Meta-analysis on the efficacy of heat mitigation measures and optimisation of hydration

Jason KW LEE Ph.D., FACSM
Associate Professor
Department of Physiology
Yong Loo Lin School of Medicine

5 Heat Management Strategies

AEROBIC FITNESS CONDITIONING

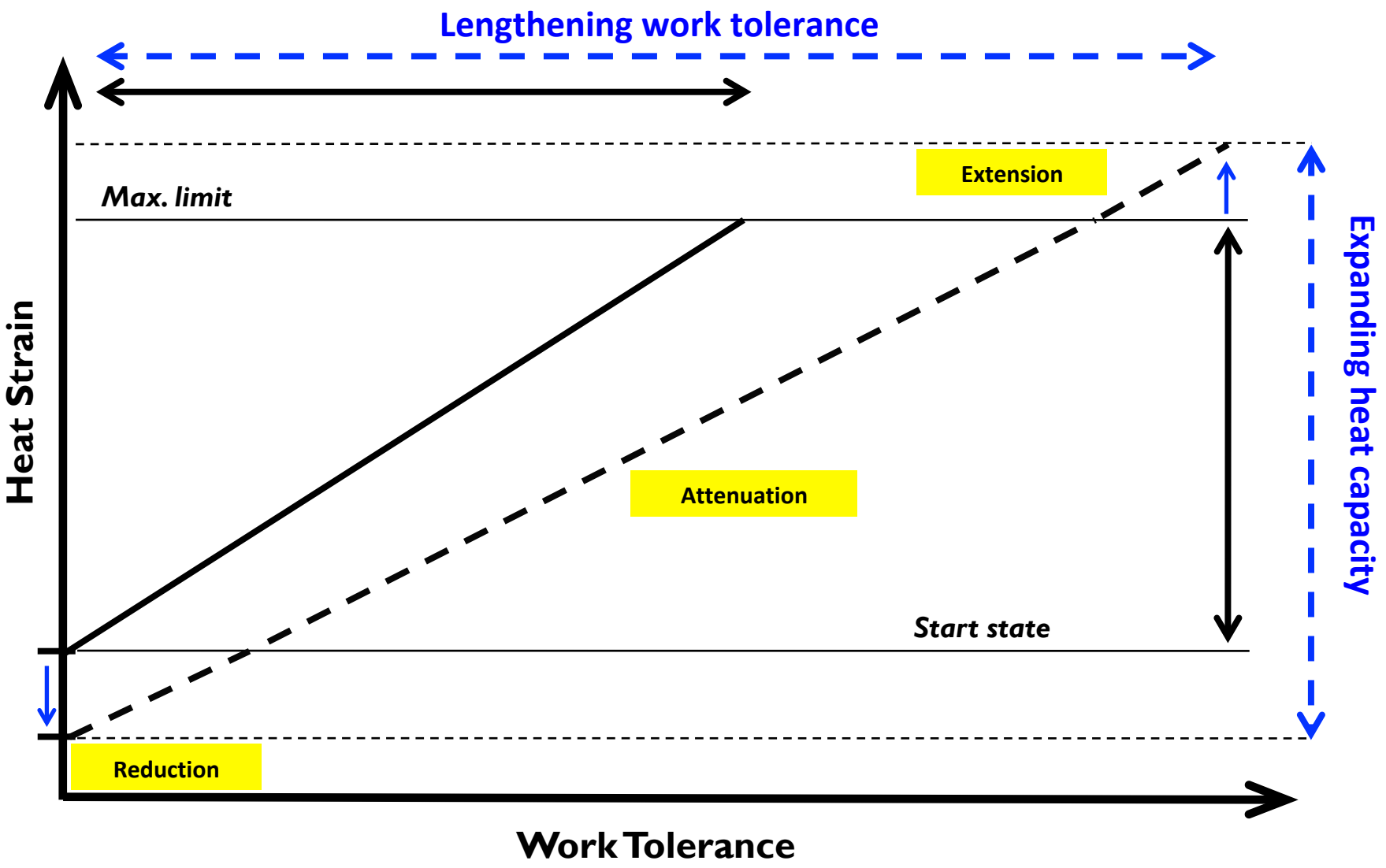
HEAT ACCLIMATISATION

PRE-ACTIVITY COOLING

WORK REST CYCLES

HYDRATION

Heat Management



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HYDRATION

Drink temperature and form

- Extensive research on fluid replacement, but limited data on the physiological responses to drinks at different temperatures

