

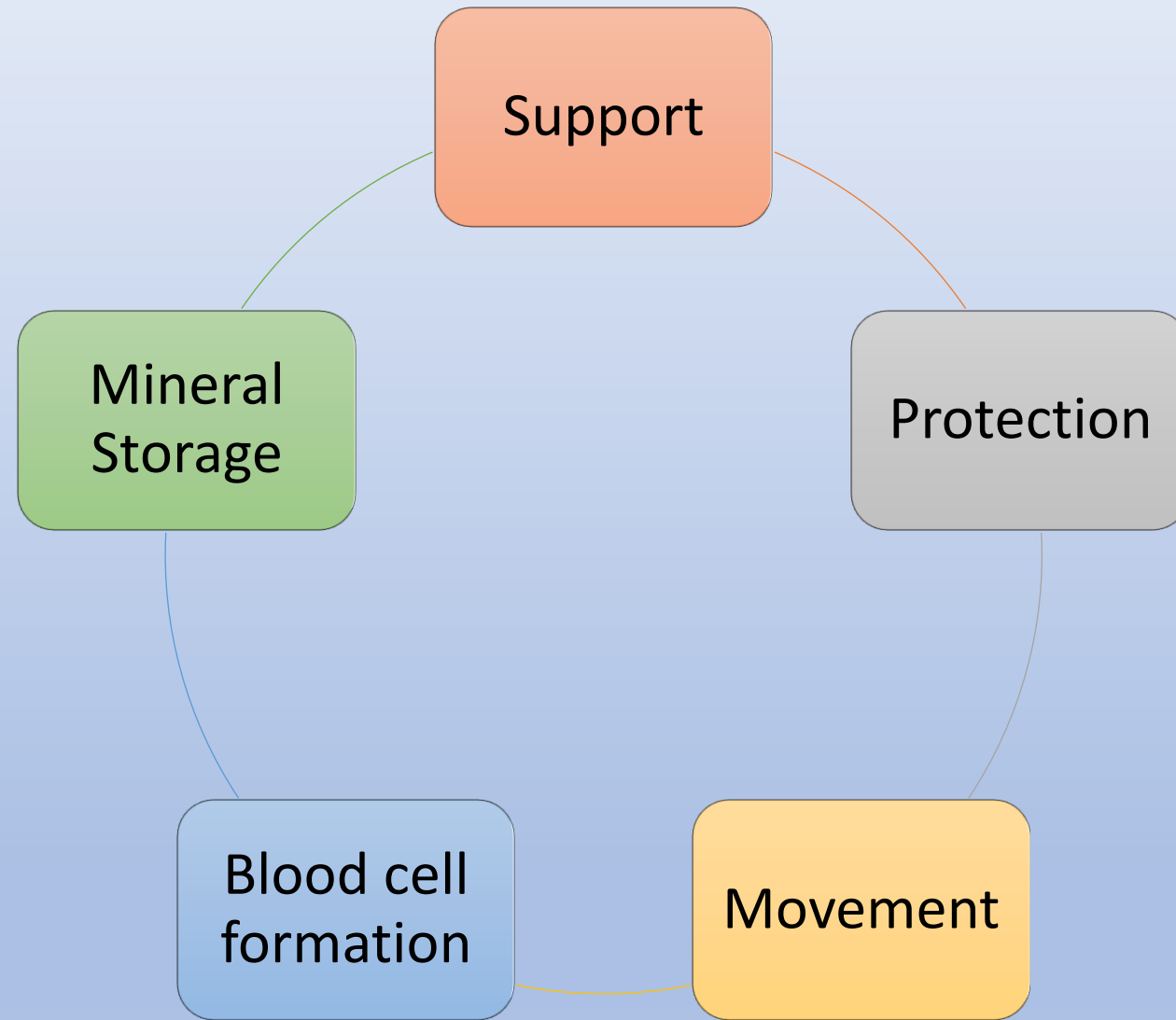
# **ORTHOPAEDIC IMPLANTS**

## **TRAUMA IMPLANTS TRAINING MODULE**

# Skeletal System



# Functions of the Skeletal System



# Anatomical Position

- ◆ An erect posture with the face forward
- ◆ Arms at the sides with the palms forward
- ◆ Feet forwards and spaced slightly apart



# Axial Skeleton Human Skeleton

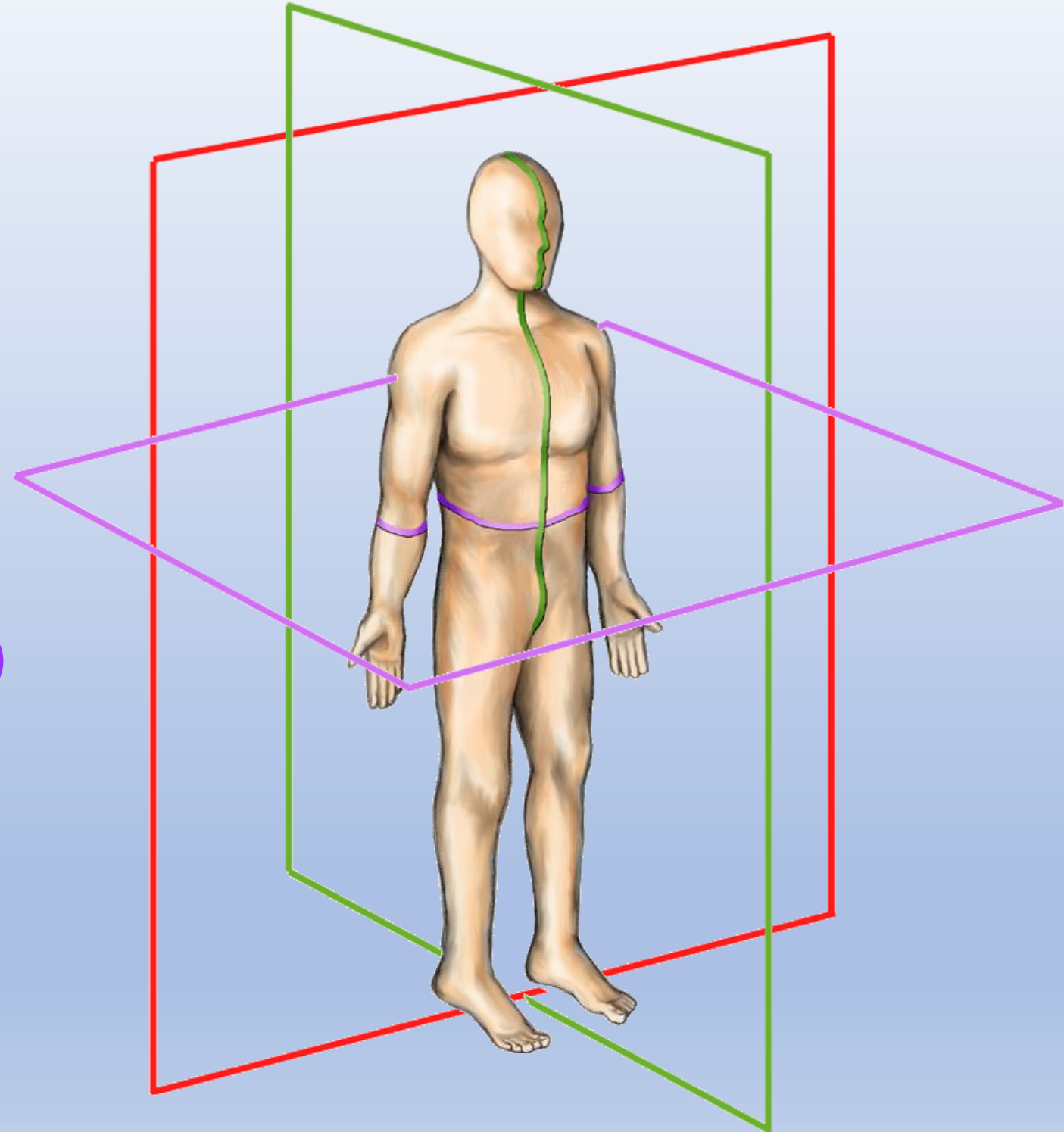


# Appendicular Skeleton



# Anatomical Planes

- Coronal (Frontal or AP) Plane
- Sagittal (Lateral) Plane
- Axial (Horizontal or Transverse) Plane

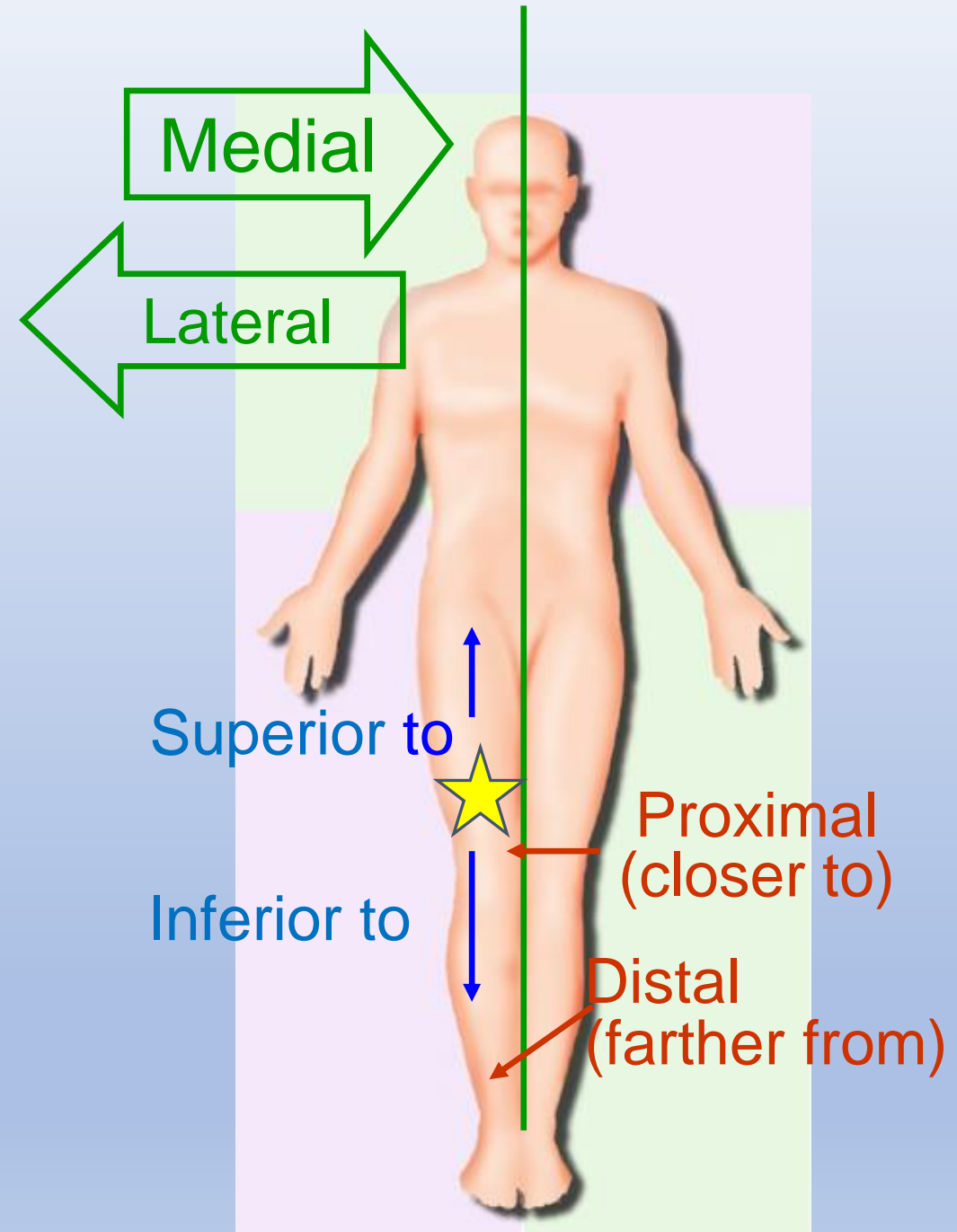


# Basic Terminology

- MEDIAL
- LATERAL

- SUPERIOR
- INFERIOR

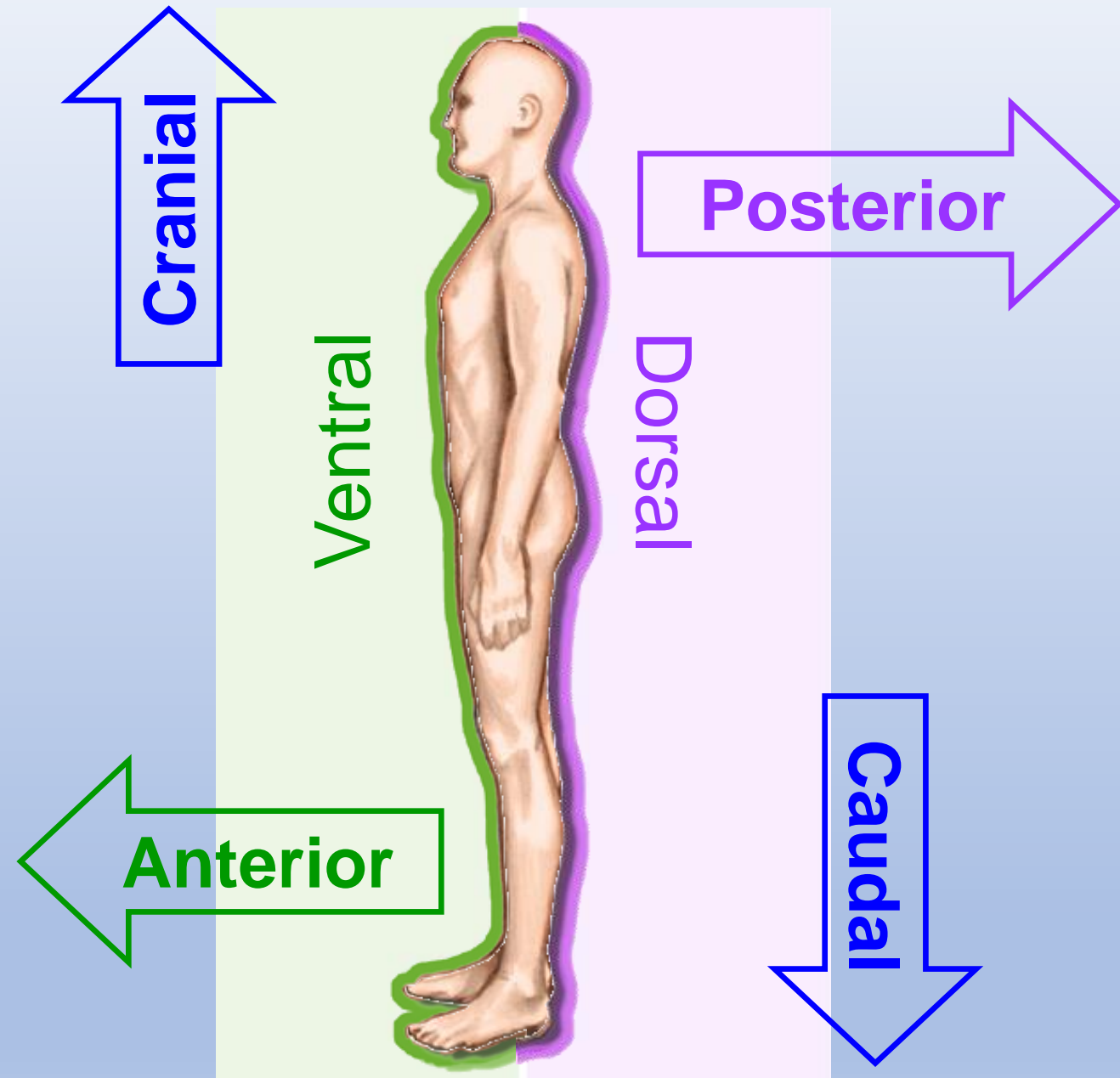
- PROXIMAL
- DISTAL





# Basic Terminology

- Cranial
- Caudal
- Anterior
- Posterior
- Ventral
- Dorsal





# Structure of the long bone

## Articular cartilage or Hyaline-

Covers and protects the bone surface  
Helps in Frictional, Compressive,  
Tensile and Shear loading

