

## Classifications

If overtraining occurs, there is not sufficient recovery time between workouts; progress is hampered. An exerciser or athlete may be slightly overtrained and make progress, just not as much as if they were not overtrained.

Acute- Muscle worked to exhaustion, traumatic injury, body exhausted after bout of exercise, depleted, sympathetic response increased, increased cortisol levels.

Chronic – muscle become weaker less full looking, depleted over time, parasympathetic response, increase cortisol levels.

Signs of overtraining

Sympathetic – Increased heart rate, increased resting blood pressure, decreased maximal power output, decreased performance

Parasympathetic – decreased resting heart rate, faster return of heart rate to resting value after exercise, decreased performance, decreased blood lactate concentrations during exercise, unemotional behavior

*Stone, M.H., Keith, R.E., Kearney, J.T., Fleck, S.J., Wilson, G.D. and Triplett, N.T. Overtraining: A Review of the Signs, Symptoms and Possible Causes. The Journal of Applied Sports Science Research 5:35-50, 1991.*

## Monitoring Example

Take your pulse upon wakening before getting out of bed for several days to establish a baseline. Have a easy or short workout if your morning heart rate is greater than 5% of your baseline. Take the day off of training if your morning heart rate is greater than 10% above baseline.

## Prevalence in Athletes

10-20% of athletes who train intensely experience overtraining which results in chronic decreases in performance and impaired ability to train.

*Raglin J, Barzdukas (1999). Overtraining in athletes: The challenge of prevention. ACSM. Health Fitness J. 3:27-31.*

## Overreaching & Tapering

Overreaching is characterized by a sharp increase in training volume. Overreaching is thought to be an early stage of overtraining which can result in increased fatigue and performance decrements. However, an increase in performance above baseline can occur, if an overreaching phase of approximately 1 week is followed by an immediate return to normal training. A taper following normal training can result in additional performance increases.

*Stone MH, Pierce KC, Sands WA, Stone ME (2006). Weightlifting: Program Design. Strength and Conditioning Journal, 28 (2), 10-17.*

## Hormonal Fluctuation Model

A higher testosterone to cortisol ratio correlates with increases of maximal strength performance

*Hakkinen KA, Pskarinen A, Alen M, Kauhanen H, Komi PV (1987). Relationships between training volume, physical performance capacity, and serum hormone concentrations during prolonged training in elite weight lifters. International Journal of Sports Medicine, 8 (suppl): 61-65.*

30% drop in [Testosterone/Cortisol](#) Ratio is proposed to be too extreme for effective recovery of performance after training

Changes of less than 10% in Testosterone/Cortisol Ratio is proposed to be too small and lead to lesser performance improvements

## Glutamine/Glutamate Ratio and Overtraining

GN/GT ratio >5.88 = Normal

GN/GT ratio >3.58 <5.88 = Adaptation

GN/GT ratio <3.58 for <2 weeks = Over Reaching

GN/GT ratio <3.58 for >2 weeks = Over Training

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## Intervention

Period of recovery

Injury

Administer [first aid](#)

Diagnosis (Physician)

Implement [Rehabilitation](#) (Physical Therapist)

Lack of progress or other overtraining symptom

Plan recovery days

Resume Training

Determine cause of overtraining

*too much, too fast, too soon*

Weight training example

[Split Program Design Flaws](#)

Cardio example

[Frequency and Duration on Running: Incidence of Injury](#)

See [Causes of Injury](#)

Also examine contributors of overtraining occurring outside of training

Change program accordingly

Reassess and readjust program indefinitely

Some authorities mistakenly misattribute injury to a specific movement when, in fact, other factors such as overtraining were to blame. See [Over Generalizations](#) and [Adaptation Criteria](#).