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RICE: The End of an Ice Age

Posted on April 4, 2014 by Joshua Stone

"Coaches have used my "RICE" guideline for decades, but now it appears that both Ice and complete Rest may delay healing, instead of helping." – Gabe Mirkin, MD, March 2014



In 1978, Gabe Mirkin, MD coined the term RICE. Health care practitioners to laypersons are quick to recognize RICE as the 'gold standard' treatment option following injury. Followers of my blog know my stance against ice and now there is support from the physician who coined the term. Yes, the very same physician, Dr. Gabe Mirkin, who coined RICE, is now taking a step back. I reached out to Dr. Mirkin and asked for permission to share his story. As you will read below in Dr. Mirkin's full post, the lack of evidence for cryotherapy is something we must listen to.

This is a controversial topic. My blog [Why Ice and Anti-inflammatory Medication is NOT the Answer](#) sparked a lot of debate. I had nearly 30,000 page hits per day for several weeks. I recently received a tweet from a peer (@AlanMRussell) who attended a presentation by Cindy Trowbridge from the University of Texas-Arlington refuting many of my comments. The debate continues, but given the evidence – or lack thereof – I stand by my thoughts that ice does not facilitate tissue healing.

I recently had the pleasure of connecting with Nichan "Nick" Zourikian a physiotherapist and researcher at Sainte-Justine University Hospital Center in Quebec. Nick published a study with Angela Forsyth, DPT (Rush University Medical Center) that led to a unique, in-journal debate among experts.

The original review article published in *Haemophilia*, challenged the effectiveness of ice (1). This led to a "Letter to the Editor" rebuttal published one year later (2), which led to a rebuttal to the rebuttal published in the same journal (3). Why is this such a hot topic? Nick summed it up perfectly in an email:

"There clearly exists a dogmatic polarization on the use of ice in our physiotherapist/athletic therapist communities! Old habits die hard. Many colleagues (even in our hemophilia community) still insist on using ice...despite the current scientific evidence available." Nick is spot on, RICE is an old habit that is dying hard.

I have long said modalities are overused and exercise is under used. [Ice: The Overused Modality](#) was my first post to make this point. I have added several posts that demonstrate the need for exercise and the positive effect mechanical load has on tissue healing and repair. See my posts on [Mechanotransduction](#), [Achilles Tendinopathy](#) and [reversibility](#) as these explain more.

The NATA's position statement in August 2013 on management of ankle sprains would support my anti-ice case. The researchers for the NATA position statements take years to critically appraising data to make conclusions. They comb over all the data and rate evidence from best "A" to worst "C". In this particular position statement cryotherapy was overall a C rating for evidence (4). The article says *"Strong clinical evidence for advocating cryotherapy is limited"*. The evidence that had the better ratings: functional rehabilitation, proprioception, balance, and range of motion (note: these are all tissue loading exercises) (4). What's interesting is many of the readers to my blog are athletic trainers, physical therapists, and physiotherapists. Yet, they are the ones who think I am nuts. Your own organization has a comprehensive position statement that supports my thoughts. Am I that crazy?

I read a piece on Medscape the lead author of the NATA position statement, Thomas W. Kaminski, PhD, ATC, said that he believes that many practitioners are still following the prescription too closely (5). The article goes on to quote Dr. Kaminski: *"I wish I could say that what we found is what is really being done in a clinical setting."* There is another quote: *"Maybe our European colleagues know something we don't"..."there is very little icing over there."* (5)

Despite the lack of evidence advocating the use of ice the debate continues. Peers continually challenge me and would like to see me hung, drawn, and quartered for suggesting no ice. 'My gosh, you mean I shouldn't take 30 ice bags out to the baseball field wrap shoulder and elbows? You're insane!' A shift in paradigmatic treatment is on the horizon. Exercise is heating up and ice is melting down. Below is the full article from [Dr. Mirkin's](#) website, which will only fuel the end of the ice age.

Why Ice Delays Recovery

March 20, 2014

by Gabe Mirkin, MD

When I wrote my best-selling *Sportsmedicine Book* in 1978, I coined the term **RICE** (**R**est, **I**ce, **C**ompression, **E**levation) for the treatment of athletic injuries (Little Brown and Co., page 94). Ice has been a standard treatment for injuries and sore muscles because it helps to relieve pain caused by injured tissue. Coaches have used my "RICE" guideline for decades, but now it appears that both Ice and complete Rest may delay healing, instead of helping.

In a recent study, athletes were told to exercise so intensely that they developed severe muscle

damage that caused extensive muscle soreness. Although cooling delayed swelling, it did not hasten recovery from this muscle damage (*The American Journal of Sports Medicine*, June 2013). A summary of 22 scientific articles found almost no evidence that ice and compression hastened healing over the use of compression alone, although ice plus exercise may marginally help to heal ankle sprains (*The American Journal of Sports Medicine*, January, 2004;32(1):251-261).