## Endosteum-

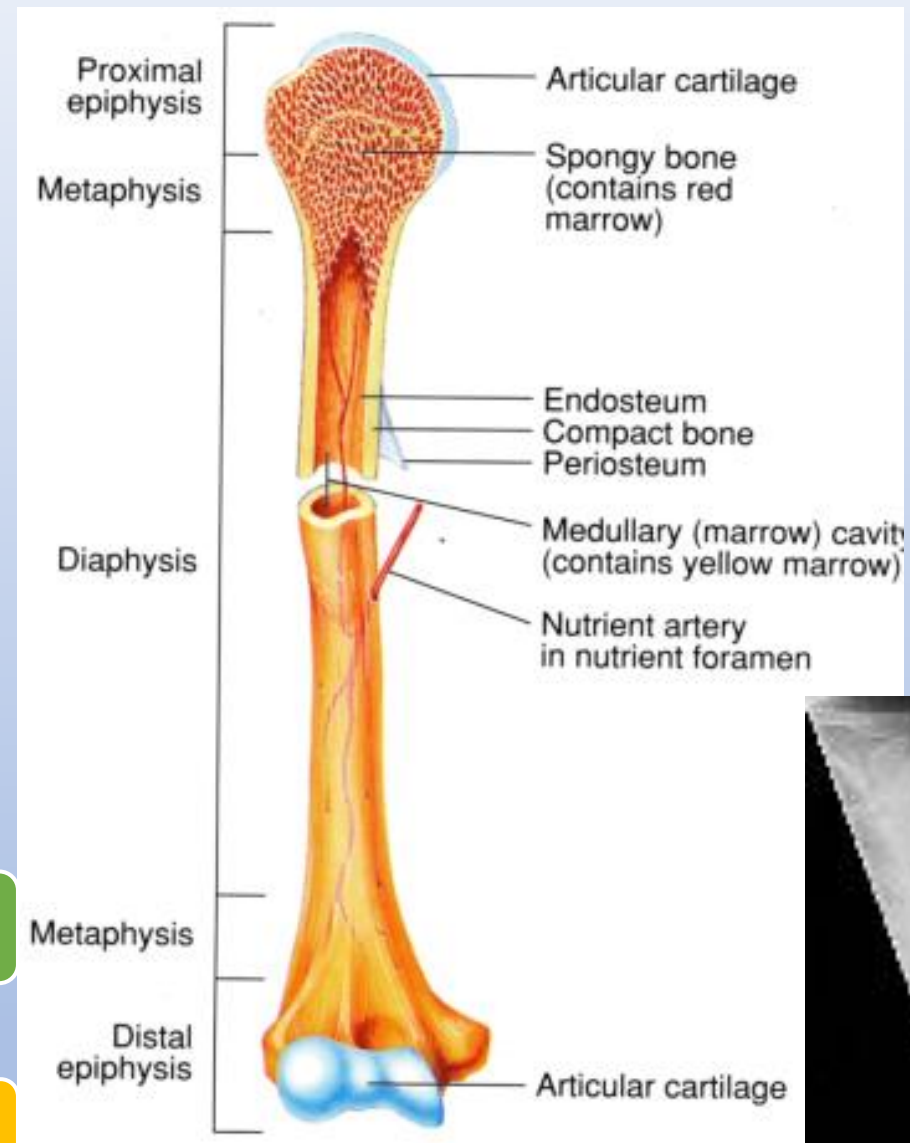
Membrane lining of the internal cavity  
(medullary) of the bone

## Periosteum-

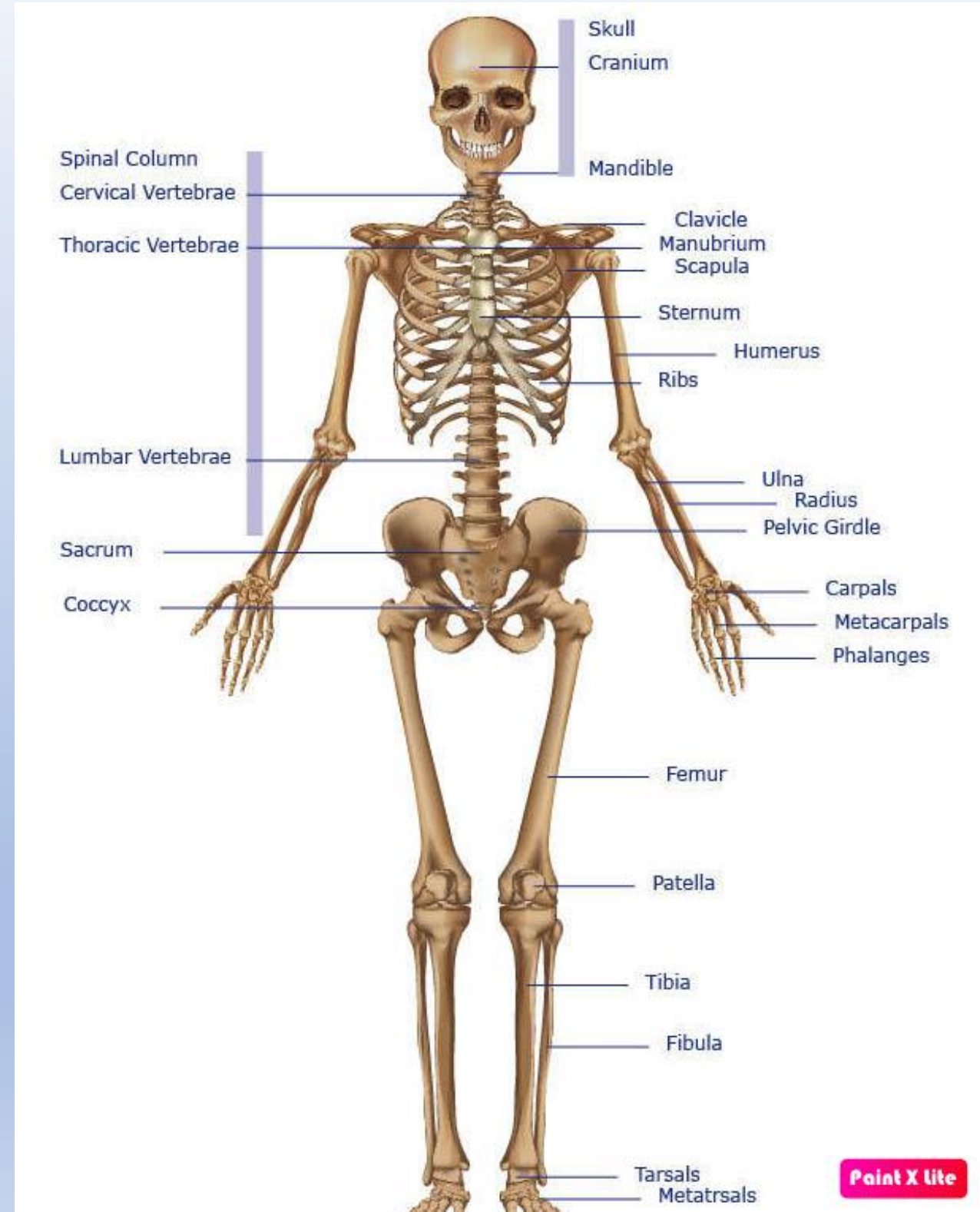
Double-layered membrane covering  
the entire external bone except the  
articular surface

In adults, metaphysis is continuous with the epiphysis

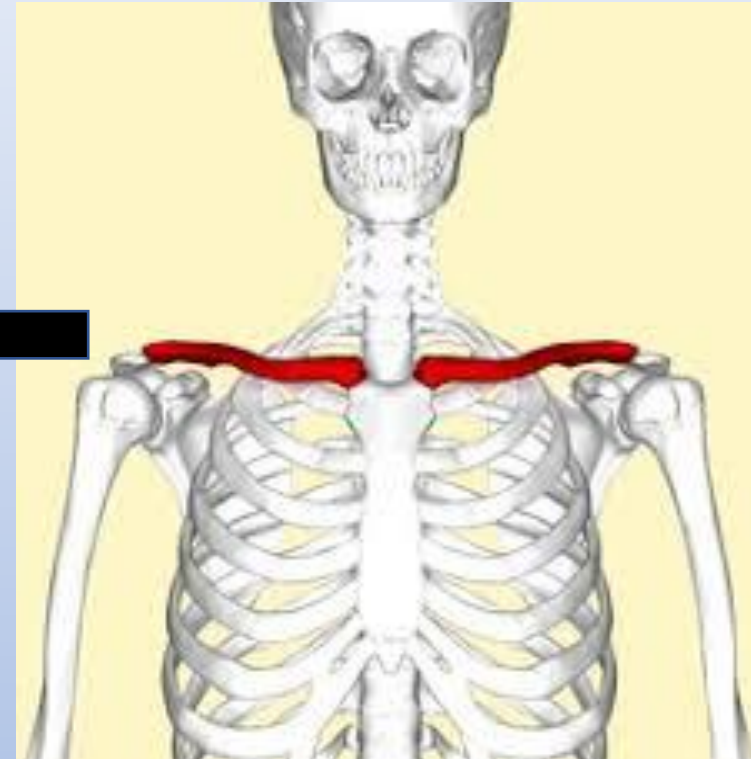
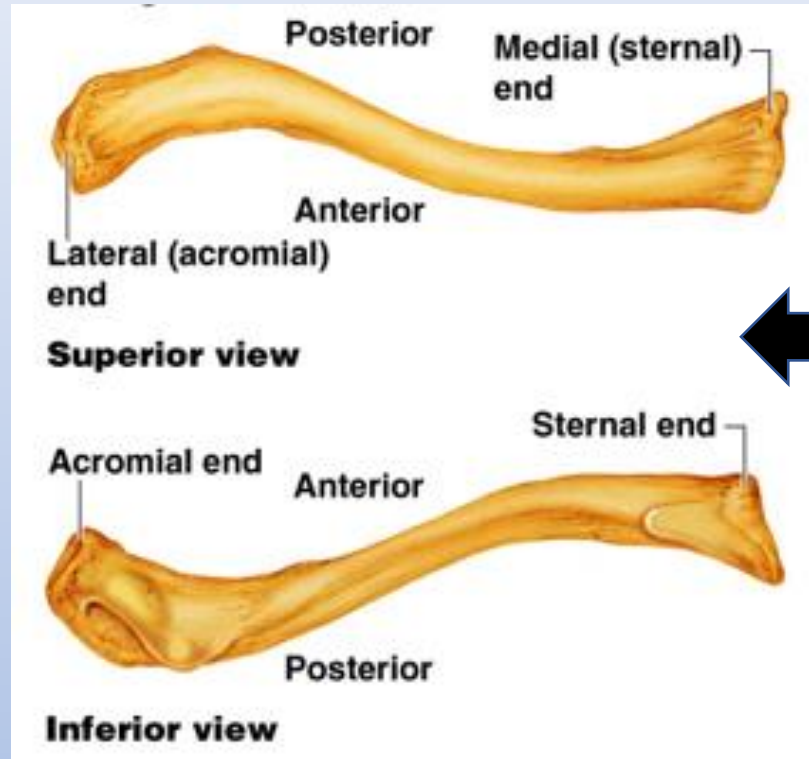
Periosteum does not cover the joint surface



