

Chapter 9: Basics of Resistance Training

Lesson 1: Benefits of Resistance Training

What is resistance training (strength training)?

A systematic program of exercises designed to increase an individual's ability to resist or exert force.

Benefits of Resistance Training

Primary: builds and tones muscles, increases strength/bone density/ligaments/tendons/metabolism, reduces body fat, reduces risk of type 2 diabetes and osteoporosis

Secondary: increases muscular endurance, reduces injury, improves flexibility, reduces stress, slows down aging process and enhances sport performance

Muscular Strength: the maximum amount of force a muscle or muscle group can exert against an opposing force.

2 Types of Muscular Strength:

Absolute Muscular Strength

Maximum force you are able to exert regardless of size, age or weight.

Relative Muscular Strength

Maximum force you are able to exert in relation to your body weight.

Relative muscular strength formula: $\text{weight lifted} / \text{body weight} = \text{relative muscular strength}$

Ex: Jim 130lbs / 125lbs = 1.04 (Jim's relative strength is greater than Tom's)

Tom 150lbs / 160lbs = .093

Muscular Endurance: the ability of the same muscle or muscle group to contract for an extended period of time without undue fatigue.

Relative Muscular Endurance: the maximum number of times you can repeatedly perform a resistance activity in relation to your body weight.

Overload Principle: improving muscular strength and endurance through placing more stress in the form of weight or resistance on a muscle than it is accustomed to handling.

Progressive Resistance: the continued systematic increase of muscle workload by the addition of more weight and resistance.

5 Different Types:

weight training- weights used to improve general fitness, health and appearance

weight lifting- weights used to compete in the sport of lifting

body building- refers to the competitive sport of lifting for muscle size and shape

rehabilitation- resistance exercises to recover from muscle or bone injury

Lesson 2: Your Muscles and Their Functions

3 Types of Muscles

Cardiac muscle: special type of striated tissue that forms the walls of the heart and is an involuntary muscle

Smooth Muscle: involuntary muscles responsible for the movements of the internal organs, such as the intestines, the bronchi of the lungs and the bladder

Skeletal Muscles: voluntary muscles attached to bones that cause body movement

- 600 skeletal muscles, 2/3 of the muscles in your body, 40% of your body weight
- **Contraction-** shortening of the muscle (bicep curl upwards)
 - **2 types of Contractions: Dynamic and Static**
 - **Dynamic contraction or isotonic contraction-** occurs when the resistance force is movable, such as a barbell.
 - **2 Phases**
 - **Concentric-** muscle shortens & exerts force in direction opposite of the pull of gravity
 - **Eccentric-** the muscle slowly and smoothly releases its contraction & becomes longer
 - **Static contraction or isometric contraction-** occurs absent of any significant movement. Ex: flexing muscle, pushing against a wall, pushing your hands together

Nerves /Muscle Fibers/Connective tissues

- Muscles contract by receiving signals from the brain
 - **Nerves-** pathways that deliver messages from the brain
 - **Muscle fiber-** specific structure in the muscle that receives the signal
 - No wider than a human hair
 - **Connective tissues**
 - **Tendons-** fibrous cords which connect muscle to bones
 - **Ligaments-** bands of tissue that connect bones together

How and Why Muscles Grow?

2 theories

- **Muscle hyperplasia-** an increase in the number of muscle fibers
 - **Has only been seen in some animals like cats and dogs**
- **Muscle Hypertrophy-** a thickening of existing muscle fibers that person is born with

How and Why Muscles Get Stronger

- **Heredity-** the ratio of slow-twitch and fast twitch muscle fibers you are born with
 - **Slow-twitch muscle fibers-** endurance activities, aerobic activities
 - **Fast-twitch muscle fibers-** quick movements, anaerobic activities
- **Muscle size-** the larger the muscle, the greater its potential for strength
- **Nerve function-** resistance improves the ability of nerves to carry message to the brain= improved strength.
- **Other Factors Associated with Muscle Strength**
 - Consistent training habits, level of strength, training intensity, length of your program

Why Muscle Get Sore? 3 theories

1. **Micro tears**- microscopic rips in the muscle fiber and/or surrounding tissues which occur during greater-than-normal resistance. Usually during the negative, or eccentric phase of an activity or exercise.
2. Depletion of oxygen during intense exercise
3. Build-up of waste materials around the muscles during intense exercise increases the pressure on sensory nerves

Treating Muscle Soreness: warm-up/cool down, reduce the amount of weight, drink plenty of water, eat meals on a regular basis, and give muscle time to repair themselves

Lesson 3: Resistance Training Myths

Myth 1: Females who lift weights will develop big, bulky muscles

- Females have smaller skeletons and less muscle fibers
- Males produce more **testosterone**- a chemical produced by the body that plays an important role in building muscles

Myth 2: Females will not develop increased strength

- Females are more than capable of developing increased strength
- Weight training can reduce the risk of **osteoporosis**- a bone disease that causes decreased bone mass and density

Myth 3: Weight Training is harmful to the growth and development of children and teens

- Done correctly, resistance training is not dangerous for teens

Myth 4: Older adults should avoid weight training

- Medical professionals advise adults to participate in fitness programs

Myth 5: With enough time & effort, anybody can be world-class body-builder or power weight lifter

- You are limited by your heredity, everyone can expect some improved strength and muscle mass, but not everyone can expect to be a body builder or power weight lifter

Myth 6: Muscle can turn to fat if a person stops lifting weights

- A decrease in muscle size and tone occurs
- Body fat increases or decreases depending on the amount of exercise performed and calorie intake/expenditure

Myth 7: Resistance training will limit my flexibility

- Will increase flexibility

Myth 8: Resistance training will hinder athletic performance

Lesson 4- R.T. Equipment

Free-weights- dumbbells, barbells, plates, clips

-unlimited direction & movement capabilities

-require more balance & coordination than machines, along with spotters

Weight Machines- move weight w/ cables & pulleys

-require little balance & no spotter

-require large amounts of space

-figure 9.7 free weights vs. weight machines

Exercise Bands- low cost

Plyometric exercises- jumping, leaping, bounding

-can place stress on tendons

Calisthenics exercises- pull-ups, push-ups, sit-ups

Clothing & Footwear- gloves, belts, straps, wraps