Healing Requires Inflammation

When you damage tissue through trauma or develop muscle soreness by exercising very intensely, you heal by using your immunity, the same biological mechanisms that you use to kill germs. This is called inflammation. When germs get into your body, your immunity sends cells and proteins into the infected area to kill the germs. When muscles and other tissues are damaged, your immunity sends the same inflammatory cells to the damaged tissue to promote healing. The response to both infection and tissue damage is the same. Inflammatory cells rush to injured tissue to start the healing process (*Journal of American Academy of Orthopedic Surgeons*, Vol 7, No 5, 1999). The inflammatory cells called macrophages release a hormone called Insulin-like growth Factor (IGF-1) into the damaged tissues, which helps muscles and other injured parts to heal. However, applying ice to reduce swelling actually delays healing by preventing the body from releasing IGF-1.

The authors of one study used two groups of mice, with one group genetically altered so they could not form the normally expected inflammatory response to injury. The other group was able to respond normally. The scientists then injected barium chloride into muscles to damage them. The muscles of the mice that could not form the expected immune response to injury did not heal, while mice with normal immunities healed quickly. The mice that healed had very large amounts of IGF-1 in their damaged muscles, while the mice that could not heal had almost no IGF-1. (*Federation of American Societies for Experimental Biology*, November 2010).

Ice Keeps Healing Cells from Entering Injured Tissue

Applying ice to injured tissue causes blood vessels near the injury to constrict and shut off the blood flow that brings in the healing cells of inflammation (*Knee Surg Sports Traumatol Arthrosc*, published online Feb 23, 2014). The blood vessels do not open again for many hours after the ice was applied. This decreased blood flow can cause the tissue to die from decreased blood flow and can even cause permanent nerve damage.

Anything That Reduces Inflammation Also Delays Healing

Anything that reduces your immune response will also delay muscle healing. Thus, healing is delayed by:

- cortisone-type drugs,
- almost all pain-relieving medicines, such as non-steroidal anti-inflammatory drugs like ibuprofen (*Pharmaceuticals*, 2010;3(5)),
- immune suppressants that are often used to treat arthritis, cancer or psoriasis,
- applying cold packs or ice, and
- anything else that blocks the immune response to injury.

Ice Also Reduces Strength, Speed, Endurance and Coordination

Ice is often used as short-term treatment to help injured athletes get back into a game. The cooling may help to decrease pain, but it interferes with the athlete's strength, speed, endurance and coordination (*Sports Med*, Nov 28, 2011). In this review, a search of the medical literature found 35 studies on the effects of cooling. Most of the studies used cooling for more than 20 minutes, and most reported that immediately after cooling, there was a decrease in strength, speed, power and agility-based running. A short re-warming period returned the strength, speed and coordination. The authors recommend that if cooling is done at all to limit swelling, it should be done for less than five minutes, followed by progressive warming prior to returning to play.

My Recommendations

If you are injured, stop exercising immediately. If the pain is severe, if you are unable to move or if you are confused or lose even momentary consciousness, you should be checked to see if you require emergency medical attention. Open wounds should be cleaned and checked. If possible, elevate the injured part to use gravity to help minimize swelling. A person experienced in treating sports injuries should determine that no bones are broken and that movement will not increase damage. If the injury is limited to muscles or other soft tissue, a doctor, trainer or coach may apply a compression bandage. Since applying ice to an injury has been shown to reduce pain, it is acceptable to cool an injured part for short periods soon after the injury occurs. You could apply the ice for up to 10 minutes, remove it for 20 minutes, and repeat the 10 minute application once or twice. There is no reason to apply ice more than six hours after you have injured yourself.

If the injury is severe, follow your doctor's advice on rehabilitation. With minor injuries, you can usually begin rehabilitation the next day. You can move and use the injured part as long as the movement does not increase the pain and discomfort. Get back to your sport as soon as you can do so without pain.

I want to thank Dr. Mirkin for allowing me to share his article. I really appreciate his continued contributions to health and wellness.

Until next time –

Josh

References:

1. Forsyth, A. L., Zourikian, N., Valentino, L. A. and Rivard, G. E. (2012), The effect of cooling on coagulation and haemostasis: Should "Ice" be part of treatment of acute haemarthrosis in haemophilia?. *Haemophilia*, 18: 843–850. doi: 10.1111/j.1365-2516.2012.02918.x
2. Rajamanickam, M., Michael, R., Sampath, V., John, J. A., Viswabandya, A. and Srivastava, A. (2013), Should ice be used in the treatment of acute haemarthrosis in haemophilia?. *Haemophilia*, 19: e267–e268. doi: 10.1111/hae.12163
3. Forsyth, A. L., Zourikian, N., Rivard, G.-E. and Valentino, L. A. (2013), An 'ice age' concept? The use of ice in the treatment of acute haemarthrosis in haemophilia. *Haemophilia*, 19: e393–e396. doi: 10.1111/hae.12265
4. Kaminski TW, Hertel J, Amendola N, et al. National Athletic Trainers' Association position statement: conservative management and preventing of ankle sprains in athletes. *J Athl Train*. 2013;48:528-545
5. http://www.medscape.com/viewarticle/823217_1 – accessed April 9, 2014.

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73 thoughts on “RICE: The End of an Ice Age”



Michael Hopper says:

April 4, 2014 at 5:36 pm

Wait, didn't he just say ice was acceptable immediately after injury?

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 4, 2014 at 5:41 pm

Yeah but not more than 6 hours and only to control pain which is still contrary to most plans

Reply



kevin ivey says:

April 10, 2014 at 5:10 pm

what about pitchers icing their arms/shoulders?

