Trends in Cryotherapy

The latest research and promising technology trends.

By Jasper Sidhu, BSc, DC

Cryotherapy has been a key part of many chiropractic practices for years. Whether it’s ice packs, gel packs or the latest ice sprays, it’s a safe bet that the majority of chiropractors use ice. Sometimes we tend to take for granted the modalities that are the norm in practice. Let’s take a look at the latest research on cryotherapy, including new technology from whole-body cryotherapy chambers to a "cooling glove" that enhances recovery and produces more strength gains than steroids. It’s time to revisit the importance of cryotherapy in clinical practice and how to apply the latest findings in your practice. You’ll never look at cold therapy the same way again.

One of the goals of cryotherapy is to decrease inflammation. However, there is also significant interest in recovering faster from an exercise program, allowing an individual to train harder. In the rehabilitation setting, this can lead to significant increases in compliance and strength gains while limiting inflammation.

Past studies have shown a lack of increased recovery from symptoms of exercise-induced muscle damage. However, a recent Cochrane Review found there was some evidence that cold-water immersion reduces delayed-onset muscle soreness after exercise compared to passive interventions involving rest or no intervention. Another study by Pointon, et al., found that although cryotherapy had no effect on recovery, it did have an effect on the perception of pain. Clinically, ice therapy during the rehabilitation stages can be effective in reducing pain perception throughout the exercise program and should be considered beyond the acute stage.

Most of the past studies were done with various types of ice packs, which may have led to different results. It begs the questions: Has cryotherapy research advanced in the past few years? Are there any new and unique technologies and protocols that will bring a revival of cryotherapy in the clinical setting? The answer to both questions is a resounding yes.

Recent Research
All signs point to a resurgence in the use of cryotherapy for recovery, performance enhancement and rehabilitation. This newfound interest in cryotherapy has led to new research on the use of ice packs, gels and cold-water immersion. Let’s take a look at current cryotherapy research and its implications on clinical practice.

Numerous animal studies suggest significant reductions in muscle temperature at the injury site with the use of cryotherapy. However, results are not as significant with human intervention. Cryotherapy’s effectiveness is dependent on the injury type, the depth of adipose tissue, the type of cooling modality used, and the length and frequency of icing. According to Bleakley, et al., "It is unlikely that a ‘panacea’ cooling dose or duration exists in the clinical setting." However, there are several research studies that can shed some light on proper implementation.

### Ice Protocol Summary

- The most effective ice therapy tool appears to be water immersion, followed by "wetted ice" (combination of water and ice).
- Application time of ice therapy is dependent on the amount of subcutaneous adipose tissue, the type of ice pack used, and caution in preventing any adverse side effects such as nerve damage and frostbite.
- Heavier ice packs (>0.6 kg) appear to produce better results.
- Temperature changes typically begin to occur in the superficial skin area after about nine minutes of icing. Therefore, icing times less than nine minutes may not produce any significant effects.
- Deeper intramuscular cooling occurs later than superficial cooling.

A study by Rupp, et al., compared the use of crushed-ice bags with cold-water immersion on the time it takes to reach an 8 degrees Celsius reduction in intramuscular temperature. The study found that the time to reach the intramuscular temperature was the same for both: an average of 2.6 minutes. However, the ice immersion group generated a greater temperature decrease 90 minutes following application.

These results have practical applications if you are treating an acute sports injury. As athletes tend to want to return to sports as soon as possible, ice water immersion may maintain the effects of cryotherapy much longer than regular ice bags. A study by Myrer, et al., supports these results: cold whirlpool was superior to crushed ice packs in maintaining prolonged, significant temperature reduction after treatment.

