

The Skeletal System



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Skeletal System: Made of Connective Tissue

- Three types of connective tissue
 - Bone (Osseous tissue)
 - Ligaments
 - Cartilage

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Bones – Functions

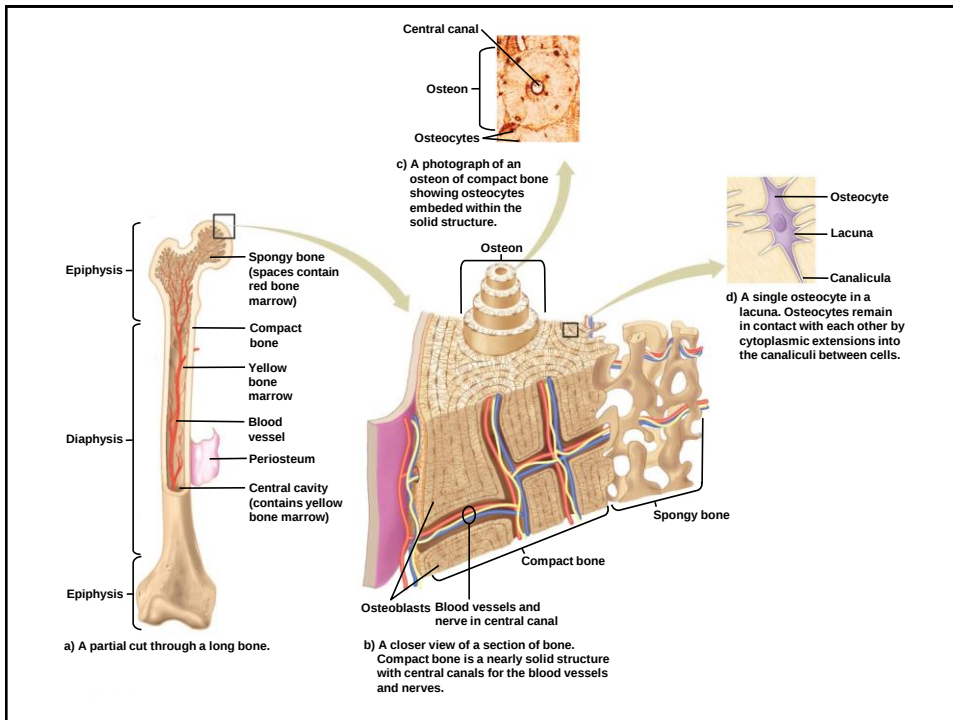
- Bones
 - hard elements of the skeleton
- Five important functions
 - 1.Support
 - 2.Protection
 - 3.Movement
 - 4.Blood cell formation
 - 5.Mineral storage
 - Calcium
 - Phosphate

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Bone – Structure

- **Bone:**hard inorganic matrix of calcium salts
 - **Compact:** forms shaft and ends, contains marrow space
 - **Spongy:** trabeculae
 - **Cells:** osteoblast, osteocytes, osteoclasts
 - **Types:** long, flat, irregular
- **Osteons/haversian system**
 - cellular arrangement
- **Periosteum**
 - connective tissue covering

