


Training for Performance



Overview

- 5 Components of Fitness
 - F.I.T.T Principle
 - Overtraining
- 

What is physical fitness?

“Fitness is an essential component of Marine Corps Combat readiness.”


-MCO P6100.13



Fitness = Combat Readiness



5 Components of Fitness

- Body Composition
 - Cardiovascular Fitness
 - Muscular Strength
 - Muscular Endurance
 - Flexibility
- 

Body Composition

- Definition: Percent of body fat plus lean body weight
 - The composition or “make-up” of the body

Body Composition

Increase Body Composition or “obesity” puts a person at risk for:

- Heart Disease
- Diabetes
- Hypertension
- High Cholesterol
- Some Cancers

Body Composition

- Circumference method (2 testers/3 tests (average of 6 tests))

Single point, adjusted by age

<u>Age</u>	<u>Body Fat (M/F)</u>
17-26	18/26%
27-39	19/27%
40-45	20/28%
46+	21/29%

≤ BC standard (Evaluated for Military Appearance Program)

> BC standard (BCP)

Cardiorespiratory Fitness



What is it?

- Large muscle groups, rhythmic nature, continuous
- Running, swimming, cycling, rowing, skiing, group fitness, etc.
- Target HR ~60%-90% HR_{max}

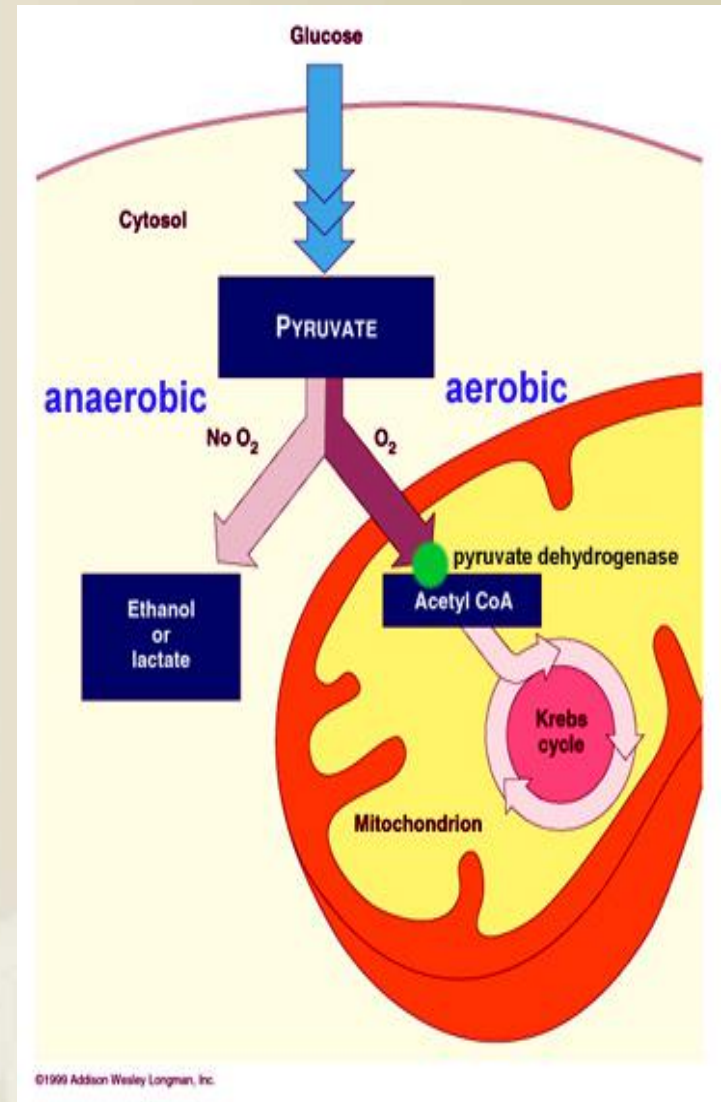
Cardiorespiratory Fitness

- Word break-down
 - “cardio” = heart
 - “respiratory” = process of obtaining O_2 and expelling CO_2 and other waste
- The efficiency in which the heart and lungs can provide adequate amounts of oxygen to the working muscles over long periods of time.

