SINGAPORE SPORT & PERFORMANCE CONFERENCE 2022

From Youth to Elite Sport: Harnessing Potential and the Pursuit of Excellence

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Organised by

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From Youth to Elite Sport: Harnessing Potential and the Pursuit of Excellence

Low and normal dose ice slurry ingestion on endurance capacity and intestinal epithelial injury in the heat – is less, more?

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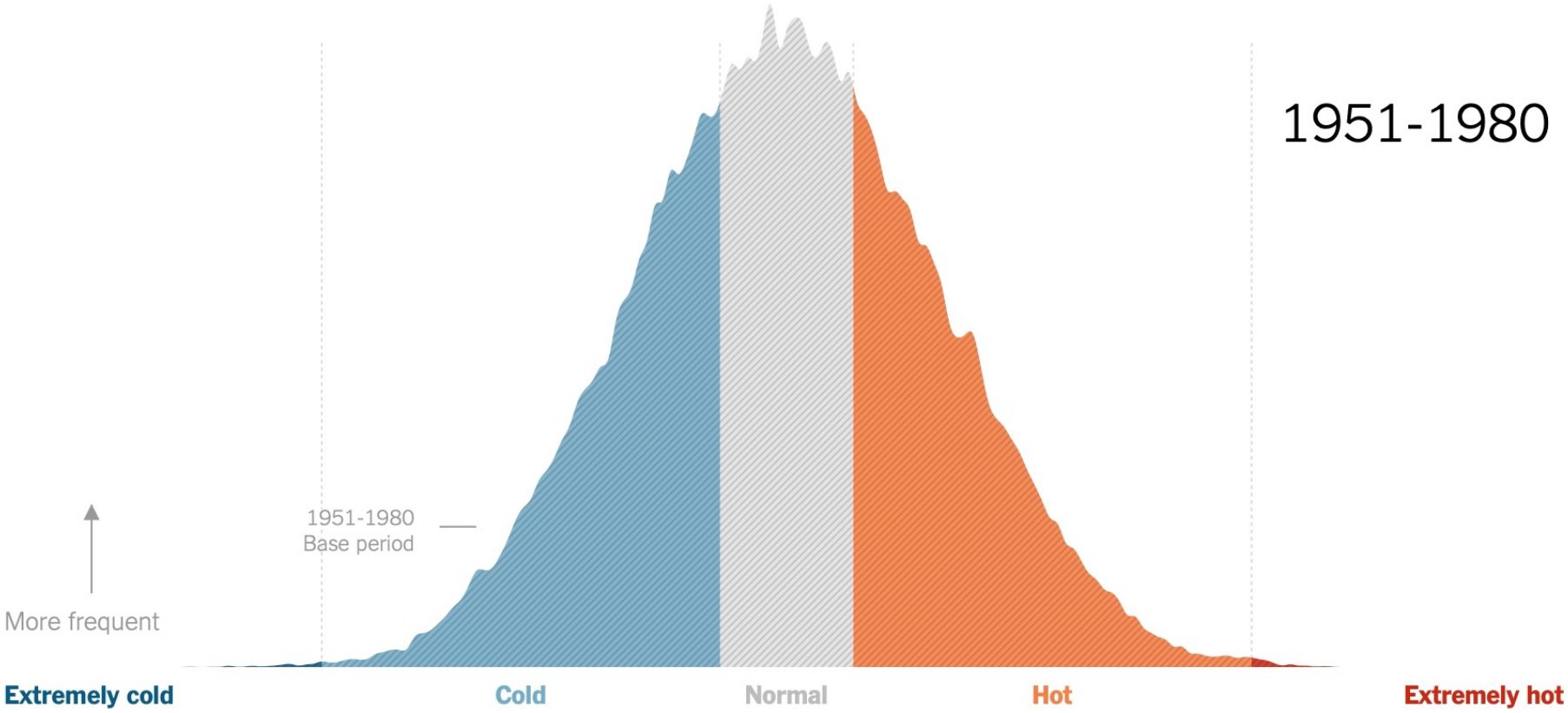
Heat – the Imminent Problem