# Anatomical Identification

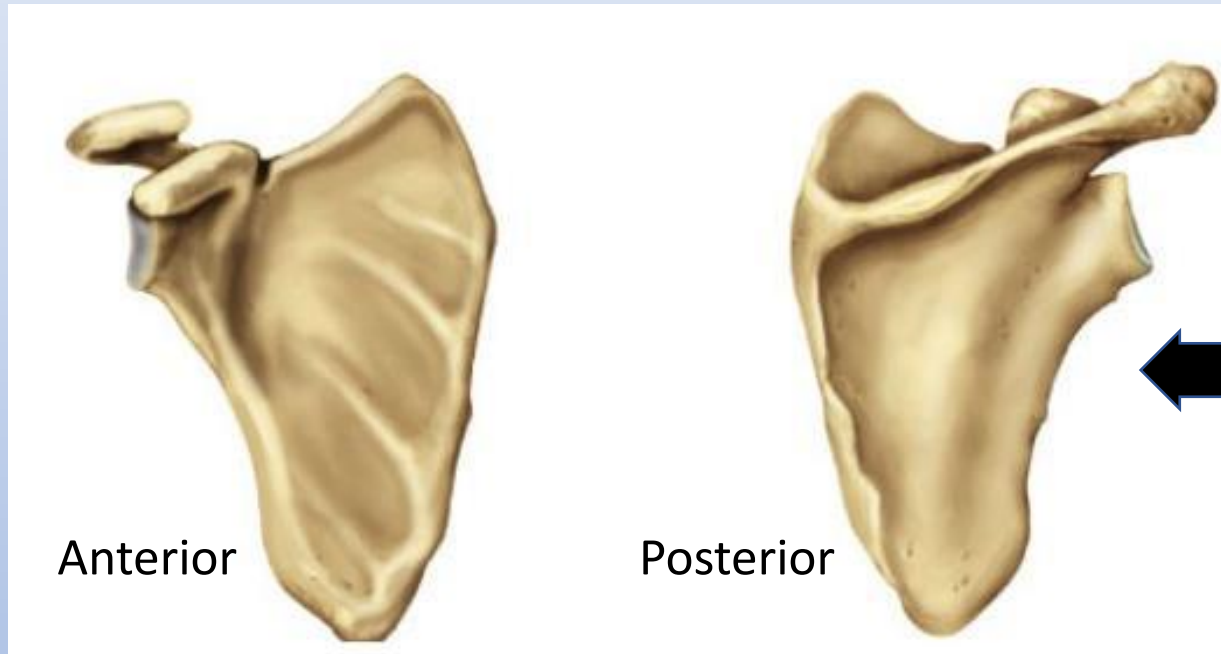


# Clavicle



Right Clavicle

# Scapula



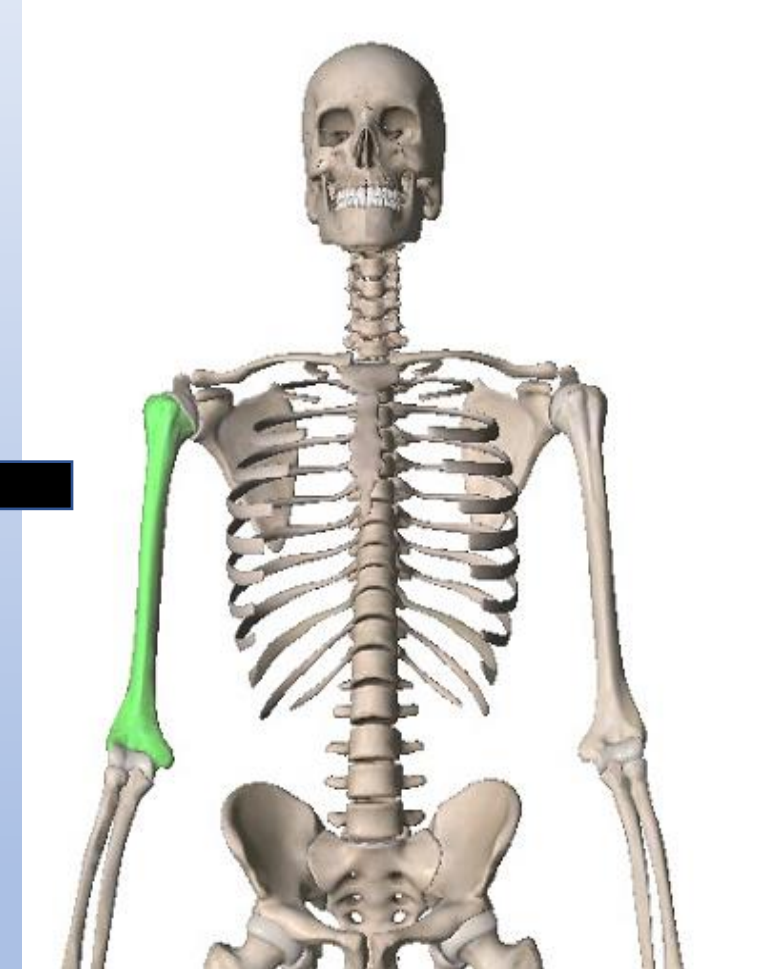
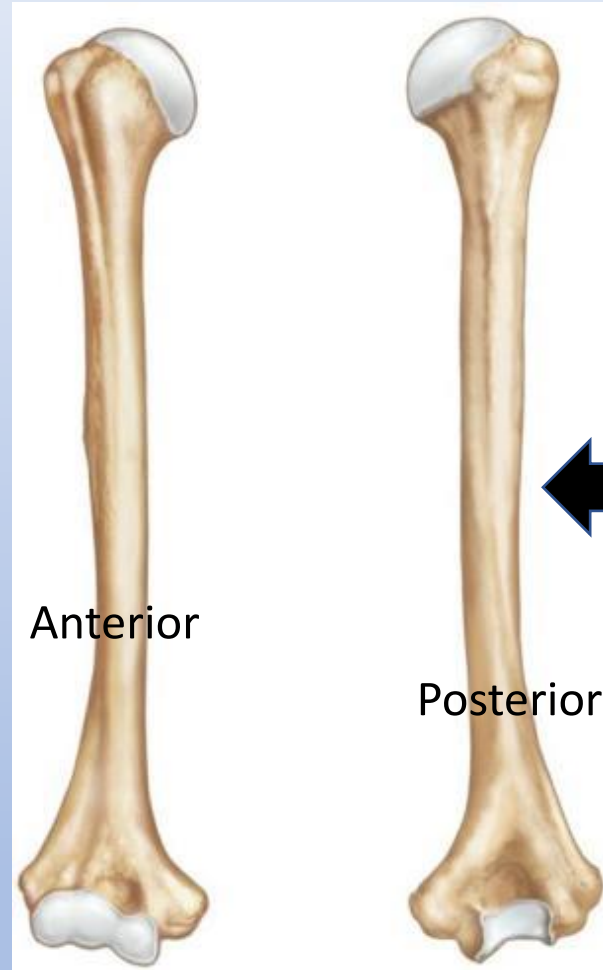
Anterior

Posterior

Right Scapula



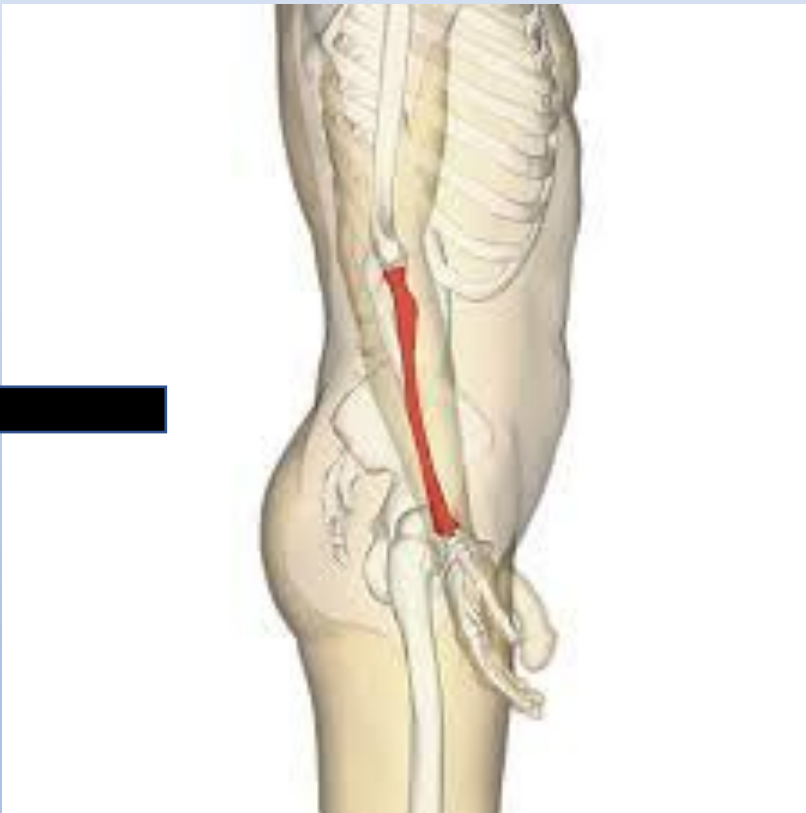
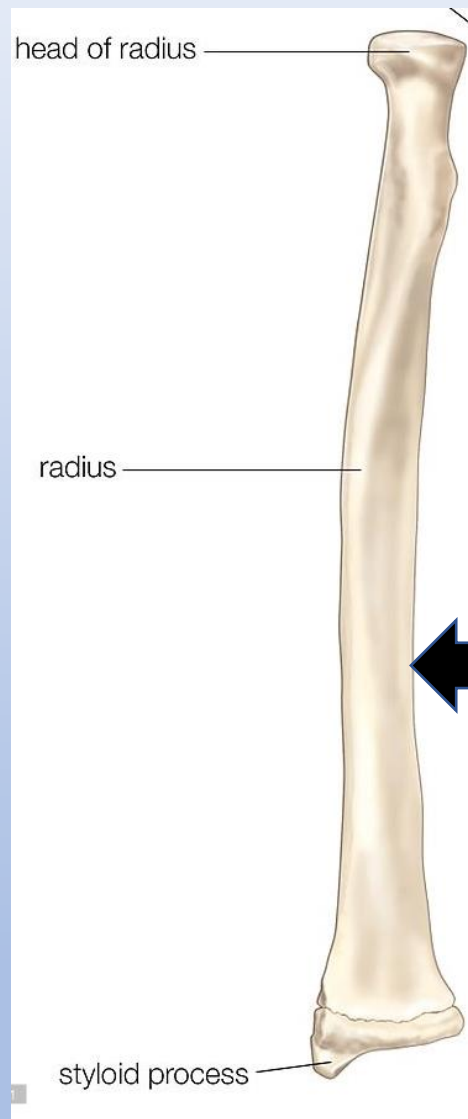
# Humerus



Right Humerus

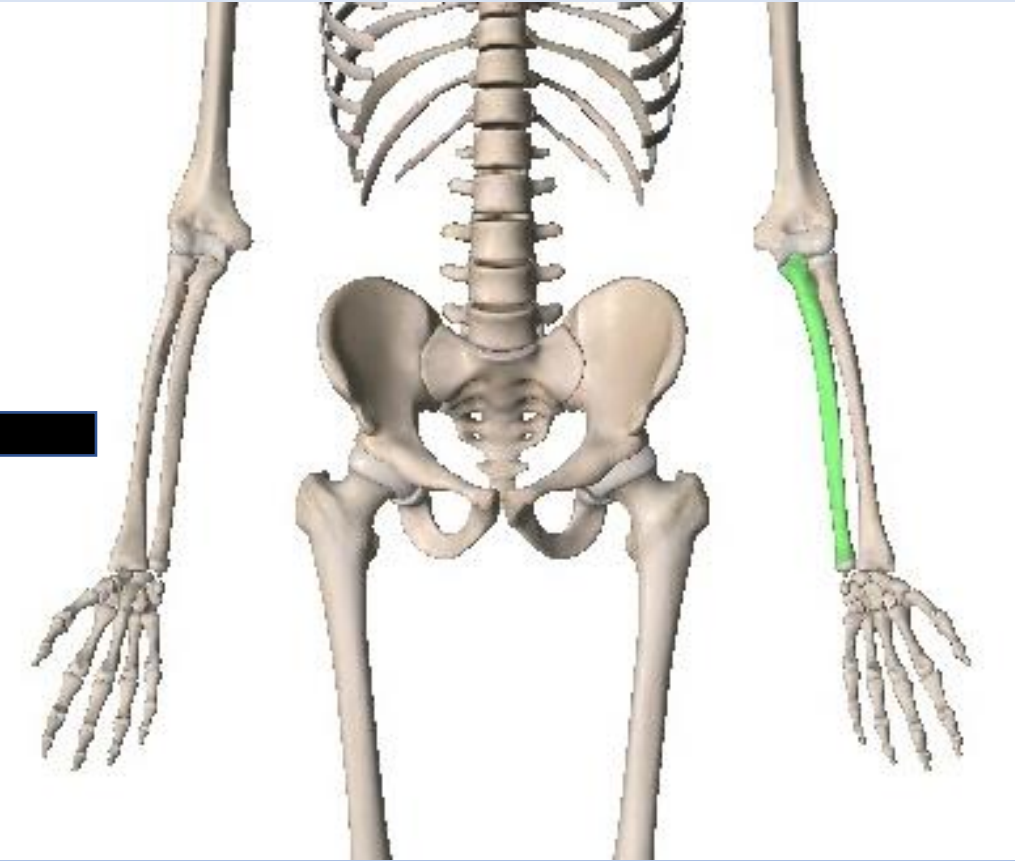
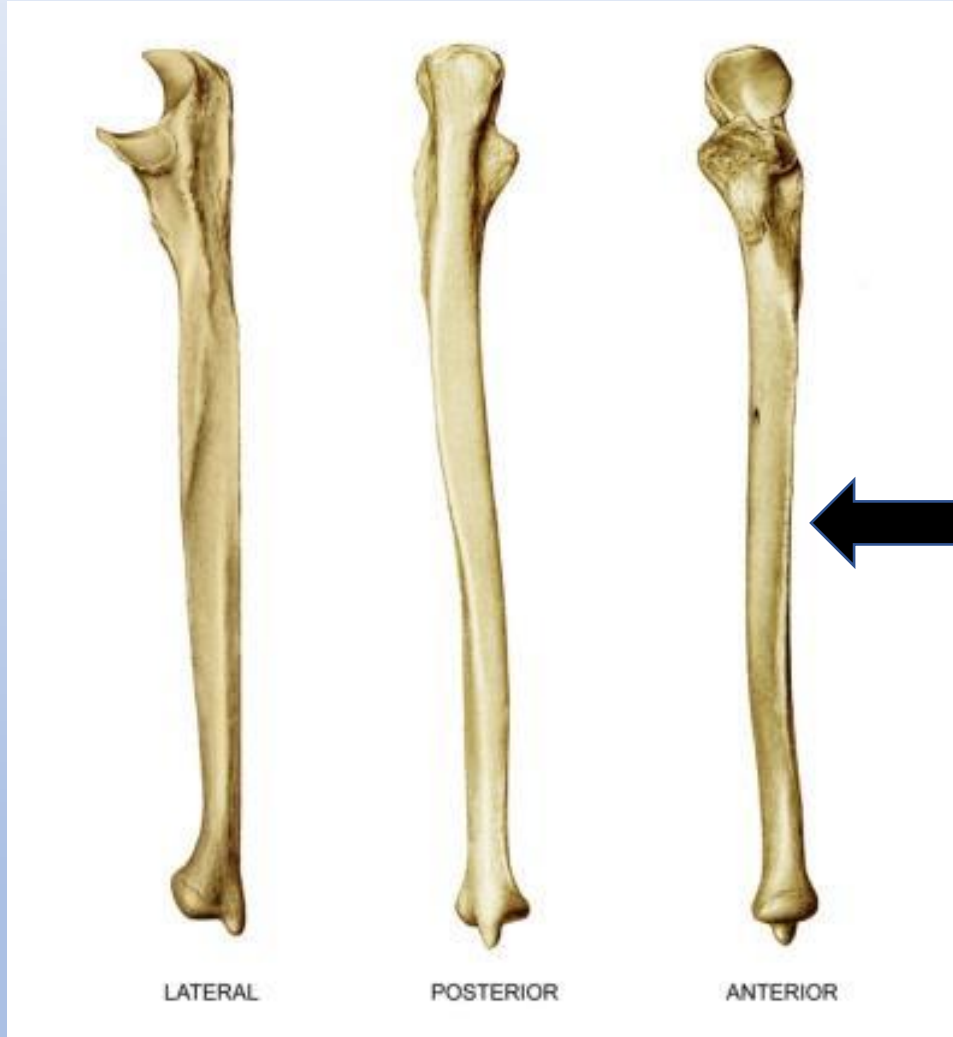