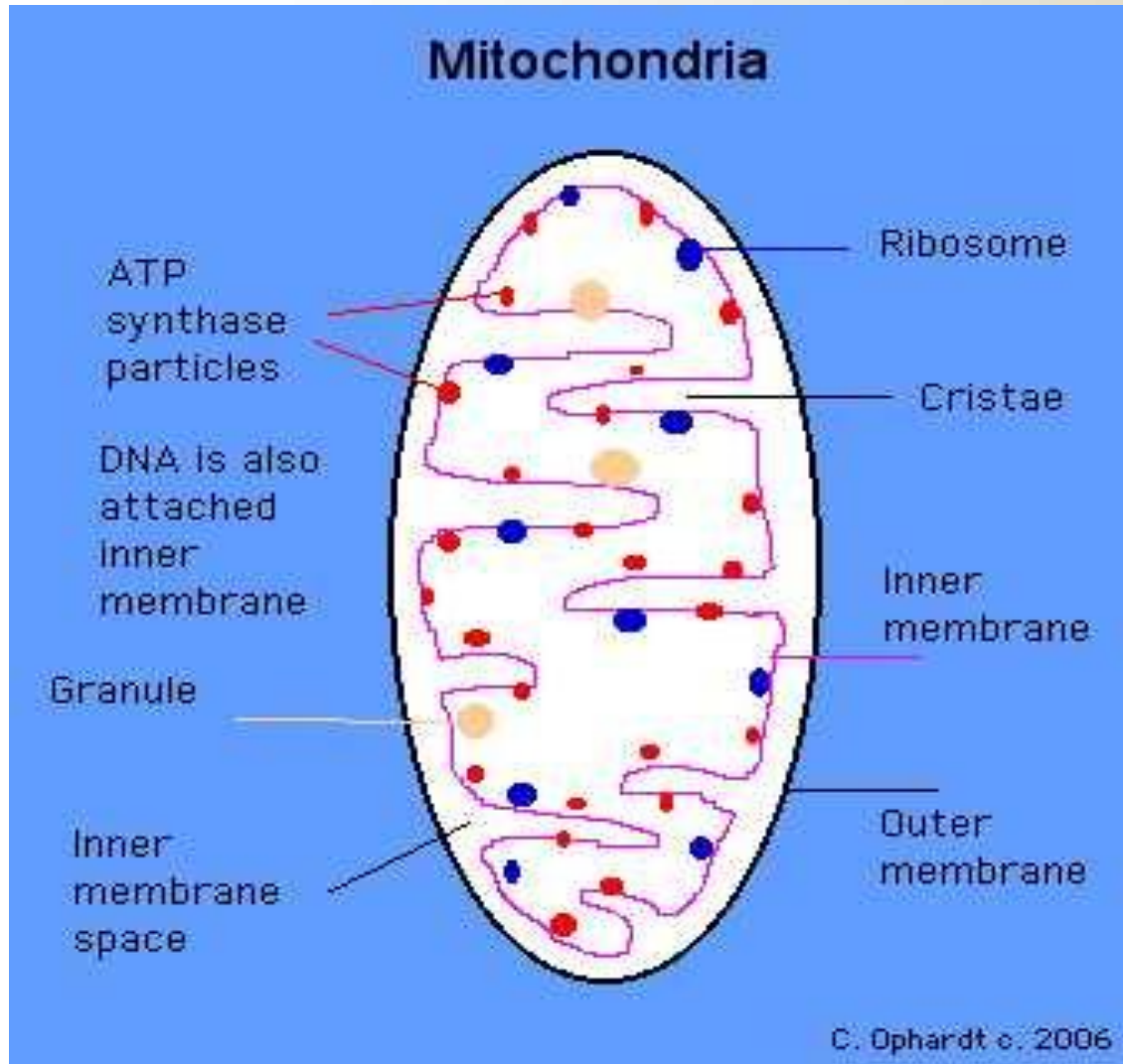


Energy Systems

- ATP-PCr System
 - Anaerobic system
 - 0-10 seconds
 - Initial action
- Glycolytic System
 - Anaerobic system
 - Activity up to 2 minutes
 - Moving someone out of harms way
- Oxidative System
 - Aerobic System
 - Activity lasting more than 2 minutes
 - Long hike



