The Science behind Recovery Strategies for Athletes

by Angela Calder, 2001

Recovery is a training principle. It focuses on identifying strategies that athletes can use to minimise and manage residual fatigue from training and competition. The resulting performance benefits reported are threefold. By minimising the effects of residual training fatigue, appropriate recovery strategies will:

1. Accelerate adaptation to the training stimuli *ie maximum gains from training, maintain quality in every session, eg movement efficiency etc*
2. Improve performances *ie through consistency and repeatability of quality training performances*
3. Minimise and eliminate non-adaptive responses to training and performance *ie prevent overtraining, fewer illnesses, injuries, or burnout problems.*

The challenge for coaches has been to identify what capacities are fatigued, and what strategies should be used to recover from this fatigue. Reliable scientific support for these strategies is difficult to find.

Hydrotherapy

Water therapies are much under utilised and undervalued in Australia. In Europe and Scandinavia a wide range of therapies have been in use for several thousand years. Recent research from Finland has demonstrated that underwater massaging following strength/power training reduces fatigue and helps to maintain neuro-muscular performances (Viitasalo et al. 1995). Similar results have been reported by Flanagan et al. 2000) with young soccer players during tournament conditions.

These findings also support the use of a spa and plunge pool routine to aid recovery. This routine involves first having a shower, followed by a spa (39 - 40^{o}C) for three minutes and then a cold shower or a plunge into a cold pool (10 - 15^{o}C) for 30 to 60 seconds. Spas should be used only if the athlete is in a healthy state and has no new soft tissue injuries. Athletes should not stay in a spa for more than five minutes, as they are likely to experience a large drop in blood pressure.

A contrast-temperature protocol involving a hot pool, with no underwater massaging, and cold plunge (same protocol as outlined above), was also used by Jo Sanders in 1996 to measure the recovery of lactate levels in high performance hockey players after a series of Wingate tests. A comparison of lactate clearances following passive rest, light exercising (active recovery) and the contrast immersion techniques was undertaken. Results indicated that lactate levels are recovered equally fast by using either the contrast water immersion protocol or the active recovery protocol. Lactate recovery following passive rest was significantly slower (Sanders, 1996).

Even contrast-temperature showering within 5 to 10 minutes following a training session is a good way to reduce metabolic fatigue, enhance arousal, and relax muscles. If there is access to a pool then interspersing light active movements with a few static stretches in the pool environment appears to reduce post training/game stiffness and accelerate the return to a normal homeostatic state.

Short periods (30-60 seconds x 1 minute dry rub with a towel: 3 reps) of cold water (10-15^{o}C) immersion to reduce post exercise oedema have become popular in many

sports. The physiological mechanisms relating to this are not yet well understood by coaches but the ensuing benefits are expressed in their athletes' reports of lighter and less tighter muscles, and the reduced recovery time between training.

The choice between contrast temperatures or an active rest routine after training or a game often hinges on access to appropriate facilities. However, it is important to note that following exercise it is essential to replenish energy stores as soon as possible. Active recovery for 10 to 15 minutes following training requires extra energy and may be less effective if the training session or game has already depleted energy stores, whereas the energy demands for the spa or shower routine are much less. Athletes also report that they find the water routines more relaxing and enjoyable than doing more work!

Following this form of hydrotherapy, muscles are more relaxed and are much easier to massage. Athletes can be taught some basic self-massage skills that they can apply, particularly to their lower legs and their necks.

Massage

Many claims are made about the benefits of massage and considerable research examining these claims has been undertaken over the last 15 years. Few claims have been substantiated by this research, but there is some limited evidence showing the positive effects of massage. Massage can increase peripheral blood flow in localised areas, and the mechanical warming and stretching of soft tissues provides *temporary* flexibility gains. Increased muscle relaxation is also demonstrated by a decrease in excitability of the motor neuron pool and by an increase in skin temperatures. Improved mood states and feelings of well being have been recorded in several studies (Calder,1990; Hamer,1999).

Most importantly for athletes - self-massage is a form of biofeedback so they can tune-in to how their body is responding to the way it has been used. Self-recognition and self-management (hydrotherapy and massage) of tight and tense muscles is a proactive way of reducing residual tension and identifying potential problem areas.

Stretching

Recent findings have supported the claims that static stretching in the warm up does not reduce the risk of local muscle injury (Pope et al. 1999: and Shrier, 1999). However, static stretching post exercise (recovery stretching) has demonstrated benefits for injury reduction. In a large American study using military trainees, divided into control and intervention groups, a systematic static stretching routine was performed before training. The intervention group also performed a static stretching routine after exercising and this group experienced 50% fewer injuries than the control group (Hartig & Henderson, 1999).

Integrating recovery techniques into competition

The soccer program at the Victorian Institute of Sport has tested the effectiveness of integrating a range of simple recovery activities into a tournament / high stress situation (Flanagan et al. 2000). Recovery techniques included a systematic hydration and refuelling program, fluid loss management, pool recovery sessions after matches, massage, stretching, nutritional supplements, hot cold showers, icing of new soft

tissue injuries, and player education about recovery including the role of sleep, and relaxation.

Players were divided into two groups with a control and an experimental group. Both groups applied basic recovery techniques involving rest, stretching, and good nutrition. The experimental group undertook the extra recovery treatments outlined above, and during the tournament were able to demonstrate maintenance of sprint capacity that was significantly longer (over several days), had a lower incidence of cough/cold symptoms and a higher personal rating of physical well being. This was in contrast to the control group where there was a significant decline in sprint performance even after the first match; a significantly higher incidence of cough and cold symptoms; and a significantly lower rating of wellness.

Summary: Reputable scientific investigations about the effectiveness of recovery strategies are rare. With the increasing anecdotal reports from coaches and athletes that after using recovery techniques, they *feel better*, or they *bounce back* faster, there is increased demand for sport scientists to examine these claims.

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