

Ch. 4 Body Systems



Ch. 4 Vocabulary



Vocab

- 💧 Neuron: nerve cell that passes messages throughout the body
- 💧 Impulse:
- 💧 Gland: an organ that produces a chemical
- 💧 Endocrine Gland: an organ that releases chemical substances directly into the blood

Vocab

- ◆ Hormone: substance released by glands. Control many of body's functions
- ◆ Enzyme: chemicals that aid in digestion that help break down food into nutrients
- ◆ Alveoli: The tiny sac at the end of the bronchioles. Where the oxygen enters the blood and carbon dioxide is removed
- ◆ Pathogen: organisms such as bacteria, viruses, and fungi that cause disease
- ◆ Antibody: chemicals that kill specific pathogens

Ch. 4.1 How is the body organized?



Cells Working Together

- ◆ The human body is made up of more than 75,000,000,000,000 cells
- ◆ There are millions of chemical processes happen every minute
- ◆ Cells depend on each other to keep the internal conditions in balance
- ◆ For example the temperature of the body needs to be around 98.6 F
- ◆ The largest human cell, the human egg cell, is about the diameter or a human hair

Levels of Organization

- ◆ All cells are made of the same basic parts but are adapted to perform different tasks
- ◆ Cells are organized by the activities they do
- ◆ Similar cells that work together to perform a task in the body make up tissues
- ◆ Cells that can contract or shorten make up muscle tissue
- ◆ When these cells contract, some part of your body moves

Levels of Organization

- ◆ While the muscle tissue contracts to move your body, the nerve tissue tells the muscle tissue to do so
- ◆ The cells that make up nerve tissues are alike, in that they can carry messages
- ◆ Brain is made up of mostly nerve tissue
- ◆ When two or more tissues work together to do a job, they form an organ
- ◆ The job of an organ is usually not as simple as the job of a tissue
- ◆ For example the heart: muscle tissue that contracts, nerve tissue that directs its activities, and other tissues to hold it together and carry blood

System	Function
Circulatory	Transports oxygen, nutrients, and cell wastes
Digestive	Breaks down foods into a form the body can use
Endocrine	Controls internal conditions, growth, development, and reproduction
Excretory	Removes wastes from the blood
Immune	Defends the body against pathogens
Muscular	Allows body movement and movement of substances within the body
Nervous	Controls body movement, thought and behavior
Reproductive	Produces sex cells and offspring
Respiratory	Provides the body with oxygen and removes gas waste from the blood
Skeletal	Provides body protection and support; interacts with muscles to allow movement

Ch. 4.2 What systems help move body parts



Skeletal System

- ◆ Bones are made of living tissues and nonliving materials deposited by bone cells
- ◆ Blood flows through every part of a bone
- ◆ When you are a baby some of your bones were made of a flexible material called cartilage
- ◆ As you age the cartilage is replaced by hard bone
- ◆ The tip of your nose and the tops of your ears are cartilage

Skeletal System

- ◆ Bones and cartilage make up your skeletal system
- ◆ Bones have several functions:
 - ◆ Support your body and give you height
 - ◆ Some bones protect important organs
 - ◆ Some form new blood cells
 - ◆ Store minerals such as calcium and phosphorus

Muscular System

- 💧 Without muscles you wouldn't be able to stand, breathe, or swallow food
- 💧 The more than 600 muscles of your body make up 40-50% of your body weight
- 💧 The muscles and the tissues that attach them to bones make up the muscular system

Muscular System

- ◆ Your body has 3 types of muscle
- ◆ Cardiac muscle is the muscle tissue in your heart. It is found nowhere else in your body
 - ◆ It can contract time after time without getting tired
- ◆ Smooth muscle can be found in organs of the digestive system and blood vessels
 - ◆ Line your stomach cause it to twist and turn to mix foods with digestive juices
- ◆ These are involuntary muscles because they work automatically to control movements inside your body