Reply



Gary Reinl says:

April 4, 2014 at 5:47 pm

Some people understand, some don't and the rest are somewhere in-between. The MELTDOWN continues! Gary Reinl @TheAntiIceMan

Reply



Lee Doak says:

April 4, 2014 at 8:50 pm

I thought i was one of the only old schoolers that used hot whirlpool and heat on injuries as soon as possible. My mentor, if you will was ATC at Oklahoma U during 60's and he used contrast bath of two minutes hot and one minute Ice the next day on ankle injuries. Lee Doak ATC

Reply



Steve Kirby says:

April 5, 2014 at 3:41 am

When people have pain free movement as soon as possible they are able to get back to using the muscles, we have been using the Bioneuro <http://www.getfitstayfitnorfolk.co.uk/bioneuro-sigma-q/> because of its ability to get into the injured area quicker and with fantastic results.

Reply



Kevin Snyder says:

April 28, 2014 at 7:05 pm

Spammer.

Reply



Tiger Tracks says:

April 5, 2014 at 7:33 am

I must also add my "two cents" as a practitioner of therapeutic massage: a recent, small-sample study has proven that massage following rigorous exercise reduced the production of cytokines, the compounds in cells that are implicated in pain associated with inflammation, whilst stimulating the activity of mitochondria (of course, we all know, the 'powerhouses' inside of cells that convert glucose into energy). In short: massage actually accelerates muscle repair and therefore healing. The study also indicated the same oppositional effect of NSAID's as stated in Dr. Mirkin's reversal above, in fact, they cautioned against a "maladaptive response" if athletes and other active people continually use inflammation-suppressing drugs after injury or overuse. ... I cut my teeth in a conventional physical therapy clinic where ice was king, but I've since backed off, suggesting something along the same lines as Dr. Mirkin (minimal use, only immediately after injury and no need to repeat the process more than once). Massage therapy is also a form of mechanical heat production, bringing fresh, oxygen-rich red blood cells into the affected area, in turn 'adding' to the natural inflammatory process.

Reply



Adam says:

April 9, 2014 at 5:26 am

Do you happen to have the title and author of that study...would be a great one to add to my library!

Reply



Hunter says:

April 9, 2014 at 6:39 am

Also keen to see this study! Is it on PubMed? It would in fact be a revolution as no one has ever before managed to prove that massage aids in recovery.

Reply



hakirby says:

May 28, 2014 at 5:04 pm

I think the OP may mean this study.

<http://well.blogs.nytimes.com/2012/02/06/how-massage-heals-sore->

[muscles/?_php=true&_type=blogs&_r=0](#) the study is cited in the article

Reply



movewellfit says:

April 5, 2014 at 11:42 am

Great article. I'm sold after reading your work & Kelly S.

Maurice D. Williams, MS Move Well Fitness, LLC. <http://www.movewellfit.com>

maurice@movewellfit.com 240.200.4003 "Movement in the Right Direction, the Right Direction" Sent from my Sony Xperia™ Z on T-Mobile's 4G LTE Network

Reply



Hockeygirl says:

April 7, 2014 at 6:08 am

There is a possible exception here, with torn Achilles' tendons... The ice stops the tendon from shrinking all the way up the leg therefore and saves a lot of rehab. Could you comment on this? This was made very clear to my friend who tore both...

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 7, 2014 at 7:02 am

While I am not denying this, I am also not agreeing. Does ice stop tendon retraction? I have not seen evidence to show this, but could be wrong. Also, I have not read anywhere that ice expedites healing of torn tendons.

Reply



Matt says:

April 8, 2014 at 2:28 pm

Out of curiosity, how was it "made very clear" to your friend?

Reply



dukeofawesome says:

April 7, 2014 at 6:15 am

So my understanding is that swelling after an injury is an immune response, so why would it be good to reduce swelling with elevation but not ice?

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 7, 2014 at 6:29 am

Swelling is not inflammation. Swelling is a by product of the inflammatory process. Ice does not facilitate drainage of swelling through the lymphatic system. Infact ice will inhibit drainage and in some cases cause an increase by reversing swelling.

Reply



Jeff Kelly says:

April 8, 2014 at 7:57 pm

You are right Josh. Ice will not facilitate drainage, however it will reduce metabolism, and when applied early will prevent the initial build up of edema. That is why we ice.

Reply



dyldahl says:

April 30, 2014 at 4:32 pm

It will also slow and negate mitochondrial biogenesis (especially PGC1-a expression); thus prevent maximum adaptive responses one would have obtained during their training session if they were to not ice, and massage or a proper cool-down (not ice).

Reply



Edward says:

April 7, 2014 at 6:54 am

This isn't anything groundbreaking. The RICE method has for me always been a method

of minimizing swelling and pain, used instantly after injury, and never as an option to healing – let's say – a sprained ankle.

However, nice article and it's good to see I'm on track with proper use of RICE.

Reply



vseymlee says:

April 7, 2014 at 10:43 pm

Reblogged this on [Designed For Healthy Living](#) and commented:

Interesting debate on the overuse of ice as in RICE... Suggestion that exercise is the best way to heal. Kinda makes sense to me.