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Cartilage and Ligaments

• Cartilage

– Function

- support

– Types

- Fibrocartilage
- Hyaline
- Elastic cartilage

• Ligaments

– Function

- attach bone to bone

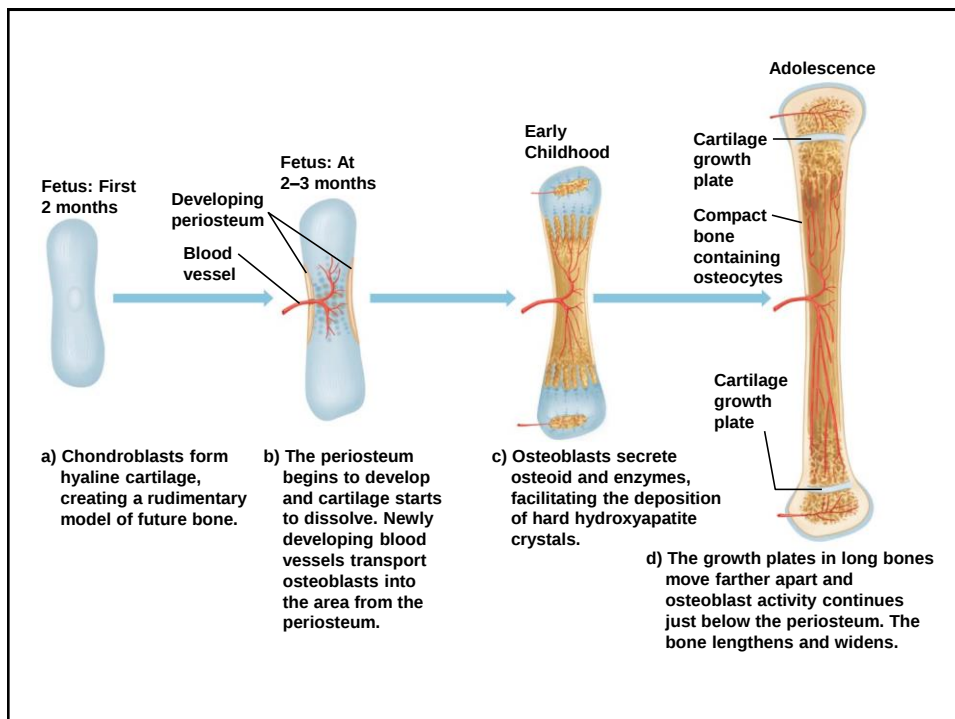
– Dense fibrous connective tissue

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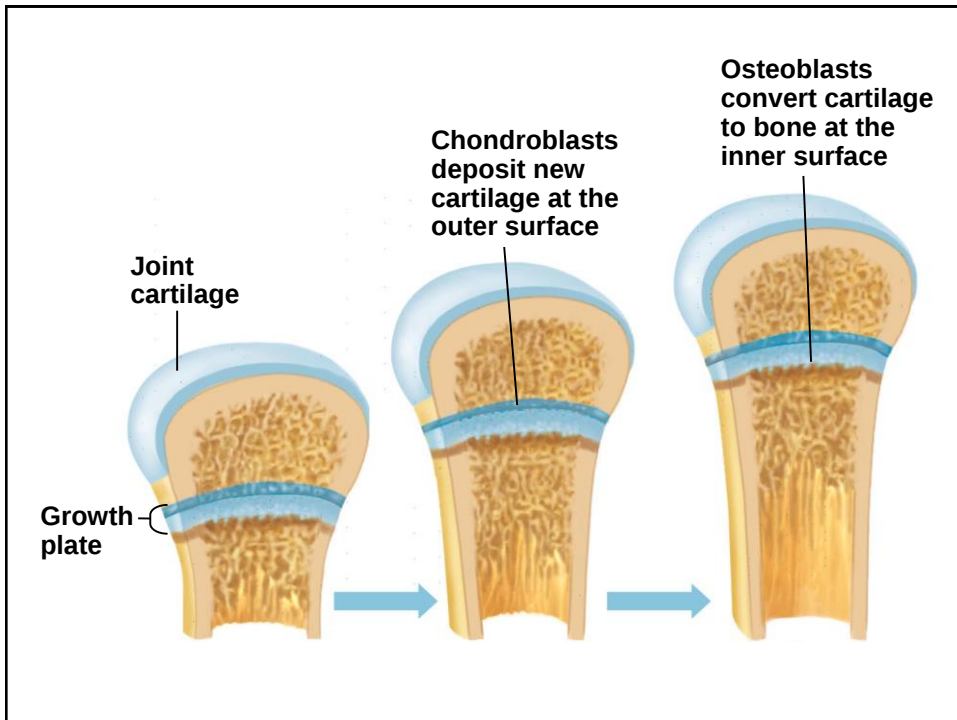
Bone Development

- Early fetal development
 - Formed by chondroblasts (cartilage-forming cells)
- Later fetal development
 - osteoblasts replace cartilage with bone
- Childhood
 - primary and secondary ossification sites formed
- Adolescence
 - elongation at growth plates

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Hormonal Control of Bone Growth

- Preadolescence
 - Growth hormone stimulates bone lengthening
- Early Adolescence
 - Estrogen and testosterone stimulate bone lengthening
- Late Adolescence
 - Estrogen and testosterone cause replacement of cartilage growth plates with bone

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Cells Involved in the Development and Maintenance of Bone

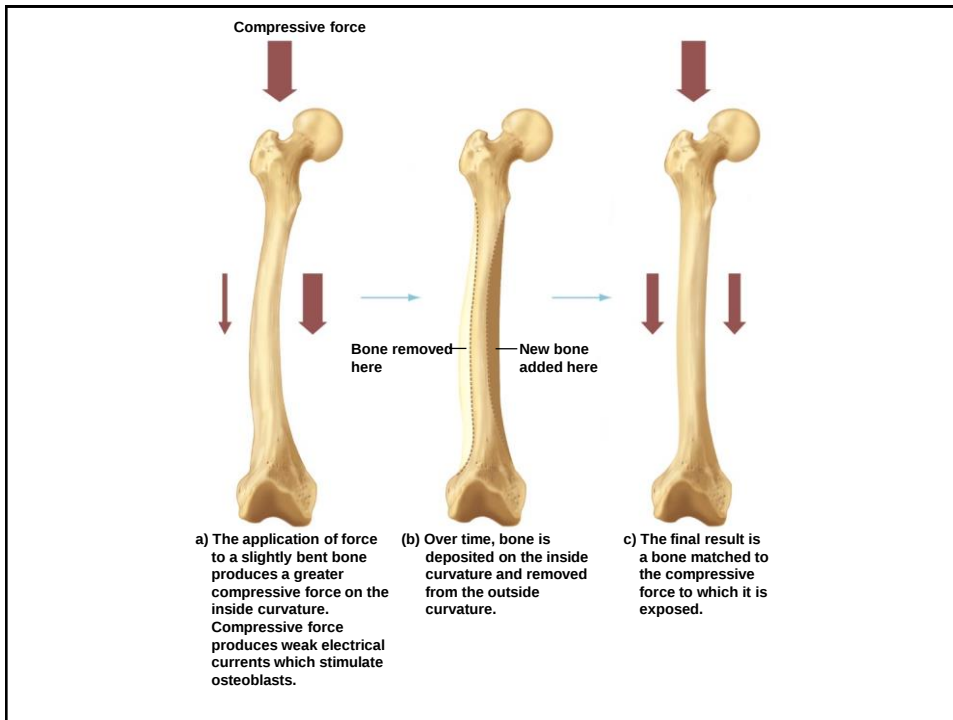
- Chondroblasts
 - cartilage-forming cells
- Osteoblasts
 - young bone-forming cells
- Osteocytes
 - mature bone cells
- Osteoclasts
 - bone-dissolving cells

