

GoVenture  
**Health & Wellness**  
Photobook

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## Body Systems

Cells and DNA	8
Cardiovascular System	13
Digestive System	19
Endocrine System	26
Immune System	32
Integumentary System	39
Muscular System	45
Nervous System	51
Reproductive System	59
Respiratory System	67
Skeletal System	72
Urinary System	78
The Senses	84



## Mental and Emotional Health

Acne	162
Self-Esteem	168
Stress	174
Depression	182
Eating Disorders	190
Suicide	197



## Substance Abuse and Addictions

Tobacco	321
Alcohol	326
Drugs	333
Gambling	341



## Environmental Health

Safe Drinking Water	348
Food Safety	354
Waste Management	362
Environmental Pollution	368



## Relationships

Healthy Relationships	202
Bullying	210
Abusive Relationships	218



## Human Development

Personality and Emotions	91
Adolescence	99
Physical Disabilities	105
Learning Disabilities	113
Teen Pregnancy and Parenthood	120



## Injury Prevention and Safety

Self-Defense	224
Violence Prevention	231
First Aid	236
Workplace Safety	243
Motor Vehicle Safety	248
Internet Safety	256



## Community Health

Public Health	376
Health Careers	383
Understanding Media Advertising	388
Health Information	395
	401



## Personal Care

Fitness and Exercise	126
Personal Hygiene	133
Dental Health	141
Sleep	148
Nutrition	156



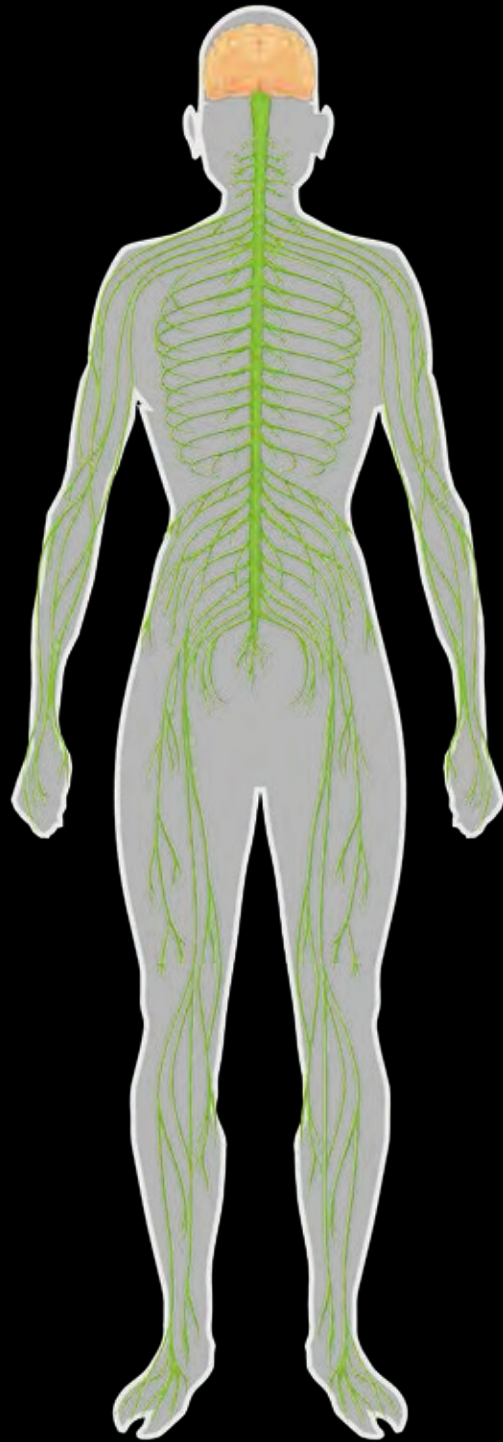
## Disease and Chronic Illness

Chronic Disease	264
Infectious Disease	270
Allergies	277
Sexually Transmitted Disease	284
HIV and AIDS	291
Cancer	298
Diabetes	306
Alzheimer's Disease	313

