

Chapter 6- The Skeletal System

Section 6.1- Skeleton Overview

Functions

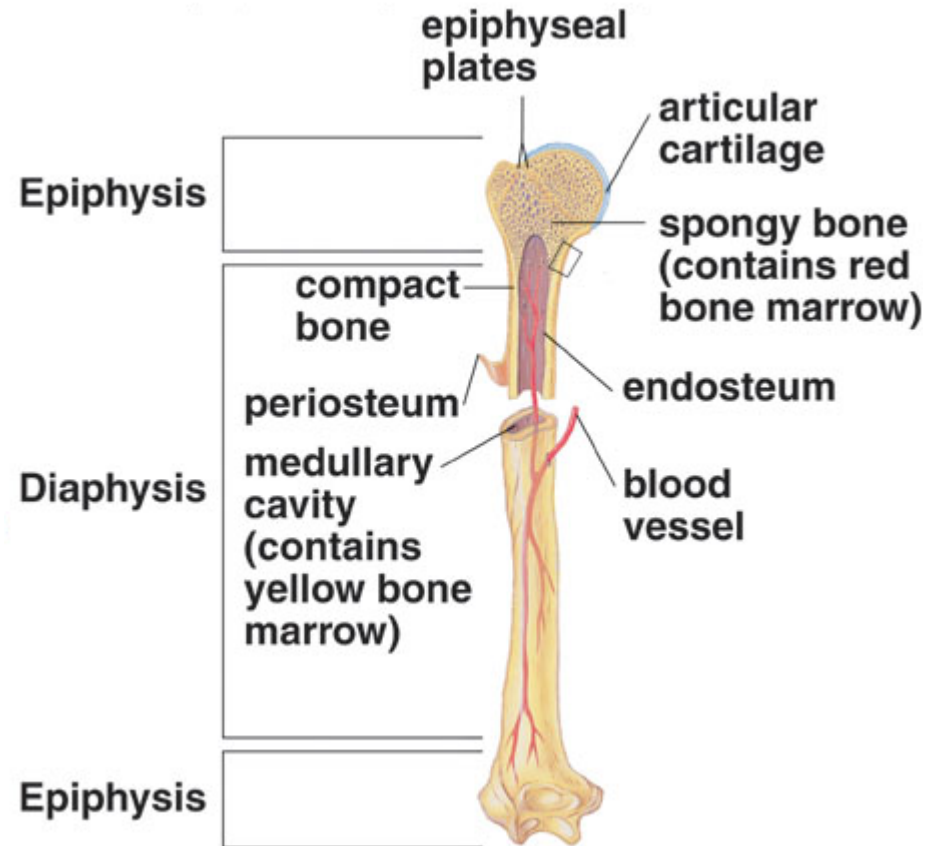
1. Supports body
2. Protects soft body parts
3. Produces red blood cells
4. Stores fat and minerals
5. Along with muscles, creates body movements

Classification of Bones

- Bones are classified by shape
- 5 Classifications
 1. Long- longer than wider
 2. Short- roughly cube shaped
 3. Irregular- varied shapes
 4. Flat- plate-like with broad surfaces
 5. Sesmoid- float, no joint with another bone