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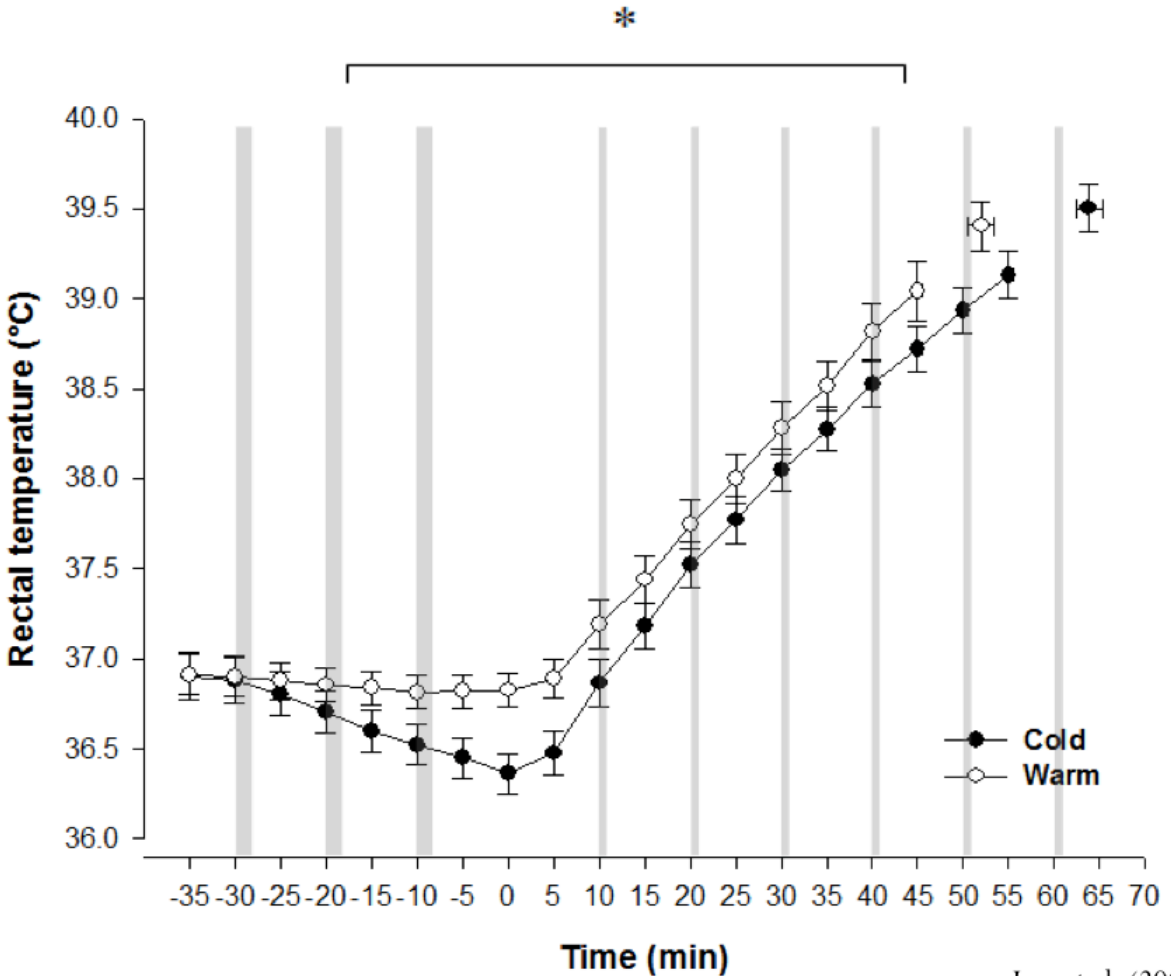
- Drink temperature and form can influence body heat storage capacity

Amount of energy required to warm or cool the ingested fluids to body temperature

$$E = M \cdot h_c \cdot \Delta T$$

M	=	Mass of the fluids ingested
h_c	=	Specific heat of ingested fluids
ΔT	=	Difference in temperature between the ingested fluids and body core temperature

