



RECOVERY STRATEGIES FOR SPORTS PERFORMANCE

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"If there was one single factor that helped this team to perform to the level they did at Atlanta, it was the recovery program that was put in place...and monitored throughout our 1996 program."—Barry Barnes Head Coach, Australian Men's Basketball, 1996 Atlanta Olympic Report.

Athletes work hard to prepare and perform successfully throughout a competitive season or for major events. Unfortunately, many ignore or forget the performance benefits gained through including recovery strategies within their daily training programs. Indeed there is a tendency for many athletes to limit the use of recovery techniques to times when they are ill or injured. Yet recovery strategies have far more benefits for athletes than merely as tools to assist with rehabilitation or recuperation.

Recovery is one of the basic principles of training methodology (Rushall & Pyke, 1990) and it has two primary roles: The first concerns monitoring the athlete's adaptation to training and stress so that appropriate recovery strategies can be determined. The second relates to the selection of specific recovery techniques and strategies to minimize any residual fatigue from training and competing. (Figure 1).

RECOVERY STRATEGIES: MONITORING ADAPTIVE RESPONSES

WHAT ARE THE VARIABLES COACHES SHOULD MONITOR?

Each coach has a wealth of observational information about the indicators of poor adaptation and excessive fatigue. Often these are observations recorded subconsciously rather than formalized documented notes. It is important for each coach to identify what it is that they observe that is indicative of excessive stress and fatigue. A quick assessment of these criteria at every coaching session will enable the coach to identify any non-adaptive stress responses at an early stage and then address them before they become a major issue for an athlete (Table 1).

WHAT ARE THE VARIABLES AN ATHLETE SHOULD MONITOR?

The responsible athlete will also monitor training adaptations through regular recordings in a training diary or log book. Maintaining a daily record is an essential training tool for all athletes as it enables them to learn how to evaluate their stress levels and their adaptive responses. Learning to recognize "how they feel" is one of the most important skills any athlete can acquire. Recordings of the quality of sleep, morning resting heart rate and morning body weight, and a daily rating of fatigue levels are four critical markers that should be recorded regularly by athletes. These four variables take two minutes to record and may be the first warning to an athlete that he or she is not adapting well to training and other stresses. Kellmann (2002) has designed a questionnaire, REST-Q that identifies excessive fatigue and under-recovery in athletes.

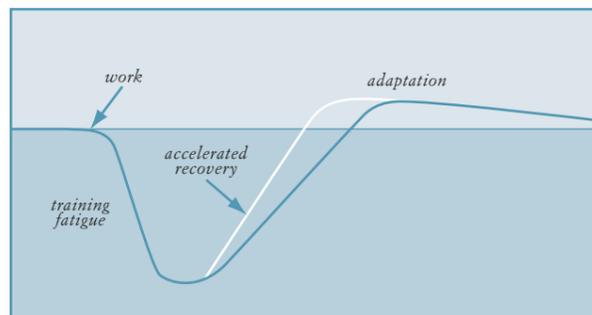


FIGURE 1. The principle of recovery

COACHING OBSERVATIONS	SIGNS & SYMPTOMS OF NON-ADAPTIVE RESPONSES
Direct Communication	Athlete tells me he has: Heavy legs Doesn't feel good Legs are sore Feels tired
Body Language	Facial expression and color Posture Signs of frustration, etc.
Performance	Poor skill execution Slow acceleration off the mark Heavy feet Poor or slow decision making / response time
Psychological	Low motivation Low concentration Aggressiveness No self-confidence
Gut feeling / 6th sense / Other things	Poor eating habits Poor diet Poor sleep patterns External stresses

TABLE 1. Example of coaching checklist for monitoring an athlete's adaptation to training and stress.

Realistically, most athletes are likely to be inconsistent with recording morning resting heart rates. Research has indicated that a more comprehensive set of variables should be monitored (Mackinnon & Hooper, 1994; Hooper et al., 1995). Some examples of monitoring sheets that include many of these variables can be found in Calder (1996) or accessed on www.ask.net.au

RECOVERY STRATEGIES: MANAGEMENT

There are four generic types of training and competition fatigue (Calder, 2003). These are **METABOLIC FATIGUE** (energy stores); **NEURAL FATIGUE** of either or both the peripheral nervous system (localized force production) and central nervous system (drive / motivation) **PSYCHOLOGICAL FATIGUE** (emotional and social stress factors); and **ENVIRONMENTAL FATIGUE** (climate and travel).

