

Anatomy



Radiological imaging of the upper limb joints:

1- Plain X-Ray.

2- Ultrasonography.

***3- Computerized tomography
(CT Scan).***

***4- Magnetic resonance imaging
(MRI) study.***

USG-HIGH FREQUENCY PROBE

- Tendons
 - Joints
 - Bursae
 - Peripheral nerves
 - Muscles
 - Vessels
-
- Tendon: *hyperechoic, fibrillar*
 - Muscle: *relatively hypoechoic*
 - Bone cortex: *hyperechoic, shadowing*
 - Fluid: *anechoic, posterior enhancement*
 - Nerve: *hypoechoic nerve fascicles, hyperechoic connective tissue, speckled appearance*

MRI

- Highly accurate for evaluation of rotator cuff pathologies
- Indicated when further investigation of rotator cuff pathology is needed.
- Advantages:
 - No ionizing radiation
 - Non-invasive
 - Multi-planar imaging
 - Demonstrates other lesions such as ACJ osteoarthritis and avascular necrosis.
 - Comprehensive display of soft tissue anatomy
 - Demonstration of the causes for impingement
 - Useful in characterization and staging of bone tumors

Upper extremity consists of:

- Phalanges
- Metacarpals
- Carpals
- Radius
- Ulna
- Humerus



Anatomy of the Hand & Wrist



The hand & wrist consists of :

- 27 Bones
 - Phalanges - 14
 - Metacarpals - 5
 - Carpals - 8



Phalanges

- Fingers & thumb
- 3 separate bones
Digits 2-5
 - Proximal
 - Middle
 - Distal
 - Tuft
- Thumb
 - Proximal
 - Distal



Naming of Digits

- 1
 - 2
 - 3
 - 4
 - 5
- Thumb
 - Index
 - Middle
 - Ring
 - Little



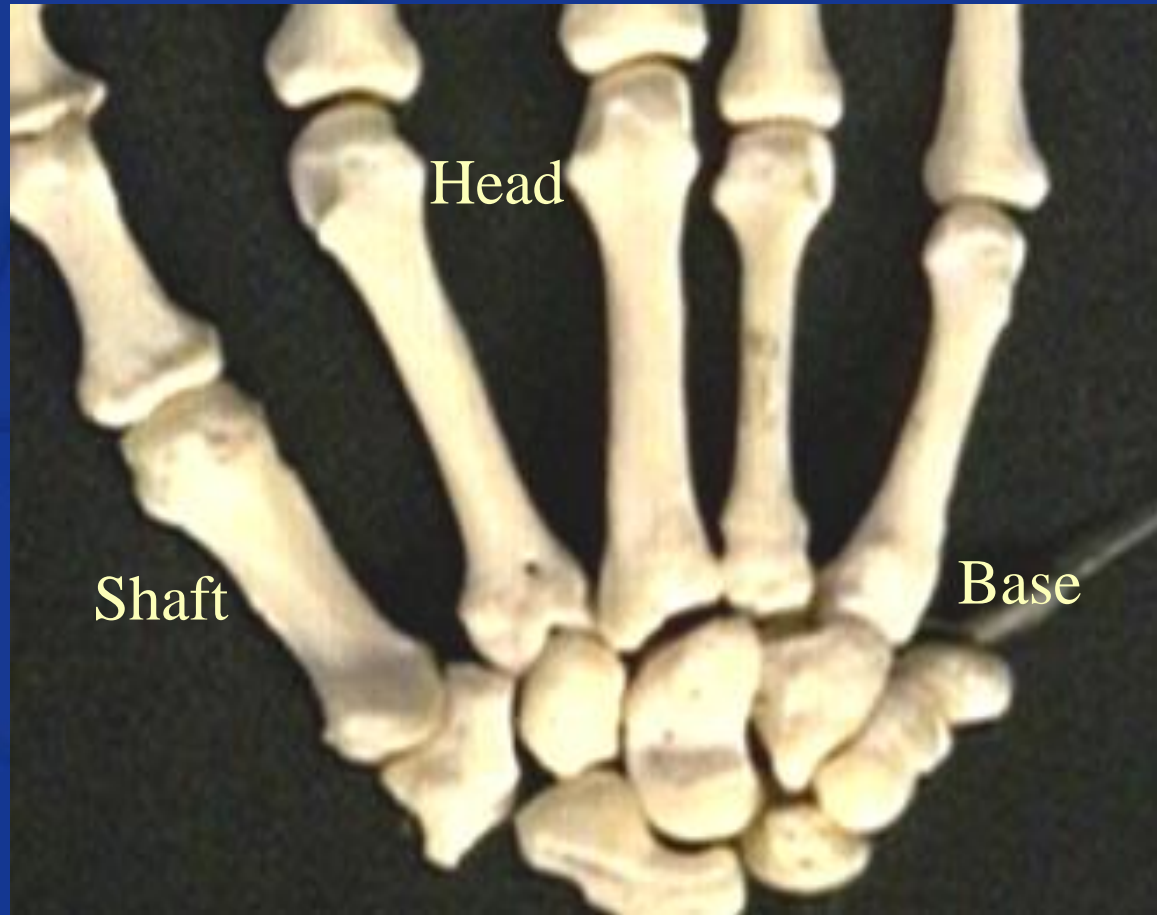
Joints

- Interphalangeal
- Metacarpophalangeal
- Distal Interphalangeal
- Proximal Interphalangeal



Metacarpals

- Palm
- Numbering
- Three parts
 - Head
 - Shaft
 - Base
- Joints
 - MP
 - Carpometacarpal



Carpals (Wrist)

- 8 bones
- Proximal row
 - a Navicular - Scaphoid
 - b Lunate - Semilunar
 - c Triquetral - Cuneiform
 - d Pisiform



Carpals (continued)

- Distal row

a Greater Multangular - Trapezium

b Lesser Multangular - Trapezoid

c Capitate - Os Magnum

d Hamate - Unciform



Mnemonic

- Never
- Lower
- Tillies
- Pants
- Grandma
- Might
- Come
- Home

- Some
- Sassy
- Children
- Play
- Through
- Their
- Old
- Underwear

Alternative mnemonic

- Some
- Lovers
- Try
- Positions
- That
- They
- Can't
- Handle

Carpal Joints

- Radiocarpal
- Intercarpal



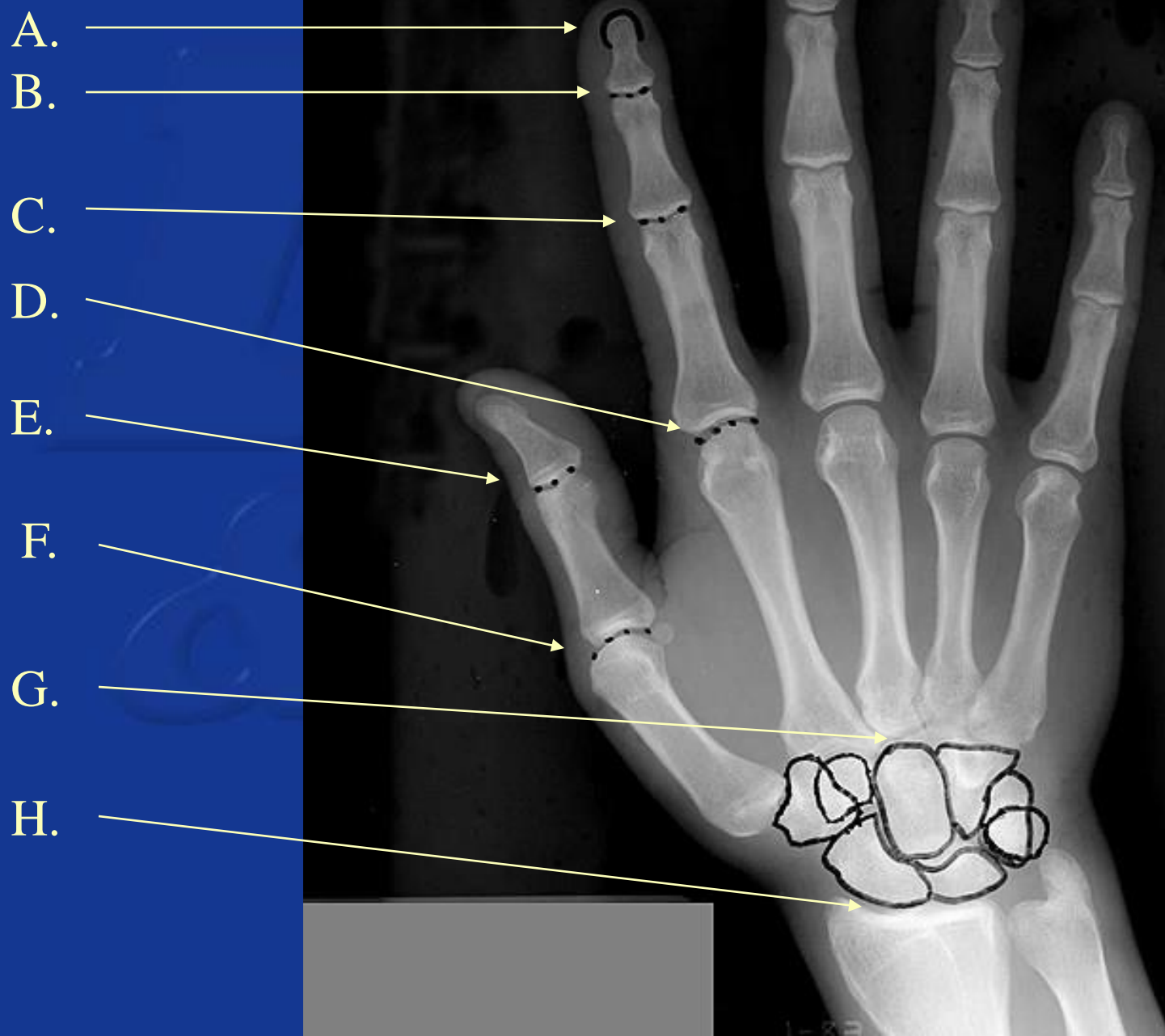
Distal Radius & Ulna

- Radial Styloid Process
- Ulnar Styloid Process
- Distal Radioulnar Jt.



Radiographic Anatomy





A.

B.

C.

D.

E.

F.

G.

H.

Tuft

2nd DIP Jt.

2nd PIP Jt.

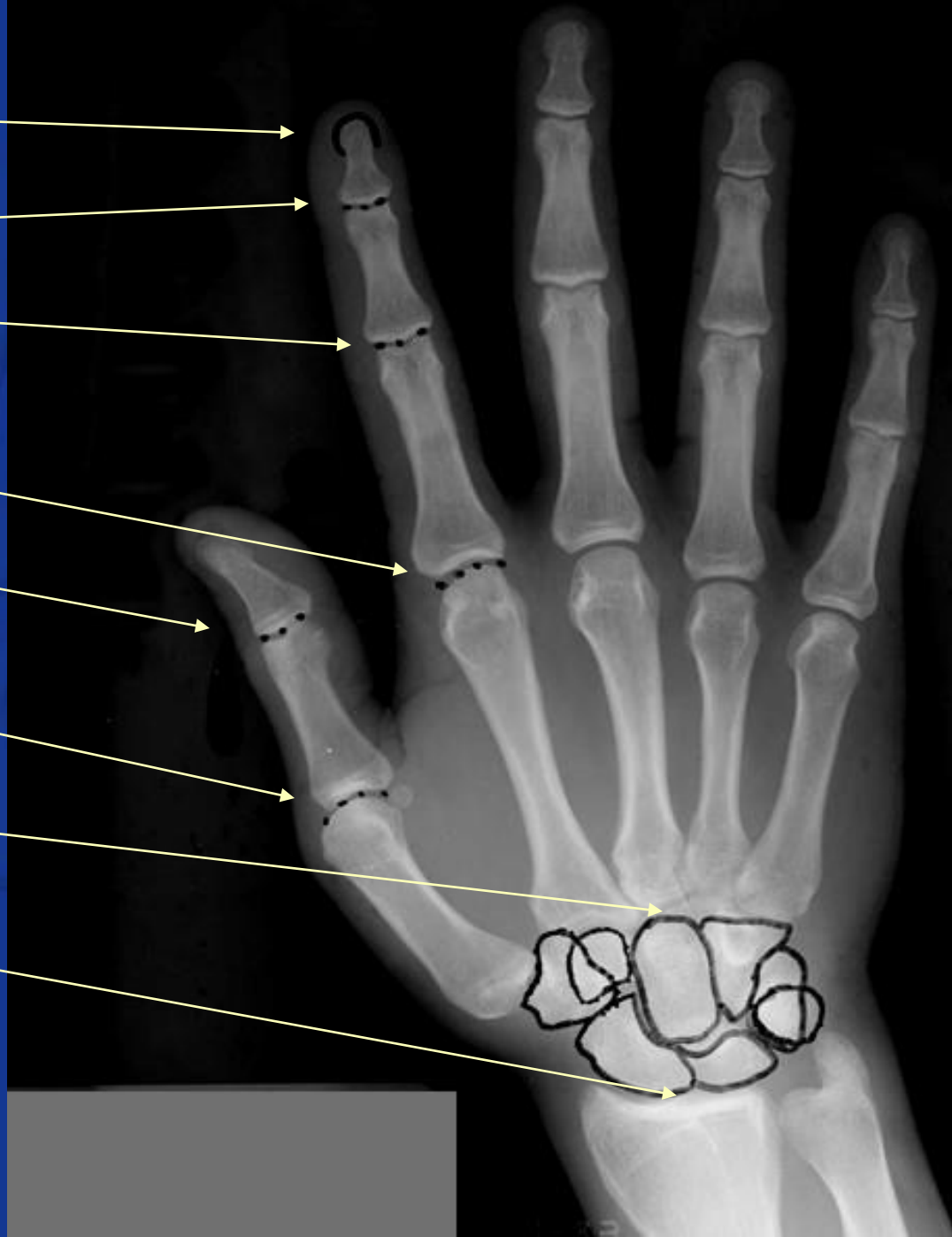
2nd MP Jt.