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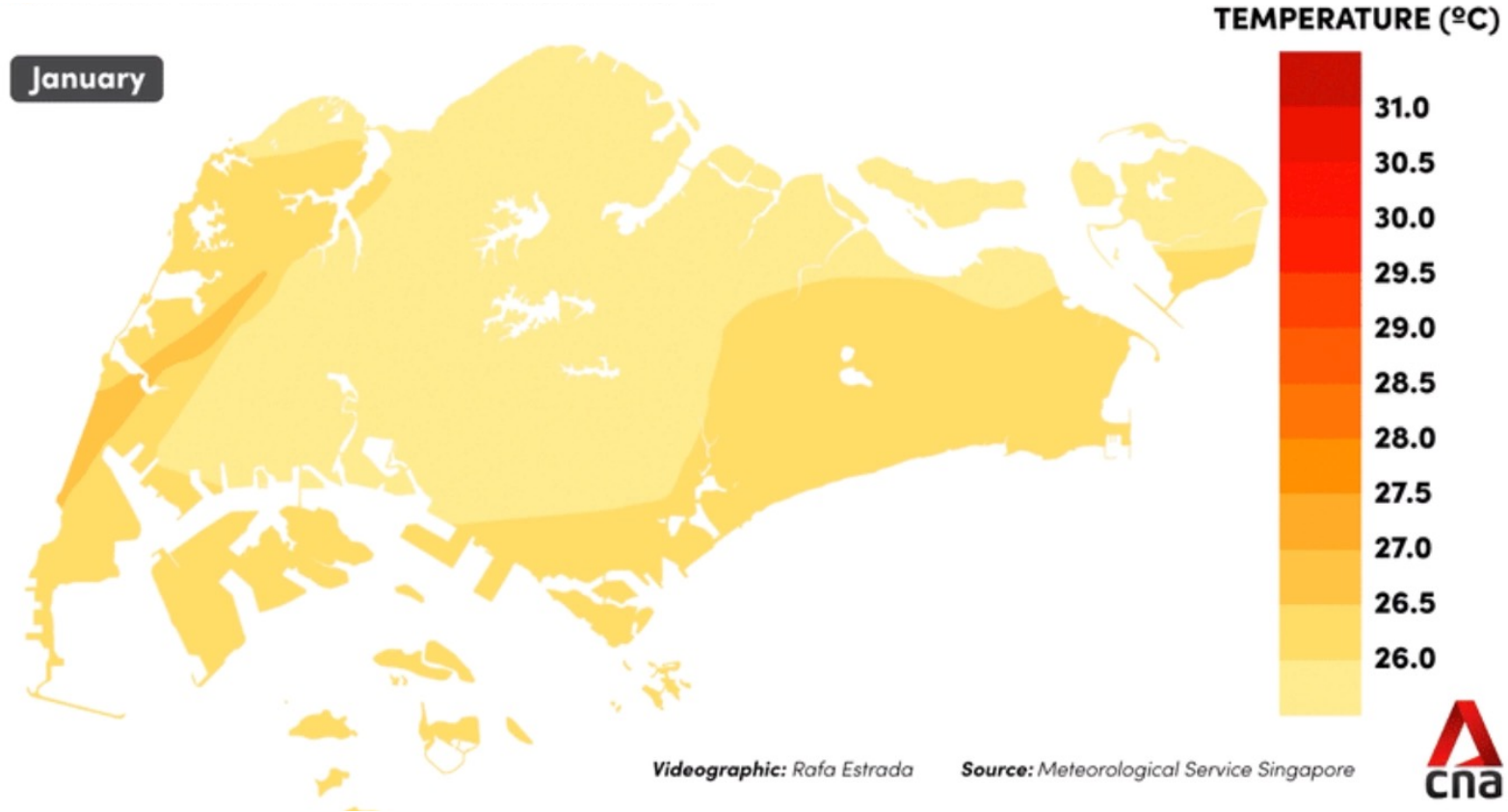
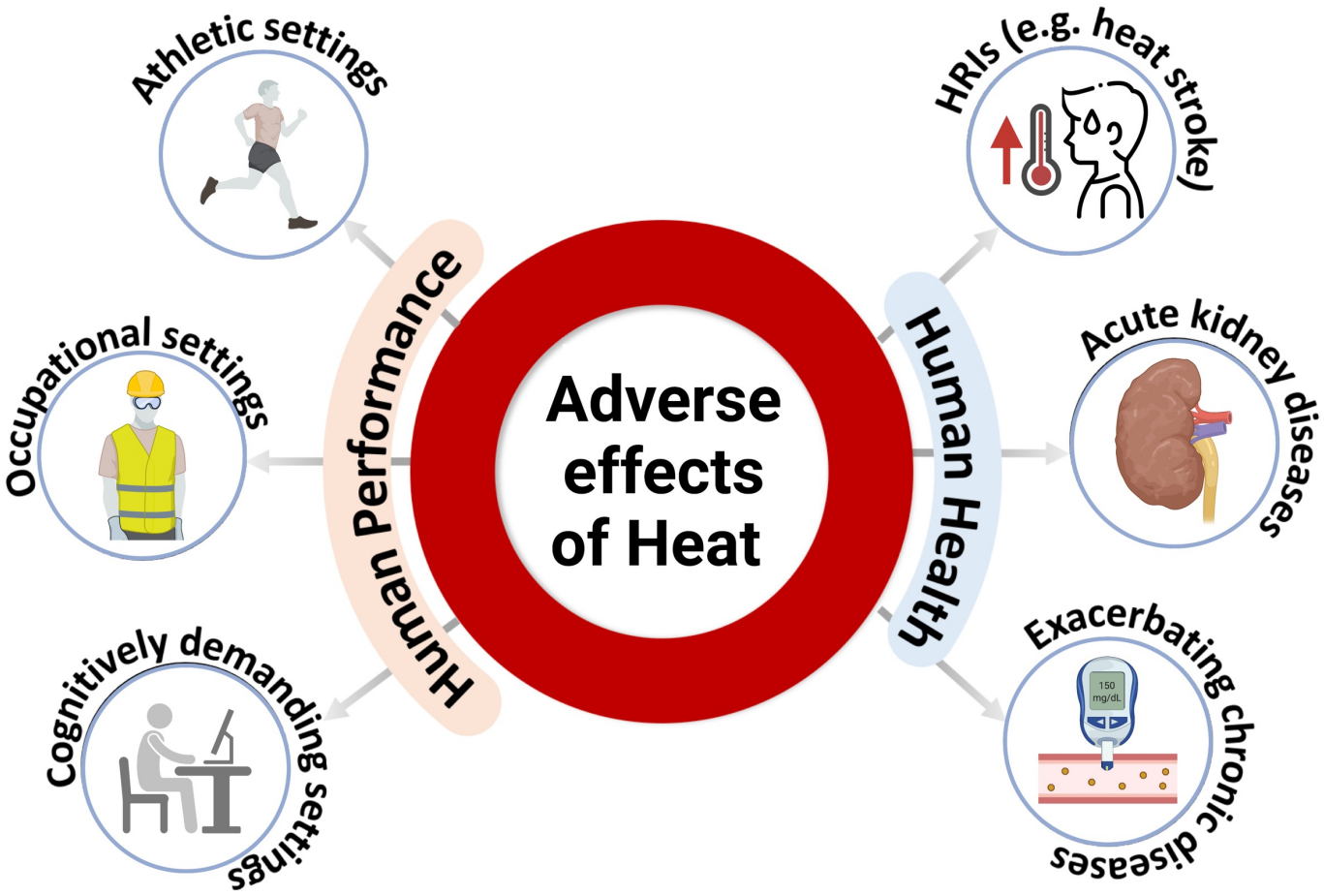


