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POSTER PRESENTATION **Open Access**

Effect of post-exercise ingestion of different molecular weight carbohydrate solutions. Part III: Power output during a subsequent resistance training bout

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Background

To maximize power adaptations, resistance training (RT) should be performed at maximal power output. In sports where more than one training bout is necessary in a day, subsequent RT may be limited by muscle glycogen, resulting in lower power output. High molecular weight (HMW) carbohydrate (CHO) solutions have been shown to result in greater glycogen re-synthesis rates, and greater work output during a subsequent cycling time trial compared to a low molecular weight (LMW) CHO solution. However, the effect of a HMW CHO on RT power output following exhaustive exercise is unknown.

Methods

Sixteen resistance trained men (mean ± SD; 23 ± 3 years; 176.7 ± 9.8 cm; 88.2 ± 8.6 kg; 12.1 ± 5.6% fat) participated in this study. One-repetition maximum (1RM) back squat (153.3 ± 53.6 kg; 1.7 ± 0.2 1RM:body mass), and VO_2 max (37.4 ± 4.3 ml·kg·min^{-1}) were initially assessed in order to prescribe exercise intensities during experimental trials. In a double-blind, placebo-controlled, randomized cross over design consisting of three testing sessions separated by one week, subjects completed a glycogen depleting exercise bout on a cycle ergometer. Immediately post-exercise, subjects ingested a placebo (PLA), or a LMW or HMW CHO solution (10%) providing 1.2 kg· bw^{-1} CHO, assigned randomly. Two hours post-ingestion, subjects performed 5 sets of 10 repetitions back squat (75% 1RM) "as explosively as possible". If subjects paused for more than 2 seconds or were unable to complete a rep, resistance was lowered by 13.6 kg. Kinematic and kinetic measurements were sampled at 1000 Hz via force plate and two linear position transducers.

Results

Average power following ingestion did not differ between CHO solutions until Set 4 (p = 0.108) and Set 5 (p = 0.083). Average power collapsed across the latter Sets was greater following ingestion of the HMW solution (Set 4, 1216 ± 97 W; Set 5, 1143 ± 102 W) compared to PLA (Set 4, 1066 ± 80 W: p = 0.037; Set 5, 1019 ± 89 W: p = 0.048), but not compared to ingestion of LMW (Set 4, 1160 ± 79 W: p = 0.355; Set 5, 1131 ± 92 W: p = 0.852). No difference was observed between LMW and PLA (Set 4, p = 0.275; Set 5, p = 0.077). The difference in average power was driven by velocity, as similar trends were observed in Set 4 and 5 (p = 0.100 and p = 0.066, respectively). Average velocity was higher following ingestion of HMW (Set 4, 0.63 ± 0.03 m·s^{-1}; Set 5, 0.62 ± 0.03 m·s^{-1}) compared to PLA (Set 4, 0.56 ± 0.04 m·s^{-1}: p = 0.050; Set 5, 0.56 ± 0.04 m·s^{-1}: p = 0.032), but not LMW (Set 4, 0.61 ± 0.03 m·s^{-1}; p = 0.422; Set 5, 0.61 ± 0.03 m·s^{-1}: p = 0.074), with no difference between LMW and PLA (Set 4, p = 0.220; Set 5, p = 0.769). HMW conferred a likely beneficial effect in Sets 4 and 5 (92.5% and 88.7% likelihood, respectively), compared to PLA; while ingestion of LMW conferred only a possibly beneficial effect (68.7%) and likely beneficial effect (83.9%) in Sets 4 and 5, respectively.

Conclusions

These data suggest post-exercise ingestion of a HMW CHO solution providing 1.2 kg· bw^{-1} CHO may allow

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athletes to sustain power output in a subsequent resistance training session when time between training sessions is limited.

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