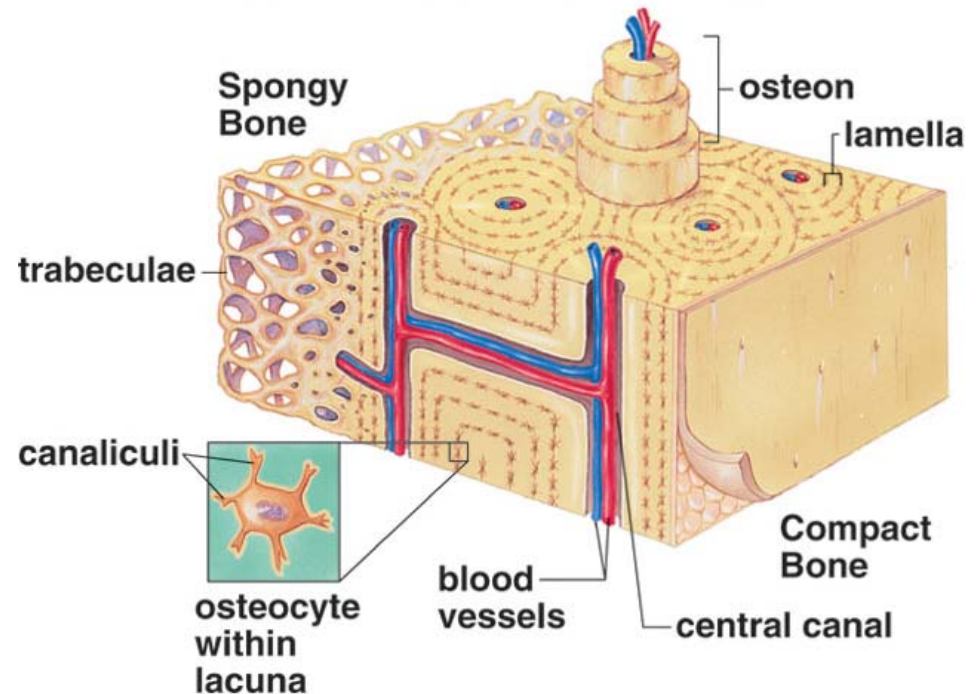
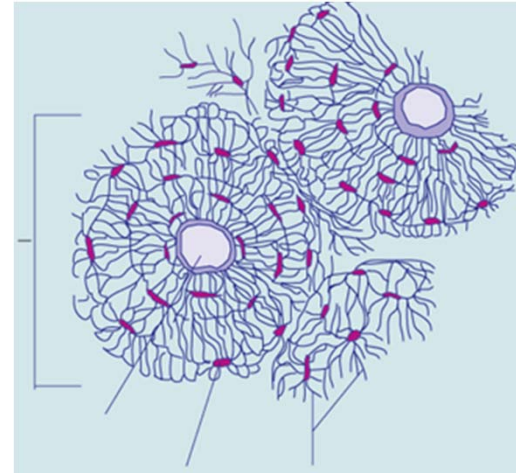
Anatomy of a Long Bone

- **Periosteum**- tough, fibrous CT covering
- **Epiphysis**- “knobby” ends; spongy bone
- **Diaphysis**- shaft; compact bone
- **Medullary Cavity**- contains red & yellow marrow; lined by endosteum
- **Articular cartilage**- hyaline cartilage at joints



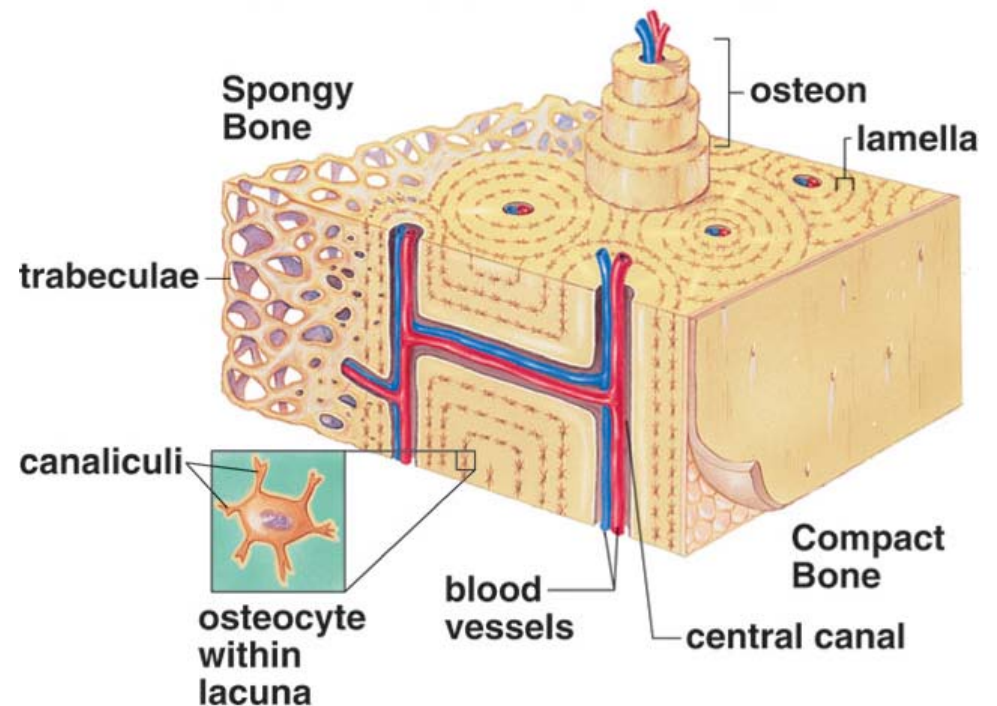
Compact Bone

- Dense bone
- **Osteons**- cylinder shaped units
 - **Osteocytes**- bone cells
 - **Lacunae**- casing around osteocytes
 - **Lamellae**- ring of matrix
- **Central canal**- blood vessels and nerves
- **Canaliculi**- passageways between osteocytes