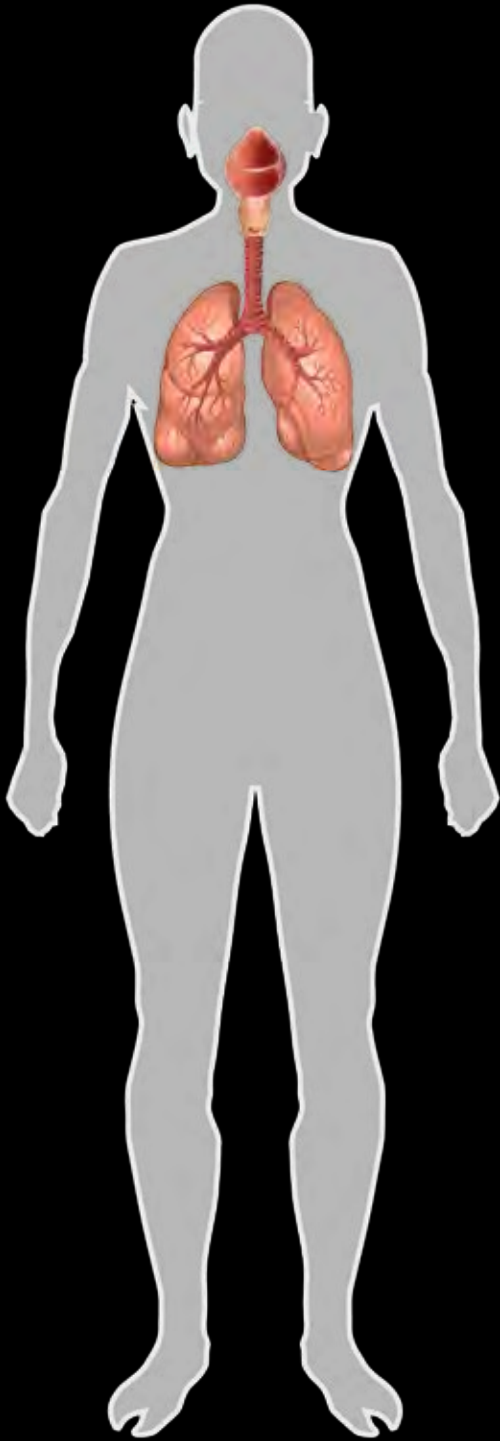
# Your Body



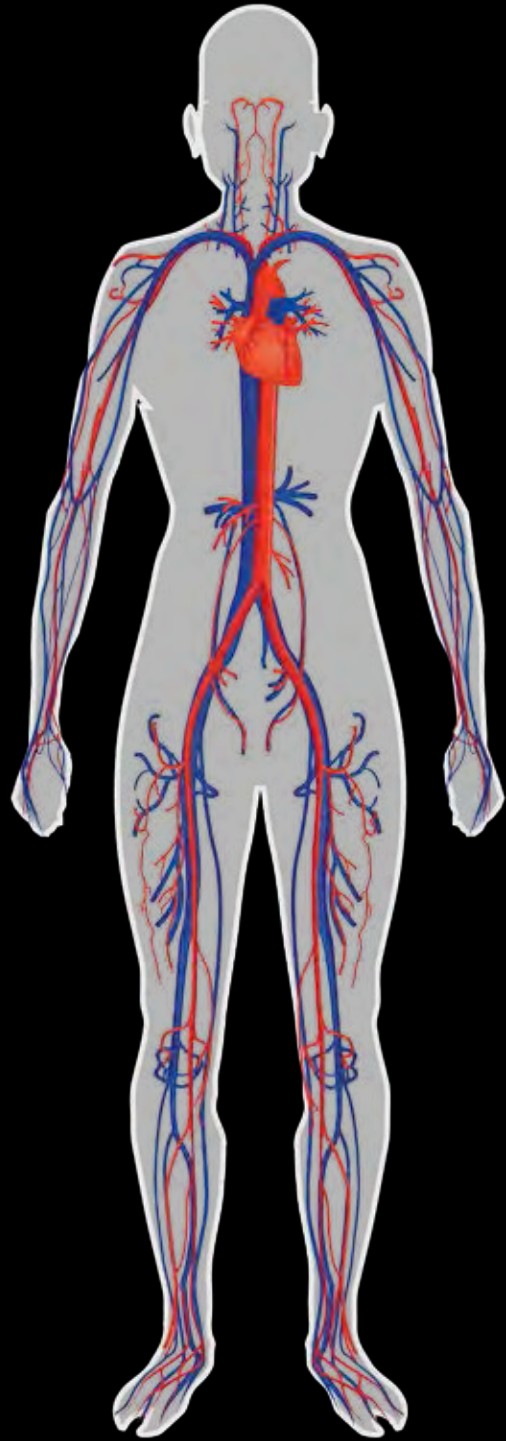
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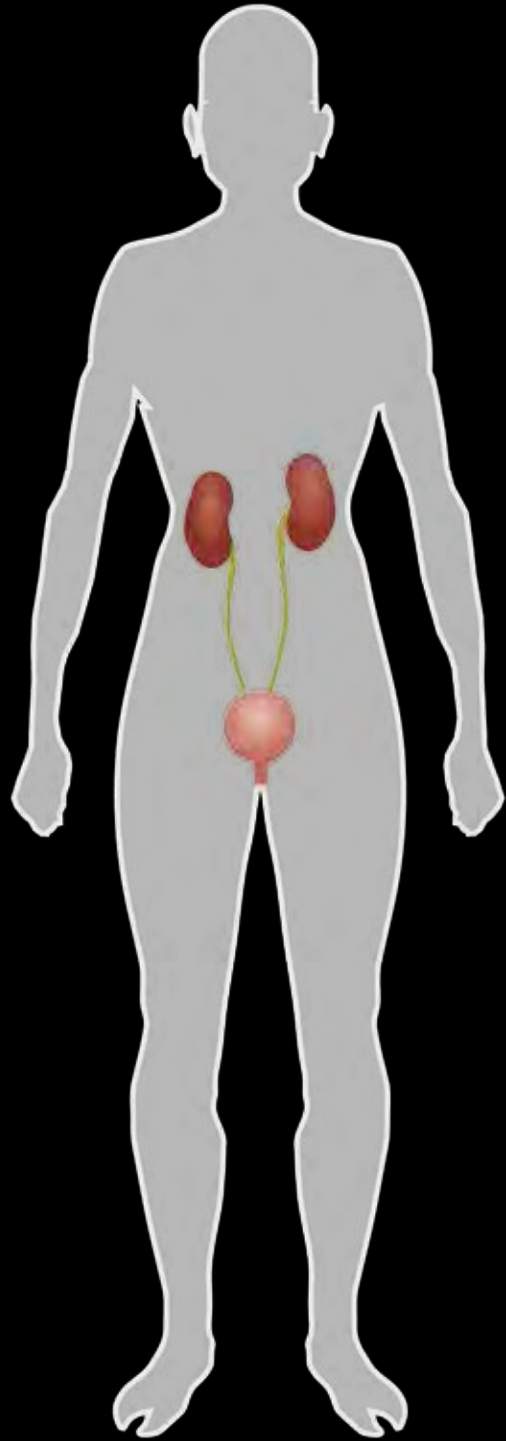


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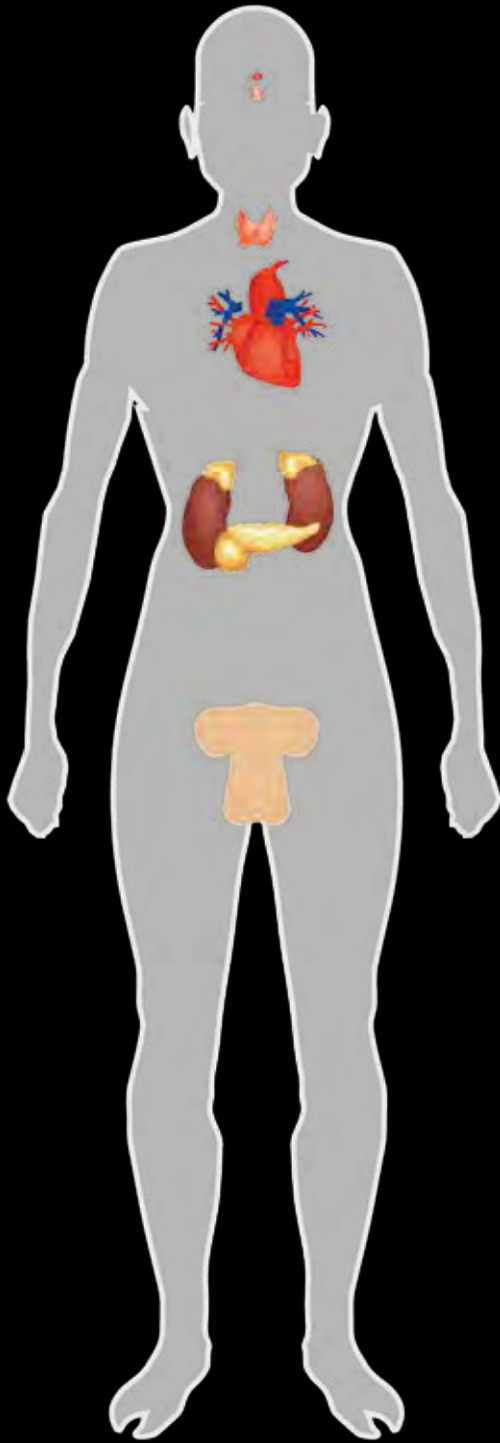