IP Jt.

1st MP Jt.

CM Jt.

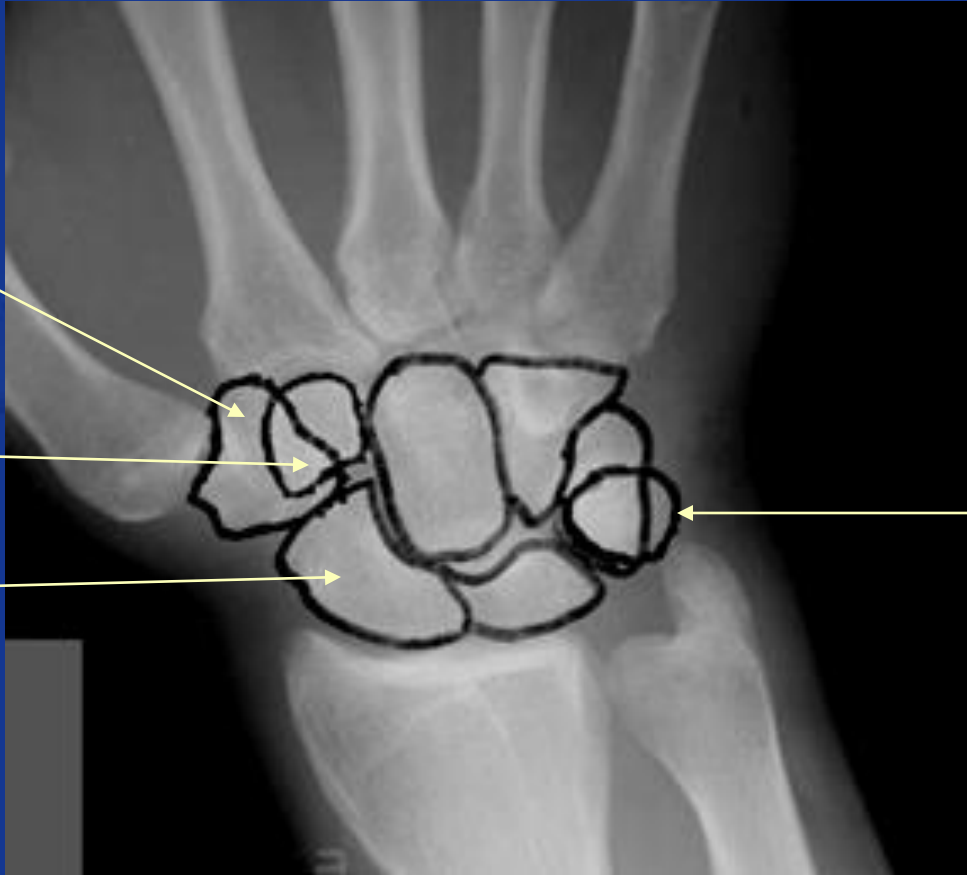
Radiocarpal Jt.



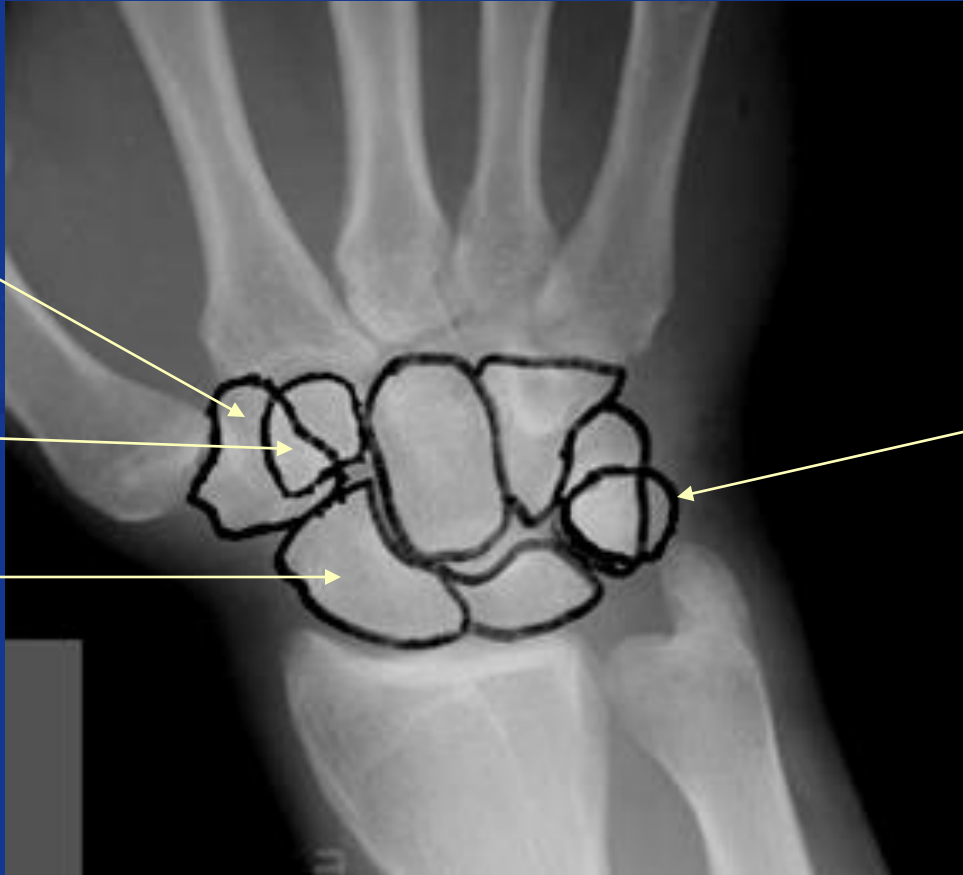
A.

B.

C.



D.

