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 Lineoeic Acid (CLA)
  - Androstenedione (Andro)
  - Human Growth Hormone (hGH)
  - Anabolic-androgenic steroids
Muscle Dysmorphic Disorder

- Muscle dysmorphic disorder (bigorexia) is a type of body dysmorphia 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