Korey Stringer Institute
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Preventing sudden death in sport

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# The Influence of Hydration on *Anaerobic Exercise*

## Summary of Findings

- **Scientific Definition:** The term anaerobic endurance is defined as high intensity exercise lasting between 30-120 seconds.[1]
- Anaerobic performance has been shown to be impaired during both single and repeated bouts of anaerobic exercise with moderate levels of dehydration at about 3%.[2]
- Repeated bouts of anaerobic exercise utilizes aerobic metabolism and with increasing dehydration and increasing number of repeated bouts of anaerobic exercise, performance is adversely affected.[2]
- With a single bout of anaerobic exercise, there seems to be a performance-duration component (30 seconds), where exercise lasting less that 30 seconds seems to be unaffected by dehydration.[2]
- It is difficult to interpret the results of the effects of hydration on anaerobic endurance due to both exacerbating (caloric restriction, increased muscle temperature, and fatigue) and masking (endurance training, test type, and menstrual status) factors within the methodological protocols which make it challenging to isolate the effects of dehydration on anaerobic endurance alone.[1]
- Of the five[3–7] studies to accurately assess anaerobic muscular endurance, it is suggested that a level of dehydration equaling 3-4% reduces anaerobic muscular endurance by an estimate of 10%[1]
- 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.).

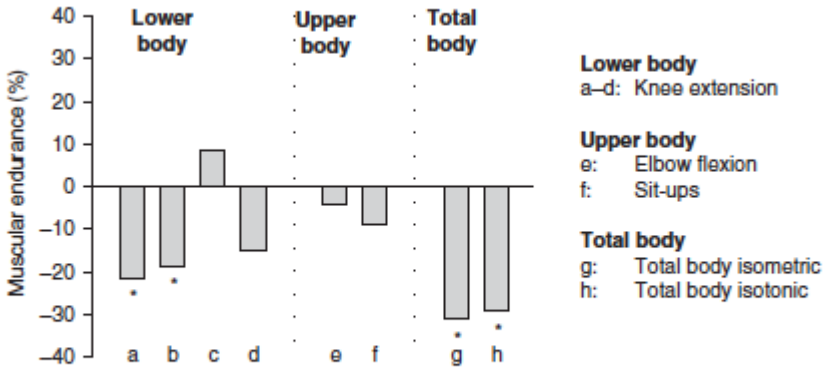


**Fig. 3.** Non-confounded effects of hypohydration on high-intensity muscular endurance (activities lasting >30 seconds but <120 seconds). Data are presented as mean percentage change from baseline. Results from: Caterisano et al.[39] (a and b); Greiwe et al.[34] (c and e); Bigard et al.[82] (d); Bosco et al.[81] (f); and Torranin et al.[83] (g and h). * $p < 0.05$.

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## Practical Applications

- Prior to competition, practice, or conditioning sessions, ensure proper hydration to maximize anaerobic performance during activity.
- Proper hydration during activity will assist in preventing any additive effects of dehydration on anaerobic endurance performance decrements.
- 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

- Results examining the influence of hydration on anaerobic performance are mixed due to mode of dehydration used (exercise-induced, fluid restriction, passive). Further research examining exercise-induced dehydration on anaerobic performance should be performed to further strengthen existing literature and to make the results more generalizable to athletic events.
- Further research investigating the effects of recovery (an aerobic exercise factor) during repeated bouts of anaerobic exercise and how these two factors are related to performance in athletes who are both euhydrated and dehydrated.
- In addition, further exploration of the performance-duration component of anaerobic performance is needed to determine if there are performance deficits in those who are dehydrated performing short bouts (<30 seconds) of exercise.

## References


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