# Radius



Right Radius

# Ulna



Left Ulna



# Bones of the Hand

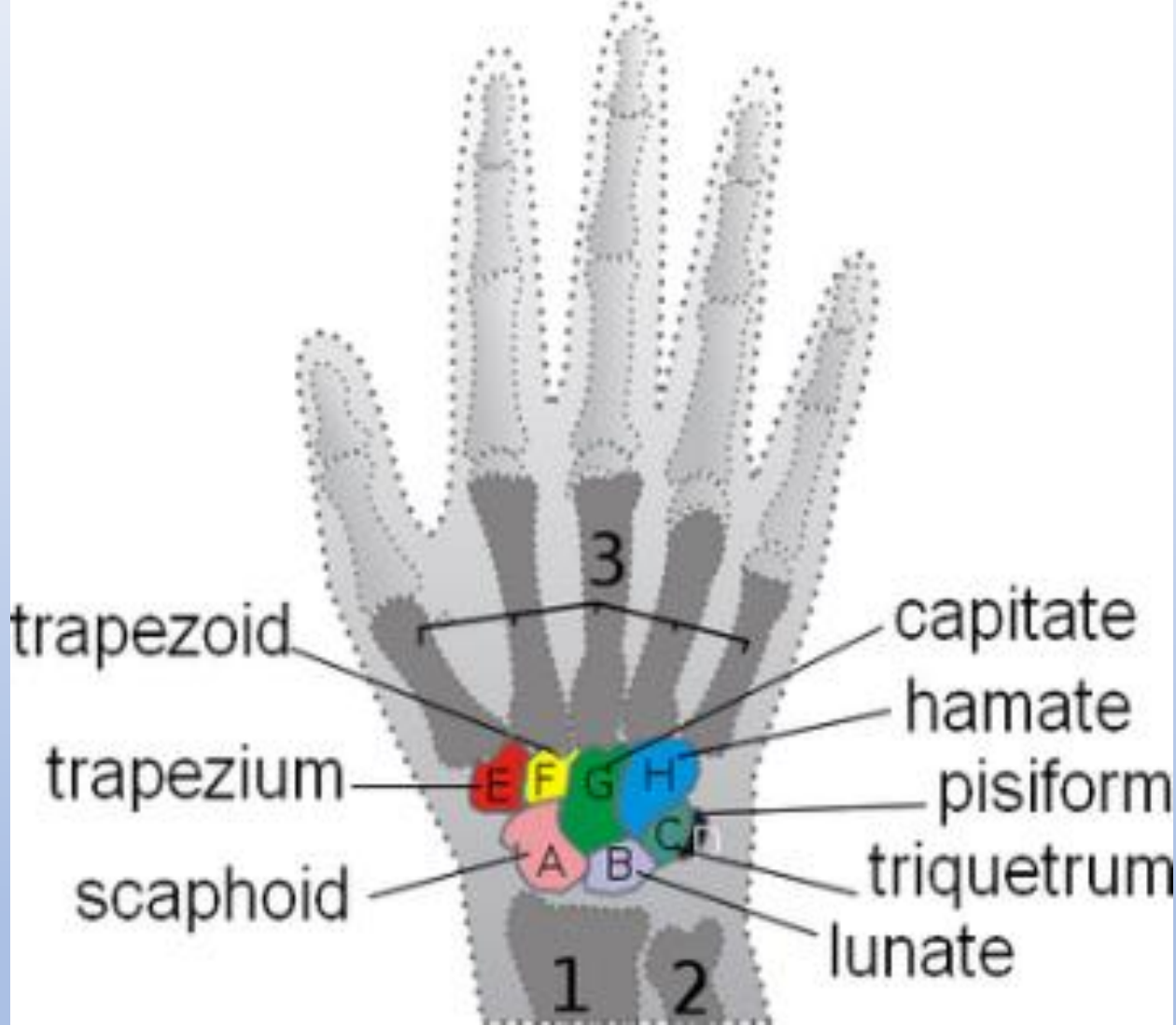
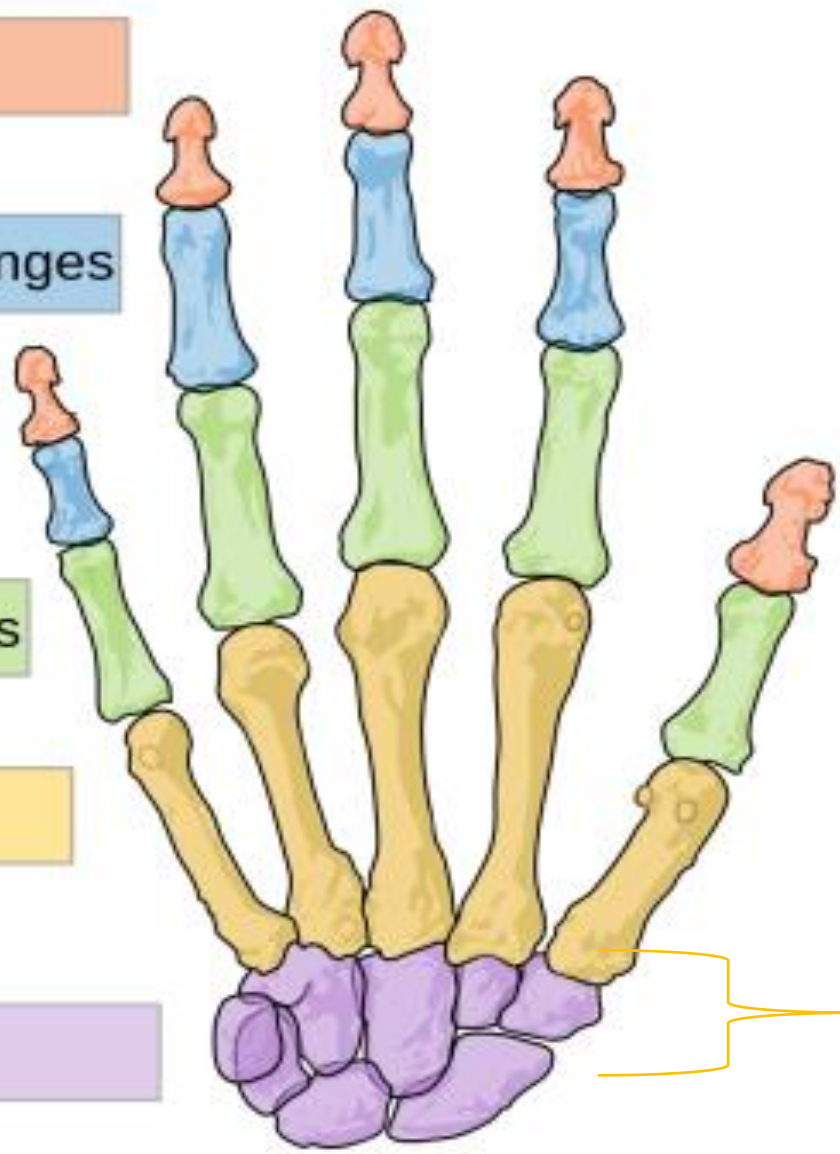
Distal phalanges

Intermediate phalanges

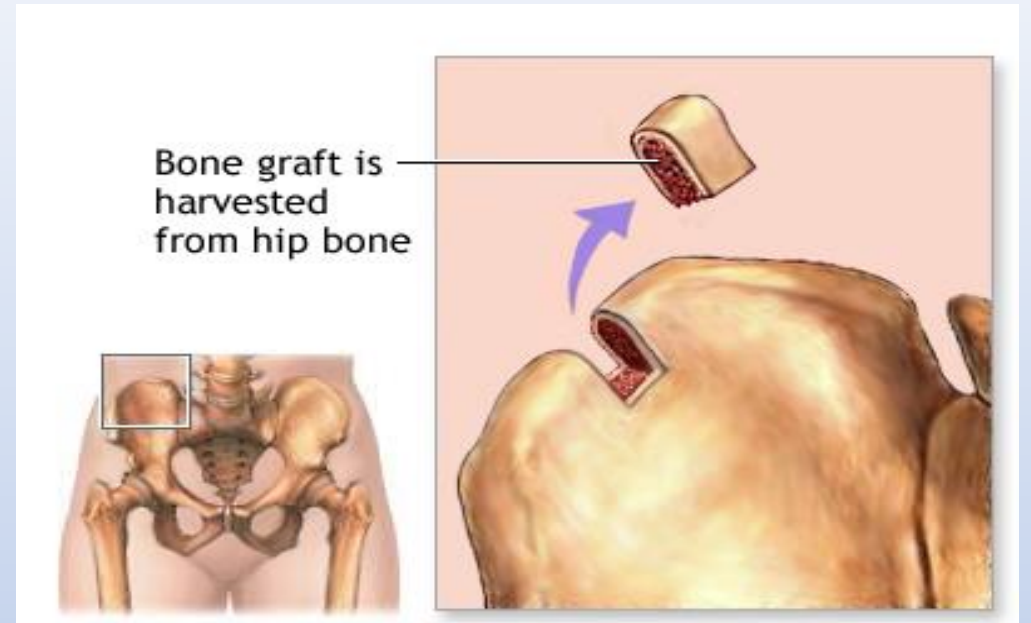
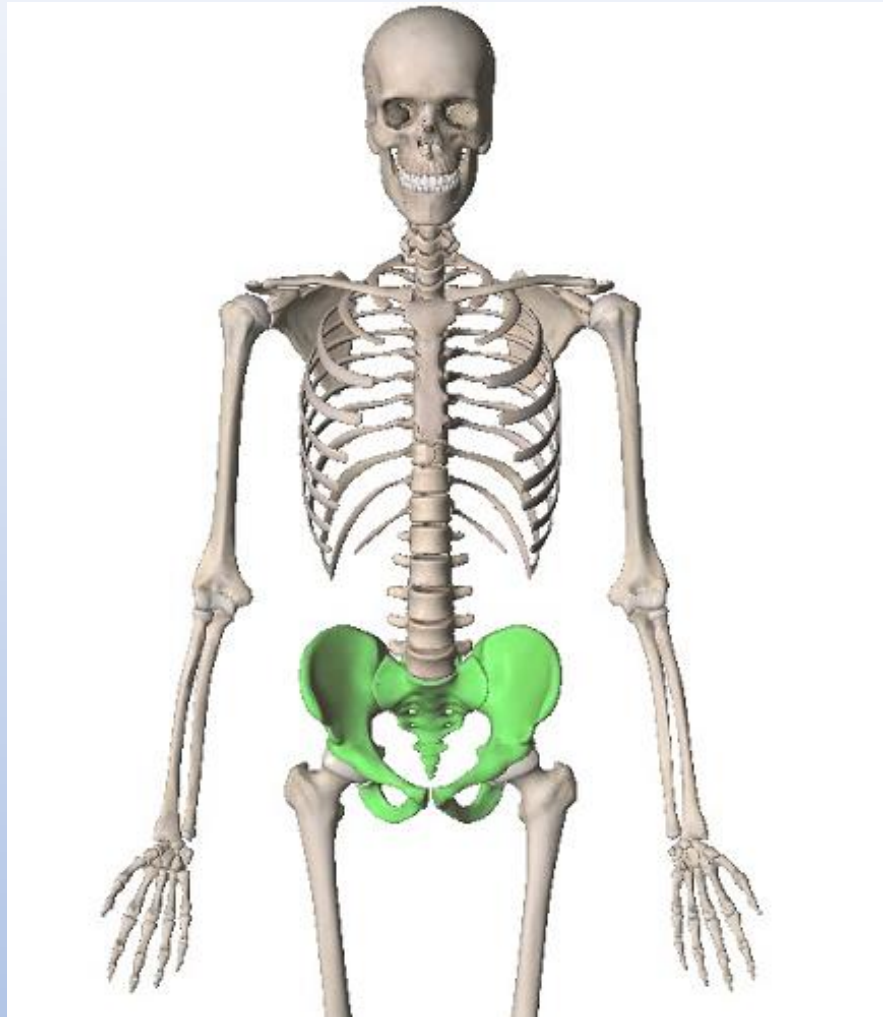
Proximal phalanges