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Mature Bone Remodeling and Repair

- Changes in shape, size, strength
 - Dependent on diet, exercise, age
- Bone cells regulated by hormones
 - Parathyroid hormone (PTH)
 - removes calcium from bone
 - Calcitonin
 - adds calcium to bone
- Repair
 - hematoma and callus formation

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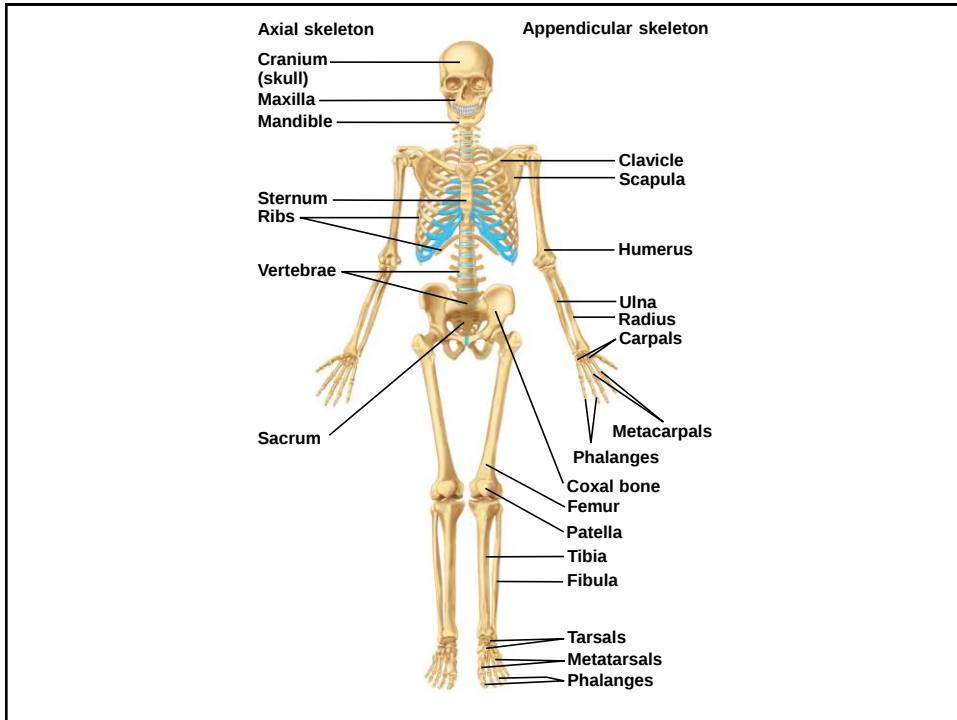


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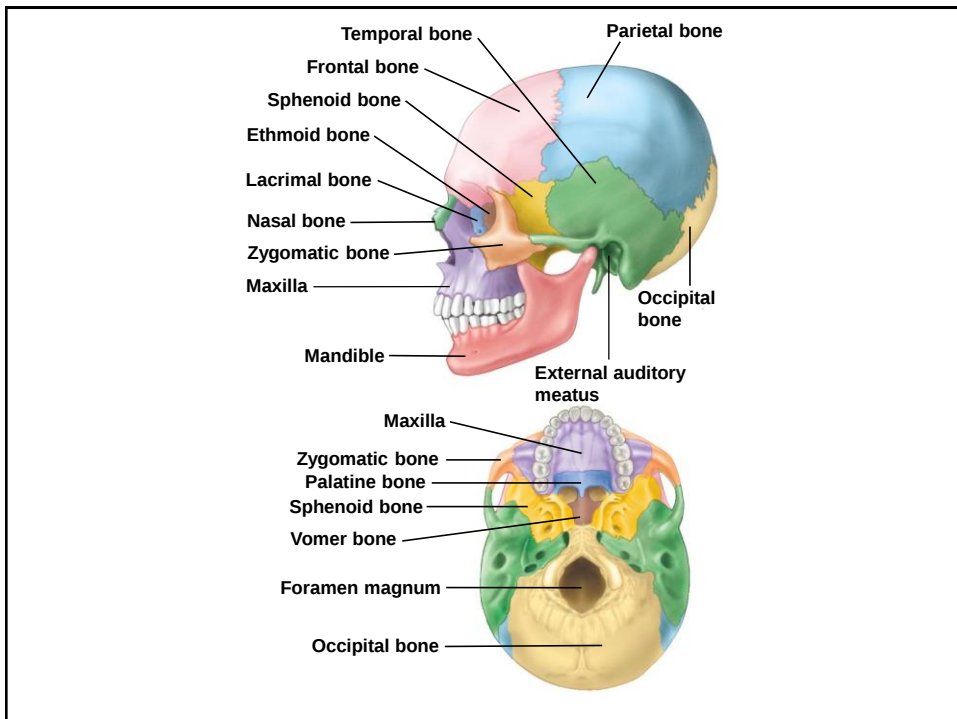
Human Skeleton