Adverse effects of Heat



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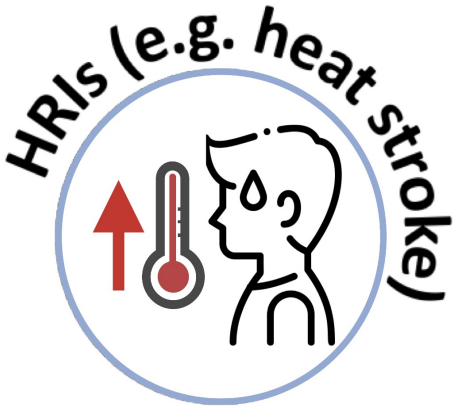
Saunders et al. (2005); Periard et al. (2016); Galloway & Maughan (1997); Fluoris et al. (2018); Gaoua et al. (2011, 2012); Park et al. (2021); Xiang et al. (2014)

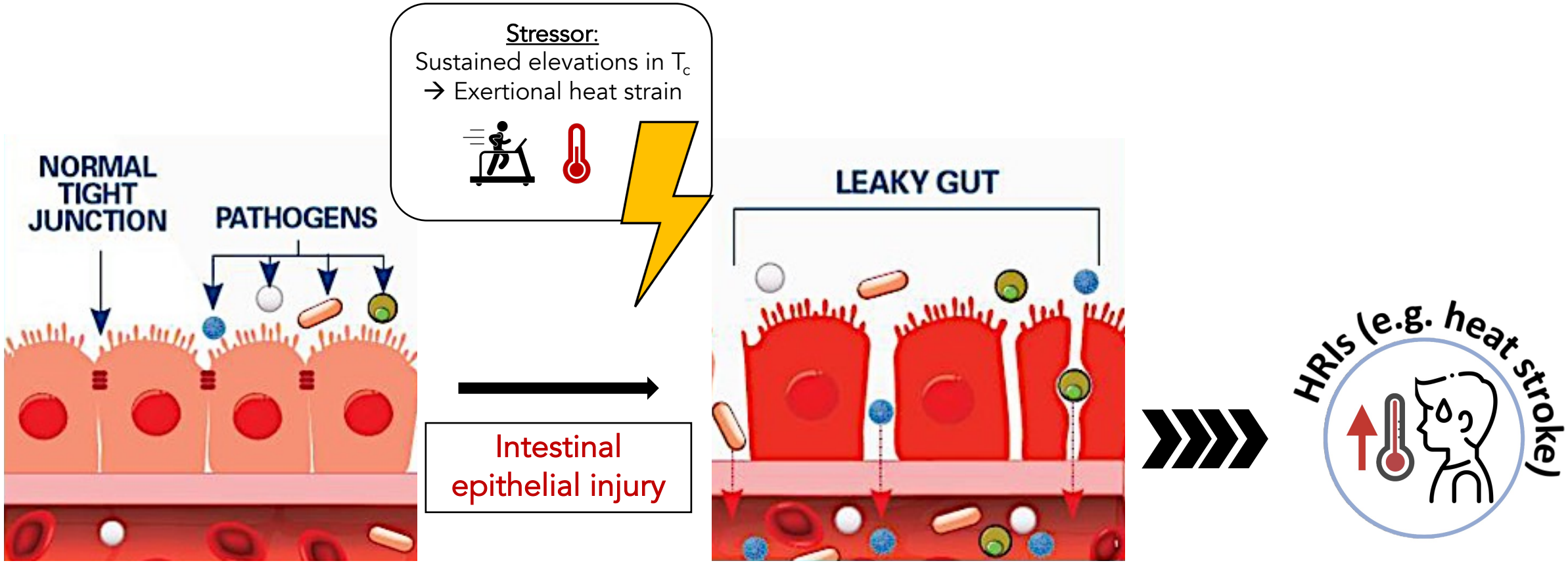
Adverse effects of Heat



Reduced exercise performance and capacity in the heat

Heat-induced gastrointestinal perturbations which are potential precursors to heat stroke

Heat-induced gastrointestinal perturbations



Bouchama & Knochel (2002); Lim & Mackinnon (2006)

Ice slurry as a cooling strategy

- Reductions in *pre*-exercise core temperature (T_c) by 0.5 to 0.7°C
- Increased heat storage capacity
- **Enhanced** exercise performance and capacity in athletic settings

Naito et al. (2018); Siegel et al. (2010, 2012); Ross et al. (2011); Bolster et al. (1999); Burdon et al. (2013)

Limitations of ice slurry

- Physical complaints (headaches, brainfreeze)
- *During* exercise – little/no protective effect
- Potential **overcompensation** resulting in reduced heat dissipation mechanisms
  - Delayed/reduced sweating, increased T_c

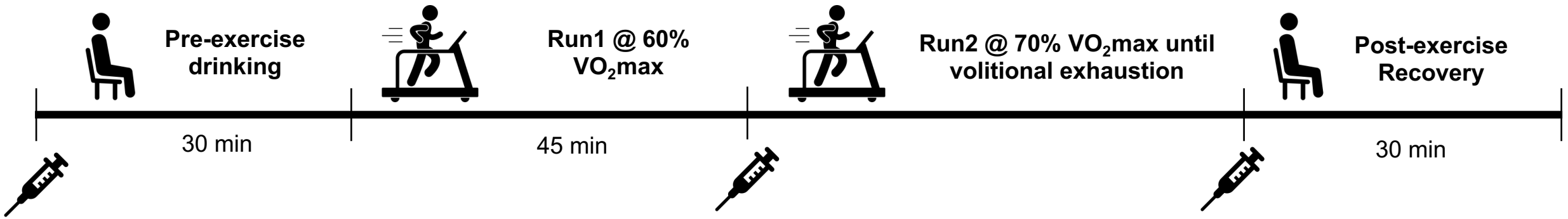
Jay & Morris (2018); Morris et al. (2016); Stevens et al. (2017); Yeo et al. (2012)