Muscular System

- 💧 The third kind of muscle is skeletal muscle
- 💧 This is a voluntary muscle which means you can control them
- 💧 All muscles contract but these are the only ones responsible for movement
- 💧 Pairs of muscles attach to opposite sides of of a bone near a joint
- 💧 When one muscle contracts and pulls the bone, the other relaxes
- 💧 Movement results in the direction of the pulling muscle

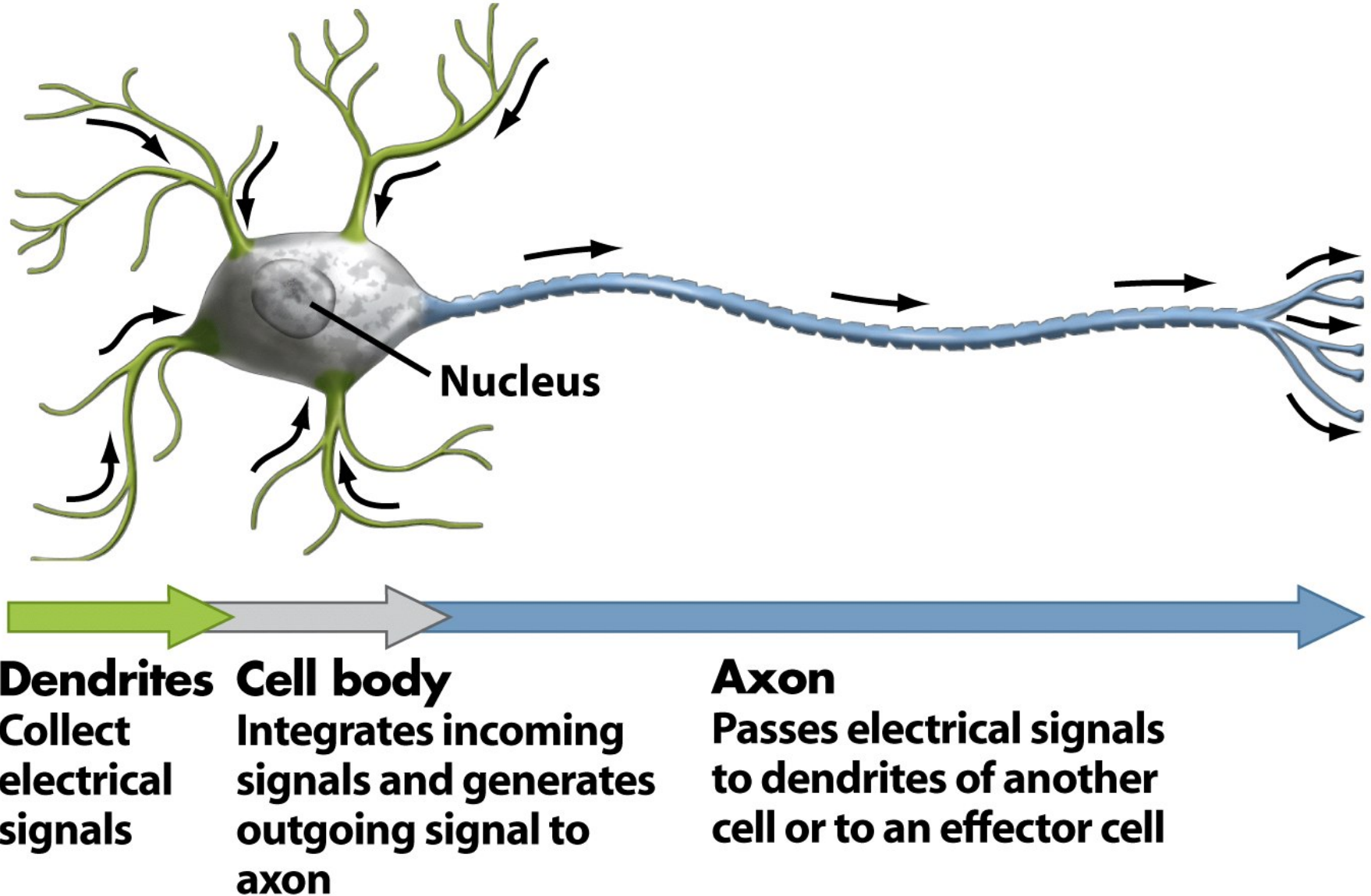
Ch. 4.3 How do systems control the body?



