



# Fit to Play™ & perform-rules of recovery (part 1)

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## ABSTRACT

This article, the first in a four part series, will provide the reader with insight into overtraining and recovery. It will allow them to recognize stressors, signs and symptoms of overtraining and underrecovery. It will also explore responsibilities for recovery and prevention of overtraining (overtraining) and underrecovery in the short and long term for both players and coaches.

**Key words:** Recovery, overtraining, overtraining.  
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Accepted: 1 October 2011  
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## INTRODUCTION

Training and subsequent overtraining concerns have been recognized in the literature for over 75 years. (Herxheimer, 1930) and the existence of the condition 'overtraining syndrome' has been well documented in the recent literature (Mackinnon & Hooper, 1991; Fry, 1991; Krieder et al, 1998; Uusitalo, 2001).

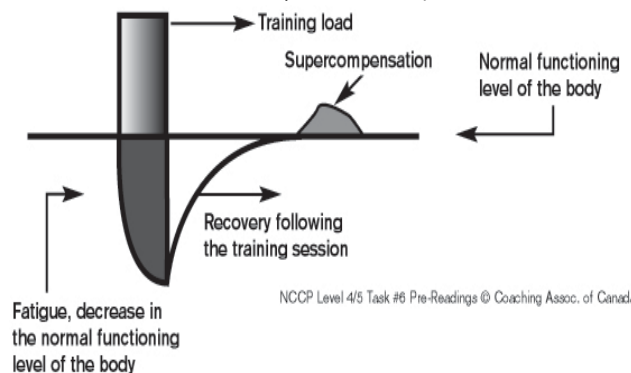
Overtraining, staleness, burnout, overtraining, overreaching and underrecovery are all terms bantered around when talking about problems associated with too much training and too little recovery. This can be confusing for the athlete. This series of articles will use overtraining and overtraining as synonymous terms for a condition in which an athlete suffers from a number of signs and symptoms which may include overuse injuries, chronic fatigue, mood disturbances and blood chemistry changes.

In general 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). Overtraining syndrome is a serious problem marked by decreased performance, increased fatigue, persistent muscle soreness, mood disturbances, and feeling 'burnt out' or 'stale' (Uusitalo, 2001). Recently, Olympians reported overtraining as a significant reason for their competitive difficulties (Gould et al., 2001).

## RECOGNIZING STRESSORS

The body responds to the stress of training and practice in a manner known as the General Adaptation Syndrome (Selye, 1974). This three stage response to stress includes; 1) alarm 2) resistance and 3) exhaustion. The first phase (alarm) is experienced when your body comes under new or more intense stress stimuli (e.g., training longer or harder, running farther, starting strength programs etc.). This shock or alarm phase may last several days or weeks depending on the amount of stress. Athletes may feel excessive soreness, stiffness and a temporary drop in their ability to perform.

Figure 1. Super Compensation. (with permission Coaching Association of Canada, 1995).



The second phase (resistance) is the phase whereby your body adapts to the new loads or increased stress stimuli and becomes stronger, allowing the athlete to return to normal functioning. The body can withstand and adapt to this type of stress for an extended period of time by making various physiological adaptations in the neurological, biochemical,

structural and mechanical systems that help to improve performance. This is often called super-compensation.

The body tolerates greater training loads and you can increase them by manipulating training variables like frequency, duration and intensity of activity. Beginning athletes can see large performance improvements with small training loads, but more elite athletes require larger loads to elicit even small performance improvements. Therefore these athletes need to ensure optimum recovery strategies are followed to minimize the potential for overtraining. Being aware of potential stressors that may be both internal and external and taking steps to minimize their impact on you can help prevent overtraining.

STRESSORS (ADAPTED AFTER PETERSEN, 2003)

Training and practice stressors

- Too much training or practice done too hard, too fast, too soon (main cause).
- Lack of recovery time.
- Too many tournaments.
- Training or playing while injured or ill.
- Returning from injury or illness too quickly.
  - Compensation from weak and damaged tissues that are unable to fully bear weight.
  - Potential increased damage to already vulnerable injured tissue.
  - Prolonged recovery time.

Travel and lifestyle stressors

- Unfamiliar or poor quality of food.
- Poor accommodation or living conditions.
- Irregular routine.
- Lack of sleep (quality and quantity).
- Jet lag and travel concerns.

