جامعة المستقبل
كلية العلوم
قسم الفيزياء الطبية

HUMAN ANATOMY

Lec. 5

SKELETAL SYSTEM

STAGE 3

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Five Functions of the Skeletal System

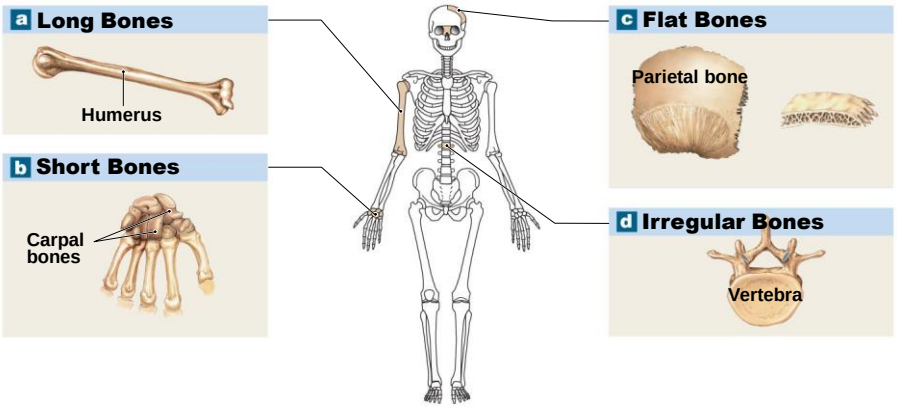
1. Support
2. Storage
3. Blood cell production
4. Protection
5. Movement

Bone Tissue Characteristics

- **Bones** or **osseous tissue**
  - Are a supporting connective tissue; cells are called osteocytes
- Calcium phosphate – give bone its texture
  - $Ca_3(PO_4)_2$

Four General Shapes of Bones

1. **Long bones**
   - For example, the humerus
2. **Short bones**
   - For example, the carpal bones
3. **Flat bones**
   - Like the scapula, ribs
4. **Irregular bones**
   - Complex in shape
   - Like a vertebra



Structure of a Long Bone

- **Compact bone**
  - Is densely packed; forms the diaphysis
- **Spongy bone**, also called cancellous bone
  - Has projections of bone separated by space
- **Periosteum**
  - Is the outer covering of bone
- **Endosteum**
  - Lines the marrow cavity and spongy bone

Figure 6-2 The Structure of a Long Bone.

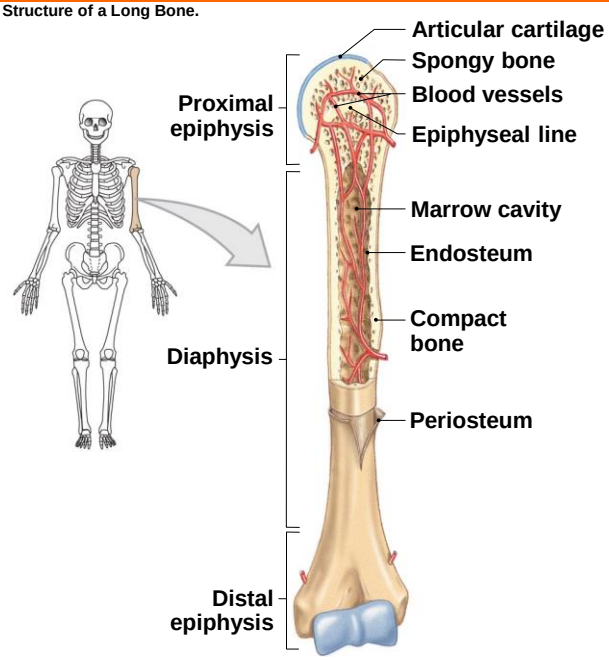
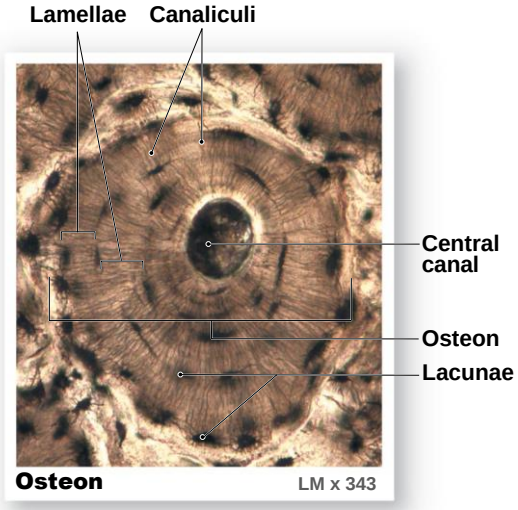