Spongy Bone

- Cancellous bone
- Light, strong
- **Trabeculae**- bony bars and plates
- **Hematopoiesis**- red blood cell production



Bone Growth and Repair

Cells involved in growth and repair of bone

1. Osteoprogenitor cells- unspecialized cells
2. Osteoblasts- builds bone
3. Osteocytes- mature osteoblasts
4. Osteoclasts- breaks down bone

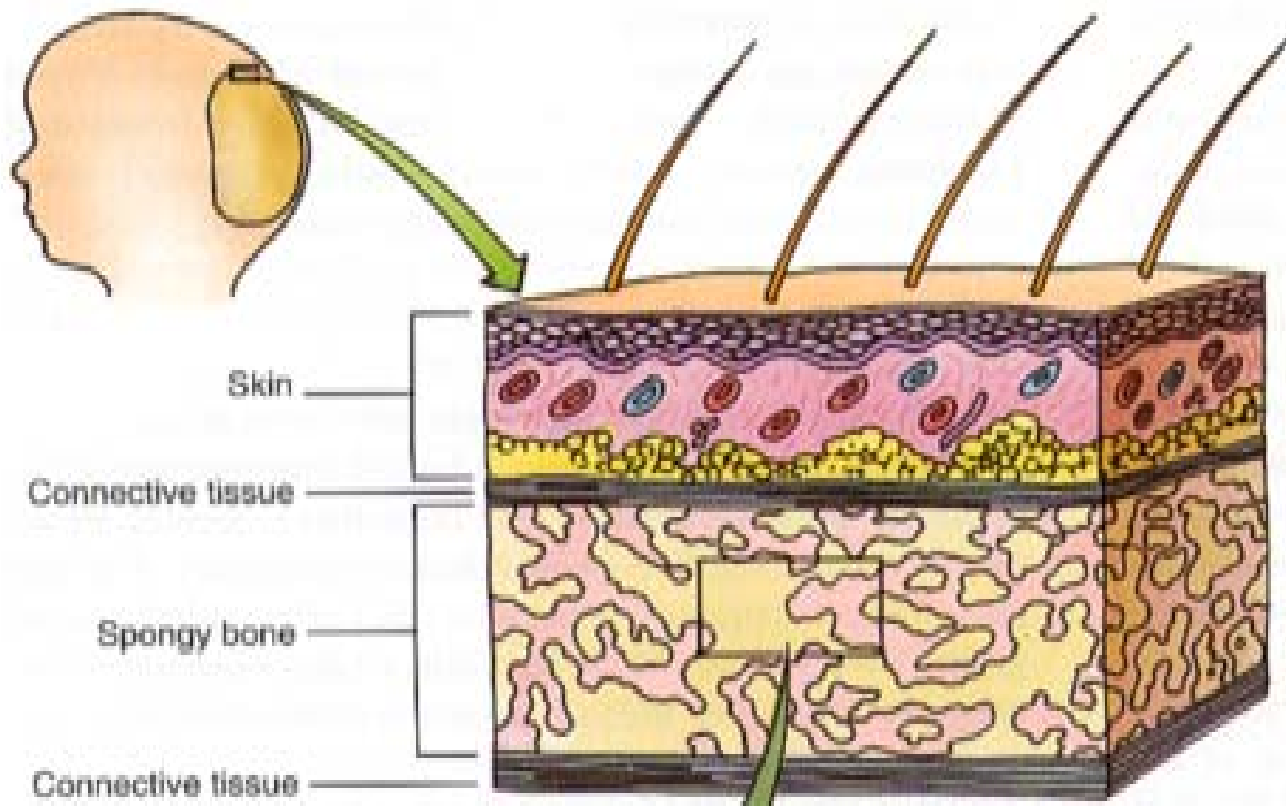
Bone Development and Growth

Ossification- formation of bone

- **2 types**
 1. Intramembranous ossification
 2. Endochondral ossification

Intramembranous Ossification

- Bone develops between sheets of fibrous CT
- Cells of CT become osteoblasts to form bone
- Bones of the skull



