The Influence of Hydration on Sweat Rate

Summary of Findings

- **Scientific Definitions:** Hypohydration is the steady-state condition of decreased total body water. Dehydration is the process of losing body water (eg, during exercise).
- Sweat rates during exercise vary depending on the exercising individual, environmental conditions (temperature and relative humidity), fitness level, exercise intensity, duration, equipment worn, and acclimatization status of the individual. During intense exercise in the heat, it is typical to see sweat rates of 1.0-2.5 L/h.1–5
- Dehydration causes a decrease in sweat rate during exercise, which results in a decreased ability for the body to cool through evaporation.
- As environmental temperature and relative humidity rise, the sweat rate of the exercising individual is increased. As sweat rate increases there is an increase in sweat sodium concentration as the body can only reabsorb sodium at a set rate.1
- Heat acclimatization leads to an increased sweat rate during exercise (especially in the heat), smaller reduction in plasma volume, and a lower sweat sodium concentration.1,6,7
- During exercise in the heat most athletes do not replace the fluids that they are losing through sweat. The dehydration that results causes a cascade of events that results in increased cardiovascular strain, increased core temperature as a result of the reduced plasma volume and the impairment of evaporative heat loss due to decreased sweat rate and decreased exercise performance.1,8–12

Change in sweat rate with increasing rectal temperature at varying levels of hypohydration.13

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Practical Applications

- Athletes should maintain an appropriate level of hydration prior to the start of exercise in the heat and aim to minimize fluid losses during the event to attenuate any performance decrements.
- Athletes should know their individual sweat rates and fluid needs in order to minimize fluid losses during exercise, especially in the heat.
- As environmental temperature and humidity increase, athletes will need to consume more fluid during exercise as their sweat rates will increase to aid in evaporative heat loss. Heat acclimatization further increases an athlete's sweat rate during exercise in the heat so additional fluids will be necessary to prevent dehydration.
- Maintaining an appropriate level of hydration during exercise will assist in maintaining plasma volume levels, which will help enhance cardiovascular and thermoregulatory function during exercise.

Looking Ahead

- Further research is needed to examine the magnitude in which sweat rates change during different environmental conditions and hydration status in exercising athletes. This may assist in determining recommended fluid intake levels during exercise during different environmental conditions.
- Further research is needed looking at the adolescent population in regards to factors affecting sweat rates during exercise and the extent of which those affect exercise performance.

References