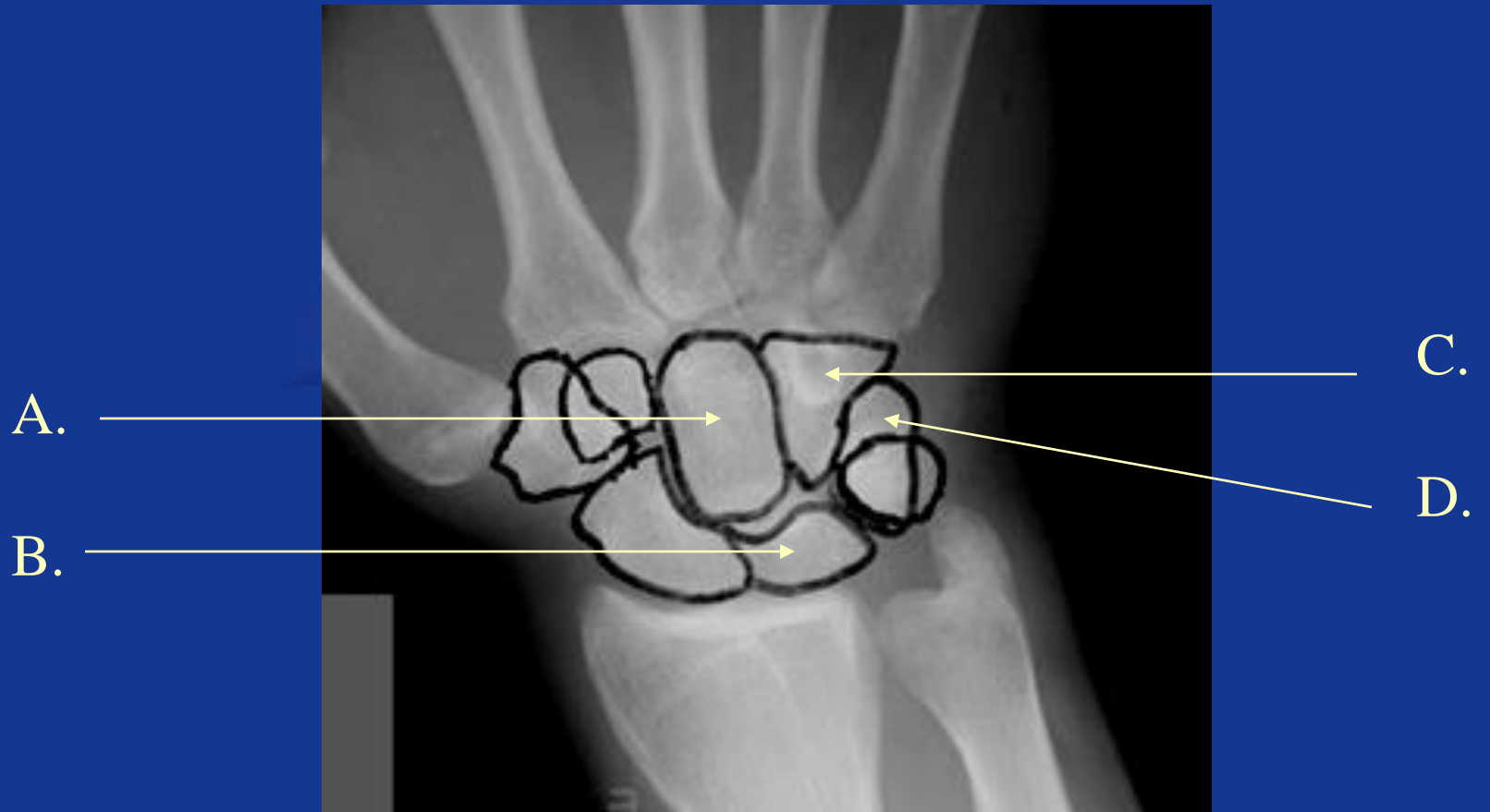


Trapezium

Trapezoid

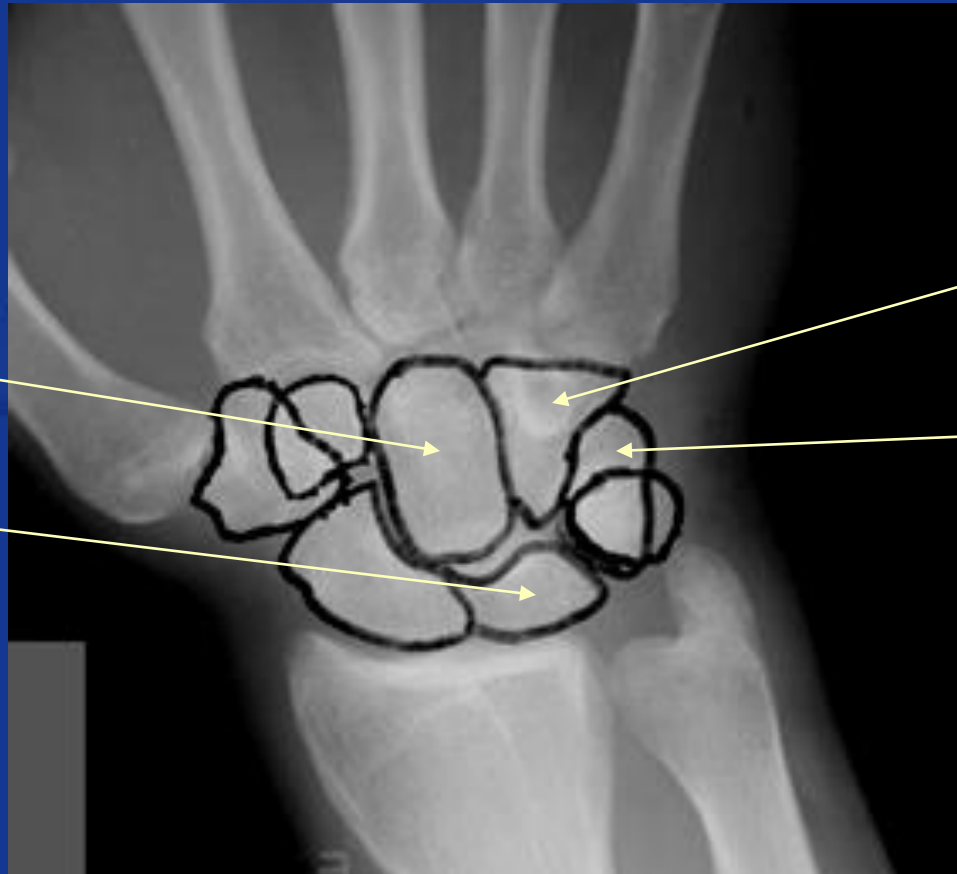
Scaphoid

Pisiform



Os Magnum

Semilunar



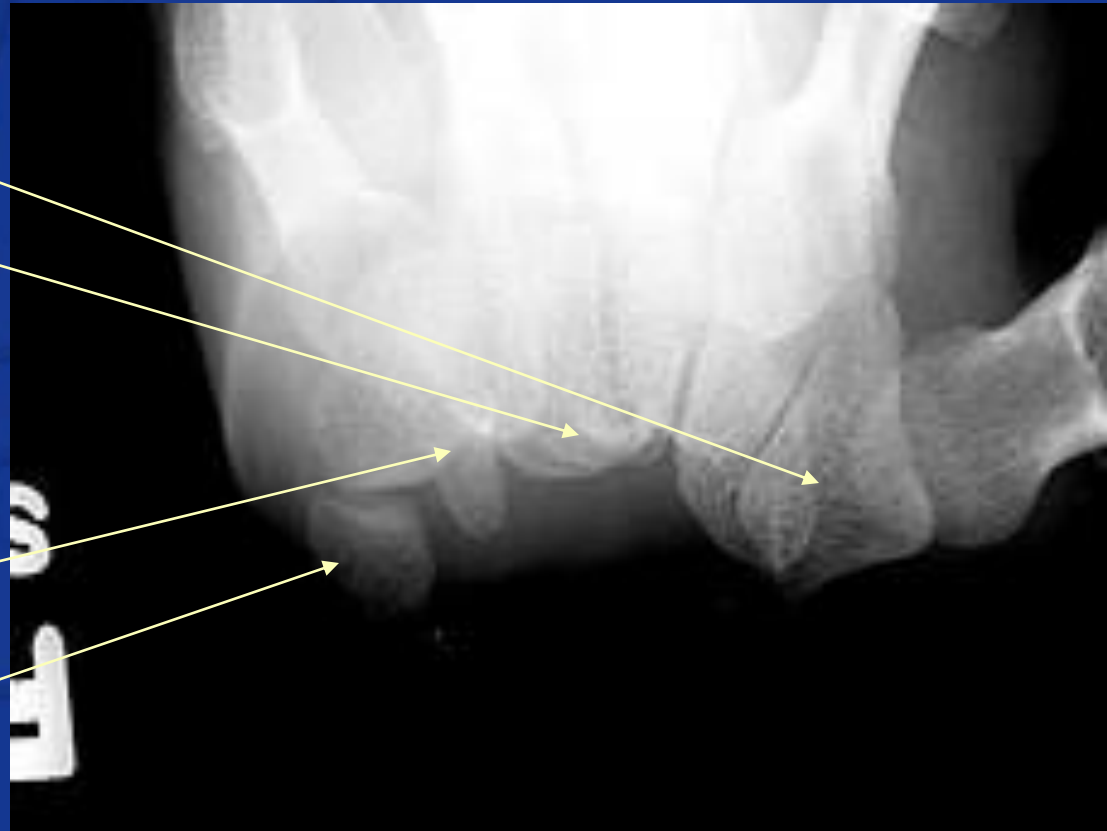
Unciform

Cuneiform

Carpal Canal

- Trapezium
- Os Magnum

- Unciform
- Pisiform



Motions of the Hand & Wrist



- Radial Flexion (Ulnar Deviation)

- Ulnar Flexion (Radial Deviation)



Base of 5th Metacarpal

Hook of Hamate

Hamate

Capitate

Pisiform

Triquetrium

Lunate

Ulna Styloid Process

Head of Ulna

Ulna

Base of 1st Metacarpal

Trapezoid

Trapezium

Scaphoid

Radial Styloid Process

Radius



Capitate

Ulna Styloid
Process

1st Metacarpal

Trapezium

Scaphoid

Pisiform

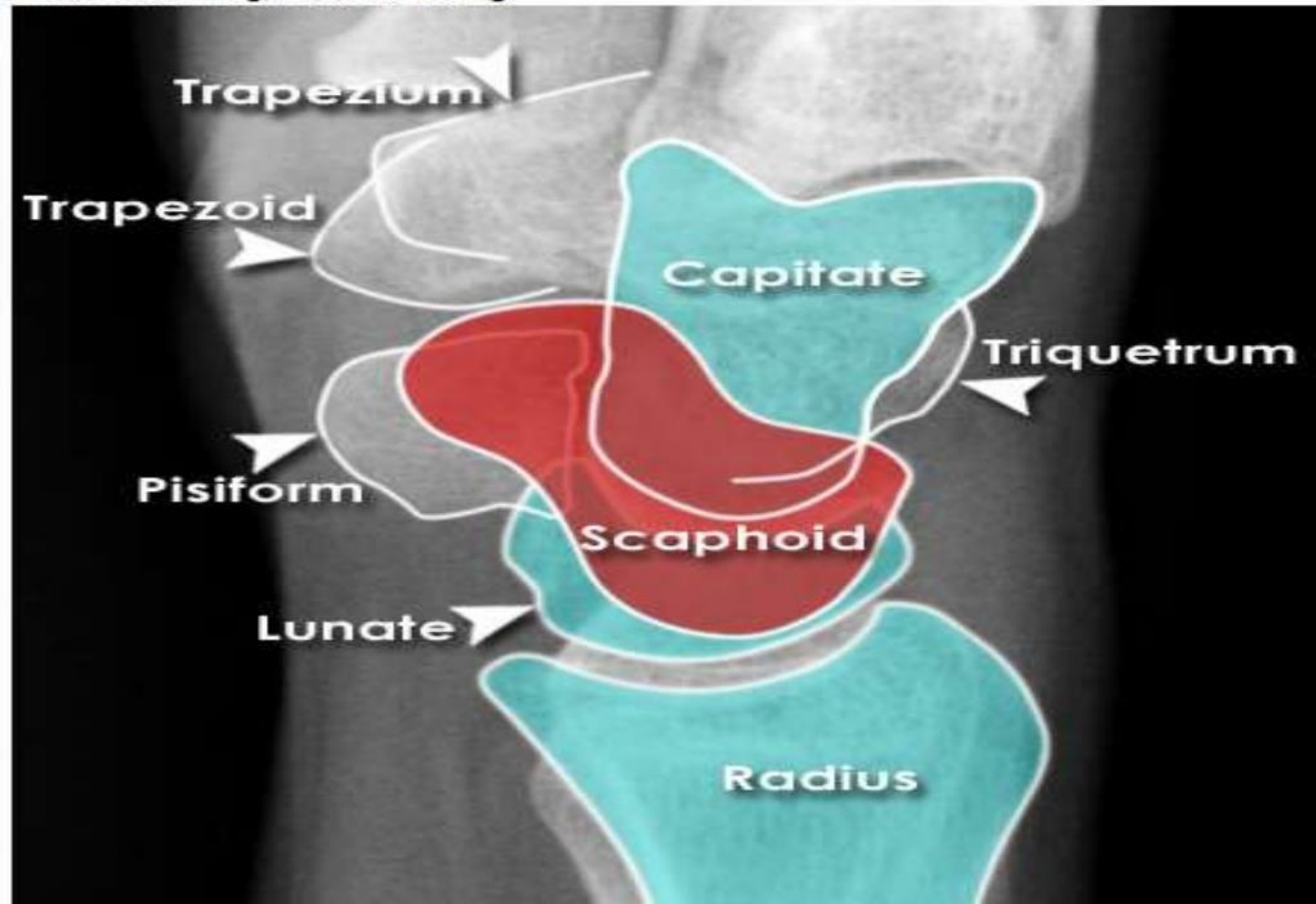
Lunate

Radius

Ulna

Wrist bones - Normal X-ray (Lateral)

Hover over image to show findings



Base of fifth metacarpal
Capitate
Hamate
Lunotriquetral ligament
Triangular fibrocartilage
Lunate
Ext. carpi ulnaris tendon



Trapezoid
Trapezium
Scaphoid
Scapholunate ligament

B



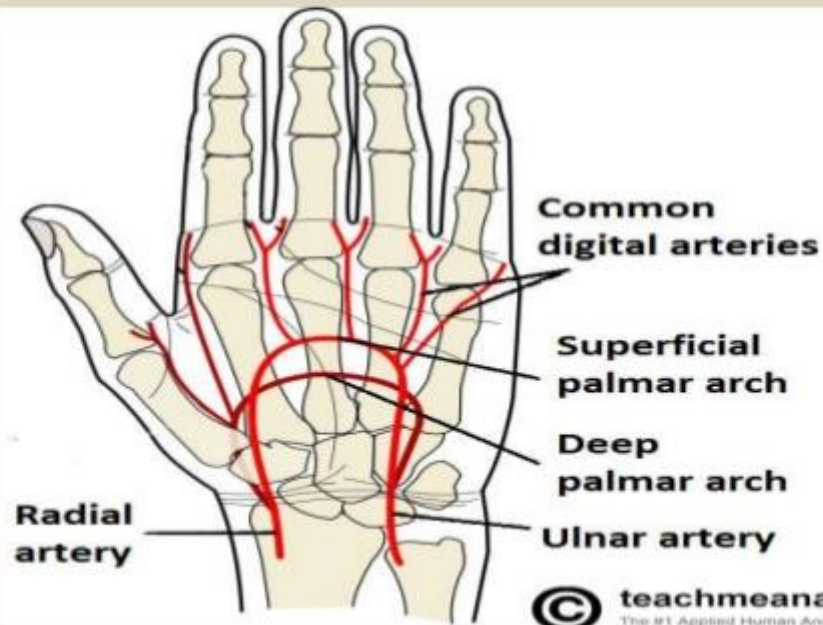
Magnetic resonance angiography (MRA) of the hand.

In the Hand

The hand has a very good blood supply, with many anastomosing arteries, allowing the hand to be perfused when grasping or applying pressure. A good majority of these arteries are superficial, allowing for heat loss when needed. In the hand, the ulnar and radial arteries interconnect to form two arches, from which branches to the digits emerge.

Radial artery – contributes mainly to supply of the thumb and the lateral side of the index finger

Ulnar artery – contributes mainly to the supply of the rest of the digits, and the medial side of the index finger.