Reply



Brett says:

April 8, 2014 at 10:40 am

This article confuses muscle injury (sTrain) and ligament injury (sPrain). Injured muscles do well with very short ice period, then some heat. This does NOT include muscle SORENESS from normal activity. Sprain involves ligaments, which do well with ICE and chiropractic care to restore functional capacity to the damage ligaments.

Reply



Andrew says:

April 8, 2014 at 1:26 pm

I use ice/cold to rehab fingers with connective tissue issues caused by hanging from small grips while rock climbing. After the initial swelling has gone down, I will submerge just my single hurt finger in an ice bath for ~30-40min. The rationale (called the Lewis Reaction) is that after the body realizes only the finger is cold, it stops shunting blood and makes a large increase in blood flow to the finger and the damaged tissues, therefore increasing healing.

I wanted to get your thoughts on this specific type of ice treatment in relation to your findings.

<http://onlineclimbingcoach.blogspot.com/2010/05/pulley-injuries-article.html> under "Ice"

Reply



Dr. Reuven M Rosenberg says:

April 8, 2014 at 2:12 pm

My Chinese medicine friends say Western medicine goes against the function of the body. In other words, if I understand correctly, they say if there's inflammation then help it along with some more heat. Ice only slows down the inflammation reaction and thereby delays or even inhibits healing.

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 8, 2014 at 2:21 pm

Great point and I agree with your friend. Traditional Chinese Medicine has been around much longer than Western Medicine and is successful. Why is it that health care practitioners in the West are so against something that has been around so long and been shown to work?

Reply



Adam Rufa says:

May 29, 2014 at 12:07 pm

Josh,

"Why is it that health care practitioners in the West are so against something that has been around so long and been shown to work?"

The fact that something has been around a long time has no bearing on its effectiveness. This blog post is a great example. The use of ice after injury has been around a relatively long time but that does not make it correct.

I am curious, what parts of Chinese Medicine has been shown to work? I don't see the "West" as against Chinese Medicine rather it is resistant to unproven treatments and theorys with a low level of plausibility.

Reply



GOD says:

May 31, 2014 at 1:50 am

"I am curious, what parts of Chinese Medicine has been shown to work?"

WHAT PART DONESNT!!! . If you are so stuck up to make a statement only by searching PubMed, I will state that you are so ignorant to be constrained into you western medical world. I assuming you are not smart enough to know any chinese, and never be lucky to read any traditional Chinese medicine books. the whole system of Chinese medicine is completely different from western medicine. People used/is using/will use it to treat people in many Asian countries. Apart from It exited way longer than western medicine, there are so many doctors use herbs and acupunctural(dry needle) on there routine treatment. Probably, you doctors in states think you are the savour of the patient, the truth is there are millions and millions people is well looked after by Chinese traditional medicine.

stop the BS of so called unproven treatments and theories. the whole RCT or experimental research system is completely based on western research structure. Is there a point to ask human what does heaven look like? they never seen it and their options are zero value here. please make comments to something you, underlings, really know, not just HEARD.

Reply



knuckleheadfitness says:

April 8, 2014 at 3:19 pm

Reblogged this on [Knucklehead Fitness](#) and commented:
Great Blog.

Reply

Pingback: [What Do You Need Today? | Live Fit and Sore](#)



Jeff Kelly says:

April 8, 2014 at 7:42 pm

After reading all of these articles now and at the time when Kelly Starrett started pushing this info, I still don't see where any research is showing us that ice is unnecessary post injury. Yes, we need inflammation for healing. No, ice will not heal tissue (but I don't recall anybody ever stating this). My understanding was always that we were icing to REDUCE inflammation, not prevent it. Why reduce inflammation? To reduce secondary hypoxic injury. Ice isn't meant to heal anything, it is meant to reduce more damage than is necessary. I do believe that the importance of ice has been overstated, but I still believe it to be a useful tool in the initial management of acute injury. Don't let the contrarians change your treatment protocols just because they have a stage to do so.

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 9, 2014 at 8:00 am

Jeff,

Thanks for the comment. You have said similar before. Point is I see more evidence that says it is unnecessary than necessary, yet it is by far the most widely used form of treatment, for both acute and chronic injury. Western Medicine is the only group that uses ice to this degree. If you applied and took a job working for Brazil Futbol club, Chinese Gymnastics, Indian Cricket, Japanese Baseball, Australian Football, or Hungarian Waterpolo and began wrapping ice to the degree that it is used here in the states they will look at you with three eyes. We are the only form of medical / practitioner care that uses ice to this degree. Are we that ignorant and omnipotent to think we are that much better than everyone else, when they have the studies to back it up and have been around much longer than Western Medicine.

Yes, swelling and edema can result in secondary hypoxic injury. However, it takes significant swelling to have secondary hypoxic tissue death and is rare. It needs significant and prolonged swelling. That said to combat swelling and edema we prevent it with ice. Unfortunately, when we prevent it with ice we are also reducing inflammation and subsequently tissue healing. On top of that the only time ice can prevent swelling is in less than 6 hrs post injury. After that it is too late. So, why do we continue to ice hours later or in to the next day? Ice does not remove swelling or edema.

