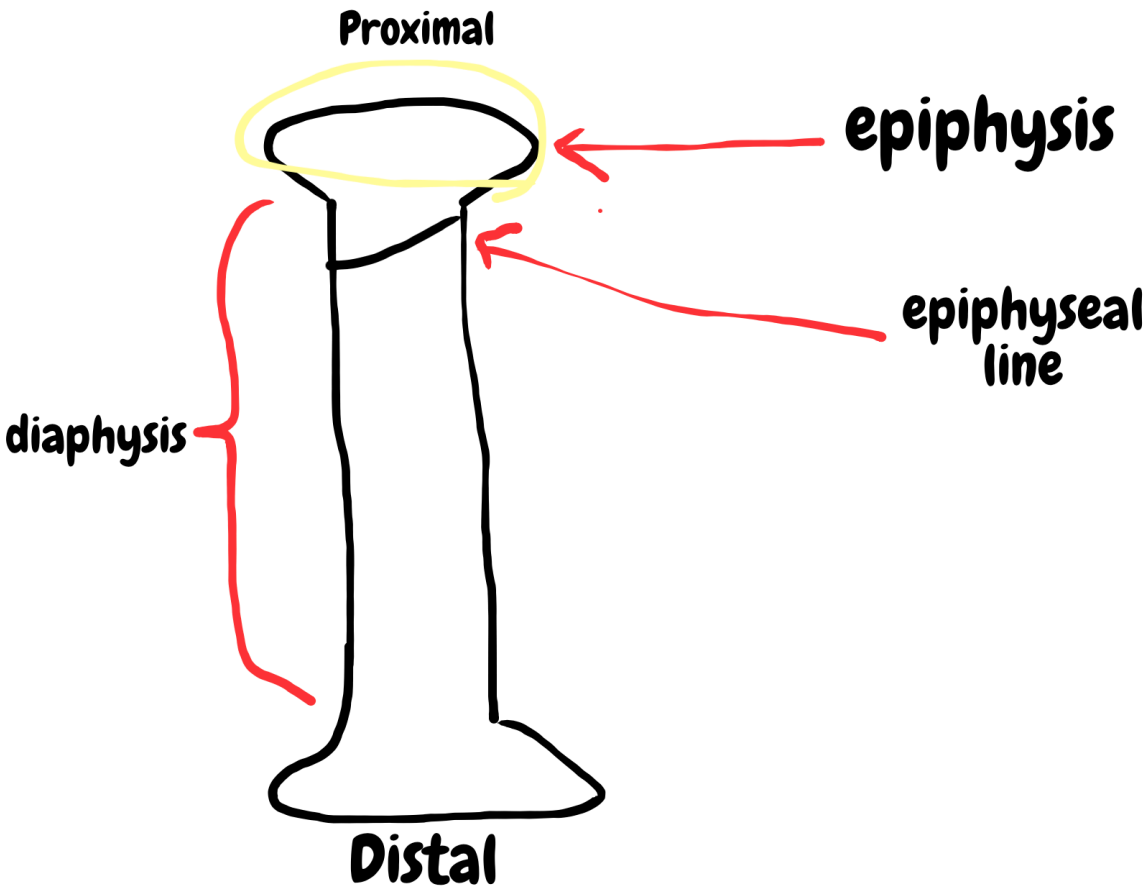
- Basic Structure of the Bone
- 4 types of cell
- Compare structure & function go compact bone vs. spongey bone

Functions of Skeletal System:

1. **Support body structures** - make a framework
2. **Protection** - internal organs
3. **Movement** - muscle attachments on skeleton - enable movement
4. **Hemopoiesis** - blood cell & platelets production - from red bone marrow - e.g. Pelvis (irregularly shaped bones)
5. **Triglyceride storage** - yellow bone marrow - in hollow shaft
6. **Mineral homeostasis** - calcium + phosphorous - muscle contraction, axon potential - need Ca when not needed Ca is reabsorbed back into bones

Parts of a Typical Long Bone:

I. Diaphysis:
   A. Main long shaft
II. Epiphyses (singl. epyphysis):
   A. Ends of bones
   B. Distal end: away from the center
   C. Proximal end: closer to the center
III. Metaphyses (singl. metaphysis):
   A. Grows during growth periods
   B. Contains:
      1. Epiphyseal Plate (in children):
         a) Layer of hyaline cartilage: present in the joints
         b) Allows bone to grow in length
      2. Epiphyseal Line (in adults):
         a) Reach adulthood: fuses over - leaves a mark
         b) In Humerus: anatomical neck of humerus or surgical neck of humerus (weakest point).



