ANNALS OF RESEARCH IN SPORT AND PHYSICAL ACTIVITY

Can carbohydrate and protein intake prevent gut-immune perturbations induced by exertional-heat stress?

Autor(es): Snipe, Rhiannon; Kitic, Cecilia; Gibson, Peter; Costa, Ricardo JS

Publicado por: Imprensa da Universidade de Coimbra

URL persistente: URI:<http://hdl.handle.net/10316.2/44090>

DOI: DOI:https://doi.org/10.14195/2182-7087_ex2018_27

Accessed : 26-Apr-2023 09:58:42

A navegação consulta e descarregamento dos títulos inseridos nas Bibliotecas Digitais UC Digitalis, UC Pombalina e UC Impactum, pressupõem a aceitação plena e sem reservas dos Termos e Condições de Uso destas Bibliotecas Digitais, disponíveis em <https://digitalis.uc.pt/pt-pt/termos>.

Conforme exposto nos referidos Termos e Condições de Uso, o descarregamento de títulos de acesso restrito requer uma licença válida de autorização devendo o utilizador aceder ao(s) documento(s) a partir de um endereço de IP da instituição detentora da supramencionada licença.

Ao utilizador é apenas permitido o descarregamento para uso pessoal, pelo que o emprego do(s) título(s) descarregado(s) para outro fim, designadamente comercial, carece de autorização do respetivo autor ou editor da obra.

Na medida em que todas as obras da UC Digitalis se encontram protegidas pelo Código do Direito de Autor e Direitos Conexos e demais legislação aplicável, toda a cópia, parcial ou total, deste documento, nos casos em que é legalmente admitida, deverá conter ou fazer-se acompanhar por este aviso.

ANNALS OF
**RESEARCH IN SPORT
AND
PHYSICAL ACTIVITY**

CAN CARBOHYDRATE AND PROTEIN INTAKE PREVENT GUT-IMMUNE PERTURBATIONS INDUCED BY EXERTIONAL-HEAT STRESS?

Rhiannon Snipe¹; Cecilia Kitic²; Peter Gibson³; Ricardo JS Costa¹

Physical exertion in hot ambient conditions perturbs the integrity of the gastrointestinal tract leading to endotoxaemia and subsequent systemic cytokine responses. Such perturbations have been linked to gastrointestinal symptoms and adverse health and performance implications. To date, it is unknown whether nutrient intake, which is a common-practice during prolonged exercise, can attenuate gastrointestinal perturbations induced by exertional-heat stress (EHS). The study, therefore, aimed to determine the effects of carbohydrate and protein intake during EHS on intestinal injury, permeability and inflammation, gastrointestinal symptoms, systemic endotoxin and cytokine responses. Using a randomised repeated-measures design with one week washout, eleven endurance runners completed 2 h running at 60% VO₂max in 35°C (27% relative humidity) consuming either 15g glucose (6% w/v) (GLUC), energy-matched whey protein hydrolysate (WHEY), or water (WATER) before and every 20 min during exercise. Rectal temperature and gastrointestinal symptoms were recorded every 10 min during exercise. Blood samples were collected pre- and post-exercise, and during recovery to determine plasma intestinal fatty-acid binding protein (I-FABP), cortisol, endotoxin, and cytokine concentrations. Pre- and post-exercise faecal samples were collected to determine calprotectin. Urinary lactulose:rahnose was used to measure small intestinal permeability. GLUC and WHEY abolished the post-exercise increase in I-FABP (trial*time, $p < 0.001$) and reduced small intestinal permeability compared to WATER (trial effect, $p = 0.002$); with WHEY reducing small intestinal permeability more than GLUC ($p < 0.05$). Total- and upper-gastrointestinal symptoms were greater with WHEY, compared to GLUC and WATER ($p < 0.05$). Endotoxaemia was observed post-exercise (10.2pg/ml;

• 101

¹ Monash University, Department of Nutrition & Dietetics, Level 1, 264 Ferntree Gully Road, Notting Hill, Victoria 3168, Australia.

² University of Tasmania, Sport Performance Optimisation Research Team, School of Health Sciences, Locked Bag 1322, Launceston, Tasmania 7250, Australia.

³ Monash University, Department of Gastroenterology- The Alfred Hospital, 55 Commercial Road, Melbourne, 3004 Victoria, Australia.

Email: rhiannon.snipe@monash.edu

time effect, $p=0.001$), with no difference between trials. However, post-exercise anti-endotoxin antibodies were higher on GLUC ($p<0.01$) and WHEY ($p<0.05$) compared to WATER, indicating improved endotoxin clearance capacity with nutrient intake. Plasma IL-6 and cortisol concentrations increased post-WATER, and were higher than GLUC, but not WHEY (trial*time, $p=0.048$ and $p<0.001$, respectively). Plasma IL-8, IL-10 and IL-1ra concentrations increased post-exercise on all trials (time effect, $p<0.01$). No differences were observed pre- to post-exercise or between trials for plasma IL-1 α , TNF- α and faecal calprotectin concentrations. Anti-endotoxin antibodies were negatively associated with I-FABP, permeability and inflammatory cytokines ($p<0.05$). In conclusion, carbohydrate (i.e., glucose) and protein (i.e., whey) intake during EHS reduces intestinal injury and small intestinal permeability, supports endotoxin clearance and improves inflammatory cytokine profiles. However, protein appears to contribute to the development of gastrointestinal symptoms, making carbohydrate a more appropriate recommendation for supporting gut-immune health during EHS.