Nervous System

- ◆ Nervous system includes the brain, the spinal cord, nerves, and sense organs
- ◆ It is constantly collecting information both inside and outside your body
- ◆ It allows you to speak, think, taste, hear and see
- ◆ It helps the body stay balanced by processing and responding to the information it receives

Information flow through neurons



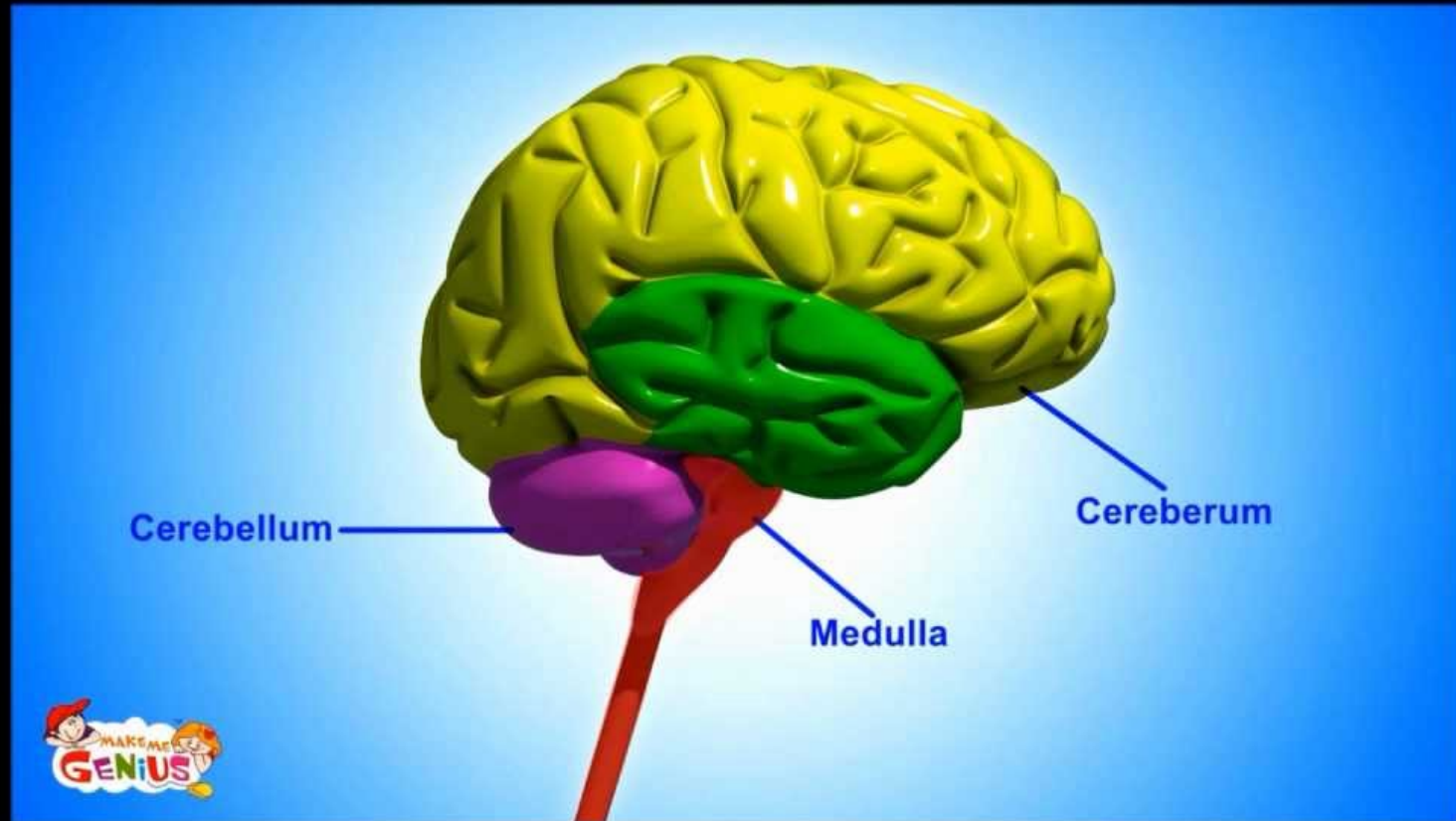
Nervous System

- ◆ When the dendrite of a neuron receives a message, the chemical makeup changes
- ◆ The chemical change causes an impulse to travel along the neuron and from one neuron to the next
- ◆ The impulses can only travel in one direction, from axon to dendrite
- ◆ Most impulses travel to the brain

The Brain

- 💧 Much of the information your nervous system collects is processed by the brain
- 💧 The brain interprets the information and sends messages telling your body to act
- 💧 Impulses received and sent by the brain pass through the spinal cord
- 💧 This long bundle of nerves run down your back
- 💧 Some carry messages to the brain, others away

Brain Cells



Reflexes

- 💧 Some messages the body receives do not pass to the brain
- 💧 A reflex is an action that happens automatically without the brain “thinking”
- 💧 Reflexes happen very fast
- 💧 They help protect the body from dangerous situations

Endocrine System

- ◆ Your endocrine system helps balance the slower body processes such as growth and sugar levels in the blood
- ◆ The endocrine system is made up of glands
- ◆ The endocrine glands are organs that release their chemical substances directly into the blood
- ◆ The substance they release is called hormones

Endocrine System

- ◆ It continually checks your body's condition
- ◆ It releases hormones when needed to maintain the internal balance
- ◆ Each hormone travels to a particular target cell
- ◆ These cells then produce a certain task

Endocrine Glands

Gland	Function
Pituitary	Controls development and body growth. Controls the thyroid, ovaries, testes and other glands
Thyroid	Controls how cells release energy