- 206 bones
- **Axial skeleton**
 - Skull, vertebral column, sternum
- **Appendicular skeleton**
 - Pectoral girdle, pelvic girdle, limbs

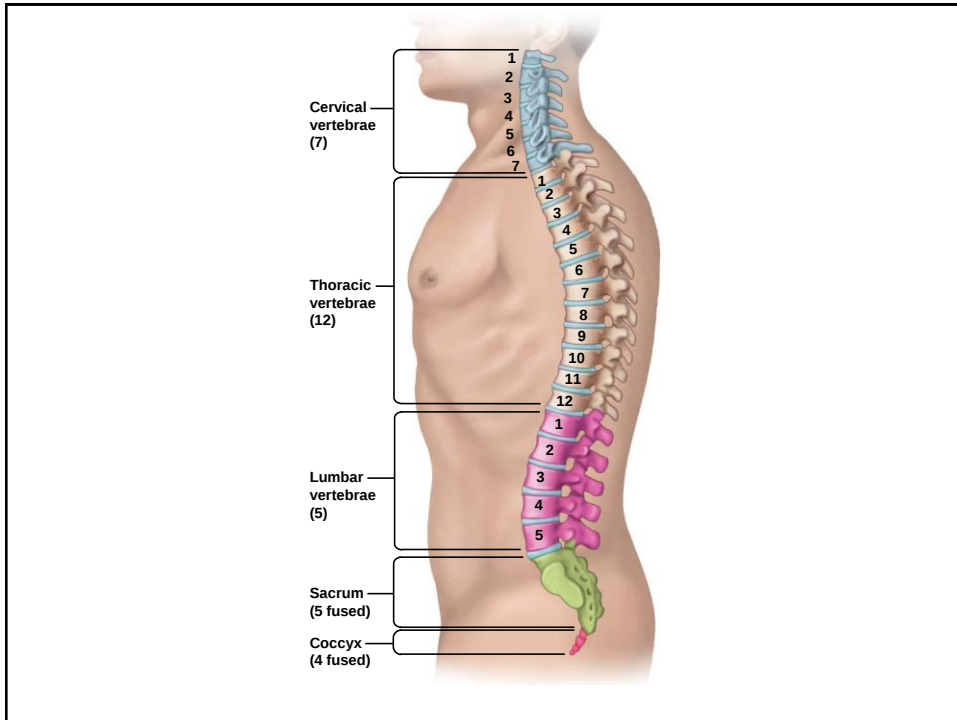
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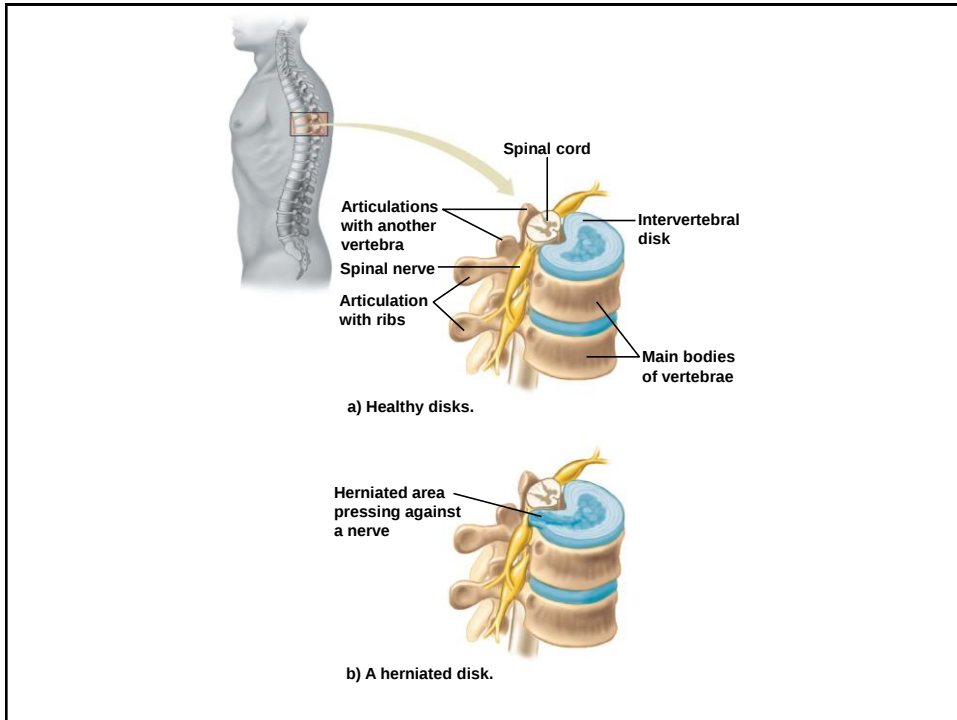


