

# BURNOUT – The ‘Overtraining’ Syndrome in Swimming

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## Introduction

There are numerous terms associated with a state of poor or diminished sporting performance; ‘burnout’, staleness, chronic fatigue, overtraining, over-stress, and over-reaching are only a few. The term ‘burnout’ is perhaps the most global of these, indicating a general state of physical as well as mental stress. It’s important that coaches realise the implications of the stress-recovery-adaptation principle as it applies to sporting performance. ‘Stress’ is essential if adaptation is to occur, but stress comes from many sources (i.e. physiological, neuro-muscular, and psychological) and has an additive (or accumulative) affect. It’s only when the balance of stress-recovery is altered to the extent that ‘adaptation’ fails to occur that the total ‘stress’ becomes inappropriate. Therefore, the condition known as ‘burnout’ or ‘overtraining’ may actually be the result of inappropriate application of stress-recovery mechanisms.<sup>1</sup> It’s not simply a matter of ‘too much training’, but often ‘too much of one type (or an inappropriate type) of training’ or ‘too many accumulated stress factors’.

For several years the sport science literature has been replete with information on a condition commonly known as ‘overtraining’. The overtrained state is quite different to the day-to-day or short-term accumulation of fatigue that may depress an athlete’s performance until the stress-recovery-adaptation cycle is complete. Proper application of training techniques means that acute fatigue is part of a normal process. However, when fatigue becomes chronic, or long-term, and the athlete fails to respond to recovery methods a state of overtraining may exist. Various physical and psychological markers have been identified as typically associated with the overtrained state; these are summarised in the table below.

Early detection of the symptoms of chronic fatigue allows the coach to modify the training and recovery aspects of the program. However, because the symptoms of overtraining are so diverse there is no single measure that by itself signals the ‘point of no return’ in training stress. This is one good reason why the coach must know the individual training characteristics of each swimmer. Any two swimmers will respond differently to the same training stress. When a swimmer experiences a reduction of training performance lasting at least one week, in conjunction with general fatigue and other physiological / psychological markers, it’s time to take action.

There are three common triggers of overtraining that result from applications of the training program:

- Inadequate recovery between training sessions. Remember that ‘recovery’ in this sense means a reduction of the training load to a sub-

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<sup>1</sup> In this discussion the terms ‘burnout’ and ‘overtraining’ will refer to the same condition (i.e. long-term reduction of physical and mental capabilities associated with sporting performance).

maximal level that creates an acceptable level of stress, this is not always the same as passive rest.

- Excessive amounts of high intensity training. Continued (i.e. consecutive sessions) training at maximal, or high sub-maximal, training loads in volumes that may be beyond the swimmer's capability to absorb.
- Sharp increases in training loads (intensity, volume or both).

Physiological and Psychological Symptoms Indicating a State of Overtraining			
<u>Physiological</u>			
<u>During Rest</u>	<u>Submax Training</u>	<u>After Max Exercise</u>	<u>After Any Training</u>
increased heart rate reduced body weight reduced body fat increased blood pressure abnormal ECG T-wave pattern decreased lymphocyte count	increased O <sub>2</sub> uptake increased ventilation increased heart rate increased lactate production reduced muscle strength feeling of heaviness loss of appetite reduced iron stores	decreased performance depressed lactate production decreased max heart rate loss of muscle co-ordination gastrointestinal distress	general fatigue muscle tension chronic muscle soreness delayed return to resting HR increased incidence of infections slight nausea
<u>Psychological</u>			
insomnia and disturbed sleep patterns / anorexia / depression / chronic 'run-down' feeling / irritability / loss of motivation to train / general apathy / sensitivity to emotional stress / changes in personality / loss of concentration / feeling of low self-esteem			

As mentioned, all stressors interact to determine the overall level of stress. If an athlete is under psychological or emotional stress (this may come from outside the training program) there may be a distinct affect upon sporting performance.

Similarly, if there are injury or illness (past or present) factors, even modest training loads may be more than the individual can absorb. There are many strategies a coach can use to prevent, or reduce the risk, of illness and injury. Hygiene, diet, and sleep patterns are generally under one's control and can be monitored to help prevent illness. Most of the injury risk in swimming is associated with muscular overuse syndromes, or muscular / skeletal abnormalities and imbalance. Repeated application of poor swimming technique usually compounds any pre-existing problems. Two obvious strategies can be followed. First, the coach must always insist upon correct swimming technique. Second, the coach can assess each swimmer's musculo-skeletal function to identify those swimmers with a potential injury risk. The screening procedure involves an assessment of muscle strength, muscle balance, range of motion in the joints, and joint stability.

