Exercise Recovery

"...you must train very hard to make progress: however, you must be able to recover from your workouts." Jim Schmitz U.S. Olympic Weightlifting Coach 1980, 1988, 1992

OVERREACHING vs. OVERTRAINING

Overreaching is a term used to describe temporary overtraining, which can require 2 days to 2 weeks of recovery time and true **overtraining**, which can require weeks to months of recovery time. "Overreaching occurs when full recovery is not achieved for an extended time period and fatigue builds up. This usually occurs slowly over the course of a month or two, but it can happen much quicker in the face of a dramatic increase in training volume and/ or intensity. Symptoms associated with overreaching are similar to fatigue, only more severe. Those of you who have overreached may also notice an increased resting heart rate, premature fatigue during training, decrease in work capacity, increased heart rate during submax loads and an increased thirst, especially at night."

"If you do overreach and do not allow for a period or two of lower intensity levels the fatigue will continue to accumulate and your body will force you to take a rest by becoming injured or over trained. True overtraining takes several months to set in but once it does you will have to dramatically decrease your workload anywhere from several weeks to several months in order to fully restore all bodily systems. During this period it is very difficult to even maintain current fitness levels, much less improve them, and a decrease is usually expected. This is why true overtraining is to be avoided at all costs."

Warning Signs of Overtraining

- Mild leg soreness, general body ache
- Pain in muscles & joints
- Washed-out feeling, tired, drained, lack of energy
- Sudden drop in ability to run 'normal' distance or times
- Insomnia
- Headaches
- Inability to relax, twitchy, fidgety
- Insatiable thirst, dehydration
- Lowered resistance to common illnesses; colds, sore throat, etc.

FATIGUE

- Dehydration: a 3% loss of body weight in water can result in performance losses from 20-30%. Greater that a 5-6% loss can be a medical emergency. Weigh yourself before and after workouts to determine how much fluid you have lost.
- Overheating: at a body temperature of 101 - 104 F you may experience muscle weakness and fatigue; at 104-105 F disorientation, severe muscle weakness and loss of balance; above 105 F diminished sweating and loss of consciousness.
- Depletion of muscle fuels: during intense short- term exercise, fatigue can result from depletion of muscle glycogen, since glucose is the only fuel source used to generate energy during anaerobic activity (ten seconds to several minutes of intense activity). Glycogen depletion can cause fatigue during long-term exercise and can be combated with proper carbohydrate loading.
- Low blood glucose: consuming up to 80 grams of carbohydrate per hour can keep maintain glucose levels during long term exercise. This is critical to proper central nervous system function and can delay fatigue by 30 to 60 minutes.
- Increased lactic acid levels: as exercise intensity is increased lactic acid can build up in the muscles. This will eventually cause you to reach your lactate threshold- the point at which the level of lactic acid in your blood is greater than your body can metabolize.
- Central fatigue: this results from impaired function of the central nervous system and effects performance. "Research suggests that regular supplementation with branced-chain amino acids can prevent or forestall central fatigue by preventing tryptophan from entering the brain."

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MUSCLE SORENESS

- Mechanical damage: Years ago it was thought that muscle soreness was caused by lactic acid. We now know that this is not the case. Lactic acid is removed from the muscle in a matter of minutes. Although we're not 100% sure, most experts now agree that muscle soreness is caused by damage (microtrauma) to the muscle fibres themselves.

  "When you strain your muscles, you produce localized damage such as microscopic tears to muscle fibre membranes and protein filaments. Over the twenty-four hours following strenuous exercise, the damaged muscles become swollen and sore. In addition, there is increased blood flow to the muscles, which causes the muscle tissues to swell. Muscle nerves perceive this abnormal state and send pain messages to your brain as soon as you try to move the morning after overexertion." "As we grow older, our muscles and their surrounding tissues lose elasticity, so we feel soreness and tightness more quickly than we did in high school."

  Specifically, it thought that the portion of the muscle cell called the sarcoplasmic reticulum (which stores calcium until it is needed for muscular contraction) tears and leaks calcium into the surrounding area of the muscle. This leads to a degree of inflammation within the muscle causing swelling and tenderness.
- Free radical damage: exercise causes free radical damage. A free radical is an atom or a group of atoms that is short one electron and is highly unstable. In order to restabilise, the atom will seek out and steel another electron from another part of the cell. Free radicals can also be called oxidants because oxygen is usually the atom that loses an electron. Anti-oxidants are vitamins (C and E) and vitamin-like nutrients (OPC) that neutralize free radicals.
- Cortisol is a hormone that is released by the adrenal glands in response to all kinds of stress, including exercise. The primary role of cortisol is to help mobilize energy for the body by increasing protein breakdown. Cortisol also "impedes the entry of amino acids into muscle cells for protein synthesis, and instead helps to transport them to the liver to be used for energy. This is why individuals involved in strength training may experience a decrease in muscle mass if they do not take the necessary steps to reduce the release of cortisol and to rebuild muscle protein."

From Burke, Edmund. *Optimal Muscle Recovery* (Garden City Park, NY: Avery Publishing Group, 1999).

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