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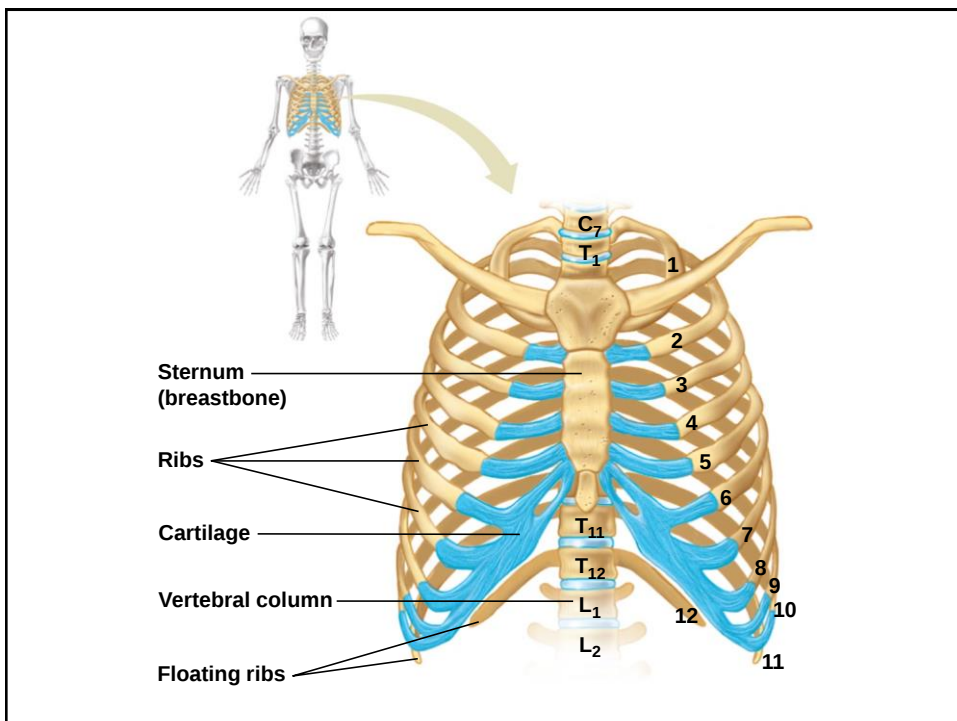
Axial Skeleton: Vertebral Column (cont.)

- Vertebral column
 - Regions: cervical, thoracic, lumbar, sacral, coccygeal
 - Intervertebral disks: cushion vertebrae; assist in movement and flexibility
- Ribs
 - Twelve pairs
 - Bottom two pair floating
- Sternum
 - Three bones fused together

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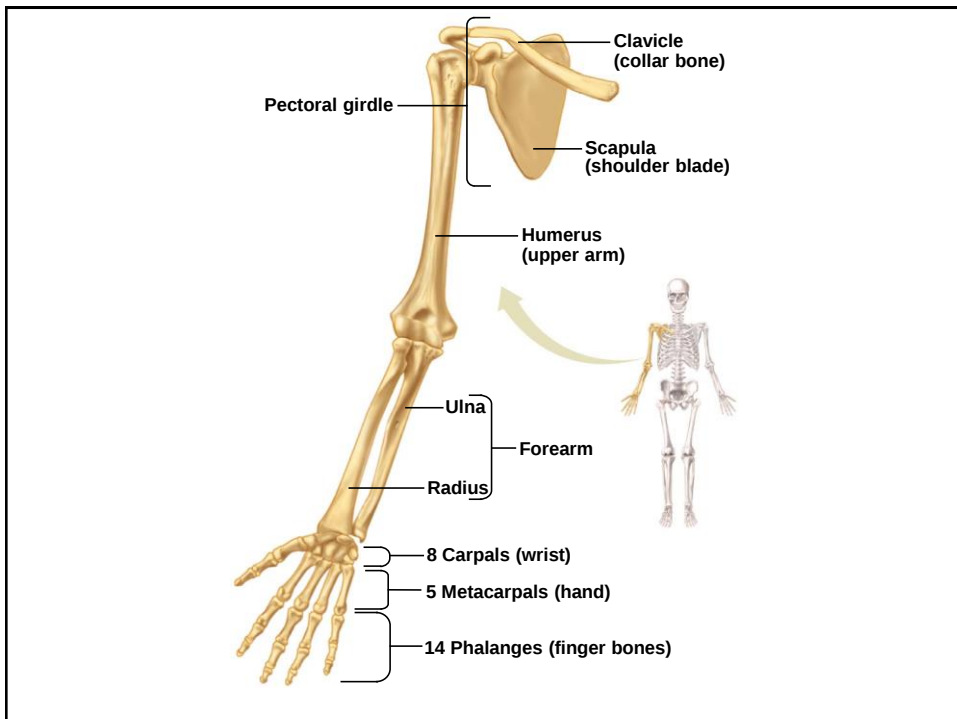


