

Radiology Anatomy of the Spine and Upper Extremity

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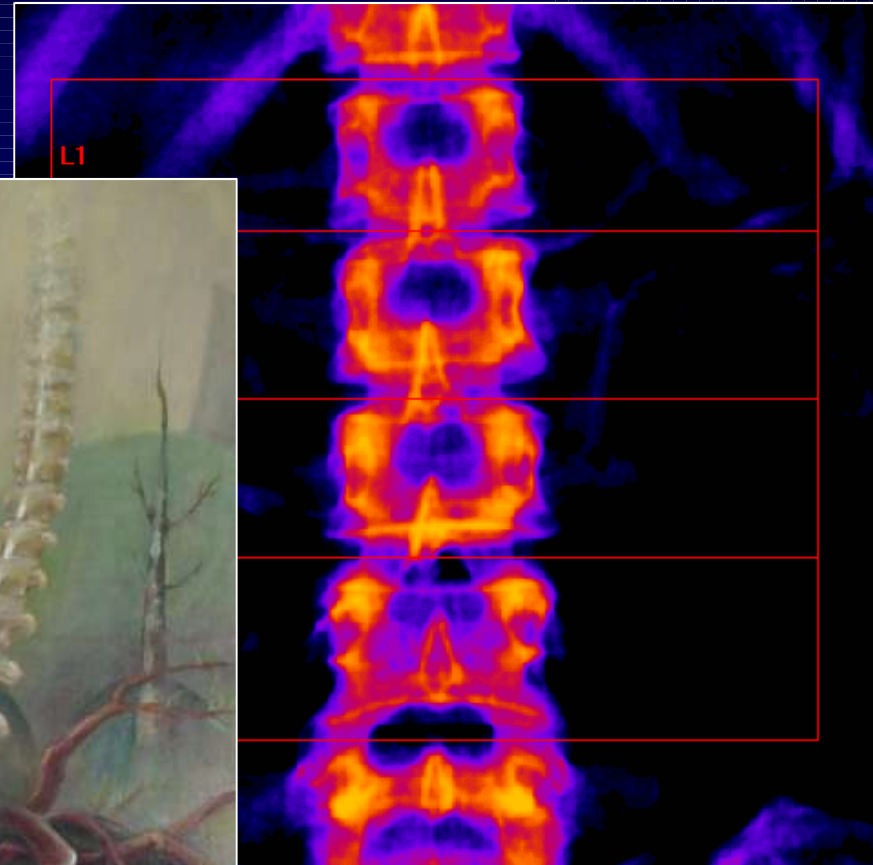
Email: tmosher@psu.edu



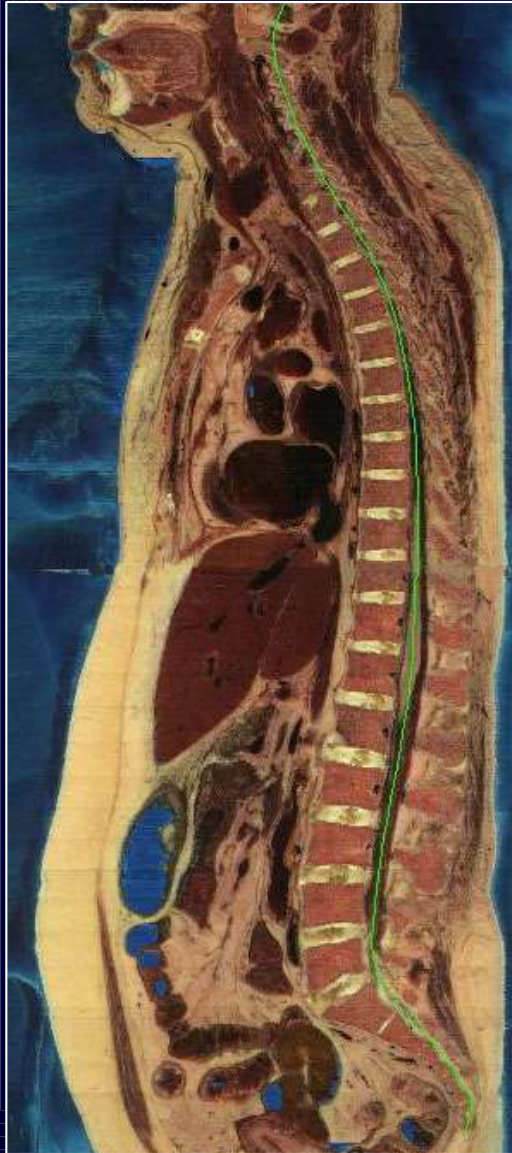
Learning Objective

- Identify anatomic structures of the spine and upper extremities on standard radiographic and cross-sectional images