Energy Systems



- Mitochondria are the energy factories of the cells
- They contain the enzymes required for the citric-acid cycle, ATP synthesis, and the oxidation of fatty acids

ATP-PCr System

- Fuel used is stored ATP (1-3sec) and stored PCr (3-5sec)
- Muscle stores little of both
- Used in high intensity short duration activities less than 10 seconds
- Shot putt, vertical jump, first few seconds of a sprint

Glycolytic System

- Fuels used is glycogen (muscle glucose store). Process is called glycolysis.
- Muscle glycogen - 2 lactic acid+3ATP
- Lactic acid is a by product and causes fatigue
- High intensity short duration maximal activities up to 2 minutes
- 400 meter run

Oxidative System

- Fuels used are fatty acids, blood glucose and muscle glycogen
- Depletion of muscle glycogen will cause fatigue
- Long duration less intense activities longer than 2 minutes
- Sub max running and cycling

Testing & Energy Systems

- PFT
 - 3 mile run Oxidative System-Cardiovascular
 - Crunches Glycolytic System
 - Pull-Ups/Flexed Arm Glycolytic System
- CFT
 - 880 run Glycolytic System-Speed
 - Ammo Lift Glycolytic System-Power
 - Mane.Under Fire ATP-PCr & Glycolytic
 - Agility, Speed, Power, Strength

Energy Systems Summary

	Aerobic	Anaerobic Glycolysis	Anaerobic ATP/PCr
Fuel	Carbohydrates (glucose/glycogen) Fatty acids	Carbohydrates Glucose/glycogen	Stored ATP and PCr
Duration	Sub-max activities Lasting >2 minutes	High intensity Activities 1-2 minutes	High intensity Activities 1-10 seconds
Example Activities	Running; 1.5, 3, 10, 26 miles, swimming, cycling	800, 400 sprint 200 meter swim Skiing	50-100m sprint Explosive movements

Muscular Fitness: Strength and Endurance



Muscular Fitness

What is it?

Muscular Strength

- Maximal force that can be generated by a muscle group
- Muscle force determined by amount of Type I, IIa, IIb muscle fibers
- Each Muscle Fiber has a purpose in the body

Muscular Endurance

- Ability of a muscle group to execute repeated contractions or isometric contraction for time

Muscle Fiber Types

- Slow Twitch (Type I)
 - Slow Oxidative (SO)
- Fast Twitch (Type II)
 - Type II a
 - Fast Oxidative Glycolytic (FOG)
 - Type II b
 - Slow Oxidative (SO)

Strength Losses

- Long periods of rest between training sessions can lead to large losses in muscle strength
- The amount of strength lost depends on the muscle and length of the period of inactivity
- To maintain strength a lighter routine is recommended to keep the strength gained

Endurance Losses

- Noticeable decreases in performance can occur quickly:
 - Decrease in performance after 2 weeks
 - 4 to 8 weeks the body becomes completely detrained
- To avoid detraining decrease frequency of running to $\frac{1}{3}$ of normal routine, or decrease the amount of time you run by $\frac{1}{3}$ to $\frac{2}{3}$

Flexibility

What is it?