Digestive  
System



Urinary  
System



Endocrine System



Muscular System



Integumentary System

# Body Systems

## Cells and DNA

Cardiovascular System  
Digestive System  
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Urinary System  
The Senses

## Cells and DNA

### Learn

Cells

Stem cells

DNA

#### **DNA and cells are two building blocks of life.**

DNA carries the coded designs for life. Cells are the smallest individual units of life. Each cell carries a full copy of the DNA it needs to recreate itself. A human body contains more than 100 trillion (100,000,000,000,000 or  $10^{14}$ ) cells.



# Cells

**Cells are the most basic functional unit of all known life.** Each cell contains all the ingredients needed to sustain itself and recreate itself. The cell itself consists of an outer membrane wall that separates one cell from another. Inside the cell are **organelles**. Think of organelles as being like body organs for a cell. They are contained within the cell membrane and they serve specific functions. The most important organelle is the nucleus. Cells that have this structure are called **eukaryotes**.

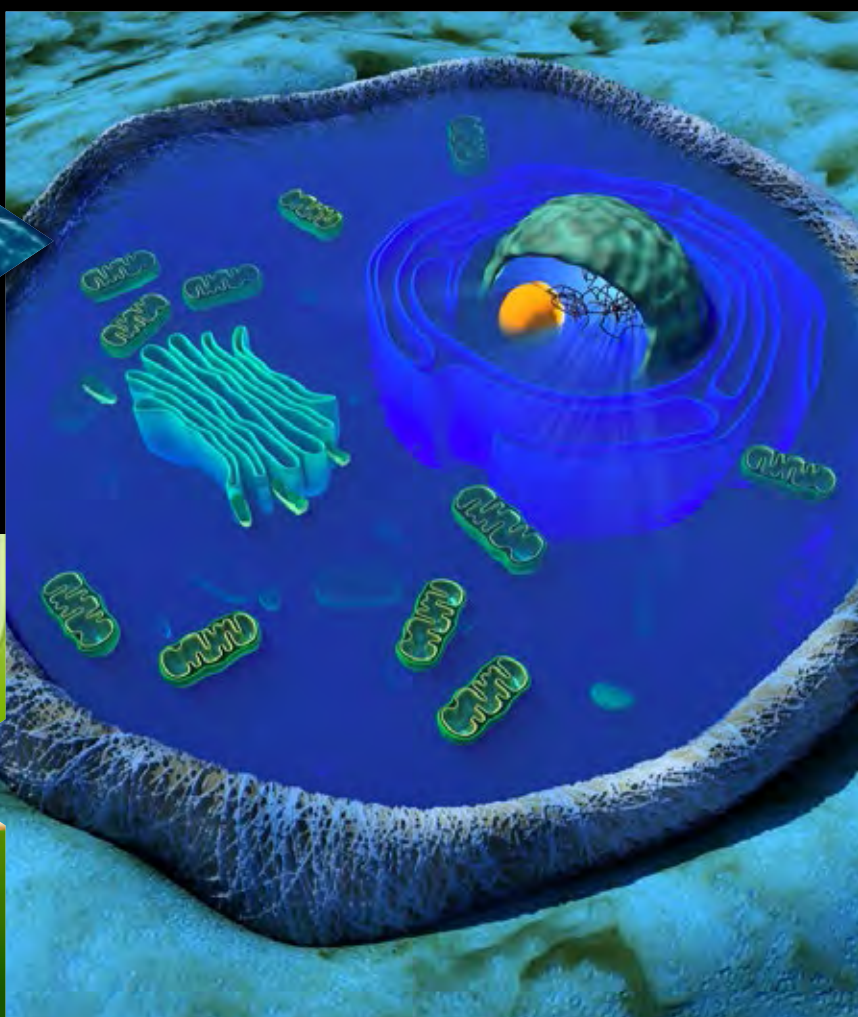
**Cells are special in that they can reproduce.** All living things share an ability to create copies of themselves. Cells are the smallest things that have that ability. Most eukaryotic cells reproduce by a process called **mitosis**. With mitosis, all the organelles in a cell are duplicated, so there is two of everything. The duplicates all gather on one side of the cell, while the originals gather on the other. The cell membrane splits down the middle to create two identical cells.

**Mitosis is form of asexual reproduction.** Sexual reproduction requires both a male and female parent to create an offspring. Asexual reproduction only requires one parent. With mitosis, a single cell makes a copy of itself.

**The outer membrane wall of a cell is selectively permeable.** Cell membranes keep some things out, and keep some things in. Selective permeability is like a door to a house. An elephant or a car would be too large to get through it, so a doorway is selectively permeable to things the size of a human or smaller. Membrane walls work the same way. They are selectively permeable to objects smaller than a certain size, or even to families of molecules with specific chemical properties.

**Constant chemical reactions happen within and around cells.** The cell membrane is said to be hydrophobic, which is to say that water molecules cannot pass through it. However, substances that are fat-soluble can pass through. Doors in the cell wall, which are selectively permeable in other ways, open periodically to let other substances through.

**Old cells self-destruct.** When a cell becomes damaged or undergoes some type of infection, it will self-destruct by a process called apoptosis. Apoptosis stops unhealthy cells from growing out of control. Abnormal cells that do not undergo apoptosis are known as cancer cells.





