

Gary Reinl's (@TheAntilceMan) rebuttal argument to an advertorial written by Phil Page and published on the Professional Football Athletic Trainers Society's Website *The original version appears at the end of this document.

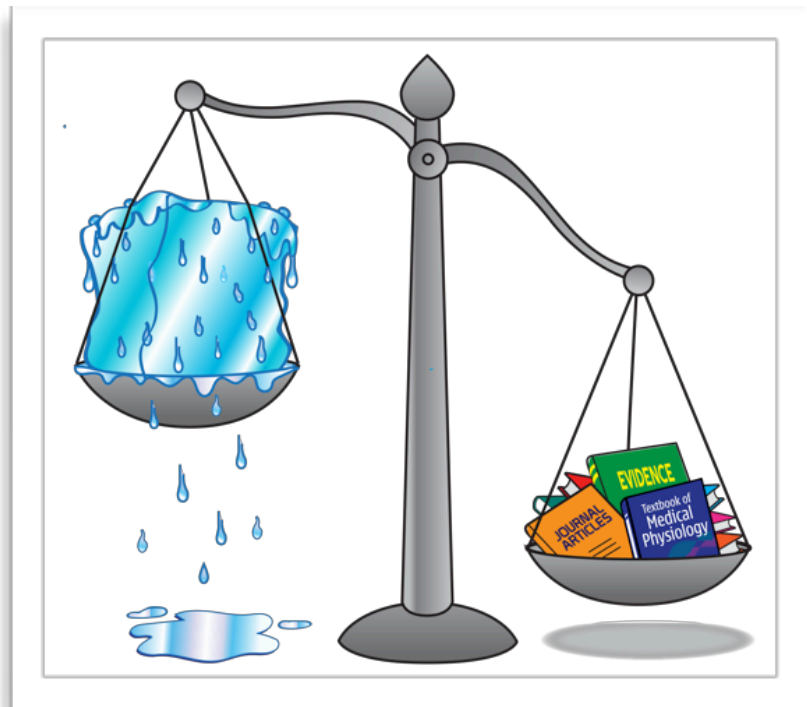
The Cold Hard Facts:

Weighing the Evidence

By Gary Reinl | Feb, 2019

“I have spent many hours dissecting this advertorial and discussing its contents with experts both inside and outside of my network, but the most surprising thing is that I cannot decipher if the author intended to make this advertorial “pro-ice” or “anti-ice” (I suspect what happened is this: he started out believing that icing damaged tissue was a good idea. But, by the time he finished, he realized that he had proven the opposite).”

*Sponsored: “To Ice or Not to Ice: That is the question” - By Phil Page, PhD, PT, ATC, CSCS, FACSM, Global Director of Clinical Education and Research for Performance Health.



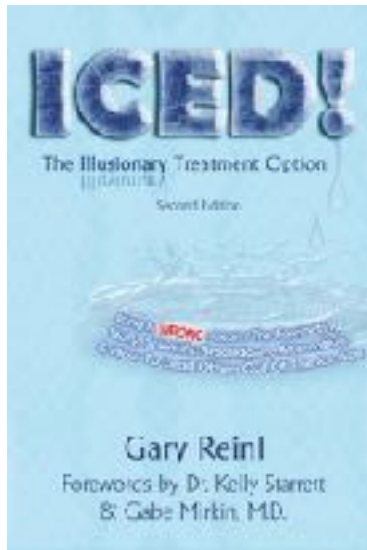
The Facts...

I deliberately did not comment on every point of contention (and there are definitely more points of contention). Instead, I focused on what I consider the most relevant and compelling. Before I begin, I want to thank Dr. Page for creating this advertorial. I was not expecting to read any facts in support of the anti-ice side of this debate. In fact, when I first read the following sentence:

“This article will help you understand the facts about ice to help YOU make the decision whether to use ice or not.”

I had low expectations. But, while Dr. Page's pro-ice opinion is apparent, he doesn't mince his words or hide behind the veil of

“ICED! The Illusionary Treatment Option” (<http://garyreinl.com/>)



some covert ivory tower.