Positioning of the Hand & Wrist



Finger

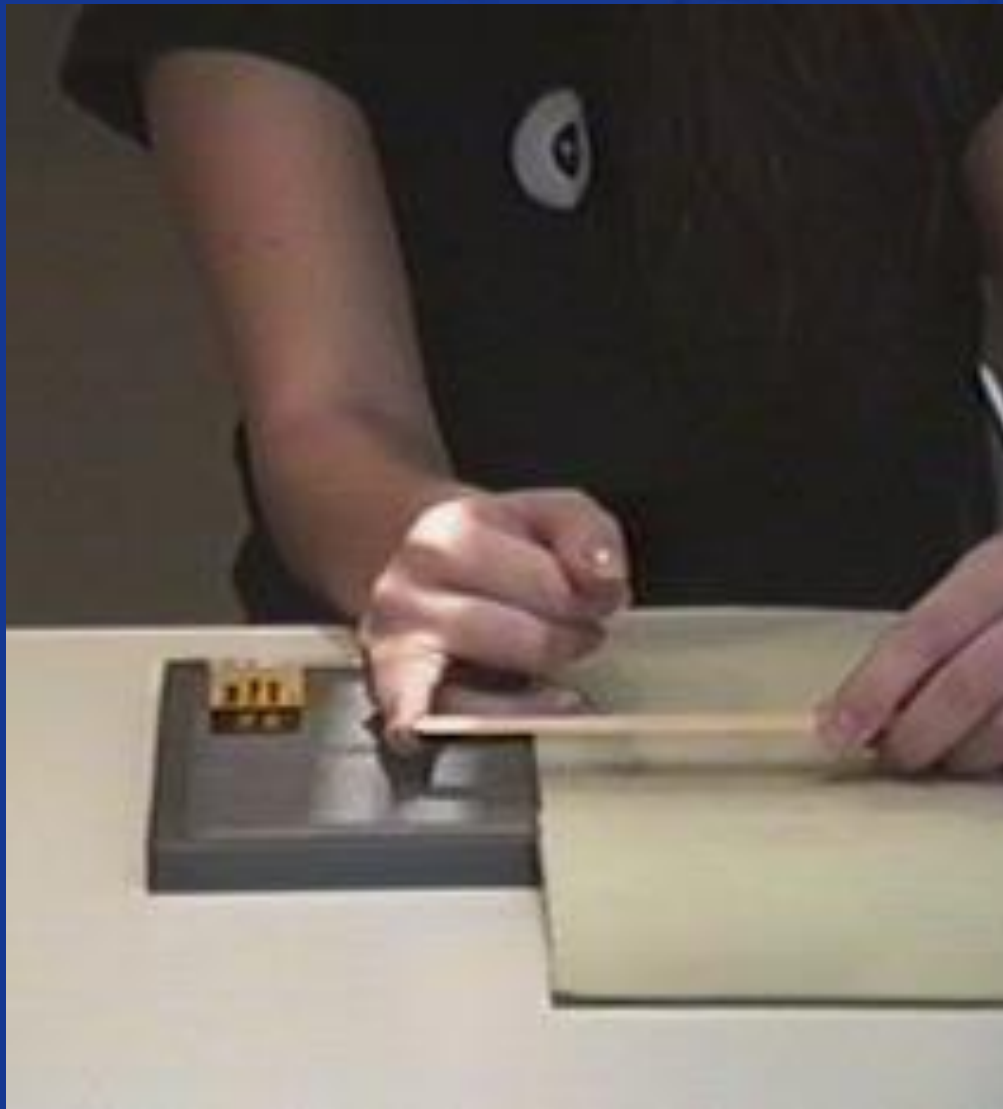
- Routine projections
 - PA
 - Medial Oblique
 - Lateral Oblique
 - Lateral
- Film size
- SID
- CR



PA



Lateral



Hand

- Routine projections
 - PA
 - PA Oblique-Lateral Rotation
 - Fan Lateral
- Non-routine projections
 - Lateral for Foreign Body

Routine Hand Projections

- Routine projections
 - PA
 - PA Oblique-Lateral Rotation
 - Fan Lateral
- Film size
- SID
- CR



PA



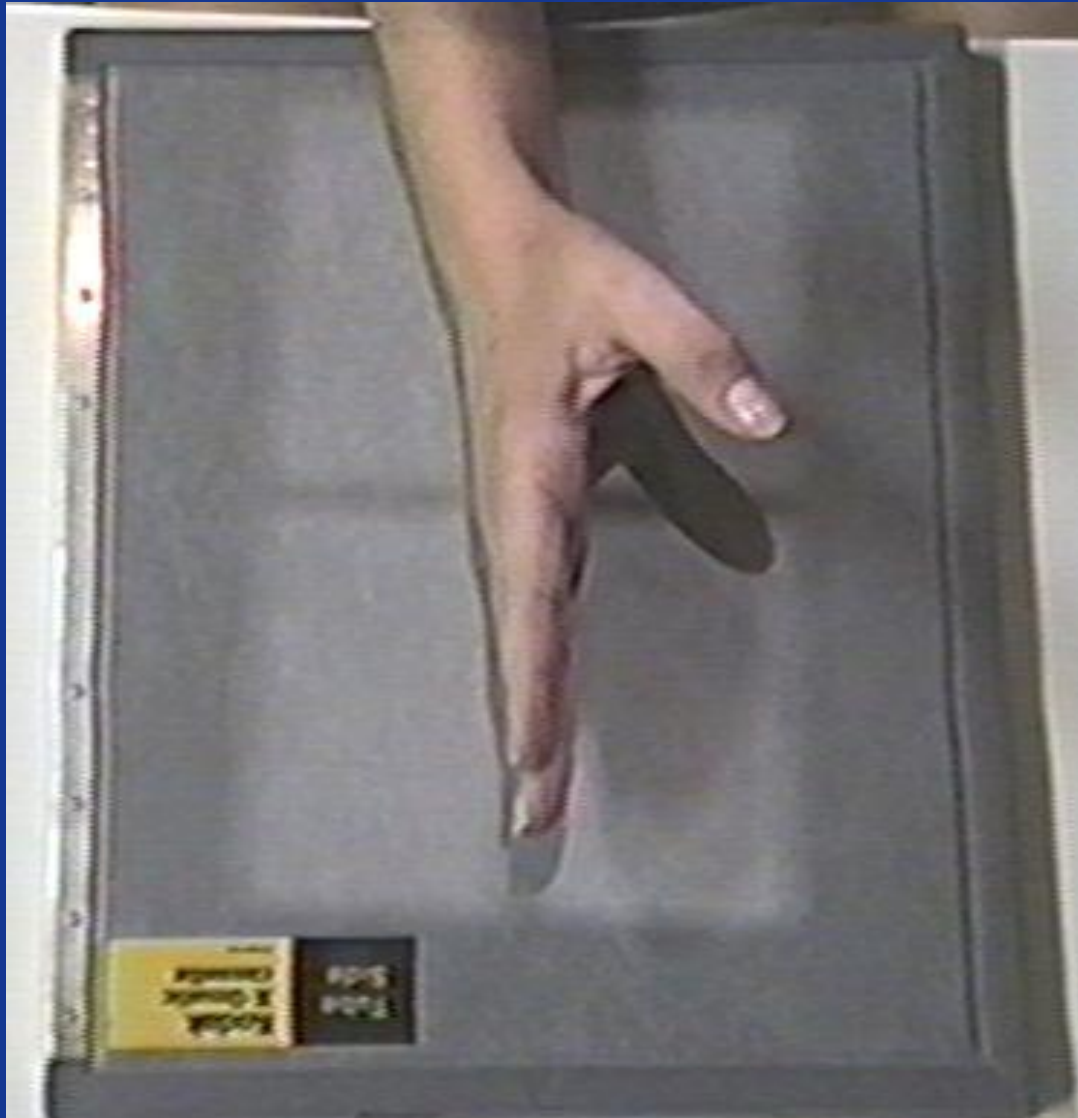
PA Oblique-Lateral Rotation



Fingers Down vs. Fingers Straight



Lateral for Foreign Body



Wrist

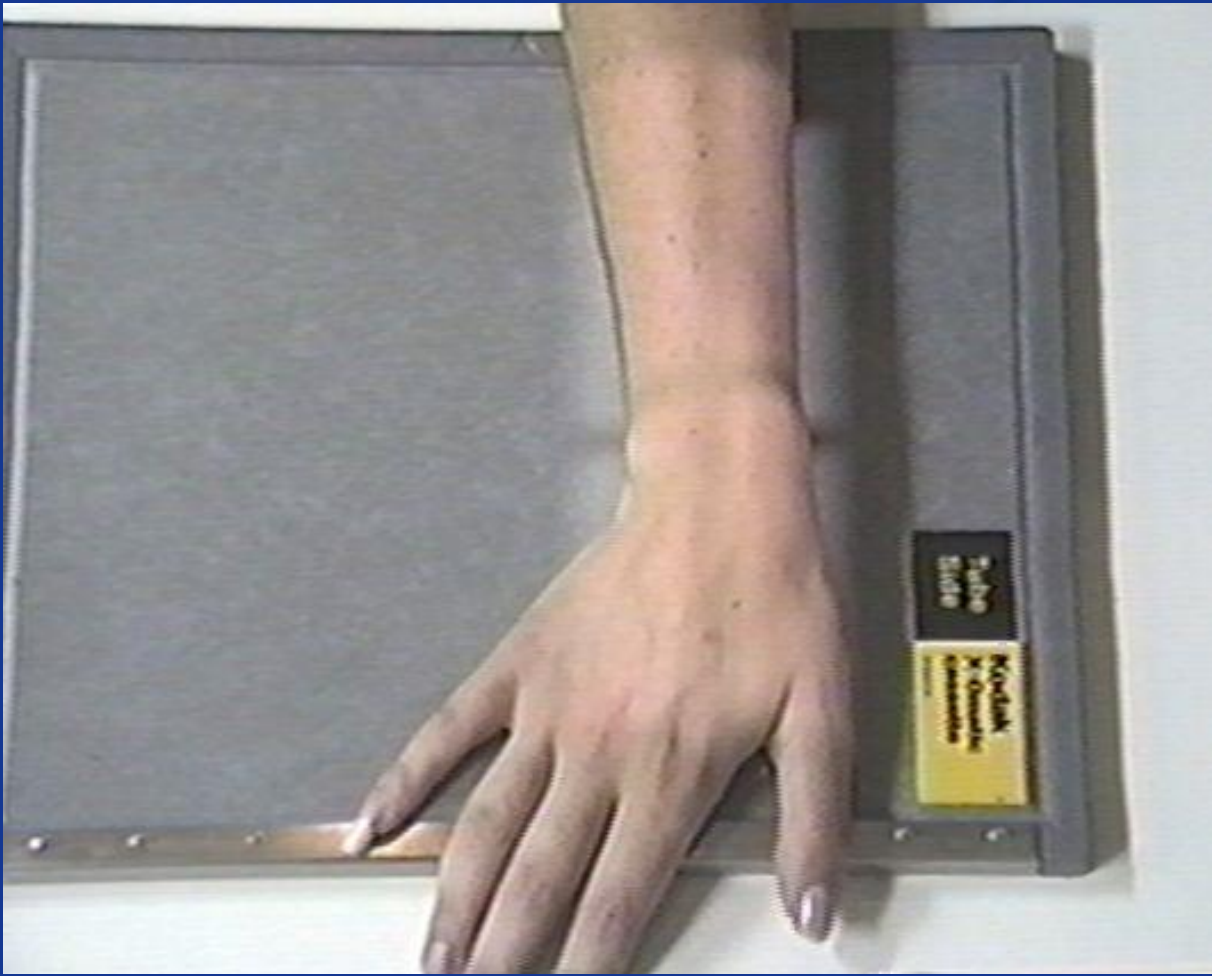
- Routine projections
 - PA (Ulnar Flexion)
 - PA Oblique-Lateral Rotation
 - Lateral
- Non-routine projections
 - PA-no flexion
 - Stetcher
 - Carpal Canal (Gaynor-Hart)
 - Lateral for Pisiform