Metacarpals

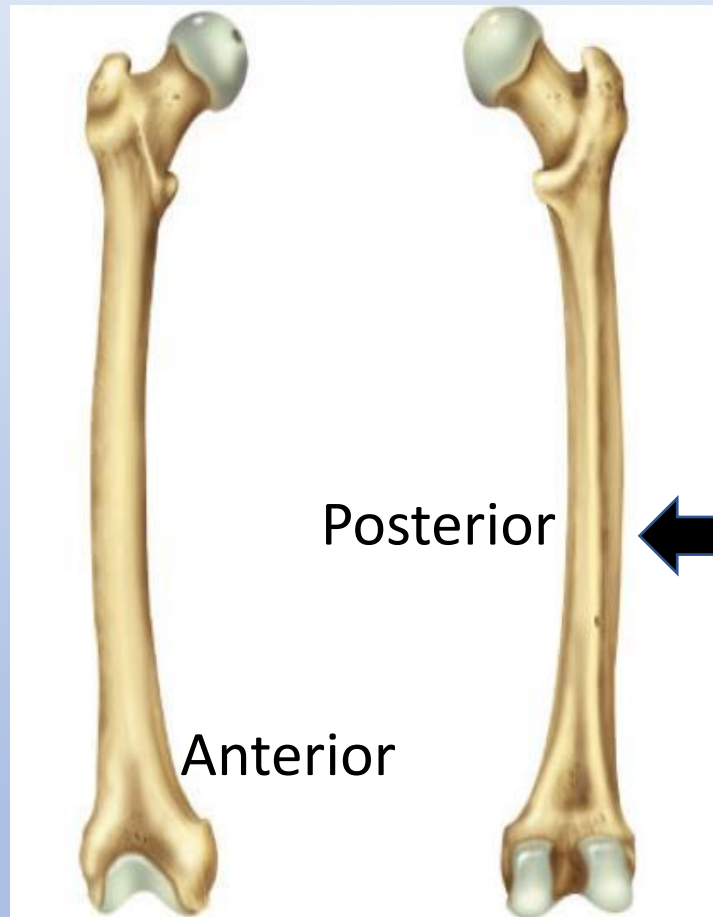
Carpals



# Pelvis



# Femur



Right Femur

# Tibia



Right Tibia



# Fibula

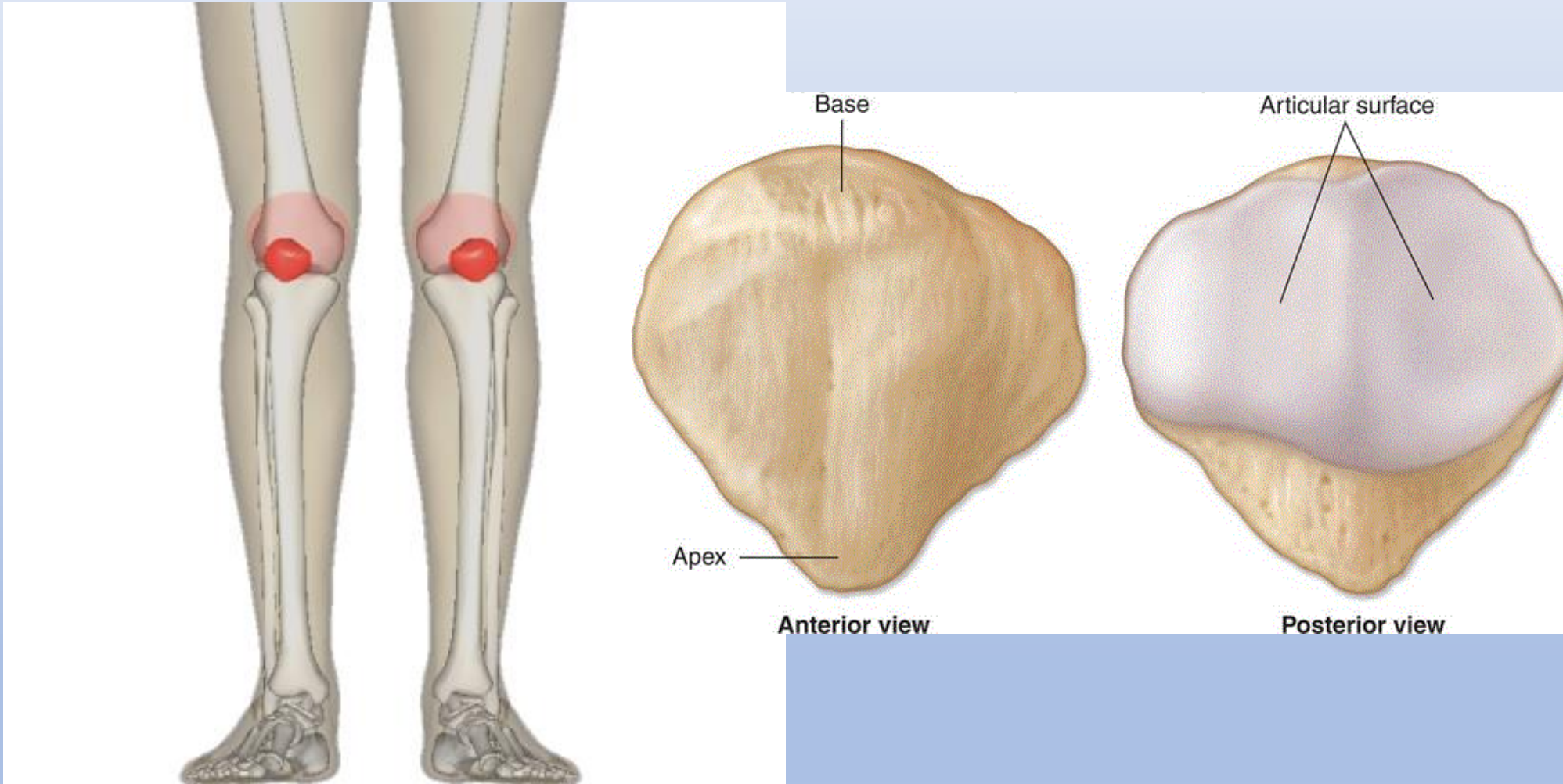


Left Fibula

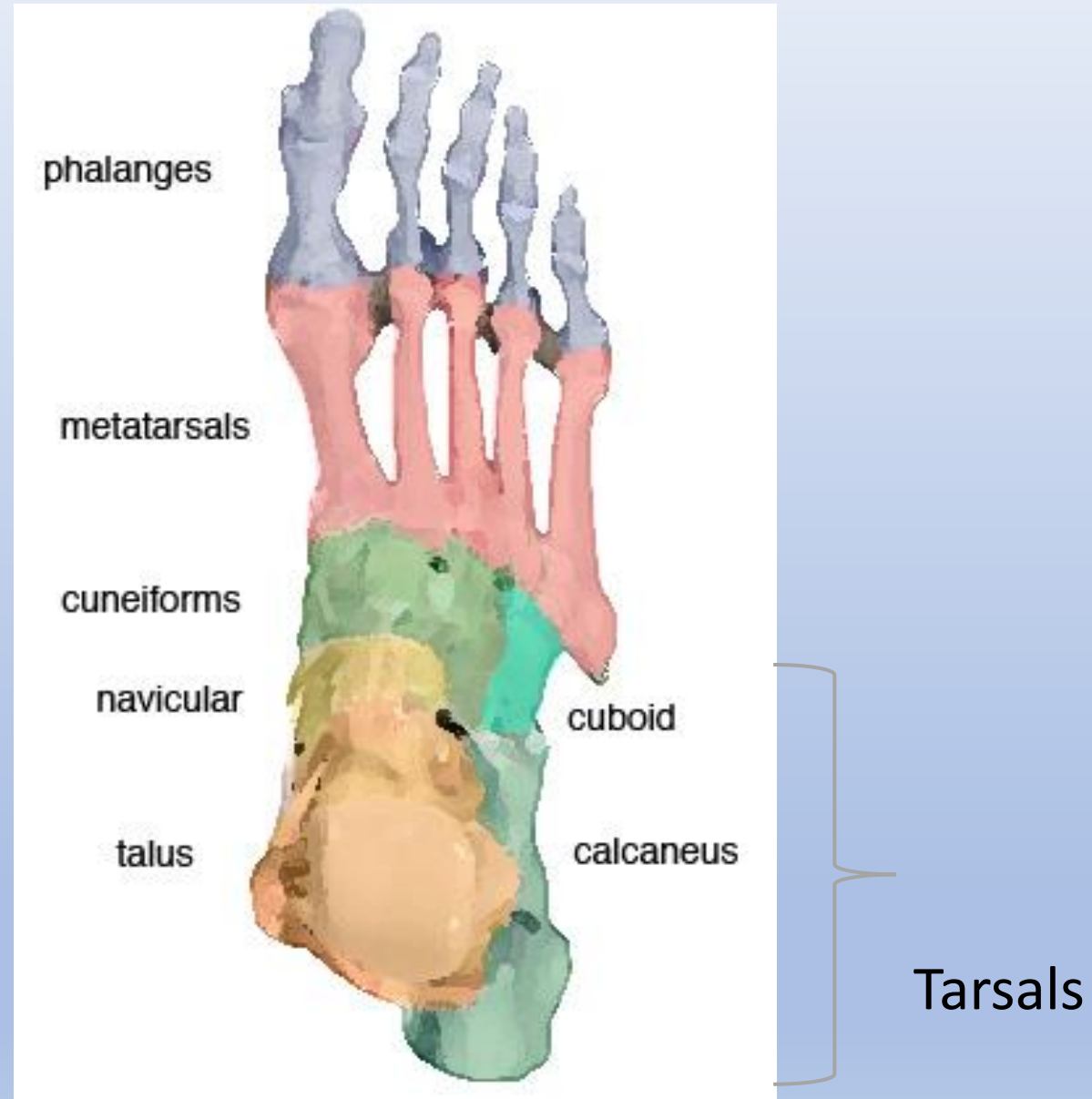




# Patella



# Foot





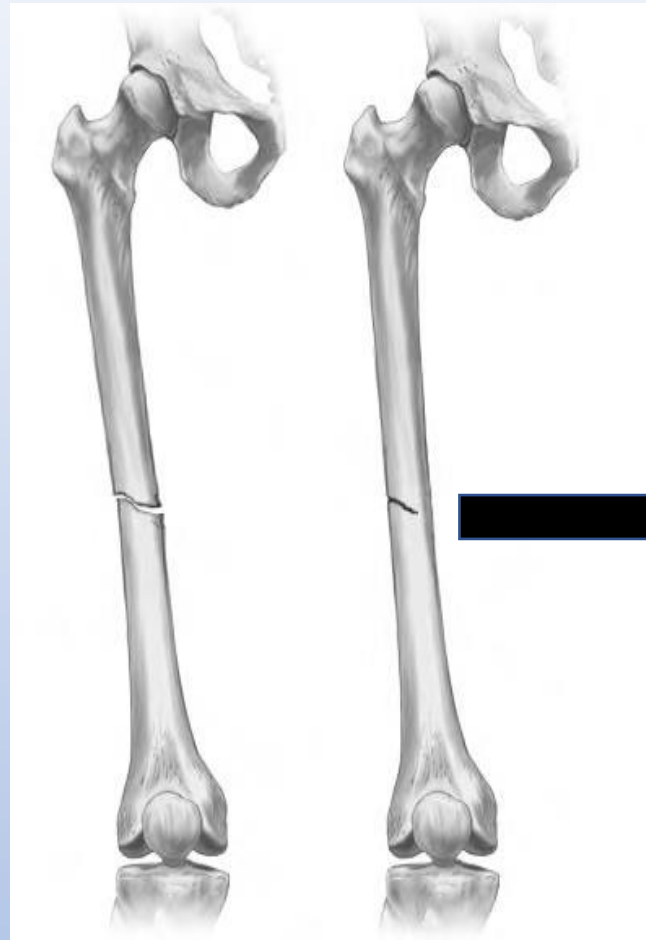
# Fracture Terminology

- What is a Fracture?

It is a Disruption In The Continuity Of The Bone.



# Fracture Terminology



- **Complete Fracture:**

- Fracture Has Penetrated Both Cortices Of The Bone

- **Incomplete Fracture:**

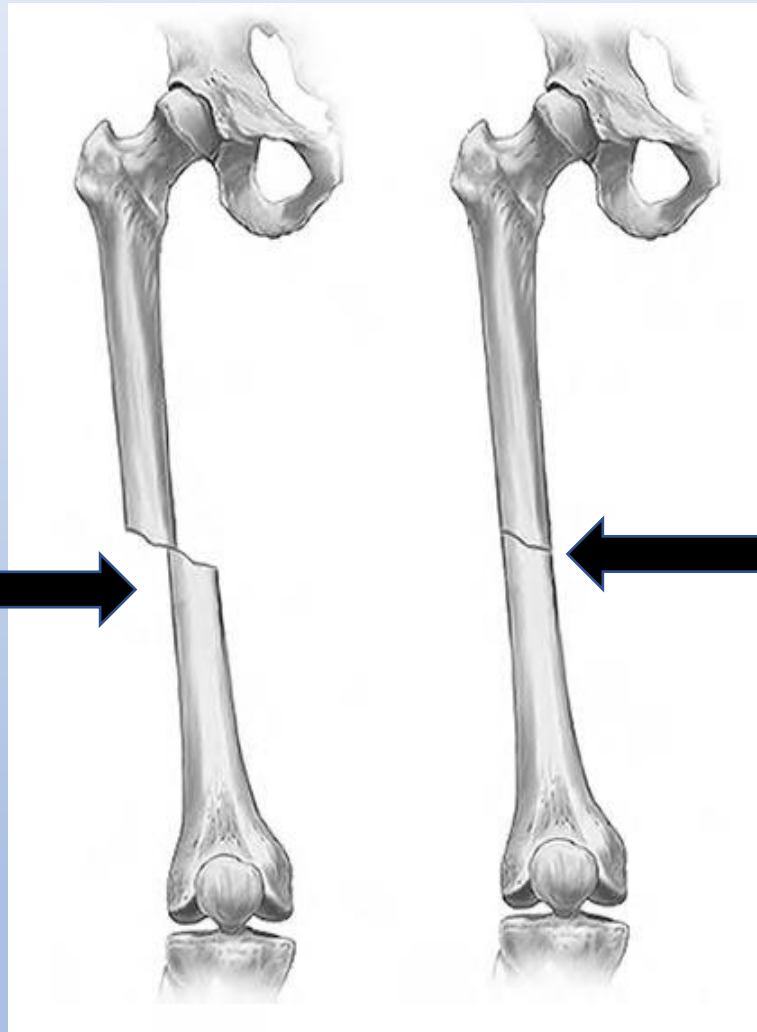
- Fracture Penetrates Only One Side Of The Cortical Wall
- Most common type is “greenstick fracture”



# Fracture Terminology

- **Displaced Fracture:**

- Bone segments are No Longer Aligned



- **Non-displaced:**

- Bone Segments Are Still In Alignment



- **Impacted Fracture:**

- Fracture Has Caused The Bone To Shorten
- Caused by a compression force.

# Fracture Terminology

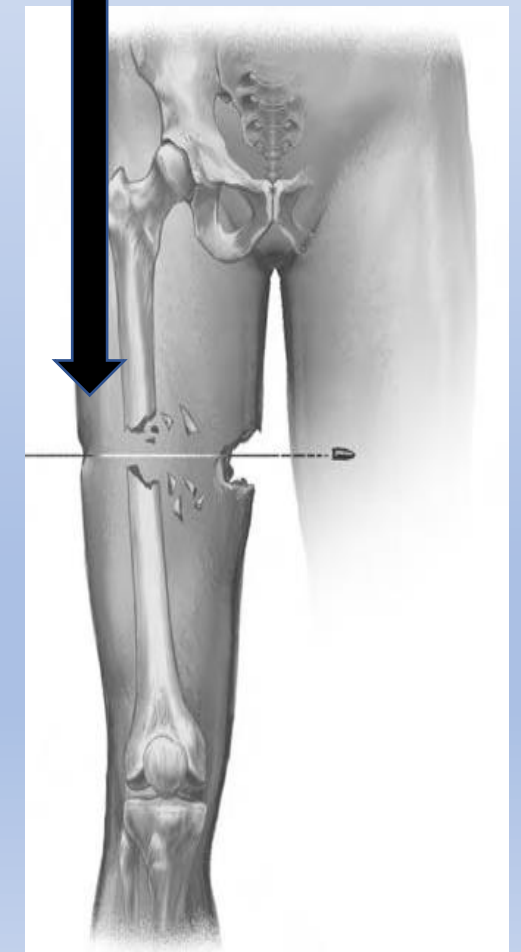
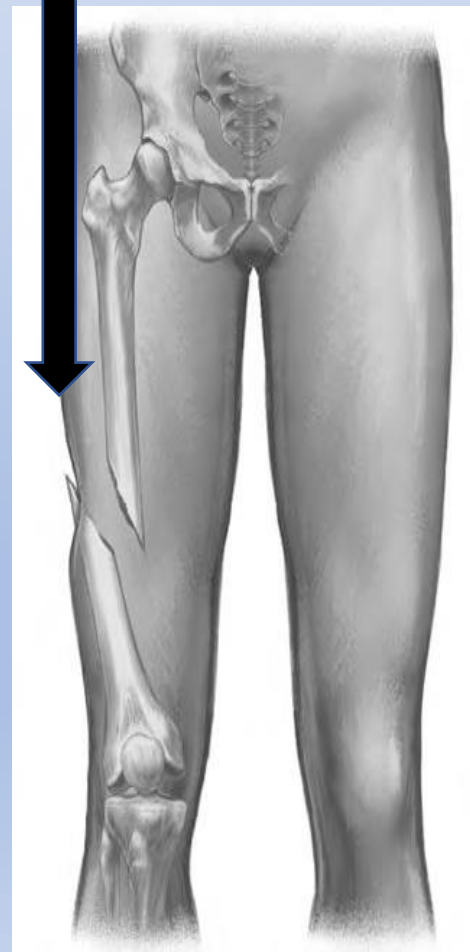
- **Closed Fracture:**
  - Skin Is Not Broken