- Ability to move a joint through its complete range of motion
- Important for athletic performance and Activities of Daily Living
- Joint Specific



F.I.T.T. Principles



The F.I.T.T. Principles

- Frequency (how often)
- Intensity (how hard)
- Time (duration)
- Type (method)

- *Progression (the next step in improvement)*

F.I.T.T. Principle for Cardio

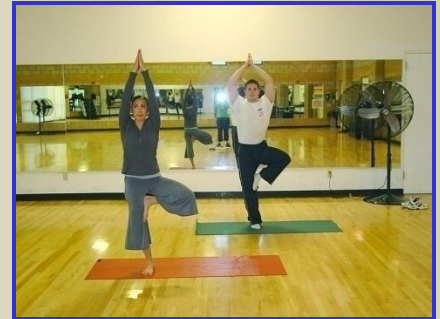
- Frequency
 - Improvement – 4-5 aerobic workouts/week
 - Maintaining – 3 aerobic workouts/week
- Intensity
 - 55-90% Max Heart Rate
- Time
 - 20-60 minutes
- Type
 - Skiing, Jogging, Biking, Swimming, Running

F.I.T.T. for Strength Training

- Frequency
 - 3 x week - for most gains
 - 2 x week - offers 90% of benefits of 3 x week
- Intensity
 - Basic fitness
 - 1 set 8-12 reps
 - Endurance
 - 12-15 reps, light weight
 - Strength
 - 4-8 reps, heavy weight
- One exercise for each major muscle group

F.I.T.T. for Flexibility Training

- Frequency
 - Minimum of 2-3 days per week
- Intensity
 - To a position of mild discomfort
- Duration
 - Hold for 10-30 seconds
- Progression
 - To achieve a full functional range of motion in all major muscle groups



F.I.T.T. Program Progression

Rules of Progression

1. Frequency
 2. Time / Type
 3. Intensity
- Only progress one F.I.T.T. principle at one time
 - Watch for appropriateness of progression

Conditioning Principles

- Specificity
- Overload
- Progression
- Individuality
- Recovery



Specificity

- Specific to the exercise done and the muscles involved
 - The training program must be relevant to the demands of the event for which the athlete is being trained
 - Includes energy systems and movement patterns

Overload

- Increasing the resistance to movement, or the frequency or duration of activity, to levels above those normally experienced

Progression

- Increase load to improve
 - Reps
 - Sets
 - Frequency
 - Weight
- Never increase more than one element at a time
- 10% rule

Individuality


- Because everyone is different, each person's response to exercise will vary

Recovery

- Providing the time and environment for the body to adapt to the demands that have been placed upon it

Periodization

The process of varying a training program at regular time intervals to bring about optimal gains in physical performance, while reducing the risk of overtraining.



Periodization Cycles

- Microcycle
 - Daily and weekly variation in volume, intensity and exercise selection
- Mesocycle
 - Major training phase within a year that lasts between 4 weeks to 3 months
 - Collection of microcycles
 - Where variation in volume and intensity occur
- Macrocycle
 - An entire training year