Aims

- Compare the efficacy of ice slurry ingestion at two doses (low and normal) on **endurance capacity** and **heat-induced gastrointestinal perturbations (e.g. intestinal epithelial injury)**

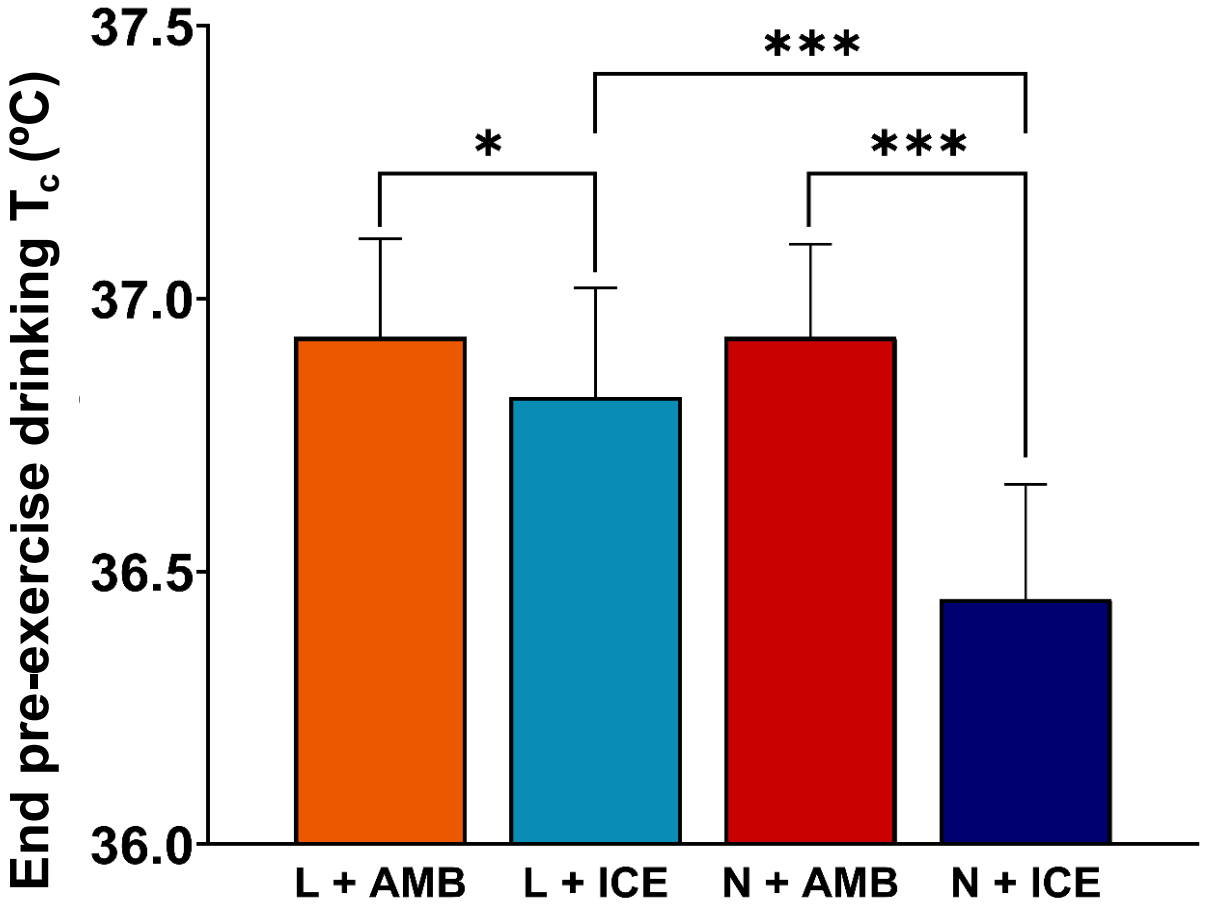
Study Design

- N = 12 physically active males (24 ± 1 yrs, 55 ± 7 ml/kg/min)

