The Muscular System

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The muscular system makes the body move. Muscles are also necessary for breathing, digestion and circulation. There are over 650 muscles in the body. They are almost forty percent of the body's weight. The muscular system has three types of muscles. They are:

- Cardiac muscle
- Smooth muscle
- Skeletal muscle

We will discuss these muscles in detail.

Cardiac Muscle

The walls of the heart are made of cardiac muscles. When these muscles contract and relax, they circulate blood throughout the body.

Cardiac muscles are involuntary. This means they are not controlled consciously like skeletal muscles.

Continuous contraction and relaxation of cardiac muscle is necessary for survival. Cardiac muscle does not get tired. It makes the energy it needs to keep the heart beating from birth until death.

Another name for cardiac muscle is **myocardium**. Read more about the heart in the **Cardiovascular System. Figure 1** is a diagram of a cardiac muscle cell.

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Important! Each educational unit contains words that are defined in the *Know Your Body Glossary*. Please remember to include the *Glossary* when downloading the educational unit(s) in PDF format.

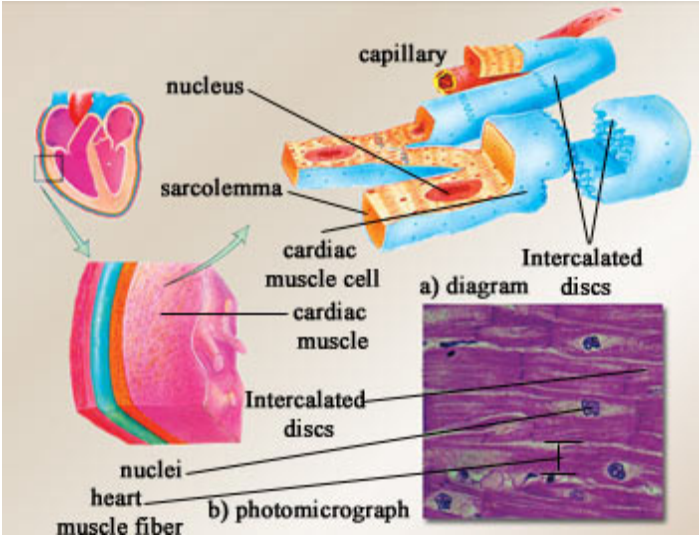

Figure 1. Cardiac muscle cell.

Types of Muscles. (n.d.). *Physiotherapy*. http://physiotherapy.blog.co.in/2008/08/25/types-of-muscles/

Smooth Muscle

The walls of hollow organs, **arteries** and **veins** and the irises of your eyes are made of smooth muscles. They are involuntary. This means they are not controlled consciously like skeletal muscles. Smooth muscles are usually formed in layers with one muscle on top of another.

Smooth muscles control the food passing through the **digestive system**. They control the bladder, the **circulatory system,** and the **reproductive system** during birth when a baby is expelled from the **uterus**. They are activated by the **autonomic nervous system. Figure 2** shows how the smooth muscles of the **esophagus** relax and contract in a wave-like motion to move food through our bodies.

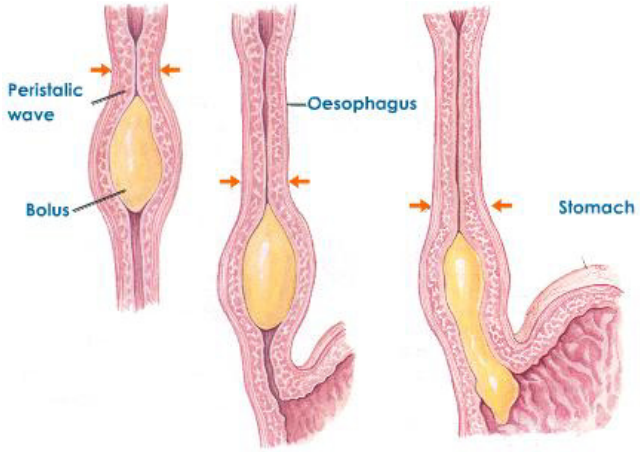

Figure 2. How smooth muscles move food through the esophagus to the stomach. Peristalsis. (n.d.). *TutorVista.com.* http://www.tutorvista.com/content/biology/biology-iv/animal-nutrition/pharynx.php

Skeletal Muscle

Skeletal muscles are voluntary**.** We can control their movement. Skeletal muscles contract and relax in pairs to move our bones. When one muscle contracts, its partner relaxes.

When we think of muscles, skeletal muscles are what comes to mind. We can see them on people who work out. Muscles vary in shape and size depending upon the job they do. In most cases, skeletal muscles attach to the end of one bone and stretch across the joint to attach to another bone. They are attached to the bones by a tough tissue called a **tendon**.

Skeletal muscles cover the body in layers. They help with breathing and posture. They protect our abdominal organs. They make the body move. **Figure 3** is a diagram of our outer layer of skeletal muscles which shows how they cover the body.

