237

Effects of high-intensity interval training performed in the morning or evening on 24 h blood glucose profiles

Samuel K. Pinto[1,*], Trine Moholdt[1,2], Evelyn B. Parr[1], Brooke L. Devlin[1], David W. Dunstan[3,1], John A. Hawley[1]

[1] *Exercise & Nutrition Research Program, Mary MacKillop Institute for Health Research, Australian Catholic University, Fitzroy, Victoria, Australia*
[2] *Department of Circulation and Medical Imaging, Norwegian University of Science and Technology, Trondheim, Norway*
[3] *Baker Heart and Diabetes Institute, Melbourne, Victoria, Australia*

Exercise and restriction of dietary carbohydrate (CHO) independently reduce daily glycaemia, but their combined effects on glycaemic control are unclear. Furthermore, diurnal rhythms exist in many physiological processes, including glucose metabolism, and it is unknown whether the time of day that exercise is performed alters glycaemic responses. We examined the effects of short-term high-intensity interval-training (HIIT) performed in the morning or evening on 24-h glycaemia during CHO-restriction.

Twenty-four sedentary males with overweight/obesity (age:36 ± 5 y, BMI: 31.2 ± 2.3 kg/m^2) participated in this randomized, three-armed parallel study (n = 8/group). Participants consumed their habitual diet for 3-d (D1-3; Baseline), followed by 5-d of CHO-restriction (D4-8; Diet-only; 15% CHO, 65% fat, 20% protein). Participants completed a further 5-d (D9-13; Diet + Training) of CHO-restriction and either daily cycle ergometer exercise at 0630 h (AM-Ex), daily exercise at 1830 h (PM-Ex), or diet-only (CON). Training consisted of three HIIT sessions (10 × 1 min at ~90% of peak heart rate) and two continuous cycling sessions (40–60 min at 60–70% of peak heart rate). Interstitial glucose was measured via continuous glucose monitoring from D1–13.

Mean 24-h glucose was reduced in AM-Ex (−0.16 mmol/L, 95%CI:−0.01–0.30, P = 0.04) and PM-Ex (−0.30 mmol/L, 95%CI:−0.46–0.14, P < 0.001) during Diet-only compared to Baseline, with no difference between Diet-only and Diet + Training for any group. Nocturnal glycaemia was reduced in PM-Ex during Diet + Training compared to Baseline (−0.62 mmol/L, 95%CI: −0.90–0.34, P < 0.001) and Diet-only (−0.41 mmol/L, 95%CI: −0.62–0.19, P < 0.001), but was unaltered in AM-Ex and CON.

These findings suggest that during CHO-restriction, short-term HIIT performed in the evening, but not the morning, may reduce nocturnal glycaemia in men with overweight/obesity. These effects may be partly due to differences in nutrient availability or hormonal milieu between morning and evening exercise. Targeted exercise with regards to timing may elicit more favourable nocturnal glycaemic control.

Research supported by Novo Nordisk Foundation Challenge Grant NNF14OC0011493.

https://doi.org/10.1016/j.orcp.2018.11.160

238

Bingeing on sweet drinks: persistent elevated intakes in rats

Simone Rehn*, Robert A. Boakes

University of Sydney, Camperdown, NSW, Australia

Several existing animal models have examined the overlap between binge-like consumption of high-sugar foods or drinks and addiction given the prevalence of comorbidity between human binge eating disorder and substance use disorder. However, findings from these existing models suffer from methodological weaknesses. We have addressed these issues using a new rat model of bingeing (Eikelboom & Hewitt, 2016). Two experiments tested whether bingeing may be analogous to substance abuse in its potential to produce addiction-like behaviours. During the 4-week Phase 1 of Experiment 1 rats were given either no access (Chow group), daily access (Unrestricted group) or access on every fourth day (Binge group) to a 4% sucrose solution. Intermittent access resulted in escalating sucrose intakes in the Binge group to double the daily intakes in the Unrestricted group. Critically, in Phase 2, when both Binge and Unrestricted groups were given identical alternate-day sucrose access, the Binge group maintained elevated sucrose intakes. This suggests that Binge rats undergo a long-term change in sucrose consumption that resembles tolerance for addictive drugs. However, several measures failed to find elevated 'withdrawal' or 'craving' in the Binge relative to the Unrestricted group, suggesting that binge-like consumption of sucrose does not elicit addiction-like behaviours more so than prolonged sucrose consumption. Experiment 2 assessed whether bingeing in this model was hedonically reinforced by replacing sucrose from Experiment 1 with a non-caloric sweetener, saccharin, and a hyperpalatable glucose-saccharin mixture. Both Saccharin Binge and Glucose-Saccharin Binge groups exhibited persistent elevated intakes relative to the Unrestricted groups and replicated the binge effect found in Experiment 1. Yet, there were again no differences in 'craving' or 'withdrawal' between Binge and Unrestricted groups. Altogether, bingeing in this model appears to be hedonically motivated, reflecting the nature of human bingeing, but binge-like consumption itself may not produce an addiction-like profile.

https://doi.org/10.1016/j.orcp.2018.11.161

239

Bone marrow transplantation and RNAseq analysis of *Gpr21*$^{-/-}$ monocytes reveals reduced migratory function and downregulation of inflammatory genes

Darren M. Riddy[1,*], Helene Kammoun[2], Sanja Bosnyak-Gladovic[1], Mark Ziemann[3], Roger J. Summers[1], Patrick M. Sexton[1], Andrew J. Murphy[2], Chris J. Langmead[1]

[1] *Monash University, Parkville, Victoria, Australia*
[2] *Hematopoiesis and Leukocyte Biology Lab, Baker Heart and Diabetes Institute, Melbourne, Victoria, Australia*
[3] *Monash University, Melbourne, Victoria, Australia*

Immune cell infiltration into tissues produces chronic low-grade inflammation leading to obesity-induced insulin resistance [1]. Insight into this mechanistic link has revealed activation of various receptors including the orphan G protein-coupled receptor, GPR21 [2]. GPR21 is widely expressed throughout the body, and on immune cells including monocytes and macrophages