Parathyroids	Control the amount of calcium and phosphorus in the blood
Adrenals	Control the body's reaction to anger, fright, or fear
Pancreas	Controls the amount of glucose in the blood
Ovaries	Control female characteristics and the menstrual cycle
Testes	Control male characteristics

Biofeedback Loop

- ◆ To keep the body in balance, glands can release fewer or more hormones
- ◆ This allows the glands to turn on, turn off, speed up or slow down the activities of organs and tissues
- ◆ A biofeedback loop is a circular pathway that sends information back and forth from one part of the body to another

Ch. 4.4 How do systems transport materials?



Digestive System

- ◆ Body cells can't use most of the foods you eat until they are broken down into simpler substances
- ◆ Some foods break down during mechanical digestion which is the tearing, crushing and mashing of food
- ◆ In chemical digestion, enzymes break down food into nutrients

Digestive System Organs

- ◆ Liver: Produces bile, which helps digest fat; stores some nutrients and breaks down harmful substances in the blood
- ◆ Gallbladder: Bile produced by the liver is stored here until it is released to the small intestine when needed
- ◆ Pancreas: Produces enzymes that flow into the small intestine; these enzymes neutralize stomach acid that is mixed with food that enters the small intestine

Process of Digestion

- ◆ Mouth: mechanical digestion starts in mouth where teeth shred food. Tongue mixes food with saliva, which is a mixture of water and enzymes. Begins the process of chemical digestion. Starts the breakdown of starch into simple sugars
- ◆ Esophagus: After food becomes soft and moist, the tongue pushes it down to the esophagus. Rhythmic contractions of the smooth muscles push the food to the opening of the stomach
- ◆ Stomach: Continues mechanical digestion by squeezing its contents with muscular contractions. Glands in stomach produce enzymes and acid that begin the breakdown of proteins. Acid kills bacteria that have been swallowed with the food. After several hours, food becomes a soupy mixture

