



# CANADIAN ATHLETICS COACHING CENTRE COACH CAST SCRIPT

## ICING, HEATING AND CONTRAST BATHS

Welcome to Coach Cast, the Canadian Athletics Coaching Centre's podcast for athletics coaches. Coach Casts are designed to take both simple and complex topics from the various fields of coaching theory and explain them in an understandable fashion to coaches of all levels. My name is Scott Saunders, and I will be your host. Together with Lee Christopher, a graduate student at the Centre here, we have written this script and it is now available online. Please feel free to seek more information on today's topic by referring to the sources referenced in this script.

The topic for this week's Coach Cast is "Icing, Heating and Contrast Baths." We all know the standard rule in choosing between icing and heating: Ice to reduce inflammation and heat to relax tight muscles and fascia. But in this podcast we'll take a closer look at the effectiveness of the three commonly used therapeutic methods just named. To discuss these measures we have dug up the recent work done in this area in the sport science literature and have also included some practical opinions.

Two years ago, a group of researchers from New Zealand wrote a review article on the experiments that had been conducted on these methods of therapy and their conclusions (Hing 2008). They found that, at that time, there was almost a complete lack of understanding in this area. On the other hand, these techniques have been used for decades, with countless pieces of anecdotal evidence, as a way to keep muscle soreness to a minimum after tough workouts. The fact that so many athletes swear by the effectiveness of these techniques together with the absence of quality experimental evidence in this area has resulted in the release of many studies over the past few years.

So now let's talk about how these techniques are used practically and also look at the sport science literature to try and get to the bottom of this. In doing this we are not attempting to prescribe an absolute truth, but through the synthesis of experience and science we can hopefully provide informative insight that will allow you, as coaches, to make a knowledgeable decision about the use of such methods with your athletes.

### ICE BATHS

Ice baths are a favourite as they are cheap, relatively easy to set up (in bath tubs, kid pools, etc.) and many athletes find them to be extremely helpful. The standard setup for ice baths is to immerse those limbs used during the exercise, (so runners typically only go hip deep) for roughly 10 – 15 minutes at no warmer than 10 – 15°C water. Similarly to contrast baths, the sooner the athlete gets into an ice tub after their workout, the better.



As mentioned, the effectiveness of ice baths has been studied a lot in the last couple of years, and the results have been a bit mixed. In one study (Jakeman 2009), researchers tested the effect of ice baths on a number of indicators of muscle damage and found that cold water immersions were not greatly effective.

However, there are many positive results coming from other experiments. In one case, it was shown that performance is significantly increased 48 hours after a workout for those using a cold tub against those not (Vaile 2008). Perceived muscle soreness is drastically lower after an ice bath, which may play an important psychological role in recovery. Also, heart rates are lower after ice bath treatments (King 2009). This reduced heart rate isn't a surprise, of course, but we can still see that there are some evident benefits to this treatment.

As a prominent Canadian therapist once told me, "icing can never hurt." As we know, icing serves to reduce swelling from inflammation, which is important in recovery. However, most people don't know the following interesting point about icing: Typically, icing only serves to reduce the temperature of the superficial musculature, and is quite ineffective at cooling deeper muscles. When a person gets out of an ice bath, the heat from the deeper muscles will transfer to the cooler outer muscles, thus reducing the temperature of the deeper structure. This is why it is important not to have a warm shower immediately after a cold bath, as otherwise deep tissues will not benefit much.

Although the sport science literature is lagging behind on the topic of ice immersions, practical experience and the current experimental results indicate the positive benefits of this method. Let's not forget the power of psychological benefits here either. If you try this with your athletes, and they feel great afterwards, this perception can go a long way in recovery.

## CONTRAST BATHS

Contrast baths use a time ratio of hot to cold tub treatment of somewhere around 3 – 5:1 exposure. In other words, contrast bath treatments usually have the athlete sit in the cold tub for one minute and then hop into a hot tub (temperature upwards of 39°C) for 3 – 5 minutes. This procedure is usually completed four or five times, and from what we discussed earlier, we know that it is better to end on a cold tub.

Let's take a minute to understand the mechanism of heat transfer as we studied it for cold immersions. The hot tub will serve the same function and heat primarily the superficial tissues. Thus, we go from a cold to a hot superficial layer, with not much change happening closer to the core. By ending on a cold treatment, we get the transfer of heat from the core towards the outer layer, and thus the deeper muscles cool off. So from the point of view of heat transfer, the main difference between contrast baths and ice baths is the rapid changing of the outer musculature temperature.

