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Fit to Play™ & perform-Rules of recovery (part 2).

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ABSTRACT

This article is the second in a four part series that will provide the reader with greater insight into the concepts of overtraining and recovery. Part two specifically will introduce the first six short-term rules of recovery giving practical applications of each for athletes and coaches.

Key words: Recovery, Overstress, Overtraining.
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INTRODUCTION

One key to success of tennis players and other athletes is not just in how hard they train off and on court, but how well they recover from training, playing, environment and travel (Petersen, 2006a). High performance players are exposed to a very demanding schedule often training two or more times per day. Under these circumstances athletes may be pushed beyond physiological and psychological limits which can result in decreased function (Bompa, 1985) and have the potential for overstress or under-recovery to occur.

Descriptions and Definitions from the Literature.

Overtraining is described as an imbalance between training and recovery (Kuipers & Keizer, 1988) or an imbalance between stress and recovery, that is too much stress combined with too little regeneration (Lehman et al, 1999). It is the final stage of an advanced state of fatigue which is characterized by a decline in the athlete's performance capability and their inability to adapt to training (Marion, 1995). Recovery is a process in time for the re-establishment of performance abilities. It varies between and within individuals and exists at multi-levels (e.g. psychological, physiological, social) (Kellmann & Kallus, 2001). Whereas under-recovery is described as the failure to fulfill current recovery demands (Kellman, 2003).

The diagnosis of overtraining is complicated. There are no exact diagnostic criteria, and physicians must rule out other diseases before the diagnosis can be made (Uusitalo, 2001).The general causes of under-recovery and subsequent overtraining are thought to include too rapid increases in intensity, volume or density of training that overwhelm the body's ability to adapt. Other factors include single sport overload, monotonous or poor periodization of training and too many competitions without adequate rest and insufficient recovery.

Efforts have been made to develop effective, easily transportable and administered techniques that will accelerate recovery and in turn improve performance. This quest however remains for the most part a combination of art and science along with a healthy dose of trial and error. The process of recovery should be an overall lifestyle focus where minor setbacks are learning experiences and change is implemented on an as needed basis.

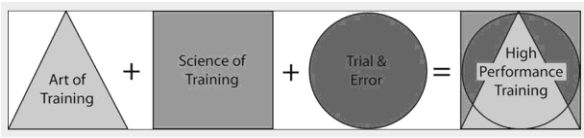

Figure 1. Petersen & Nittinger, 2006)(with permission Racquet Tech Publishing).

As workloads and other associated stresses increase so does the time required for planning and implementing adequate recovery strategies. By varying or cycling the specifics of training volume, intensity, and density you can achieve peak levels of conditioning at the proper time (Petersen, 2006b). The best treatment for prevention of overstress, overtraining or overreaching is prevention (Uuistalo, 2001) with a well planned daily, weekly, monthly and yearly schedule that includes use of a variety of high performance recovery tips and strategies (Petersen, 2006a).

Recovery sessions provide an opportunity for both player and coach to start to unwind, recover and prepare for the next day. It is important for coaches to recognize that they also need to recover as they undertake large amounts of physical work and stress (Calder, 2003). The relaxed atmosphere fosters a good interchange of ideas that can be implemented into the training structure.

The list of short-term rules of recovery (see below) have been developed to help athletes and coaches set priorities in the recovery process. They are based on experience, current literature, anecdotal evidence from athletes as well as coaches and sport medicine and science personnel. Following these short-term rules of recovery on a regular basis will help to ensure the athletes' recovery needs are met and thus will protect against overstress.