Given the fact I wrote the book “**ICED! The Illusionary Treatment Option**” (<http://garyreinl.com/>) and more than a million people -- including hundreds of physicians, physical therapists and athletic trainers that work directly with thousands of professional and other elite athletes -- have heard my “anti-ice” message via my book, podcasts, articles, radio interviews, presentations, and one-on-one conversations, there is little doubt that I am one of the “anti-ice proponents” cited by the author at the beginning of this advertorial. Interestingly, he never mentions me by name or the fact that the Harvard-trained medical doctor that invented the RICE (rest, ice, compression, elevation) protocol -- dubbed by me the “god father of the ice age” -- has not only publicly recanted his previous recommendation to ice damaged tissue, but also wrote the foreword to the second edition of my book! In other words; the recommendation to ice damaged tissue was a mistake in the words of the man that invented one of the most recognized protocols in western medicine!

Since I specifically noted the comment by the author above, I felt compelled to add the following before I begin my point by point discussion: Let’s start with intent. Why would you want to “ice” damaged tissue? Hopefully we can all agree that preventing further loss is paramount (do no *additional* harm). That being the case, what are the main causes of further damage following all related emergency medicine procedures? There is little reason to debate that the suffocation of otherwise perfectly healthy cells that were not involved in the initial trauma (via congestion) and faulty scarring and disuse atrophy (via stillness) are the main culprits. Big point here; the congestion, generally speaking, is not caused by too much fluid being sent to site by your innate intelligence (remember that, by design, the damaged vessels constrict, which limits flow, and the healthy surrounding vessels dilate and increase perfusion, which increases flow), but instead by too little being evacuated via your passive lymphatic system. Also, inflammation and swelling are two entirely different things; inflammation is phase one of the three phase healing process (inflammation, repair, remodel) and swelling is merely the accumulation of waste at the end of the inflammatory process

“Seriously, do you honestly believe that trapping the waste in and around the damaged site and preventing the natural flow of oxygen and supplies and potentially damaging/destroying muscle, nerve, skin and stem cells is a good idea?”

.....
[https://twitter.com/
TheAntilceMan/status/
1076272719870623746](https://twitter.com/TheAntilceMan/status/1076272719870623746)

that is not yet evacuated. Regarding the faulty scarring and disuse atrophy, muscle activation is the cure; not stillness – or worse, stillness on ice! ^{2, 7}

(<http://garyreinl.com/articles/Secondary-Cellular-Death-Is-Negligent-Homocide.pdf>)

Although I address this point below in far greater detail, I want to make note here of the critical point that the only way to organically decrease swelling in and around a damaged site is via the passive lymphatic system,¹ which is nearly fully reliant on muscle activation around those lymphatic vessels to move the waste (and cryotherapy depresses that process). Thus, making the involved tissue cold is a giant step in the wrong direction. And, if you believe that you can limit the amount of fluid sent to the area post-trauma by making it very cold, be careful what you wish for. That fluid is sent there by your immune system to mobilize the “repair and cleanup crew” and is used to carry the waste away. So, let me ask you, do you honestly believe that the sending of this fluid to the damaged site by your innate intelligence is some arbitrary and/or chaotic event? That it is a gross error that you must stop? Big point here; in otherwise healthy people, there is not “too much” fluid coming in. Instead, there is too little going out. And icing undeniably delays/limits that movement in both directions. Be careful what you wish for!

Think about this: how could dimming the signals between the muscles and the nerves (which is what happens when you ice) possible help move waste through the passive lymphatic system? Of course, it doesn't. The best way to move the waste is via muscle activation, not by suppressing the immune, circulatory and lymphatic systems. And, that same muscle activation that moves the waste through the passive lymphatic system – which incidentally saves those otherwise perfectly healthy cells noted above, from suffocation and prevents, or at the very least, limits faulty scarring – also drives the tissue preservation and regeneration processes, specifically, preventing or retarding disuse atrophy, lowering myostatin levels, increasing nitric oxide production, awakening and mobilizing stem cells and facilitating the processes of angiogenesis and mitochondrial biogenesis. (<http://www.garyreinl.com/articles/Disuse.pdf>)

**“Simply stated:
there’s not too much
inflammation, there’s
too little evacuation!”**

I have spent many hours dissecting this advertorial and discussing its contents with experts both inside and outside of my network, but the most surprising thing is that I cannot decipher if the author intended to make this advertorial “pro-ice” or “anti-ice” (I suspect what happened is this: he started out believing that icing damaged tissue was a good idea. But, by the time he finished, he realized that he had proven the opposite). In one sentence, he claims that

“...there are hundreds of studies on the benefits of cryotherapy”. While in another he admits that “... several systematic reviews of randomized controlled trials evaluating cryotherapy after injury have concluded “insufficient evidence” due to the low quality of available studies.” Followed by this little dandy; “It is important to note that while the scientific literature on cryotherapy is quite vast, it remains plagued with poor quality clinical studies and few studies on injured populations; in addition, the heterogeneity among ice application in terms of time and type limits generalizability.”

