Hydration during Intense Exercise Training

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Hydration status has profound effects on both physical and mental performance, and sports performance is thus critically affected. Athletes may begin exercise in a hypohydrated state due to incomplete recovery from a previous competition or training session or as a result of incomplete recovery from water loss that was induced to achieve a specific body mass target. Dehydration will also develop in endurance exercise where fluid intake does not match water loss.

There is considerable debate as to level of dehydration at which exercise capacity and performance are affected and whether a systematic drinking strategy is needed to offset water loss or whether thirst will guide the athlete sufficiently. The focus has generally been on the influence of hydration status on performance in competitions or laboratory tasks. However, most athletes spend much more time in training than in competition, and thus, sweat loss and fluid replacement in training may have important implications. Maintaining adequate hydration in training might permit the athlete to sustain high training loads. Likewise, training with fluid replacement strategies would help the athlete to train the intestinal tract for competition. On the contrary, it could be argued that dehydration increases physiological strain, resulting in enhanced training adaptation.

Hypohydration may impair training quality and may also increase stress levels. It is unclear whether this will have negative effects (reduced training quality, impaired immunity) or whether it will promote a greater adaptive response. Nevertheless, hypohydration increases cortisol levels, which seems to agree with a subjective response of greater perceived exertion, and this could increase an athlete’s risk of infectious illness. Moreover, hypohydration could also increase gastrointestinal distress during exercise and lead to performance decrements. Only limited research, some of which was performed in animal models, is available to answer these questions. In contrast to the possible negative effects, hypohydration and the consequent hyperthermia can enhance the effectiveness of a
heat acclimation program, resulting in improved endurance performance in warm and temperate environments in a shorter time period.

Most elite athletes train at least twice per day. Restoring fluid balance from training session to training session is a challenge, and athletes often begin training in the dehydrated state, risking a gradual performance impairment over the course of the day or training week. The athlete's priority for recovery after exercise will depend on the intensity and volume of the preceding session, environmental conditions and other factors. Replacement of carbohydrate, fluid and electrolytes timed correctly and ingested in the right quantities should ensure restoration of substrate reserves (e.g. glycogen) and water balance.

Drinking in training may be important in enhancing tolerance of the gut when athletes plan to drink in competition. The intestinal tract is highly responsive to feeding and fasting. Data show that high carbohydrate intakes, either ingested in form of meals or using sport drinks, gels or bars during exercise, can increase maximum absorption rates. Enhanced absorption may also lead to increased oxidation, and in some cases, better performance. Carbohydrate intake drives water from the intestine to the circulation, so faster carbohydrate uptake should lead to faster water absorption.

Finally, the distribution of water between body water compartments may also be important in the initiation and promotion of cellular adaptations to the training stimulus. Cell swelling will favor anabolic reactions such as protein and glycogen synthesis.

Individual hydration status and sweat rate assessments are well-accepted strategies to improve athletes' awareness surrounding individual fluid needs. While sport nutrition professionals may support the necessary testing to establish individual fluid guidelines, care should be taken not to create an athlete's dependency on such services.