

Sports Training Principles

To improve performance in sport or fitness!!

Aims:

To provide a background of information in the theory and application of sports training as applied to competitive sports and when and how they are used and abused.

Learning Outcomes:

To have an understanding of the three principles of specificity, overload and reversibility as key concepts in training. How a training year is broken down; how as an osteopath you have an input, how this relates to a rehabilitation program.

Questions:

What do I already know about sports training?
What's the relevance of learning about how people train?
What new skills will I develop as a result of understanding about sports training?



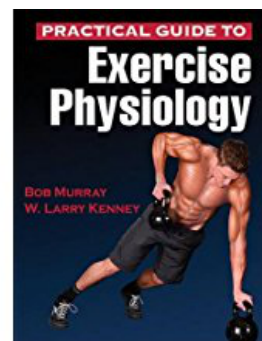
Important Point!

There are many ways people train for sports. What is presented are just examples, it's the principles of training you need to understand.

Remember!

There is a lot of information being presented here, some of which will confuse you and is here for completeness rather than for you to know in great detail. But, by understanding the key concepts you will be able to apply them into constructing a rehabilitation program for an injury.

Recommended reading.



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For conditioning for competitive sports:

For each sport participated at a competitive level a training program should be followed. This involves conditioning the body and mind to attain a certain level of performance. This varies from sport to sport and changes with maturity. More recently more science has gone into training differences between the genders and especially for women during menstruation.

A training program can usually be applied to a year long cycle. This year is broken down into sections; from these we get subsections and again these too are subdivided until we have individual training units.

It's the understanding of these training units throughout a week that Osteopaths can play a major role in injury prevention and recovery.

Intensity: The percentage of maximum effort of an exercise.

Power is work per unit of time, or force times the velocity of movement. Power output and thus intensity is dependent upon the load and speed of movement. This has a large effect on what energy system is used. Intensity must reach a certain threshold level before adaptation results.

Volume: The actual amount of work done over a set time.

Training for health and fitness can be very different.



⇨ *Expand on this in your own time!*



Key Concept!

⇨ *Expand on this in your own time!*

Training Program



As the volume goes down the intensity goes up and vice versa.

Key Concept!

The overall objective is to improve one's performance.

With the more mature sports person it is to slow down the rate of decline!



In reality the percentage of improvement can be very small, in some cases for elite athletes it's less than 1%, for growing developing teenagers it could be 10%.

Breakdown of the training year.

↔[Link to rehabilitation!](#)

The first breakdown of the year plan is into sections called - [Macrocycles](#).

These are from 1 to 3 months long and have specific objectives.

Macrocycle	Objectives
Phase 1 Introductory Month	Basic fitness, get body use to training again, no major outcomes.
Phase 2 General Training	Train for fitness, train whole body, basic all round training to establish a good level of aerobic fitness and a certain minimal status in the foundation of fitness for the specific sport. Prepare for phase 3.
Phase 3 Specific Training	Specific training of sport to perfect the individual components of sports techniques and specific fitness. Prepare for phase 4.
Phase 4 Pre-Competition	Specific pre-competition training, establish solid technique, incorporate competition psychology. Prepare for phase 5.
Phase 5 Competition	Technique improved, work on maintaining specific fitness, adjust training for specific competitions. Reach year Goals.
Phase 6 Recovery	Allow regeneration of body from high demands placed upon it, have some relaxing fun, set next year's Goals.



The overall objective is to bring about an overall improvement in performance. Each **Macrocycle** is divided into smaller periods of training called **Mesocycles**, which are periods of 2 to 6 weeks. Each mesocycle will also have a training objective, i.e. to improve maximum strength in power lifts. The sum total of all the mesocycles within a macrocycle should meet the objectives of that macrocycle.

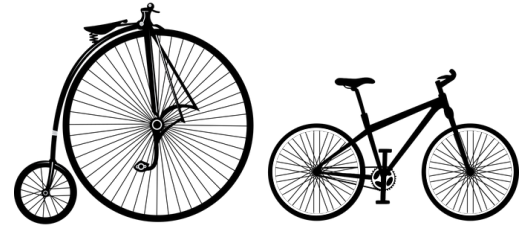
The mesocycle is subdivided into **Microcycles** which last for 1 to 2 weeks. These are broken down into **training sessions** and these are also divided into **training units**. There can be 2 to 4 units within a session.