Figure 6-3b The Microscopic Structure of a Typical Bone.



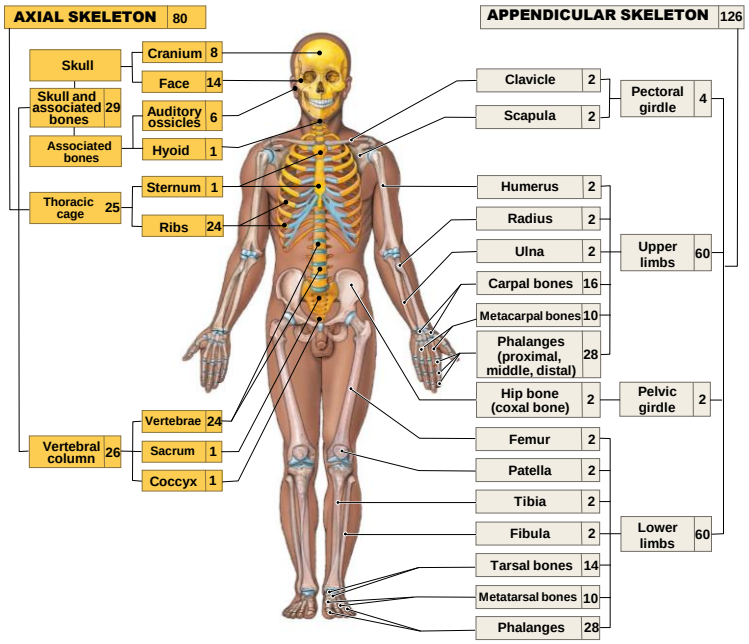
b In this thin section through compact bone, the intact matrix making up the lamellae appears white, and the central canal, luacunae, and canaliculi appear black due to the presence of bone dust.

Requirements for Bone Growth

- Mineral supply
  - Especially calcium salts
- Vitamin D_3
  - Involved in calcium metabolism
  - Rickets is due to vitamin D_3 deficiency – softening and bending of the bones in growing kids
- Vitamin A and vitamin C
  - Provide support for osteoblasts
  - Vitamin C deficiency can cause scurvy – weak and brittle bones
- Growth hormone, sex hormones, thyroid hormone, and the calcium-balancing hormones

Skeletal Divisions

- **Axial skeleton** includes:
  - The **skull** and associated bones
  - The **thoracic cage** with the **ribs** and **sternum**
  - The **vertebral column**
- **Appendicular skeleton** includes:
  - The **pectoral girdle** and the upper limbs
  - The **pelvic girdle** and the lower limbs



The Axial Skeleton

- **The Skull**
- Houses brain and sense organs for sight, smell, taste, and balance
- Total of 22 bones
  - 8 form the **cranium**
  - 14 are **facial bones**

Figure 6-10 The Adult Skull, Part I.

