Fall 2010

Research Review: Mixed-Method Cooling in the Heat?

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RESEARCH REVIEW

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Title: 'The Use of Mixed-Method, Part-body Pre-cooling procedures for Team-Sport Athletes Training in the Heat'
Author: Dr Rob Duffield et al (Charles Sturt University, NSW & Murdoch University, WA).
Source: *Journal of Strength and Conditioning Research,* Vol 23 (9), 2009.

Introduction: As I write this, it's summer here on the Northern Beaches of Sydney and it's a hot one today, 39°C (102.2 °F in my language) and it's just my luck that today's training regime is heavy front squats followed by stairs (running and hopping). It's just not fair – the workout is difficult enough as it is, without being compounded by the extreme heat. The stairs segment is certainly not going to be easily accomplished with the thermal strain I am about to add to the high intensity workout (and with pre-fatigued legs as well).

Fortunately I am fairly well read on thermoregulation and the use of cooling strategies. A number of my colleagues who work with professional rugby teams have utilised cooling vests with their players to facilitate thermoregulation in the heat. My dilemma is that I am almost certain that I will be unable to complete the stair climbs with a cooling vest on, as when it's wet it adds an additional four kilos to my training mass (and I'm still trying to shed the extra kilo from the recent holidays!).

A few years ago I read a series of articles which investigated the use of cooling vests and the effectiveness of 'pre-cooling' on athletic performance. For example, a paper by Webster et al., (2005) found that pre-cooling reduced both core and skin temperatures (0.5 to 1.4°C), reduced sweat rates (by 10 to 23 per cent), and improved endurance running time (at 95 per cent VO_2max) by almost one minute.

Dr Duffield and his colleagues have re-visited the concept of pre-cooling, recently investigating its effectiveness in lacrosse players. These investigators utilised a unique approach to the pre-cooling concept; their pre-cooling methodologies (20 minutes in total) included subjects using simultaneous pre-cooling strategies. The researchers utilised a cooling vest (Arctic Heat) on the torso, cold towels soaked in 3°C water on the neck and trapezius muscles, and plastic bags of ice on the quadriceps (bilateral). All subjects were seated during the pre-cooling procedures.

Methodologies: Following the pre-cooling procedure, all subjects underwent an exercise protocol which included a five-minute warm-up, 20 metre sprints, five minutes static stretching, and then four 5-minute intermediate sprint exercises. These sessions were completed at both 32.4°C and 44.0°C, with and without pre-cooling.

Parameters assessed included core temperature (°C), heart rate (bpm), and hydration status. Additionally Dr Duffield included the use of GPS units so they could categorise the sprint exercise into categories based upon running speeds (<7.0km/h; 7.0 – 14.4km/h; >14.5km/h; and > 20km/h).

Results: The authors reported that pre-cooling resulted in an increase in total distance covered during the intermittent-sprint (i.e., 7.0 – 14.4km/h). There was also a significantly lower sweat loss associated with pre-cooling (-1.0kg) versus no cooling (-1.8kg). Surprisingly, there were no differences between conditions for either the rating of perceived exertion or thermal sensation scale.

Pros: The findings from this study support the benefits of pre-cooling for endurance performance and may be beneficial for improved training or competition in the heat. The pre-cooling methods used in this study may appear to be somewhat cumbersome, however exercise or competition in the heat warrants dedication to both acclimatisation, proper hydration (pre, during, post), and thermoregulation.

Cons: The findings were interesting as the authors did not demonstrate a difference in resting core temperature between the pre-cooling and control conditions. However, there was a significant difference in core temperature during the exercise and a trend towards lower core temperature also in recovery associated with pre-cooling. N