

CHAPTER 9 Basics of Resistance Training

Lesson 1 Benefits of Resistance Training

What You Will Do

- Define resistance training and identify its importance to your health and fitness.
- Identify the role of muscular strength and muscular endurance in resistance training.
- Explain the benefits of resistance training.



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Terms to Know

- resistance training
- muscular strength
- absolute muscular strength
- relative muscular strength
- muscular endurance
- relative muscular endurance
- progressive resistance



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Benefits of Resistance Training

Working out with weights is popular among males and females of all ages.



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What is Resistance Training?

The best way to build and tone your muscles is through a program of **resistance training**.



Term to Know

Resistance training

Also called strength training, a systematic program of exercises designed to increase an individual's ability to resist or exert force.

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What is Resistance Training?

Resistance training is also called weight training. It may involve:

- weights
- weight machines
- elastic bands
- the weight of your own body



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What is Resistance Training?

Benefits of resistance training

Builds and tones muscles

Improves metabolism

Increases the strength of the tendons, ligaments, and bones

Reduces body fat

Increases muscular endurance

reduces stress

Slows the aging process



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Muscular Strength and Endurance

People with high levels of **muscular strength** and endurance are able to perform daily tasks more efficiently. There are two types of muscular strength.



Term to Know

Muscular strength

The maximum amount of force a muscle or muscle group can exert against an opposing force.

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Muscular Strength and Endurance

Absolute muscular strength is the first type of muscular strength.

A person able to lift 100 pounds is stronger in absolute muscular strength than a person able to lift only 80 pounds.



Term to Know

Absolute muscular strength

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

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Muscular Strength and Endurance

Relative muscular strength is the second type of muscular strength.

It is more important than absolute muscular strength.



Term to Know

Relative muscular strength

Relative muscular strength is the maximum force you are able to exert in relation to your body weight.

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Muscular Strength and Endurance

Consider this example:

Jim weighs 125 pounds and can lift 130 pounds during a weight training exercise.

Tom weighs 160 pounds and can lift 150 pounds on the same exercise.

Tom is stronger in the absolute sense, but Jim is stronger in the relative sense because he exerts more strength per pound of body weight.



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Muscular Strength and Endurance

Here is the formula for calculating relative muscular strength:

	Weight Lifted ÷ Body Weight = Relative Muscular Strength
Jim	130 lbs ÷ 125 lbs = 1.04
Tom	150 lbs ÷ 160 lbs = 0.93

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Muscular Strength and Endurance

Muscular endurance is measured by the amount of resistance (or weight) and the number of repetitions (or "reps").

A person who can properly lift 75 pounds for 15 reps has greater muscular endurance than a person of the same gender who can only do 10 reps with the same amount of weight.

Term to Know

Muscular endurance

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

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Muscular Strength and Endurance

As with muscular strength, good health and fitness depend more on **relative muscular endurance** than on absolute endurance.



Term to Know

Relative muscular endurance

The maximum number of times you can repeatedly perform a resistance activity in relation to your body weight.

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Resistance Training and Overload

According to the overload principle, to improve a muscle's strength or endurance, you must first overload that muscle.

In resistance training, overloading means putting more stress, in the form of weight or resistance, on a muscle than it is accustomed to handling.



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Resistance Training and Overload

As your muscles gradually adjust to the increased stress, you need to employ **progressive resistance** to increase the workload further and make the muscles stronger.



Term to Know

Progressive resistance

The continued systematic increase of muscle workload by the addition of more weights or resistance.

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Resistance Training and Overload

There are five components of progressive resistance training:

- weight training
- weight lifting
- bodybuilding
- strength training
- rehabilitation



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1. **Vocabulary** What is resistance training?
2. **Recall** Why is relative muscular strength more important to personal fitness than absolute muscular strength?
3. **Recall** What is muscular endurance?

3. Recall

When muscles can contract for an extended period without undue fatigue.

FOUNDATIONS OF PERSONAL FITNESS

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Fitness Check

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Lesson 2 Your Muscles and Their Functions

What You Will Do

- Identify the different types of muscles and explain how muscles work.
- Apply the biomechanical principle of type of contraction to resistance training.
- Identify the role nerves play in muscle function and strength.
- Describe how muscles grow and become stronger.



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Lesson 2 Your Muscles and Their Functions

Terms to Know

- cardiac muscle
- smooth muscles
- skeletal muscles
- contraction
- extension
- dynamic contraction
- static contraction
- nerves
- muscle fiber
- muscle hyperplasia
- hypertrophy
- microtears



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Lesson 2 Your Muscles and Their Functions

Your Muscles and Their Functions

The routine movements you make each day require little conscious thought but involve the complex interaction of many different muscles and muscle groups.

All body movement depend on muscles.



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Lesson 2 Your Muscles and Their Functions

Types of Muscles

Your heart is the most important muscle in your body.

Contraction of **cardiac muscle** is involuntary.



Term to Know

Cardiac muscle

A special type of striated tissue that forms the wall of the heart.

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Types of Muscles

The **smooth muscles** work without a person's conscious control.