## Prevention Strategies

Most of the strategies available to the coach are relatively simple. The hard part is to know when to apply these techniques and how to apply them within the context of the overall training plan. The goal of any training program is to produce an increased athletic performance and naturally this requires increased demands upon the athlete. The human organism is amazing in its ability to absorb stress and to adapt, but it does have its limitations. These general strategies may help the coach to plan appropriate training programs:

- Individualise training programs as much as possible, in recognition of each swimmer's training/recovery ability.
- Maintain good communication with each athlete. This may be done by observation of the swimmer's behaviour, verbal communication, or through a training log.
- Increase training loads, both volume and intensity, in a progressive manner.
- Provide variety in the workouts to reduce the 'mental fatigue' factor.
- Plan blocks of training (i.e. periodisation) that allow for recovery as well as peak training stress.
- Involve athletes (this depends upon their training background and maturity) to some degree in the design of the training program.
- Provide transitions in training between seasons.
- Include activities or training sets that generate 'success' for each swimmer.
- Encourage good hygiene (i.e. never let swimmers share drink bottles) and nutrition (fluid and carbohydrate replenishment) practices.
- Include 'preparation / recovery / regeneration' techniques into the training program.

## Program Prescription

The best way to avoid 'overtraining' is to prescribe training loads that are both challenging and appropriate. To do this the coach must understand the relative stress produced by various types of training. The table below equates each type of training with the primary energy source, the stress impact (i.e. this is a simple low-moderate-high rating), a reference to race pace, and a rating of perceived exertion.<sup>2</sup> Training loads are planned to elicit an adaptation response. However, the performance requirements during swimming competition and the adaptation response in training are not simple and straightforward. Training adaptations require both short-term and long-term application of stress. Loads must be increased over time, adaptations must be sequenced for maximum effect, and all the while we must take care to stress the swimmer without exceeding his/her ability to absorb stress and recover sufficiently to accept additional stress.

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<sup>2</sup> The most common 'RPE' or 'rating of perceived exertion' scale is the Borg Scale (exercise ratings range from 6-20 on this scale); for simplicity a 1-10 rating system has been used in the above table.

As an example, let's look at key factors associated with energy production. How can the coach develop a training system that allows him/her to monitor and control the training stress? It would be scientifically precise to continuously monitor oxygen consumption and lactic acid accumulation during training, but this is simply not practical for most coaches. However, swimming velocity is another key marker that is generally associated with a relative energy contribution, and velocity is easily measured with a stopwatch. Heart rate also has a relationship to swimming, providing useful information about submaximal aerobic workloads. Together heart rate, oxygen consumption, and lactic acid accumulation are physiological factors that are 'felt' or interpreted by the individual as measures of effort or intensity of work.

Markers of Exercise Stress				
Heart-Rate bpm ↓ Max	Approx. % Max VO2	Lactic Acid Balance	Rating of Effort	Description of Perceived Effort
rest - 70	<b>below 30</b>	resting level	<b>1</b>	very light exertion ( <i>sub training level</i> )
70-50	<b>30-50</b>	resting level	<b>2</b>	easy warm-up ( <i>recovery &amp; preparation</i> )
50-40	<b>50-70</b>	removal rate increases	<b>3</b>	light to moderate work ( <i>basic training effects</i> )
40-30	<b>70-80</b>	both production & removal increase (balanced)	<b>4-5</b>	moderately hard ( <i>endurance effects</i> )
30-20	<b>80-90</b>	* both production & removal increase	<b>6-7</b>	hard ( <i>endurance &amp; speed</i> )
20-10	<b>90-95</b>	* production starts to exceed removal	<b>8</b>	very hard ( <i>high sub-max load</i> )
10-max	<b>above 95</b>	* production ex- ceeds removal	<b>9</b>	very, very hard ( <i>approaching max load</i> )
max	<b>100 +</b>	production ex- ceeds removal	<b>10</b>	exhausting

\* Swimmers with high aerobic capacity (i.e. endurance trained) will be able to remove lactic acid from the muscle more efficiently and maintain a more even balance of production and removal; increases in lactic acid accumulation will be slowed.

While 'perception' of effort is not a precise scientific measurement, it has been demonstrated in numerous research situations to be a reliable indicator of energy supply. Therefore, a coach can use a simple rating scale from 1 - 10 that identifies the effort required to swim at various intensities, with corresponding heart rates (i.e. in terms of beats per minute below a swimmer's individual maximum) to provide an estimate of training stress. The table (see above) shows the links between various physiological 'markers'. These can be used by the coach to help quantify training loads.

### Treatment of Overstress

The initial response of the coach should be to review the current training program and adjust the load. This may be done by reducing the volume or intensity of the training stress. A second response should involve a complete review of the athlete's training program and lifestyle (i.e. look for psychological stress as well as physical). Rest may be required, but rest does not mean total inactivity. Active recreation or a change in the training emphasis may be enough to stimulate recovery. Third, look for pathological or injury related reasons for the onset of overtraining. Consult with an expert to devise both short-term and long-term solutions. Once all the major factors have been considered and changes to the training program made, if the symptoms of overtraining persist then a complete break from the training routine may be necessary.

### Summary

Overtraining syndrome, or 'burnout' is a complex condition brought on by an excess of stress (physiological and psychological). No single early warning sign is applicable in all cases; therefore, the coach must continuously monitor the physical and psychological health of swimmers through a number of means. Professional assistance may be required to determine if illness, injury, or mental health are the primary causes of over-stress. The best defence against overtraining is to plan and implement a periodised training program that allows each athlete to adapt to a progressive training load.