So if your #1 goal is to prevent secondary hypoxic death (which it should not be), why use ice to do so when you have other tools at your arsenal? Instead of reducing necessary healing properties to prevent swelling, why not use other

tools (compression, massage, muscle pump, etc) to remove swelling. We can allow for normal tissue healing and remove swelling! How novel!

In response to your last statement: "Don't let the contrarians change your treatment protocols just because they have a stage to do so." Don't let anecdotal evidence and old habits prevent you from thinking outside the box. There might be a better way. We might be wrong.

Reply



Jeff Kelly says:

April 16, 2014 at 4:42 pm

Josh, late getting back to this. Everything you said is true. We do "over ice". No question. I have always felt strongly that compression was a far superior modality. I guess my beef is that when folks (and I do not mean you) use an enormous platform to create controversy, that the general public takes it as gospel. The message being distributed is that ice is now a wrong choice post injury. This is not what the research is telling us. Yes, you are right. It takes significant swelling to create hypoxia, and this is exactly why we ice. To prevent that significant swelling, this has ALWAYS been why we iced, but I think out of simplicity we started telling our patients that we are doing it to reduce inflammation/swelling (because to the lay person they are the same thing) which is where the message maybe got lost. I do not believe that icing, and I am more than open to changing my mind on is, is anywhere near powerful enough to completely eliminate necessary inflammation. It is simply a method of controlling it for the reason listed above. That is where clinical judgement comes in and is what separates the great clinicians from the "protocol" oriented clinicians. I really do believe we are closer in agreement in this than you believe, but I feel compelled to use my little voice whenever this topic comes up as I believe a faulty message is being spread on a large scale and want to avoid future clients from questioning my judgement when and if I choose to use ice as a modality.

Reply



Shari Berkowitz says:

April 8, 2014 at 8:10 pm

Thank you for both this and your first piece on the subject of ice and injury recovery. I appreciate what it takes to share information that conflicts with common thought and

education. I face this in both of my fields (biomechanics and Pilates/exercise). As the squeaky wheel, we must hold to our convictions, research more than our peers and work to share new information. We may make seeming-enemies in that people do not like to question their methods...and themselves. They will fight hard against us. However, we must charge ahead! It is the only way!

With that please keep posting information about this. I, too, will research more and seek more evidence-based data to share. We have to help people understand by bringing proof to them.

Let's see where this goes!

Reply



Chris says:

April 8, 2014 at 8:18 pm

My understanding that ice was utilized to create a temporary hypoxic state. This hypoxic state would then decrease (again temporary) the metabolic rate of the injured cells thus decreasing swelling. The swelling would then be decreased and thus prevent increased pressure on healthy cells and thus decrease or prevent secondary cell death. Am I mistaken?

Reply



sarahtgriffin2013 says:

April 9, 2014 at 8:46 am

Reblogged this on [Slow Mo Mother Runner](#) and commented:

Wow! I was just suggesting that a friend of mine be sure to ice her shins after going out on her first run in years. Maybe it's not the best idea anymore? This is a very interesting read on the standard of using RICE for sports injuries. I don't know about you, but that and NSAIDS were my go to fix for sore shins and tired and achy muscles. In retrospect, I haven't been so diligent on icing this past year and haven't faced any serious injury. Hmmmm. A lot to ponder about how we treat our bodies and how they can recover on their own.

Reply



Karoline Clevinger says:

April 9, 2014 at 9:25 am

Mr. Stone – I slipped on ice on stairs 3 1/2 weeks ago, apparently thrusting my left foot (toes pointed down) into the deck step to prevent a complete fall. I was successful in preventing the fall but finally gave up after about 8 hours of icing (20 mins on/off) and elevation. The throbbing was too much so I went for the x-ray – broken 'big' toe). I have been taping the toe to it's neighboring toe and wearing the beautiful 'shoe' ever sense. Honestly, I have moved away from wearing the shoe at home. I have purposely not tried to 'baby' the toe – walking barefoot around the house lately as long as there is not discomfort. A few days after the break, I started feeling numbness in my left foot/leg. I see an integrative med doc who put me on Curcumin (Turmeric) 2x a day stating the swelling was likely pinching a nerve. The numbness went away but has returned over the last several days. The numbness, heavy weighted feeling goes up my left leg but is not constant. Have I possibly done permanent nerve damage due to constricting with icing?

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 9, 2014 at 9:33 am

I really have no idea. I would say doubtful, but you should continue to seek further consult.

Reply



tretrosi2013 says:

April 9, 2014 at 12:33 pm

Reblogged this on [VACILANDO](#).

Reply



Paul Gerst L.Ac. says:

April 9, 2014 at 2:49 pm

Reblogged this on [New England Natural Health Services](#).

Reply



Enrique Tapia says:

April 9, 2014 at 7:39 pm

well what are the conclusions? would you use other modalities? compression is one, the use of heat and at what moment? which modality of heat? we all know that ice has been used to CONTROL swelling and prevent it but not to heal injuries, it is used to calm pain, so decreasing these pain and swelling we will be able to start mobilizations and continue the rehab process, what about ice massage?? im sorry but i dont find anything new at the conclusions. Would you change the RICE method to a heat/compression method? all this needs more studies. ICE has much more to offer in his correct use.

Reply



James Hermans (@Neuromagnetics) says:

April 9, 2014 at 8:14 pm

Great article Josh.

