Fluid Replacement for Athletes[1]

To ensure proper pre-exercise hydration, the athlete should consume approximately:

- **500-600 mL (17-20 fl. oz.) of water or a sports drink 2-3 hours before exercise and**
- **200-300 mL (7-10 fl. oz.) of water or a sports drink 10-20 minutes before exercise.**

Fluid replacement should approximate sweat and urine losses and at least maintain hydration at less than 2% body weight reduction.

- This generally requires **200-300 mL (7-10 fl. oz.) every 10-20 minutes**.
- Specific individual recommendations are calculated based on sweat rates, sport dynamics, and individual tolerance.
- Maintaining hydration status in athletes with high sweat rates, in sports with limited fluid access, and during high-intensity exercise can be difficult, and special efforts should be made to minimize dehydration.
- Dangerous hyperhydration is also a risk if athletes drink based on published recommendations and not according to individual needs.

Post-exercise hydration should aim to correct any fluid loss accumulated during the practice or event.

- **Ideally completed within 2 hours**, **rehydration should contain water** to restore hydration status, **carbohydrates** to replenish glycogen stores, **and electrolytes** to speed rehydration.
- The primary goal is the immediate return of physiologic function (especially if an exercise bout will follow).
- When rehydration must be rapid, the athlete should compensate for obligatory urine losses incurred during the rehydration process and drink about 25-50% more than sweat losses to assure optimal hydration 4-6 hours after the event.

Fluid temperature influences the amount consumed. While individual differences exist, **a cool beverage of 10° to 15°C (50° to 59°F) is recommended**.

In many situations, athletes benefit from including carbohydrates (CHOs) in their rehydration protocols.

- Consuming CHOs during the pre-exercise hydration session (2 to 3 hours pre-exercise) along with a normal daily diet increases glycogen stores.
- If exercise is intense, then consuming CHOs about 30 minutes pre-exercise may also be beneficial.
- Include CHOs in the rehydration beverage during exercise if the session lasts longer than 45-50 minutes or is intense.
- An ingestion rate of about 1 g/min (0.04 oz/min) maintains optimal carbohydrate metabolism.

    - For example, 1 L of a 6% CHO drink per hour of exercise.
- CHO concentrations greater than 8% increase the rate of CHO delivery to the body but compromise the rate of fluid emptying from the stomach and absorbed from the intestine.
    - Fruit juices, CHO gels, sodas, and some sports drinks have CHO concentrations greater than 8% and are not recommended *during* an exercise session as the sole beverage.
- Athletes should consume CHOs at least 30 minutes before the normal onset of fatigue and earlier if the environmental conditions are unusually extreme, although this may not apply for very intense short-term exercise, which may require earlier intake of CHOs.
- Most CHO forms (ie, glucose, sucrose, glucose polymers) are suitable, and the absorption rate is maximized when multiple forms are consumed simultaneously.
- Substances to be limited include fructose (which may cause gastrointestinal distress); those to be avoided include caffeine, alcohol (which may increase urine output and reduce fluid retention), and carbonated beverages (which may reduce voluntary fluid intake due to stomach fullness).

Inclusion of sodium chloride in fluid-replacement beverages should be considered under the following conditions:

- inadequate access to meals or meals not eaten
- physical activity exceeding 4 hours in duration
  or
- during the initial days of hot weather.
- Under these conditions, adding modest amounts of salt (0.3 to 0.7 g/L) can offset salt loss in sweat and minimize medical events associated with electrolyte imbalances (eg, muscle cramps, hyponatremia).

Adding a modest amount of salt (0.3 to 0.7 g/L) to all hydration beverages would be acceptable to stimulate thirst, increase voluntary fluid intake, and decrease the risk of hyponatremia and should cause no harm.

[1]National Athletic Trainers' Association. (2000). *National Athletic Trainers' Association Position Statement: Fluid Replacement for Athletes*. Casa, D. J., et al.