- **Open Fracture:**
  - Fracture Outside the Skin and near the Fracture Site

From within      From without

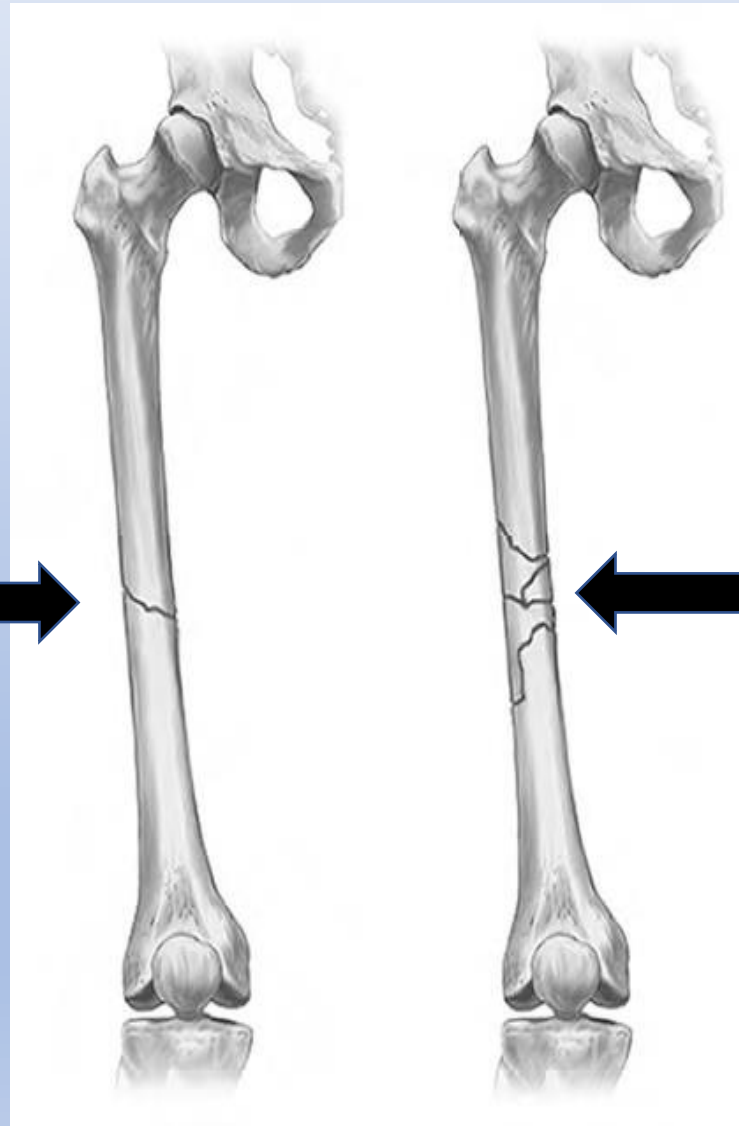
Bone Forced Through Skin      Bone Is Dragged Through Skin By External Source



# Fracture Terminology

- **Simple Fracture:**

- Closed Fracture With A Single Fracture Line And Only Two Fracture Fragments
- Typically a low energy trauma



- **Comminuted Fracture:**

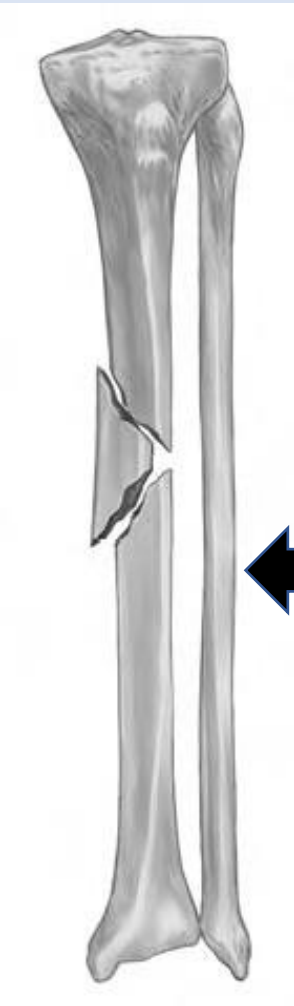
- Bone Is Broken Into Multiple Pieces
- Typically a higher energy trauma



# Fracture Terminology

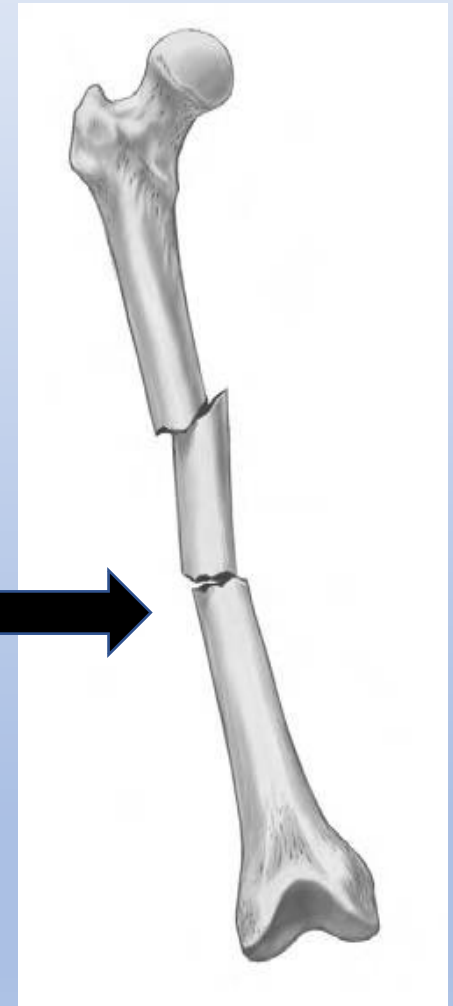
## Butterfly Fracture:

- The Fracture Lines Meet
- Segment Of Bone Resembles Wing Of Butterfly
- Typically caused by a bending injury



## Segmental Fracture:

- Fracture At Two Levels Of The Same Bone
- Divides Bone Into 3 sections



# Fracture Terminology

- **Spiral Fracture:**

- Line Creates A Helical Curve That Encircles The Shaft Of The Bone
- Usually caused by a rotation movement



- **Avulsion Fracture:**

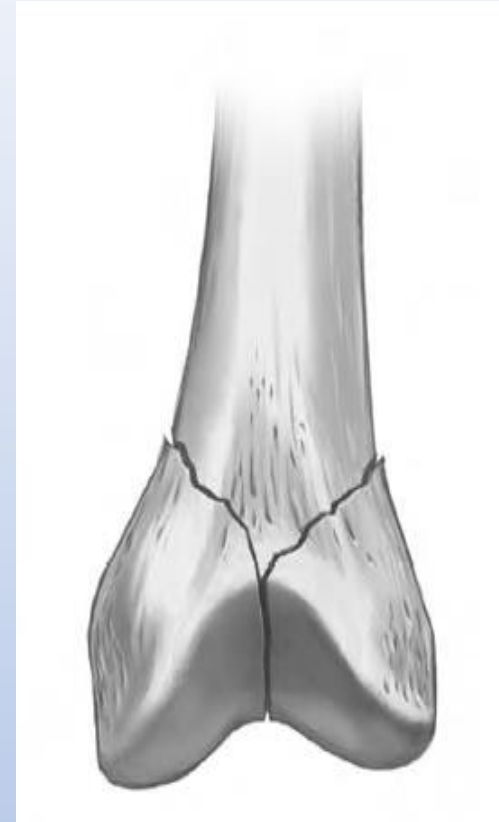
- A Fracture At A Traction Epiphysis.
- Caused by a “pulling” force.
- Typical at a fibrous joint.



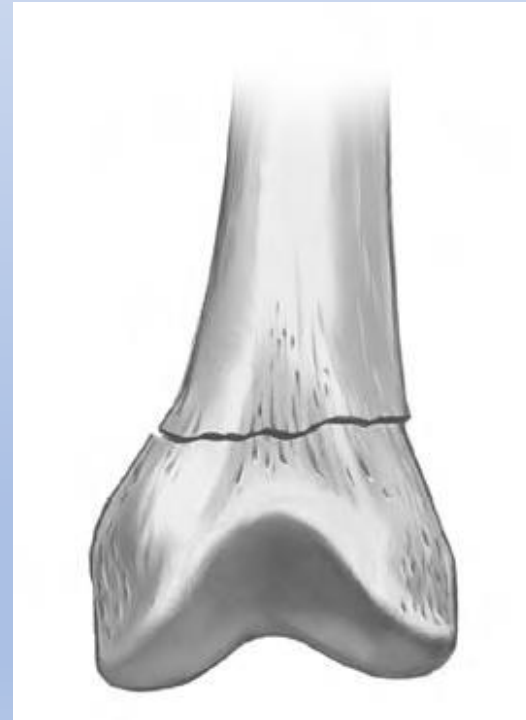


# Anatomical Fractures

- Inter-condylar Fracture



- Supracondylar Fracture



# Anatomical Fractures

- Intertrochanteric Fracture



- Sub trochanteric Fracture

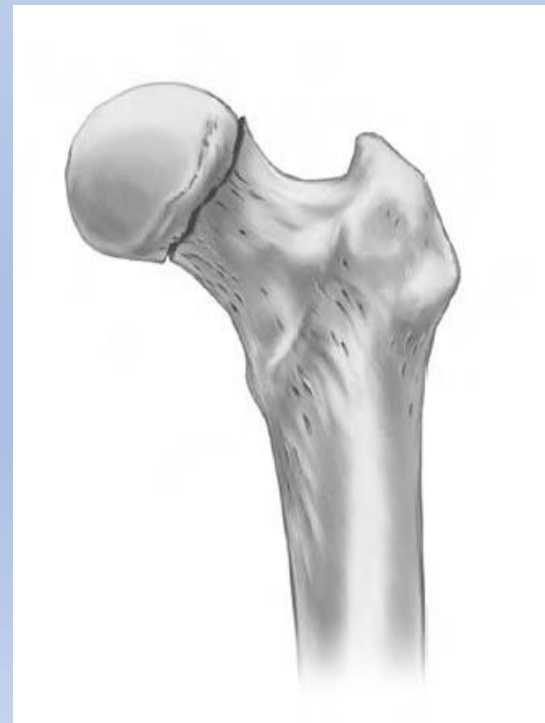


# Anatomical Fractures

- Medial Malleolus Fracture



- Sub-capital Fracture



# Anatomical Fractures

- Intra-articular Fracture:
  - Extends Into The Articular Portion Of A Joint

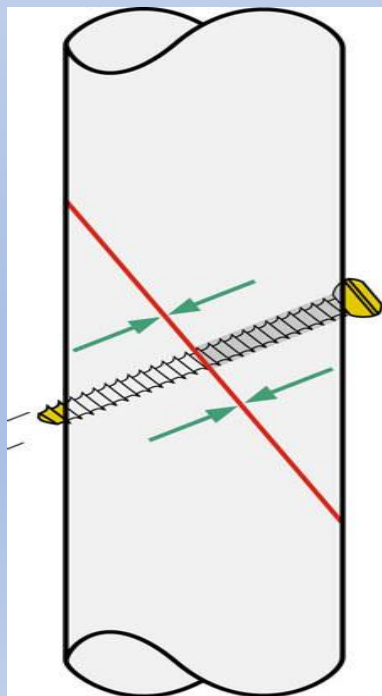
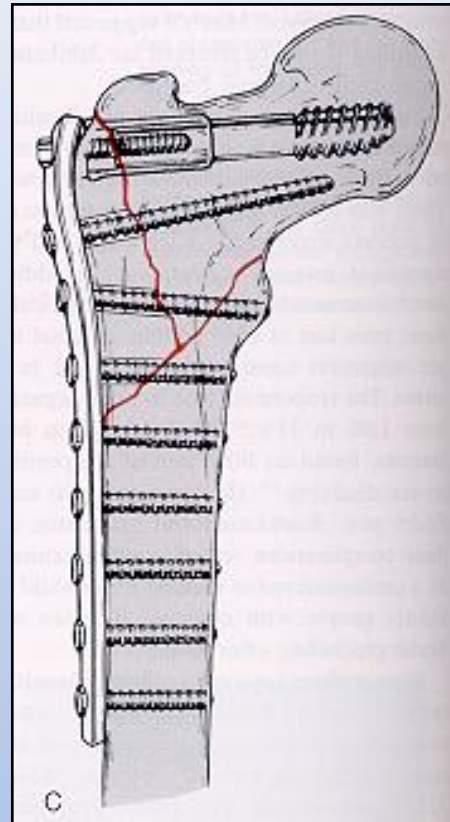


- Periarticular Fracture:
  - Occurs Near A Joint But Does Not Involve The Joint Surface

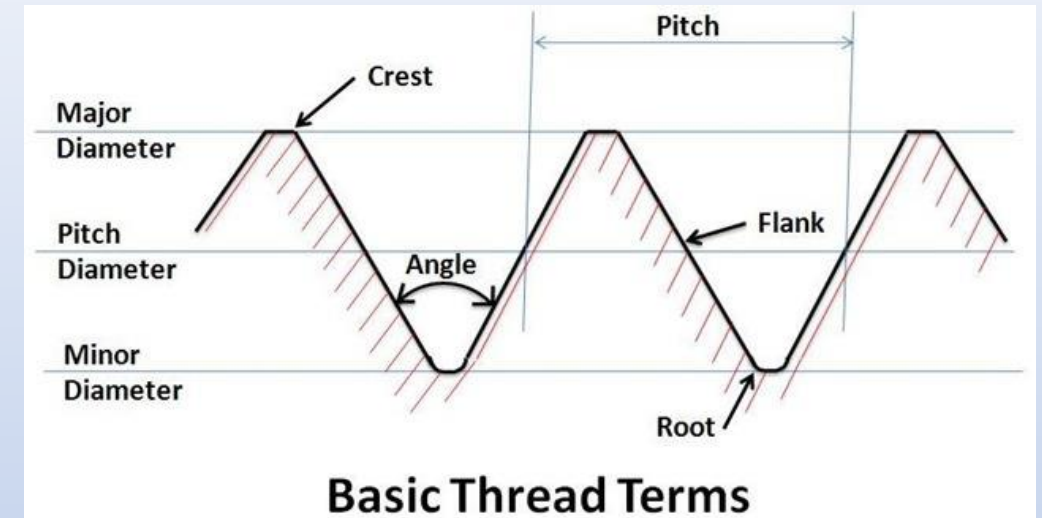


# Functions of a Screw

The main use of the screw is to connect two (or more) objects together usually by compressing them against each other.

