

Wellness: Concepts and Applications  
8<sup>th</sup> Edition  
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Building Muscular Strength and Endurance

Chapter 4

# Muscular Strength and Endurance

- **Resistance training** may be the only type of exercise capable of slowing and maybe reversing loss of muscle mass, bone density, and strength
- The “Use it or lose it” axiom applies to the 600-plus muscles in the body
- Declining stimulation of the muscles results in progressive shrinking and weakening of the muscles

# Health Benefits of Resistance Training

- Strength training increases muscle mass and decreases the amount of fat tissue
- Increased muscle mass means your body burns more calories – even at rest
- The functions of daily life can be performed with less effort
- Symptoms of arthritis are reduced
- Stronger legs improve balance and reduce the risk of falling



# Health Benefits of Resistance Training (2)

- Risk of **osteoporosis** is reduced
- People can live independently and with dignity longer
- At least 50% of the disability associated with aging is due to disuse
- Reaction time is improved and people may sleep more restfully
- Improves self-esteem, self-confidence, and body image
- Positive impact on cardiorespiratory endurance, hypertension, blood fat levels and improve blood sugar and insulin control

# Anaerobic Exercise

Anaerobic means “without oxygen”

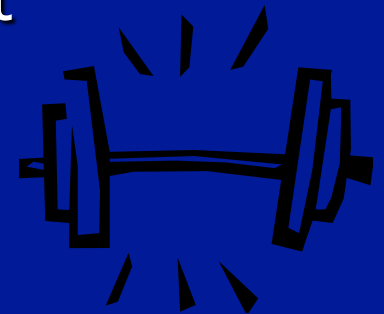


- In anaerobic exercises the body demands more oxygen than can be supplied
- Anaerobic exercises are high intensity
- Anaerobic exercises can be sustained for only a few seconds

# Muscular Strength

the maximum force a muscle or muscle group can exert with one contraction

- **Muscular strength** is best developed by high-intensity exercise—lifting more weight fewer times
- To increase strength
  - select a weight of 80% to 90% of your one-repetition maximum that cannot be lifted more than 10 times
  - Weight selected should supply enough resistance to perform a minimum of 8 repetitions but not more than 12 repetitions
  - Children and adolescents should never lift maximum loads



# Static Training—Isometrics

- **Isometric contractions** occur when muscles produce tension but do not change in length
- Pushing against a door or other immovable object is an isometric contraction
- Isometrics increase exercise arterial blood pressure
- Strength development is joint-angle specific

# Dynamic Exercise—Isotonic Training

- Isotonic contractions occur when muscles shorten and move the bones to which they are attached
- Isotonic movements consist of concentric and eccentric contractions
- Delayed muscle soreness (24 to 48 hours after exercise) from isotonic exercise is caused by microscopic tissue damage
  - Stretching, light exercise, or rest can alleviate soreness



# Dynamic Exercise—Variable Resistance Training

- Isotonic exercises do not maximally stress muscles throughout their full range of motion
- Variable resistance equipment is designed to provide maximum resistance throughout the full range of motion
- Universal Gym and Nautilus equipment vary the resistance, although the actual resistance is imprecise