Routine Wrist Projections

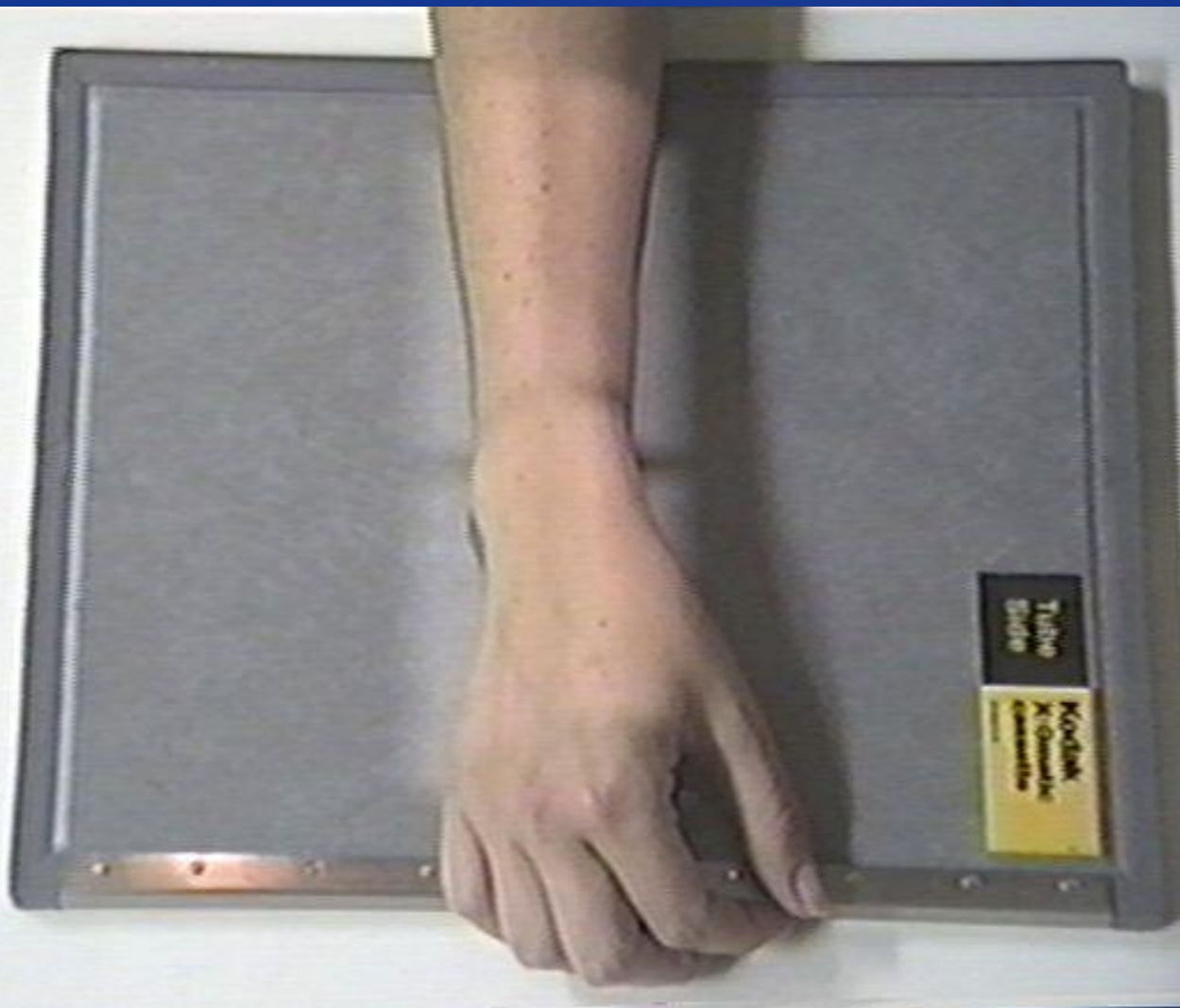
- Routine projections
 - PA (Ulnar Flexion)
 - PA Oblique-Lateral Rotation
 - Lateral
- Film size
- SID
- CR



PA (Ulnar Flexion)



PA Oblique-Lateral Rotation



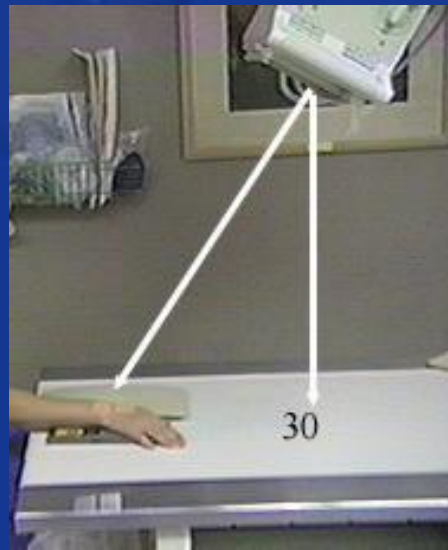
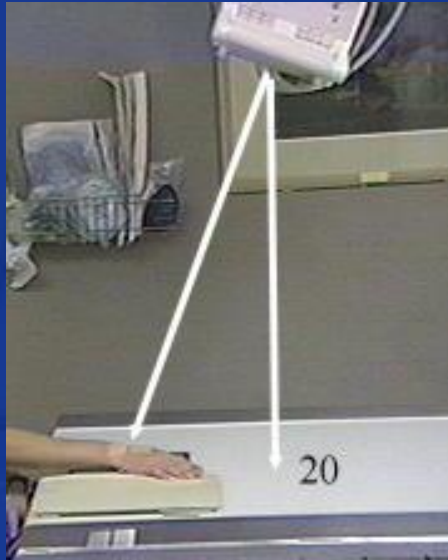
Lateral



Structures shown



Scaphoid views (Stetcher)



Anatomy of the Forearm & Elbow



Radius

- Distal
 - Styloid Process
 - Ulnar Notch
- Proximal
 - Head
 - Neck
 - Tuberosity
- Shaft



Ulna

- Distal
 - Head
 - Styloid Process
- Proximal
 - Olecranon process
 - Coronoid process
 - Trochlear notch
 - Radial notch
- Shaft

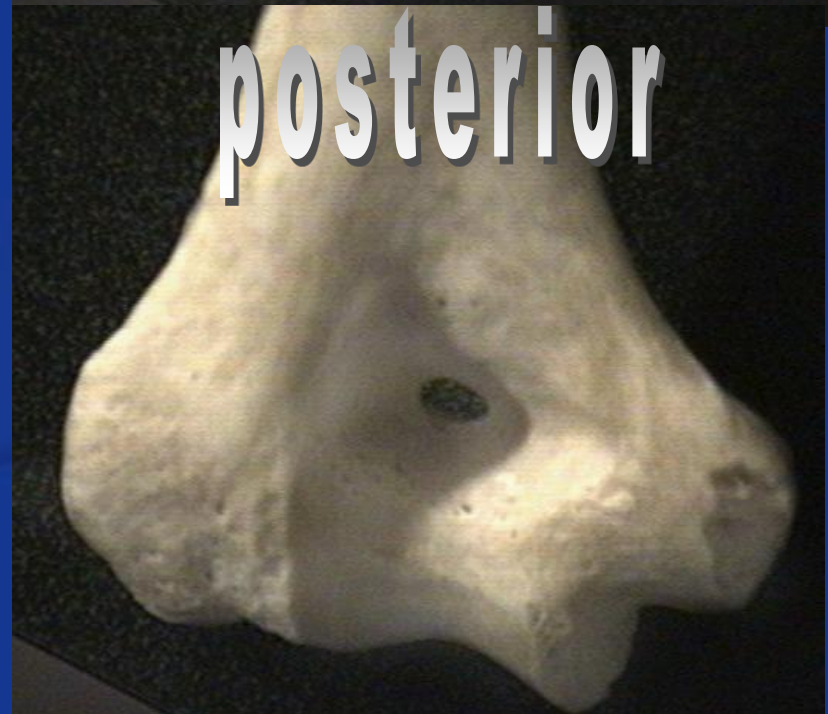
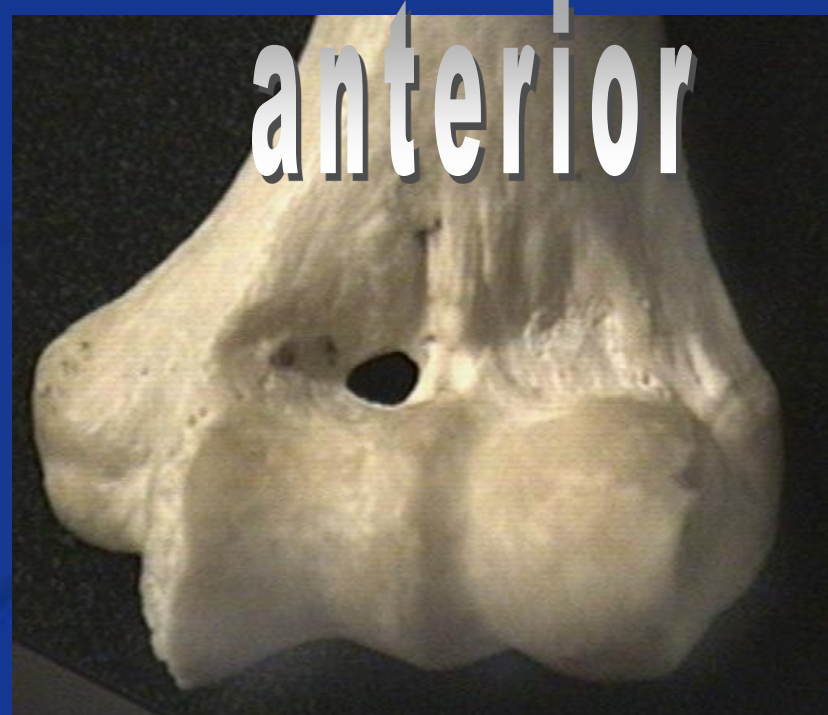


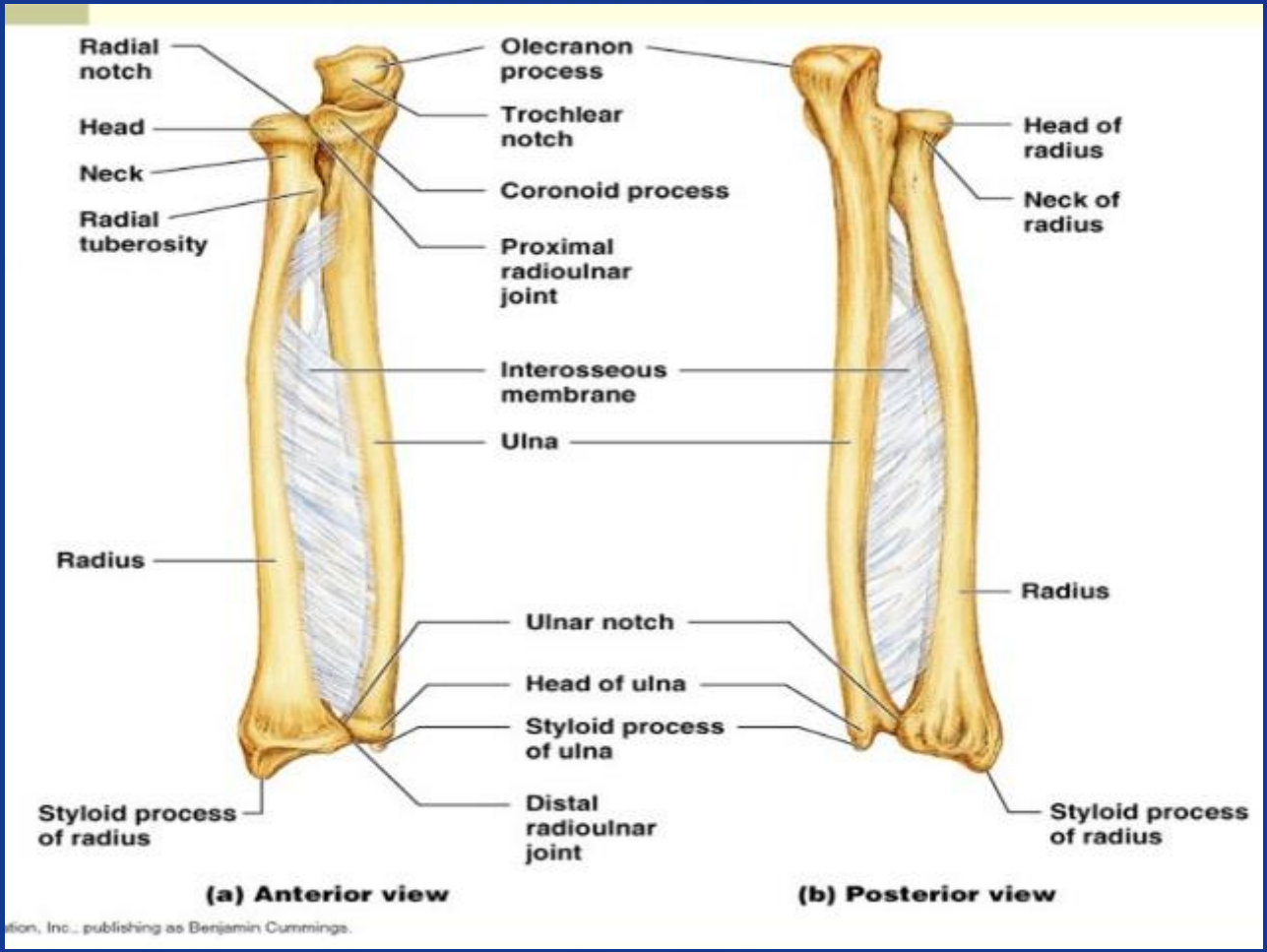
Effects of pronation on the forearm



Distal Humerus

- Humeral Condyle
 - Trochlea (Medial condyle)
 - Capitulum (Lateral condyle)
- Lateral epicondyle
- Medial epicondyle
- Depressions
 - Coronoid fossa
 - Radial fossa
 - Olecranon fossa