SPINE



Visual Human Sagittal View



7 Cervical Vertebra

12 Thoracic Vertebra

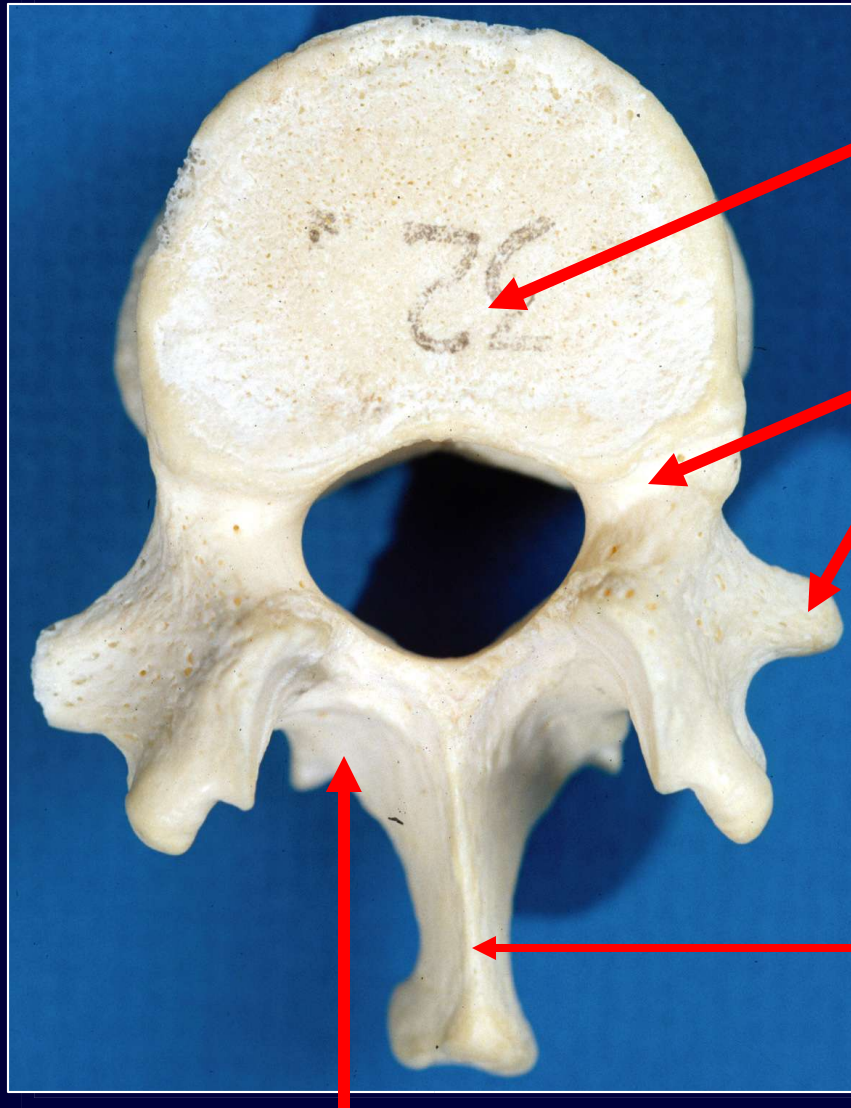
5 Lumbar Vertebra

5 Sacral Vertebra (fused)

3 Coccygeal Vertebra (fused)



Lumbar Vertebral Body



BODY

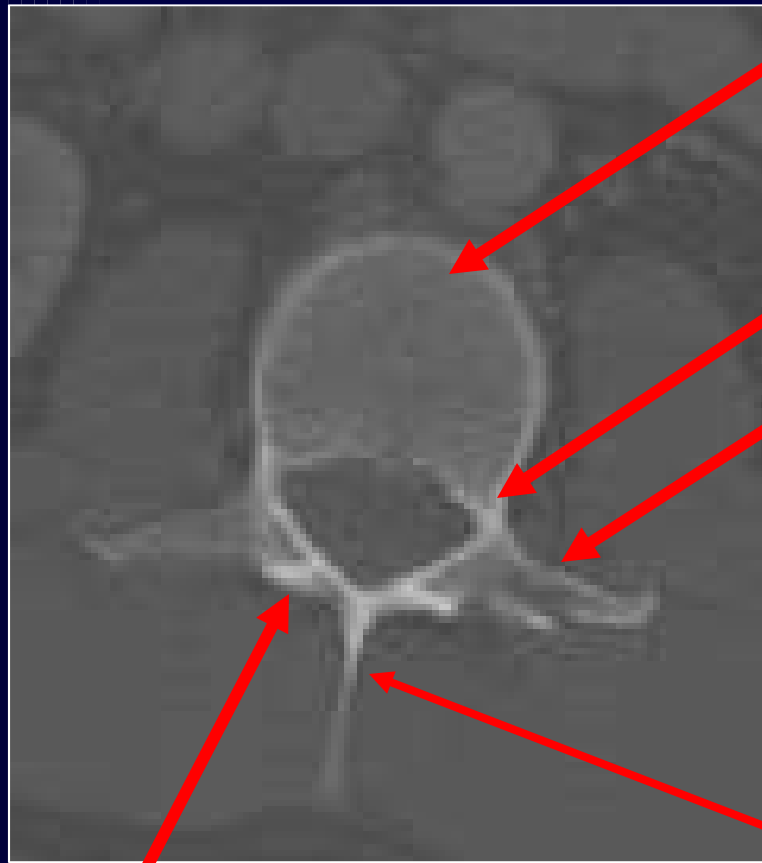
PEDICLE