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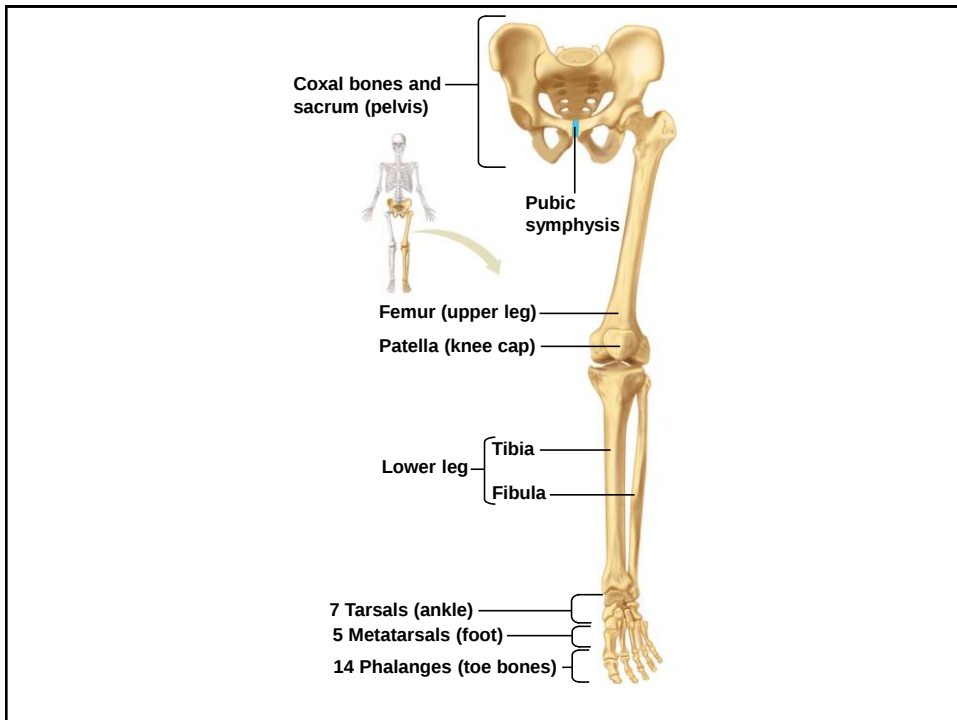
Appendicular Skeleton

- Pectoral girdle: shoulder
 - Clavicle and scapulas
- Pelvic girdles: hip
 - Coxal bones, sacrum
- Arms
 - humerus, radius, ulna, carpals, metacarpals and phalanges
- Legs
 - femur, tibia, fibula, tarsals, metatarsals and phalanges

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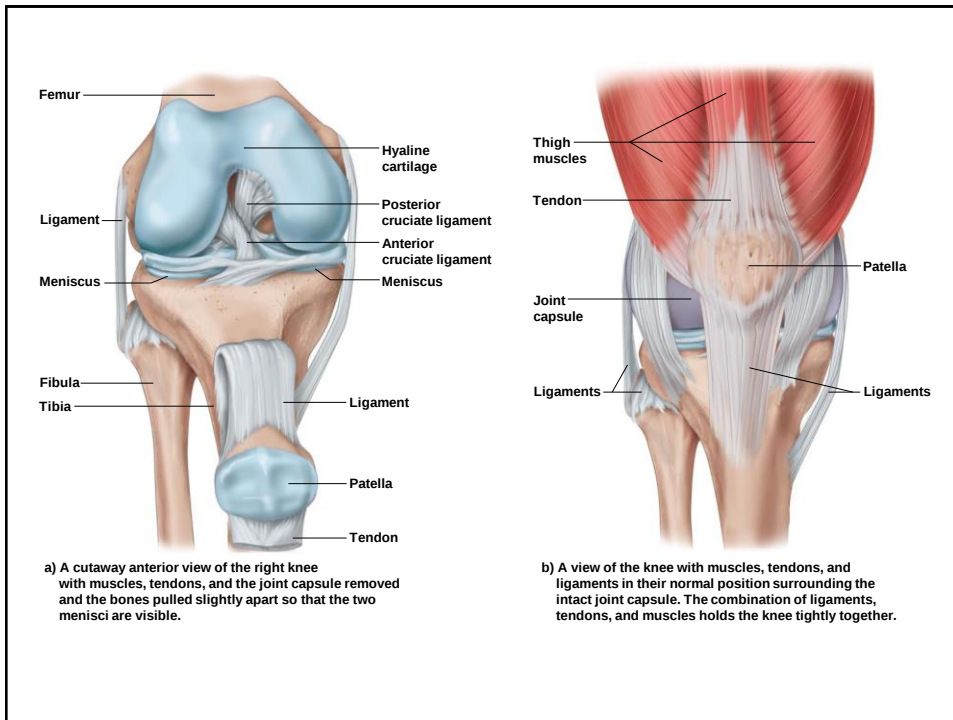


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Joints (Articulations)

- Classified by degree of movement
 - **Fibrous joint**
 - immovable (e.g., fontanelles)
 - **Cartilaginous joint**
 - slightly movable, cartilage connection (e.g., backbone)
 - **Synovial joint**
 - freely movable (e.g., shoulder, hip)