In other words; the hundreds of studies that supposedly tout the benefits of cryotherapy are, from an academically-based researcher’s prospective, unreliable junk.

On the topic of swelling the author makes a claim that

“...cryotherapy significantly reduces edema (swelling) after acute trauma”

and then a few paragraphs later he provides several specific references to the fact that it does not;

“Ice alone doesn’t directly reduce swelling, which has been confirmed in several studies.”

By the way, here’s why icing damaged tissue cannot move swelling away from the damaged site (and the surrounding area) via the passive lymphatic system (which is the only natural way out ¹⁾: *“The lymphatic system is a ‘scavenger’ system that removes excess fluid, protein molecules, debris, and other matter from the tissue spaces. When fluid enters the terminal lymphatic capillaries, any motion in the tissues that intermittently compresses the lymphatic capillaries propels the*

“I liken the use of ice for pain control to the sympathetic bartender the gives the alcoholic a drink so they can temporarily feel better. Is the problem fixed? No. Did you make things worse? Probably.”

lymph forward through the lymphatic system [think ankle pumps or any other form of muscle activation] eventually emptying the lymph back into the circulation.” (Textbook of Medical Physiology 10th Edition, Guyton and Hall) or worse, why it moves it in the wrong direction: “When ice is applied to a body part for prolonged period, nearby lymphatic vessels begin to dramatically increase their permeability (lymphatic vessels are ‘dead-end’ tubes which ordinarily help carry excess tissue fluids back into the cardiovascular system). As lymphatic permeability is enhanced, large amounts of fluid begin to pour from the lymphatics ‘in the wrong direction’ (into the injured area), increasing the amount of local swelling and pressure and potentially contributing to greater pain” (The use of Cryotherapy in Sports Injuries, Sports Medicine, Vol. 3. pp. 398-414, 1986).

So much for the author’s claim that

“Furthermore, no studies have shown that ice actually increases swelling...”

Regardless, we all know that some level of swelling will occur following all significant musculoskeletal trauma. For example, if you damage a nerve via cryotherapy (or any other tissue for that matter) – and please don’t try to tell me that you never heard of an ice pack causing nerve damage – fluid will appear in and around the damaged site. If there was no swelling before and now there is, that’s called an increase. And, more importantly, you don’t need a study to prove it!

Regarding inflammation, the author seems to agree with every related clinical textbook on planet Earth that; inflammation is the first phase of the natural and necessary three-phase healing process. But then, for some inexplicable reason, states that he believes our immune system mistakenly sends too many “misbehaving” “*inflammatory mediators*” to the damaged area! Further, he also believes that if he and his army of icers don’t rush in and save the day by temporarily slowing down circulation and dampening the inflammatory response, otherwise perfectly healthy cells that were not involved in the initial trauma will succumb to the negative effects of this otherwise unpreventable physiological calamity. Oh my! Go get ‘em Roger Ramjet!

“In every other area of medicine, we call that junk science. It is nothing more than recommendations based on whispers and hearsay. Or what the rest of us call bunk. Total bunk!”

Did you notice that he didn't provide any related references (other than something that some so-called "guru" supposedly said nearly 50 years ago)?

Or that he never discussed how many *"inflammatory mediators"* we're supposed to have?

Or how he knows when he's stopped enough of them?

Or if hands are different from feet?

Or if you're different from me?

Or if a bone bruise is different from a pulled muscle?

Or how he'd know if you didn't have enough of them to begin with?

Or provide any measurement system whatsoever?

Or how cold you need to make the tissue?

Or how long you need to keep the tissue cold?

Or how often you need to reapply the ice?

Or how you compensate for the insulating properties of body fat individual to individual?

Or how you make a deep tissue cold without destroying the upper layers?

Or whether the proper temperature for a broken bone is the same or different than the proper temperature for a sprained ligament?

I've got plenty more questions that beg scientific clarification, but let's start with those.