Process of Digestion

- ◆ Small Intestine: Most digestion takes place here. Tiny, fingerlike projections, called villi, line the small intestine. Digested food passes into the blood through the walls of the villi. The villi absorb about 7. liters of fluid a day
- ◆ Large Intestine: Materials that can't be absorbed into the bloodstream pass into the large intestine. Little digestion takes place here. Absorbs water from the undigested material and stores solid wastes until they leave the body

Circulatory System

- ◆ The villi in the small intestine contain blood vessels that pick up nutrients and pass them into the blood
- ◆ These vessels carry blood and nutrients to all parts of your body
- ◆ Carrying materials and nutrients throughout the body is the job of the circulatory system
- ◆ The circulatory system is made up of blood, the heart and blood vessels

Circulatory System

- ◆ The liquid part of the blood is called plasma
- ◆ It contains nutrients picked up from the small intestine, waste products produced by cells, red and white blood cells and platelets
- ◆ When blood picks up nutrients, the blood is traveling in tiny blood vessels called capillaries
- ◆ Capillaries are the smallest blood vessels in your body
- ◆ They are so small that red blood cells must travel through them one at a time
- ◆ Materials are exchanged between the blood in the capillaries and the cells they pass among

Circulatory System

- ◆ Blood flows from capillaries into larger vessels called veins
- ◆ Veins carry blood to the heart
- ◆ The heart is a muscular organ about the size of your fist
- ◆ The pumping of your heart moves blood through all parts of your body
- ◆ Blood travels away from the heart through muscular tubes called arteries
- ◆ As arteries move farther from your hear, they branch and become smaller and smaller until they form capillaries

Blood Cells

- ◆ Red blood cells carry oxygen to your cells
- ◆ White blood cells attack and destroy bacteria, viruses, and other disease-causing particles
- ◆ Platelets are pieces of cells formed in bone marrow. When you are cut or bleeding, platelets cause tiny fibers to form in the blood. These fibers cause the blood to clot, which helps stop bleeding

Respiratory System

- ◆ Cells use oxygen to release energy from the nutrients
- ◆ In this process, carbon dioxide is produced and needs to be removed
- ◆ Blood is the substance that delivers oxygen and removes carbon dioxide. It does this as it travels through your lungs
- ◆ Your lungs, nose, trachea, and bronchial tubes form your respiratory system

Respiratory System

- ◆ The function is to take in oxygen from the air and release carbon dioxide from the body
- ◆ When you breath in air enters the nose and moves to the lungs through the trachea
- ◆ The trachea branches into bronchial tubes, which continue to branch into smaller and smaller tubes. The smallest being bronchioles.
- ◆ In the lungs, the bronchioles end at the alveoli, which are covered by the capillaries
- ◆ In the alveoli oxygen enters the blood and carbon dioxide is removed

Ch. 4.5 How do systems keep the body healthy?



Immune System

- ◆ Your body is constantly defending itself from pathogens
- ◆ Pathogens can be found everywhere, but most never have a chance to make you sick
- ◆ Your body has several ways to defend itself
- ◆ Your skin is the first layer of protection.
- ◆ Tears help wash away bacteria and contain chemicals that kill it

Immune System

- ◆ The linings of your nose, mouth and throat secrete mucus that traps pathogens
- ◆ The saliva and juices produced in the stomach contain chemicals that kill bacteria
- ◆ Reflexes also help get rid of bacteria
 - ◆ Sneezing, coughing, and throwing up bad foods

Immune System

- ◆ Even with all the defenses, pathogens still enter the body
- ◆ When a pathogen enters the body the immune system springs to action
- ◆ First, there is an increased blood flow to the area of the pathogen
- ◆ This increase in blood supply signals to one type of white blood cell to attack and kill pathogens
 - ◆ This type of white blood cell will attack any invader

Immune System

- ◆ Other types of white blood cells are more specialized
- ◆ They can tell the difference between pathogens and release antibodies to attack them
- ◆ This response allows the body to recognize and fight the same pathogen if it enters the body again
- ◆ Your body responds to a vaccine the same way. It is made of dead or weakened pathogens that the body uses to train and prepare to see that pathogen again