# Stem cells

**Stem cells are unique among cells.** They are like generic cells. They have all the qualities of other cells, but have not yet committed themselves to one task or another. Whereas other cells can only reproduce new cells identical to themselves, stem cells can change to become almost any kind of healthy cell.

**Stem cells are produced in the very earliest stages of life.** The first cells produced upon conception are stem cells. As these stem cells divide and multiply, they start to differentiate. This means that they take on a specific purpose and function that is different from other cells. Indeed, all the cells in the body can trace their ancestry back to stem cells.

**Stem cells exist in the bodies of adults.**

They are found in places where cell creation is abundant. For instance, red blood cells are created in the marrow of bones. The marrow is home to a type of stem cell that creates blood cells. However, these adult stem cells are limited in the range of cell types they can create.

**Scientists hope to use stem cells to replace damaged cells.**

Cells of the nervous system, the pancreas, and the heart reproduce very slowly. They are not able to repair themselves if they get damaged. Stem cells might be used to repair damaged cells that cannot repair themselves.

**The most flexible stem cells are embryonic stem cells.**

Once harvested, these stem cells can be cultivated. That means they can reproduce themselves over and over again in test tubes. These stem cells alone have the ability to change into any other kind of cell. Scientists are learning how to control that differentiation.

**Embryonic stem cell research is controversial.**

Some embryos that provide stem cells could develop into a fetus if left alone in the womb. A fetus could be born into society where it would have human rights. Do embryos have rights? Do they need protection? Do the potential benefits of stem cell research outweigh the rights of an embryo?



# DNA



**DNA is a chemical that contains coded instructions for life.** All human cells contain deoxyribonucleic acid (DNA). The DNA contains the instructions for making other cells. DNA has a double helix structure, and looks like a spiral staircase. The genetic information is carried in the steps between the spiral handrails. Segments of DNA that carry genetic information are called genes. Each person possesses a unique and individual DNA code.



DNA has a double helix structure

**Your DNA is a unique combination of your parents' DNA.** Your DNA is unique to you, but carries influences from both your parents. If you were to compare your DNA to either of your parents, you would see many similarities, and only a few differences. Indeed, there are similarities between your DNA and that of your grandparents, and all your ancestors. The differences are proportional to the number of generations that separate you from your ancestors.

## All life on Earth carries DNA code.

In this respect, humans share a common bond with all other living things. All humans share 99.9% of the same DNA. The 0.1% of genes that differ is highly variable. This variance accounts for all the differences in humans.



## DNA is used as forensic evidence.

Remember that each person has unique DNA. Remember that each cell in the body carries a full copy of DNA. That means it is possible to compare the DNA from a crime scene to the DNA of a suspect. This DNA profiling has become very reliable. It can be used as evidence in court to convict someone or to prove his or her innocence.

# Did you know?

Cells are too small to be seen without magnification.

There are more bacterial cells in the human body than human cells.

Cells are separated from their environment by an outer "skin" called a membrane.

Cells have varying lifespans, depending on their function.

99.9% of human DNA is shared by all people.

Cells are the smallest units of life.

As living things, cells have the ability to reproduce.

Cells reproduce asexually. They only need one parent.

Cells contain DNA.

Each person has a unique DNA code.

# Summary

# Body Systems

Cells and DNA

Cardiovascular System

Digestive System

Endocrine System

Immune System

Integumentary System

Muscular System

Nervous System

Reproductive System

Respiratory System

Skeletal System

Urinary System

The Senses

## Cardio-vascular System

### Learn

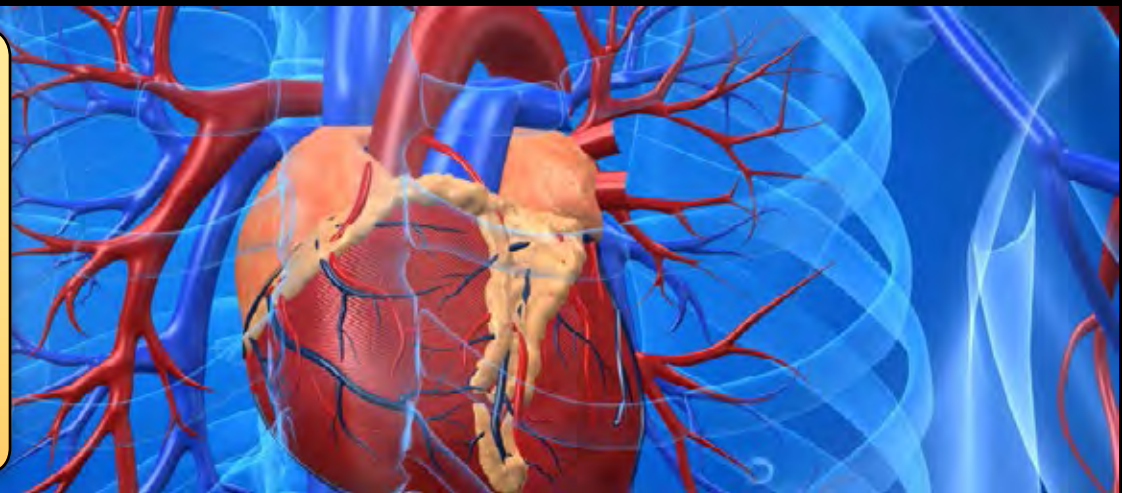
**Blood and parts of the cardiovascular system**

**The heart**

**Ways to measure cardiovascular strength**

**Heart diseases**

**The cardiovascular system is composed of the blood, blood vessels, and the heart.** Its main functions are to circulate oxygen and nutrients to your body's cells, to carry waste away from those cells, and to carry the blood cells that fight disease.





# Blood and parts of the cardiovascular system



**Blood is a fluid that transports oxygen and nutrients through your body.**

**Adult bodies contain about 5 liters of blood.** At any given time, 10% of your blood is in your lungs, exchanging carbon dioxide (CO<sub>2</sub>) for oxygen (O<sub>2</sub>). At that same moment, about 5% of your blood will be in your smallest capillaries, delivering O<sub>2</sub> to cells, and taking waste CO<sub>2</sub> away. The remaining 85% of your blood is being transported around your body.