Environmental stressors

- Constant competitive environment.
- Inadequate acclimatization to heat, cold, humidity or altitude.
- Lack of support from family and friends.
- Lack of adequate finances.
- Employment or scholastic concerns.
- Personal relationships.

Health stressors

- Illness or injury.
- Medication, alcohol and other substances.
- Cold and Flu, infections, allergies or other health concerns.
- Poor nutrition and/or hydration.
- Large fluctuations in body weight and composition.

RECOGNITION OF OVERSTRESS AND UNDERRECOVERY

Detecting underrecovery, overtraining and subsequent overtraining can be a big problem for athletes and coaches alike. This is because the underlying mechanisms and causes remain, for the most part, unknown. Coaches who know their athletes well have a distinct advantage in early detection of overtraining and can minimize the potential for overtraining and optimize performance. Reliable clinically proven tests for diagnosis have not been established, and the underlying mechanism for performance decreases is not known (Urhausen & Kinderman, 2002; Armstrong & VanHeest, 2002; Hawley & Schoene, 2003) or fully understood. The factors contributing to the increase or decrease of overtraining are complex and multifaceted and the response to overtraining appears to be highly individual with the signs and symptoms varying greatly from player to player. Thus a particular training schedule may improve the performance of one individual, be insufficient for another, and be damaging for a third (Raglin, 1993).

PHYSICAL AND PSYCHOLOGICAL SIGNS & SYMPTOMS

Overtraining remains more easily detected by decreases in physical performance and alterations in mood state than by changes in immune or physiological functions (Shephard & Shek, 1998). Subjective symptoms remain the most sensitive indicators of overtraining syndrome (Fry et al, 1991; Uusitalo, 2001; Urhausen & Kinderman, 2002; Marion, 1995; Armstrong & VanHeest, 2002). Symptoms can include persistent fatigue, muscle soreness, reduced coordination, weight loss, mood changes. Frequent illness may accompany performance decrements, but they may also be signs of underlying medical conditions (Hawley & Schoene, 2003). One of the best indicators of overtraining is how well the athlete is coping. A decrease in their general sense of well-being, pain in muscles upon rising, and poor quality of sleep appear to be linked with excessive fatigue, and could be signs that precede overtraining (Marion, 1995).

PHYSICAL	PSYCHOLOGICAL
Increased feeling of fatigue.	Decreased motivation to train.
Decrease in performance.	Decreased motivation to compete.
Increased muscle tension and tenderness.	Disturbed sleep or ability to relax.
Increased susceptibility to illness or injury.	Increased irritability.
Decreased appetite & weight.	Decline in feelings of self-worth.
Increased resting heart rate.	Uncontrollable emotions.
Increased blood pressure.	Increased anxiety or insecurity.
	Oversensitive about criticism.
	Listlessness or melancholy.

Table 1. Commonly agreed upon overtraining signs & symptoms (Shephard & Shek, 1998; Uusitalo, 2001; Urhausen & Kinderman, 2002; MacKinnon & Hooper, 1991; Kreider et al, 1998a; Kuipers & Keizer, 1988).

FATIGUE – UNDERRECOVERY – OVERTRAINING CONTINUUM

A certain amount of fatigue is necessary to develop the physical abilities or fitness factors of stamina, strength, speed, skill and power. Fatigue is usually a temporary condition which disappears within a few hours or few days if the athlete has access to adequate and appropriate recovery strategies including nutritional, physical, psychological and emotional support. If too much training is done too fast and too soon (before recovery has occurred) the fatigue level can remain and lead to a decrease in performance in the immediate, short or longer term. Under such conditions, the reaction of many athletes is to increase the volume and/or intensity of their training, thus establishing a vicious circle that only serves to aggravate the problem.