SHORT-TERM RULES OF RECOVERY (DAILY)	
Rule #1-Re-hydration	Rule # 7-Release the soft tissue
Rule #2-Re-fuel	Rule # 8-Regain & maintain muscle length
Rule #3-Recovery work	Rule # 9-Re-play & review your training or competition
Rule #4-Re-align the body	Rule # 10-Reinvigorate with recovery menu
Rule # 5-Re-set the balance clock	Rule # 11-Relaxation
Rule # 6-Re-connect the core	Rule # 12-Rest (passive)

Table 1. Short-term Rules of Recovery (daily) (adapted after Petersen, 2003, Peteresen & Nittinger 2007, Petersen, 2009).

SHORT-TERM RULES OF RECOVERY

What Athletes do for Themselves

Rule #1- Rehydration

The most important nutritional considerations for recovery relate to fluid and fuel replacement strategies (Burke, 2000), therefore drink plenty of water. The goal is to have light colored urine. The harder, higher and hotter conditions you train or compete in, the more you need to drink. Pre-hydration and immediate re-hydration are key. Losing as little as 2% of body weight through sweat can impair an athlete's ability to perform due to low blood volume and less than optimal utilization of nutrients and oxygen. Also, younger players may need to be more vigilant about hydration strategies as dehydration seems to be more detrimental to children than to adults (Bar-Or, 2001).

Rule #2-Re-fuel

Athletes can help minimize the effects of metabolic fatigue by starting each session with adequate carbohydrate stores (fuel)on board. Adequate supplies of glycogen in the muscle and in the liver are needed to support the energy demands of the player and promote recovery for the next training session. Ensure that adequate nutrition (carbohydrate fuel) is consumed pre- and post training. Dietary carbohydrate is the primary source for the body to manufacture glucose (Coyle, 1995). Since glycogen stores take 24- 48 hours to replenish, they must be replaced daily.

(Costill & Hargreaves, 1992). Each gram of glycogen is stored with approximately three grams of water, so ensure adequate hydration to ensure maximum glycogen synthesis.

There is a window of opportunity within the first 20-30 minutes after strenuous exercise, to replenish muscle fuel stores at a faster rate than if carbohydrate intake is delayed for longer. Small amounts of protein taken with carbohydrates before, during and after hard training, helps to minimize muscle protein breakdown as a result of heavy workloads. Athletes should consume between 1.2 and 1.5 g/ kg body weight of simple carbohydrates as soon as possible after exercise (Costill & Hargreaves, 1992).

Practical Application

Consume 1.2-1.5 grams of carbohydrate per kilogram of body weight immediately after exercise and then follow that with an additional 1.5-2.0 grams of carbohydrate per kilogram at a meal or snack within two hours (Parsons, 2006). A banana has about 30 grams of carbohydrates and 2 cups of 1% chocolate milk contains approximately 54 grams of carbohydrate. Other good recovery foods are dried fruit bars, yogurt and low fat granola cereal.

Rule #3-Re-align the body

Training for a sport like tennis is asymmetrical in nature and can torque the body's muscle and fascial systems leading to an imbalance in length and strength of muscles and tendons. The flexed posture of competitive sport further adds to this imbalance. While upper body development is asymmetrical in tennis, symmetrical strength and flexibility of the legs and

lower torso are necessary for optimum court mobility (Petersen, 1988). The malalignment syndrome remains one of the frontiers in medicine, unrecognized as a cause of over 50% of back and limb pain (Schamberger, 2002). The associated biomechanical changes-especially the shift in weight-bearing and the asymmetries of muscle tension, strength and joint range of motion- affect soft tissues, joints and organ systems throughout the body. Abnormal pelvic motion during training can put undue strain on a variety of structures that lead to overuse problems. Very few competitive players in swinging sports make it through an entire season without experiencing some form of lumbar, hip, knee, thoracic or shoulder pain associated with kinetic chain weakness and/or malalignment issues (Petersen , 2010).

The most common presentation of malalignment syndrome is rotational malalignment. Other conditions like upslip, pelvic inflare and outflare and other presentations can also occur but should be dealt with by an appropriately trained therapist that has had special training to recognize, diagnose and treat the malalignment syndromes (Petersen et al, 2006). As sport medicine and therapy personnel we must recognize malalignment and postural syndromes and ensure that the daily training plans and rehabilitation protocols address these syndromes in a pro-active manner (Petersen, 2006c).