Term to Know

Smooth muscles

Muscles responsible for the movements of the internal organs, such as the intestines, the bronchi of the lungs, and bladder.

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Lesson 2 Your Muscles and Their Functions

Types of Muscles

Skeletal muscles are voluntary—that is, you consciously control their movement.



Term to Know

Skeletal muscles

Muscles attached to bones that cause body movement.

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Types of Muscles

Resistance training has little effect on involuntary muscles.

The rest of this lesson will focus mainly on skeletal muscles and how resistance training influences them.

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Lesson 2 Your Muscles and Their Functions

Types of Muscles

Skeletal muscles work together to produce two complementary, or opposing, actions: **contraction** and **extension**.



Terms to Know

Contraction

The shortening of a muscle.

Extension

The stretching of a muscle.

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Types of Muscles

One type of muscle contraction is **dynamic contraction**.

Sometimes called *isotonic contraction*, this is a type of muscle contraction that occurs when the resistance force is moveable, such as a barbell.



Terms to Know

Dynamic contraction

The shortening of a muscle.

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Types of Muscles

A second kind of muscle contraction is **static contraction**.

Flexing the muscle in your upper arm is an example of a static contraction.



Terms to Know

Static contraction

Sometimes called isometric contraction, a type of muscle contraction that occurs absent of any significant movement.

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Types of Muscles

For a muscle to contract, it must receive a signal from the brain.

This signal is carried by **nerves**.



Terms to Know

Nerves

Pathways that deliver messages from the brain to the other body parts.

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Types of Muscles

The **muscle fiber** is a long thin strand that receives nerve signals.

Bundles of muscle fibers account for most of a muscle's mass.



Terms to Know

Muscle fiber

The specific structure in the muscle that receives nerve signals.

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Types of Muscles

Skeletal muscles are connected to the bones by means of fibrous cords of soft tissue called tendons.

Bones are connected to one another by bands of tissue called ligaments.

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How and Why Muscles Grow

Scientists do not fully understand exactly how and why resistance training builds muscles.

Several theories have emerged.

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How and Why Muscles Grow

Some experts believe that muscles get larger during weight training due to **muscle hyperplasia**.



Terms to Know

Muscle hyperplasia

An increase in the number of muscle fibers.

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How and Why Muscles Grow

Other researchers contend that a person is born with his or her full number of muscle fibers.

According to this view, muscle growth is due to **hypertrophy**.



Terms to Know

Hypertrophy

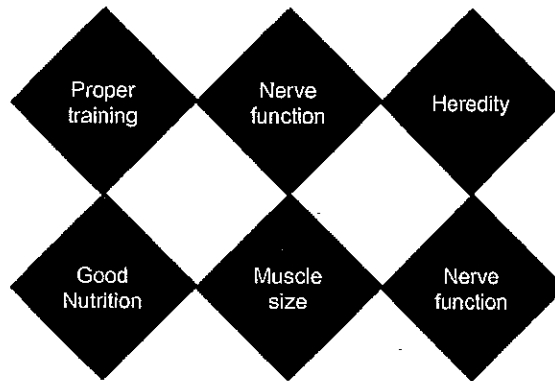
A thickening of existing muscle fibers

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How and Why Muscles Get Stronger

Factors that affect muscle strength

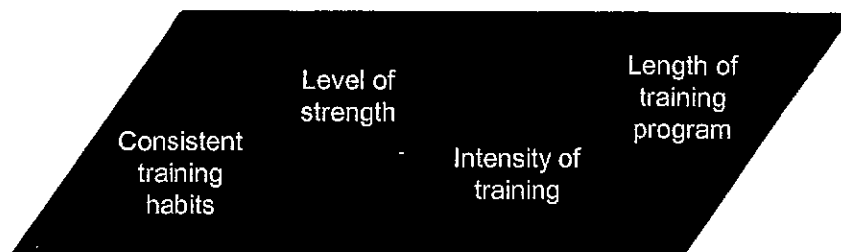


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How and Why Muscles Get Stronger

Lesser factors that influence the development of muscular strength



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Why Muscles Get Sore

One theory about why muscles get sore is that **microtears** occur during greater-than-normal resistance.



Terms to Know

Microtears

Microscopic rips in the muscle fiber and/or surrounding tissues.

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Why Muscles Get Sore

- A second theory about why muscles get sore is that during intense exercise, a muscle may not receive all of the oxygen it needs.
- A third explanation is that waste products accumulate around muscles during intense exercise, increasing pressure on sensory nerves.



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Why Muscles Get Sore

To relieve muscle soreness:

- Perform a proper warm-up and cooldown.
- Do a lighter workout if pain is excessive.
- Drink plenty of water and eat nutritious meals regularly.
- Give the muscles rest before reworking them.

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Lesson 2 Your Muscles and Their Functions

1. **Vocabulary** What is muscle hypertrophy? What causes it?
2. **Recall** List and explain the two types of muscle contraction.
3. **Recall** What is one explanation of why and how muscles get stronger?

3. Recall

Heredity can determine your potential for muscle growth. The intensity and consistency of workouts plays a role.