**Plasma accounts for about 50% of blood volume.** Plasma is mostly water enriched with glucose (sugar), salts, proteins, and hormones. Plasma is the part of blood that flows. Its job is to carry nutrients, hormones, carbon dioxide, clotting factors, the cells that contain oxygen, and disease-fighting and injury-repairing cells to the parts of the body where they are needed.

**Red blood cells carry oxygen from the lungs to the rest of the body.** Hemoglobin gives these cells their red color. Hemoglobin is made of simple proteins and iron pigments that turn bright red when they react with oxygen. Red blood cells are created inside the marrow of your largest bones. They are almost donut-shaped, with a thick ring surrounding a flat disk. They are very flexible and can bend and twist to fit into capillaries. About 3 million of these cells are created every second. They live for about 120 days. At any given moment, there are 25 trillion red blood cells in your body.

**White blood cells defend the body against infection and disease.** White blood cells are actually colorless. They come in many varieties. Various body organs produce them, and each plays a specific role. Some white blood cells produce antibodies to fight viral infections. Others digest infection-producing bacteria. Still others detoxify foreign substances. White blood cells are larger than red blood cells, and there are fewer of them. The lifespan of white blood cells depends on the service they perform. They travel through the bloodstream to wherever they are needed.

**Platelets are small fragments of cells that clump together to stop bleeding.** Platelets cause blood to clot and form scabs that repair cuts in the skin. They get their name from their shape. Platelets look like tiny oval plates. Like red blood cells, platelets are produced in bone marrow. They have a lifespan of about one week.

**Blood vessels are the pipes that direct the flow of blood through the body.**

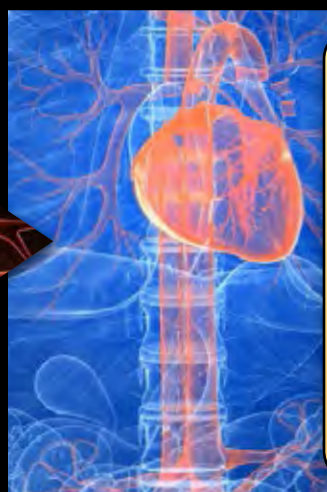
**Arteries are the biggest blood vessels.** They carry blood filled with oxygen away from the heart to all parts of the body. **Arteries** are thick-walled tubes with a circular covering of yellow, elastic muscle fibers that absorb the tremendous pressure wave of a heartbeat and slow the blood down.

**The pressure of waves of blood flowing through your body is known as the pulse.** You can feel your pulse in your arms, wrists, and neck.

Eventually arteries divide into smaller **arterioles** and then into even smaller **capillaries**, the smallest of all blood vessels. One arteriole can serve a hundred capillaries.

**Capillaries are tiny blood vessels with porous walls.** Capillaries extend to almost every part of the body. The **porous walls** mean that O<sub>2</sub>, CO<sub>2</sub>, and nutrients can pass through them. Capillaries are a bit like a train station. The train arrives. Some people get off, some people get on, and then the train departs. In the same way, blood arrives at the capillaries, lets the O<sub>2</sub> and nutrients out through the porous walls of the capillaries. Any CO<sub>2</sub> and waste move through the capillary walls into the blood. The blood then departs the capillary and makes its way back to the heart, to begin its journey again.

**Veins are the blood vessels that return blood to the heart.** Veins, unlike arteries, have thin, slack walls because the blood has lost the pressure which forced it out of the heart. Blood without oxygen is a darker reddish-blue color. Blood oozes through the veins much more slowly than it pumps through the arteries.



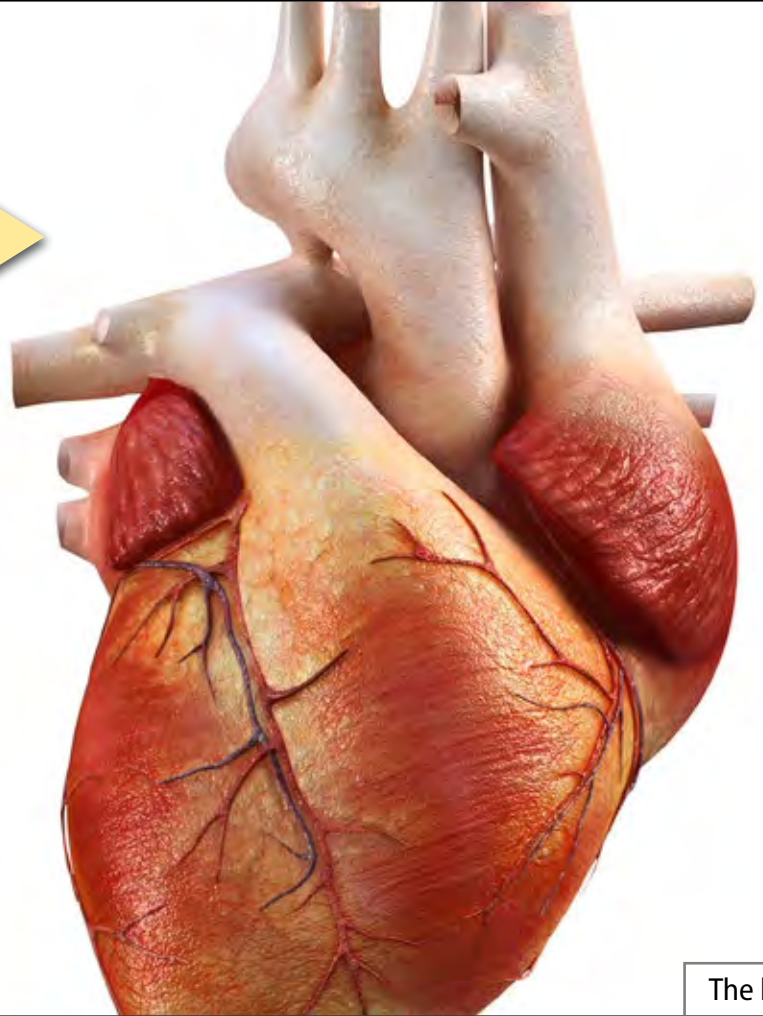


# The heart

**The heart works as two pumps, one on the right and one on the left.** These two pumps work together, drawing blood in as the heart muscles relax and pumping blood out when the heart muscle contracts. One pump (the right side of the heart) takes the blood that is returning in the veins, and pumps it through the lungs. The other pump (the left side of the heart) takes the oxygen-rich blood from the lungs and pumps it to the rest of the body.

