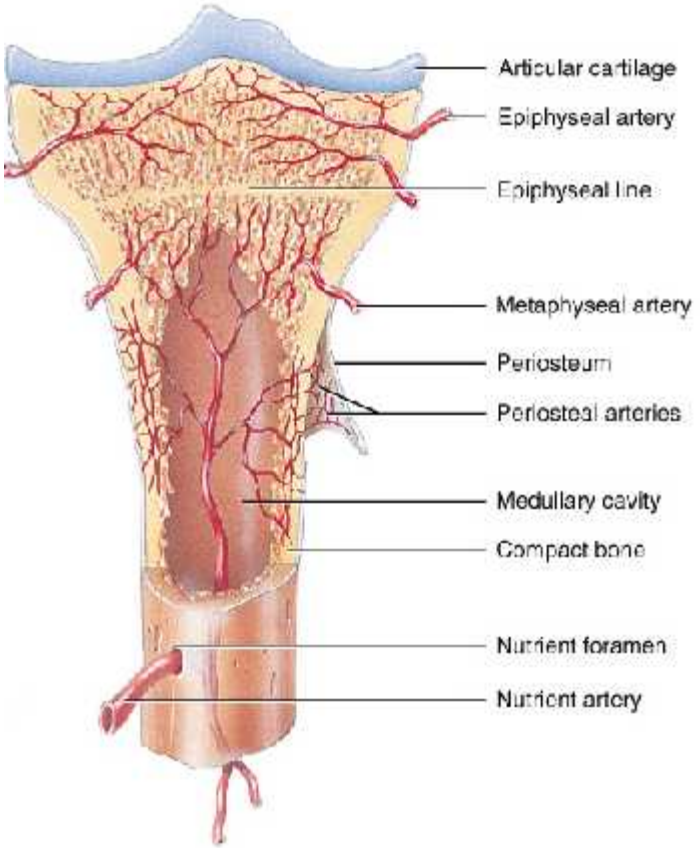
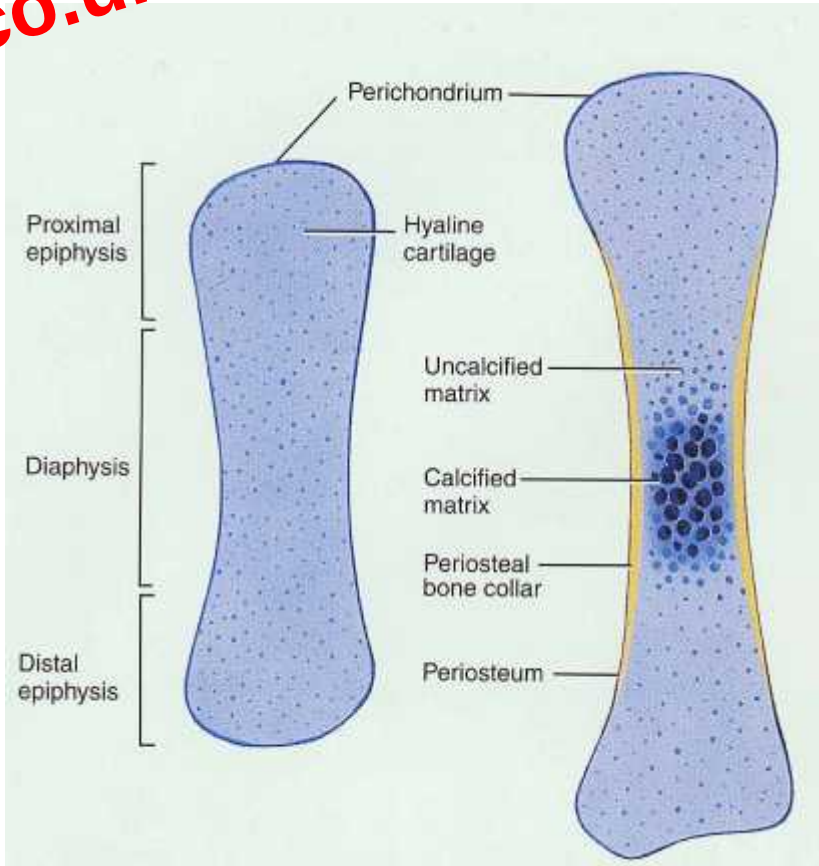
Blood and Nerve Supply of Bone