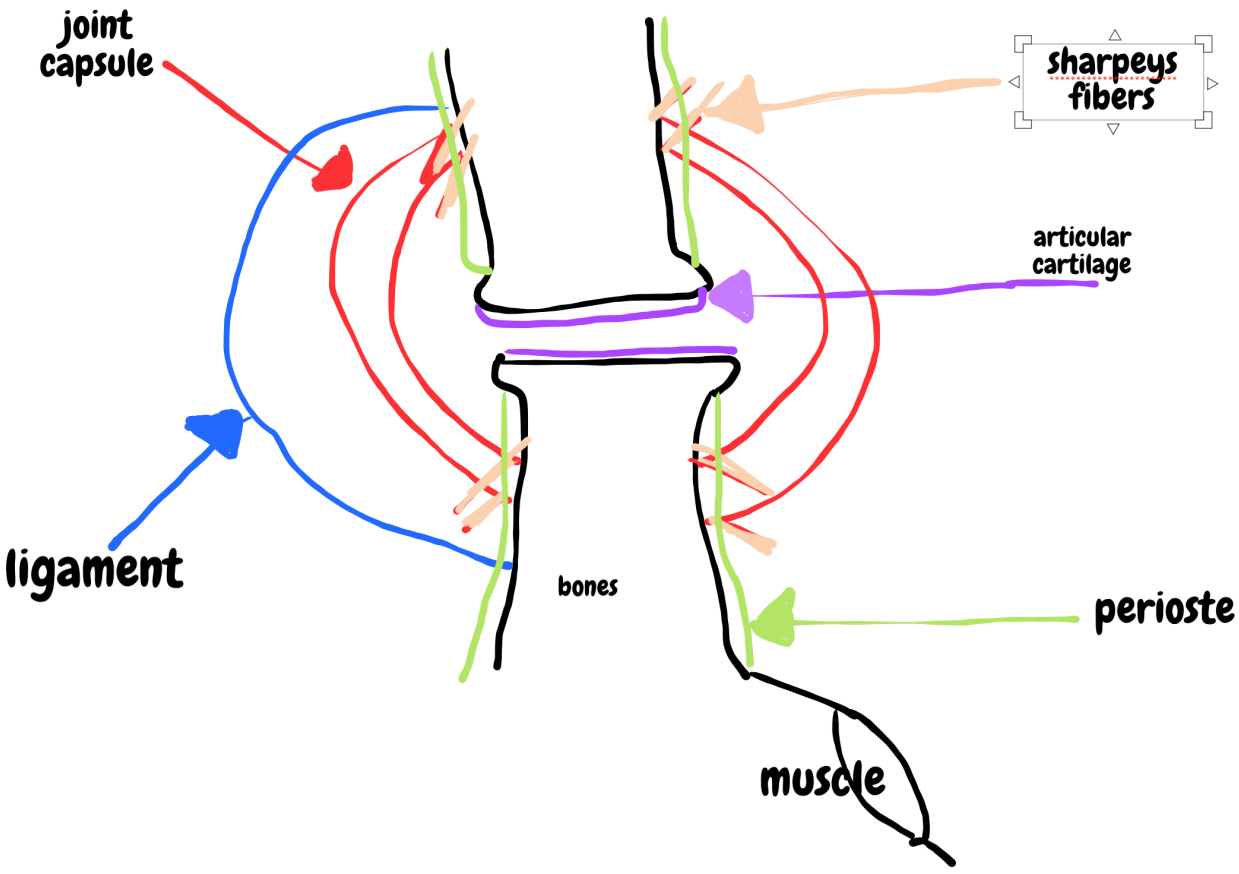
IV. Articular Cartilage:
- Hyaline Cartilage:
    1. Types of connectivity tissue, gel-like
    2. Lines bony surface to reduce friction and absorb shock
    3. e.g. humerus articulates with the ulna
    4. Present when two bones are connecting to make a joint
    5.

V. Periosteum (covers outside the bone):
    1. Contains bone-forming cells
    2. Point of attachment for tendons, ligaments, joint capsules

VI. Medullary Cavity:
    1. Contains yellow bone marrow (in hollow shaft)

VII. Endosteum:
    1. Also contains bone-forming cells

- Sharpeys Fibers: perforating fibers - connective tissue



BONE VS. TISSUE

Compact Bone Tissue	Spongy Bone Tissue
Lines diaphysis	More space
Very strong	Help make bones lighter
Resists stress	Storage for red bone marrow
	Found in epiphyses of long bone - short, flat, irregularly shaped
About 80%	About 20%

HISTOLOGY OF BONE TISSUE

Bone tissue (osseous) = bone cells + extracellular matrix

- Extracellular Matrix (ECM):
  - nonliving, inorganic material
  - 15% water
  - 30% collagen
  - 55% crystallized mineral salts:
    - Calcium phosphate
    - Calcium hydroxide
    - Calcification: mineral salt crystallize & tissue hardens
  - Collagen-type of protein —> tensile strength
  - Crystallized mineral salts —> hardness

Deficiencies:

- Osteogenesis Imperfecta:
  - “brittle bones”
  - Deficit in collagen or poor quality collagen (genetic)
- Osteomalacia (adults) or Rickets (children):
  - Malnutrition (calcium)
  - Same deficiency but for different ages

Summary:

1. Every bone is an organ: various functions of skeletal system
2. Basic parts of the a typical long bone (diaphysis, metaphysis, epiphysis,…)
3. Compact Bone vs. Spongey Bone
4. Bone Tissue - ECM - Characteristics of bone (strong: resist tensile force, and hard)
5. Deficit in Collagen vs. Ca 2+