**The heart is at the center of the cardiovascular system.**

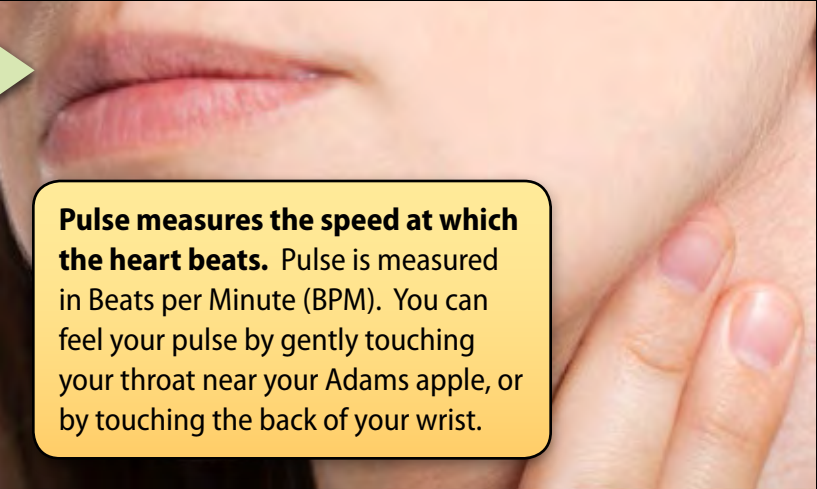
**Each side of the heart (each pump) has two chambers.** The first chamber is the atrium. Blood flows into the atrium from outside the heart. The blood then moves from the atrium into the ventricle. The ventricle then pumps the blood out of the heart to its next destination. Both sides of the heart have an atrium and a ventricle.




The heart

**Valves at the entrance and exit of the ventricle prevent blood from flowing backwards.** Blood is pushed from one chamber to another when the heart muscle contracts. Like a fist tightening, the heart muscle squeezes blood in the heart chambers to push it forward. Valves prevent the blood from flowing backwards.

# Ways to measure cardiovascular strength

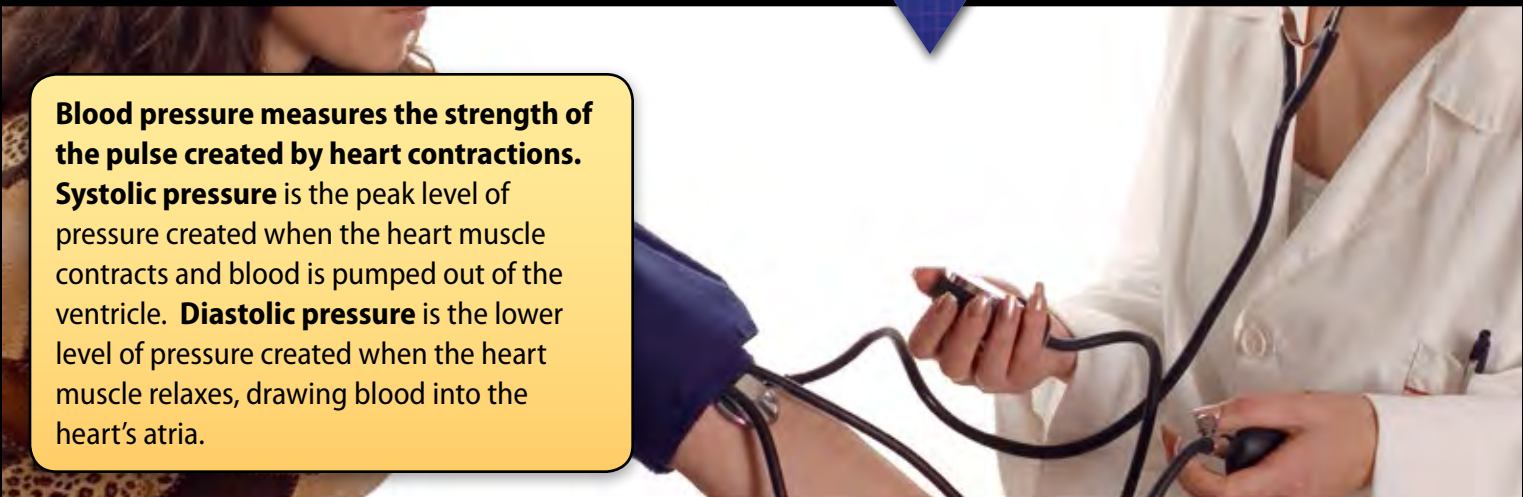


**Pulse measures the speed at which the heart beats.** Pulse is measured in Beats per Minute (BPM). You can feel your pulse by gently touching your throat near your Adams apple, or by touching the back of your wrist.



**Hospitals often use electrocardiograms, which measure the electrical impulses that cause the heart muscle to contract.**

Blood pressure is usually expressed in terms of the systolic pressure over diastolic pressure, for example 120/80.