With respect to ice packs themselves, it was found that ice packs made of cubed ice or "wetted" ice (ice and water) were also superior to crushed ice in reducing intramuscular temperatures. The study points out that wetted ice is the closest one can get to an ice bath. The water/ice combination allows for better contouring of the ice pack over the affected surface area.
Another important consideration to take into effect is the size of the ice pack. A study by Janwantanakul suggests that an ice pack containing at least 0.6 kg of ice leads to a greater magnitude of cooling than one that is less than 0.3 kg, regardless of the size of the contact area.\(^9\)

The length of ice application is dependent on the amount of subcutaneous fat present. Another important consideration with respect to ice application is the adverse effects of prolonged ice therapy. Prolonged use can sometimes lead to frostbite or nerve damage.\(^10\)-\(^11\) That’s why some recommendations note that ice therapy should not exceed 20 minutes at a time. However, a study by Otte, et al., reinforces the fact that people with different subcutaneous adipose tissue thickness require different ice therapy times. In fact, the authors recommend 25 minutes of ice time for patients with a skinfold of less than 20 mm to a 60-minute application for skinfold measurements of 30 mm to 40 mm.\(^12\)

Research also suggests various tissues cool and rewarm at different times. A study by Enwemeka, et al., showed that temperature falls significantly at the skin and 1 cm level after eight minutes of treatment.\(^13\) During the application, there was insignificant temperature decrease in the deep intramuscular areas. However, as superficial temperatures rose, the deeper tissues began to cool to the point that 40 minutes post-application, the deeper areas were cooler than the superficial areas.

Therefore, the coldness of the skin should not be an indicator of how effective the cooling process is for the deep intramuscular areas. In fact, a study by Jutte, et al., showed that superficial temperatures were a weak predictor of intramuscular temperature during cryotherapy.\(^14\)

**Technology Trends**

There are two different types of cryotherapy that will increase in popularity in the near future, in my opinion: whole-body cryotherapy and the "cool" glove, designed to improve markers of health and improve recovery. Whole-body cryotherapy is a unique form of cryotherapy, delivered via a cryochamber. The patient is exposed to very cold air maintained between -110 degrees C to -140 degrees C for approximately two to three minutes. The technology was initially developed to accelerate recovery for athletes from muscle injury.\(^5\) However, focus has shifted to the relief of pain and inflammatory symptoms in various musculoskeletal conditions, including arthritis, rheumatic conditions and fibromyalgia. A study by Ma, et al., suggests significant improvements in VAS (Visual Analog Scale) and active ROM after whole-body cryotherapy for the management of adhesive capsulitis of the shoulder.\(^6\)
In another study, when compared to cold water immersion (CWI), whole-body cryotherapy elicited a greater reduction in skin temperature.\(^7\) And compared to far-infrared and passive modalities in recovery from exercise-induced muscle damage in highly trained runners,\(^8\) three whole-body cryotherapy sessions, performed within 48 hours, accelerated recovery to a greater extent than infrared and passive modalities.

Another new cryotherapy technology gaining traction is the "cool" glove. The technology is based on the premise that cooling via the palm can enhance recovery and improve aerobic exercise endurance and work volume. The technology was originally designed to improve recovery following surgery. The results were so effective that the shift focused to enhancing performance.

A recent study evaluated the use of a cooling glove to increase work volume during resistive exercises.\(^9\) The study found that over a six-week period, the treatment group showed significantly more enhancement in performance compared to the control. Pull-ups increased by 144 percent compared to 5 percent for the control group. Over three weeks of bench-press training, palm cooling increased work volume by 40 percent compared to 13 percent in the control group.

In the clinical setting, the ability to recover faster can have many implications. Patients who fatigue quickly or are unable to recover fast enough, particularly due to pre-existing conditions, can benefit from cryotherapy advances. For example, a "cool" glove was recently tested on multiple sclerosis patients. Many patients with MS experience increased fatigue and pain with increases in temperature due to ambient conditions or physical activity. A study by Grahn, et al., found that the trial group using the cooling treatment increased exercise duration by 33 percent.\(^10\)

The latest research sheds more light not only on current cryotherapy practices, but also how cryotherapy can be utilized in novel new ways. Tailoring cryotherapy to the individual patient can produce significant results through the course of rehabilitation. It can be utilized effectively not just in the acute stage of care, but through the entire rehabilitation program and beyond.

References

2. Howatson G, Goodall S, van Someren KA. The influence of cold water immersions on adaptation


Click [here](https://www.dynamicchiropractic.com/mpacms/dc/article.php?id=56308&no_paginate=true&p_friendy=true?no_b=true) for previous articles by Jasper Sidhu, BSc, DC.