The Influence of Hydration on Muscular Power

Summary of Findings

- **Scientific Definition:** Muscular power is defined as the power generated when a muscle engages in a maximal concentric action at the optimal shortening velocity.\(^1\)
- Overall the evidence indicates that maintaining hydration enhances performance by attenuating the decreases in muscular power that occur from dehydration.\(^2\)\(^-\)\(^7\) Some evidence shows that dehydration has no effect on muscular power\(^8\)\(^-\)\(^13\) and reasons for these conflicting results are most likely due to the different testing procedures used in these studies to elicit dehydration.
- Interpreting the effects of dehydration on muscle power is difficult due to confounding factors (caloric restriction, hyperthermia, fatigue due to exercise, the test used to assess power, training status, and menstrual status) that can be involved in the experimental protocols examining this topic.\(^14\)
- Numerous authors\(^2\),\(^7\),\(^14\)\(^-\)\(^16\) have postulated that the decrease in muscular power as a result of dehydration is caused by factors affecting the neuromuscular system.
- Of the available literature examining the effects of dehydration on muscle power, a level of 3-4% dehydration reduces muscular power by about 3%.\(^14\)
- 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.).

Muscular power changes due to dehydration in controlled studies.\(^12\)
Practical Applications

- Prior to competition, practice, or conditioning sessions, ensure proper hydration to maximize power during activity.
- Proper hydration during activity will assist in preventing any additive effects of dehydration on power losses.
- Athletes participating in sports such as football, basketball, soccer, ice hockey, wrestling, and rugby should maintain adequate hydration to attenuate power losses during training and competition.

Looking Ahead

- Further research investigating the effects of dehydration on power in isolation from exercise, exercise in the heat, passive heating resulting in increased muscle temperature, or caloric restriction is needed to gain a better understanding of the magnitude on how dehydration affects strength during physical activity.
- Further investigations to determine if greater strength gains in athletes are obtained during strength and conditioning sessions if they are properly hydrated versus if they are dehydrated.

References