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 monitoring 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 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. Kellman (2002) has designed a questionnaire, REST-Q that identifies excessive fatigue and under-recovery in athletes.

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.asi.org.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 (localised 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.

**Monitoring Adaptation**

- Direct Communication
- Body Language
- Performance
- Psychological
- Gut feeling / physical sensation / Other things

**Signs & Symptoms of Non-Adaptive Responses**

- Athlete tells me he has: Heavy legs
- Doesn’t feel good
- Legs are sore
- Feels tired
- Facial expression and color
- Posture
- Signs of frustration, etc.
- Low motivation
- Low concentration
- Aggressiveness
- No self-confidence
- Poor eating habits
- Poor diet
- Poor sleep patterns
- External stresses

**Table 1. Example of coaching checklist for monitoring an athlete’s adaptation to training stress.**

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**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 events 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 stresses 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).

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.

Cross-training can also be used as a means of relaxing physically and psychologically. This routine involves first having a shower, followed by a massage. Both acupressure and acupuncture focus on applying pressure or stimulus to specific points located on 14 meridians (line patterns) on the body.

DEBRIEFING

Debriefing is one of the most useful ways to evaluate performance and provide emotional and psychological post training 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.

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

REFERENCES