It's very common for outdated and entrenched medical practices to die a very slow death...Look up the Semmelweis Reflex. It's equally true that effective unconventional therapies have a very slow uptake, typically the early adopters and innovators lead the charge (sometimes to a dead end:).

I'll have to reassess some of my posts on RICE and be encouraged that the evidence is mounting for newer therapies such as gradient modulated static magnetic field therapy which can produce both pain relief and tissue healing. In addition, early evidence does show a reduced inflammatory response which seems to contradict your reasoning and no doubt will require further investigation. See... <http://bit.ly/10XhIbp>

Reply



R Scott Nanamura says:

April 9, 2014 at 8:21 pm

Thanks Josh, great article! My teachers who are MD's and Acupuncturists never told us to use ice. It was always heat. When the IGF-1 enters into the damaged cells the metabolism of that cell increases and therefore generating more heat(basic physiology). So it only makes sense that by using ice it only slows the healing process as the metabolism of the cell has to "heat up" again to start or to continue the healing process. They said to add heat to the injury, either mild heat or hotter if needed to

increase and speed up the healing process. This in turn would also help to carry away any swelling/edema faster as well. There was a interesting story my martial arts teacher told us. In the days when the different martial arts schools would fight each other to see who had the best technique, it was also known that who ever had the best healing liniments could heal their students quicker and get them training again. They all used heating liniments! These techniques have been around for thousands of years!

Reply



Lisa L. Ball says:

April 9, 2014 at 8:33 pm

So wonderful to see that others are coming to understand this. We have long advocated against the use of ice. Use San Huang San. Visit PlumDragonHerbs, the premier manufacturer of effective herbal treatments for sports-related injuries. We have been teaching athletes for many years how to manage injuries in accordance with the body's natural healing capabilities.

Reply



Kate says:

April 9, 2014 at 11:49 pm

Interesting. Of course ice does not make tissues heal. It does, however, reduce inflammation, prevent more inflammation and send cold signals up the fast nerve fibers to create a block in the neural gate thus reducing pain.

Reply

Pingback: [Sport Injuries: Not RICE, but REC | A Skirt on the Mat](#)



greg725 says:

April 10, 2014 at 8:37 am

Reblogged this on [The Touch of Soul](#) and commented:

Great article... While much of my training tells me to use the RICE method for treating injuries, my understanding of our immune system has always lent credit to the fact that constricting blood flow is counter intuitive. This is just another evolution of medicine.

Reply



Jessica I says:

April 10, 2014 at 11:55 am

Very interesting. I wonder if this applies to most injuries and not just muscle tissue damage. I suffered two bad sprains in my ankle last fall and of course medics and later the sports med doctor all suggested RICE. Sprains dealing with connective tissue rather than muscle damage, would RICE still apply? I ended up using ice and elevation while in a walking boot for the first 4 weeks, then slowly added resistance work until I was able to run again. I was fortunate enough to regain enough strength to run a marathon 4 months after injury, however I am still battling swelling in the joint and lack of side-to-side stabilization on uneven surfaces, such as trail and grass. Hoping RICE didn't hamper the progress.

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 10, 2014 at 1:55 pm

Thank you.

This is my own personal opinion, but I believe RICE, specifically Ice, inhibits tissue healing (bone, ligament, muscle, or tendon). When there is injury the inflammatory process initiates the entire healing process. If we ice, that process is delayed or reduced, no matter where the injury is at.

Reply

Pingback: [RICE the end of ice for inflammation | BODYWORK & Movement Skills](#)

Pingback: [Nassar: ICE is NICE — Gymnastics Coaching.com](#)



Jonathan Evans says:

April 11, 2014 at 4:30 am

Hi Josh,
would be interested in whether you've seen any research on the secondary influence of icing. The way I was taught was that icing would mean that the blood retreats from

that area taking with it the body's inflammatory mediators (which is consistent with what your research shows) – but the secondary effect was where the main benefit came – in that when you took the ice away the blood would return to that area over the next 20 – 30 min bringing with it a surge of the body's good stuff (including of course IGF1). So repetition of this contrast either by ice and no ice or ice and heat would cycle the blood through & improve the healing. This would work best for the peripheral joints as icing a muscle near the axial skeleton would not get the same blood retreating to core 'hypothermic type effect'. Would this also help explain why there was improvement when icing the ankle?

Be interested in your thoughts on all of this.

best regards Jonathan

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 11, 2014 at 5:51 am

Ice delays and interrupts healing. Why do we feel our body is unable to follow its natural course. Also why should we be applying ice so it can cycle? If we want it to cycle when is the exact moment it should be turned off?

As you said after you remove the ice blood rushed back to the site and along with it inflammatory mediators. The problem is the healing process begins immediately and the application of ice interrupts the process. Then if we continue the ice cycle over the next 2-24 hours how much interruption should we have?

How does the interruption of the process improve healing?

Imagine a dam breaks and water is gushing out of the dam and will flood the towns below. We send emergency crews to the dam but stop them half way there (for no reason) they just stop on the road. Meanwhile the dam is still leaking just not as much. Then after twenty minutes we allow crews to move to the dam, they begin work, but we stop them again. This process does not improve fixing of the dam or make it faster. It slows it down. We need to allow athletes to heal and get back to activity.

