The Skeletal System

Chapter 15 Lesson 2

Functions of the Skeletal System

- The skeleton plays a crucial role in movement by providing a strong, stable, and mobile framework on which muscles can act.
- Supports and protects your delicate internal organs.
- Bones are living structures and the principal storage centers for essential body minerals such as calcium, and phosphorous.
- Bones are the manufacturing center for the body's blood cells. Red bone marrow produces millions of blood cells each day.

Structure of the Skeleton

- The skeletal system is divided into two main parts:
- **Axial Skeleton-** *includes the 80 bones of the skull, spine, ribs, and sternum.* The vertebrae- small bones that make up your spine- protect your spinal cord. The ribs, most of which are attached to the sternum in your chest, protect your lungs and heart.
- **Appendicular Skeleton-** *includes the 126 bones of the shoulders, arms, hands, hips, legs, and feet.* It helps you perform a wide range of movement.

Types of Bones

- **Strong long bones-** like the femur are found in the arms and legs. The shafts of long bones are called the *diaphyses.* The ends are called *epiphyses.* The epiphyses form joints with other bones. The enlarged ends, which are composed mainly of spongy bone tissue, give stability to joints. The inner part of the epiphyses contain red marow, which produces all the red blood cells and most of the white blood cells and platelets in the body.
- **Short bones-** like those in the wrists and ankles, are as broad as they are long. More than half of all short bones in the body are in the hands and feet.
- **Flat bones-** like the ribs and skull bones, have a thin flat shape. These bones generally serve to protect the vital organs.
- **Irregular bones-** like vertebrae, have a shape that does not fit into any of the other categories. Vertebrae are specifically designed to protect, provide stability, and provide mobility to the spinal cord.

Cartilage

- Definition- *a strong, flexible connective tissue.*
- Different types of cartilage line the surfaces of joints and enable them to move smoothly, cushion adjoining vertabrae, and support the nose and ears. A baby's skeleton is mostly cartilage.
- As the body grows, most cartilage cells are replaced by bone cells and minerals through **ossification-** *the process by which bone is formed, renewed, and repaired.*
- Bone renewal occurs as part of the body's normal process in which old cells are replaced by new cells.
- Bone repair fuses broken bones after a fracture.

Joints

- The point where two bones meet is called a *joint.* Some joints are fixed, such as those between the bones of the skull. Some only allow a small amount of movement, such as those in the vertebrae. Most joints have a wide-range of movement. There are several types of mobile joints:
- **Ball and socket joint-** this type of joint allows for the widest range of movement: backward, forward, sideways, and in a circle. Examples: shoulder and hip.
- **Pivot joint-** in a pivot joint, a bony projection allows rotation. Example: the joint between the vertebrae in your neck allowing your head to rotate.
- **Ellipsoidal joint-** A joint like the one in your wrist, an oval shaped part that fits into a curved space. This allows all types of movement except pivotal.
- **Hinge joint-** allows for bending and straightening. Examples: elbows, and knees.

Joints cont.

- At joints where movement occurs, the surfaces of the bones are coated with smooth, slippery cartilage to reduce friction during movement. **Ligaments** are *tough bands of fibrous, slightly elastic tissue that bind the bone ends at a joint.*
- In addition to binding the bones together, ligaments prevent excessive movement of the joint.
- **Tendons** are *fibrous cords that join muscle to bone or to other muscles.*

Care of the Skeletal System

- Your habits and decisions you make concerning nutrition and exercise can affect the health of your skeletal system now and later in life.
- Calcium is one of several minerals found in dairy products that's essential for building strong bones and is most important during the teen years.
- Phosphorous, another vital mineral, combines with calcium to give bones their rigidity.
- Regular physical activity, especially weight bearing exercise, increases bone mass.
- Exercise promotes better circulation of blood, increasing nourishment to your bones.

Problems of the Skeletal System

- Skeletal system disorders and injuries to bones can be the result of many factors. These include: poor nutrition, infections, sports and recreational mishaps, accidents, and poor posture.
- The skeletal system is also affected by degenerative disorders such as osteoporosis.

Fractures

- Fractures are any type of break in a bone.
- Fractures are divided into two main types, simple and compound.
- In a simple fracture the broken bones do not stick out through the skin.
- In a compound fracture one or both ends of the bone project through the skin

Fractures cont.

- Fractures are classified according to the shape or pattern of the break:
- **Hairline fracture-** the fracture is incomplete, and the two parts of the bones do not separate.
- **Transverse fracture-** the fracture is completely across the bone. This may result from a sharp, direct blow, or from stress caused by prolonged use of an already damaged bone. Example: running, weightlifting.
- **Comminuted fracture-** the bone shatters into more than two pieces, usually from severe force as in an auto accident.

Osteoporosis

- Osteoporosis is a condition in which bone density decreases, causing bones to become brittle and easily fractured.
- Women are especially vulnerable to osteoporosis after menopause, because their bodies no longer produce estrogen, which helps maintain bone mass.
- By getting ample physical activity and good nutrition during your teen years you can help to prevent osteoporosis as you age.

Scoliosis

- Scoliosis is lateral, or side to side curvature of the spine.
- Scoliosis usually starts in early childhood or adolescence and becomes more pronounced as you age.
- Depending on the severity of the curvature, treatment may involve exercise, or a special brace and back surgery.

Injuries to the Joints

- **Dislocation-** results when a bone slips from its normal position at a joint. This is usually accompanied by tearing of the joint ligaments. This condition requires a physician to reset the dislocated bone and immobilize the joint so the tissue can heal.
- **Torn Cartilage-** can result from a sharp blow or severe twisting of a joint. Doctors can now repair some cartilage tears with arthroscopic surgery.
- **Bunion-** painful swelling of the bursa in the first joint of the big toe. These are caused by wearing tight-fitting, or high heeled shoes. Large bunions may only be corrected through surgery.
- **Bursitis**- a painful condition that occurs when the bursa in a joint becomes inflamed. This is common in shoulder and knee joints. Bursitis is usually the result of pressure, friction, or slight injury to the membrane surrounding the joint.
- **Arthritis-** inflammation of a joint, characterized by pain, swelling, stiffness, and redness.

Repetitive Motion Injury

- Definition- *damage to tissues caused by prolonged, repeated movements.*
- This occurs when the same motions are performed for hours at a time. It has been predominately related to computer use.
- One of the most common types is carpal tunnel syndrome. This results when pressure is placed on the median nerve as it passes to the hand through a gap known as the “carpal tunnel”.
- Symptoms of carpal tunnel include weakness, tingling, or burning in the fingers.
- Treatment includes wearing a splint, medication, or surgery.