No supporting evidence, no problem! There is no need for such details – the "guru" has spoken!

In every other area of medicine, we call that junk science. It is nothing more than recommendations based on whispers and hearsay. Or what the rest of us call bunk. Total bunk!

**“Just do it or else!”
is not a plan that I can
follow.”**



In otherwise healthy people, our immune system does not automatically mount a dysfunctional response to tissue damage. It is an utterly ridiculous belief that deserves no recognition whatsoever in the practice of evidence-based medicine. But hey, perhaps the village witch doctor would buy into this!

The buildup of waste (swelling) is not because there is too much fluid sent to the area but instead because too little fluid was evacuated (think the direct consequence of; rest, ice, compression). In other words: stillness – or worse, stillness on ice – is the enemy; not inflammation. Simply stated, there’s not too much inflammation, there’s too little evacuation! Ironically for the icers, temporarily slowing down circulation and dampening the inflammatory response (which “believers” have been blindly doing for nearly 50 years) actually makes things worse, not better. Here’s the really odd kicker: after seemingly gleefully proclaiming that ice slows down the “*natural and necessary*” healing process, the author then states that

“There is no direct evidence that ice impedes healing after acute trauma ...”.

Go figure!?

(<http://www.garyreinl.com/articles/AntiInflammatory.pdf> , <http://garyreinl.com/articles/Stillness-is-the-Enemy.pdf>)

Do you remember learning in school that damaged vessels constrict and healthy surrounding vessels dilate and increase perfusion? Do you honestly believe, regarding musculoskeletal damage, that your innate intelligence always mismanages the inflammatory response and needs to be “dampened” every time with no exceptions and that no measurements whatsoever are needed? “Just do it or else!” is not a plan that I can follow.

While it appears late in the advertorial, the author does state,

“Aside from acute trauma (<48 hours after injury), ice probably does not help.”

All things considered, I’d call this a huge win for the anti-ice movement. Mark my words; if all icers agree to stop using ice beyond 48 hours, this is the beginning of the end of the ice

“If you know the area is going to swell; don’t let it accumulate, keep it clear!”



age! “...*beyond pain reduction.*” It’s true that making tissue cold temporarily reduces the sensation of pain (I liken the use of ice for pain control to the sympathetic bartender the gives the alcoholic a drink so they can temporarily feel better. Is the problem fixed? No. Did you make things worse? Probably). However, if you evacuate the waste from and around the damaged site and restore the natural flow of oxygen and supplies to and around the damaged site via muscle activation or better yet, never allow the waste to accumulate in the first place (e.g. with the use of ankle pumps, electronic muscle stimulation, etc.), the sensation of pain will be reduced while facilitating, not suppressing, the healing process (or worse, causing further damage!).

Consider this analogy: Imagine that you knew it was going to snow 24 inches in the next 24 hours, one inch per hour. Every hour, you could effortlessly keep your sidewalk clear of that one inch of snow with the use of a good stiff broom. However, if you wait until morning, and open your door to 24 inches of angry snow, I assure you that the snow won’t be cleared with a good stiff broom and it won’t be effortless! Moral of the story: if you know the area is going to swell; don’t let it accumulate, keep it clear! Additionally, electronic pain control devices and/or instrument assisted soft tissue mobilization tools and/or laser devices and/or dry needling provide similar relief without the perils and restrictions inherent to cryotherapy. (<http://www.garyreinl.com/articles/Disuse.pdf>) <https://www.angt.tv/procrastination-a-fundamental-flaw-in-injury-management/>

The author even admits that using ice

“...as a recovery tool is questionable, particularly after intensive eccentric exercise (such as pitching).” He claims that, *“This may be because the recovery process is different from the healing process.”*

Ok, I want to make sure that I understand this statement. If I need something healed, my innate intelligence must first determine what caused the damage? And if it was caused by repeatedly throwing a baseball, using ice is likely not a good idea? However, if it’s caused by repetitive stress (e.g. repeatedly throwing a baseball), then ice is a good idea? Yikes!

“Three words: More unreliable junk!”



The author ends this section of his advertorial with this self-serving unsubstantiated doozy;

“It is unwise to equate recovery to healing from a physiological perspective until scientists can identify specific mechanisms associated with recovery such as delayed onset muscle soreness (DOMS).”

