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Is it the End of the Ice Age?

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The use of the RICE (Rest, Ice, Compression, Elevation) protocol has been the preferred method of treatment for acute musculoskeletal injuries for decades. However, the efficacy of using ice as a recovery strategy following injury in humans remains uncertain, and there is a growing trend recommending against icing following injury. Animal models suggest that while ice can help to accelerate the recovery process, extreme muscle cooling might delay repair and increase muscle scarring. Despite the conflicting evidence, ice should not be dismissed as a potential treatment option. When considering what is known about the injury cascade, the optimal application window for ice is in the immediate acute stage following injury to reduce the proliferation of secondary tissue damage that occurs in the hours after the initial injury. Practitioners should tailor the application of ice based on the injury timeline and repair process, consistent with applications in 20-30 minute intervals within the first 12 hours post-injury. Until the evidence unanimously proves otherwise, the culture of icing injuries should remain a staple in sports medicine.

The RICE (Rest, Ice, Compression, Elevation) protocol has been the preferred method of treatment for acute musculoskeletal injuries since Dr. Mirkin coined the term with his coauthor Marshall Hoffman in 1978 in "The Sports Medicine Book."[1] In reality, the implementation of this protocol to accelerate recovery was unsubstantiated in the publication. Although the recommendations were reaffirmed in subsequent decades,[2] Mirkin recanted his original position on the protocol in 2014.[3] There is a growing trend recommending against icing following injury so as not to blunt the natural healing response and potentially cause further damage to the affected tissue. Subsequently, there has been much debate among clinicians about best practice following injury, with some recommending that ice be removed from the standard management of soft tissue injuries altogether.

The injury cascade involves primary injury resulting in immediate structural changes in the tissues, followed by secondary injury, which encompasses delayed proliferation and exacerbation of the initial structural damage.[4] Based on what is known about the injury cascade, the optimal application window for ice is in the immediate acute stage following the injury.[5] The rationale for administering ice at this stage is to reduce the proliferation of secondary tissue damage that occurs in the hours after the initial injury. Although applying ice on the days following injury will provide pain relief through the slowing of neural conductance velocity, it is of little additional benefit. In practice, administering ice in the immediate stage after injury can be challenging. Most individuals, practitioners, and even animal model studies often fail to apply ice within the first hours after injury. In the acute post-injury phase, we cannot expect a modality, often administered only one time, and often too late, to have any consequential impact on the recovery and healing process.

While controlled trials implementing the use of ice immediately following musculoskeletal injuries in humans do not exist, there is plenty of evidence in the literature from animal models. The scientific basis for administering ice, or any form of cryotherapy for that matter, to reduce metabolism and inflammation following injury comes from animal models. Animal models suggest that by promptly applying ice, the metabolic demand in the affected area might be suppressed,[6] which in turn could limit the magnitude of the pro-inflammatory response,[7,8] help to accelerate the onset of the anti-inflammatory phase,[9,10] and reduce the area of secondary muscle injury.[11] On the contrary, animal models caution that if extreme muscle cooling is achieved following injury, it might delay repair[12–14] and increase muscle scarring.[12] Although these results are inconclusive in determining whether using ice hinders or expedites recovery after injury, recent evidence suggests that ice may have a beneficial effect by reducing the immediate pro-inflamma-

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tory response and promoting muscle regeneration. This is especially true in injury models that involve smaller magnitudes of necrotic myofibers, which more closely resemble the conditions in human injuries.10 Collectively, the evidence from animal models should not deter practitioners and athletes from implementing ice as a recovery strategy following injury.

SUMMARY

The efficacy of using ice as a recovery strategy following injury in humans remains uncertain, highlighting the need for high-quality, randomized controlled trials that focus on the impact of ice on the healing process to inform practitioners. With conflicting evidence, it is important to consider the current best available evidence and avoid selectively choosing evidence to support biased conclusions.

While a clear cause-and-effect relationship between ice and injury recovery in humans has yet to be established, evidence from animal models suggests that ice should not be dismissed as a potential treatment option. In fact, ice can be considered a useful tool in minimizing the proliferation of secondary tissue damage and should remain a mainstay in the field of play and emergency care following injury during training or competition. To promote functional recovery of the athlete after injury, practitioners should tailor the application of ice based on the injury timeline and repair process, consistent with applications in 20-30 minute intervals within the first 12 hours post-injury. Practitioners should reach for a wet ice pack and have the athlete sit on the bench while receiving treatment (only if they have been ruled out from the practice or game). Further, the training staff should educate their injured athletes on the importance of repeat applications during the acute stage of injury.

Overall, until the evidence unanimously proves otherwise, the culture of icing injuries should remain a staple in sports medicine. So, is the ice age coming to an end? Not anytime soon.

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