**TRANSVERSE
PROCESS**

SPINOUS PROCESS

LAMINA

Lumbar Vertebral Body



BODY

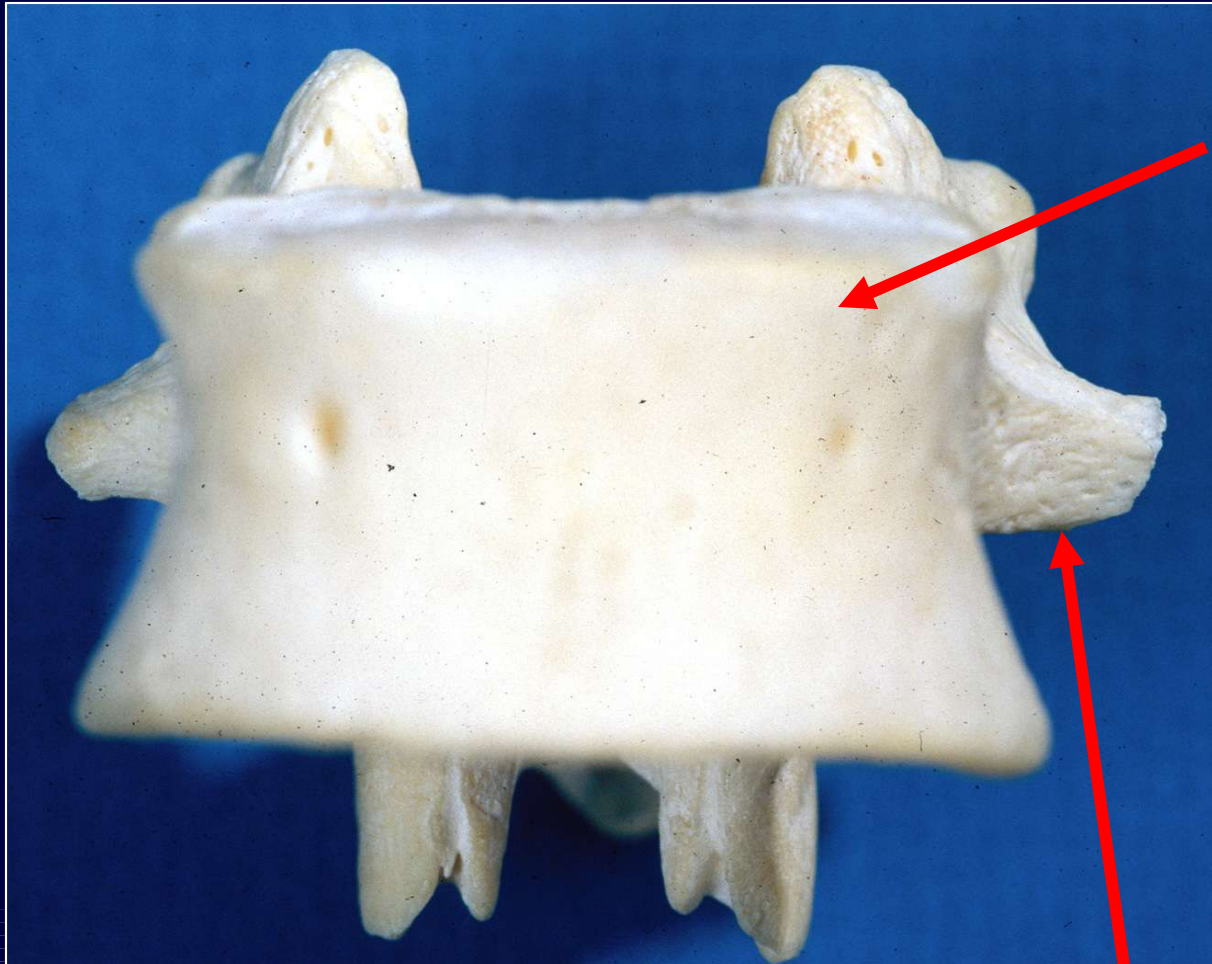
PEDICLE

**TRANSVERSE
PROCESS (*fractured*)**

SPINOUS PROCESS

LAMINA

SPINE FROM THE FRONT

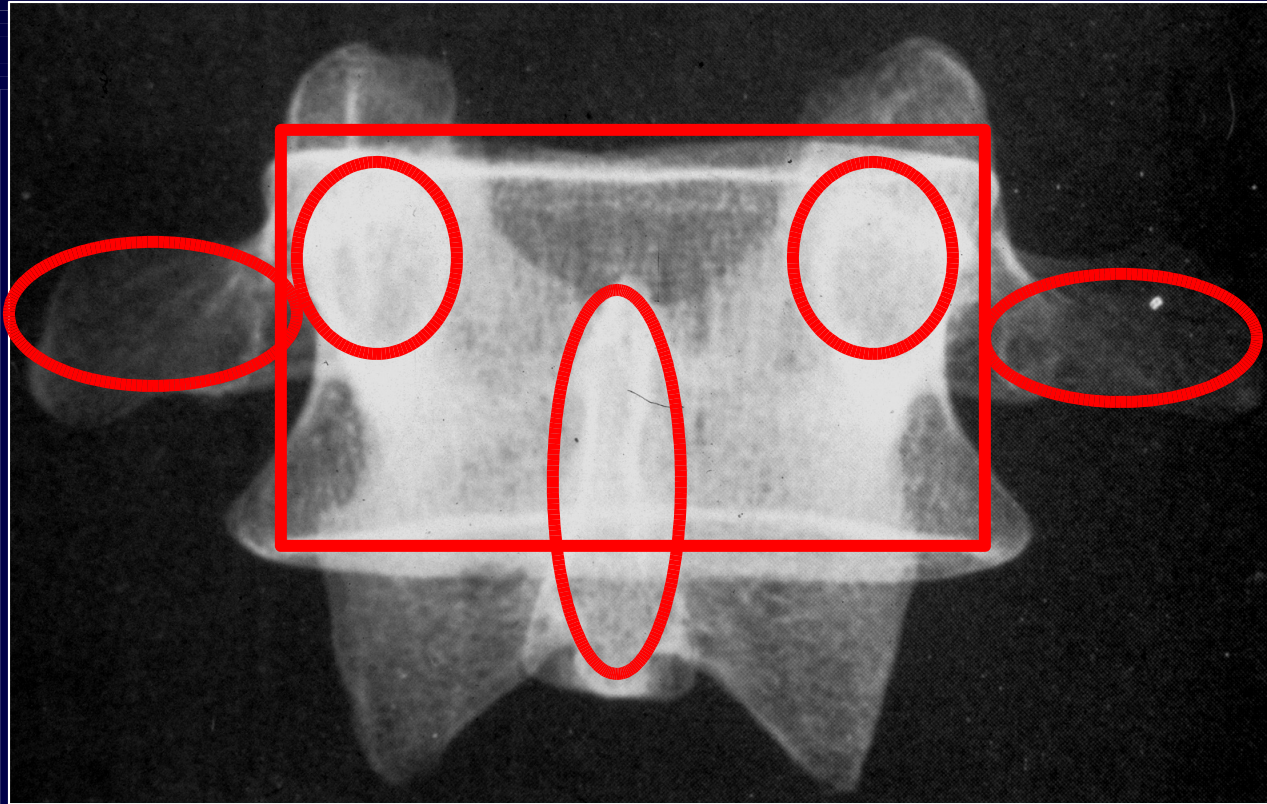


BODY

**TRANSVERSE
PROCESS**

