

REST HUB

Recovery Ready



Water Immersion Overview

When prescribing water immersion within an athlete's recovery program, there are a range of considerations that may influence and optimise the outcome/s.

Post-exercise water immersion should be thoughtfully applied to suit the needs of the athlete, sport-specific situation, environmental conditions, and the recovery outcome.

Where possible, prescribers should be aware of existing water immersion research, with consideration given to the exercise modality, participant cohort (i.e., novice vs. recreationally active vs. athletic), immersion protocol/s, and the training goal (i.e., acute vs. chronic).



Immersion temperature, duration, & depth

- > Cold water immersion (CWI) is commonly implemented at temperatures of 10-15 °C for 10-15 minutes.
- > Hot water immersion (HWI) is commonly implemented at temperatures of ~38-40 °C. Higher temperatures or extended durations may induce discomfort and increase the risk of heat stress.
- > Contrast water therapy (CWT) is commonly implemented by alternating similar immersion durations for both HWI and CWI.
- > Protocols should be practical and time efficient (e.g., typically 10-15 minutes).
- > Immersion of the whole-body (head out) optimises hydrostatic pressure effects (e.g., venous return) and maximises the total surface area available for heat transfer.



Immersion periodisation

- > The application of water immersion strategies should be periodised to align with the goals of the training phase.
- > For example, CWI can be manipulated to maximise training and performance outcomes. During pre-season and general preparation phases, selectively apply CWI following technical/skill-based sessions and minimise use when the goal is specifically related to strength or hypertrophy; During in-season and specific preparation phases, CWI may be increased following, or in readiness for, priority sessions, particularly when subsequent training requires high levels of skill or quality; During a taper phase, the application of CWI can help maintain high-intensity training and reduce fatigue and muscle soreness.



Frequency of competition

- > When competing frequently, increasing the use of CWI or CWT may be beneficial to reduce muscle soreness and enhance subsequent neuromuscular performance.
- > CWI can be effective between competitive efforts on the same day if reductions in core and muscle temperature are not limiting factors for subsequent performance (e.g., performance may be impaired if there is insufficient time prior to subsequent warm up to provide adequate rewarming). In situations where CWI is not possible or practical, strategies such as compression clothing or intermittent pneumatic compression may be suitable alternatives.
- > Like all strategies implemented between or at the completion of competitive efforts, water immersion protocols should be rehearsed, and refined, to optimise performance.



Environmental conditions

- > CWI is highly effective to cool the body in thermally challenging environmental conditions and is the preferred strategy for rapid cooling in the event of heat illness.
- > When exercising in the heat, CWI can reduce physiological strain and improve thermal comfort.
- > Conversely, in cooler environmental conditions, HWI or CWT may be more appropriate to support recovery outcomes.



Individual factors

- > Consider body surface area to mass ratio (BSA:M) and composition when prescribing protocols.
- > Athletes with a larger BSA:M have a greater capacity for heat exchange and may respond more rapidly to different water temperatures.
- > Athletes with lower subcutaneous fat experience a greater decrease in core and muscle temperature during CWI.
- > Along with potential body composition differences, females may experience higher baseline core temperatures during the luteal phase of the menstrual cycle.
- > An athlete's disability can influence responses to water immersion and should be considered prior to use.
- > Additional considerations may include specific management of acute injuries, open wounds or infections, as well as an athlete's inflammatory (e.g., acute oedema) and vascular (e.g., vascular impairment or disease) status.



Belief effect / psychological factors

- > Athletes report a reduction in perceived soreness and fatigue with the inclusion of appropriate recovery strategies, including water immersion.
- > It is important to acknowledge and address the potential impact of previous immersion experiences. An athlete's prior experiences (e.g., too cold/hot, too long, forceful application) and any associated perceptual responses (e.g., stress, anxiety, fear) may impact their desire or capability to participate in present or future water immersion sessions.
- > Ongoing education regarding immersion strategies is encouraged to promote athletes' understanding of the benefits and constraints.



Cold water immersion (CWI)

- > Of all water immersion techniques, CWI (e.g., ice baths) is often the most available.
- > To maximise benefits, avoid hot showers immediately after CWI.
- > For athletes less habituated to CWI, total immersion time can be accumulated with short breaks in between.
- > Colder does not necessarily mean better! If implementing a continuous CWI protocol, a higher temperature (e.g. 15 °C vs. 10 °C) may increase comfort and compliance without compromising benefits.
- > Lower temperatures may be best suited to intermittent CWI or for acute cooling to treat heat-related illness.
- > Examples of situations where the integration of CWI in an athlete's recovery program may be beneficial include:
 - Training and competing in thermally challenging environmental conditions.
 - Competition periods.
 - Following exposure to significant impact (e.g., contact sports) or muscle damage (e.g., eccentric contractions).
 - When suffering excessive perceived soreness or fatigue.
 - When subsequent performance or training quality is a priority.
 - For injury or illness management (in consultation with relevant medical practitioners).
 - For the management of specific impairments to support recovery and daily function.



Hot water immersion (HWI)

- > HWI (e.g., hot water bath, spa) upregulates multiple physiological responses, including skin, muscle, and core temperature, heart rate, blood flow, and cardiac output.
- > When strategically implemented, HWI may promote positive adaptive responses following resistance exercise.
- > Water temperatures of ~38-40 °C are commonplace. Higher water temperatures or extended immersion durations may induce discomfort and increase the risk of heat stress.
- > Select injuries may be more responsive to HWI or thermoneutral water immersion, compared to CWI. Consultation with relevant practitioners is recommended to optimise recovery or rehabilitation outcomes.



Contrast water therapy (CWT)

- > CWT (i.e., alternating between HWI and CWI) may promote metabolite removal via vasodilation and vasoconstriction and improve perceptions of fatigue.
- > Commonly implemented with similar immersion times for both HWI and CWI.
- > Protocols involving a greater proportion of CWI may assist with reducing core and muscle temperature.
- > Where relevant, finish the session with CWI to leave the body with a cooling stimulus.



Recommended Reading

Machado A, Ferreira P, Micheletti J, et al. Can Water temperature and immersion time influence the effect of cold water immersion on muscle soreness? A systematic review and meta-analysis. *Sports Med.* 2016 Apr;46(4):503-14. doi: 10.1007/s40279-015-0431-7.

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Mujika I, Halson S, Burke L, Balagué G, Farrow D. An integrated, multifactorial approach to periodization for optimal performance in individual and team sports. *Int J Sports Physiol Perform.* 2018 May 1;13(5):538-561. doi: 10.1123/ijsp.2018-0093.

Stephens J, Halson S, Miller J, Slater G, Askew C. Cold-water immersion for athletic recovery: One size does not fit all. *Int J Sports Physiol Perform.* 2017 Jan;12(1):2-9. doi: 10.1123/ijsp.2016-0095.

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