

Bones, Muscles, and Joints

PART 2

What Are the Muscles and What Do They Do?

Bones don't work alone — they need help from the muscles and joints. Muscles pull on the joints, allowing us to move. They also help the body perform other functions so we can grow and remain strong, such as chewing food and then moving it through the digestive system.

The human body has more than 650 muscles, which make up half of a person's body weight. They are connected to bones by tough, cord-like tissues called **tendons**, which allow the muscles to pull on bones. If you wiggle your fingers, you can see the tendons on the back of your hand move as they do their work.

Humans have three different kinds of muscle:

1. **Skeletal muscle** is attached to bone, mostly in the legs, arms, abdomen, chest, neck, and face. Skeletal muscles are called **striated** (pronounced: **stry**-ay-ted) because they are made up of fibers that have horizontal stripes when viewed under a microscope. These muscles hold the skeleton together, give the body shape, and help it with everyday movements (they are known as voluntary muscles because you can control their movement). They can contract (shorten or tighten) quickly and powerfully, but they tire easily and have to rest between workouts.
2. **Smooth, or involuntary,** muscle is also made of fibers, but this type of muscle looks smooth, not striated. Generally, we can't consciously control our smooth muscles; rather, they're controlled by the nervous system automatically (which is why they are also called involuntary). Examples of smooth muscles are the walls of the stomach and intestines, which help break up food and move it through the digestive system.

Smooth muscle is also found in the walls of blood vessels, where it squeezes the stream of blood flowing through the vessels to help maintain blood pressure. Smooth muscles take longer to contract than skeletal muscles do, but they can stay contracted for a long time because they don't tire easily.

3. **Cardiac** (pronounced: **kar**-dee-ak) muscle is found in the heart. The walls of the heart's chambers are composed almost entirely of muscle fibers. Cardiac muscle is also an involuntary type of muscle. Its rhythmic, powerful contractions force blood out of the heart as it beats.

Muscles and Movement

Even when you sit perfectly still, there are muscles throughout your body that are constantly moving. Muscles enable your heart to beat, your chest to rise and fall as you breathe, and your blood vessels to help regulate the pressure and flow of blood through your body. When we smile and talk, muscles are helping us communicate, and when we exercise, they help us stay physically fit and healthy.

The movements your muscles make are coordinated and controlled by the brain and nervous system. The involuntary muscles are controlled by structures deep within the brain and the upper part of the spinal cord called the brain stem. The voluntary muscles are regulated by the parts of the brain known as the cerebral motor cortex and the cerebellum.

When you decide to move, the **motor cortex** sends an electrical signal through the spinal cord and peripheral nerves to the muscles, causing them to contract. The motor cortex on the right side of the brain controls the muscles on the left side of the body and vice versa.

The **cerebellum** (pronounced: ser-uh-**beh**-lum) coordinates the muscle movements ordered by the motor cortex. Sensors in the muscles and joints send messages back through peripheral nerves to tell the cerebellum and other parts of the brain where and how the arm or leg is moving and what position it's in. This feedback results in smooth, coordinated motion. If you want to lift your arm, your brain sends a message to the muscles in your arm and you move it. When you run, the messages to the brain are more involved, because many muscles have to work in rhythm.

Muscles move body parts by contracting and then relaxing. Your muscles can pull bones, but they can't push them back to their original position. So they work in pairs of flexors and extensors. The **flexor** contracts to bend a limb at a joint. Then, when you've completed the movement, the flexor relaxes and the **extensor** contracts to extend or straighten the limb at the same joint. For example, the biceps muscle, in the front of the upper arm, is a flexor, and the triceps, at the back of the upper arm, is an extensor. When you bend at your elbow, the biceps contracts. Then the biceps relaxes and the triceps contracts to straighten the elbow.

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