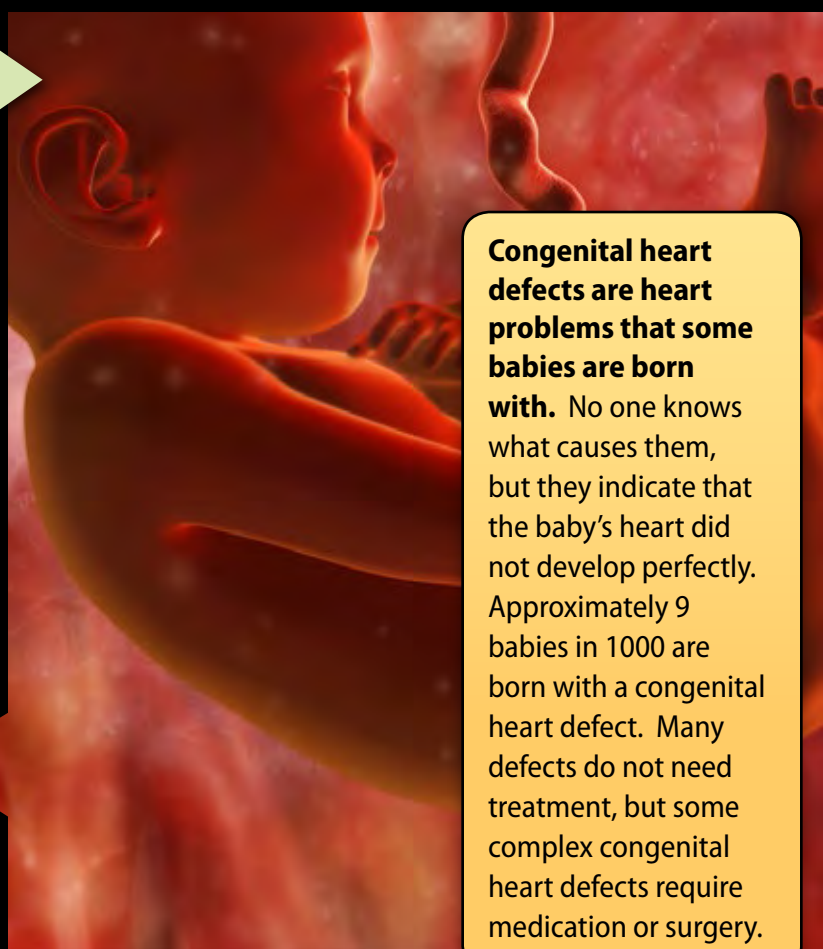


**Blood pressure measures the strength of the pulse created by heart contractions.**

**Systolic pressure** is the peak level of pressure created when the heart muscle contracts and blood is pumped out of the ventricle. **Diastolic pressure** is the lower level of pressure created when the heart muscle relaxes, drawing blood into the heart's atria.

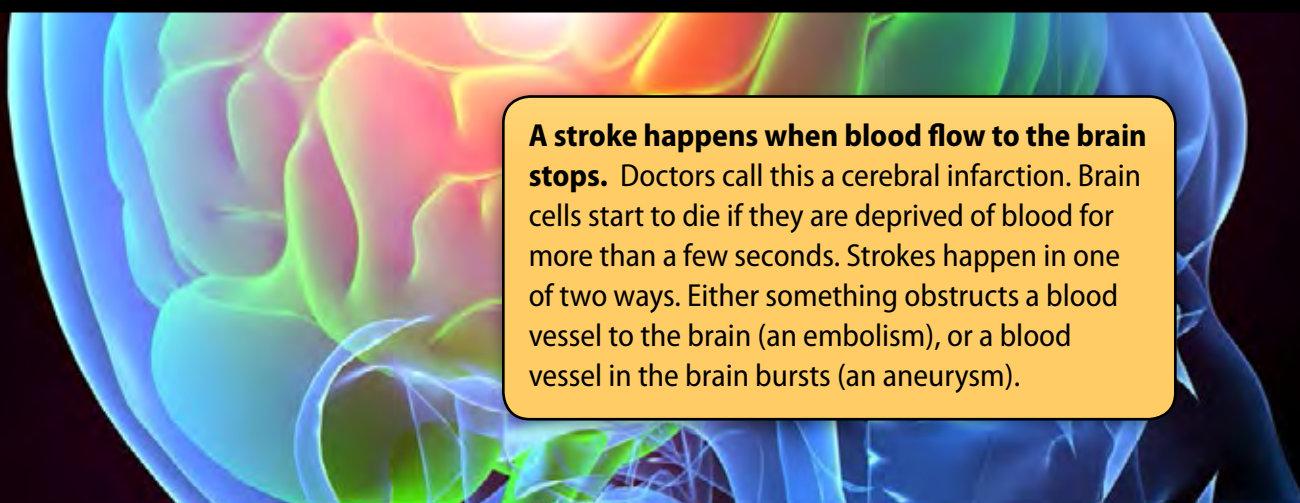


# Heart diseases



**Congenital heart defects are heart problems that some babies are born with.** No one knows what causes them, but they indicate that the baby's heart did not develop perfectly. Approximately 9 babies in 1000 are born with a congenital heart defect. Many defects do not need treatment, but some complex congenital heart defects require medication or surgery.

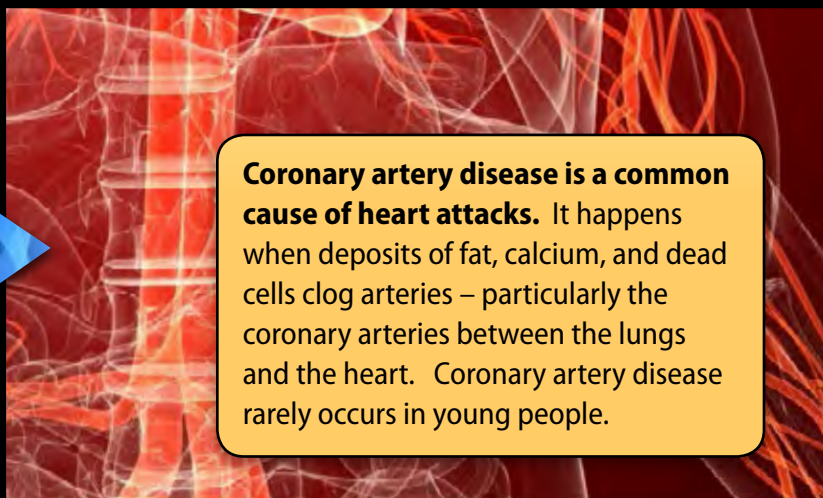
**A heart attack happens when blood flow to the heart is blocked.** Doctors call this a myocardial infarction. Heart attacks are usually caused by a blood clot that blocks one of the coronary arteries. Cells in the heart start to die if they are deprived of oxygen for any length of time.



**A stroke happens when blood flow to the brain stops.** Doctors call this a cerebral infarction. Brain cells start to die if they are deprived of blood for more than a few seconds. Strokes happen in one of two ways. Either something obstructs a blood vessel to the brain (an embolism), or a blood vessel in the brain bursts (an aneurysm).



**Coronary artery disease is a common cause of heart attacks.** It happens when deposits of fat, calcium, and dead cells clog arteries – particularly the coronary arteries between the lungs and the heart. Coronary artery disease rarely occurs in young people.