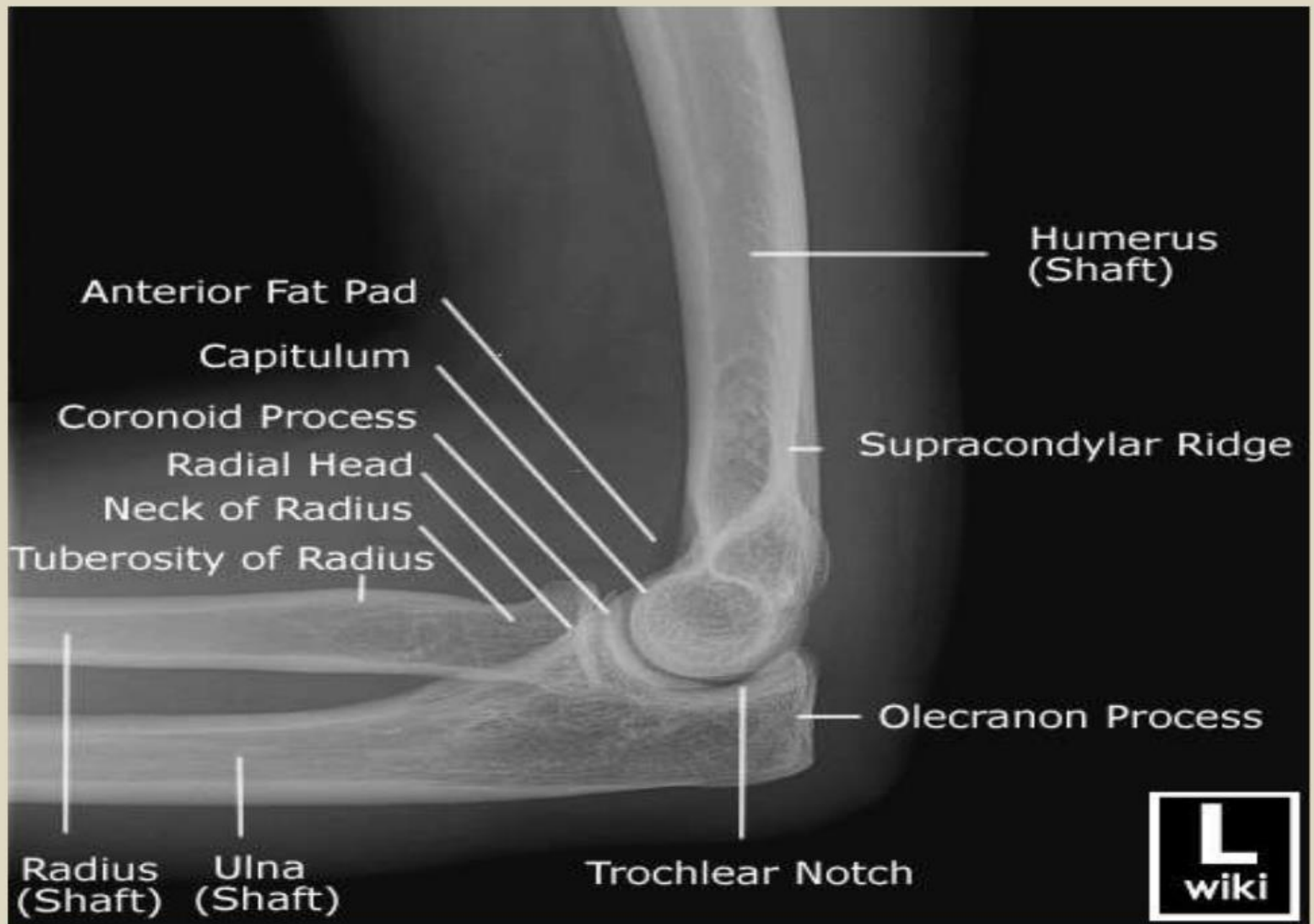
Classification of Joints

- Radioulnar
 - Proximal
 - Distal
- Elbow

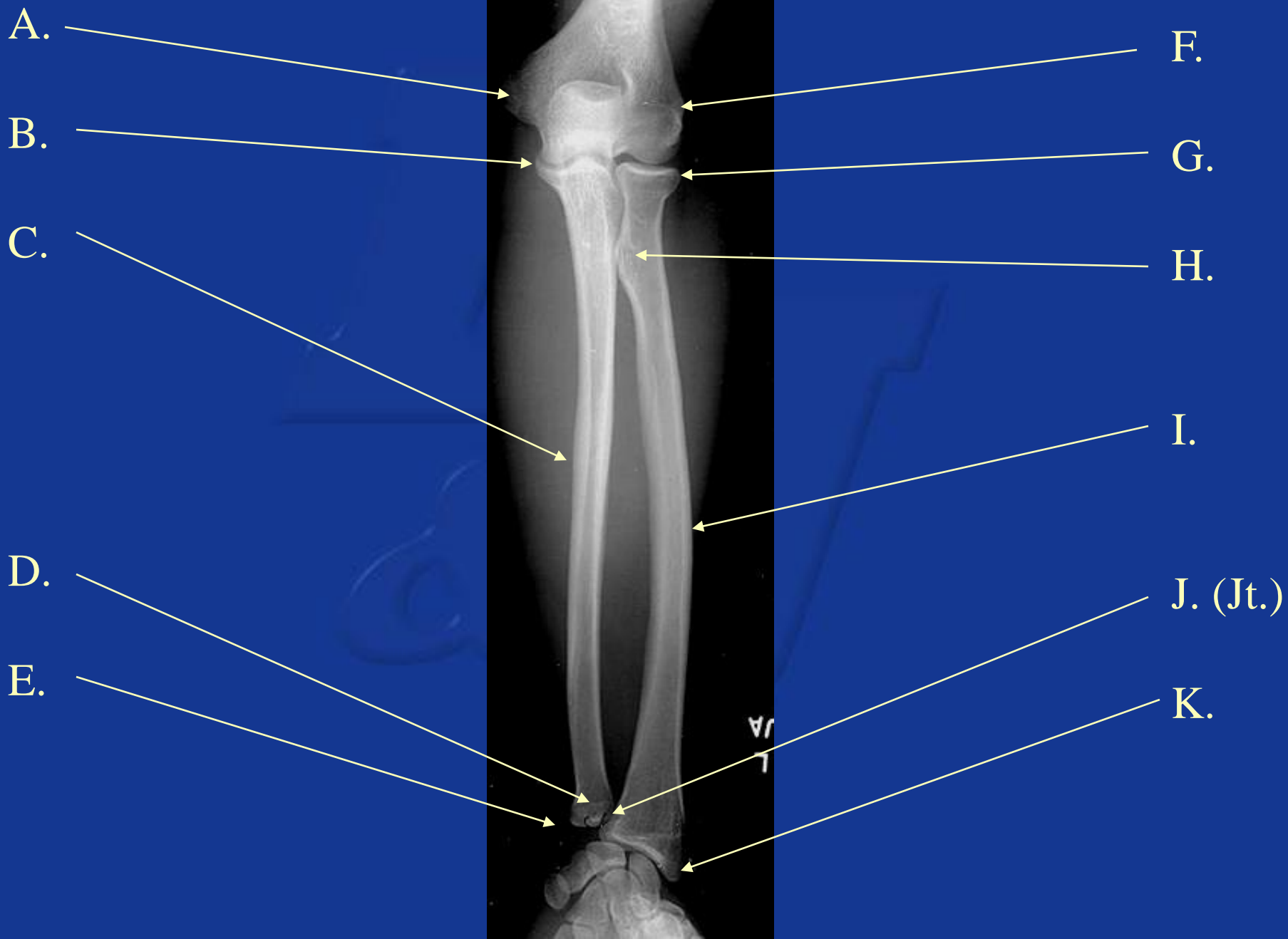


Radiographic Anatomy





Adult Elbow - Lateral View.



Medial Epicondyle

Coronoid Process

Shaft (Ulna)

Ulnar Head

Ulnar Styloid Process

Lateral Epicondyle

Radial Head

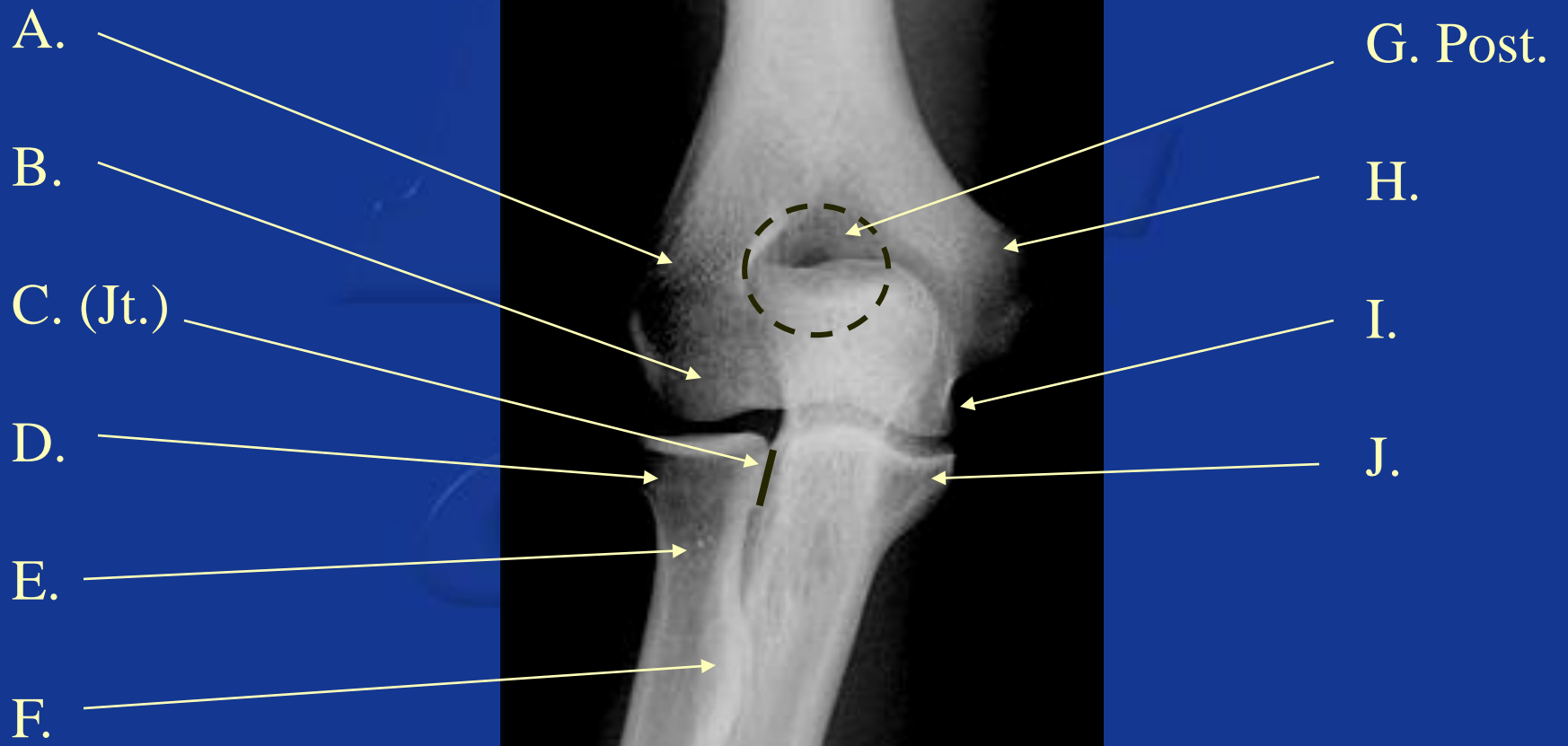
Radial Tuberosity

Shaft (Radius)

Distal Radioulnar Jt.

