

# **Overreaching and overtraining syndrome - causes, symptoms, diagnostics and prevention**

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## **Abstract**

The overtraining syndrome is a state of lowering the efficiency of the body resulting from the overlapping of many stressors and an inadequate rest period. This phenomenon is commonly observed among athletes. Unfortunately, there are no appropriate tools to diagnose and assess OTS, therefore, appropriate behaviours to prevent the occurrence of this phenomenon are extremely important.

## **Overreaching - what is it?**

Overreaching is a frequent occurrence in sport due to the systematic increase of loads in the training cycle.

Overreaching is the accumulation of training and out-of-train stress, resulting in a short-term reduction in the ability to perform tasks, with the occurrence of physiological and mental

symptoms of maladjustment; the return to the form and the period of regeneration can last from several days to a week.

In contrast, the overtraining syndrome is the accumulation of training and non-training stresses, resulting in a long-term reduction in the ability to perform tasks, with the occurrence of physiological and mental symptoms of maladjustment; the return to the form and the period of regeneration can last up to several weeks or months [1].

The overtraining syndrome is a complex condition characterized by a variable group of symptoms and pathophysiological abnormalities. In the overtraining syndrome there is always resistance to the regeneration system. It occurs in response to strength training with high intensity and imbalance between rest training in combination with other stressors occurring in private life [2].

### **Division of overreaching**

Player's overreaching is divided into different types. The European College of Sport Science introduced a division into:

- FO- functional overreaching,
- NFO- non-functional overreaching,
- STO- overtraining syndrome.

Functional overreaching is a desirable phenomenon in sport. It involves short-term reduction of the player's form and after proper rest the athlete's skills and performance increase.

Non-functional overreaching is an undesirable state, resulting from too large and unmatched training load. This causes a long-term decline in the athlete's form and is associated with negative psychological and neuroendocrine symptoms.

Overtraining syndrome is a state similar to NFO, but it lasts longer. Symptoms are more intense and affect more areas of the human body, for example, there may be symptoms also from the immune or neurological system.

### **Causes**

The reasons for overtraining are not specific and identical, it is the result of the overlap of many components.

Carl Foster believes that the overtraining syndrome is a common problem and mentions the two main causes of this state of affairs. First of all, it is obvious that increasing the training load results in improved performance of the athlete (up to a point). Athletes and trainers decide to

constantly increase the load in order to even slightly improve the form, because it determines the athlete's sports performance. Secondly, at the time of worse sports results, whether in training or already at competitions, the natural response of most athletes is to increase training load [2].

Romain Meeusen, Martine Duclos et al. say, that the main reason for overtraining is the lack of balance between the training and the rest period. They also exchange other probable reasons, such as training monotony, too many sports competitions, personal emotional problems and too much demand for themselves. Other less likely causes are: sleep problems, exercise heat stress [3].

Also Lehmann, Manfred, Foster and others emphasize the complexity of the problem of overtraining. According to them, the basic reason is the previously mentioned insufficient rest period, too high training loads and other stress factors unrelated to sport. These main causes affect specific systems causing subsequent changes that overlap and cause overtraining [4].