Secondly, the accumulation of swelling (byproduct of inflammation) needs to be removed. Our body's natural system does this (although its not perfect) but ice actually causes perfusion of lymphatic vessels and reversal of flow. Why would we want that? The will increase pain and further delay healing.

So I disagree the cycle of ice is not beneficial. I also do not think icing a sprained ankle is effective. If we allow healing to occur and facilitate removal of swelling and edema will have better results.

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS says:

April 11, 2014 at 5:57 am

My apologies if there are typos in my last comment. Typing one line at a time on a phone. 😊

Reply



Jonathan Evans says:

April 11, 2014 at 7:09 am

Hi Josh,

appreciate your reply – has got me thinking!

best regards Jonathan

Reply



Josh Stone, MA, ATC, NASM-CPT, CES, PES, FNS

says:

April 11, 2014 at 7:21 am

That's all I ask for! People can disagree all the want, just ask that think through the alternative.

Reply

Pingback: [RICE: The End of an Ice Age | Athletic Medicine | Failing Faster](#)



Georgi says:

April 12, 2014 at 7:59 am

My opinion on the mechanism of action of cryotherapy is that vasoconstriction occurs in the beginning , but later comes vasodilation and flushing . Example: when you make a

snowball in winter with bare hands , then there is a strong blood flow to the hands and redness , right? And then all the nutrients from the influx of fresh blood are present . These effects are due to the effects of cold on vascular autonomic system and the somatic nervous system. Cryotherapy leads to a reduction of pain , which reduces the tonus of the muscles and spasticity . And by reducing spasticity and pain is relieved that predisposes to proceed with physiotherapy.

Reply

Pingback: ["RICE: The End of an Ice Age" | Greg Maness' Functional Sports Performance Blog](#)



Jo hodge says:

April 14, 2014 at 4:31 am

I am very interested in your thinking on using ice on injuries. Treating animal (I am a veterinary physiotherapist) and myself

I have always been reluctant to use ice. I do not like it used on myself and have always used heat, gentle massage

and compression, massaging muscles above and below an injury will help to sedate nerves and to encouraging circulation and where possible full range of movement. I find gentle stretching has far more pain relief . All people and animals are different and need different modules of care but

I will continue to study and research and appreciate any comments and ideas.

Reply



just another s-a-h-mother says:

April 14, 2014 at 10:14 pm

As an occasional "athlete" and someone who has very recently (this past Friday) had a scope and clean-up done on a knee that was originally injured 17 years ago, I must say that I have never been a fan of icing an injury. Some rest, yes. Elevation to gravitationally reduce swelling, sure. I always found ice contributed to stiffness if used the way it was usually prescribed. And compression was simply annoying more often than not. I'm all for gentle massage, something passed down by my mother from the time I was a child.

Reply



annemarieultra says:

April 15, 2014 at 2:18 am

Reblogged this on [annemarieultra](#) and commented:

I use ice baths after a race but then go back to training the next day.

Reply



Daniel Jacobs says:

April 15, 2014 at 3:09 am

Mice studies show that insulin-like growth factor (IGF-1), released by macrophages that swarm into injured tissue, helps rebuild muscle fibers while limiting scar-tissue formation (fibrosis). Along the way, IGF-1 tones down inflammation by blocking inflammatory signaling molecules and allowing macrophages to migrate out of the injured tissue. See "Local expression of IGF-1 accelerates muscle regeneration by rapidly modulating inflammatory cytokines and chemokines," The FASEB Journal, May 2007: <http://www.fasebj.org/content/21/7/1393.full.pdf+html>

What a paradox! The same hormone (IGF-1) secreted by macrophages (large inflammatory cells) winds up turning off the inflammatory response and encouraging macrophages to clear out of the injured area! Physiologists call this a "negative-feedback loop," in which a series of biochemical reactions, once it has run its course, switches itself off to restore balance. The authors of this FASEB study explain: "The full recovery of muscle strength after injury is...hampered by the persistence of inflammatory response and the development of fibrosis" (p. 1400).

This shows that Dr. Gabe Mirkin overstates and oversimplifies his case in his subhead, "Anything That Reduces Inflammation Also Delays Healing." While correctly criticizing pharmaceutical drugs and ice packs, Dr. Mirkin overlooks the toxic consequences of inflammation, especially when it persists beyond the acute phase.

Neutrophils, highly mobile immune cells, are the first to rush to the site of injured tissue. Aiming to gobble up invasive pathogens, neutrophils release a burst of reactive oxygen species — notably superoxide anions and hydrogen peroxide. These toxic radicals kill invasive bacteria and fungi, but they also wind up killing the neutrophils themselves. And hydrogen peroxide poisons the extracellular medium — the watery environment outside the neutrophils — damaging the injured tissue. Worse still, in blunt-force trauma — with no break in the skin — neutrophils may find no invading pathogens to attack and gobble up! So their "collateral damage" becomes a serious problem during the inflammatory phase.