SPECIMEN RADIOGRAPH L4

BODY

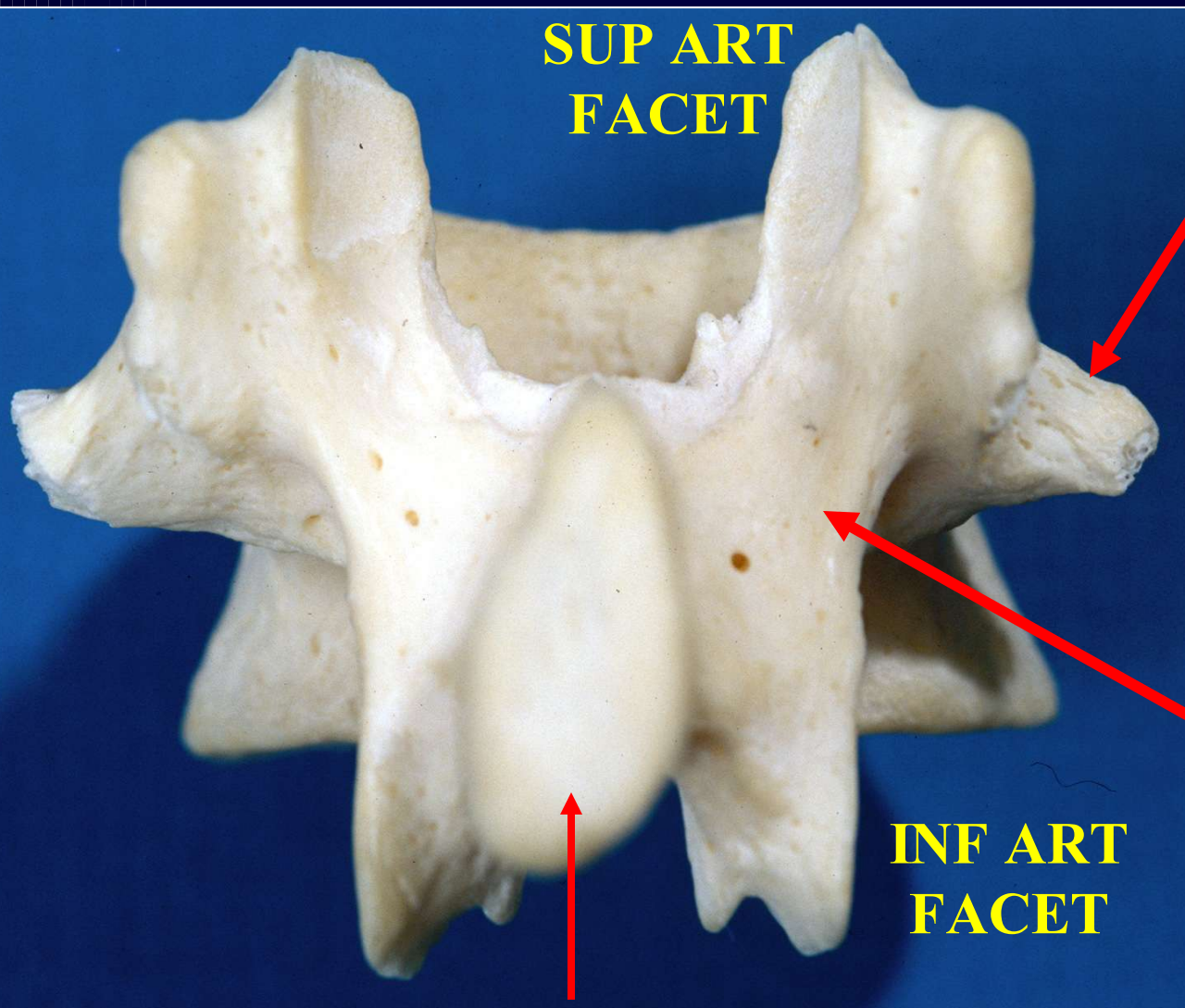


PEDICLES

SPINOUS PROCESS

TRANSVERSE PROCESSES

SPINE FROM THE BACK



**SUP ART
FACET**

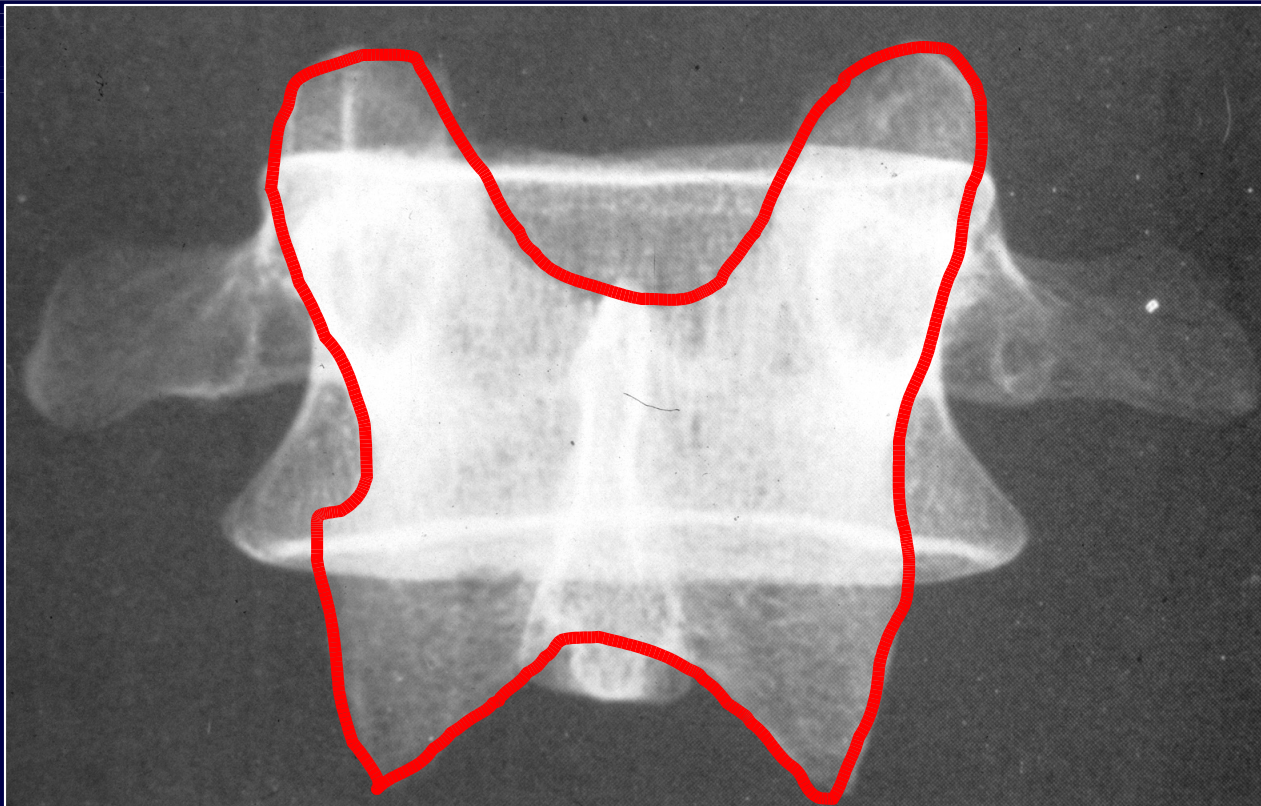
**TRANSVERSE
PROCESS**

LAMINA

**INF ART
FACET**

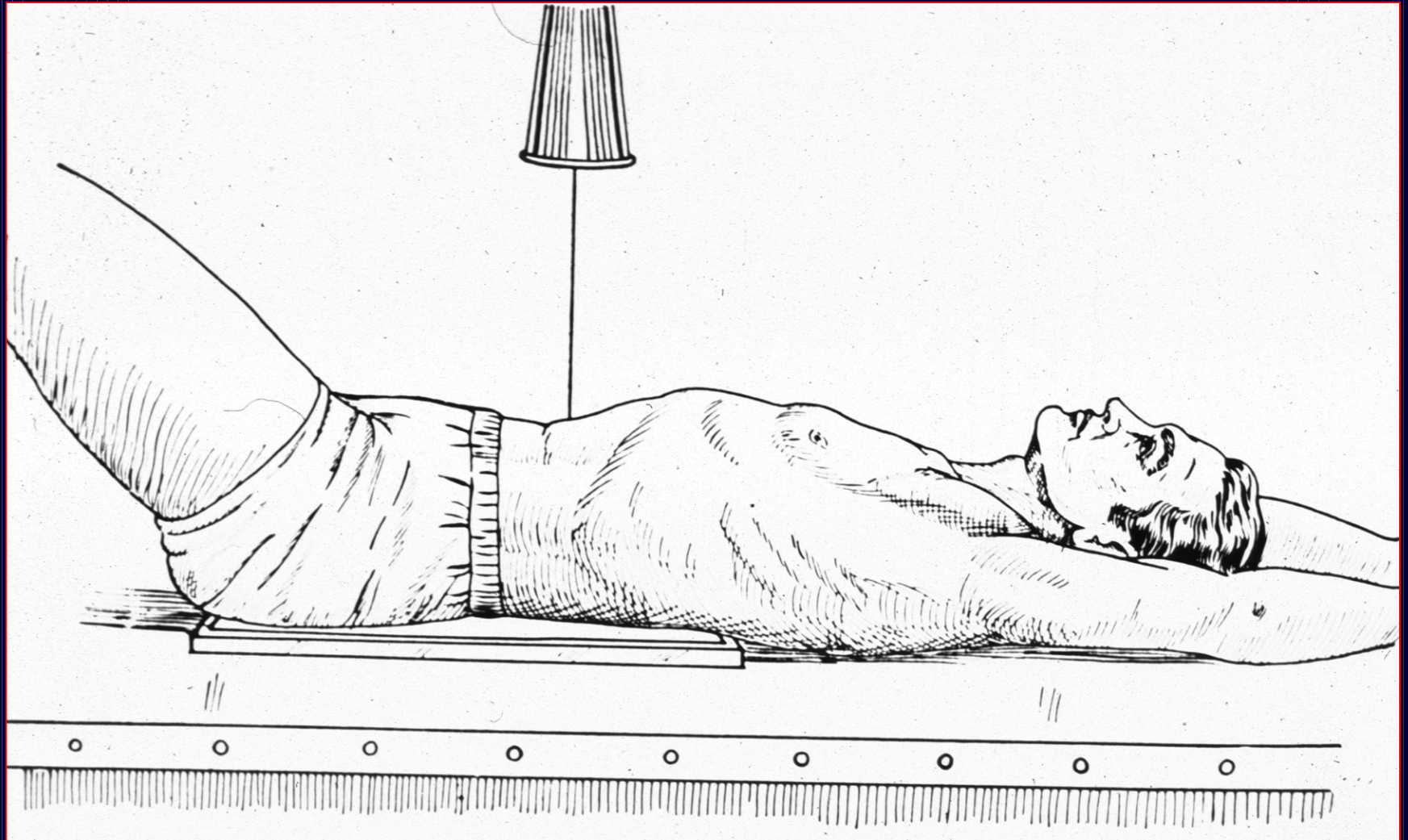