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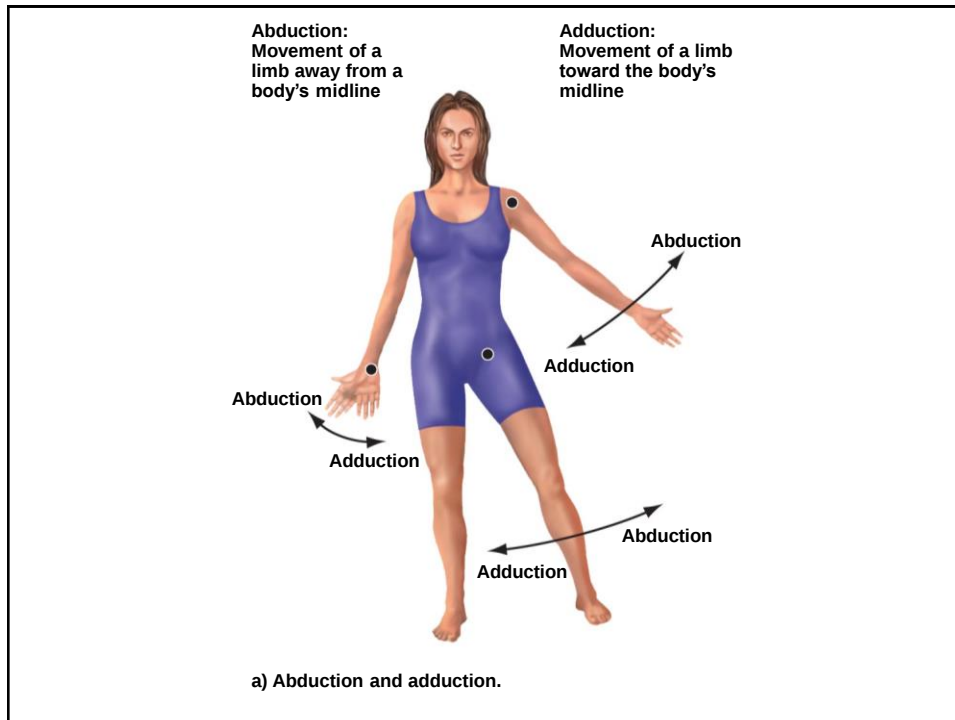


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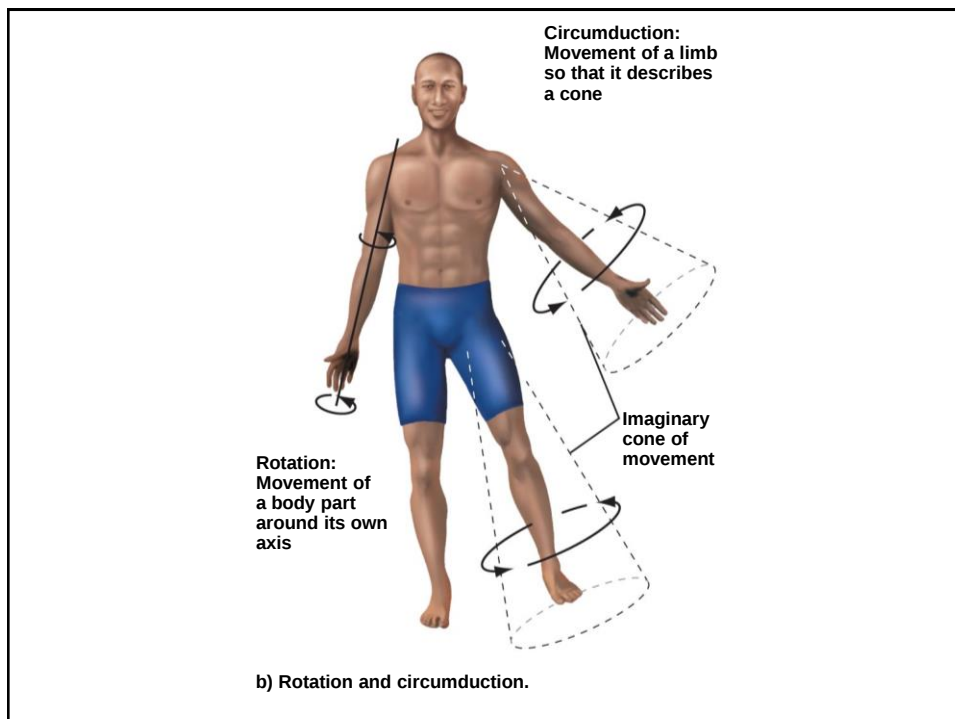
Synovial Joints

- Joint capsule
 - synovial membrane + hyaline cartilage
- Synovial membrane secretes synovial fluid as a lubricant
- Hyaline cartilage acts as a cushion
- Types of synovial joints
 - Hinge joint
 - Ball and socket joint
- Tendons – join bone to muscle