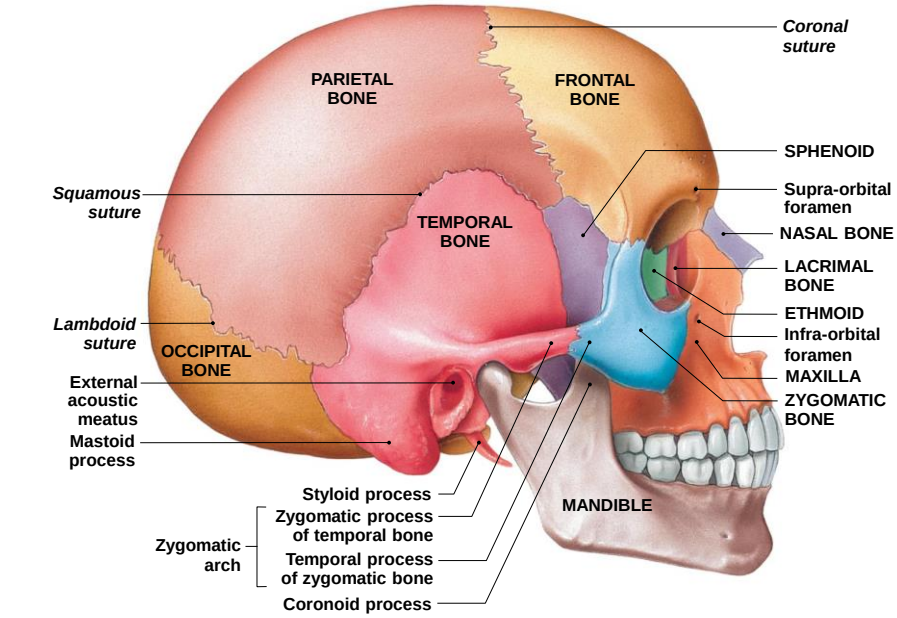
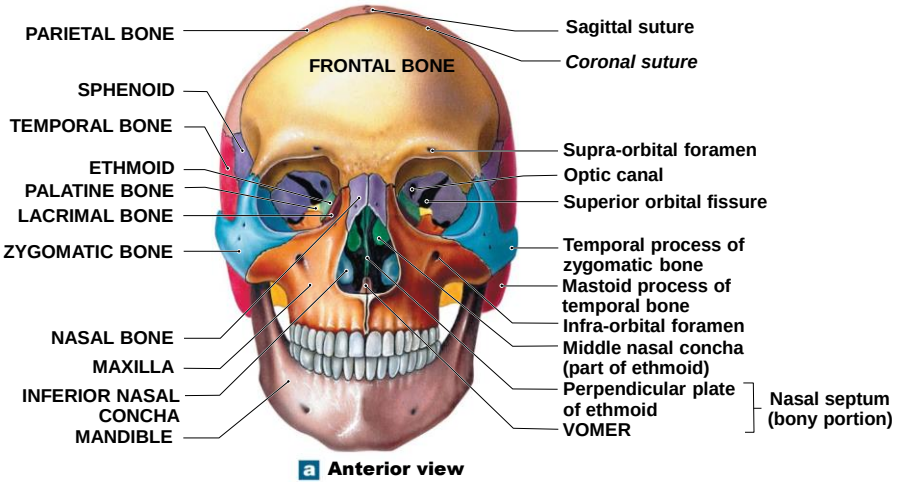


Figure 6-11a The Adult Skull, Part II.



The Vertebral Column

- **Cervical region** (neck) has 7 **cervical vertebrae**
- **Thoracic region** has 12 **thoracic vertebrae**
- **Lumbar region** has 5 **lumbar vertebrae**
- **Sacral region** has 5 fused vertebrae in the sacrum
- **Coccygeal region** also made of 3–5 fused vertebrae in the **coccyx**

Figure 6-16 The Vertebral Column.