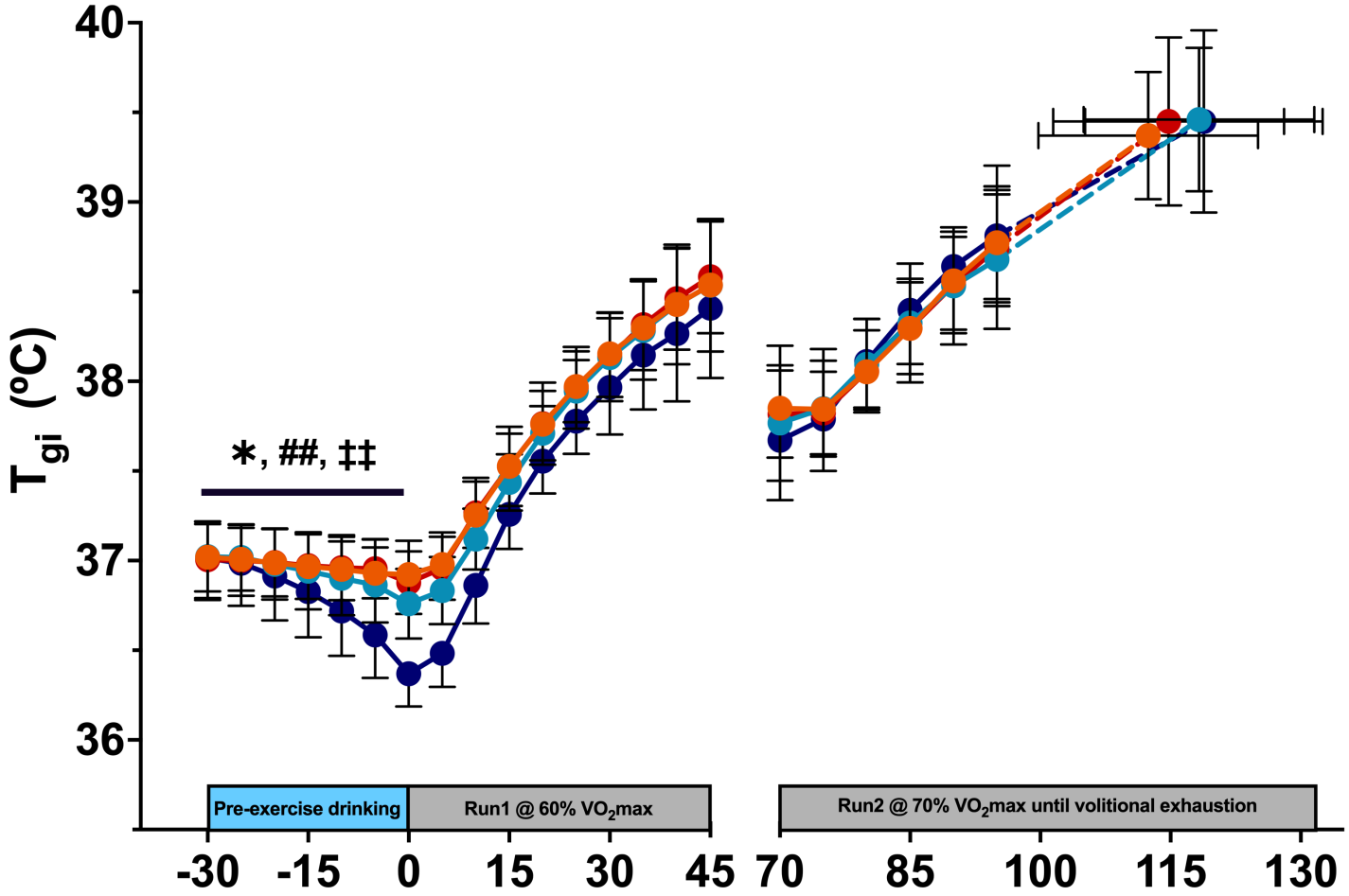


Trial	Rest Phases	Run Phases
Low dose + Ambient Drink (L + AMB)	4g/kg	1g/kg
Low dose + Ice Slurry (L + ICE)		
Normal dose + Ambient Drink (N + AMB)	8g/kg	2g/kg
Normal dose + Ice Slurry (N + ICE)		

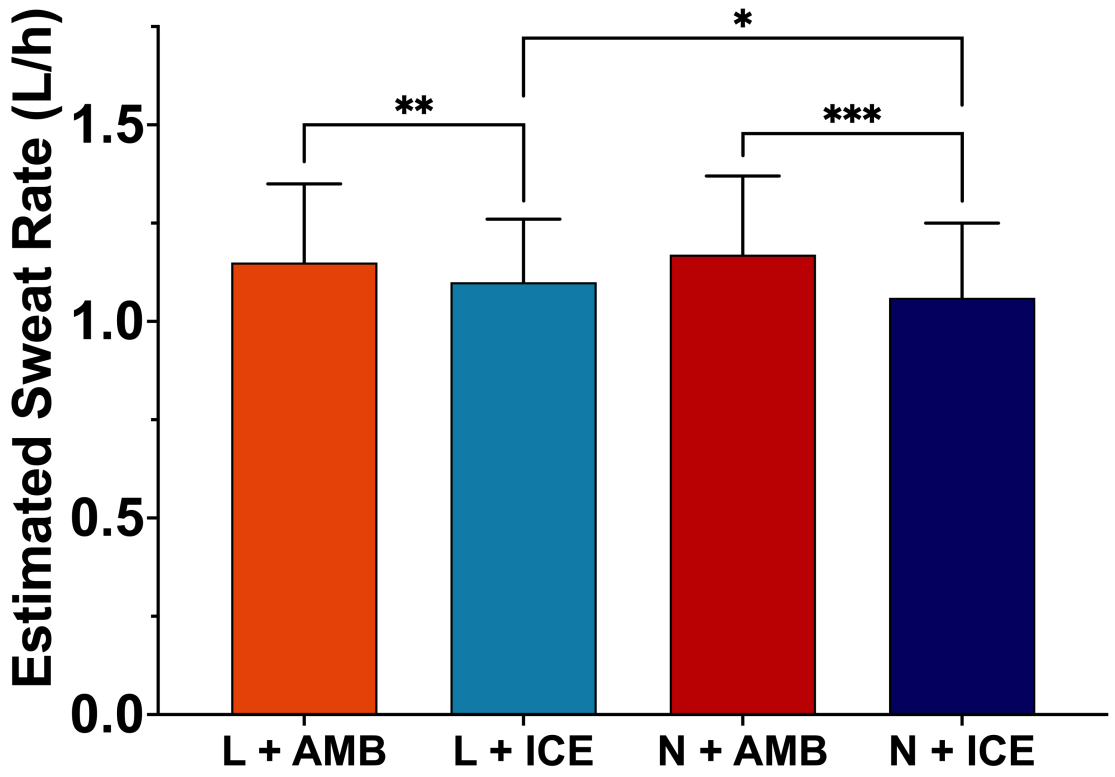
Low dose effectively reduces *pre*-exercise T_c

