



E.COOLINE – MORE ENERGY AND PERFORMANCE BY COOLING

Studies conducted at the University of Münster prove performance increase up to 110%

Baking heat in summer and in hot countries limits sports performance. This is nothing new. However, what is new is the fact that heat regulation can already reduce performance at significantly lower temperatures and what can be done about it.

Within the body, more than 70 % of the energy used for movement is converted into heat. In order to maintain an optimal and stable body temperature of 37°C, the body sweats to cool itself through the sweat evaporating on the skin. However, this process also requires energy – lots of energy. According to Prof. Winfried Joch of the Sport Science Institute of the University of Münster, more than 90 % of the energy consumption in sport may be used for heat regulation alone. This energy could be used more effectively if the body was cooled by other means.

E.COOLINE can do

Thanks to the High Tech Vlies specially developed for this task, E.COOLINE can store a sufficient quantity of water. At higher temperatures or with increasing skin

temperature, the water evaporates within the fleece and thereby cools the body. By reducing sweating, the body requires less energy. Important body parameters that are decisive for sports performance are improved. Furthermore, it was proven that performance could be increased up to 110%.

This effect represents a real sports performance booster.

This was confirmed not only by top level athletes, but also in scientific studies.

Cooling down before training begins delays the temperature increase – according to the research results of Professor Winfried Joch and Dr. Sandra Ückert: "Athletes starting with a cooler body need more time to reach the natural temperature limit and can there-

fore provide top performance for a longer time".

During a study about the effect of different cooling application times of a "COOLINE INSIDE" cooling vest (E.COOLINE), which was conducted by the Institute of Sport Science at the University of Münster and the Institute of Sport and Sport Science at the University of Dortmund, the effect of active cooling textiles before and during breaks of sports activities was to be evaluated.

The aim of the study was to determine the effects of different application timing of cooling vests on the parameters heart rate, core body temperature, O₂ consumption and lactate. The aspect of optimal timing of the cooling vest application is of high importance in sports practice, since many forms

of sports have very different requirements. Therefore, a pre-cooling with 20 minutes of cooling before a 20 minute run (B), inter-cooling with 20 minutes of cooling between two runs (C), pre- + inter-cooling (D) as well as a control test without cooling (A) were conducted.

Fifteen test subjects with an average age of 25 years participated in the randomised study. This study design and the number of test subjects comply with international standards and are therefore reliable.

The speed of the runners was set at 85 % of their individual heart rate in a preliminary test, so that the required performance was clearly defined. Each runner performed the test in randomised sequence on different days under the four sets of conditions described. The results were unequivocal.

Lower lactate values

When cooling was performed, the lactate values were notably lower than in the control test without cooling.

Depending on the measuring time, the values were between 10% and 35% lower than in the control test without cooling at the corresponding time (See Figure 1).

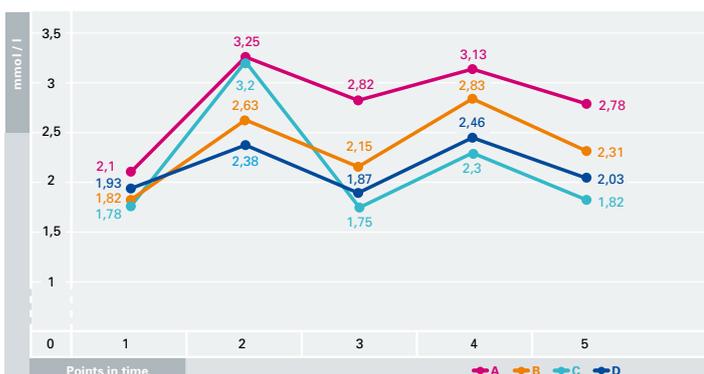


Figure 1: Lactate values during the test variations A-D



Figure 2: CBT-course during test variations A-D

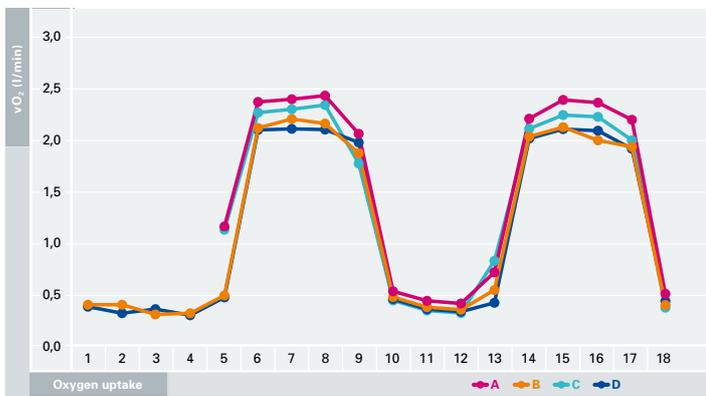


Figure 3: O₂ uptake during test variations A-D

Body temperature lower

The measurement of body temperature provided an unexpectedly clear result. Although many studies with ice vests provided no results in this respect, but rather observed a rise in body temperature, the results were much better with the highly physiological cooling effect of E.COOLINE.

