**Unit 5 Chapter 14 Skeletal, Muscular, and Nervous Systems**

**Skeletal System Functions:**

* Providing support for the body
* Protecting internal tissues and organs from damage
* Acting as a framework for attached muscles
* Allowing movement of limbs and digits
* Producing new red and white blood cells
* Storing fat and minerals, such as calcium and phosphorus

**Bones-** made up of living tissues formed into different layers. Outer layer is hard, densely packed, compact bone.

-Beneath that is spongy bone, a less dense bone with a network of cavities filled with red bone marrow, where blood cells are produced.

**Connective Tissue**

**Cartilage-** a strong, flexible connective tissue that can also act as a cushion between two bones to reduce friction.

**Ossification-** the process by which bone is formed, renewed, and repaired.

**Ligament-** band of fibrous, slightly elastic connective tissue that attaches one bone to another.

**Tendon-** is a fibrous cord that attaches muscle to the bon.

**Eat a healthy diet, get regular physical activity, and have regular checkups to keep your skeletal system healthy. Foods high in calcium, vitamin D, Phosphorus help prevent skeletal disorders.**

**Understanding Skeletal Problems**

**Fracture-** any type of break in the bone, compound fracture is where the broken end goes through the skin.

-Hairline fracture: parts of the bone do not separate

-Transverse fracture- when the fracture is completely across the bone

-Comminuted fractures: when the bone shatters into more than two pieces

**Injuries to joints-** can occur from overuse, strain, or disease

-Dislocation: results when a bone slips out of place, tearing the ligaments that attach the bone at the joint.

-Torn Cartilage- results from a sharp blow to a joint or a severe twisting of a joint.

-Bursitis- results from the painful inflammation of bursa, a fluid filled sac that helps reduce friction in joints

-Bunions- are painful swellings of the bursae in the first joints of big toes.

-Arthritis- inflammation of a joint, resulting from an injury, natural wear and tear, or autoimmune disease.

-Carpel tunnel syndrome- occurs when ligaments and tendons in the wrist swell. Causing numbness, a tingling sensation in the thumb and forefinger, pain, and weakness in the hand.

-Osteoporosis- condition in which there is a progressive loss of bone tissue.

**Muscular System**

Like rubber bands, muscles are elastic; they stretch to allow a wide range of motion. This allows them to move the bones or organs that they are attached to.

-Muscles are made up of hundreds of long cells called muscle fibers; major muscles in the body are made up of hundreds of bundles of these fibers.

**Types of Muscles**

**Smooth Muscles-** are muscles that act on the lining of the body’s passageways and hollow internal organs. EX: found in digestive tract, urinary bladder, lining of blood vessels, and the passageways that lead to the lungs \*\*Involuntary muscles\*\*

**Skeletal muscles-** muscles attached to bone that cause body movements. Skeletal muscle has a striated or striped appearance under the microscope. Most of muscle tissue is skeletal and under voluntary control. Skeletal muscles often work together and perform opposite actions to produce movement. One contracts while the other relaxes.

**Flexor-** muscle that closes a joint

**Extensor-** muscle that opens a joint

**Cardiac Muscle-** a type of striated muscle that forms the wall of the heart. This muscle is involuntary and is responsible for the contraction of your heart. It contracts rhythmically about 100,000 times each day to pump blood through your body.

**Caring for Muscles:**

* Get regular exercise
* Eat high protein foods to build muscle
* Practice good posture to strengthen back muscles
* Use proper equipment and wear appropriate clothing to protect muscles during any physical activity.

**Understanding Muscular problems**

**Bruises:** are areas of discolored skin that appear after an injury, usually a blow to the body**.** The injury causes the blood vessels beneath the skin to rupture and leak, resulting in a bruise. Large bruises can be treated with an icepack.

**Muscle Strains and Sprains:** result when muscles are stretched or partially torn from over exertion. Apply ice to reduce swelling, and the rest of the infected area.

**Tendonitis:** or the inflammation of a tendon can be the consequence of injury, overuse, or natural aging. Treatment includes ultrasound or anti-inflammatory medication to reduce pain and swelling.

**Hernia:** occurs when an organ or tissue protrudes through an area of weak muscle. Hernias commonly occur in the abdomen from straining to lift a heavy object. Surgery is usually recommended, and may be required to repair the hernia.

**Muscular Dystrophy:** is an inherited disorder in which skeletal muscle fibers are progressively destroyed. There is no cure, but with early detection, muscle weakness can be delayed through exercise programs.

**Nervous System**

\*Complex network that allows communication between the brain and parts of the body. It stores information and coordinates all activities, from breathing or digesting food to sensing pain and feeling fear. The brain, spinal cord and nerves work together, transmitting messages between organs, tissues, and cells.

**Central Nervous system (CNS):**  consists of the brain and spinal cord.

**Peripheral Nervous System (PNS):** gathers information from inside and outside your body. This includes nerves that extend from the brain, spinal cord, and sensory receptors, such as those in the skin.