Practical Application

Figure 2a. Muscle energy techniques.

Figure 2a &b. Simple muscle energy techniques can be used to help correct. Consult with your physical therapist.

Figure 3. Stretches following the self correction regain muscle length.

Rule #4-Recovery work

Within Session

Players can facilitate recovery and lactic acid removal within their playing and practice session by continuing to move between points with walking small or baby steps and doing knee and ankle pumping exercises while seated at changeovers. Although the periods of walking and rest during match play are probably sufficient to allow players to metabolize lactate efficiently, when recovery between rallies is too short, running speed for strokes preperation and stroke speed is decreased (Ferrauti et. al, 2001). In addition, shaking or vibrational techniques can also help to decrease tension in the lower and upper extremities.

Post Session

The utilization of recovery techniques must become habitual and be performed daily (Bompa, 1985).

Figure 4. Use light resistance and cycle at 85-90 RPM (revolutions per minute) for 15-20 minutes.

Studies suggest that light aerobic exercise such as cycling following anaerobic training (e.g.-sprint) might facilitate

recovery of force or speed/power by increasing lactic acid removal, thus possibly helping restore normal calcium levels within muscle fibers (Signorile et al, 1993). To help flush out the lactic acid and other waste products that built up in the muscle during training and competitions, try using the 'spin only' cycle routine. At higher pedalling rates there is a greater recruitment of slow twitch fibres. Since slow twitch fibres are more resistant to fatigue, a higher pedalling rate will prove advantageous and less likely to cause premature fatigue (Hagan et al, 1992). Other modalities such as pool running or walking can be used in the absence of a bike.

Rule #5-Regain and maintain muscle length.

The state of tension in muscle groups should be assessed on a daily basis and new stretches added to ensure that a good length-tension balance is maintained in all muscle groups responsible for on- court performance. Research has shown that static stretches prior to exercise did not prevent lower extremity overuse injuries, but additional static stretches after training and before bed resulted in 50% fewer injuries occurring (Hartig & Henderson, 1999). Performing static and facilitated stretches optimizes muscle and tendon length post training. Players should develop their own set of stretches based on an evaluation by their sport science and medicine team and be adjusted as the training emphasis and demands change.

'Hold relax and contract relax' PNF techniques have been shown to be more effective than just static stretching (Enoka, 1994;Lucas & Koslow, 1984). PNF techniques may be relaxing as players can lie down and perform no work while being stretched passively- therefore PNF can also be an effective means of post exercise relaxation (Reque, 2003).

Figure 5. Hamstring stretches and other stretches can be done both post activity and during a pool session.

Rule #6-Re-set the balance clock

Balance training is a fundamental component of functional mobility and dynamic sports activity and should be part of everyone's daily fitness routine whether destined for the pro-circuit or not (Petersen, 2006d).

As physical therapists and fitness coaches we have long known the benefits of balance and body awareness exercises in rehabilitating injuries and in sport specific training. Most gyms will have some balance equipment available. By training on an unstable surface, balance reactions and coordination are trained at a subconscious level, facilitating these reactions to become automatic. This helps to prevent injury and improve sport performance. Re-set your balance clock with some drills using wobble boards, foam rolls, rolled towels or the dynamic edge.

Figure 6. Balance training with a rolled towel or a wobble board.

Figure 7. Balance training with a dynamic edge device.

CONCLUSION

The challenge for most coaches and players is to identify which specific capacities are fatigued and then select appropriate recovery strategies to restore the player to a normal functioning state. Athletes, coaches, therapists and parents all need to be more aware of the importance of restoration and regeneration following heavy workloads and how best to use the equipment, facilities and modalities available to facilitate recovery.

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