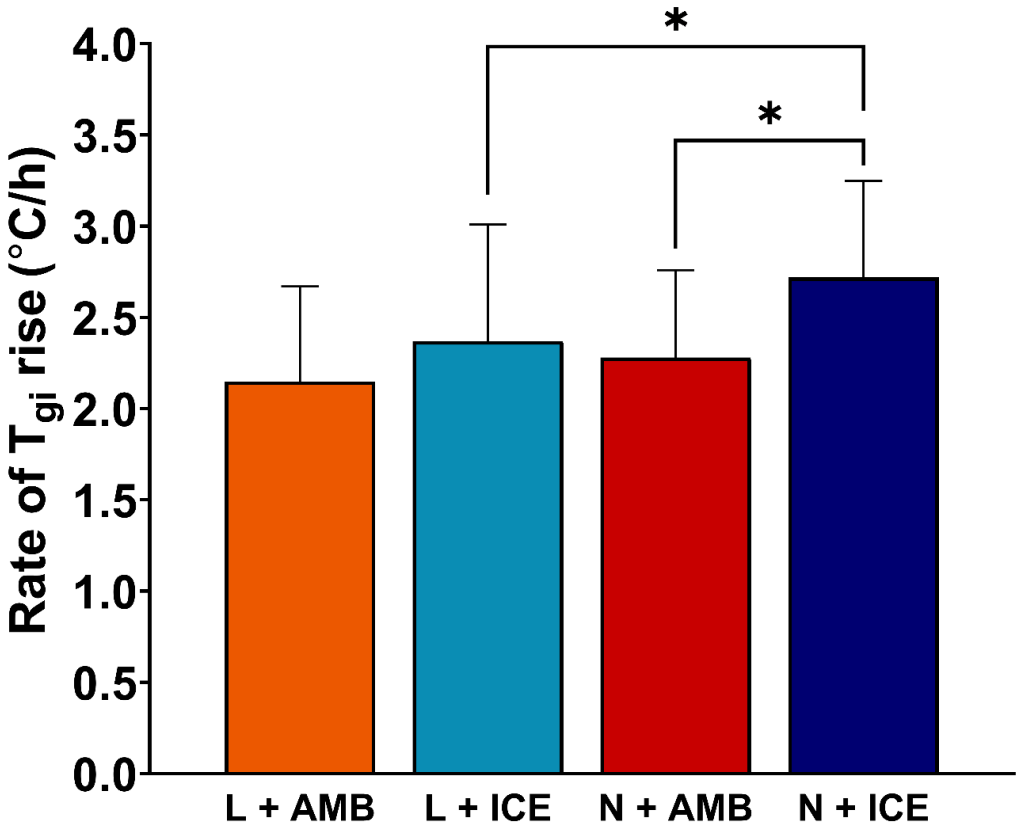


Efficacy *during* exercise limited

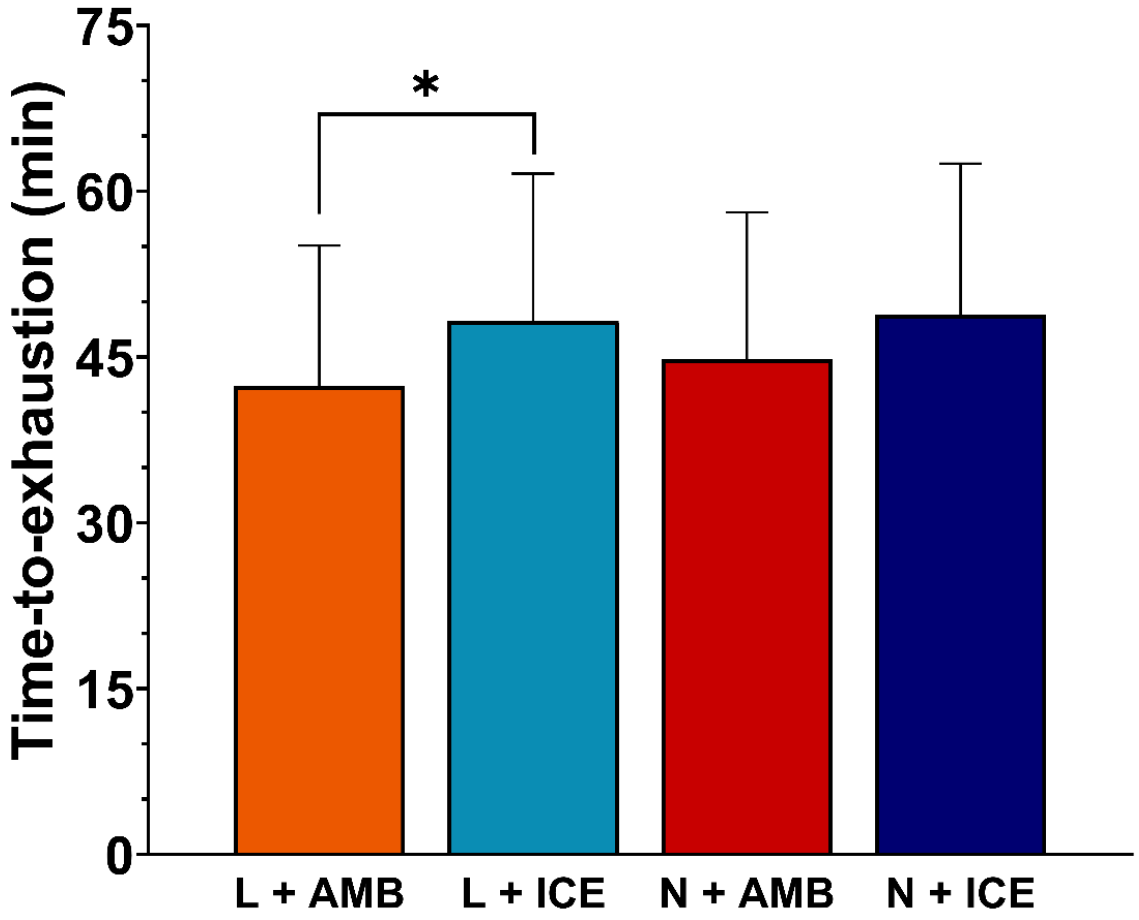


Greater overcompensation effect observed in