- Periosteal arteries
  - supply periosteum
- Nutrient arteries
  - enter through nutrient foramen
  - supply compact bone of diaphysis & bone marrow of the central canal
- Metaphyseal & epiphyseal aa.
  - supply red marrow & bone tissue of epiphyses

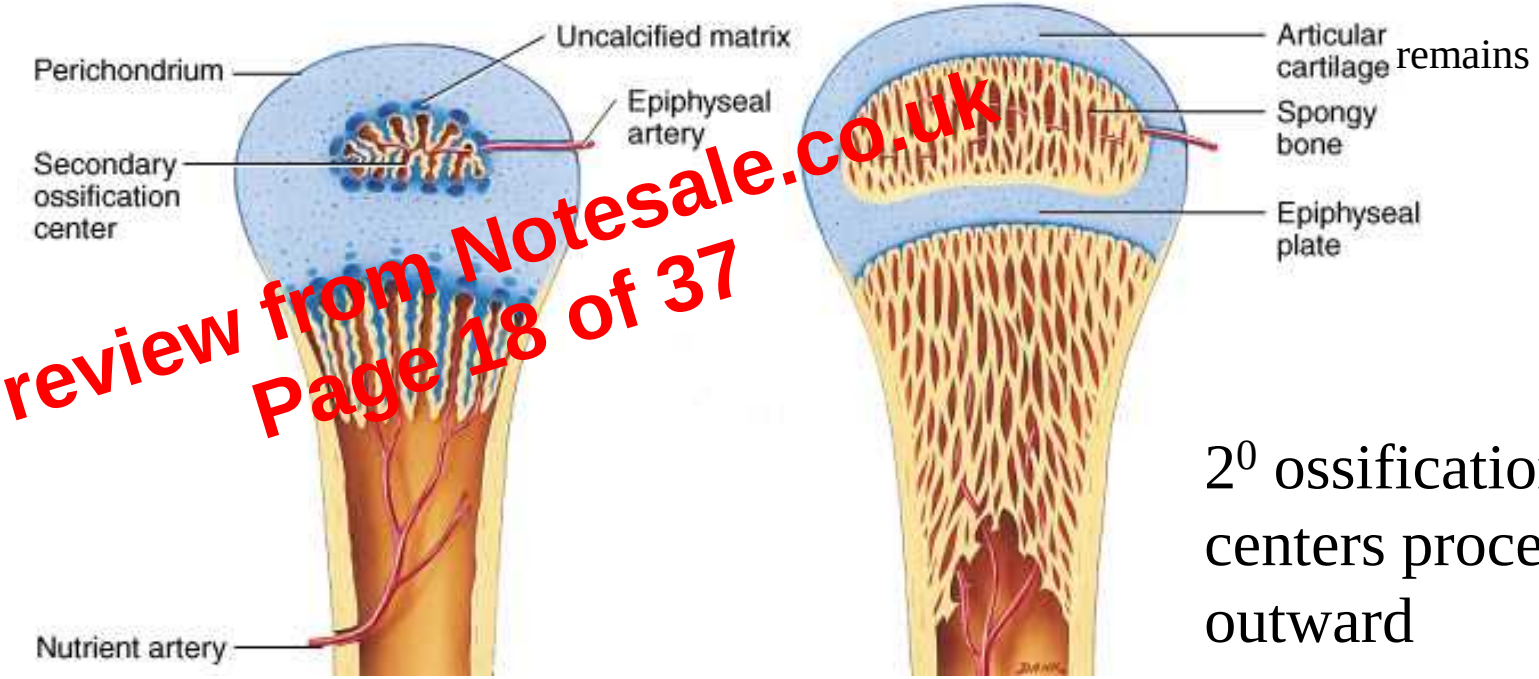


Endochondral Bone Formation (1)