An obvious effect on the core body temperature by application of cooling via the E.COOLINE vest is found, whereby this effect increases with increasing period of activity. The trend indicates that the greatest effect was clearly achieved with the "double" application of the cooling vest (cooling before and after the first run; pre- and inter-cooling Test D), providing the lowest temperature values (See Figure 2).

From a physiological point of view, the oxygen supply to the musculature is the most crucial and performance-determining criterion in endurance sports. The amount of oxygen available to the musculature is vital for the generation of energy. The more oxygen is available to an individual muscle, the higher the intensity of endurance performance can be.

Therefore, the VO₂max (oxygen uptake) is the gross criterion for the general endurance performance capability.

Using less oxygen for the very same performance is an indicator that energy was saved and therefore accomplished the same performance with a lower energy consumption. Here, too, the test sessions with cooling clearly had the advantage. Applying the cooling vest lowered O₂ consumption, with an obviously positive effect on the pre- or pre- + inter-cooling variations (Test B and D). Therefore, distinctly less energy was needed with cooling to accomplish the very same performance (See Figure 3).

The study investigators' résumé was unanimous. As a general rule, a 20 minute cooling application by using an activated E.COOLINE vest has a positive effect on the physiological parameters during a 2 x 20 minute run requirement (85% cf-range). The positive effect is expressed as a clearly economising effect, whereby the pre and inter-cooling variation is the most effective. If cooling can only be applied once, i.e. either only before exercise, or only during the break between two exercise units, no significant varying effects are to be expected from this application profile. However, in view of practice in sport, it is important to know that several cooling applications during multiple breaks, such as in Tennis, produce the greatest effects.

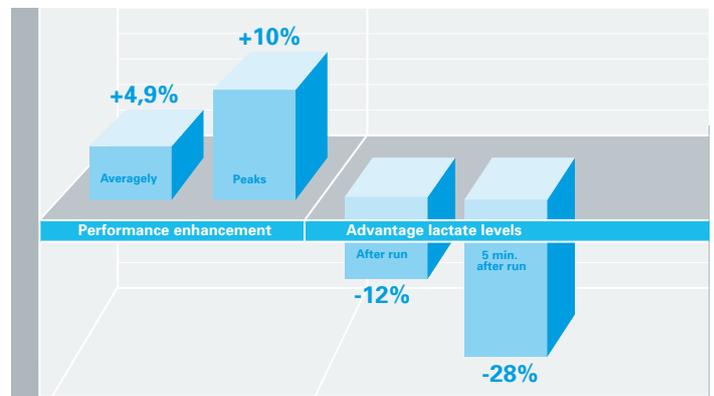


Figure 4: Performance enhancement and lactate levels in endurance training with cooling

More than 100 studies worldwide have dealt with the subject of cooling and performance enhancement. Most of them failed because of the inadequate provision of cooling and the lack of the necessary logistics of cooling batteries and cooling facilities.

Not so with E.COOLINE. Due to the natural process of evaporation cooling, the product is independent of refrigerators, air conditioning or an external energy source. Simply activated for 10 seconds with water, the cooling effect lasts for hours.

After the energy saving effects of pre- and inter-cooling were confirmed, another study was intended to demonstrate the effect of using E.COOLINE directly during physical exercise.

This study was also designed on the basis of international criteria. This time the runners were asked to run as fast as possible for one hour in order to establish the distance covered both with and without cooling vest. In the 60 minutes, the runners wearing the cooling vests ran on average 407 metres (stadium circuit) more than the same runners without cooling. This is equivalent to an increase to almost 105% [+4.9%] in performance and more than half of the athletes ran additional distances of 650-800 m. This corresponds to an increase in performance of up to 110% (+10%).

According to Dr. Sandra Ückert, of the German Olympic Sport Federation (Deutscher Olympischer Sportbund [DOSB]), a performance increase of already 1% makes the difference between 1st place and 8th place in a world championship or at the Olympic Games.

Moreover, the lactate values of the runners running with the cooling vests were on average 12% lower. In other words, despite the same heart rate, the same duration of exercise and despite a higher running performance, the physical load was less (See Figure 4).

As already demanded by Mr. Carsten Bölke, the physiotherapist of the DUV (German Ultra Marathon Association), these results make the use of cooling vests a useful option for endurance training in all forms of sports.

Cooling provides an entirely natural form of performance reserve. Not only is energy lost at 30°C in the shade, but already as soon as the heat regulation system of the body produces the first drops of sweat; energy, which could be better invested in sports performance.

When a split second is crucial in sport, pre and inter-cooling together with a training advantage with E.COOLINE can be decisive.



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