normal dose compared to low dose

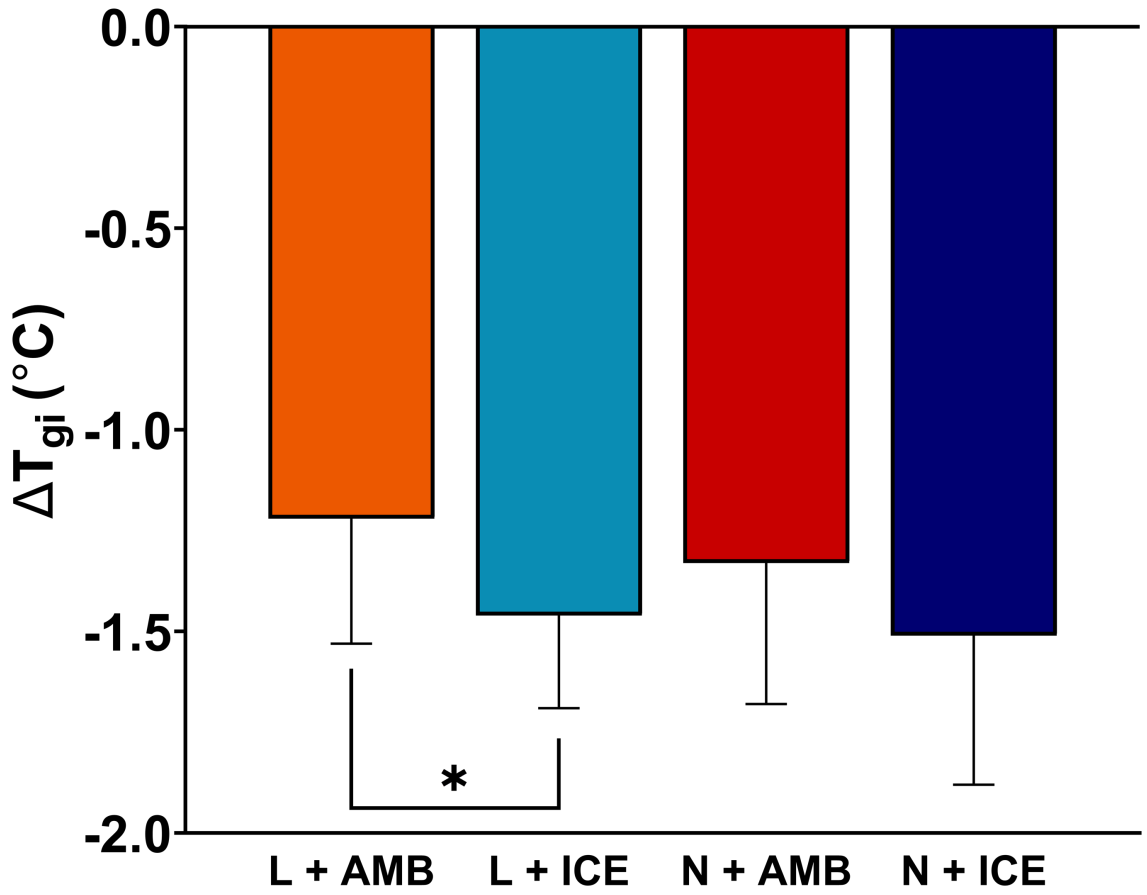




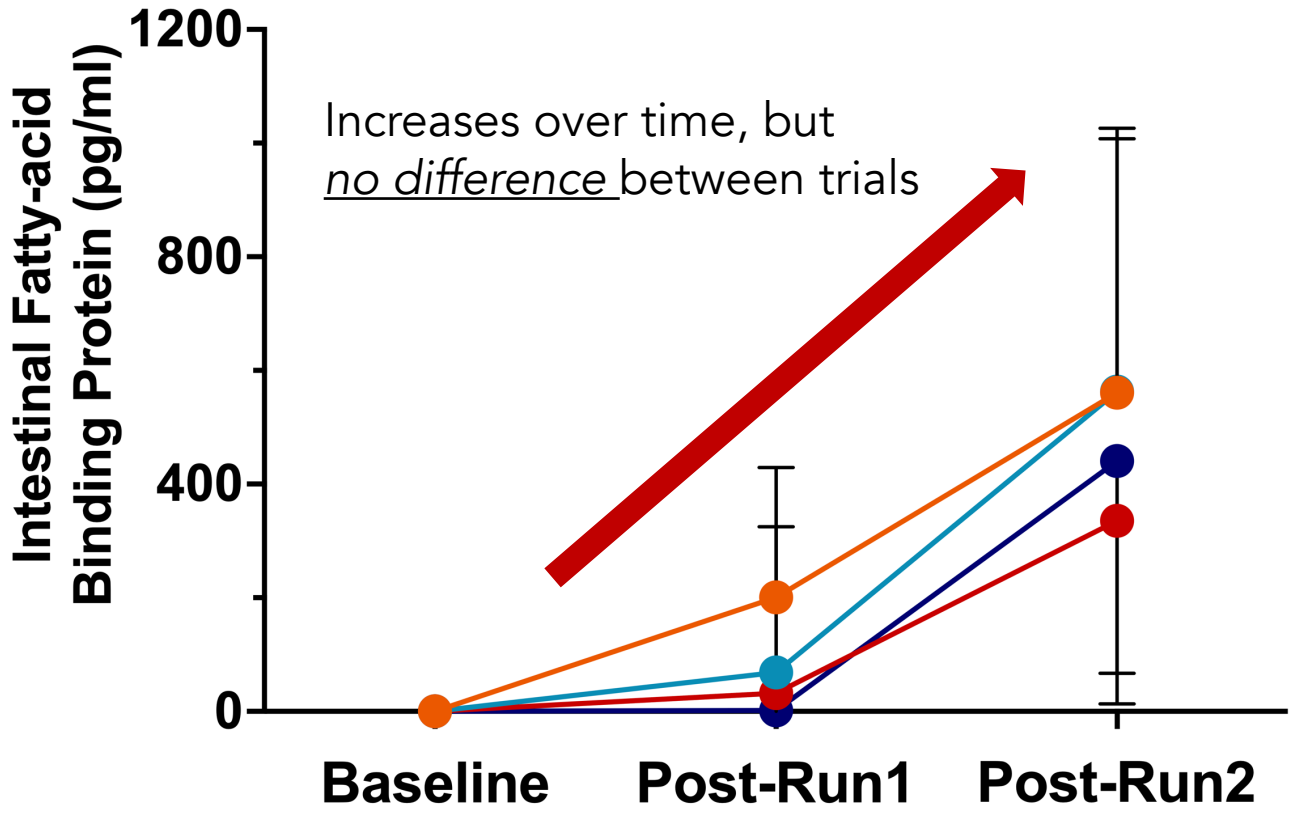
Low dose ice slurry improves endurance capacity



