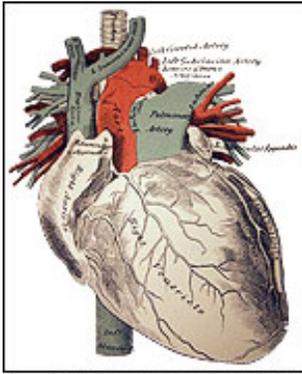




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## Four Body Systems

### Circulatory System



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The circulatory system is the body's transport system. It is made up of a group of organs that transport blood throughout the body. The heart pumps the blood and the **arteries** and **veins** transport it. Oxygen-rich blood leaves the left side of the heart and enters the biggest artery, called the **aorta**. The aorta branches into smaller arteries, which then branch into even smaller vessels that travel all over the body. When blood enters the smallest blood vessels, which are called **capillaries**, and are found in body tissue, it gives nutrients and oxygen to the cells and takes in carbon dioxide, water, and waste. The blood, which no longer contains oxygen and nutrients, then goes back to the heart through veins. Veins carry waste products away from cells and bring blood back to the heart, which pumps it to the lungs to pick up oxygen and eliminate waste carbon dioxide.

### Digestive System

The digestive system is made up of organs that break down food into protein, vitamins, minerals, carbohydrates, and fats, which the body needs for energy, growth, and repair. After food is chewed and swallowed, it goes down the esophagus and enters the stomach, where it is further broken down by powerful stomach acids. From the stomach the food travels into the small intestine. This is where your food is broken down into nutrients that can enter the bloodstream through tiny hair-like projections. The excess food that the body doesn't need or can't digest is turned into waste and is eliminated from the body.

### Endocrine System

The endocrine system is made up of a group of glands that produce the body's long-distance messengers, or hormones. **Hormones** are chemicals that control body functions,

such as metabolism, growth, and sexual development. The **glands**, which include the pituitary gland, thyroid gland, parathyroid glands, adrenal glands, thymus gland, pineal body, pancreas, ovaries, and testes, release hormones directly into the bloodstream, which transports the hormones to organs and tissues throughout the body.

## Immune System

The immune system is our body's defense system against infections and diseases. Organs, tissues, cells, and cell products work together to respond to dangerous organisms (like viruses or bacteria) and substances that may enter the body from the environment. There are three types of response systems in the immune system: the anatomic response, the inflammatory response, and the immune response.

- The **anatomic response** physically prevents threatening substances from entering your body. Examples of the anatomic system include the mucous membranes and the skin. If substances do get by, the inflammatory response goes on attack.
- The **inflammatory system** works by excreting the invaders from your body. Sneezing, runny noses, and fever are examples of the inflammatory system at work. Sometimes, even though you don't feel well while it's happening, your body is fighting illness.
- When the inflammatory response fails, the **immune response** goes to work. This is the central part of the immune system and is made up of white blood cells, which fight infection by gobbling up antigens. About a quarter of white blood cells, called the lymphocytes, migrate to the lymph nodes and produce antibodies, which fight disease.

## Lymphatic System

The lymphatic system is also a defense system for the body. It filters out organisms that cause disease, produces white blood cells, and generates disease-fighting antibodies. It also distributes fluids and nutrients in the body and drains excess fluids and protein so that tissues do not swell. The lymphatic system is made up of a network of vessels that help circulate body fluids. These vessels carry excess fluid away from the spaces between tissues and organs and return it to the bloodstream.

## Muscular System

The muscular system is made up of tissues that work with the skeletal system to control movement of the body. Some muscles—like the ones in your arms and legs—are voluntary, meaning that you decide when to move them. Other muscles, like the ones in your stomach, heart, intestines and other organs, are involuntary. This means that they are controlled automatically by the nervous system and hormones—you often don't even realize they're at

work.

The body is made up of three types of muscle tissue: skeletal, smooth and cardiac. Each of these has the ability to contract and expand, which allows the body to move and function. .

- **Skeletal muscles** help the body move.
- **Smooth muscles**, which are involuntary, are located inside organs, such as the stomach and intestines.
- **Cardiac muscle** is found only in the heart. Its motion is involuntary

## Nervous System

The nervous system is made up of the brain, the spinal cord, and nerves. One of the most important systems in your body, the nervous system is your body's control system. It sends, receives, and processes nerve impulses throughout the body. These nerve impulses tell your muscles and organs what to do and how to respond to the environment. There are three parts of your nervous system that work together: the central nervous system, the peripheral nervous system, and the autonomic nervous system.

- The **central nervous system** consists of the brain and spinal cord. It sends out nerve impulses and analyzes information from the sense organs, which tell your brain about things you see, hear, smell, taste and feel.
- The **peripheral nervous system** includes the craniospinal nerves that branch off from the brain and the spinal cord. It carries the nerve impulses from the central nervous system to the muscles and glands.
- The **autonomic nervous system** regulates involuntary action, such as heart beat and digestion.

## Reproductive System

The reproductive system allows humans to produce children. Sperm from the male fertilizes the female's egg, or ovum, in the fallopian tube. The fertilized egg travels from the fallopian tube to the uterus, where the fetus develops over a period of nine months.

## Respiratory System

The respiratory system brings air into the body and removes carbon dioxide. It includes the nose, trachea, and lungs. When you breathe in, air enters your nose or mouth and goes

down a long tube called the trachea. The trachea branches into two bronchial tubes, or primary bronchi, which go to the lungs. The primary bronchi branch off into even smaller bronchial tubes, or bronchioles. The bronchioles end in the alveoli, or air sacs. Oxygen follows this path and passes through the walls of the air sacs and blood vessels and enters the blood stream. At the same time, carbon dioxide passes into the lungs and is exhaled.

## Skeletal System

The skeletal system is made up of bones, ligaments and tendons. It shapes the body and protects organs. The skeletal system works with the muscular system to help the body move. **Marrow**, which is soft, fatty tissue that produces red blood cells, many white blood cells, and other immune system cells, is found inside bones.

## Urinary System

The urinary system eliminates waste from the body, in the form of urine. The kidneys remove waste from the blood. The waste combines with water to form urine. From the kidneys, urine travels down two thin tubes called ureters to the bladder. When the bladder is full, urine is discharged through the urethra.

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