Radial Styloid Process





Lateral epicondyle

Capitulum

Proximal radioulnar
jt.

Radial head

Radial neck

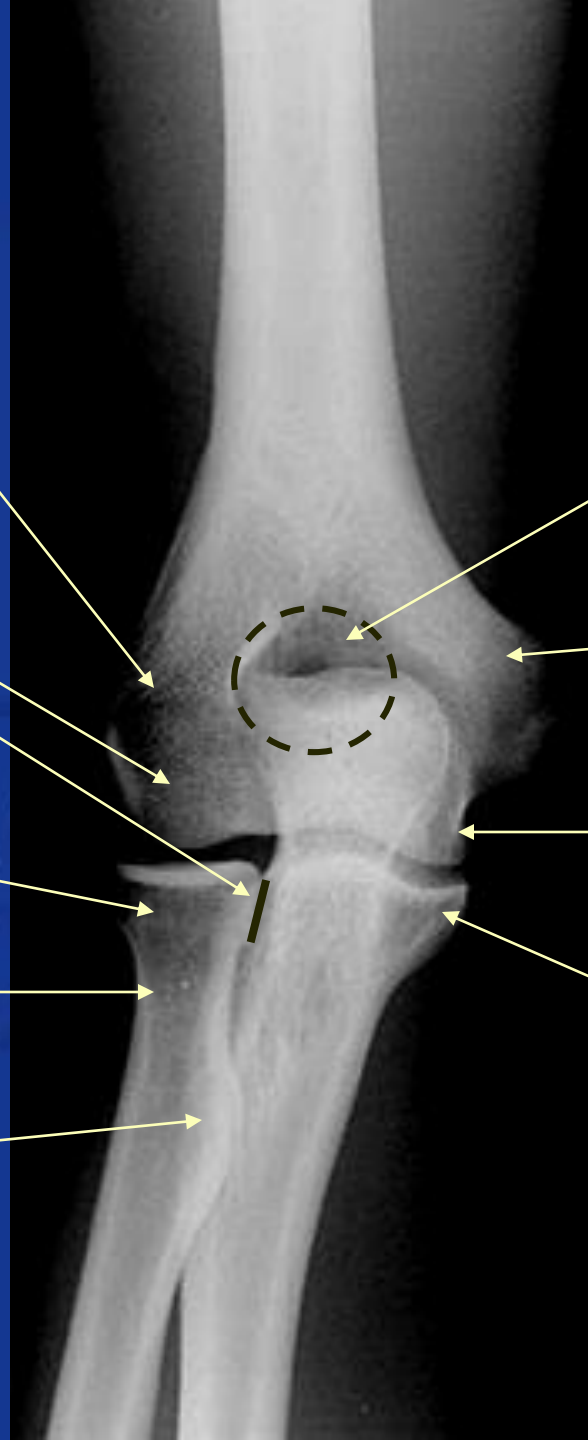
Radial tuberosity

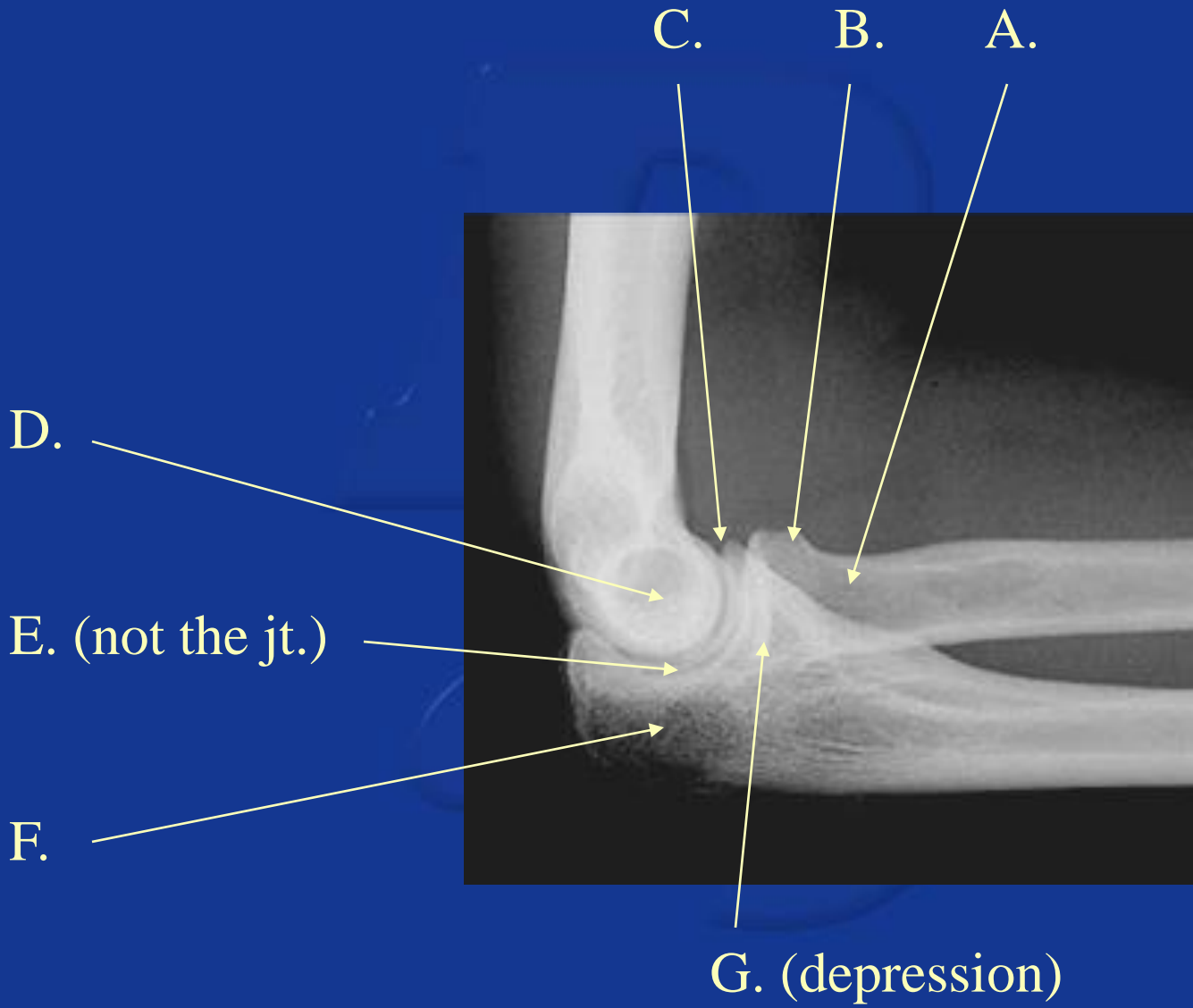
Olecranon fossa

Medial
epicondyle

Trochlea

Coronoid
process





Coronoid Process

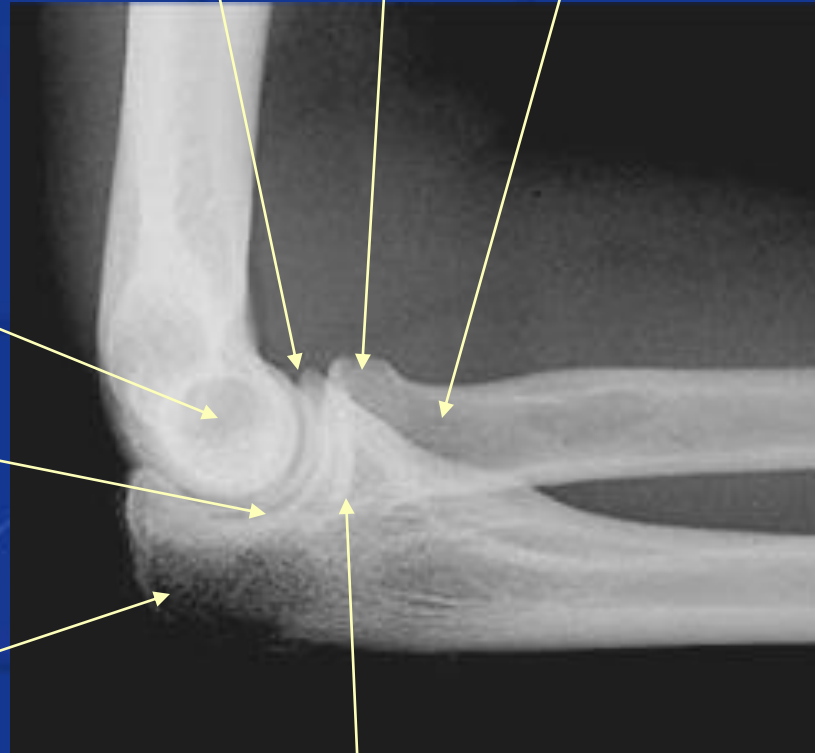
Radial head

Radial neck

Condyles

Trochlear notch

Olecranon
process



Radial notch



A faint, light blue illustration of a human hand and forearm is visible in the background, centered behind the text. The hand is shown in a slightly flexed position, with the fingers pointing towards the bottom right. The forearm extends from the elbow towards the hand.

Positioning of the Forearm & Elbow

Forearm

- Routine projections
 - AP
 - Lateral
- Film size
- SID
- CR



AP



Lateral

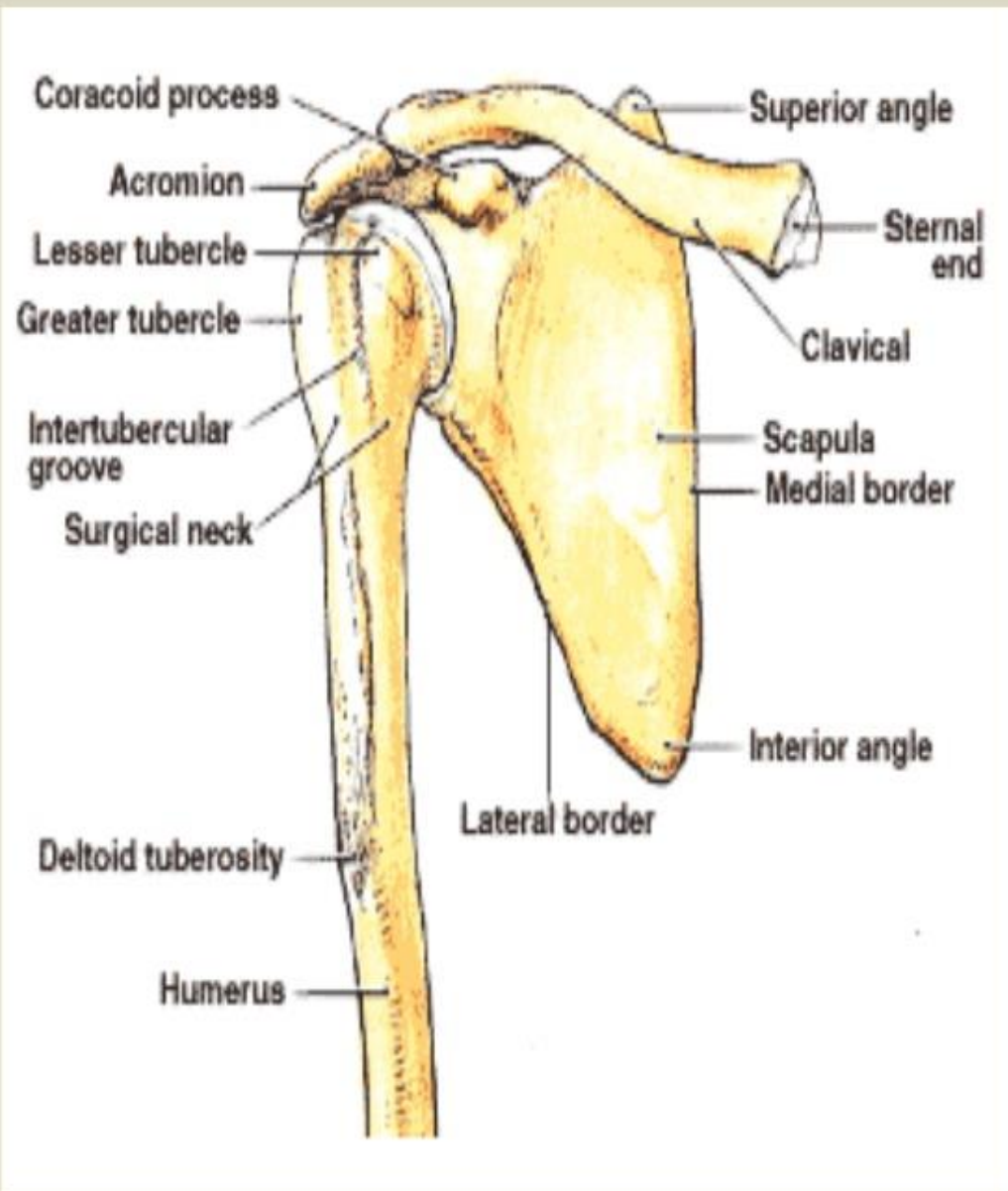


AP View of the Shoulder.