A good coach understands not only what is being stimulated through prescribed training sessions, but also what is being fatigued. The challenge is to recognize the type of fatigue and then select specific strategies to reduce and minimize this fatigue as soon as possible after the training or performance situation. There are three major specialty areas to include when designing appropriate recovery strategies for an athlete's training program.

NUTRITION: FLUID AND FUEL FOR RECOVERY

The most important nutritional considerations for recovery relate to fluid and fuel replacement strategies (Burke, 2000). Monitoring fluid loss so that it is kept to a minimum is essential. A bodyweight loss of two percent or more during exercise will result in a reduction in aerobic output. If an athlete becomes excessively dehydrated, not only can this be dangerous and lead to overheating, their aerobic capacity can be reduced by up to six-percent.

Adequate supplies of glycogen in the muscle and in the liver are needed to support the energy demands and promote recovery for the next training session. Athletes can minimize the effects of metabolic fatigue by starting each session with their fuel tanks full. They can top-up during the event with sports drinks and take other carbohydrate and protein foods. Small amounts of protein taken with carbohydrates before, during and after hard training, are also recommended to help minimize muscle protein breakdown as a result of heavy workloads (Tarnopolsky, 2000).

Nutritional supplements should be used with caution and sound scientific advice. Many coaches and athletes are pressured to use supplements and new products and it is often difficult to source reliable evidence-based information about what is appropriate and safe to use. A useful impartial website for advice on this area is www.ais.org.au/nutrition

PHYSICAL THERAPIES

A wide variety of activities and therapies are used to assist with recovery from training fatigue. Unfortunately, many recovery techniques popular with athletes and coaches have not been extensively investigated by scientists so coaches and athletes often rely on anecdotal information about what is best to use. The following list is an indication of some of the most commonly used recovery techniques.

REST: PASSIVE REST

Passive rest, particularly in the form of sleep, is an area that is not well understood by either coaches or athletes. Sleep is probably *the* most important form of recovery an athlete can have. A good night's sleep of seven to nine hours provides invaluable adaptation time for adult individuals to adjust to the physical, neurological, immunological and emotional stressors that they experience during the day. An adolescent experiencing heavy training and a growth spurt may need up to ten hours a night and athletes who are sick often need more sleep as a part of their recuperation. However, too much sleep can be detrimental to performance as it can slow down the central nervous system and lead to increased levels of melatonin that can leave the athlete feeling slow and lethargic.

REST: ACTIVE REST

Active rest is much undervalued by athletes. The end of the loading component of the training session is an ideal time to introduce active recovery activities, although active rest strategies can also be interspersed easily throughout the session. (i.e., sets and reps). Activities can be selected to fulfill several tasks. They can either help recover the physiological state of the athlete (light jog, walk, swim or cycle to recover the lactate system), recover neural fatigue (light jostling/shaking of muscle groups), or used as a means of psychological and emotional restoration (light but different activities).

Cross-training can also be used as a form of active rest provided the work intensities are modest (light aerobic) and the exercises undertaken are different to those normally performed in training, e.g., pool work after a game (Photo 1).



PHOTO 1. Static stretching in a pool after a game.

Rest days are essential. Ideally at least one day per week should be a non-training day. This allows time for physical and psychological recovery as well as time for other interests and personal and family relationships.

HYDROTHERAPIES

A wide range of hydrotherapies have been in use restoratively for several thousand years. Spas, pools, steam rooms, cold pools, and contrast temperature protocols were used by the ancient Greeks and Romans.

One of the few published articles on the effectiveness of hydrotherapies comes from research with nationally ranked Finnish track and field athletes (Viitasalo et al., 1995). Researchers demonstrated that underwater massaging (using the jets in a spa) following plyometrics training helped athletes to maintain leg-explosiveness on the following day. In contrast, passive rest after such training resulted in a significant reduction in leg power.

The protocols used by the Finnish researchers were very similar to those used by the ancient Romans. Essentially, this routine involves first having a shower, followed by a spa (39 to 40°C) for three minutes and then a cold shower or a plunge into a cold pool (10 to 15°C) for 30 to 60 seconds. Warm immersion produces vasodilation of the peripheral circulation and the cold immersion encourages vasoconstriction. Three to five sets of this

protocol producing rapid vasodilation and vasoconstriction will accelerate blood flow.