SPINOUS PROCESS

SPECIMEN RADIOGRAPH L4



Lamina and Facets

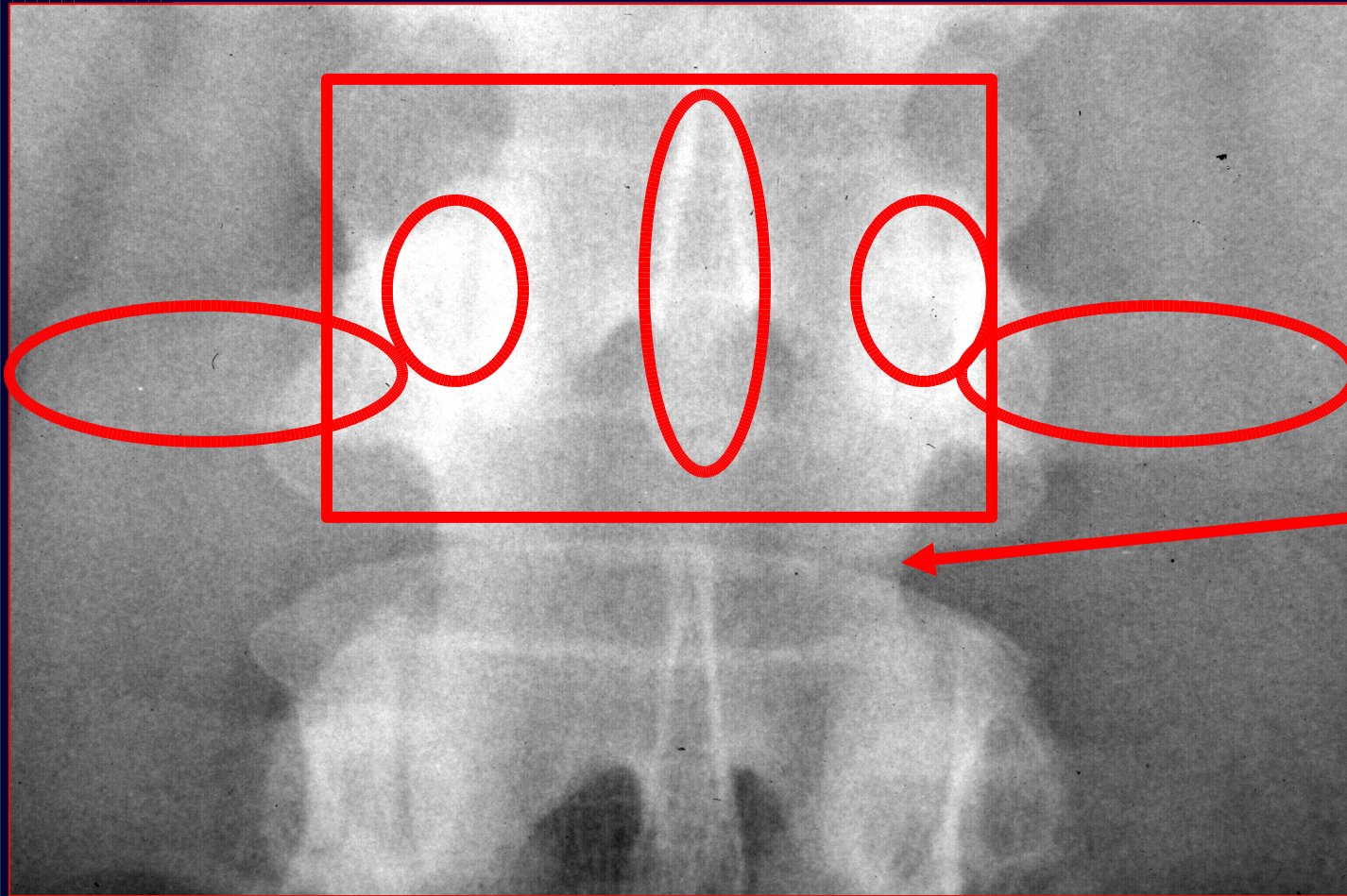
AP Lumbar Spine



AP Lumbar Spine



AP Lumbar Spine



BODY
PEDICLE

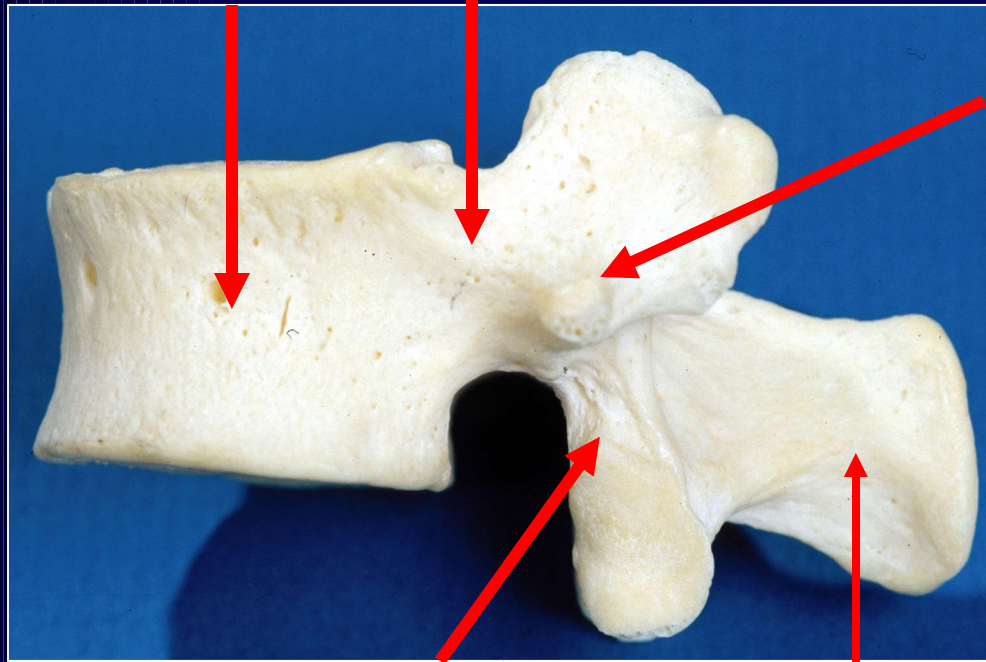
LAMINA

TRANSVERSE
PROCESS

SPINOUS
PROCESS

Spine Viewed from Side