- ***“Glenohumeral,” “Grashey,” or “Scapular” AP View***
 - ***Same structures***
 - ***AC joint not visualized as well***
 - ***Better visualize the glenoid & humeral head (especially with ER view)***



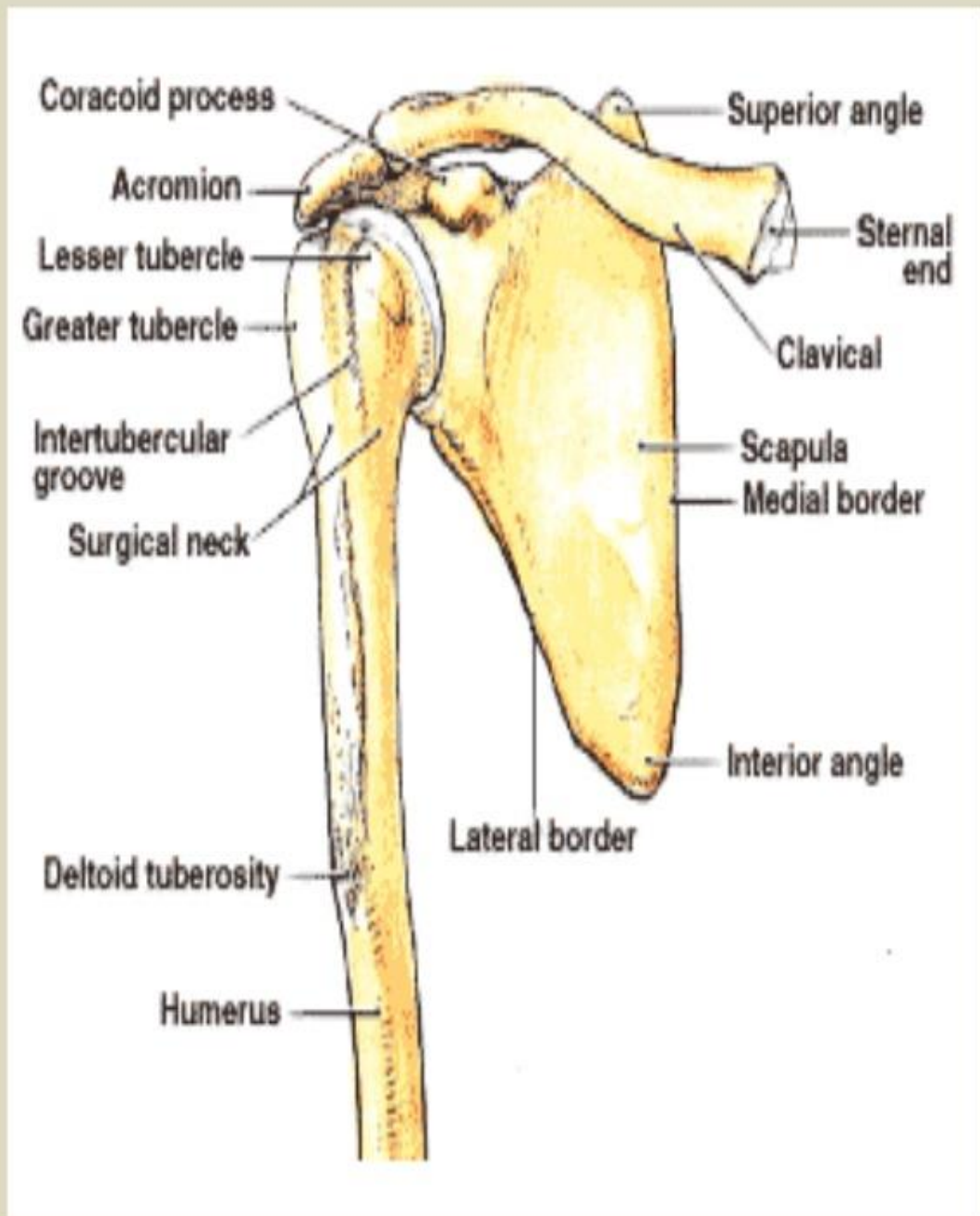
Anatomy.



- **3 Bones**
 - *Humerus.*
 - *Scapula.*
 - *Clavicle.*
- **3 Joints**
 - *Glenohumeral.*
 - *Acromio-clavicular.*
 - *Sternoclavicular.*
- **1 “Articulation”**
 - *Scapulothoracic.*

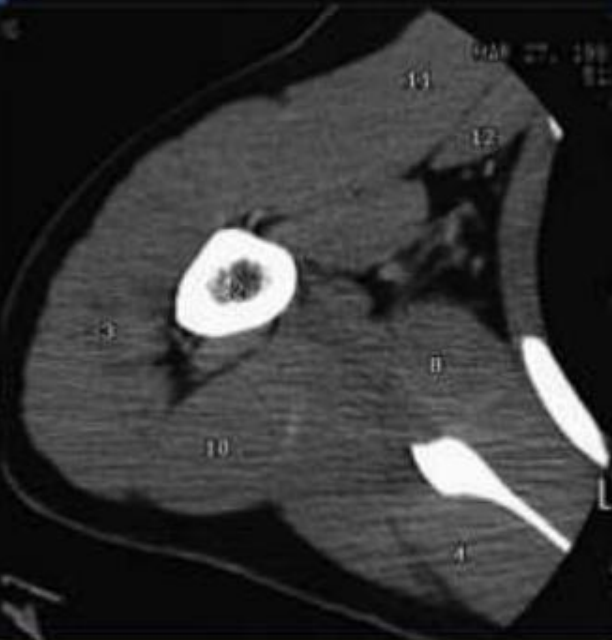
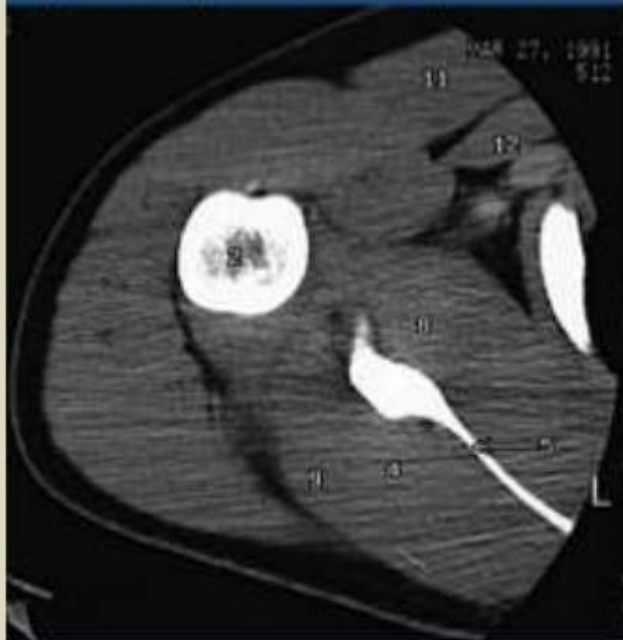
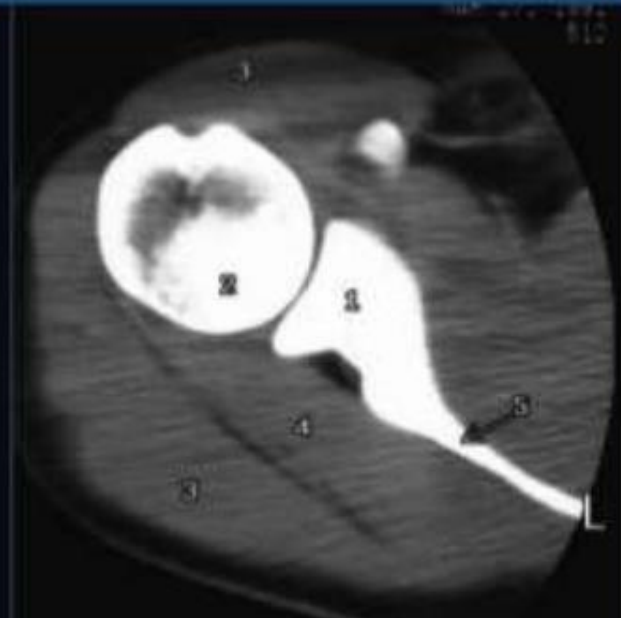
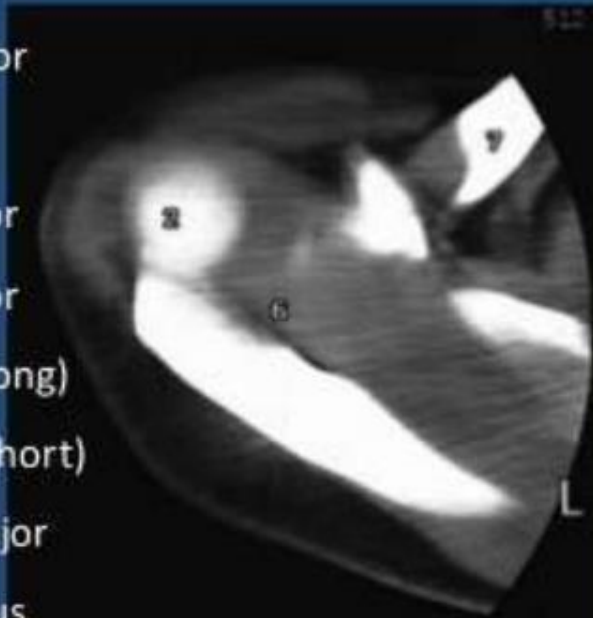
- **Humerus**

- **Head.**
- **Anatomic neck.**
- **Surgical neck.**
- **Greater tubercle.**
- **Lesser tubercle.**
- **Intertubercular groove.**
- **Deltoid tuberosity.**
- **Shaft.**



CT

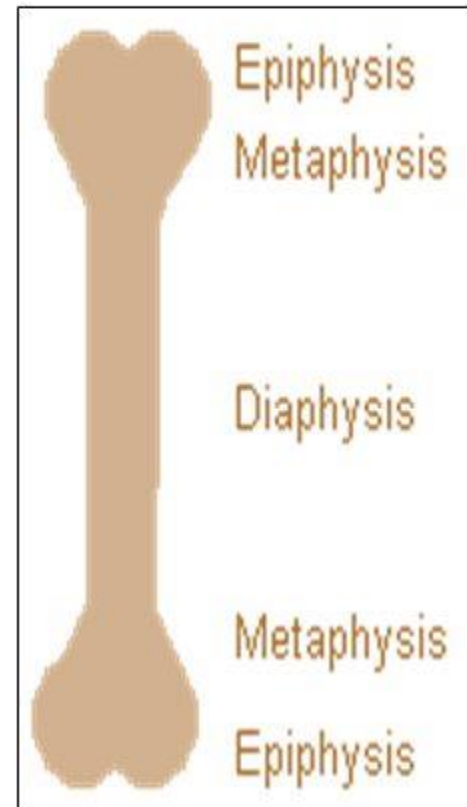
- | | |
|------------------|--------------------|
| 1) Glenoid | 9) Teres minor |
| 2) Humerus | 10) Triceps |
| 3) Deltoid | 11) Pec major |
| 4) Infraspinatus | 12) Pec minor |
| 5) Scapula | 13) Biceps (long) |
| 6) Supraspinatus | 14) Biceps (short) |
| 7) Clavicle | 15) Teres major |
| 8) Subscapularis | 16) Latissimus |



TERMINOLOGY

EPIPHYSIS
METAPHYSIS
DIAPHYSIS

TEBEROSITY/TROCHONTER
CONDYLE
GROOVE
FOSSA
PROCESS



-
-

THANK YOU