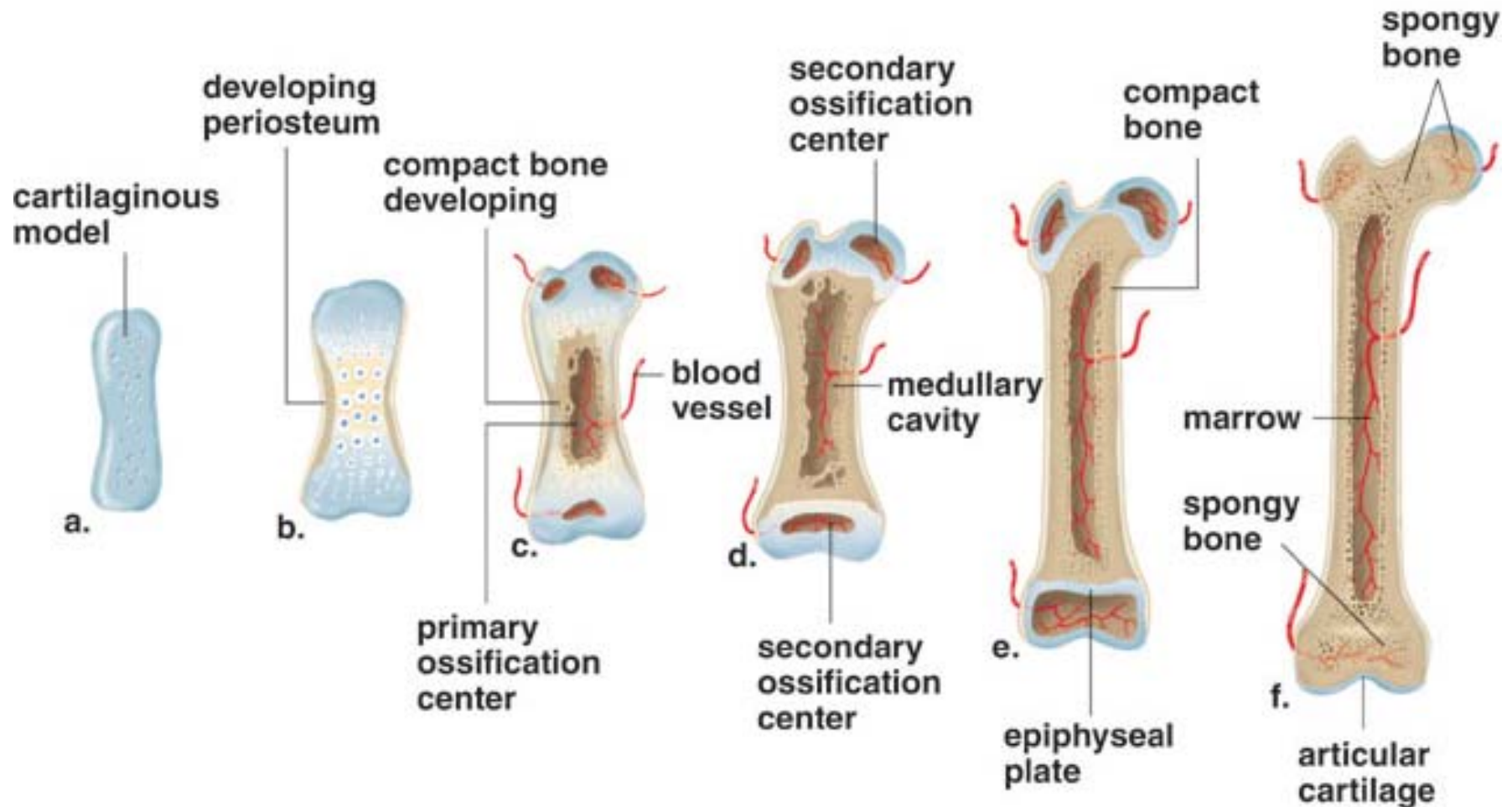
Endochondral Ossification

- Hyaline cartilage is replaced by bone
- Involved in bone formation and lengthening of bone