Cold fluids was effective in reducing Tc at rest leading to an improved endurance capacity



- Exercise 65% VO_2 peak to exhaustion
- T_{db}: 35°C; RH: 60%
- Water at 4 or 37°C

Lee, Shirreffs, Maughan (2008) MSSE

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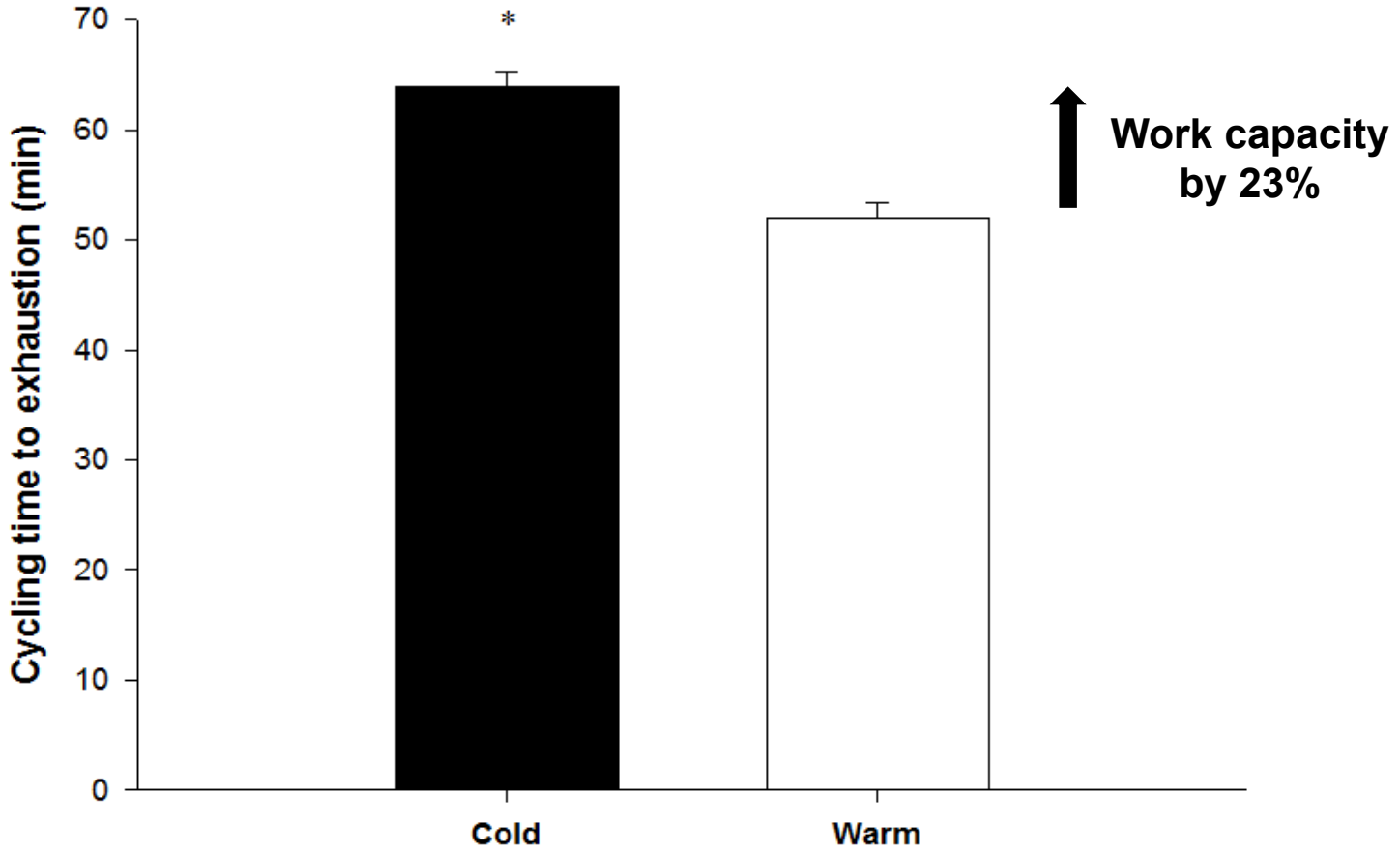

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From bench to ~~bedside~~ work site?