We need not resign ourselves to the inevitability of collateral damage following muscle injury. Vitamin E prevents neutrophils from releasing large amounts of hydrogen peroxide, thereby protecting injured tissue from free-radical damage. See "Vitamin E —

a selective inhibitor of the NADPH oxidoreductase enzyme system in human granulocytes," 1983: <http://europepmc.org/articles/PMC1916385/pdf/amjpathol00192-0049.pdf> Studying human volunteers who took vitamin E capsules, these authors found that vitamin E greatly reduces the amount of hydrogen peroxide released by neutrophils, yet improves neutrophils' ability to attack and kill pathogens. Vitamin E, both taken internally and applied topically, might well promote recovery and healing from muscle and joint injuries. In addition to swallowing vitamin E capsules, you can rub vitamin E oil or cream into the skin and then apply gentle heat to drive the vitamin into the injured tissue. Of course, you can also combine this with massage.

Reply



facingthefireswithin says:

April 15, 2014 at 1:52 pm

Reblogged this on [facingthefireswithin](#) and commented:

This is certainly not an athletic blog but I do mention exercise frequently and use it heavily so this is worth noting.

Reply



Judy Hall says:

April 18, 2014 at 4:46 pm

Thanks Daniel Jacobs for the review of the chemistry of a bruise. Judicious use of ice/cold packs mediates the inflammation but sadly is overused by the length of time it is usually applied. While studying hydrotherapy during massage college studies, ice was recommended immediately after injury but as Dr. Mirkin recommends after the first 6 hours more than 10 minutes is possibly damaging. What I have witnessed in my own injuries (3rd degree ankle sprain in 1984) and what I have recommended for my clients during 24 years of practice as a Registered Massage Therapist, is that yes after the immediate inflammatory response, the next phase of healing can still benefit from ice therapy. Particularly after exercise after injury, 3-5 minutes of ice with a linen towel or t-shirt between skin and ice pack, and then reapplied in 1 hour increments as needed due to discomfort with gentle stretching to regain full range of motion, helps to interrupt the inflammatory chemical process. Icing longer than 5 minutes (I tell clients that when they feel the chill, that is long enough but don't exceed 5 minutes) creates a chill in the muscle and skin tissue that sets up the body to rewarm the area that is now too cold. Too much ice sets up a warming response that can recreate the inflammation and really slow healing. The 3rd degree sprain I had was treated in a college physiotherapy

department and was vigorously attacked with both heat and ice and exercise and balance boards and ROM. To this day, that ankle tolerates cold better due to the ice whirlpool that was used after the exercises and ultrasound. I have no crepitous 30+ years later and no limitations of any kind. I will continue to recommend ice to those that have stalled in their healing, particularly after the massage therapy that may have included frictions.

Reply



Lana Dahl says:

April 18, 2014 at 5:39 pm

I agree with the above! I love results!!! As a licensed massage therapist for 23 years most of my clients say they finally have relief after using ice. In my own healing, nothing else worked when the pain took me to the floor...steady usage of ice 3 times a day allowed me to move and keep moving without crippling spasms. I had a client also who while waiting for a knee replacement, used ice 3 times a day and found she could walk normally even after work could go for a walk on the beach. I love it; I recommend it and of course if it doesn't provide a good response know that that is not for that particular client/situation.

Reply



Lee Doak says:

April 18, 2014 at 7:57 pm

talking about acute injury care here Lana

Reply



Tom Stone says:

April 18, 2014 at 7:03 pm

Does this mean that NSAIDs should not be taken for pain relief following orthopedic surgery (I am immune to oral narcotics)???

Reply



Thomas says:

May 28, 2014 at 1:26 pm

Kudos to Dr Mirkin. It is plain awesome when a scientist/researcher/clinician does admit he/she was wrong. This is the way science evolves and go forward and contributes to a better knowledge for all field clinicians (who bother to read reports and research)

Reply

Pingback: [RICE: The End of an Ice Age | Stone Athletic Medicine | Center for Acupuncture](#)



Mark Disalvo MPT OCS MTC says:

May 31, 2014 at 11:15 am

In talking about swelling, I remember reading studies that showed just the smallest amount of swelling also inhibited muscle contraction and performance (for example VMO). Wouldn't it then be imperative to reduce the amount of swelling to improve that muscle performance. In the clinical setting, appropriate massage techniques can help reduce the inflammation. At home, patient's may benefit from the convenience of ice as a temporary pain relieving technique and mild inflammation control. Effective massage does require some degree of training.

Some patients overdo exercise and movement which can lead to further injury, while others are too afraid to even move the injured area, causing other clinical problems. I agree with other commenters that it takes good clinical judgement in deciding what is going to help your patient with the greatest effectiveness.

Has there ever been a study done – ice vs non icing with same treatment protocol over specific week period in regards to performance?

Reply



Joshua Stone says:

May 31, 2014 at 11:40 am

I think you are referring to AMI (arthrogenic muscle inhibition). Yes, swelling does cause AMI, but why use ice to prevent swelling when the side effect is delayed healing?

Why not use other modalities and massage (as you stated) to move swelling out? These modalities can prevent AMI and do not inhibit healing.

Reply

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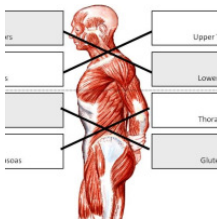
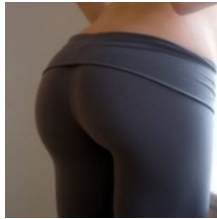
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