Especially if you want to dissuade your audience from considering the evidence presented in an indexed peer-reviewed journal article that proved icing damaged tissue caused additional damage: “Topical Cooling (Icing) Delays Recovery From Eccentric Exercise–Induced Muscle Damage.” “These data suggest that topical cooling, a commonly used clinical intervention, seems to not improve but rather delay recovery from eccentric exercise–induced muscle damage.”

Regarding the author’s statement that *“Unfortunately, these claims have done nothing but create confusion and even anger.”* **Three words: More unreliable junk!**

Here’s the author’s closing statement:

“Yes, sometimes ice is over-used and sometimes claimed to do things it probably doesn’t do.” A big win for the anti-ice movement. *“While there are some circumstances where ice may not be appropriate or helpful”* (another big win for the anti-ice movement). *“...blanket statements like, “Ice is wrong” is both inaccurate and unfair.”*

Fact: the author repeatedly acknowledges that there is no credible evidence that cryotherapy helps the healing process and either ignores, misunderstands or is unaware of the fact that cryotherapy delays healing, increases swelling and causes additional damage. Further, although he touts cryotherapy as an effective way to temporarily assuage the sensation of pain, he omits any mention of the related negatives noted above or the fact that there are ways to attain equal (if not better) relief that work with – instead of against – the healing process.

“The science supports ice in some situations,” I must have missed that part of this advertorial. *“...but the research is often insufficient to make a definitive conclusion on when to*

Calling out all evidence-based clinicians:

seriously, do you honestly believe that trapping the waste in and around the damaged site and preventing the natural flow of oxygen and supplies and potentially damaging/destroying muscle, nerve, skin and stem cells is a good idea? (think: Frost bite, Cryotherapy induced nerve damaged, Ischemic Perfusion Injury (IRI), Non Freezing Cold Injury (NFCI), Cryotherapy induced muscle damaged, etc.) (<https://twitter.com/TheAntilceMan/status/1076272719870623746>).

use ice or not."

OK, now I remember, he's referring to all that unreliable junk again.

"Until ice is directly proven harmful to healing (which is unlikely),"

Oh, I get it. Since there is no creditable evidence that cryotherapy is helpful the author wants to shift the debate in a new direction. Hey Phil, newsflash: trapping the waste in and around the damaged site and preventing the natural flow of oxygen and supplies is harmful. ^{1,3,4,5,6} "...it remains a gold standard of treatment in acute injuries." Yeah, fool's gold!

(1)The Revised Starling Principle file:///C:/Users/Gary/Downloads/Revised%20Starling%20Principle.pdf

(2) Is ice right? Does cryotherapy improve outcome for acute soft tissue injury?

Emerg Med J. 2008 Feb;25(2):65-8. doi: 10.1136/emj.2007.051664. Collins NC1.

CONCLUSION:There is insufficient evidence to suggest that cryotherapy improves clinical outcome in the management of soft tissue injuries.

(3) Cold-induced vasoconstriction may persist long after cooling ends: an evaluation of multiple cryotherapy units

Knee Surgery, Sports Traumatology, Arthroscopy

September 2015, Volume 23, Issue 9, pp 2475–2483

Conclusions: The results demonstrate that cryotherapy can create a deep state of vasoconstriction in the local area of treatment. In the absence of independent stimulation, the condition of reduced blood flow persists long after cooling is stopped and local temperatures have rewarmed towards the normal range, indicating that the maintenance of vasoconstriction is not directly dependent on the continuing existence of a cold state. The depressed blood flow may dispose tissue to NFCI.

(4) Topical Cooling (Icing) Delays Recovery From Eccentric Exercise–Induced Muscle Damage

Tseng, Ching-Yu¹; Lee, Jo-Ping²; Tsai, Yung-Shen²; Lee, Shin-Da³; Kao, Chung-Lan⁴; Liu, Te-Chih²; Lai, Cheng- Hsiu²; Harris, M. Brennan⁵; Kuo, Chia-Hua^{1,3}

These data suggest that topical cooling, a commonly used clinical intervention, seems to not improve but rather delay recovery from eccentric exercise–induced muscle damage.

(5) Influence of icing on muscle regeneration after crush injury to skeletal muscles in rats

One last thing:

I wonder how many clinicians the author spoke with regarding why they no longer ice before he published this advertorial? Wish he had talked with me or at the very least, some of these anti-icers:

(<https://twitter.com/TheAntilceMan/status/1050207556193447936>).