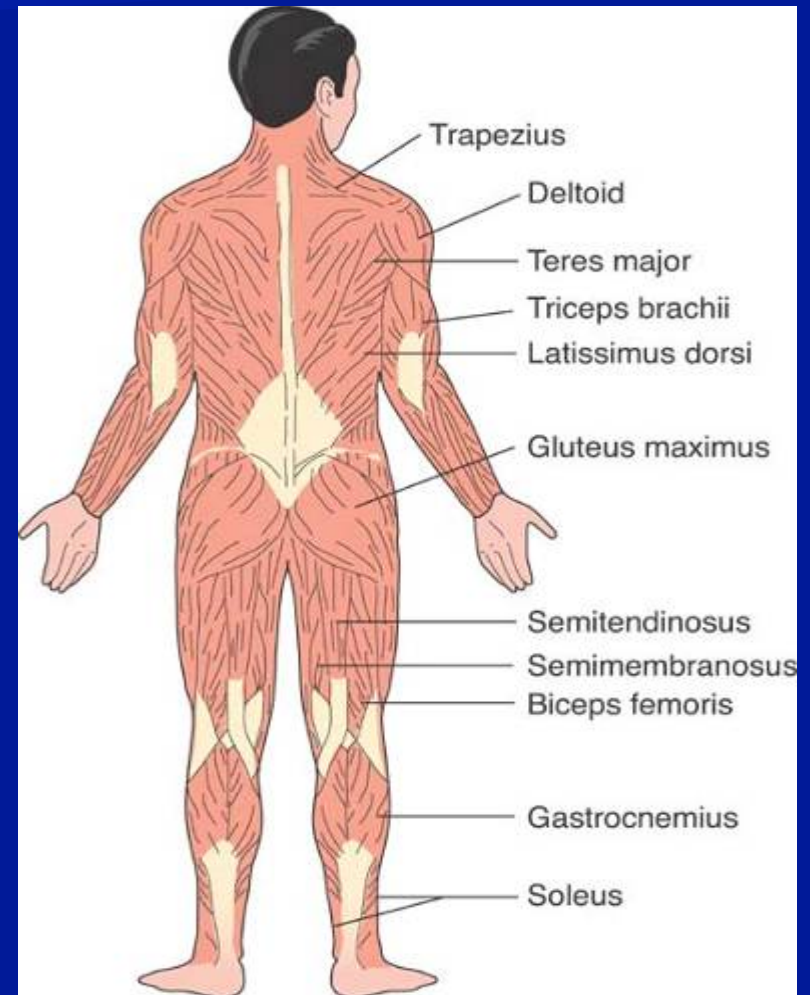
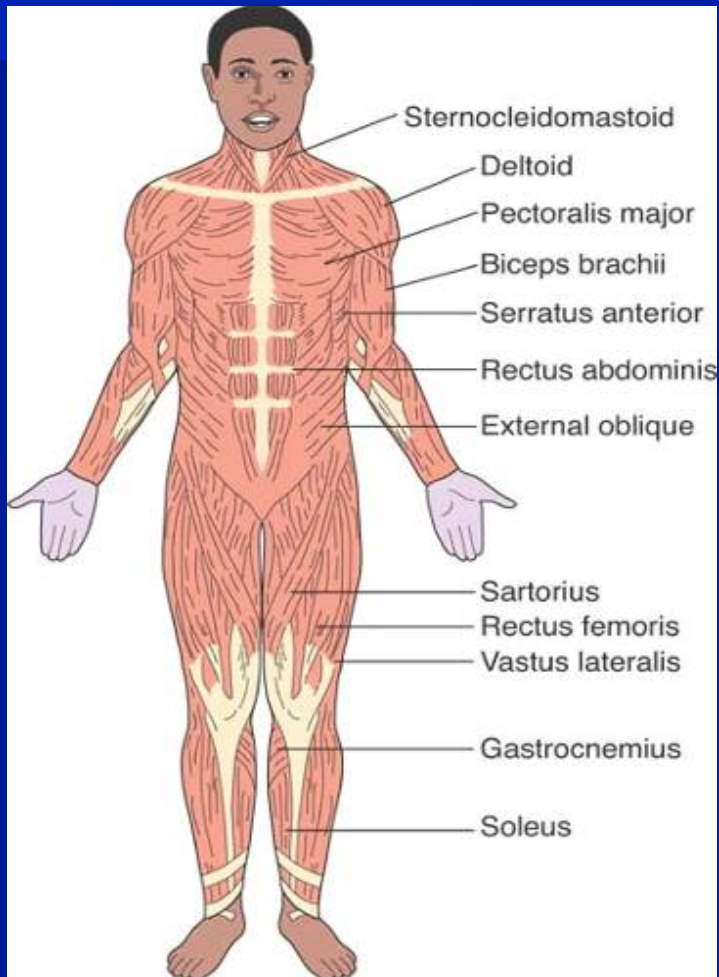
# Dynamic Exercise

## Free-Weight Training



- Free-weight training uses dumbbells and barbells to increase strength
- Free weights allow flexible movements, and the equipment is versatile
- Maximum resistance throughout the full range of motion does not occur, and spotters are needed for some exercises

# Selected Muscles of the Body Front and Rear Views



# Dynamic Exercise

## Isokinetic Training

- Isokinetic training uses equipment that adjusts resistance to accommodate the force applied by the exerciser
- Isokinetic exercises use preselected speeds that remain constant
- Maximum resistance is met throughout the full range of motion

# Dynamic Exercise

## Circuit Resistance Training (CRT)

- **CRT** develops several fitness dimensions simultaneously
- A circuit usually consists of 8 to 15 exercise stations
- Circuits are repeated 2-3 times for a 30- to 50-minute workout
- Exercisers work at 40% to 55% of maximum ability, performing as many repetitions as possible at each station
- Optimal gains are difficult to achieve

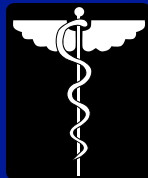
# Muscular Endurance

- Muscular endurance is the repeated application of muscular force against a submaximal resistance
- Usually done over an extended period (15-45 sec. for 8-20 repetitions)
  - If exercises are performed to maximum fatigue they may also build strength



# Principles of Resistance Training

A minimum of eight to ten exercises involving the major muscle groups should be performed two to three days per week. A minimum of 1 set of 8 to 12 RM or to near fatigue should be completed by most participants; however, for older and more frail persons, 10 to 15 repetitions may be more appropriate.



American College of Sports Medicine (ACSM)

# Principles of Resistance Training

- Intensity
- Duration
- Frequency
- Overload
- Progression
- Specificity
- Variety





# Ergogenic Aids

- Ergogenic aids are substances, techniques, and treatments that theoretically improve physical performance in addition to the effects of normal training
- Some of the more well-known aids include:
  - Protein supplements
  - Creatine
  - Ginseng
  - Chromium Picolinate
  - Ubiquinone (Co-Q10)
  - Conjugated Linoleic Acid (CLA)
  - Androstenedione (Andro)
  - Human Growth Hormone (hGH)
  - Anabolic-androgenic steroids



# Muscle Dysmorphic Disorder

- Muscle dysmorphic disorder (bigorexia) is a type of body dysmorphism where people's perceptions of their bodies are distorted.
- Opposite of anorexia nervosa
- Become preoccupied with and avid practitioners of weight training.
  - Increased susceptibility to androgenic steroids
  - Constant preoccupation with body permeates all phases of person's life
  - Primarily in men