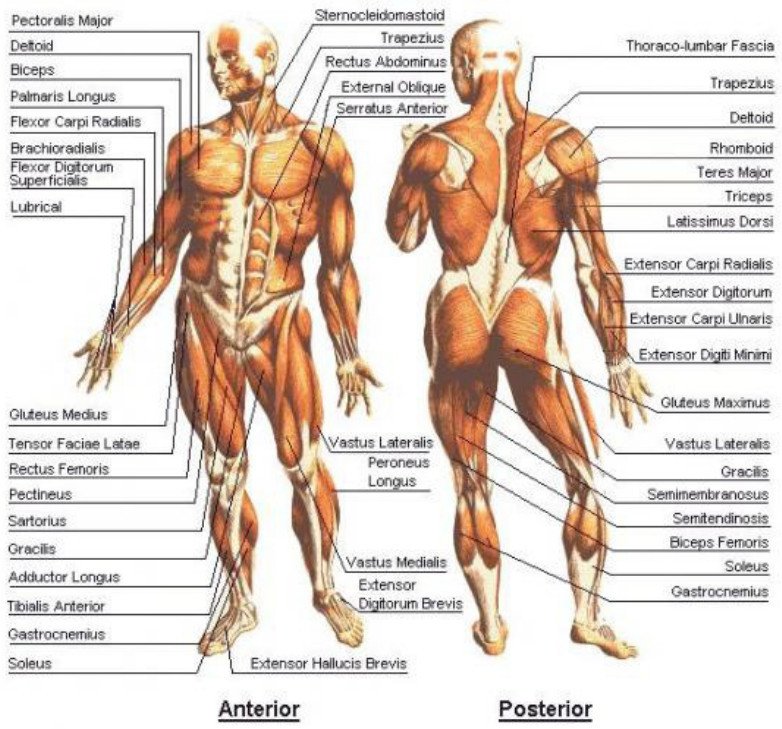

Figure 3. Skeletal muscles of the body.
Muscular Development. (n.d.). *2HealthFitness.com*. http://2healthfitness.com/1_2_Anatomy-Chart.html

Keeping the Muscular System Healthy

The first part of keeping muscles healthy is a good diet. For muscles to grow, they need the right kinds of food. Do not eat fatty foods. Eat grains such as bread and pasta. Eat lots of fruits, vegetables and dairy products. Drink at least eight 8-ounce glasses of water daily. Limit drinks such as soda and certain juices. They are high in sugar and can lead to fat storage in the muscles. Get regular exercise. A good exercise program has five parts:

- Warm up with light exercise
- Stretch
- Raise your heart rate with aerobic exercise
- Build muscle with resistance exercise such as weights

- Cool down with slow exercise

Diseases of the Muscular System

Below is a list of common diseases of the muscular system:

Bursitis is **inflammation** of a bursa. Bursa is a fluid-filled sac between a **tendon** and skin, or between a **tendon** and bone. Bursitis is very painful because of the swelling that occurs.

Carpal tunnel syndrome occurs when the median nerve is pinched. This can be due to swelling of nearby **tendons**. When the nerve is pinched, it can cause numbness and pain of the fingers, hand and forearm. Without treatment, this damages the nerves and muscles.

Compartment syndrome happens when too much pressure builds up in and around the muscles. It can result from injury, pressure on a blood vessel, or swelling which creates pressure on the muscle tissue. Symptoms are severe pain, a feeling of fullness or tightness in the muscle and a tingling feeling. Numbness means death of the muscle cells and damage may be permanent.

Muscular Dystrophy is a group of genetic diseases that cause the muscle fibers to become easily damaged. There are over one dozen different types. Symptoms are muscle weakness, lack of coordination and loss of mobility.

Myasthenia gravis is a disease causing weakness of the skeletal muscles. The name is Latin and Greek for "grave muscle weakness." Muscle weakness increases during periods of activity and improves after periods of rest. A common side effect is droopy eyelids.

Poliomyelitis affects mostly children. It spreads through direct contact with mucous, phlegm, feces, or contact with food and water contaminated by feces of an infected person. When it invades the **nervous system**, it can cause paralysis or death.

Shin splints cause pain and soreness along the **tibia** or shinbone. This can be due to a stress injury or tendonitis. **Shin splints** usually occur in runners when they do not have good shoes to support their feet and legs.

Tendonitis occurs when the **tendons** attaching muscle to bone become irritated due to overuse. When the **tendon** becomes inflamed, movement is painful.

Case Study of the Muscular System

“And the crowd goes wild as Joey Hart scores another goal for his team!” the announcer screams. Joey has played soccer since he was seven when his parents bought him his first soccer ball. He is now 18 and the star player for his high school team. Joey knows to keep playing his best; he needs to keep his body healthy.

“Ever since I was little, my mother made sure I got plenty of exercise and ate healthy foods,” Joey said.

Eating good foods and drinking lots of water helps muscles grow. Getting plenty of exercise will also help muscles grow.

“I do three types of exercise, stretching, aerobics, and resistance training. Stretching exercises help balance and flexibility, so I do not strain or injure a muscle. Aerobic exercises help me run for longer periods by building endurance. And resistance training makes muscles bigger and stronger, so I can kick the ball farther.”

“Do your muscles get tired after playing in a long game?” the reporter asked Joey after one of his games.

“After running for a long time my muscles get tired and do hurt sometimes,” Joey answered.

“Soaking my muscles in warm water and massaging where it hurts is a good way to make them feel better. I try to stay healthy and in shape so I can keep playing soccer for as long as I want,” Joey said. “However, I know I won't play forever. Some day my muscles will not work the same as when I was younger.”

Joey is correct. His muscles will slowly start to weaken as he grows older. Just as our skin wrinkles and our hair might turn gray, our muscles change with age.

"If I eat healthy and exercise every day I can keep my muscles healthy. I will play soccer for as long as I can!"

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