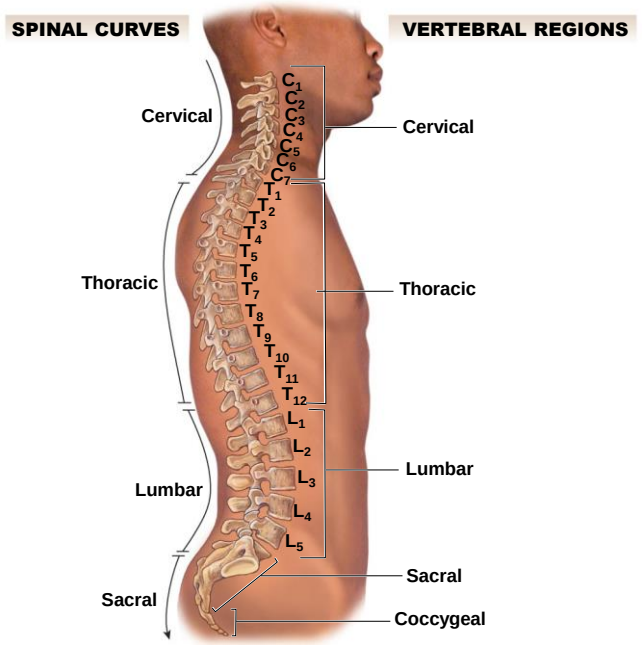
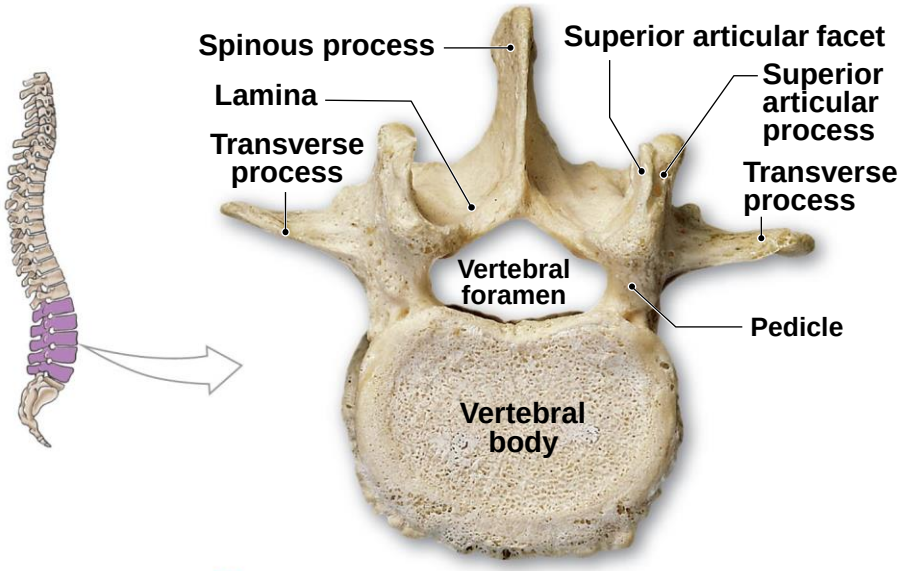


Figure 6-17c Typical Vertebrae of the Cervical, Thoracic, and Lumbar Regions.



C Lumbar vertebra, superior view

The Upper Limb

- Contains the bones of the arm
  - The **humerus**
  - Proximal area of the limb from the scapula to the elbow
- Contains the bones of the forearm
  - The radius and ulna
- Contains the bones of the wrist and hand
  - The carpals, metacarpals, and phalanges

Figure 6-23 The Right Humerus.

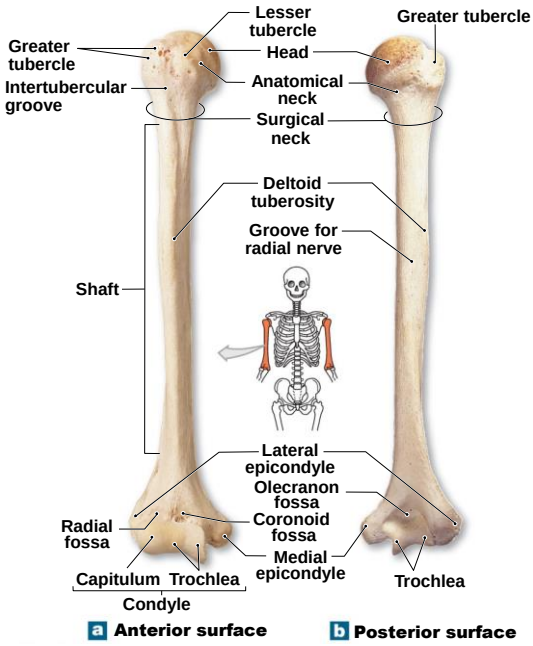


Figure 6-24 The Right Radius and Ulna.