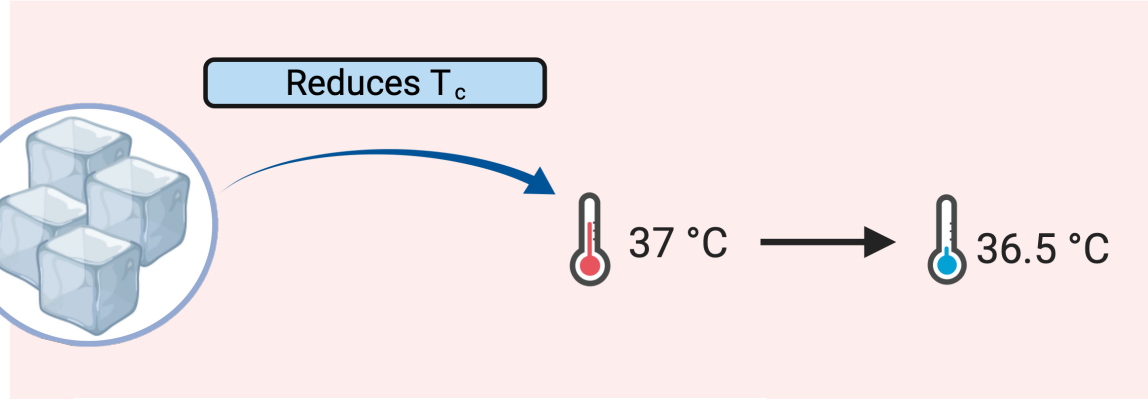
Low dose ice slurry reduces T_c *post*-exercise

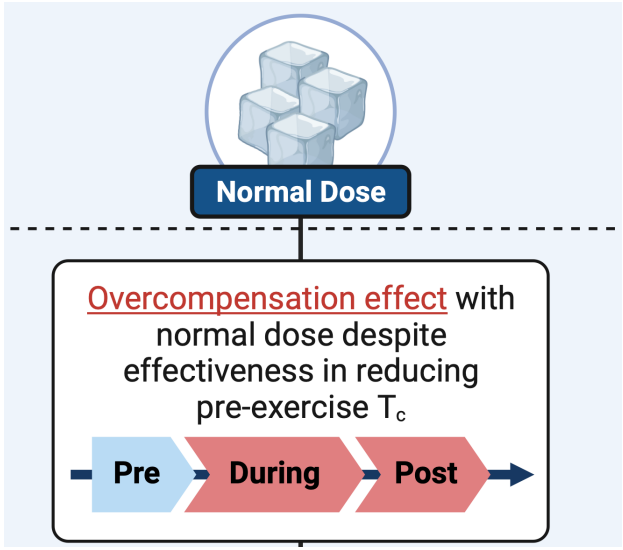


Ice slurry does not protect against intestinal epithelial injury

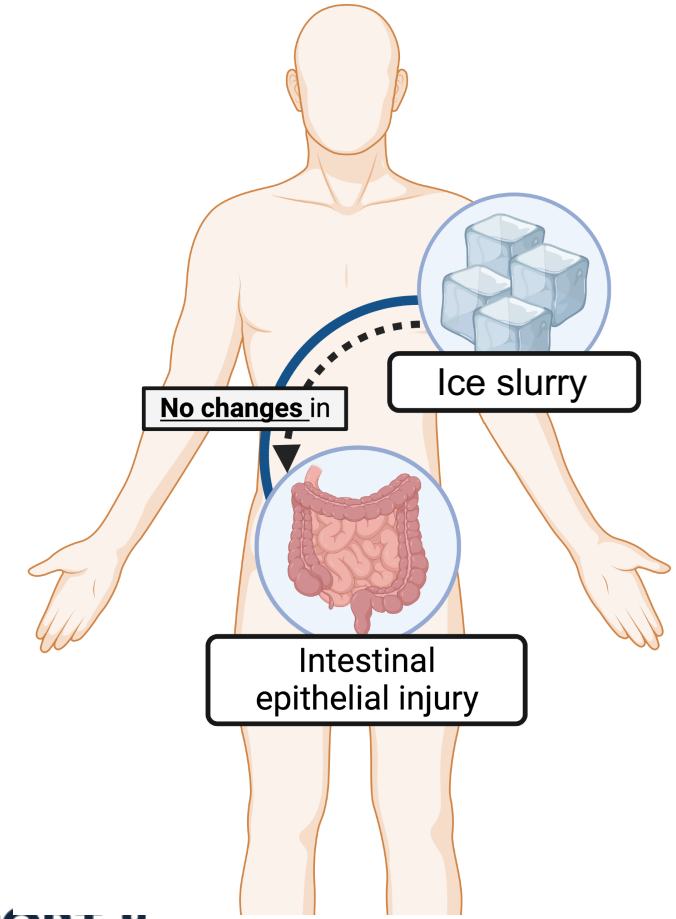


Conclusion


Reduces T_c
37 °C
36.5 °C


Normal Dose
Overcompensation effect with normal dose despite effectiveness in reducing pre-exercise T_c
Pre
During
Post

Conclusion



- Reducing thermal strain alone **insufficient** to prevent gastrointestinal perturbations

Key take-home messages

- When a **lower hydration rate** is preferred, **low dose ice slurry** confers greater benefit on endurance capacity than ambient drink
- Ice slurry may be effective in **sports with intermittent rest breaks** to reduce thermal strain

Acknowledgements

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