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Focus on Core Temperature as a Heat Disorder Countermeasure

[redacted] ICE SLURRY "Cools from the Core" -

NUS team finds new purpose for old clothes

Summary

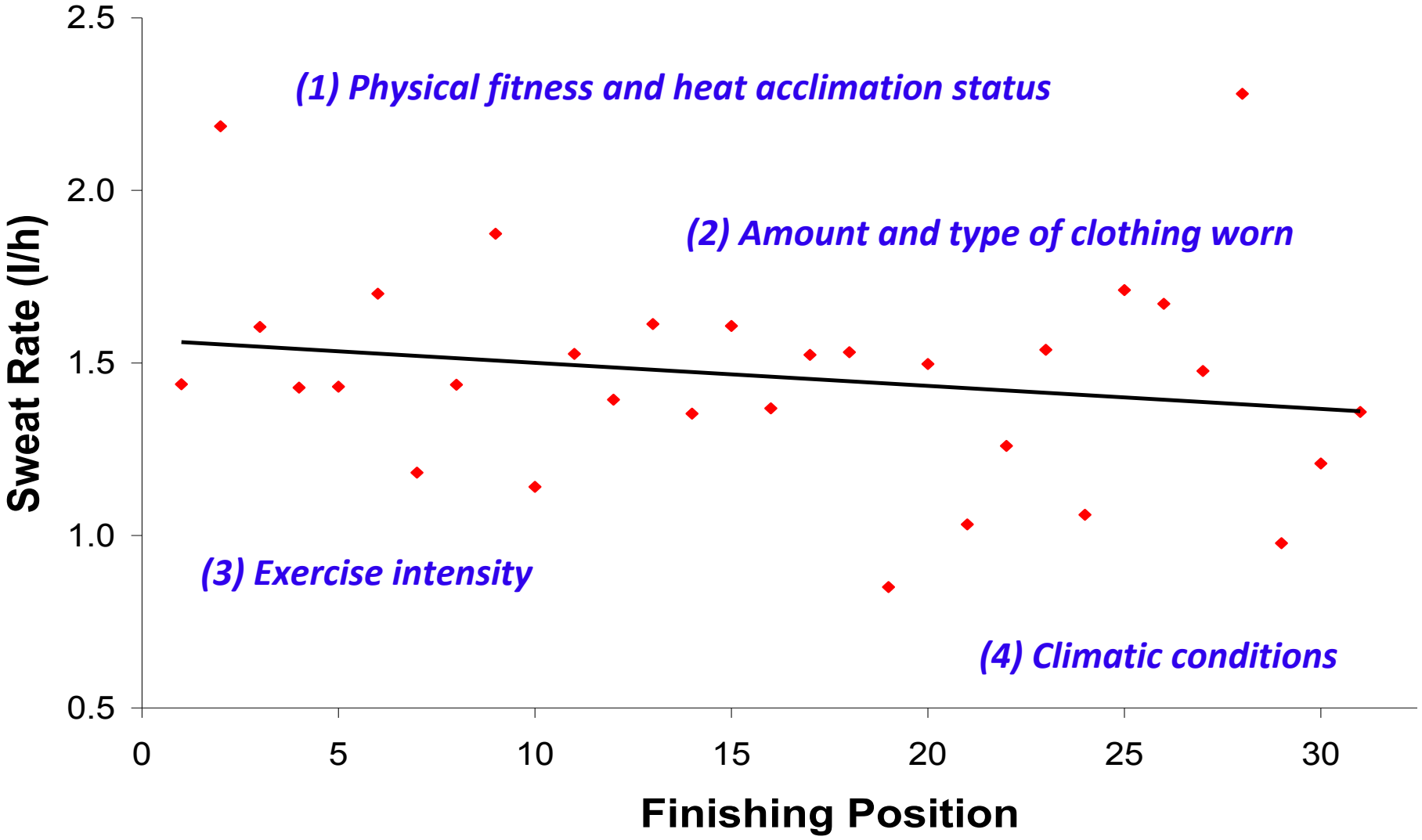
- While employing a combination of various heat mitigation will be most ideal, the meta-analysis allows prioritization based on resources at hand

- Ingestion of ice slurry is an effective and practical precooling method
  - Lesser volume required to attenuate body temperature
  - Efficacy achieved without affecting drink constituents