- Development of Cartilage model
  - Mesenchymal cells form a cartilage model of the bone during development
- Growth of Cartilage model
  - in length by chondrocyte cell division and matrix formation (interstitial growth)
  - in width by formation of new matrix on the periphery by new chondroblasts from the perichondrium (appositional growth)
  - cells in midregion hypertrophy & the surrounding matrix calcifies resulting in death of some central chondrocytes which are unable to obtain nutrients



Endochondral Bone Formation (3)

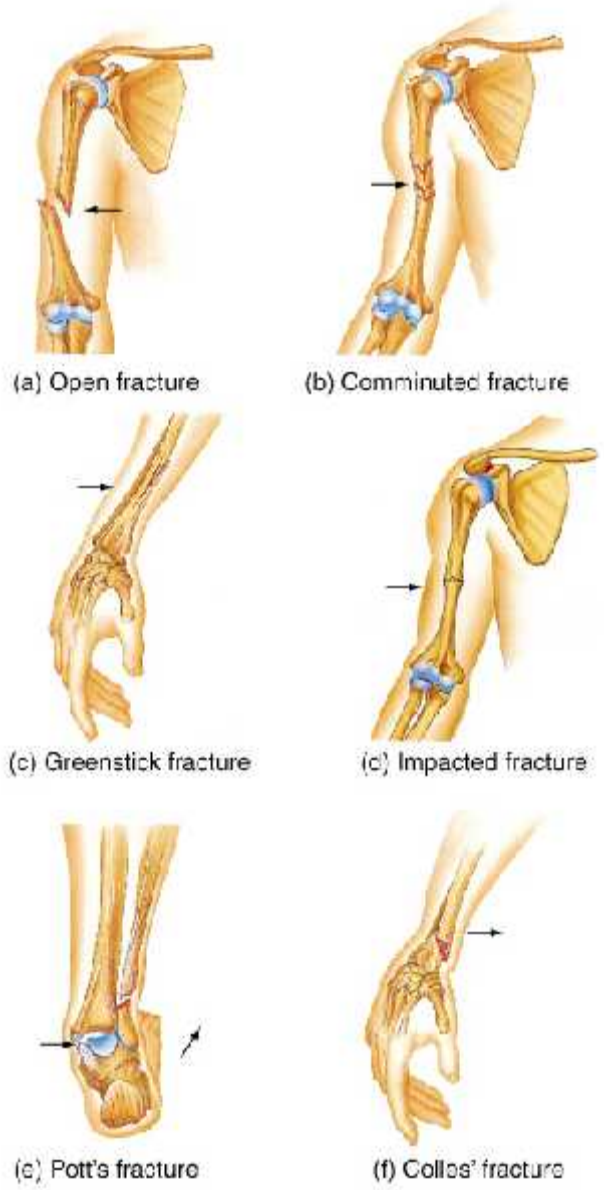


2^0 ossification centers proceed outward

- Development of Secondary Ossification Center
  - blood vessels enter the epiphyses around time of birth
  - spongy bone is formed but no medullary cavity
- Formation of Articular Cartilage
  - cartilage on ends of bone remains as articular cartilage.

Fractures

- Named for shape or position of fracture line
- Common types of fracture
  - closed -- no break in skin
  - Open (compound) fracture --skin broken
  - comminuted -- broken ends of bones are fragmented
  - greenstick -- partial fracture
  - impacted -- one side of fracture driven into the interior of other side
  - Pott's -- distal fibular fracture
  - Colles's -- distal radial fracture
  - stress fracture -- microscopic fissures from repeated strenuous activities



Types of Fractures

Transverse fractures, such as this fracture of the ulna, break a bone shaft across its long axis.