Stages

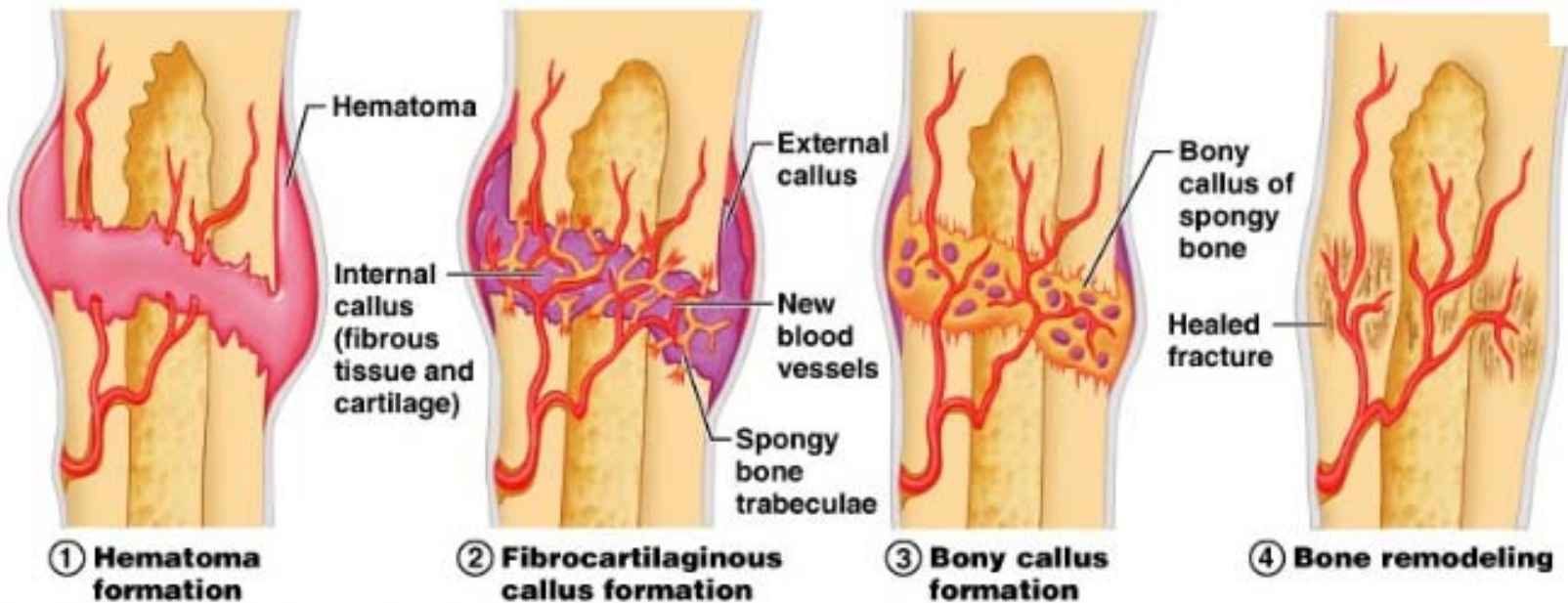
1. Cartilage begins to break down in diaphysis (primary ossification center)
2. Osteoblasts begin to build bone
3. At the epiphyses, osteoblasts build bone (secondary ossification center)
4. Epiphyseal plate (growth plate) remains between 1° and 2° centers
 - Stop growing when plate is completely replaced by bone

Endochondral Ossification



Bone Repair

- Fractures- break in bone
- 4 Steps
 1. Hematoma- swelling, blood clotting
 2. Fibrocartilaginous callus- fibrocartilage fills space
 3. Bony callus- osteoblasts replace FC with bone
 4. Remodeling- osteoclasts reabsorb unneeded bone



