

15 ON - 15 OFF?

The excepted practice of ice application to acute musculoskeletal type injuries has been for the most part fairly standard: 15 minutes on, 15 minutes off over a 90 minute period. If we did nothing else, this approach to immediate treatment of injury, has been and will continue to be adequate. My belief is that if we have certified trainers, first aiders, and lay people who do nothing more than follow this basic procedure, we have come a long way in injury management.

However, in his book **Cryotherapy in Sport Injury Management** author **Kenneth L. Knight** suggests that there is more to the application of ice than was previously thought. Mr. Knight is a professor of athletic training at Indiana State University and served as a trainer for high school, junior college, and college teams for over 25 years.

Mr. Knight contends that “real” ice, the kind actually made from frozen water, can and should be left in place for 30 minutes and even up to 40 minutes in large fleshy areas of the body. He further contends that a towel placed between the skin and the ice only serves to prevent the cold from getting deep into the muscle quickly.

We need to understand why we apply ice to injuries first, before we can truly understand what the best method of application is. I think that it is basically understood that we apply ice to an injured body part immediately to 1) control pain and 2) to reduce swelling. These are probably the 2 most important reasons for applying ice, so for the purposes of this article I will focus attention on them. Keeping in mind that there are many types of cryotherapeutic rehabilitation therapies that are too many and too complex for the context of this article.

Ice application should occur as soon as possible after an acute injury or trauma. Apply crushed-ice packs directly to the skin. A towel or elastic wrap between the ice pack and the body will insulate against the full effects of the cold thereby making treatment less effective. Frostbite will not occur if real ice is used for less than 30 to 60 minutes. Frozen gel-packs should **never** be placed directly on the skin because their temperature may be many degrees below zero and could cause frostbite. If the injured player is physically able to make their way to the bench and the injury is located in a place that is easily accessible without having to remove much equipment (i.e.; wrist, calve, etc.),the trainer should be able to scrape ice off the ice surface as soon as play has stopped. It should then be placed in a plastic bag and applied within minutes.

By applying ice so quickly after the injury we have achieved one of our goals, the control of pain. There will be a reduction of any swelling, but only if the ice is left in place for a long enough period of time. For instance, if the injury is a contusion type, not serious enough to remove the player from play but serious enough to warrant application of ice, applying that ice for periods of 3-5 minutes between line changes is going to very little in terms of reducing swelling. If the injury happens to be in a spot that can't be accessed

without the removal of clothing or equipment and is instead applied right through it, the effectiveness of that cold is again greatly diminished. If you have both of these scenarios at once, short periods of ice application through thick clothing/equipment will be of purely psychological benefit.

The much larger issue of swelling reduction or *inflammation* is more complex in its approach. First of all, the **inflammation response** is a local, tissue-level response of the body to an irritant. It's purpose is to defend the body against alien substances, to dispose of dead and dying tissue so that repair can take place and to promote regeneration of normal tissue. So, the prevention or diminishing of the inflammatory response would only delay the healing process. There is confusion between "swelling" and the "inflammation response" in that using ice to control pain and swelling is helpful; while limiting inflammation is not. Again, the different methods of promoting recovery and rehabilitation with ice are complicated and exceed the bounds of this article. Whenever dealing with an acute traumatic injury just remember the acronym **RICES**, Rest, Ice, Compression, Elevation, and Stabilization.

Rest: decreased activity, be aware that does not mean inactivity. Though there certainly needs to be a reduction in the amount and type of activity so as not to aggravate the injury and allow time to heal. Too little activity could result in delayed healing, muscular atrophy (shrinking of muscle) and possibly the development of adhesions (new tissue sticking together).

Compression: external pressure. This external pressure can be applied with a tensor bandage wrapped fairly tightly, but not so tight as to impair circulation, around the injured body part. This compression can be applied over top of ice, and then reapplied after the ice has been removed for a minimum period of 24 hours after the injury. The main reason for compression is to control edema (excess accumulation of fluid) and reduce swelling by promoting reabsorption of this fluid.

Elevation, if injury permits, helps to reduce swelling by lowering (tissue hydrostatic) pressure in the injury site.

Stabilization, its purpose is to provide enough support to an injured limb to allow the surrounding muscles to relax. A sling or splint are two ways that support could be given to an injury. It is important that this support is present so as to prevent the muscles around the injury from going into spasm.

The length of application of ice according to Mr. Knight is considerably longer than you might think or possibly have heard in the past. The ice packs should be applied intermittently, so no continuous application because it is both unnecessary and potentially dangerous. Because most of the body's parts rewarm slowly after ice application you could keep an area cool by applying ice for 30 minutes up to 40 minutes for large muscle groups, every 2 hours.

The length of therapy varies according to the severity of the injury, 12 to 72 hours is widely accepted as a good guideline to follow. Remember, the application of ice as soon as possible after the injury is extremely beneficial to the rehabilitation of that injury. When making an ice pack, crushed ice would be preferable, but if the rink that you happen to be in does not have an ice machine in the lobby, the shaved ice lying around the boards of the ice surface works nicely. Place a few handfuls of this into a heavy duty Ziploc bag (more may be required if the injured area is larger), and suck as much air out of the bag as you can (a straw in your first aid kit works well). Place the ice pack directly on the skin and secure in place with a tensor bandage, remembering to wrap fairly tightly for compression. Elevate the injured body part if the injury permits, so it is above the level of the heart. Remove the ice pack after 30 to 45 minutes and replace the tensor bandage. Repeat this procedure every 1 to 2 hours, depending on the level of activity of the injured player (increased activity such as walking causes the body to rewarm faster). Ice should be removed before the player goes to bed, however, the tensor can be left in place over night to provide compression. Be sure that the circulation is **not** impaired by the tensor.

Frozen gel packs like the ones you put into picnic coolers should be avoided as they are not real ice and their temperatures can go much lower than real ice, thereby causing frost bite injury if placed directly on skin.

Chemical ice packs, the type that come in a plastic bag and need to be slapped against something to be activated should never be used. Their temperatures do not go low enough to have any measurable effect on an injury. They also do not last long enough to do any good even if they did get cold enough. The greatest risk of chemical ice packs in my experience is the harsh ammonia-based chemicals inside. Should one of these packs develop a leak or a tear, the chemicals inside can cause burns to the skin or eyes.

The supporting research of Mr. Knight's book is impressive, complete with clinical studies, graphs, charts and some 18 pages of listed references. I thought it important enough considering the frequency with which ice is used to treat injuries, especially in hockey that we not limit ourselves to one set protocol if another credible one is available. You may choose to continue to apply ice to injuries for the "15 on, 15 off" protocol, if for no other reason than, maybe it's easier to remember, that's fine. But now there is evidence that it is left on for longer not only will it not injure the player, it quite possibly will be beneficial.

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Reference: Cryotherapy in Sport Injury Management (1995)
Author: Kenneth L. Knight