BODY PEDICLE



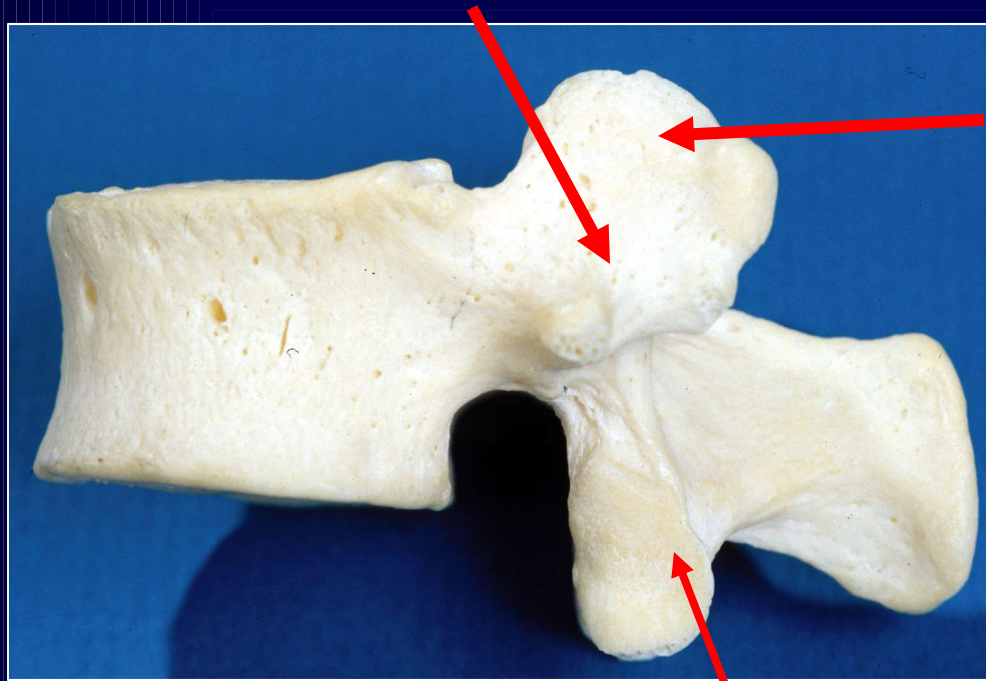
**TRANSVERSE
PROCESS**

LAMINA

SPINOUS PROCESS

Spine Viewed from Side

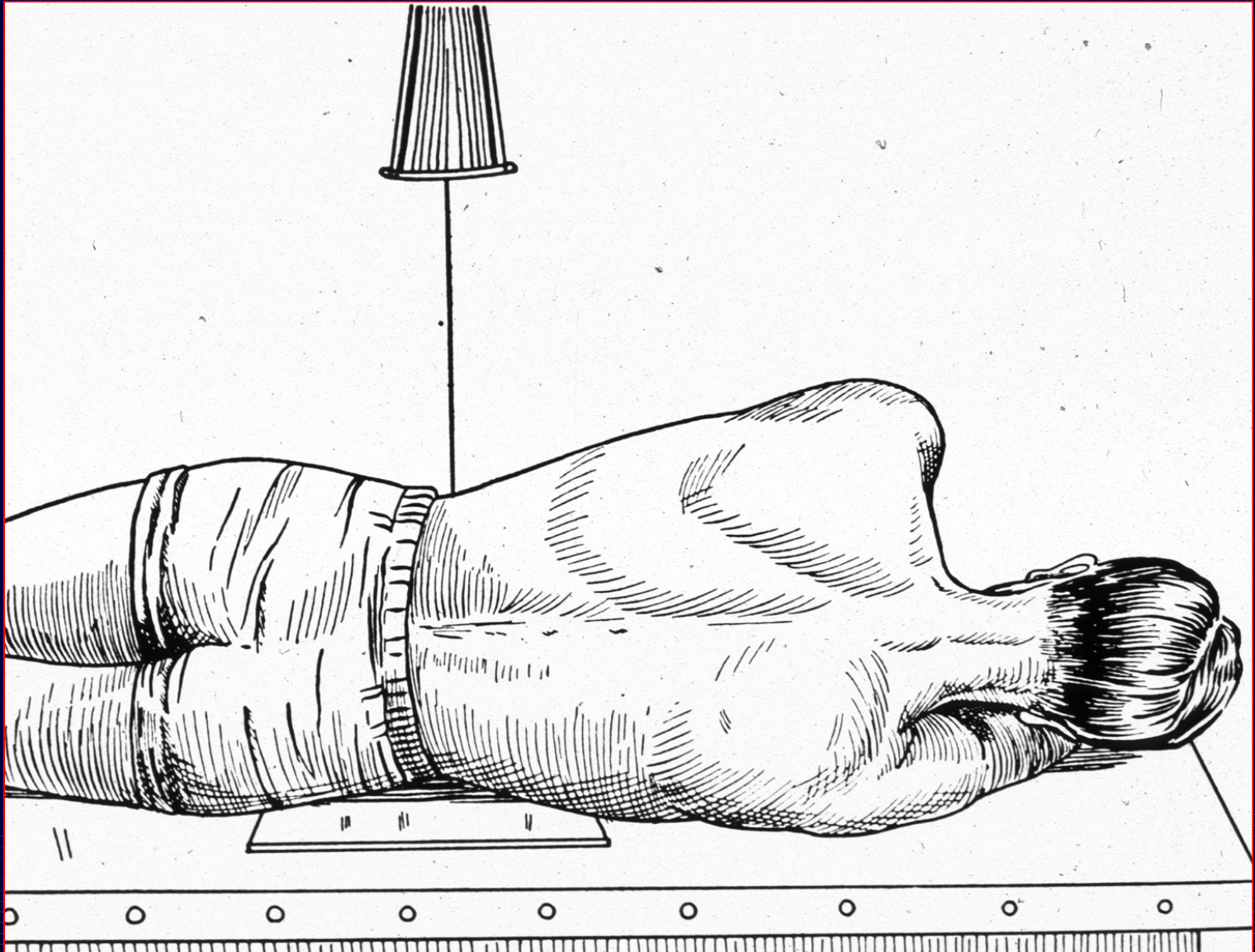
PARS INTRAARTICULARIS



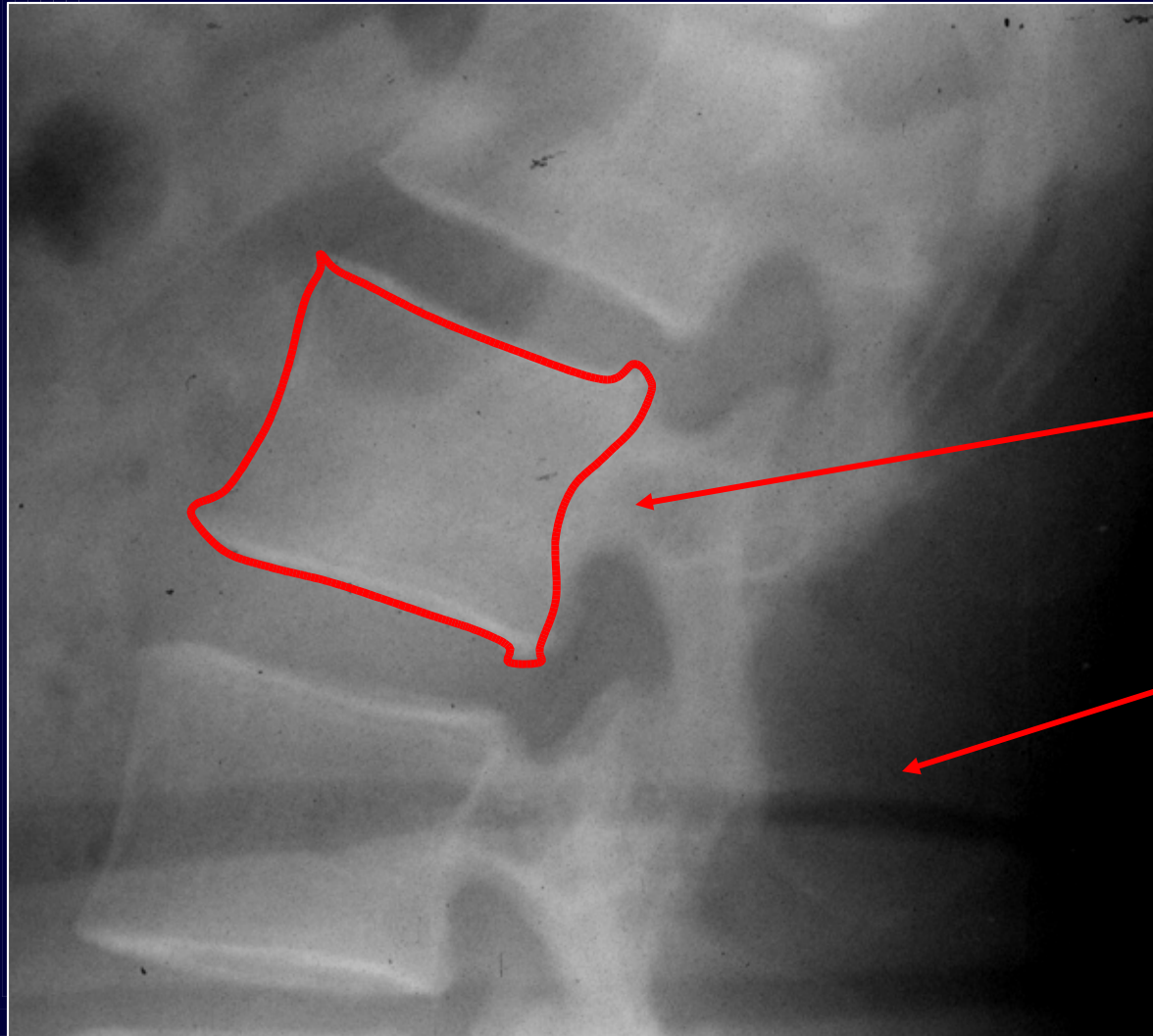
**SUPERIOR
FACET**

INFERIOR FACET

Lateral Lumbar Spine



