CompassSport Series - Fitness for Orienteering

Post-exercise recovery – part 1

This series of articles is covering a range of topics within the field of strength and conditioning, with the aim of helping to develop the orienteer's physical performance, irrespective of age or ability. In this issue, we begin to explore the post-exercise recovery process in the first of a two-part piece…..

Let me start this article, if I may, by asking you a question. At the last orienteering event you participated in, what was your routine for the first hour after the race? I would guess that, for many of you, the thoughts now going through your head include 'routine… what's that?' or 'routine, why do I need a routine?' and, finally, probably something along the lines of 'well, I grab the nearest person I vaguely know and start pulling my course apart, usually focusing on all the mistakes I made'. The last one, of course, is the classic and if you personally don't do this, then you'll certainly walk past many orienteers hanging around the download area that are engaged in exactly this kind of behaviour. The focus of the next two articles is not on debating the rights and wrongs of this common post-race approach from a psychological or technical perspective – I will leave that for others to discuss – but on outlining what the orienteer should be doing purely from a physiological perspective in the minutes and hours following an event, in order to optimize their recovery process.

Fatigue and Training Recovery

Before outlining what an orienteer should be doing following exercise, to assist in maximizing their recovery, we need to spend a short time outlining the issues around fatigue, as this knowledge will help us to understand and facilitate recovery by designing appropriate strategies to overcome the causes of fatigue. The classic model of fatigue, and one that would be alluded to by many orienteers if they were quizzed about the effects of exercise on them, is what is known as 'the peripheral hypothesis'. Here we associate fatigue with factors at play in the working muscles, such as a build-up of lactic acid, a decrease in glycogen availability and an increase in muscle tissue damage. There is also a belief that some peripheral fatigue could be linked to neural mechanisms, where sustained or repeated muscle contractions results in a decrease in the discharge of motor neurons, so that maximum force in the muscles can no longer be achieved (Gandevia, 1998).

The other model of fatigue, and one that has gained some support in the scientific community in recent times, is that of 'the central hypothesis'. Here it is suggested that the brain acts as a protective mechanism to prevent excess damage to the muscles and to other essential organs, such as the heart. This central mechanism, if it does indeed have a role to play in fatigue, creates a much more complex problem of how to optimize recovery than do the peripheral elements. Manipulating the central factors, in addition to controlling those in the periphery, could potentially double the challenge of achieving full exercise recovery. Although the issues contributing to fatigue are yet to be fully understood, with much scientific work in this field needed to establish whether the central and/or the peripheral models are valid, it would be rational to postulate that if peripheral issues were resolved through a well-designed,

scientifically sound recovery strategy, then this would have an associated effect on the central mechanisms too.

In summary, it is likely that traditional orienteering, where the athlete is engaged in exercise typically between 30-75 minutes on varying terrain and often with significant ascent and descent, will create a significant amount of fatigue, particularly in the working muscles, where a combination of glycogen depletion, lactate accumulation and muscle fibre damage will take place. Let us now focus on the research around recovery techniques and begin to build an appropriate recovery routine.

Methods for Potentially Enhancing Recovery

According to Viru (1995) the main functions of any recovery strategy should be:

- Normalisation of functions
- Normalization of homeostatic equilibrium
- Replenishment and temporary supercompensation of energy resources
- Reconstructive functions, especially cellular processes and enzymatic functions.

The first two areas occur rapidly and should be the focus of the orienteer within the first few minutes post-exercise, whereas the latter two take much more significant periods of time. Nonetheless actions taken by the orienteer in the first hour following exercise will have a substantial effect on the efficiency of all of these processes. This first article focuses on normalization of functions and homeostasis and strategies to optimize this, with the other two areas to be discussed in more depth in the next installment.

When considering a strategy to deal with these first two issues, the orienteer can incorporate aspects from two different post-exercise recovery approaches: active or passive. Active recovery is based around low-intensity exercises (eg. jogging, walking, stretching, cycling and water exercises), whereas passive recovery includes activities such as upright sitting, supine rest, showers, ice-baths, massage, saunas and electrostimulation.

Research examining the different recovery modes has created a confusing picture, with many of the recent studies contradicting one another's findings. These divergent conclusions are due to several influences at play here. Firstly, sedentary individuals appear to benefit more from an active recovery, whereas athletes show similar performances after either passive or active interventions. Secondly, there are often issues with the research, where other factors involved, such as diet, sleep and level of hydration, are not well controlled. Finally, few of the studies have investigated simultaneously the different recovery methods in field situations and the amount of data recorded is often limited. Thus, as Tessitore et al (2008) state, 'a need exists' for ecological studies to be conducted including 'aspects of practical settings while maintaining experimental control' to examine in detail the value of both active and passive recovery strategies. Let us look at what we do know currently, from both a hypothetical and empirical perspective.