Experiments have been able to more clearly show the effectiveness of contrast baths in comparison to straight cold immersions. Contrast baths can significantly reduce



lactate concentrations, perceived muscle soreness and heart rates (King 2009). In one study (Vaile 2008), squat jump performances were tested and drastically improved performance for those using contrast baths was seen as soon as 24 hours after the initial exercise bout. Note that this value of 24 hours is half the time that the straight ice tub was seen to show positive effects.

This is a common theme in the experiments we have looked at for this Coach Cast; namely, ice tubs have some good benefits, but contrast baths appear to be more effective. However, it is obviously much more difficult to set up a proper contrast bath in comparison to an ice bath. Many coaches do not have the facilities necessary, and simply using a shower for the hot component may not be sufficient.

Therefore, we recommend that if you have the capability, contrast and ice baths can be played with to see what your athletes prefer. It may be the case that contrast baths are more hassle than they are worth.

So what about using just heat after a tough workout? What about the differences between dry heat and wet heat? Let's now talk about these two treatments.

## HEATING

However comforting the thought of entering a hot tub immediately following exercise for an athlete may be, it is probably not the best idea. This heat will cause an intensification of the inflammation in areas worked hard through training. Therefore, the use of a hot tub for recovery is not ideal in the acute post exercise phase. On the other hand, when such inflammation has reduced, wet heat could be utilized as a tool for increasing vasodilation (i.e., increasing blood vessel diameter) to enhance circulation and decrease muscle soreness.

Unfortunately, the literature in this area is minimal and so does not help with our discussion. Wet heat is something coaches will have to prescribe when they feel it fits the needs of a particular athlete with care needing to be taken in the acute recovery phase.

On the other hand, dry heating methods, which include humid and infrared saunas, make use of a subtly different heating mechanism than wet heat (conduction versus convection heating), and are more often used. A typical treatment is usually a 20 – 30 minute session in a sauna heated to a temperature upwards of 90°C; no rocket science here. Let's talk about humid saunas first.

A really nice study was done on distance runners using humid sauna routines (Scoon 2009). They found that after 3 weeks of using a sauna after workouts, endurance athletes increased their run time to exhaustion by 32% over a control group. These performance improvements were explained by significant increases in red blood cell and plasma volumes.



Now, turning our attention to infrared saunas, there has been little research at present on such a method for sport or exercise therapy. However, research on the health benefits of such saunas is slightly more extensive, highlighting some interesting findings.

In a comparison between traditional humid and infrared saunas, researchers looked at the sweat of the subjects. The sweat collected from individuals spending time in the traditional sauna contained 95 – 97% water, compared to sweat from the infrared sauna participants, which contained 80 – 85% water. The remaining portion of the sweat from the latter participants was made up of cholesterol, fat-soluble toxins, toxic heavy metals, sulfuric acid, sodium, ammonia, and uric acid (Adams, 2008). In addition, the infrared source of heat more deeply penetrates tissues and so can stimulate vasodilation of peripheral blood vessels, creating a more effective physiological environment for recovery in the post acute stage (Adams, 2008). Therefore, we can advocate the use of infrared saunas as a great source for detoxification leading to improved athlete health.

#### CONCLUSION

On the whole, these methods of therapy are widely used by athletes, yet are generally prescribed by coaches without a great deal of understanding of their mechanisms of effectiveness. To be fair, these mechanisms haven't even been fully established by sport science experts. Thus, until a greater depth of research is carried out on such techniques, coaches could consider the critical points outlined in this Coach Cast to make a more informed decision.

So what is it that we recommend? Well, depending on time and facility constraints, from our study of this topic it seems that a good place to start would be the use of cold tubs immediately following difficult workouts. Contrast baths could then be used to try and improve upon the success or failure of ice tubs. An infrared sauna, if you have access to one, could be a very valuable tool in both the improvement of athlete health and the relaxation of fascia and musculature. But never forget the standard rule: Ice to reduce inflammation and heat to relax the fascial and muscular network.

Wrapping up this podcast, let's look at this situation holistically. Sport science research is nice, but the conclusions currently coming from this area are unclear. But one thing that they do illustrate is that, particularly for ice and contrast baths, these treatments show reasonable benefits. More importantly, it is difficult to do harm with these techniques. They are there for the coach to toy with; on a visit to Dan Pfaff last year, I saw him experimenting with using infrared saunas *before* workout for a few minutes to help relax the musculofascial system. Therefore why not *safely* experiment and find out what works for your athletes?

That's it for this week's Coach Cast. We hope that you got some ideas out of this podcast that you can apply in your coaching. I want to thank Lee Christopher again for his invaluable contribution to this script. For any questions or comments, please feel



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