Ryo Takagi, Naoto Fujita, Takamitsu Arakawa, Shigeo Kawada, Naokata Ishii, and Akinori Miki

01 FEB 2011 <https://doi.org/10.1152/jappphysiol.01187.2010>

In summary, icing applied soon after a muscle crush injury could have retarded proliferation and differentiation of satellite cells at the early stages of regeneration through retardation of degeneration and macrophage migration, which play a crucial role in muscle regeneration, and could have induced not only a delay in late stages of muscle regeneration but also impairment of muscle regeneration along with a thicker collagen deposition around the regenerating muscle fibers. Judging from these findings, it might be better to avoid icing, although it has been widely used in sports medicine.

(6) Textbook of Medical Physiology 10th Edition, Guyton and Hall
“The lymphatic system is a ‘scavenger’ system that removes excess fluid, protein molecules, debris, and other matter from the tissue spaces. When fluid enters the terminal lymphatic capillaries, any motion in the tissues that intermittently compresses the lymphatic capillaries propels the lymph forward through the lymphatic system, eventually emptying the lymph back into the circulation.”

(7) Loading of healing bone, fibrous tissue, and muscle:
implications for orthopaedic practice

Journal of the American Academy of Orthopedic Surgeons,
Vol 7, No 5, September/October 1999
Buckwalter JA1, Grodzinsky AJ.

Abstract

One of the most important concepts in orthopaedics in this century is the understanding that loading accelerates healing of bone, fibrous tissue, and skeletal muscle. Basic scientific and clinical investigations have shown that these tissues respond to certain patterns of loading by increasing matrix synthesis and in many instances by changing the composition, organization, and mechanical properties of their matrices. Although new approaches to facilitate bone and fibrous tissue healing have shown promise (e.g., the use of cytokines, cell transplants, and gene therapy), none has been proved to offer beneficial effects comparable to those produced by loading of healing tissues. For these reasons, patients with musculoskeletal injuries and those who have recently undergone surgery are now being treated with controlled physical activity that loads their healing tissues. Evaluation of new approaches to the promotion of healing of bone, fibrous tissue, and muscle should include consideration of the effects of loading on tissue repair and remodeling

Beginning of original advertorial



Sponsored: To Ice or Not to Ice: That is the question©

**By Phil Page PhD, PT, ATC, CSCS, FACSM
Global Director of Clinical Education and
Research for Performance Health
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of PFATS**

Ice has gotten a bad rap recently. Anti-ice proponents have stated that “Icing doesn’t work,” and ice has “never been proved effective.” Such statements are biased, inaccurate, and just plain wrong. Unfortunately, these claims have done nothing but create confusion and even anger. It’s easy to make these statements by looking at a few selected studies that support the anti-ice position

while ignoring the hundreds of other studies on the benefits of cryotherapy.

The good thing about the anti-ice movement is that it makes us take a step back and re-evaluate the clinical decisions we make—and why we make them. Are they based on “tradition” or evidence? This article will help you understand the facts about ice to help YOU make the decision whether to use ice or not.

In a survey of Cramer First Aider readers, 97% (nearly 450 individuals) stated that they believe in applying ice to acute injuries. So, despite the negative press and false accusations, proponents of ice are still doing the right thing. Yes, icing immediately after an acute injury is correct and has lots of evidence to support it. But how do you defend your decision against the nay-sayers?

It is important to note that while the scientific literature on cryotherapy is quite vast, it remains plagued with poor quality clinical studies and few studies on injured populations; in addition, the heterogeneity among ice application in terms of time and type limits generalizability. Much of what we know about the physiological effects of ice on the healing process is based on animal studies, where extraneous variables are easier to control and obviously subjects are easier to recruit.

The most confusing anti-ice claim is that ice impedes the healing process, particularly the inflammatory phase, potentially leading to an increase in swelling. Some claim ice delays healing because it does not allow the body to go through the textbook phases of healing: injury, inflammation, repair, and remodeling. And in doing so, they claim this delay causes a buildup of metabolic waste and fluid (edema).

Interestingly, the same argument was addressed in 1975 by the ice-research guru, Dr. Ken Knight [1]. While inflammation is a natural and necessary phase of the healing process, the inflammatory mediators can sometimes do more harm than good. Remember that acute trauma, such as an ankle sprain, is relatively isolated to one or two ligaments; however, the inflammatory response may consume a much broader area, filling the entire lateral compartment. The inflammatory mediators may be necessary to heal the ligaments, but they can cause harm to uninjured tissues in the area.

