

HYDRATION

AN EXPERT REFRESHER

This resource was created by Michael Naylor, Head of Performance Nutrition at the UK Sports Institute, in collaboration with the GetPRO Professional team.

Water has many functions including regulating body temperature, removing waste products via urine, transporting nutrients and compounds in the blood, and acting as a lubricant for our joints. For athletes, dehydration can result in reduced endurance and strength performance as well as heat related illness. Research suggests individuals suffer adverse effects when there is a loss of <2% body weight. To maintain a euhydrated state, it is important individuals avoid over drinking (hyperhydration) and under drinking (hypohydration).

DEFINITIONS, RECOMMENDATIONS AND GUIDELINES

The definition of hydration during exercise (avoiding losses greater than 2–3% of body mass while also avoiding overhydration), has been taken from the National Athletic Trainers' Association Position Statement, which was written by key researchers in this area, including Brendon McDermott, Scott Anderson, Lawrence Armstrong and Douglas Casa¹. Here, you will also find definitions for hyperhydration, exercise-associated hyponatremia, dehydration, hypo-hydration and drinking to thirst.

'Dehydration impairs performance in most events, and athletes should be well hydrated before exercise... Sufficient fluid should be consumed during exercise to limit dehydration to less than about 2% of body mass. Sodium should be included when sweat losses are high, especially if exercise lasts more than about 2 hrs. Athletes should not drink so much that they gain weight during exercise. During recovery from exercise, rehydration should

include replacement of both water and salts lost in sweat.'

The above reference was taken from the conclusion of the 2010 IOC Consensus statement², with several recent papers supporting the conclusion³.

However, creating exact recommendations for hydration is difficult, due to the myriad of factors influencing sweat rates / sweat sodium concentrations⁴.

Papers have provided some rough guidelines to help further define the IOC's 2010 consensus recommendations; however, it is important to emphasize that these provide a rough guide only. The Academy of Nutrition and Dietetics provided an excellent position paper on Nutrition and Athletic Performance, with authors including Louise Burke, a hugely influential scientist in this space. See reference 5 (p514-515), for a full overview of their hydration guides.

HYDRATION RECOMMENDATIONS

SODIUM CONCENTRATION

The concentration of sodium in sweat rates can vary from 15 to 90mmol/L with the average falling around 40 mmol⁶. In addition, sweat rates can vary from ~0.3 litres per hour to ~2.4 litres per hour⁷. Therefore, Asker Jeukendrup, among many others has recommended sodium and potassium intake during exercise to be ~20 to 30 mmol/L and ~2 to 5 mmol/L respectively, due to their ingestion aiding the replenishment of sweat electrolyte losses during exercise, and 20 to 30 mmol/L sodium also helping stimulate physiological thirst, improving palatability and voluntary fluid intake⁷. It is difficult to pinpoint exact hydration recommendation quantities of both fluid and electrolyte use, due to the inter and intra variability between individuals, something that should be highlighted when working with athletes. For an in-depth overview of daily fluid requirements and sodium intake

suggestions before, during and after exercise, please see reference 7, (p.578 daily fluid requirements and p.596, competitive sport or exercise).

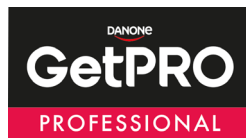
It is important athletes look out for potential salt loss signs, such as the appearance of visible white lines on their clothing, potentially indicating they may want to consume an electrolyte before and or during their session in that environment, especially if exercising for over 2hrs⁸. Ultimately, using a urine colour hydration chart is a great way to assess hydration levels throughout the day, aiming for zones 1-3⁹, however less practical if exercising for long durations. To gain a more accurate assessment of sweat rate, specific tests can be conducted, which should be repeated in each changing environment¹⁰.

HYDRATION IN DIFFERENT ENVIRONMENTS

The hydration recommendations in the heat appear more prescriptive with the IOC publishing a consensus statement in 2023¹¹. In the heat, sweat rates are likely higher, increasing the chances of our euhydrated state being tilted off balance. Again, emphasis should be on minimising body water mass losses, without increasing body weight. Moreover, training in other more extreme environments, such as altitude can increase sweat rate due to factors such as a rise in respiratory losses, while exercising in the cold can mean athletes are less likely to notice thirst. In some cases, athletes may not even notice sweat if their environment masks it, such as

during swimming or water sports. The key point here is making athletes aware that they may need to think about their hydration when exercising in different environments.

Given the importance of hydration for health and performance, particularly in the heat, it is great to see governing bodies of sports altering their rules for events to allow for greater hydration measures, with the international federations striving to develop sport specific extreme heat policies. For example, FIFA rules allow a hydration and cooling break after 30 minutes of play, while World Triathlon improved the number



of aid/ drink stations on the run¹¹. This shows that we can't ignore these changes at the elite level, and procedures must be

reflected at grass roots, to ensure the health and safety of recreational athletes.

TAKE HOME POINTS

- Good hydration practices include beginning exercise in a euhydrated state; preventing excessive hypohydration during exercise; and replacing remaining losses following exercise prior to the next exercise bout
- Drinking to thirst is generally accepted, with addition of sodium if high sweat losses or if exercising over 2 hours
- Hypohydration is influenced by individual sweat rate, exercise mode, intensity, duration, and environmental factors such as heat
- Characteristics and rules of each sport, such as the use of particular uniforms or the availability of fluid during training and competition, may influence optimal hydration strategies

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