Surface Features of Bone

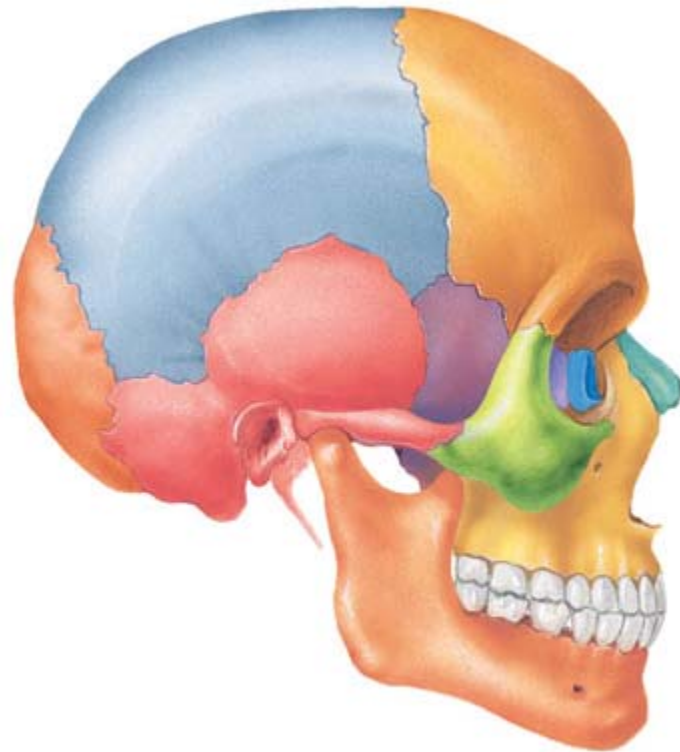
- Be sure to study the table of bone surface features.
- You will need to know these terms when identifying landmarks on bone for your lab practical.

Section 6.4- Joints (Articulations)

- Factors that influence movement
 - Taut binding tissue
 - Bony fit
- Classified by amount of movement allowed
 - Immovable
 - Slightly movable
 - Freely movable
- 3 Types of Joints
 - Fibrous
 - Cartilaginous
 - Synovial

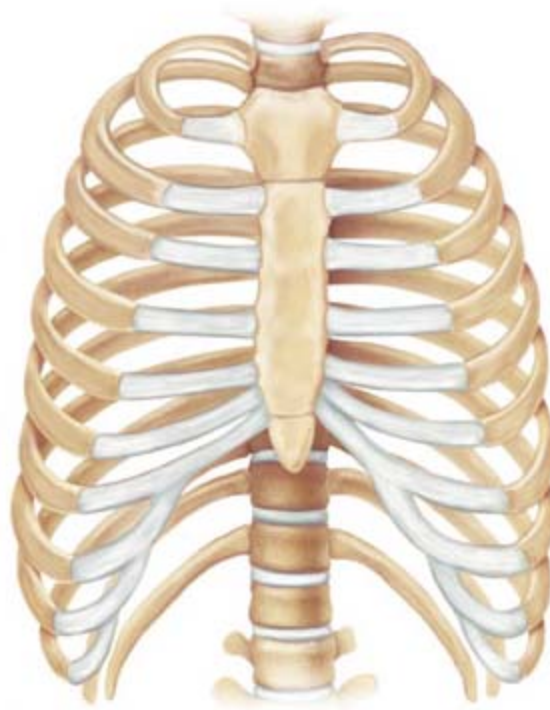
Fibrous Joints

- Immovable
- Joint space filled with fibrous CT
- Sutures of the skull



Cartilaginous

- Slightly movable
- Joint space filled with cartilage
- Between vertebrae, between costals and sternum, pubic symphysis

