The Influence of Hydration on 

Core Temperature

Summary of Findings

- Exercise causes a rise in core body temperature that is further exacerbated with dehydration and exercise in the heat.¹
- A review of the existing literature (indicated in the graph below) comparing the rise in core temperature to changes in body mass loss during exercise in the heat shows that the increase in core temperature for every additional 1% change in body mass loss is 0.22°C (4°F).² An athlete who is 2% more dehydrated than their competitor will be competing at roughly 1°F higher which can have decrements in performance the higher the core temperature.¹⁻⁹
- With evidence indicating that dehydration results in an increased core temperature at a given exercise intensity, staying hydrated could help reduce the risk of exertional heat stroke.¹⁰
- In the field setting, the rise in core temperature is more pronounced in fixed intensity exercise in the heat compared to race paced trials, however, performance was adversely affected in both conditions in those that were dehydrated.⁶
- Wearing protective equipment such as a football uniform further exacerbates heat strain by limiting the body’s ability to cool effectively via evaporation. This can have adverse effects when exercising in the heat and/or when athletes are unacclimatized to exercising in the heat.⁷
- Body mass losses of 3-4% can occur in exercise lasting 60-90 minutes, especially if an athlete begins practice dehydrated or there are additional external factors affecting sweat rate (environmental temperature, protective equipment/clothing, etc.).
Practical Applications

- Prior to competition, practice, or conditioning sessions, ensure proper hydration to attenuate the rise in core temperature, especially when exercising in the heat.
- Proper hydration during activity will also assist in attenuating a rise in core temperature during physical activity.
- Sports in which protective equipment is worn (e.g., football) should ensure that frequent hydration breaks are implemented into a practice session since equipment has been shown to affect heat dissipation from the body during exercise.
- Athletes participating in sports such as football, ice hockey, wrestling, and rugby should maintain adequate hydration to attenuate anaerobic endurance performance decrements during activity.

Looking Ahead

- Future research looking at whether there are cooling devices available that can be used during exercise or a practice session that will attenuate rises in core temperature and if these devices decrease the increased influence of dehydration on core body temperature.
- Examining the rise in core temperature during exercise should be further examined by evaluating the influence of hydration at the beginning of exercise (hypohydration, euhydrated, or hyperhydrated) on the rise in core temp during an exercise session.
- Research done in a field setting can sometimes be difficult due to the inability to control for some factors. With that said, performing additional field-studies and controlling for as many factors as possible may help further support the conclusions made in existing literature looking at the effects of hydration on core temperature.

References