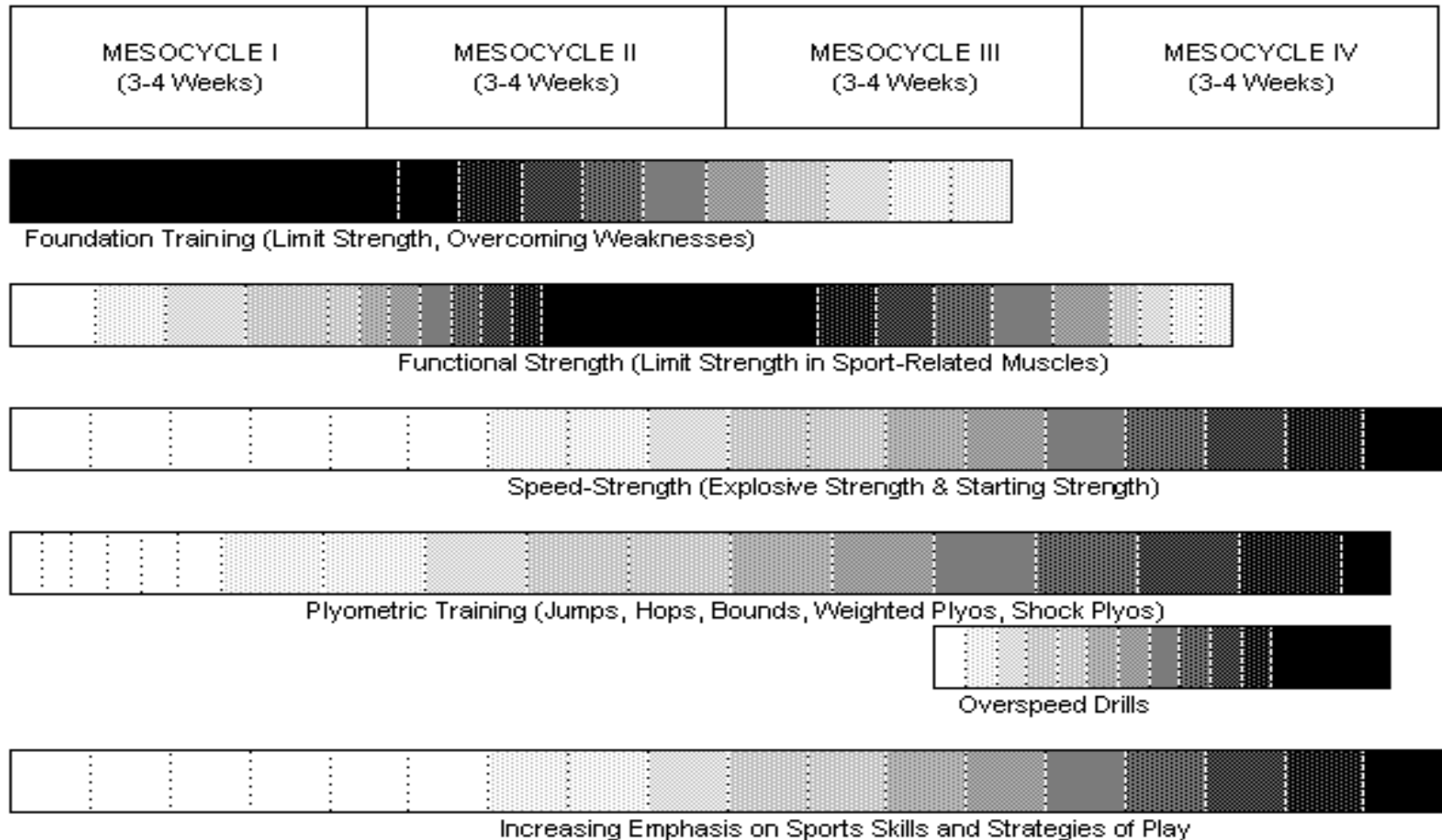
Periodization

MESOCYCLE I OBJECTIVES	MESOCYCLE II OBJECTIVES	MESOCYCLE III OBJECTIVES	MESOCYCLE IV OBJECTIVES
<p>Reverse the effects of disuse</p> <p>lose fat</p> <p>begin getting rid of your weaknesses noted in your last competition period</p> <p>establish a serious training mentality</p> <p>begin aerobic training</p>	<p>build on all your muscles' limit strength</p> <p>continue losing fat</p> <p>maximize your progress in eliminating perceived weaknesses</p> <p>start to train seriously for anaerobic strength (hill training)</p>	<p>maximize anaerobic strength in your sport-specific movements</p> <p>final phase of fat removal</p> <p>get serious about your speed training</p> <p>your weaknesses all gone, now you maximize skill</p> <p>train at altitude if possible</p>	<p>exclusively aerobic threshold training</p> <p>most on your mind are the skills of your sport</p> <p>strategize</p> <p>concentrate on your strengths</p> <p>train at altitude if possible</p>

Note: Shading represents increasing or decreasing intensity level and training emphasis

Periodization

GENERAL MODEL FOR ATP & ATP/CP SPORTS PERIODIZATION



Questions?