As osteopaths we can come in at the microcycle stage of interpretation of a training program to assess how training units and training sessions are put together. It is these combinations that often lead to injury.

The microcycle can thus have 12 training sessions within it and thus possibly 40 training units within it.

The training unit has some basic objectives, they come in the form of speed, strength work, flexibility, technique, endurance, a combination of these such as speed endurance and there are three others often neglected by coaches!

Know the definitions of these!



Macrocycle:

Mesocycle:

Microcycle:

Training sessions:

Training units:

DESTRESS

Key Concept!

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Hans Selye (1907–1982): Founder of the stress theory

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5915631/>

The training units – the basics:

Within each unit it is important to know the demands placed on the body and how much energy and which type has been used.

Sufficient time is needed by the body to recover from certain activities within the unit according to the volume and intensity.

Recovery can be accelerated if units of active recovery are introduced into the microcycle.

As a rule a high intensity stimulus needs more recovery and these should not be successive.

When training units with varying objectives and demands follow each other it may not be necessary to await complete recovery.

Demands of speed, elastic and maximum strength should be carried out on days of optimal capacity and never follow days of high demand especially if this involves lactic-anaerobic endurance training.

Example of a Training Session

Think/Lookup.....

Warm up and mobility (flexibility)

Neuromuscular work (technique, speed, strength)

Energy system work (all endurance, speed, strength)

Aerobic warmdown (relaxation of body, recovery)

10 minutes jogging followed by 20 minutes general stretching

Weights – Power cleans 5 sets 4 reps 85%

High Intensity so Low Volume

Bench Press 5 sets 4 reps 85%

Squats 5 sets 6 reps 85%

Endurance – Static cycling 25 minutes low intensity

Low Intensity so High Volume

Warm down – 20 minutes relaxed stretching and sauna

Effects of training:

⇨ Expand on this in your own time!

The Immediate Effect: The effect of training on the body during the application of the stimulus. Associated factors are biochemistry of energy production, mobilization of those aspects of physiology which allow the body to support the activity, regulation of the neuromuscular control of movement.

The Residual Effect: After the stimulus is removed; the body operates to bring about recovery from the immediate effect, a heightened metabolic rate to repair damage and to restore the status quo but also to allow for overcompensation.

The Cumulative Effect: Successive residual effects are built upon so that over a period of time (mesocycle) a greater stimulus is required to take the body to its full capacity.

Adaptation to Loading:

This is the raising of an athlete's functioning capacity due to the external loadings to specific environmental conditions. These are psychological adaptations as well as physical.

Three Principles:

Key Concepts!

Overload

Specificity

Reversibility

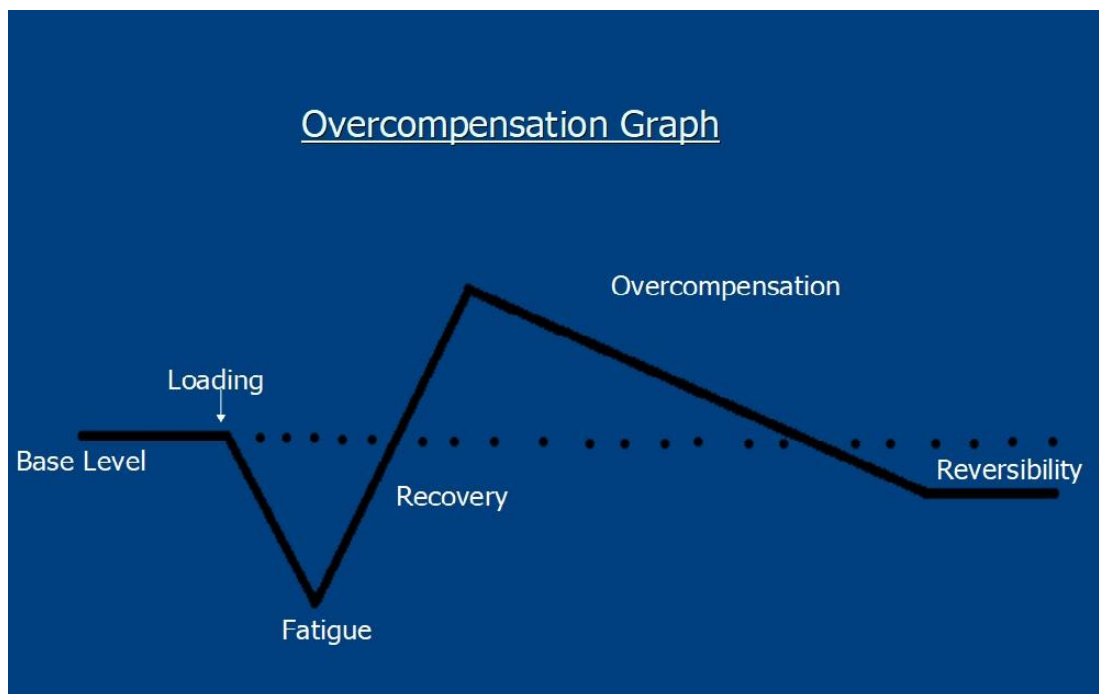
Overload:

↪ Link to rehabilitation!

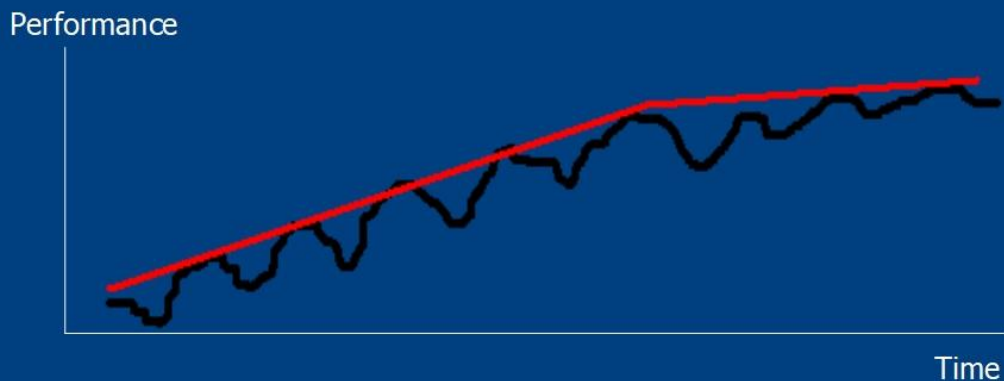
A specific exercise overload must be applied to enhance physiological improvement effectively and to bring about a training change. By exercising at a level above the normal capacity, a variety of training adaptations enable the body to function more efficiently.

The appropriate overload for each person can be achieved by manipulating combinations of training frequency, intensity, mode and duration.

This concept of individualized and progressive overload applies to the sports person, the sedentary person, the disabled and the cardiac patient.



Progressive Overloading



Specificity:

⇨ *Link to rehabilitation!*

When applied to training, specificity refers to adaptations in the metabolic and physiologic systems depending on the type of overload imposed.

It is known that a specific exercise stress such as strength-power training induces strength-power adaptations, and that specific aerobic or cardiovascular exercises elicit specific endurance training adaptations with essentially no interchange between strength and endurance.

This implies that aerobic fitness for swimming, cycling, running or skiing is most effectively achieved when training involves the specific muscles involved in the desired performance.

Reversibility:

↪ [Link to rehabilitation!](#)

Detraining occurs rapidly when a person stops exercising.

After only 1 or 2 weeks of complete rest from training, significant reductions in both metabolic and working capacity can be measured, and many of the training improvements are lost within weeks.

Even among highly trained athletes the beneficial effects of exercise are transient and reversible. Hence reconditioning needs to be started months prior to competition.

There should also be maintenance of training in specific conditioning needs to slow down the rate of reversibility.

Many ex-top sports persons are in poorer condition physically several years after active participation than the businessman who exercises on a regular basis.

Key Points:

The more the amounts of loading approach an optimal value relative to an athlete's maximum at the moment of loading, the more rapidly adaptation takes place.

If demands exceed the athlete's maximum, or the structure of loading is wrong, then there is no capacity for adjustment and performance is reduced. **Risk of injury.**

The relationship between loading and recovery is critical and this should be viewed as a whole.

Overcompensation is quickly achieved in young and developing athletes (weeks), it takes months in mature athletes (look at the cumulative effects of training of a mesocycle rather than a microcycle).

Loading must be systematically and progressively increased.