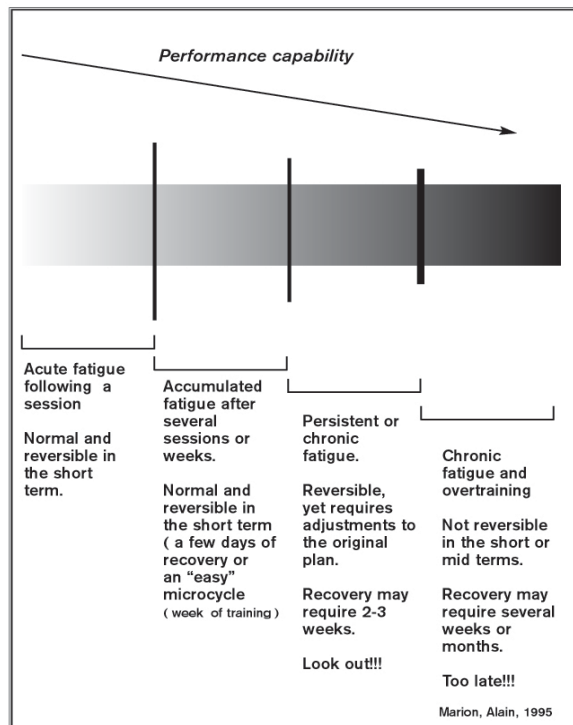


Figure 2. The Fatigue-Overtraining Continuum diagram (with permission Coaching Association of Canada).

PERIODIZING YOUR RECOVERY STRATEGIES

Ideally you should divide your yearly training plan into five phases as outlined below (Petersen, 2006). The recovery program may vary with the phase of training as the athlete needs to recover from the fatigue of whatever fitness characteristics are being developed in the short term and continue to practice applicable longer term recovery strategies.

Pre-competition

- 1 Phase A-‘Training for Training’
- 2 Phase B-‘Building the Base’
- 3 Phase C -‘Getting Specific’

In-competition

- 4 Phase D-‘Tournament Competition & Maintenance

Post-competition

- 5 Phase E-‘Rest & Recovery’

The yearly training plan must be treated as a flexible tool. The types of recovery strategies one uses will remain somewhat constant but the weighting of each may vary with the phase of training. For example during the in-competition phase more weighting may be put on psychological and emotional recovery strategies and recovery from travel.

During the post-competition phase and immediately pre-competition, one should familiarize themselves with the recovery menu and start self-monitoring. During phase A, Training for Training, pay particular attention to the physiological recovery that is needed to alleviate symptoms associated with heavy training loads. During phase B and C as the training gets more sport specific and one is doing more speed and power work, neurological or CNS recovery must be optimized- which will be covered later in editions of this series. Psychological and emotional recovery should be reinforced throughout the pre- competition training and recovery process.

During the in-competition- phase D- recovery strategies should be automated and built into the daily, weekly and multi-week training routine. Psychological and emotional recovery strategies that may involve others are important to be implemented during this time. It is important to provide adequate time for recovery when planning the training program. This should include at least one recovery day or rest day in the weekly microcycle, an easier week each three-four weeks in the longer-term macrocycle and rest periods (away from competition) of up to four to six weeks should be included in the yearly training cycle.

The following is a list of short term and longer-term recovery strategies that athletes can do for themselves or others can do for athletes to aid recovery. They have been developed with the help of current literature as well as from anecdotal evidence from athletes, coaches and sports medicine and science personnel. Ensuring that the short and long term ‘Rules of Recovery’ are implemented on a regular basis will help optimize recovery and prevent overtraining.

SHORT TERM RECOVERY STRATEGIES (DAILY)	LONG TERM RECOVERY STRATEGIES (WEEKLY AND MONTHLY)
Re-hydrate	Resynchronize
Re-fuel	Rest (active)
Re-align	Refresh with variety
Recovery work (within & post session)	Record & monitor
Regain and maintain muscle length	Retail therapy (shopping)
Re-set the balance clock	Re-balance your life
Re-connect the core	Reinvest in yourself
Release the soft tissue	Resist illness
Re-play & review your training or match	
Reinvigorate with recovery menu	
Relaxation	
Rest (passive)	

Table 2. Short and long term recovery strategies: What athletes do for themselves.

RECOVERY STRATEGIES
Reassess, re-evaluate and re-plan
Recognize & reassure
Role model & mentor

Table 3. What others can do for athletes.

CONCLUSION

Training for and playing tennis is both physically and mentally demanding and recovery sessions must be incorporated into sports specific training programs. There is little hard scientific research on overtraining and recovery and what has been done is somewhat unsystematic with overlapping terminology and varied study protocols. Never the less many practical solutions can be implemented. Proper recovery depends on many factors and individuals who know and understand this can selectively apply techniques on an individual basis to facilitate recovery and improve performance. The upcoming articles that will complete this series of papers- Rules of Recovery part 2, 3 and 4- will elaborate specifically on short and long term recovery strategies.

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