Physiology

2 stage

LEC 8

the Skeletal System

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the Skeletal System of the Human Body

The skeletal system forms the framework of the human body, providing structure, protection, and support for organs. It plays a crucial role in movement, blood cell production, and mineral storage. This lecture will explore the anatomy, physiology, and functions of the skeletal system, along with common disorders and their clinical significance.

The skeletal system is vital for the overall function and health of the human body. Understanding its structure and functions is essential for recognizing the importance of bone health and the impact of disorders. Preventive measures and early intervention can significantly enhance skeletal health.

Anatomy of the Skeletal System

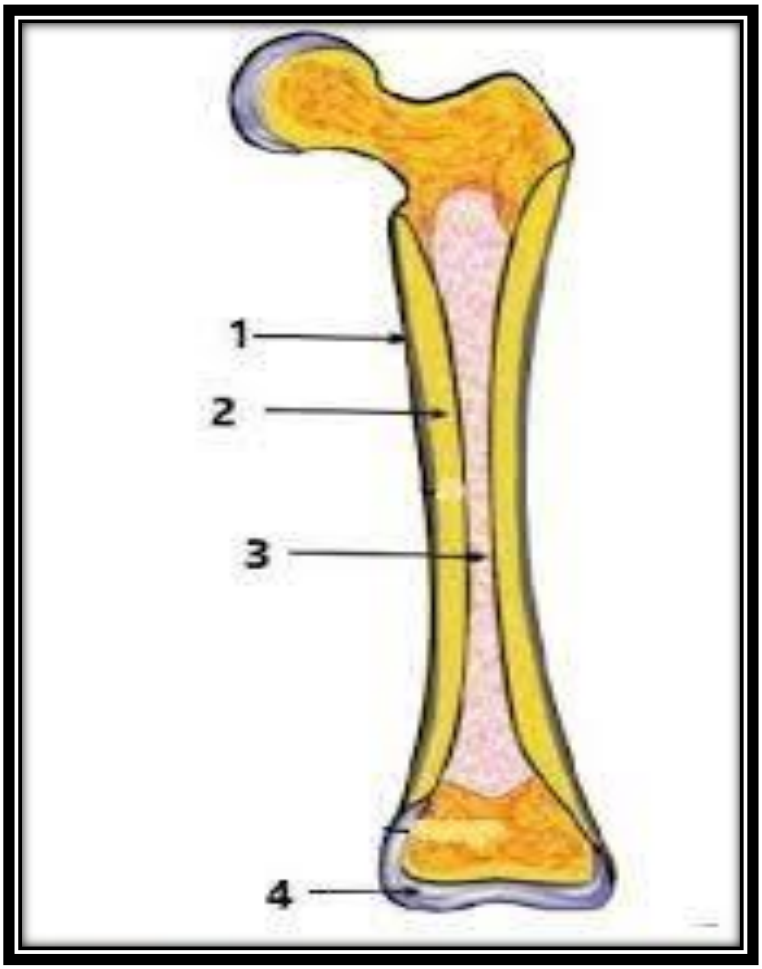
- Composition: The skeletal system consists of bones, cartilage, ligaments, and tendons.
- Total Number of Bones: An adult human has 206 bones, while infants have approximately 270 bones, some of which fuse during growth.

Major Bone Types

- Long Bones: Found in the limbs (e.g., femur, humerus).
- Short Bones: Found in the wrists and ankles (e.g., carpals, tarsals).
- Flat Bones: Protect vital organs (e.g., skull, ribs).
- Irregular Bones: Complex shapes (e.g., vertebrae).

Bone Structure

- Diaphysis: The long shaft of a bone.
- Epiphysis: The ends of long bones, containing spongy bone and red marrow.
- Articular Cartilage: Covers the joint surfaces, reducing friction.
- Periosteum: A dense layer of connective tissue that covers the surface of bones.



Functions of the Skeletal System

1 Support
- Structural Framework: Provides shape and support to the body, allowing for upright posture.

2 Protection
- Vital Organ Defense: Encases and protects organs (e.g., the skull protects the brain, and the ribcage protects the heart and lungs).

3 Movement
- Muscle Attachment: Serves as attachment points for muscles, facilitating movement through joints.

4 Blood Cell Production
- Hematopoiesis: The process of blood cell formation occurs in the red bone marrow found in certain bones.