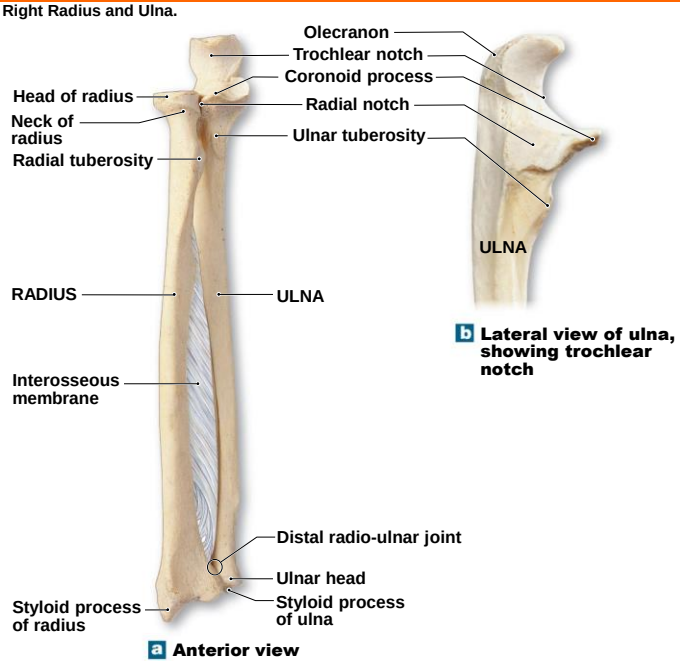
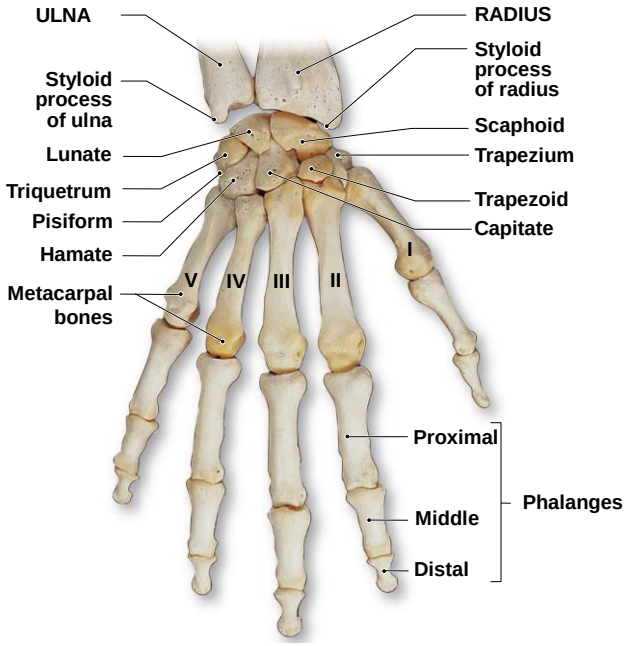


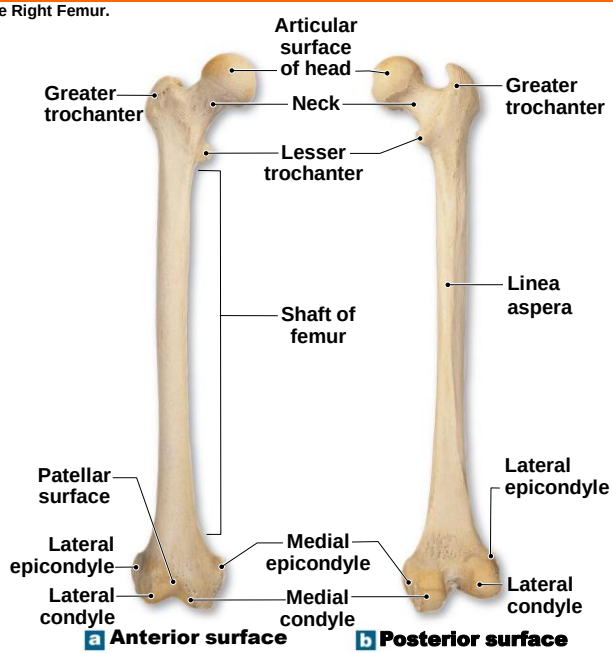
Figure 6-25 Bones of the Right Wrist and Hand.



