

Student Guide

Lesson: How Muscles Contract

Do you remember about the importance of proteins to organisms? The human body has many kinds of proteins, and each has its own structure related to its function. Muscles are made largely of two particular proteins: actin and myosin. Together, these filaments are the real mechanisms behind every muscle contraction you have ever or will ever make.

Lesson Objectives

- Describe the cellular and molecular basis of muscle contractions.
- Explain the relationship between bone and muscles with regard to movement.

PREPARE

Approximate lesson time is 60 minutes.

Materials

For the Student

Biology: A Reference Guide

Keywords and Pronunciation

actin : specialized protein making up the thin muscle filaments

myofibrils : tubular organelles found within a muscle cell

myosin : specialized protein making up the thick muscle filaments

sarcomere (SAHR-kuh-mihr) : a unit of contraction of a muscle that arises from the side-by-side position of actin and myosin

LEARN

Activity 1: How Muscles Contract *(Online)*

Instructions

As you read through the lesson online, use the space below to take notes.

Two types of protein filaments, actin and myosin (which are in parts of a muscle cell), work together to contract a muscle.

Bone moves when pulled by a muscle. Pairs of muscles often work together to move a bone back and forth.

Muscles have many levels of organizational units. The first unit, a fascicle, contains groups of parallel muscle fibers.

Each muscle fiber contains long, parallel strands, or myofibrils.

Each myofibril contains many pairs of interacting filaments, which are made up mostly of the proteins myosin and actin.

The side view of a myofibril shows actin and myosin filaments as units of patterned striations, or sarcomeres.

Contractions take place when myosin heads attach and move along actin-binding sites.

Critical components of muscle contractions also include ATP and calcium.

The intensity of a muscle contraction depends on how many motor units receive signals from the nervous system.

ASSESS

Quiz: How Muscles Contract (*Online*)

Complete the Quiz.