Proceedings of the Nutrition Society (2011), **70 (OCE6)**, E350 doi:10.1017/S0029665111004356

Winter Meeting, 6–7 December 2011, 70th Anniversary: Body weight regulation – food, gut and brain signalling

Appetite, acylated ghrelin and 24 hour energy intake responses to low volume sprint interval exercise versus prolonged endurance exercise

K. Deighton, R. Barry, C. E. Connon and D. J. Stensel
School of Sport, Exercise and Health Sciences, Loughborough University, Leicestershire, LE11 3TU, UK

Appetite and the orexigenic (appetite stimulating) gut hormone acylated ghrelin are acutely suppressed during strenuous endurance exercise[1]. Additionally, energy deficits induced by such exercise do not appear to elicit compensatory increases in appetite, acylated ghrelin and energy intake in the subsequent 24 h, resulting in a negative energy balance[1]. Recent evidence suggests that low volume sprint interval training may act as an alternative to endurance exercise as a time-efficient method of improving aerobic fitness[2,3] and cardiovascular disease risk factors[3,4]. However, the appetite, hormonal and acute energy balance responses to such exercise are unknown and may have important implications regarding the effectiveness of such exercise for weight management. This study investigated the appetite, acylated ghrelin and 24 h energy intake responses to 30 min low volume sprint interval exercise compared with 60 min traditional endurance exercise.

Twelve healthy male volunteers (mean (SD); age 23 (3) years, body mass index 24.2 (2.9) kg.m^{-2}, maximum oxygen uptake (VO_2 max) 46.3 (10.2) mL.kg^{-1}.min^{-1}) completed 3, 8 h trials separated by one week in a counterbalanced Latin Square design. Participants arrived at the laboratory at 8.45 am after an overnight fast and the 8 h trial commenced upon completion of a standardised breakfast meal (72.9 % carbohydrate, 9.5 % protein, 17.6 % fat). Sixty min of continuous cycling exercise at 68.1 (4.3) % of VO_2 max was performed from 1.75–2.75 h in the endurance exercise trial (END). In the sprint trial (SPR), exercise was performed from 2.25–2.75 h and consisted of six 30 s cycle sprints with 4 min recovery after each and 3.5 min warm-up and warm-down periods. No exercise was performed in the control trial (CON). Appetite ratings[5] and plasma acylated ghrelin concentrations were measured throughout each trial. Food intake was monitored from a cold buffet meal at 3.5 h, a hot buffet meal at 7 h and an overnight food bag.

The net energy expenditure of exercise was significantly higher in END than SPR (631 (100) vs. 142 (12) kcal; $P < 0.0005$). All appetite perceptions (hunger, satisfaction, fullness and prospective food consumption) changed over time ($P < 0.0005$). Trial × time interactions ($P < 0.0005$) revealed lower appetite in SPR than CON at 2.75 h ($P \leq 0.001$). Appetite was higher in SPR than END at 5, 5.5 and 6.5 h (all $P \leq 0.001$). Ad libitum 24 h energy intake did not differ between trials (CON: 3093 (744); END: 3238 (766); SPR: 3088 (713) kcal). Relative energy intake (energy intake minus the net energy expenditure of exercise) was significantly lower in END than CON ($P = 0.006$) and tended to be lower in END than SPR ($P = 0.082$; CON 3093 (744); END 2607 (774); SPR 2946 (714) kcal). A main effect of trial revealed higher acylated ghrelin concentrations in CON than END and SPR (both $P \leq 0.01$). A trial × time interaction effect revealed lower acylated ghrelin concentrations in END and SPR than CON at 2.47 h and in SPR than CON at 2.75 and 3.5 h (all $P \leq 0.002$).

Sprint interval exercise suppressed appetite and acylated ghrelin to a greater extent than continuous endurance exercise but stimulated compensatory increases in appetite in the hours after exercise. However, 24 h energy intake was unaffected. Subsequently, relative energy intake was 15.7 and 11.5 % lower in END than CON and SPR, due to the high level of energy expenditure during the endurance exercise session. This study supports previous findings that traditional endurance exercise induces a negative 24 h energy balance but suggests that low volume sprint interval exercise does not. Further studies must be conducted to examine whether this would transpire into differences in weight loss if used as weight management interventions.

1. King JA, Miyashita M, Wasse LK *et al*. (2010) *Appetite* **54**, 492–498.
2. Burgomaster KA, Howarth KR, Phillips SM *et al*. (2008) *J Physiol* **586**, 151–160.
3. Nybo L, Sundstrup E, Jakobsen MD *et al*. (2010) *Med Sci Sports Exerc* **42**, 1951–1958.
4. Babraj JA, Vollaard NBJ, Keast C *et al*. (2009) *BMC Endocr Disord* **9**, 3.
5. Flint A, Raben A, Blundell JE *et al*. (2000) *Int J Obes* **24**, 38–48.