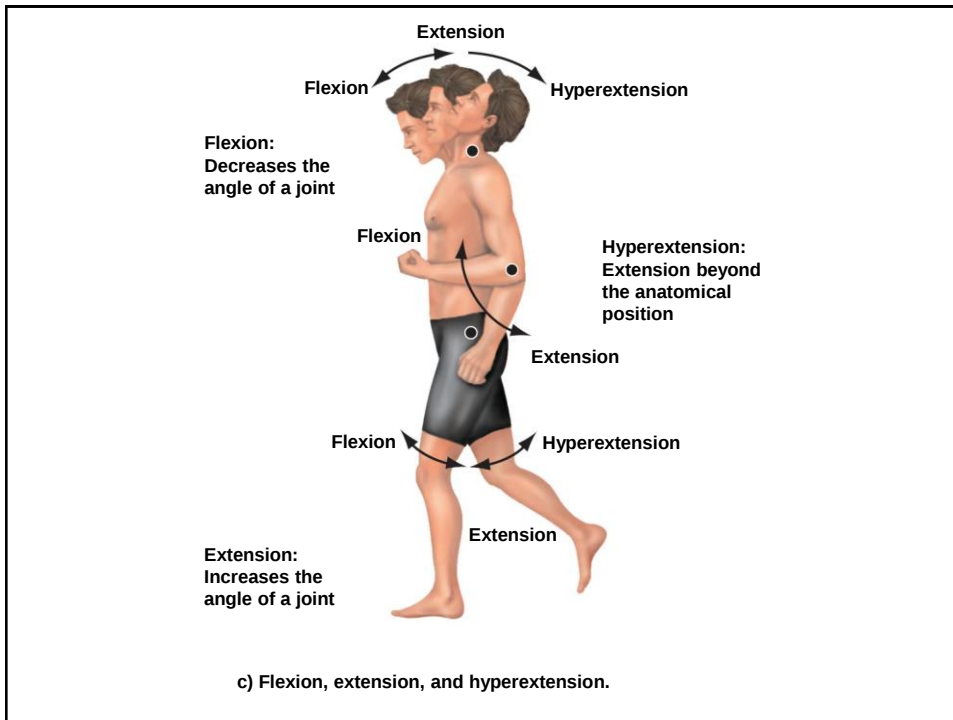
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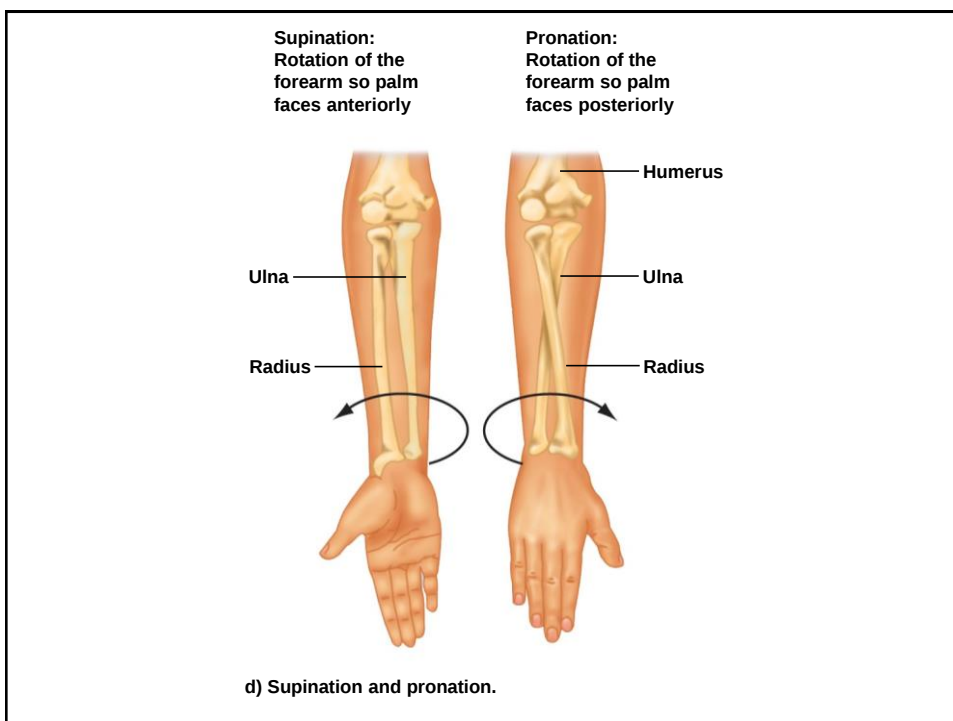
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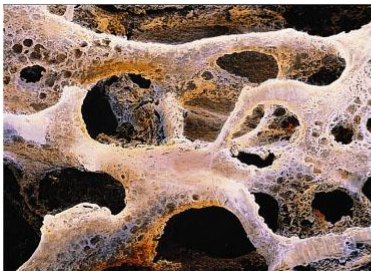
Diseases and Disorders of the Skeletal System

- **Sprains**
 - stretched or torn ligaments
- **Bursitis and tendinitis**
 - inflammations
- **Arthritis**
 - inflammation of joints
 - Osteoarthritis
 - Rheumatoid arthritis

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Diseases and Disorders of the Skeletal System

- **Osteoporosis**
 - excessive bone loss



(b)



(a)

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