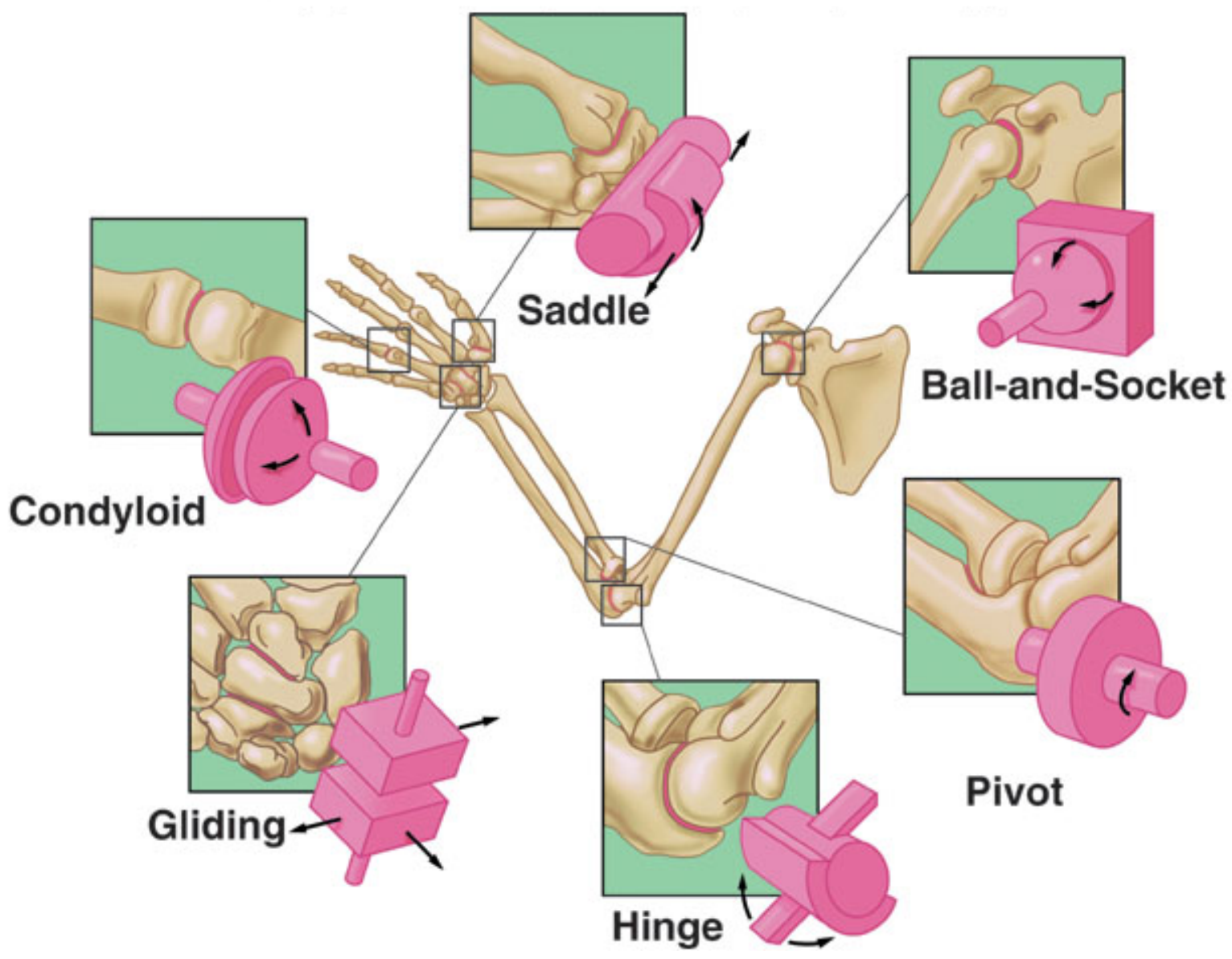


Synovial Joints

- Freely movable- can move in one direction or can move in more than one direction
- Parts of a synovial joint
 - Joint cavity- filled with synovial fluid (reduces friction)
 - Synovial membrane – lines cavity, secretes synovial fluid
 - Joint capsule- stabilizes joint
 - Ligaments- CT joins bone to bone
 - Articular cartilage- caps bones (reduces friction)
- Knee, elbow, shoulder, hip, fingers, toes, etc.

Types of Synovial Joints

- Saddle- 1st metacarpal and 1st proximal phalanx
- Ball and Socket- acetabulum and head of the femur; glenoid fossa and head of the humerus
- Pivot- atlas and axis; head of the radius and the radial notch
- Hinge- elbow; knee
- Gliding- carpals; tarsals
- Condyloid- metacarpals and phalanges, metatarsals and phalanges



Movements Permitted by Synovial Joints

Most movements of the body occur parallel to body planes

Movements begin from anatomical position.

- Angular Movements
- Circular Movements
- Special Movements

Angular Movements in the Sagittal Plane

- Flexion
 - Joint angle decreases from 180° to 0°
 - Dorsiflexion- pull toes toward knees
 - Plantar flexion- point toes
- Extension
 - Joint angle increases from 0° to 180°
- Hyperextension
 - Joint angle past 180°

Angular Movements in the Frontal Plane

- Adduction
 - Move body parts toward midline of body
- Abduction
 - Move body parts away from the midline of body
- Inversion and
 - Ankle turned inward
- Eversion
 - Ankle turned outward
- Tilt

Circular Movements in the Transverse Plane

- Rotation
 - Axis and atlas
 - Twist at the trunk
- Pronation
 - Forearm movement- “pouring”- palm down
- Supination
 - Forearm movement- “supporting”- palm up

Special Movements

- Circumduction
 - making a wide circle with an appendage
- Elevation
 - Raise your shoulders
- Depression
 - Lower your shoulders