THANK YOU

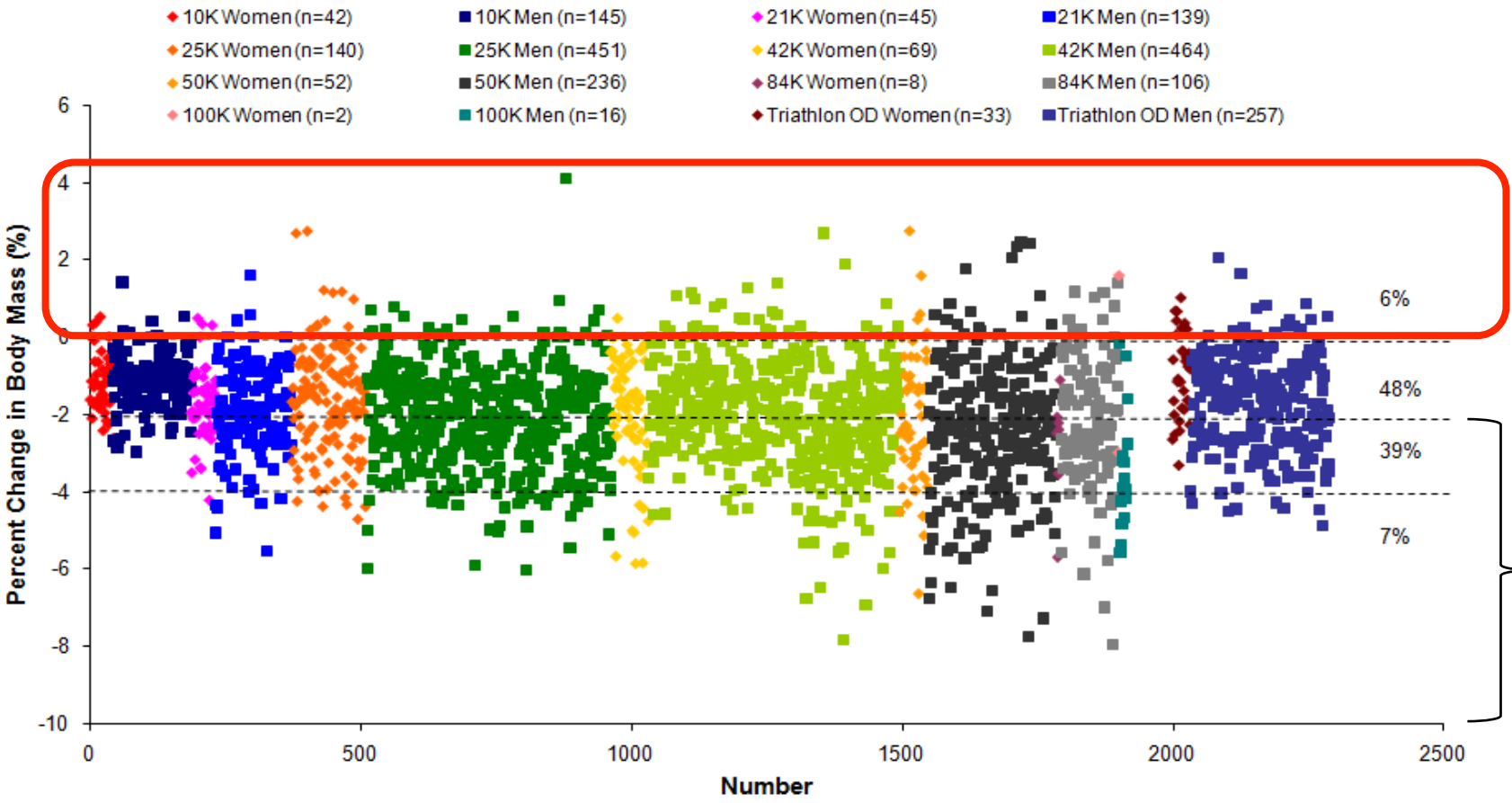
Jason Lee Ph.D., FACSM
phsjlkw@nus.edu.sg

Climatic conditions – just one of several factors



Lee et al. (2010). EJAP

Dehydration following races in the tropics (n=2206)



