$ ingestion improved high intensity cycle capacity before training but had no influence on performance after a period of SIT.

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A comparison of the neurophysiological and emotional responses to three exercise models

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Introduction: Predominant tests of exercise capacity are maximal oxygen uptake (VO_2max), time to exhaustion (TTE) and the time trial (TT). Compared to TTE and VO2max, the variable intensity of the TT allows for manipulation of physiological strain, suggesting regulatory strategies between the body and brain. This study aimed to compare the neurophysiological responses of these tests and characterise the usually observed endspurt (ES).
Method: 14 cyclists completed testing as follows; $\dot{V}O_2$max, TT and TTE. The $\dot{V}O_2$max and TT were controlled for work done (kJ). TTE intensity was set at average power (W) in the TT. During exercise W, electroencephalography (EEG), electromyography (EMG), cerebral near infrared spectroscopy (NIRS) and heart rate (HR) were measured continuously with post exercise rating of perceived exertion (RPE) and Feeling Scale (FS) values recorded.
Results: Normalised EMG response for the VO2max (54.3±14%), TT (85±9%) and TTE (71.9±4%) were different across test and time (*P*<0.001). All tests changed significantly over time for NIRS tissue oxygenation index (TOI), oxyhaemoglobin (OHb) and deoxyhaemoglobin (HHb). TOI was lower over time (*P*<0.05) in TTE and TT compared to $\dot{V}O_2$max and HHb was greater at exercise termination (ET) in TT and TTE (*P*<0.05). At ET in prefrontal and motor cortices EEG responses of alpha slow (αs) and alpha fast (αf) waves were higher than Beta (β) and Gamma (γ) in $\dot{V}O_2max$ (*P*<0.01). FS rated the end of the $\dot{V}O_2max$ was more pleasant (6.7 ± 2.9) than either the TT (5.9 ± 3.0) or TTE1 (4.9 ± 2.3) (*P*<0.05). At the ES W, EMG, OHb and HHb increased from 313.0±52, 92.2±41, 13.3±7.3 and 8.3±3.8 to 384.2±71, 118±62%, 15.2±8.6 and 9.3±3.6 respectively (P<0.05).
Conclusion: Each exercise model displayed different cerebral characteristics and the ES preceded an increase in W and EMG activity and was related to greater deoxygenation at the PFC. These novel results have implications for understanding the role of the brain in exercise performance.

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Comparison of match running demands in elite (AFLW) and sub-elite (VFLW) women's Australian Football

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Introduction & Aims: The inaugural Australian Football League Women's (AFLW) competition now provides an elite pathway for female Australian Football (AF) players. This study aimed to quantify and compare the match running movements of elite (AFLW) and sub-elite (Victorian Football League Women's, VFLW) women's AF competitions.
Methods: Match running movements were recorded using 10 Hz GPS units during 7 AFLW (n=91 files) and 13 VFLW (n=263 files) competition matches, and are reported relative to playing time. Data were analysed across competition levels for whole game, by position, and by quarter.
Results: AFLW players covered moderately greater relative high-speed running (HSR, 14.4-18.0 km·h^{-1}, AFLW 14.9±5.7 m·min^{-1}; VFLW 12.2±3.9 m·min^{-1}; ES =0.61, ±0.39), very high-speed running (VHSR, 18.0-20.0 km·h^{-1}, 4.2±2.0 m·min^{-1}; 3.2±1.4 m·min^{-1}; ES =0.61, ±0.14) and sprint (>20 km·h^{-1}, 3.3±2.2 m·min^{-1}; 2.1±1.6 m·min^{-1}; ES =0.65, ±0.16) distances than VFLW players. The largest within-position difference across competition levels was for small forwards, with AFLW covering greater HSR (20%), VHSR (40%), and sprint distances (100%) than VFLW. While small differences where apparent for other positions, tall forwards cover similar running movements in both competitions. In the AFLW competition, VHSR and sprint distance decreased in the fourth quarter when compared with quarters one and two, whereas match running movements were consistent through quarters in the VFLW competition.
Conclusion: The elite AFLW competition demonstrated greater relative match running demands than the sub-elite VFLW competition, in particular for relative higher speed running (>14.4 km.h^{-1}) distances. This may reflect the differences in match rules between competitions (fewer on-field players and shorter match time in AFLW), providing greater on-field space per player and more interchange players available. This information can assist in prescribing appropriate training for elite women's AF competition.

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Physiological Stress and Upper Respiratory Symptoms following Long-Haul Air Travel: Implications for Performance Recovery?

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Introduction & Aims: Impaired performance recovery was recently reported following long-haul travel east compared to west. While results indicated this was due to worse sleep and subjective fatigue, limited data on physiological responses to such travel exists, which could also impact recovery. The present study investigated the effects of east compared to west long-haul travel on physiological stress markers and upper respiratory symptoms.
Methods: 10 physically trained males provided resting blood and saliva samples at 09:00 and 17:00 (local time), and completed the Wisconsin Upper Respiratory Symptom Survey at 09:00 on four consecutive days in the two weeks prior to outbound travel (BASE), and the first four days following travel from Australia to Qatar (WEST). After a 4-day washout and return travel (EAST), data was collected at the same time on the first four days post-travel.
Results: Salivary cortisol concentration was *likely* reduced at 09:00 in both WEST (ES, ±90% CI; 0.64, ±0.43) and EAST (0.61, ±0.42) compared to BASE, and *almost certainly* greater at 17:00 in EAST compared to WEST (1.84, ±0.59) and BASE (1.19, ±0.55). Plasma IL-1ra concentration was *almost certainly* (0.82, ±0.27) and *very likely* (0.62, ±0.30) reduced in EAST and WEST compared to BASE at 17:00. Plasma IL-6 concentration was *very likely* (0.78, ±0.38) and *almost certainly* (1.57, ±0.52) greater at 09:00 in EAST compared to BASE and WEST, and *almost certainly* greater (1.04, ±0.43) at 17:00 in EAST compared to WEST. No differences were observed for plasma CRP concentration. Though upper respiratory symptom severity was *likely* greater in both WEST (0.56, ±0.67) and EAST (0.60, ±0.59) compared to BASE, no differences were observed for upper respiratory symptom number or functional impairment, or salivary IgA concentration.
Conclusion: Greater physiological stress was observed following long-haul air travel east compared to west, which could also explain the exacerbated performance recovery observed.