**\*\*CNS receives messages from nerves in the PNS, interprets them, and sends out response\*\***

**Neurons:** or nerve cells transmit messages to and from the spinal cord and brain. Three Types:

* **Sensory neurons:** carry messages from the receptors in the body to the CNS.
* **Motor neurons:** carry messages from the CNS back to muscles or glands in response to an impulse.
* **Interneurons:** communicate with and connect to other neurons.

**Cell Body-** of a neuron contains the nucleus, which regulates the production of proteins within the cell. Unlike other cells in the body, neurons have limited ability to repair damage or replace destroyed cells.

**Dendrites:** are branched structures that extend from the cell body in most neurons. These receive information and transmit impulses toward the cell body.

**Axons:** transmit impulses away from the cell body and toward another neuron, muscle cell, or gland.

**Brain**

**Cerebrum:**  is the largest and most complex part of the brain. Billions of neurons in the cerebrum are the center of conscious thought, learning, and memory. The right and left sides or hemispheres communicate with each other to coordinate movement. Right hemisphere controls the left side of the body. The left Hemisphere controls the right side of the body. The left hemisphere is the center of language, reasoning, and critical thinking skills. The right hemisphere is the center for processing music and art and comprehending spatial relationships. Each hemisphere has four lobes:

**The frontal lobe:** controls voluntary movements and has a role in the use of language. The prefrontal areas are involved with intellect and personality.

**The parietal lobe:** is involved with sensory information, including feelings of heat, cold, pain, touch, and body position in space.

**The occipital lobe:** controls sense of sight.

**The temporal lobe:** contains the sense of hearing and smell, as well as memory, thought and judgment.

**Cerebellum:** is the second largest part of the brain. It coordinates the movement of skeletal muscles. This also continually receives messages from sensory neurons in the inner ear and muscles. It uses this information to maintain the body’s posture and balance. Being able to carry out complex movements like serving volleyball, or playing the violin is made possible by the cerebellum.

**Brain Stem:** is a 3 inch long stalk of nerve cells and fibers that connects to the spinal cord to the rest of the brain. Incoming sensory impulses and outgoing motor impulses pass through the brain stem.

**Medulla Oblongata:** regulates heartbeat, respiratory rate, and reflexes such as coughing and sneezing.

**The Pons:** helps regulate breathing and controls the muscles of the eyes and face.

**The midbrain:** controls eyeball movement, pupil size, and the reflexive response of turning the head.

**Thalamus:** relays incoming sensory impulses from the eyes, the ears, and pressure receptors in the skin.

**Hypothalamus:** regulates body temperature, appetite, sleep, and controls secretions from the pituitary gland, affecting metabolism, sexual development, and emotions

**Automatic Nervous System**

**-**controls involuntary functions like digestion and heart rate. It has two smaller networks:

-Sympathetic nervous system: kicks in when you are startled, sending messages that cause your heart rate to increase. Blood vessels in your muscles dilate allowing greater blood flow. This is the “fight or flight” response that prepares you to react in a dangerous situation.

-Parasympathetic nervous system: opposes the action of the sympathetic nervous system by slowing body functions. During periods of rest, it slows heartbeat, relaxes blood vessels, and lowers blood pressure to conserve energy. It stimulates production of saliva and stomach secretions to promote the digestion of food.

**Somatic Nervous System**

-Involves voluntary responses that are under your control. Sensory neurons relay messages from the eyes, ears, nose, tongue, and skin to the CNS. Motor neurons carry impulses from the CNS to skeletal muscles.

**Problems with Nervous System**

**Headaches:**  can be caused by muscle tension, eyestrain, and exposure to fumes, a sinus infection, dehydration, or food allergies. Migraines are recurrent headaches that may be accompanied by sensitivity to light.

**Head Injuries:** each year 435,000 American children and teens sustain brain injuries. Types of head injuries include concussion, temporary loss of consciousness, contusion (a bruising of the brain tissues that causes swelling, and coma) caused by major trauma.

**Spinal Injuries:** these require medical care. Swelling of the spinal cord or the tissue around it can result in temporary loss of nerve function. Permanent nerve damage will result without treatment. If the spinal cord has been severed; paralysis results.

**Meningitis:** is an inflammation of the spinal cord and cranial meninges caused by bacterial or viral infection. This is very serious can result in death. Symptoms include fever, headache, light and sound sensitivity, and neck stiffness.

**Some nervous system diseases are degenerative, which means they occur over time as cells break down.** **Multiple sclerosis, Parkinson’s disease and Alzheimer’s are examples.**

**Epilepsy:** is a disorder of the nervous system that is characterized by recurrent seizures, sudden episodes of uncontrolled electrical activity in the brain. Causes include brain damage at birth, infections, head injury, or exposure to toxins. Medication can help.

**Cerebral Palsy:** refers to a group of neurological disorders that are the result of damage to the brain before, during, or just after birth or in early childhood. Physical therapy and medication can help patients cope.