The Lower Limb

- Contains the bones of the thigh
  - The *femur* is the longest bone in the body
- Contains the *patella* or kneecap
- Contains the bones of the leg
  - The *tibia* and *fibula*
- Contains the bones of the ankle and foot

Figure 6-28 The Right Femur.



The Fibula

- Runs parallel and lateral to tibia
- Articulates with tibia inferior to the lateral tibial condyle
- Does not articulate with the ankle
- **Lateral malleolus** is distal end of fibula
- Interosseus membrane connects tibia and fibula

Figure 6-29 The Right Tibia and Fibula.

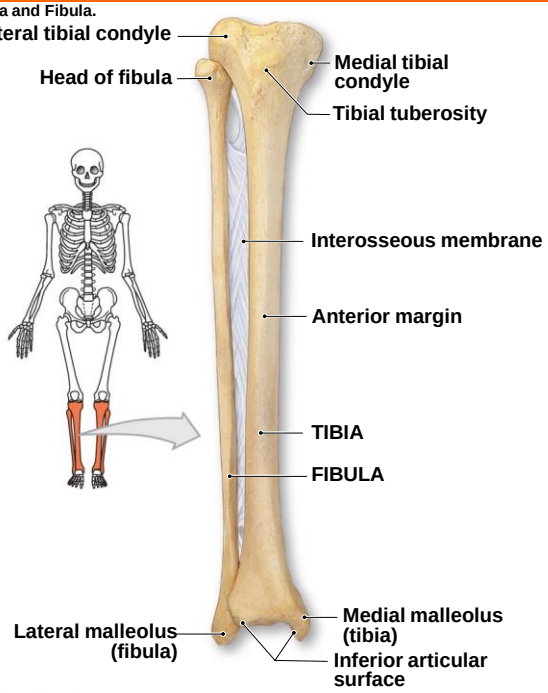
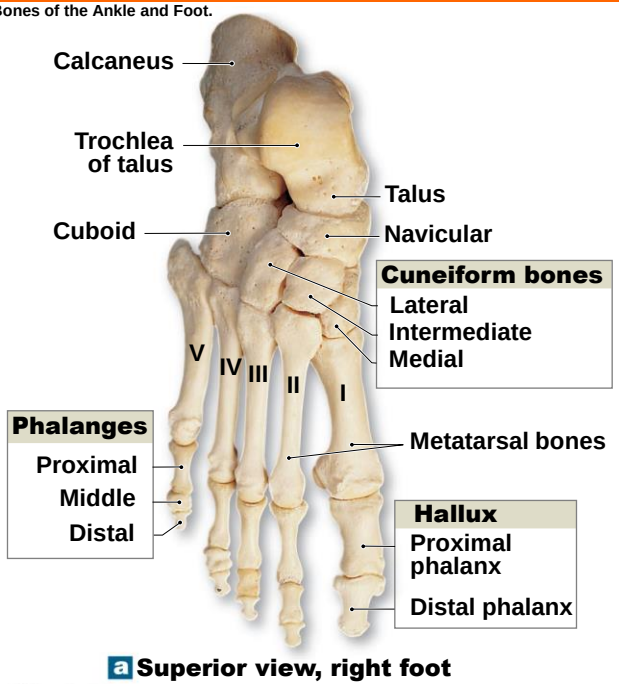


Figure 6-30a The Bones of the Ankle and Foot.



a Superior view, right foot