Lateral Lumbar Spine

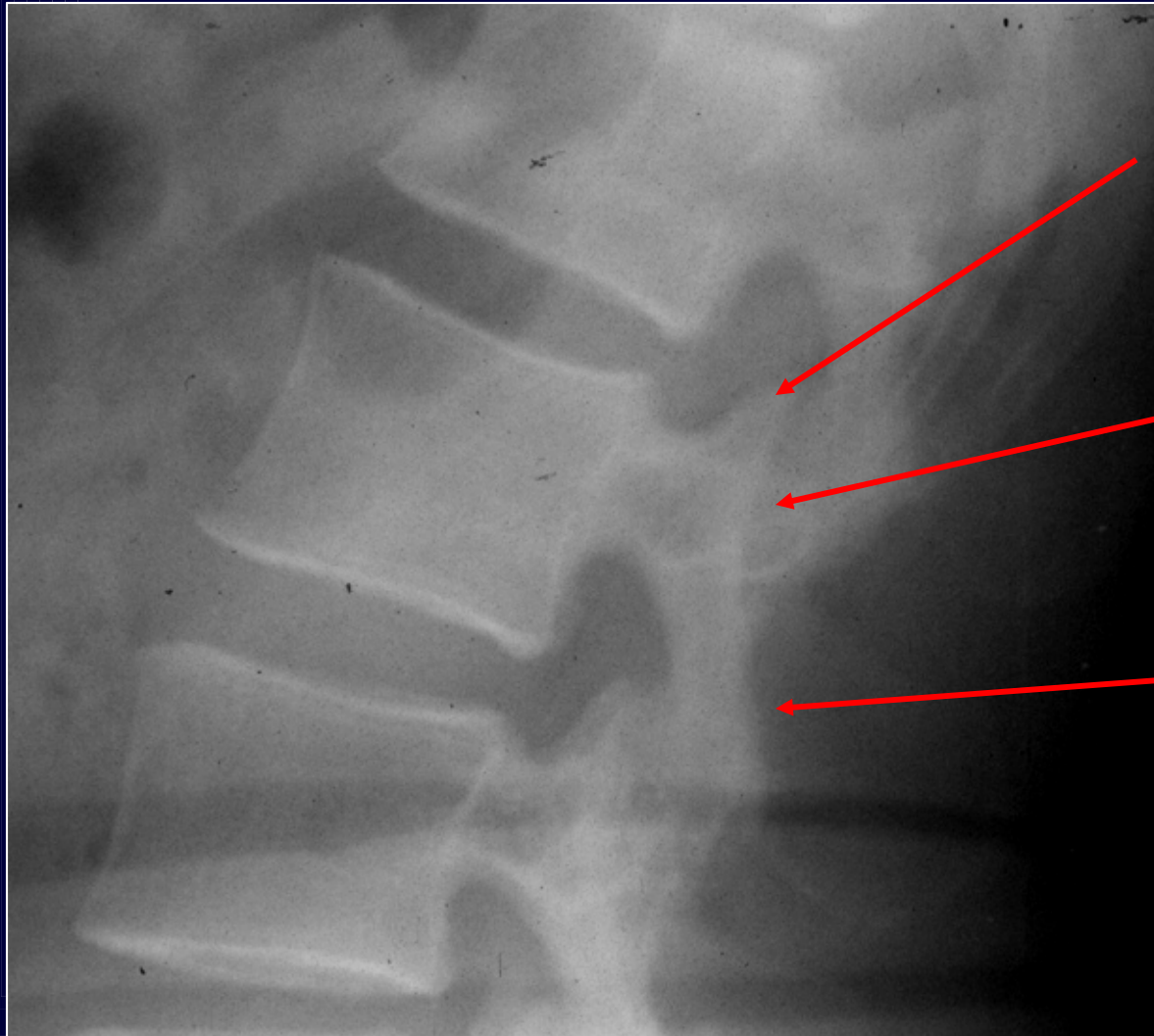


BODY

PEDICLE

**SPINOUS
PROCESS**

Lateral Lumbar Spine

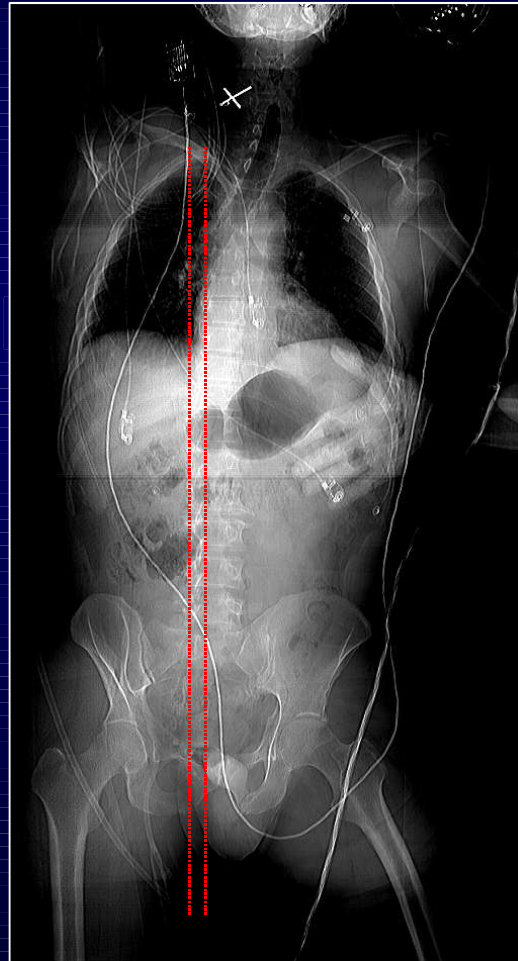


**SUPERIOR
FACET**

PARS

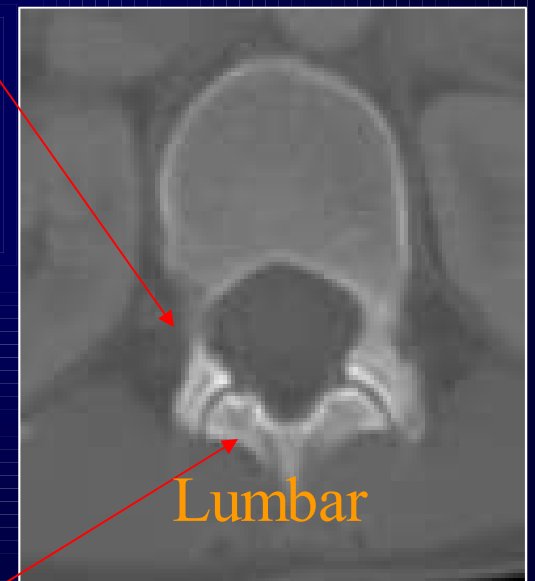
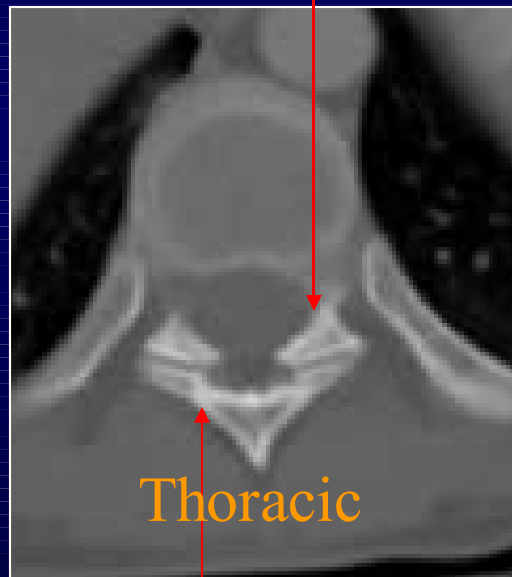
