PART 3
Methods to Improve Exercise Performance

Chapter 10
Training For Sport and Performance

Fitness and Training

Training - the organized sequence of exercise that stimulates adaptations in anatomy and physiology. These adaptations are termed training adaptations, or chronic adaptations.

Fitness - a general term that actually contains many components:
- cardiorespiratory endurance
- muscular endurance
- muscular strength
- muscular power
- flexibility
- body composition
- emotional/psychological qualities

Principles of Training

Specificity
Training should be based on the specific demands/needs of the sport/event. The better one can understand these demands/needs, the more likely one can develop a suitable training program.

Research Findings

VO_{2} max
- VO_{2} max is largest in the trained exercise mode for well-trained individuals
- There is partial transfer in VO_{2} max improvement between run and cycle training

Lactate Threshold
- For well trained individuals, the LT and VT are more sensitive indices of training improvement than VO_{2} max
- There is partial transfer in LT improvement between run and cycle training

Intense Exercise and Weight Lifting
- long distance running decreases muscle power
- Research of training using isokinetic muscle contractions indicates that the velocity of contraction is an important component of training specificity
- Little is known of how to time strength/power and endurance training so that the benefits of each are maximized

Cross Training
- Defined as training in different modes of exercise
- When used correctly, cross training can improve the quality of training by - a stimulus for adaptation, maintaining muscle power, and preventing injuries
Overload and Overtraining

**Overload** is a principle based on the need to train above a stimulus threshold for the development of chronic training adaptations.

**Overtraining** is a condition that occurs when an athlete has trained too hard or for durations that are too long to allow full recovery. A decrease in performance remains the most sensitive gauge of overtraining.

The nature of the overload stimulus depends on:
- Exercise intensity
- Recovery duration
- Exercise duration
- Type of exercise
- Frequency of exercise sessions
- Initial level of fitness

Additional symptoms of overtraining:
- ↑ Resting heart rate
- ↓ Body weight
- ↓ Appetite
- Muscle soreness that is retained > 24 hrs
- Worse running economy and ↑ submaximal HR
- ↑ Incidence of illness (colds, flu, etc.)
- ↑ Constipation or diarrhea
- ↓ Performance
- Lack of desire to train or compete

The Taper

Involves a period of reduced training (days to several weeks) prior to athletic competition. Research shows that a correct taper:
- does not ↓ VO₂ max
- ↑ muscle power
- ↑ performance

Reversibility and Detraining can occur if the training stimulus is completely removed. Bed rest can ↓ VO₂ max by 27% in 20 days.

Retraining concerns whether previously trained individuals have a more rapid rate of adaptation after a return to training. **This concept is not supported by research.**

Methods of Training

Cadiorespiratory and Muscular Endurance
- Continuous
- Interval
- Fartlek

Muscular Strength and Hypertrophy
- Repetitions, Sets, Recovery
- Circuit Training
- Eccentric Loading
- Periodization
- Plyometric Training
- Pyramid System
- Super Set System