A contrast temperature following the same protocol as outlined above, was used by researchers from the University of Canberra in 1996 to measure lactate recovery in high-performance hockey players after a series of Wingate tests (Sanders, 1996). Results indicated that lactate levels were recovered equally fast by using either the contrast water immersion protocol or the active recovery protocol. Lactate recovery following passive rest was significantly slower.

Showering within five to ten minutes at the end of a training session is a good way to accelerate recovery of both lactates and peripheral neural fatigue. Contrasting temperatures can be achieved with a shower and bath at home or the use of a small paddling pool or tub for cold immersion.

SPORTS MASSAGE

Many claims are made about the benefits of sports massage (Photo 2) and numerous research studies examining these claims have been undertaken over the last 15-20 years. Despite this there is not much evidence-based science to substantiate many claims that are made about the benefits of massage (Calder, 1990). What little information that does exist provides evidence for increased muscle and skin temperatures, leads to a relaxation response as demonstrated by a reduction in resting heart rates, blood pressure and a decrease in excitability of the motor-neuron pool. Improved mood states and feelings of well-being have been recorded in several studies and many athletes will use massage as both a means of relaxing physically and psychologically.



PHOTO 2. Sports massage.

ACUPUNCTURE AND ACUPRESSURE

Acupressure is often performed as an adjunct to sports massage but acupuncture requires more extensive qualifications and is less accessible and more expensive than massage. Both acupressure and acupuncture focus on applying pressure or stimulus to specific points located on 14 meridians (line patterns) on the body.

PSYCHOLOGICAL SKILLS

There are four main psychological strategies that are used to enhance recovery: debriefing, emotional recovery, mental toughness skills and relaxation techniques.

DEBRIEFING

Debriefing is one of the most useful ways to evaluate performance and provide emotional and psychological recovery post training or post match. A successful debriefing approach helps both the coach and athlete to evaluate performances objectively, identify what specific changes are needed and then set realistic goals for the next training session or match. An excellent debriefing model that focuses on process rather than outcomes is outlined by Hogg (2002).

EMOTIONAL RECOVERY / CONTINGENCY PLANNING

In the case of a major setback or traumatic situation or event, additional resources and strategies may assist the athlete to manage this process and help them to take the first steps in “coming to terms” with the situation. It is important for coaches to identify in advance the strategy or strategies that they will use if such situations arise. Contingency planning is an important aspect of preparation for handling emotionally traumatic events.

Some of the simplest distracters to use during a tournament or competition are mood-lifting activities. These can include watching an amusing video or comedy show on television, reading an escapist or adventure novel, or going to a fun park, zoo or light entertainment center. A sense of humor and a feeling of comradery, or team support, are invaluable in times of emotional stress. For athletes in extended competitions away from home, and especially overseas, planning such activities as part of the tour is essential.

MENTAL TOUGHNESS SKILLS

Recognition of the complex interaction and strong relationship between physical and emotional states is important for recovery training. This is evident when muscle relaxation is observed in conjunction with lowered heart rates and blood pressures and improved mood states. Skills associated with developing mental toughness or emotional control and relaxation strategies, are important strategies for athletes to use. Positive self-talk and developing positive body language are some of the effective skills that have been used by elite tennis athletes (Loehr, 1992). These techniques can be used within training and match situations as well as afterwards and coupled with biofeedback techniques for greater effect.

RELAXATION TECHNIQUES

Many relaxation techniques are available. An athlete needs to practice only one or two techniques on a regular basis for these to become effective tools to use to aid recovery. Some of the more common relaxation techniques include: meditation, progressive muscle relaxation, visualization, breathing exercises, music, and flotation.

CONCLUSION

Every training session is important, as it is an opportunity to become an even better performer. Athletes should aim to start each training session or game in as fresh a state

as possible so that they can maximize the training benefits and experiences of the session or event. Recovery strategies are aimed at helping athletes to do this by focusing on reducing residual training fatigue and stress.

Coaches can help educate athletes to understand, plan and use recovery strategies with a view to athletes learning to manage this for themselves. Effective monitoring and recovery management will enable both the coach and athlete to train hard, perform better and more consistently, to reduce training injuries and illnesses, and to develop sound self-management strategies. 🧘

The winning formula is:
**WORK HARD + RECOVERY WELL =
BEST PERFORMANCE**

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