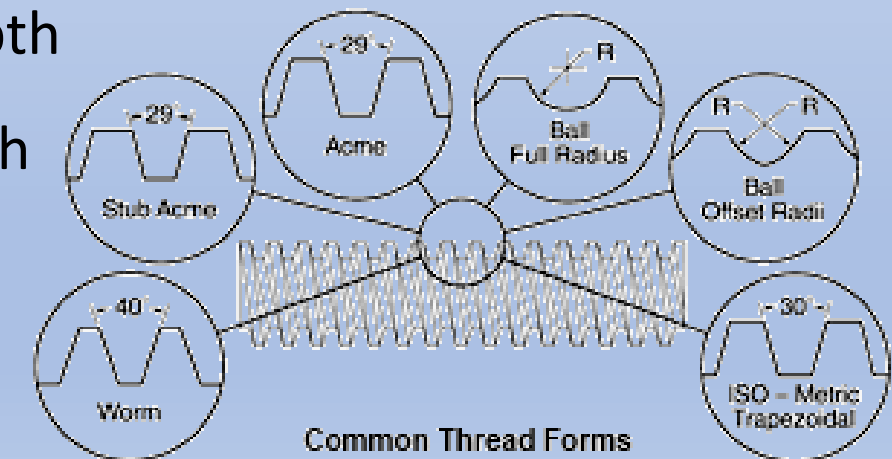


# The Thread



There are three aspects of importance in the thread:

- Shape
- Depth
- Pitch



# Thread Shape

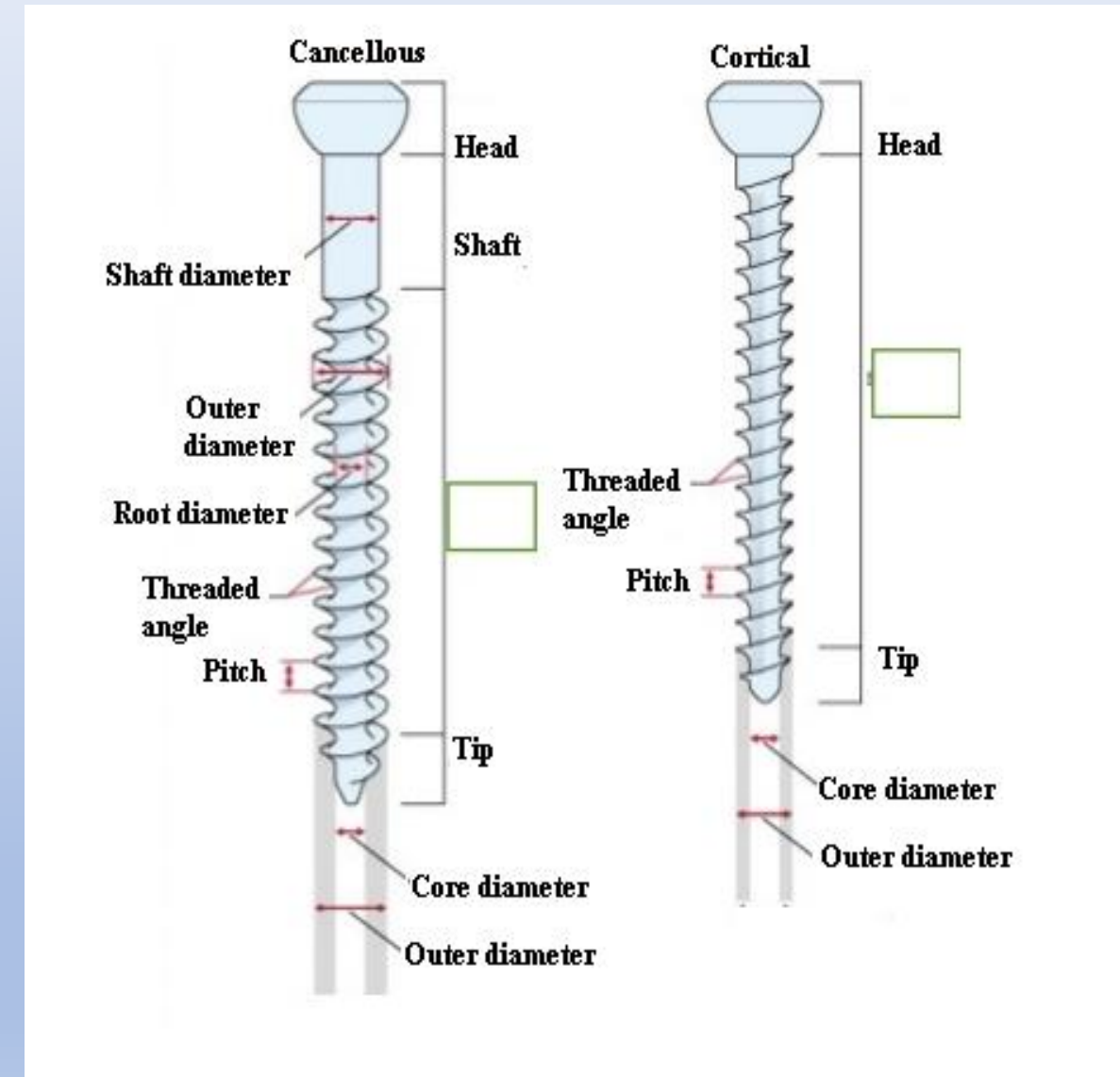
- Cortical Thread

- Smaller Depth
- Smaller Pitch
- Smoother Shape



- Cancellous Thread

- Larger Depth
- Larger Pitch
- Shaper Shape



# What Are Plates?

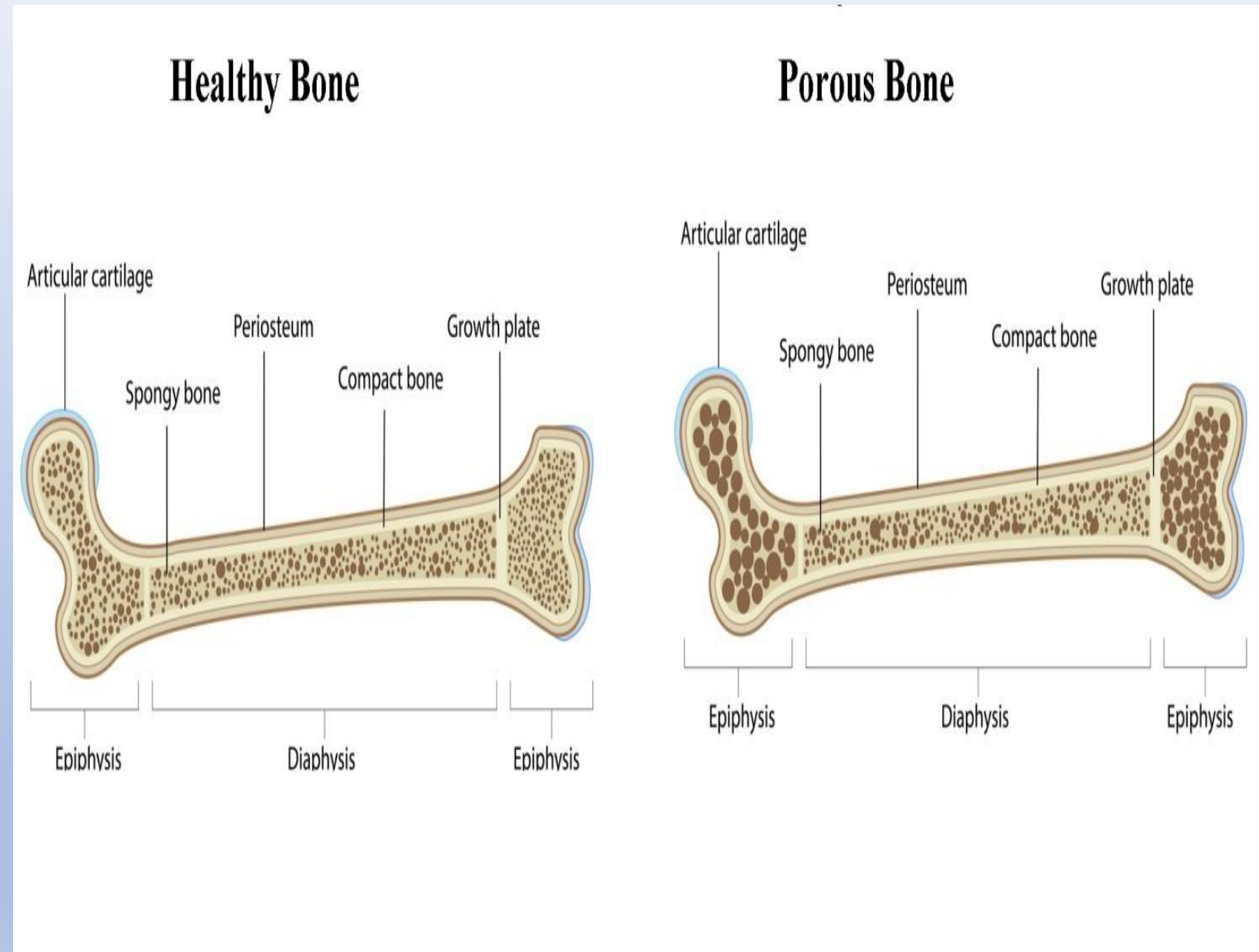
- Plates: Plating is procedure of application of orthopedic bone plates to fix a fracture. An orthopedic bone plate is a device that is fixed to the bone by application of screws on both side of fracture.
- Plating is widely used for fixation of diaphyseal fractures of upper extremity and metaphyseal and articular fractures.
- Plates are now widely accepted with different standard techniques of [osteosynthesis](#), throughout the skeleton. Different anatomical locations demand different shapes and sizes of plates.





# Where can the Bio-fixation plates be used?

- They can be used for plating of weak & porous bones.



# Plating options of Clavicle

Superior Left Clavicle



Superior Clavicle Plate



Clavicle Plate

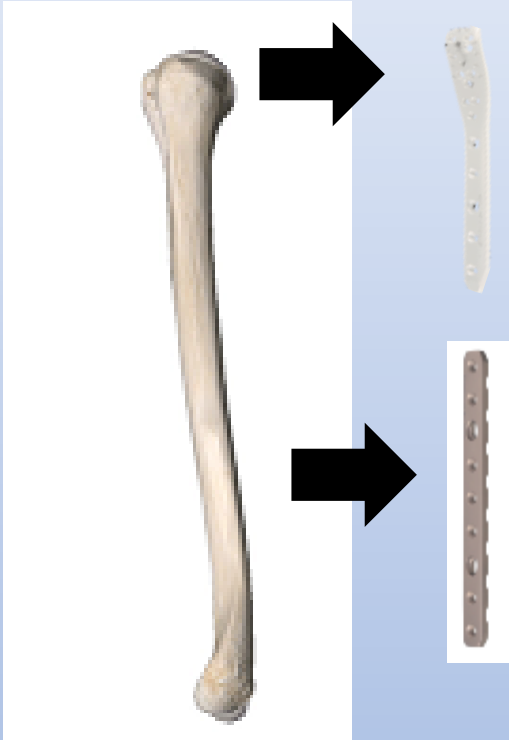
Left AC Joint



Clavicle Hook Plate

# Plating Options of Humerus

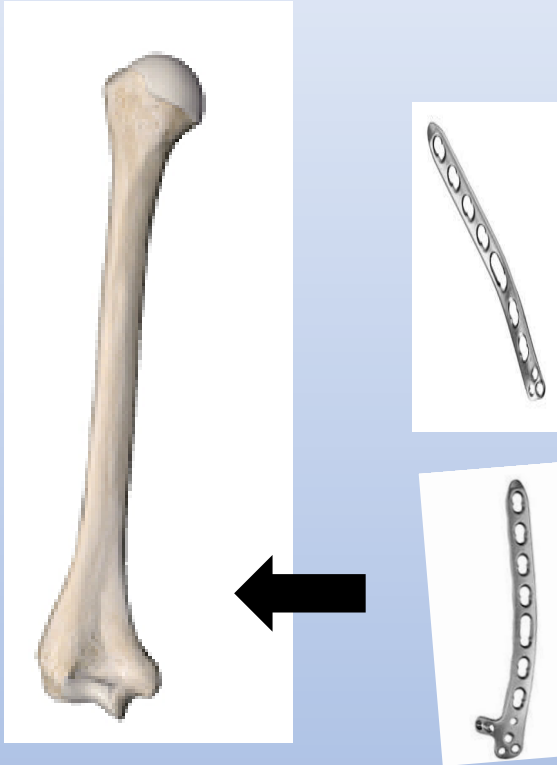
Left Lateral



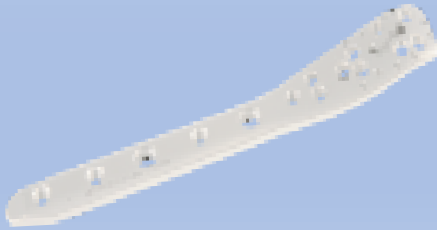
Left Medial



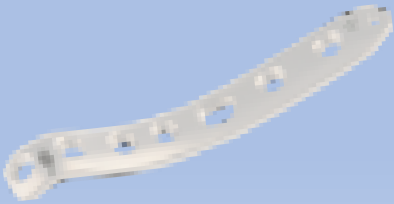
Left Posterior



Small Locking Plate 3.5 /  
Reconstruction Locking Plate



Proximal Humerus  
Locking Plate Phillos



Distal Medial Humerus  
Locking Plate

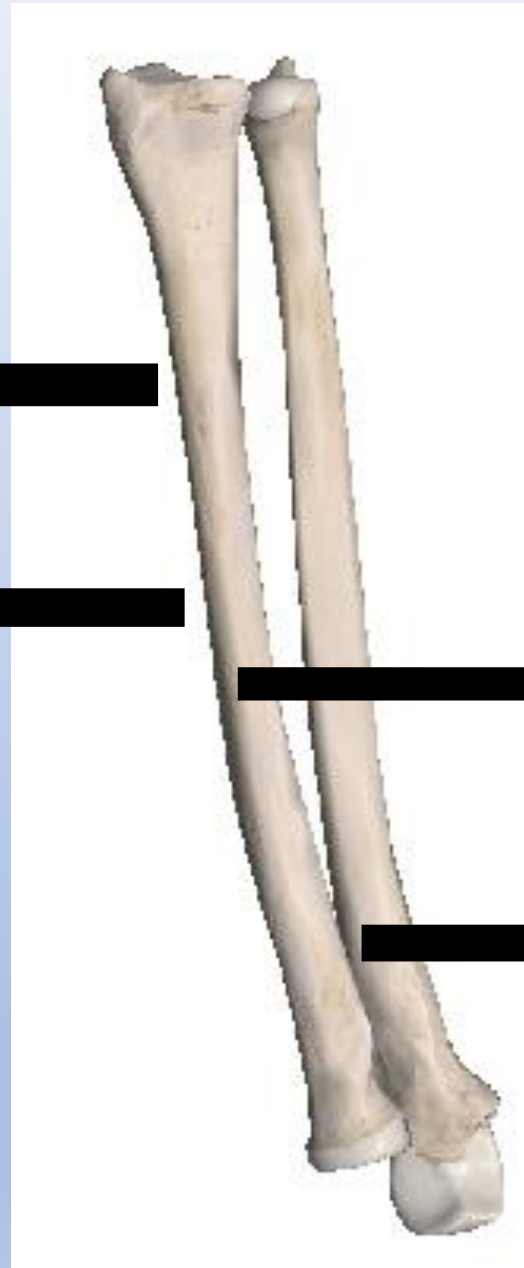
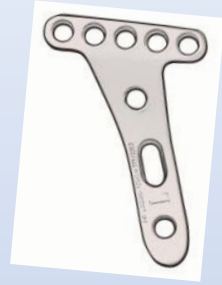