Active Recovery Strategy

The theory behind active recovery proposes that a period of gentle exercise following a bout of serious exertion, such as that undertaken in a race or high-intensity training session, can help in a number of ways. Firstly, it is anticipated that the exercise will help to maintain blood flow around the body, assisting in removing waste products, such as lactic acid and carbon dioxide, and prevent them collecting in the periphery. A popular myth here is that lactic acid will contribute to delayed-onset muscle soreness (DOMS) in the days after exercise following its pooling in the muscles, even though this was dismissed as a concept by scientific research some time ago (Schwane et al., 1983). Law and Herbert (2007) also demonstrated recently that, although many people engage in a cool down in the belief that this will reduce DOMS, there is no evidence to support this belief, suggesting that 'cool down neither exacerbates nor protects against muscle damage'. Finally, lactic acid build up in a long distance orienteering event is unlikely to be significant at the end of the race, as the orienteer is continually cycling this away from the exercising muscles and metabolizing it elsewhere in the body during the race, but the active recovery process may still assist in removing whatever waste products and metabolites exist at the end of exercise and could yet be of value in this respect, even if it has no significant effect on DOMS.

Another positive aspect of the low-intensity active recovery is that it helps with a return of body temperature to normal and assists in restoring homeostatic balance in a gradual rather than sudden fashion. Other functions, such as heart rate, stroke volume, breathing rate and tidal volume, are also reduced in a slow and steady manner. Reilly and Ekblom (2005) have stated that a warm down helps to 'damp activity in the nervous system, which promotes sleep afterwards' and that this gradual reduction in body temperature via an active recovery can assist the immune system in overcoming its usual post-exercise suppression. Finally, it is postulated that active recovery helps to restore muscle length and function, particularly through a stretching regime (Calder, 1996), although the value of stretching post-exercise has yet to be determined scientifically and it remains an area for much debate.

Passive Recovery Strategy

Of the possible post-exercise strategies that could be adopted here by orienteers following an event, the most common are likely to include rest (seated or lying), showers and, possibly, massage. It is unusual at races to have the facility for an ice-bath or sauna, but these are potential approaches post-training, away from the normal race environment.

Research into massage therapy suggests that, physiologically, there is little to support the conjecture that it is effective in promoting recovery (Bishop et al., 2008). Weerapong et al. (2005) also reported that some studies have shown that massage effectively reduced DOMS, but many others have not. However, the psychological benefits of massage are often significant and not to be discounted by athletes and coaches.

Cold water immersion or ice baths is another approach that has been used by athletes in recent years. Contrast showers (alternating between hot and cold) or saunas and ice tubs are another possible strategy for orienteers to consider post-exercise. The theory is that the cold temperature acts on the periphery to encourage removal of waste products and metabolites from the muscles and alternating

hot and cold therapy encourages this process even further. Research (Eston and Peters, 1999; Bosak et al., 2008) has suggested that these techniques can have some positive effects on certain aspects of recovery, but its overall effect on performance varies among individuals. Again, it would appear that athletes perceive there to be a value with use of such treatments and the psychological benefit for those who respond positively to cold water immersion should certainly not be discounted.

Recommended Post-exercise Routine

Let us finally bring together all this evidence and practice and put together a recommended post-exercise strategy for the orienteer to consider. This is summarized below in table 1.

Post-exercise Routine (Immediate)
0-15 mins • Exercise gently (around 50-60% max), gradually decreasing the intensity from run to jog to walk • Intersperse exercise with stretching (use of static and/or dynamic techniques) • Begin rehydration
15-30 mins • Continue hydration • Begin eating carbohydrate and protein mix • Self-massage of legs • Use of hydrotherapy (contrast shower, ice bath) if possible
30-60 mins • Continue hydration • Take in more food • Begin analysis of race • Start to unwind and relax

Adapted from Jeffreys (2005)

The first half an hour after exercise is the most important time to begin the recovery process and should not be delayed, wherever possible. The mix of gentle exercise and stretching, bringing the various physiological variables down to resting level, is the primary focus initially and it is recommended to intersperse the aerobic exercise with the stretches. Each stretch should focus on the key muscles involved in running (ie. calf, hamstring, quads, adductors, gluteals and lower back) and be held, if static, for around 15 seconds each, repeated twice on each muscle group. Hydration and refueling begins also immediately and the next article in the series will discuss this, and other longer term recovery strategies, in more depth. Finally massage and hydrotherapy, if available, should be considered, especially if the orienteer feels, through personal experience, that these techniques are of benefit to them.

Conclusion

The post-exercise routine is undoubtedly as important as any other element of a successful and comprehensive training programme and, although there is still a great deal of our current practice yet to be ratified by science, there is little doubt that the physical and mental benefits of a well-constructed recovery strategy are apparent to all who adhere to this approach. The next article in the series will

explore other post-exercise techniques and continue to give more ideas for the orienteer to include in their practice.

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