- Acute dehydration (>2% body mass loss) may not compromise health

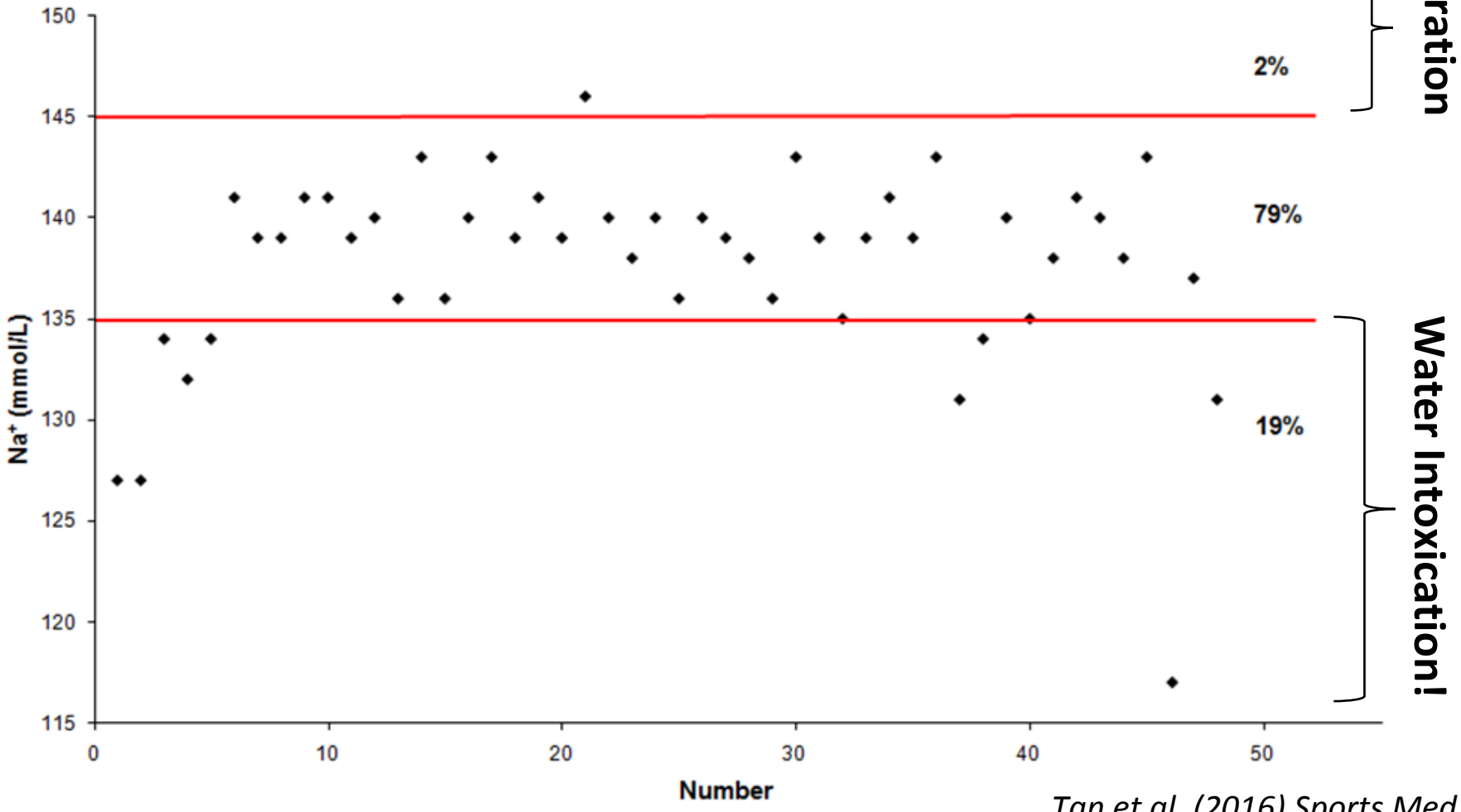
Tan et al. (2016). Sports Med

Definition

EAH is the occurrence of hyponatremia during or up to 24 hours after prolonged activity and is defined by a serum/plasma Na+ concentration below the < 135 mmol/L

EAH is primarily a *dilutional hyponatremia*

Prevalence of Exercise Associated Hyponatremia at Onsite Endurance Medical Tents: 2009 to 2011 (n=48)



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