Distal Humerus without  
support Locking Plate



Distal Humerus with  
support Locking Plate

# Radius/Ulna Plating Options



Distal Radius Volar Head of 5h

Distal Radius Volar

Small T Locking Plate

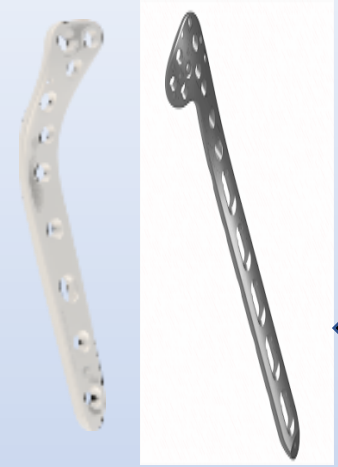
Small T Oblique Angled Locking Plate

Reconstruction Locking Plate

Olecranon Locking Plate

# Plating Options of Tibia

Proximal Lateral Tibia Locking Plate



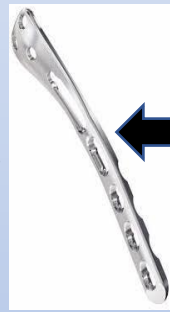
L Locking Plate



Proximal Medial Tibia Locking Plate



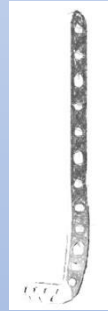
Proximal Posterior Tibia Locking Plate



Reconstruction Locking Plate



Distal Tibia Anterolateral Locking Plate



Distal Tibia Locking Plate



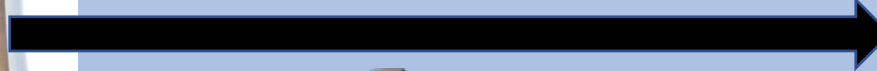
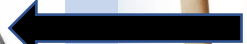
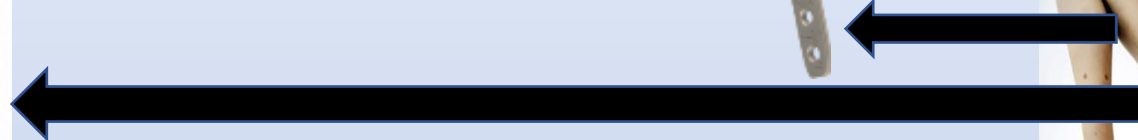
Distal Fibula Locking Plate



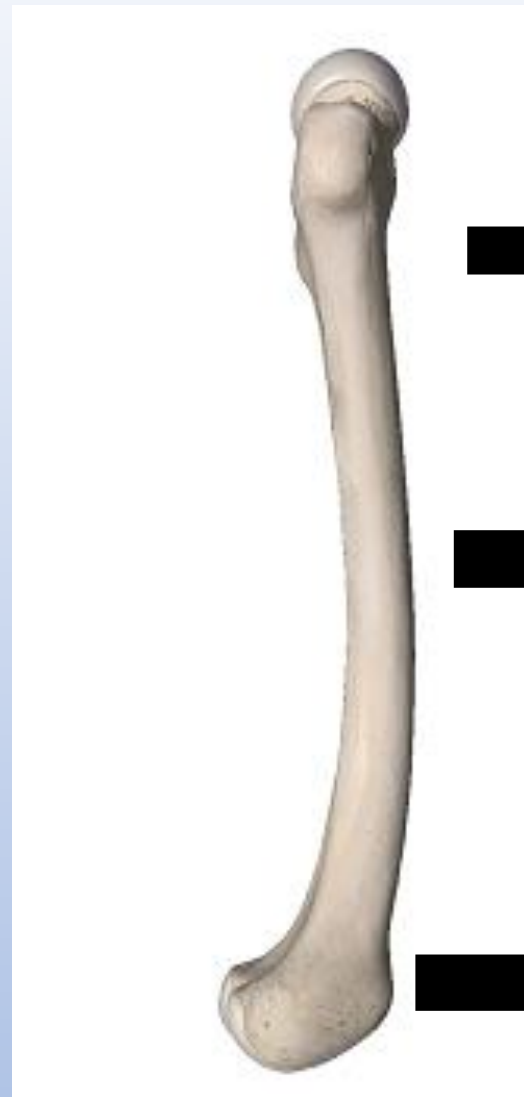
T Locking Plate - Universal



LEFT TIBIA



# Plating Options of Femur



**Reconstruction Plate 4.5**



**Distal Femoral Locking Plate**

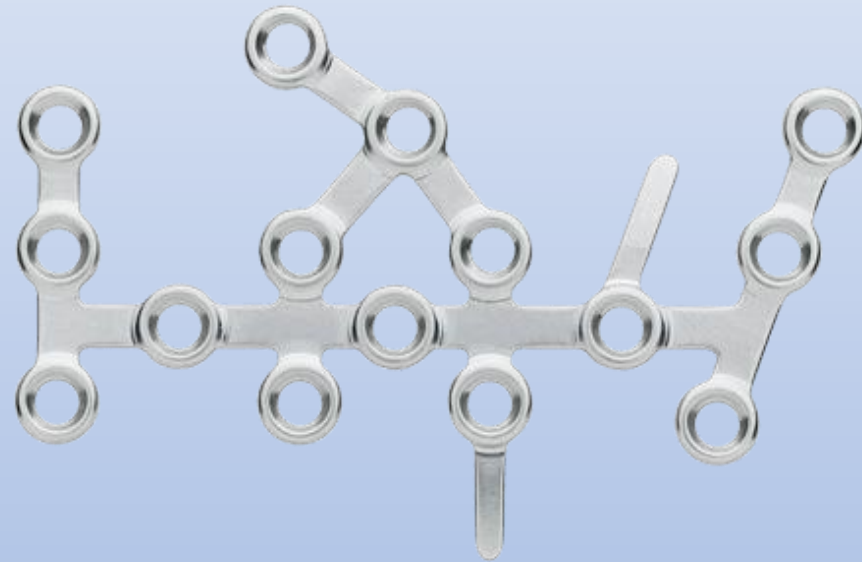


**Broad DCP Locking Plate**



# Calcaneal Locking Plate(Calcaneal Fractures)

## Calcaneal Locking Plate (Calcaneus Fractures)



Easy cutting and contouring  
Diagonal arm stabilizes sustentaculum  
& supports Talo-Calcaneal joint  
Bendable tabs supports plantar fragment

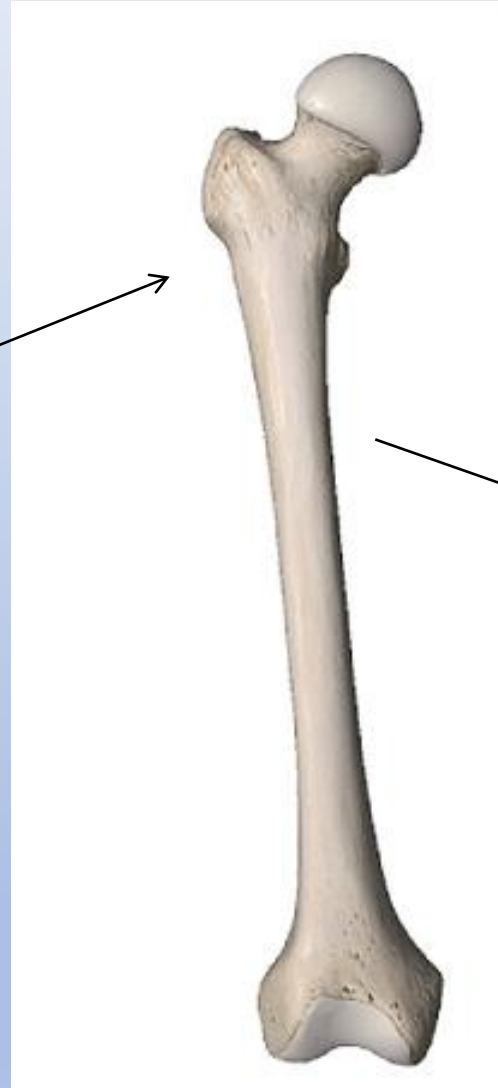


# Nailing Options of Femur



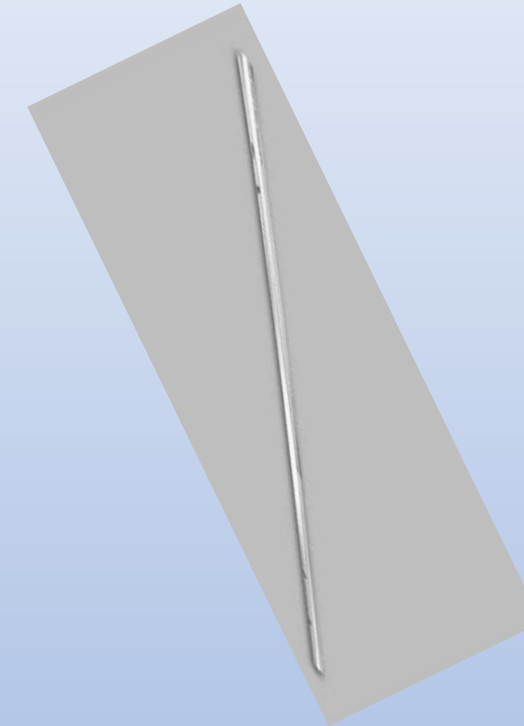
## Short PFN/TFN Nail

Nail -  $\varnothing$  9.0 mm / 10 mm / 11 mm / 12 mm  
LENGTH ( 180 mm to 250 mm )  
PFN Screws  $\varnothing$  8.0 mm ( 50 mm to 100 mm )  
PFN Screws  $\varnothing$  6.4 mm ( 50 mm to 100 mm )  
Interlocking Bolts 4.5mm ( 20 mm to 70 mm )



## Long PFN/TFN Nail

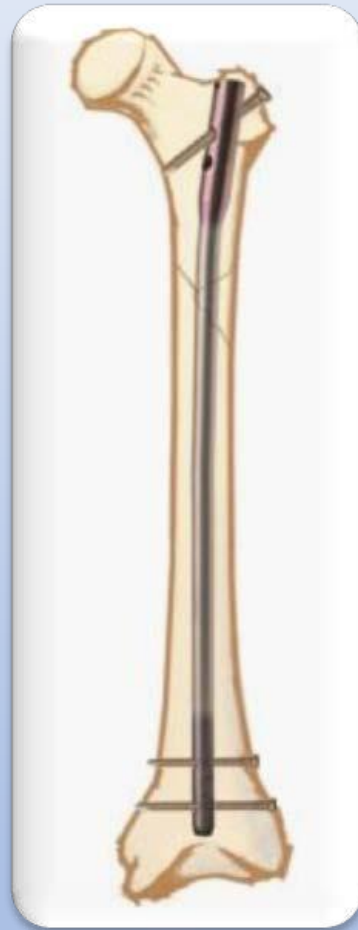
Nail -  $\varnothing$  9.0 mm / 10 mm / 11 mm / 12 mm  
LENGTH ( 300 mm to 400 mm )  
PFN Screws  $\varnothing$  8.0 mm ( 50 mm to 100 mm )  
PFN Screws  $\varnothing$  6.4 mm ( 50 mm to 100 mm )  
Interlocking Bolts 4.5mm ( 20 mm to 70 mm )



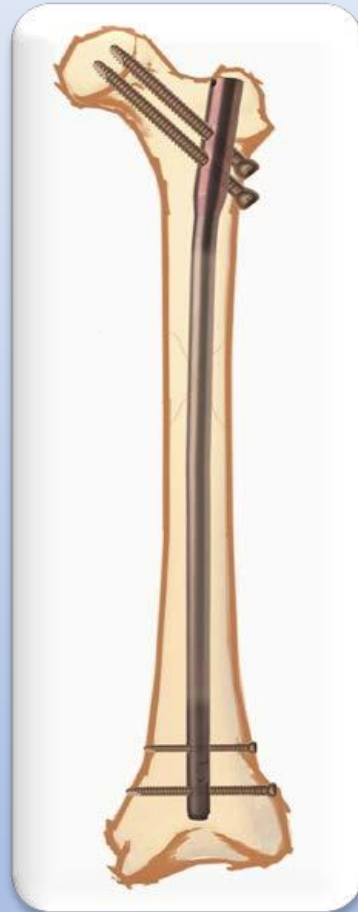
## Femur Intramedullary Nail

Nail -  $\varnothing$  9.0 mm / 10 mm / 11 mm / 12 mm  
LENGTH ( 380 mm to 440 mm )  
Interlocking Bolts 4.5mm ( 20 mm to 70 mm )

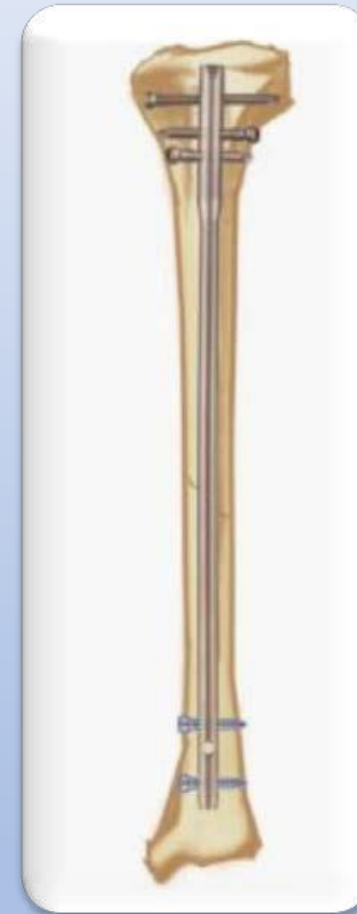
# Nail Portfolio



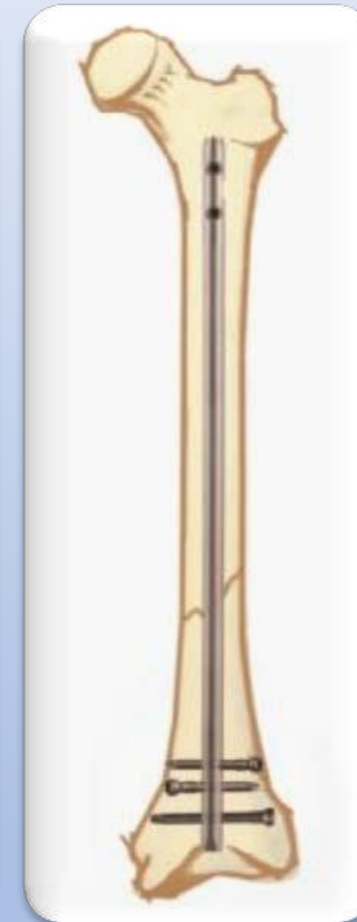
*Femoral Nail*



*Femoral Nail  
Recon Mode*



*Tibia Nail*



*Retrograde Nail*

**Thank You**