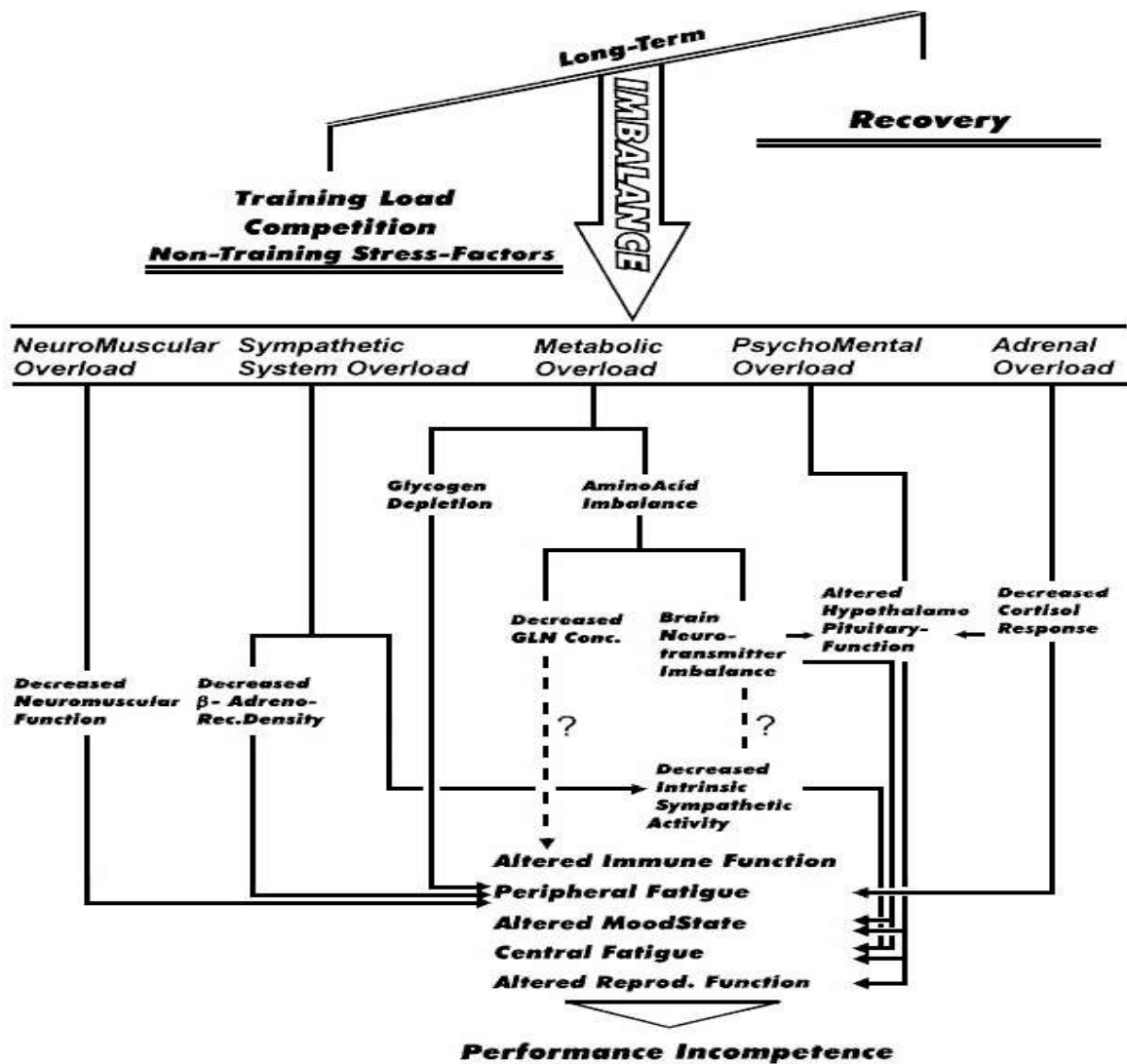


Figure 1. Schematic overview of the genesis of overtraining syndrome in endurance sports related to long-term high-volume overtraining, as far as known at present [4].

## **Symptoms**

Symptoms occurring during the overtraining syndrome are not the same for every person, it is an individual matter, and their intensity is also subject to individual changes.

The most common symptoms are: fatigue and performance decline [3]. The overtraining syndrome also affects the player's mental sphere, which may be manifested by malaise, sleep disorders, weight loss and a negative attitude to training [5].

Overtraining also induces metabolic changes in the form of: reduction of muscle glycogen stores, intensification of decay processes and inhibition of synthesis processes (so-called anabolic deficit). People with chronic fatigue syndrome also show increased sympathetic activity [6].

Other non-specific possible symptoms of overtraining include: pain in muscles and joints, greater susceptibility to injury [5,7]

## **OTS diagnosis and testing**

Unfortunately, diagnosing OTS is still problematic, due to inconsistent symptoms and the lack of appropriate tools. A possible diagnosis of OTS can be made only after excluding other factors that may cause symptoms indicating overtraining syndrome. Therefore, the overtraining syndrome can be diagnosed only if there are no other reasons to justify this condition. It is therefore necessary to exclude organic diseases such as, for example, endocrine disorders, iron deficiency and infectious diseases as well as other abnormalities or nutritional behaviours (anorexia, bulimia) [7,3].

Diagnosing the overtraining syndrome forces scientists to set specific diagnostic criteria. A reliable OTS index should be sensitive to training load and cannot be dependent on other factors (eg nutrition). It should allow to distinguish changes in the body occurring as a result of acute effort from chronic modification. In addition, this indicator should be easy to make, repeatable and cheap. Unfortunately, none of the currently proposed indicators meets all the criteria [5,7]. Currently, scientists propose several possibilities to assess the OTS, but these are only theories:

- assessment based on measuring the concentration of selected hormones,
- assessment based on measuring certain physiological parameters,
- fitness tests,

- mood tests,
- assessment based on the examination of the immune system [7].

## **Prevention**

As in any disease prevention is better than cure, especially in this case, because it is difficult to see and diagnose the first symptoms of the overtraining syndrome. Due to the fact that the main and most likely cause of OTS is the inadequate balance between training and rest, special attention should be paid to the quality and time of regeneration. It is also extremely important to individualize training, constant monitoring of the player's response to stress and periodic performance assessment. Not without significance is also a well-balanced diet, hygienic lifestyle and hydration of the body [5]. The prevention of OTS also includes the control of the appropriate amount and quality of sleep, keeping records by the athlete regarding daily training, avoiding monotony at workouts, minimizing personal stress, and suspending or reducing the intensity of workouts during infection [3]. Also, the psychological side of the OTS must not be forgotten, cyclic tests are needed to assess the mental and emotional state of the player and to provide him with psychological comfort.

## **Summary**

The overtraining team, despite the efforts of scientists and newer theories about the mechanism of formation, is still not fully understood. In addition, the fact that there is still no standardized OTS assessment tool, as well as its very individual course, contributes to this. The overtraining syndrome results in long-lasting and serious consequences, so you should pay a lot of attention to the prevention, as well as a continuous deeper understanding of this issue.

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