Spiral fractures, such as this fracture of the tibia, are produced by twisting stresses that spread along the length of the bone.

Displaced fractures produce new and abnormal bone arrangements; nondisplaced fractures retain the normal alignment of the bones or fragments.

Compression fractures occur in vertebrae subjected to extreme stresses, such as those produced by the forces that arise when you land on your seat in a fall.

In a greenstick fracture, such as this fracture of the radius, only one side of the shaft is broken, and the other is bent. This type of fracture generally occurs in children, whose long bones have yet to ossify fully.

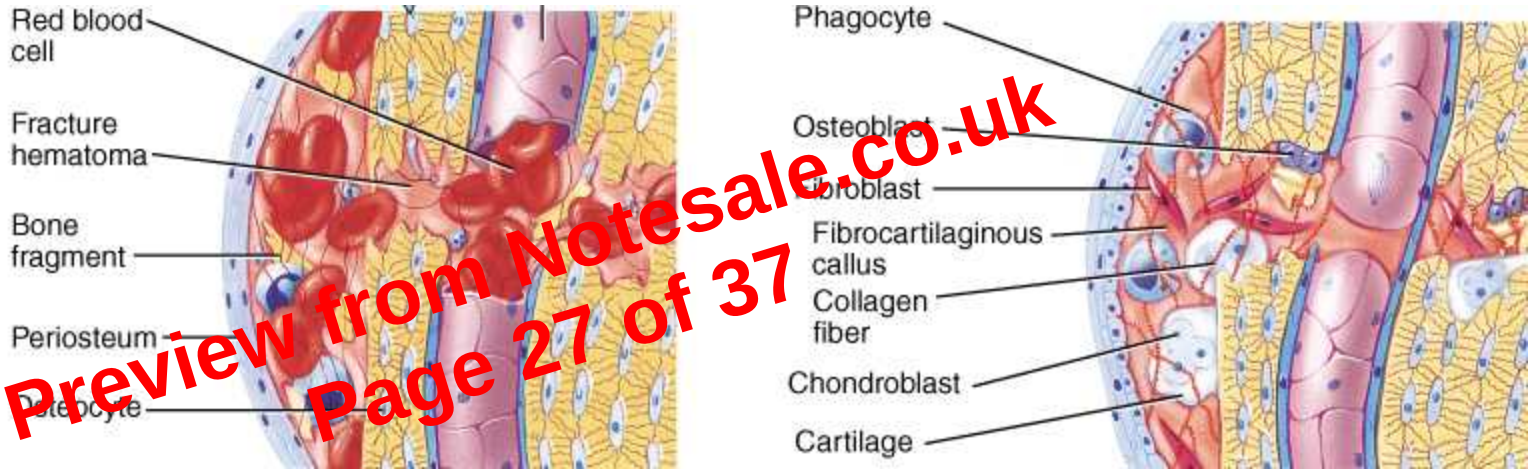
Comminuted fractures, such as this fracture of the femur, shatter the affected area into a multitude of bony fragments.

Epiphyseal fractures, such as this fracture of the femur, tend to occur where then bone matrix is undergoing calcification and chondrocytes are dying. A clean transverse fracture along this line generally heals well. Unless carefully treated, fractures between the epiphysis and the epiphyseal cartilage can permanently stop growth at this site.

A Pott fracture occurs at the ankle and affects both bones of the leg.

A Colles fracture, a break in the distal portion of the radius, is typically the result of reaching out to cushion a fall.

Repair of a Fracture (1)



- Formation of fracture hematoma
  - damaged blood vessels produce clot in 6-8 hours
  - inflammation brings in phagocytic cells for clean-up duty
  - new capillaries grow into damaged area
- Formation of fibrocartilagenous callus formation
  - fibroblasts invade the procallus & lay down collagen fibers
  - Cells in center of callus differentiate into chondroblasts which produce fibrocartilage to span the broken ends of the bone