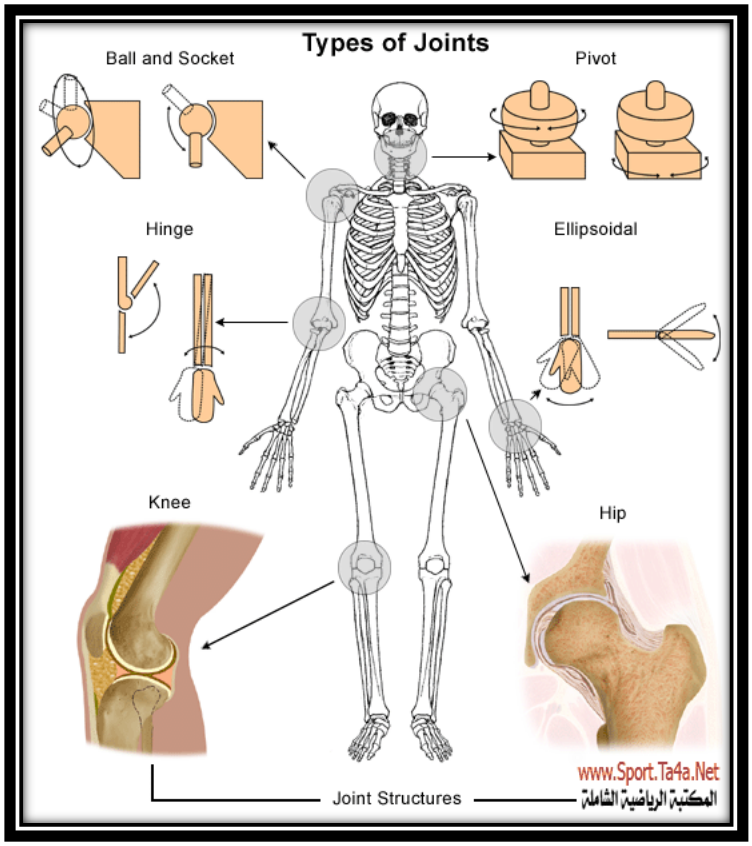
5 Mineral Storage
- Reservoir: Bones store essential minerals such as calcium and phosphorus, releasing them into the bloodstream as needed.

Types of Joints

1 Fibrous Joints
- Description: Immovable joints connected by fibrous tissue (e.g., sutures in the skull).

2 Cartilaginous Joints
- Description: Joints connected by cartilage, allowing limited movement (e.g., intervertebral discs).

3 Synovial Joints
- Description: Freely movable joints characterized by a synovial cavity (e.g., knee, elbow).
- Types: Include hinge joints, ball-and-socket joints, and pivot joints.



Types of Joints

Bone Development and Growth

1 Ossification
- Process: The transformation of cartilage into bone, occurring during fetal development and childhood.

2 Growth Plates
- Epiphyseal Plates: Areas of growing tissue near the ends of long bones that allow for lengthening until adulthood.

3 Remodeling
- Continuous Process: Bones undergo constant remodeling in response to stress, injuries, and hormonal changes.

Common Disorders of the Skeletal System

1 Osteoporosis
- Description: A condition characterized by decreased bone density, increasing fracture risk.
- Risk Factors: Age, hormonal changes, and nutritional deficiencies.

2 Arthritis
- Description: Inflammation of joints, leading to pain and stiffness.
- Types: Includes osteoarthritis and rheumatoid arthritis.

3 Fractures
- Description: Breaks in bones caused by trauma, overuse, or conditions like osteoporosis.
- Types: Simple (closed) fractures and compound (open) fractures.

4 Scoliosis
- Description: A lateral curvature of the spine, which can affect posture and movement.

Clinical Significance

1 Diagnostic Tools
- X-rays: Common imaging technique to view bone structure and detect fractures.
- MRI: Useful for assessing soft tissue injuries around bones and joints.

2 Treatment Options
- Medications: Pain relievers, anti-inflammatory drugs, and medications for osteoporosis.
- Surgery: Procedures like joint replacements or fixation of fractures.

3 Preventive Measures
- Nutrition: Adequate calcium and vitamin D intake for bone health.
- Exercise: Weight-bearing activities to strengthen bones and prevent osteoporosis.