Dr. Knight noted that ice essentially “dampens” the negative effects of inflammation on associated tissues by reducing the “secondary injury.” He did not identify ice as an ‘anti-inflammatory’ per say; rather, ice



slows down tissue metabolism and circulation, delaying and reducing the inflammatory response to reduce the amount of residual injury. Through hypothermia and vasoconstriction, ice actually decreases the amount of waste material that must be removed from the injury site [1].

Other researchers have supported Dr. Knight's position on reducing secondary injury with ice [2, 3]. In addition, a recent animal study [4] confirmed that while inflammation is reduced or delayed, ice does not affect the healing process. Furthermore, no studies have shown that ice actually increases swelling; in fact, a systematic review of animal studies [5] confirmed that cryotherapy significantly reduces edema after acute trauma.

While the physiologic research behind cryotherapy mechanisms provide convincing evidence, several systematic reviews of randomized controlled trials evaluating cryotherapy after injury have concluded "insufficient evidence" due to the low quality of available studies [5-9]. In addition, most studies use swelling or other surrogate measures as the main outcome variable, which may not be the best outcomes to determine "effectiveness" of ice, as opposed to a functional outcome such as 'return to activity.'

There is no direct evidence that ice impedes healing after acute trauma or return to activity. A systematic review [10] concluded that cryotherapy may have a positive effect on return-to-sport. One found that early cryotherapy (<36 hours) after injury was associated with significantly faster return to activity compared to delayed cryotherapy or heat [11]. With ice, timing may be everything. Bleakley and colleagues [6] noted, "The sooner after injury cryotherapy is initiated, the more beneficial this reduction in metabolism will be." Therefore, the conclusion that ice is not effective is egregiously false.

While there is no direct evidence that ice is harmful to the healing process, its use as a recovery tool is questionable, particularly after intensive eccentric exercise (such as pitching). This may be because the recovery process is different from the healing process. It is unwise to equate recovery to healing from a physiological perspective until scientists can identify specific mechanisms associated with recovery such as delayed onset muscle soreness (DOMS).

Aside from acute trauma (<48 hours after injury), ice probably does not help beyond pain reduction. Ice alone doesn't directly reduce swelling, which has been confirmed in several studies [12, 13]. However, ice's ability to reduce pain makes it an effective and safe alternative in pain management. It's been well established that pain and swelling can inhibit muscle strength; therefore, it would be wise for practitioners to address pain with safer cryotherapy alternatives to initiate movement as soon as possible. That's where therapeutic exercise and muscle activation comes in. "Cryokinetics," or the use of cold to facilitate exercise, can play a key role in a rehabilitation program [14].

Yes, sometimes ice is over-used and sometimes claimed to do things it probably doesn't do. While there are some circumstances where ice may not be appropriate or helpful, blanket statements like, "Ice is wrong" is both inaccurate and unfair. The science supports ice in some situations, but the research is often insufficient to make a definitive conclusion on when to use ice or not. Until ice is directly proven harmful to healing (which is unlikely), it remains a gold standard of treatment in acute injuries.

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1. (1)capillaries, any motion in the tissues that intermittently compresses the lymphatic capillaries propels the lymph forward through the lymphatic system, eventually emptying the lymph back into the circulation.”

(7) Loading of healing bone, fibrous tissue, and muscle: implications for orthopaedic practice
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One of the most important concepts in orthopaedics in this century is the understanding that loading accelerates healing of bone, fibrous tissue, and skeletal muscle. Basic scientific and clinical investigations have shown that these tissues respond to certain patterns of loading by increasing matrix synthesis and in many instances by changing the composition, organization, and mechanical properties of their matrices. Although new approaches to facilitate bone and fibrous tissue healing have shown promise (e.g., the use of cytokines, cell transplants, and gene therapy), none has been proved to offer beneficial effects comparable to those produced by loading of healing tissues. For these reasons, patients with musculoskeletal injuries and those who have recently undergone surgery are now being treated with controlled physical activity that loads their healing tissues. Evaluation of new approaches to the promotion of healing of bone, fibrous tissue, and muscle should include consideration of the effects of loading on tissue repair and remodeling.