**Hypercholesterolemia is also known as high cholesterol.** Cholesterol is a waxy substance that is found in the body's cells, in the blood, and in some of the foods we eat. Having too much cholesterol in the blood is a major risk factor for heart disease and can lead to a heart attack.

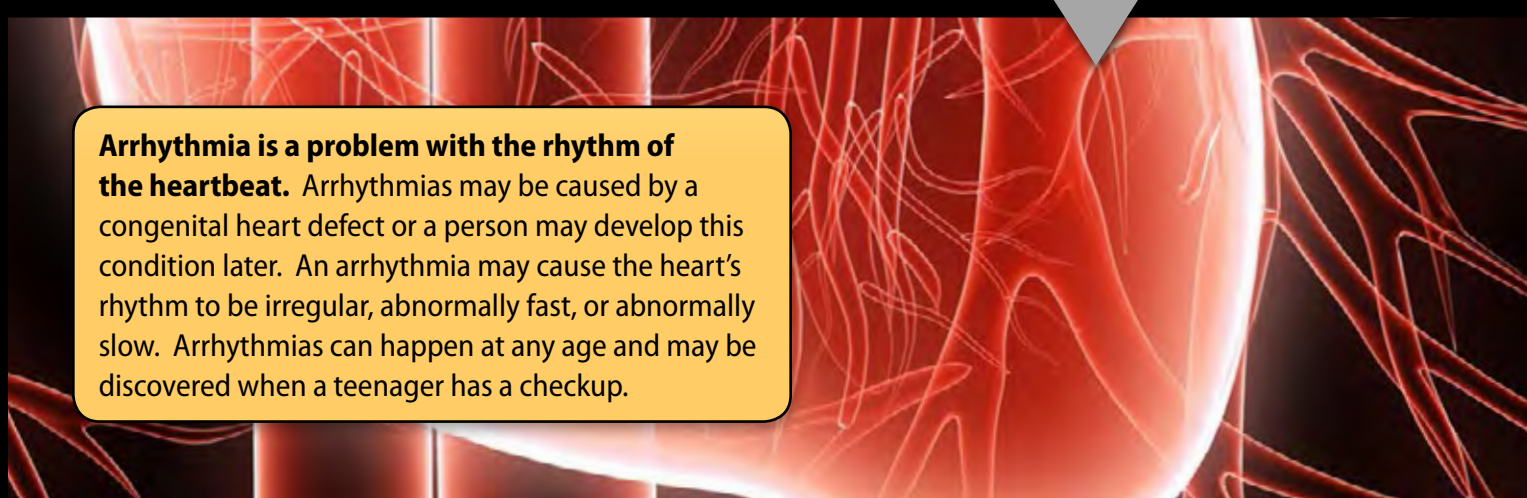


Cholesterol plaque in artery

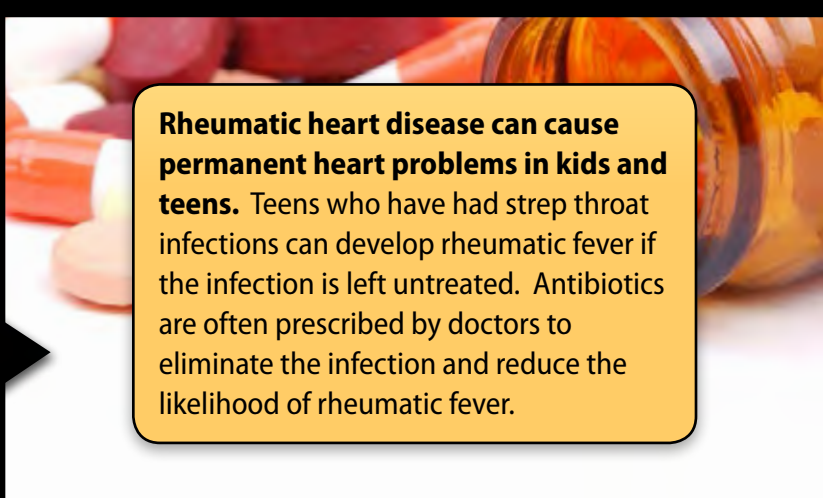


**Hypertension is also known as high blood pressure.** Hypertension happens when a person has blood pressure that remains significantly higher than normal. This creates additional strain for the heart and other organs. Teens can have high blood pressure, which may be caused by genetic factors, excess body weight, diet, lack of exercise, and diseases such as heart disease or kidney disease.

**Arrhythmia is a problem with the rhythm of the heartbeat.** Arrhythmias may be caused by a congenital heart defect or a person may develop this condition later. An arrhythmia may cause the heart's rhythm to be irregular, abnormally fast, or abnormally slow. Arrhythmias can happen at any age and may be discovered when a teenager has a checkup.



**Rheumatic heart disease can cause permanent heart problems in kids and teens.** Teens who have had strep throat infections can develop rheumatic fever if the infection is left untreated. Antibiotics are often prescribed by doctors to eliminate the infection and reduce the likelihood of rheumatic fever.





# Did you know?

Your heart is about the size of your fist and contains four chambers.

The heart contracts more than 100,000 times daily.

About 5 percent of the total blood volume is in the systemic capillaries at any given time. Another 10 percent is in the lungs.

Every day, about 5 liters of blood travels the equivalent of 60,000 miles (about 100,000 kilometers) through blood vessels in our bodies.

Blood is bright red when it is carrying oxygen and dark red when it is not. Veins appear because the fatty underlayer of your skin absorbs the longer (red) frequencies, acting as a color filter.

The heart is a pump that pushes the blood through the body.

The cardiovascular system is composed of blood, blood vessels, and the heart.

Its role is to carry oxygen, hormones, and nutrients to the body, and to take away CO<sub>2</sub> and waste products.

It also delivers disease-fighting cells and repair cells to various parts of the body.

Many heart diseases are preventable.

# Summary



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Is there anything more important than our health and wellness? You can enjoy a better quality of life if you practice healthy living from an early age.

GoVenture Health introduces you to 59 fundamental health and wellness subjects, including 288 topics and 1,000 images. Each topic is presented in a beautiful photobook style that is interesting to read and easy to understand.

GoVenture Health is also available as an ebook (sold separately) with hundreds of games and activities, including crossword puzzles, word searches, matching games, memory games, flash cards, action games, and more!



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