**INFERIOR
FACET**

CT Lumbar Spine Sagittal Reconstructions



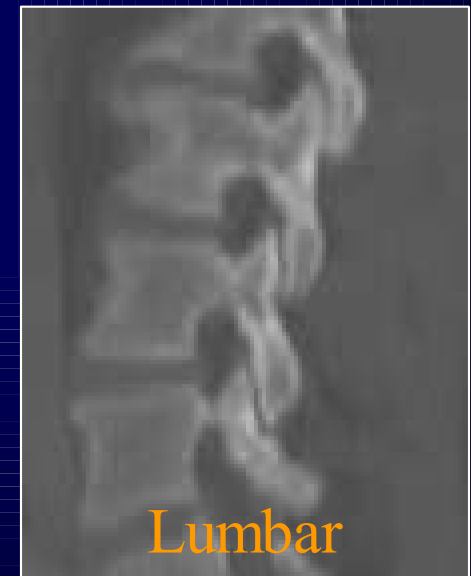
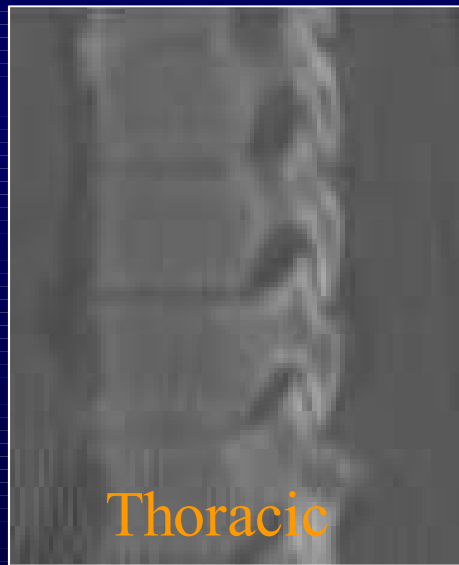
Facet Joints Axial View

Inferior Facets

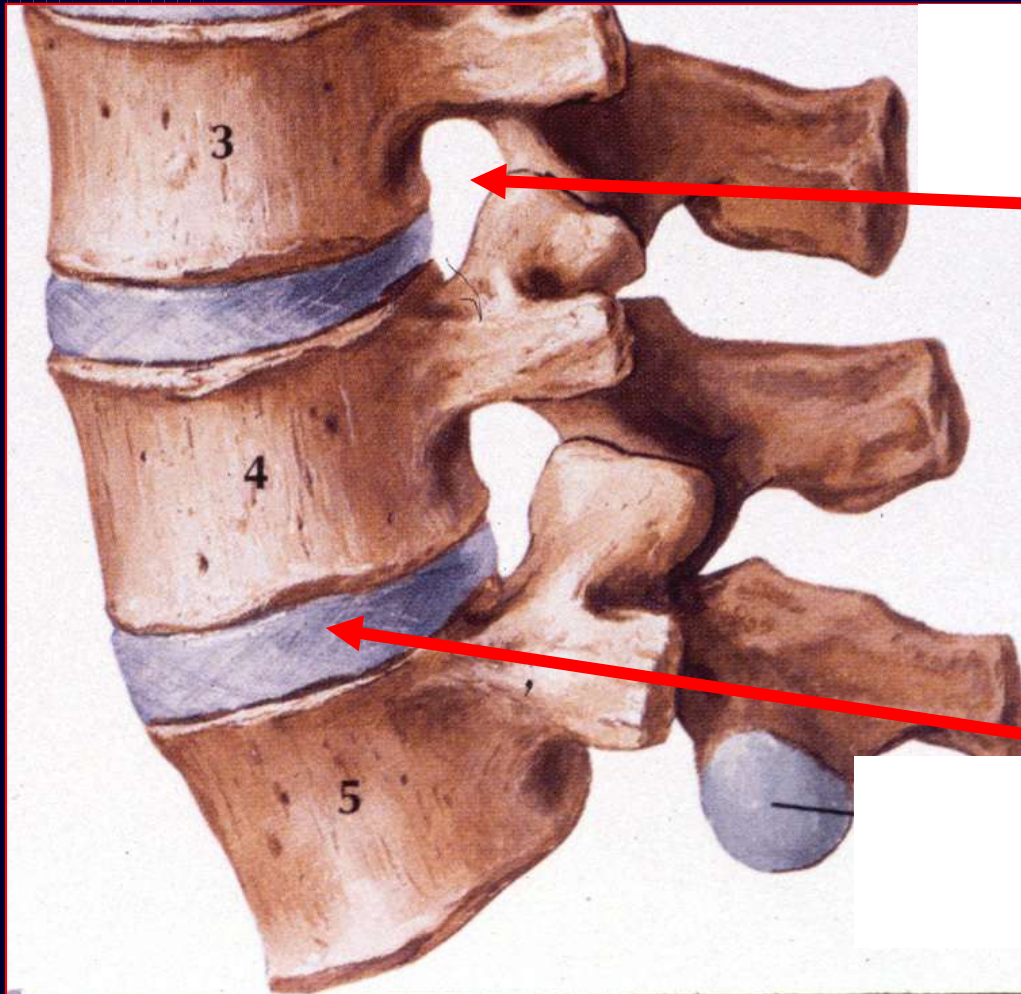


Superior Facets

Facet Joints Sagittal Reconstructions



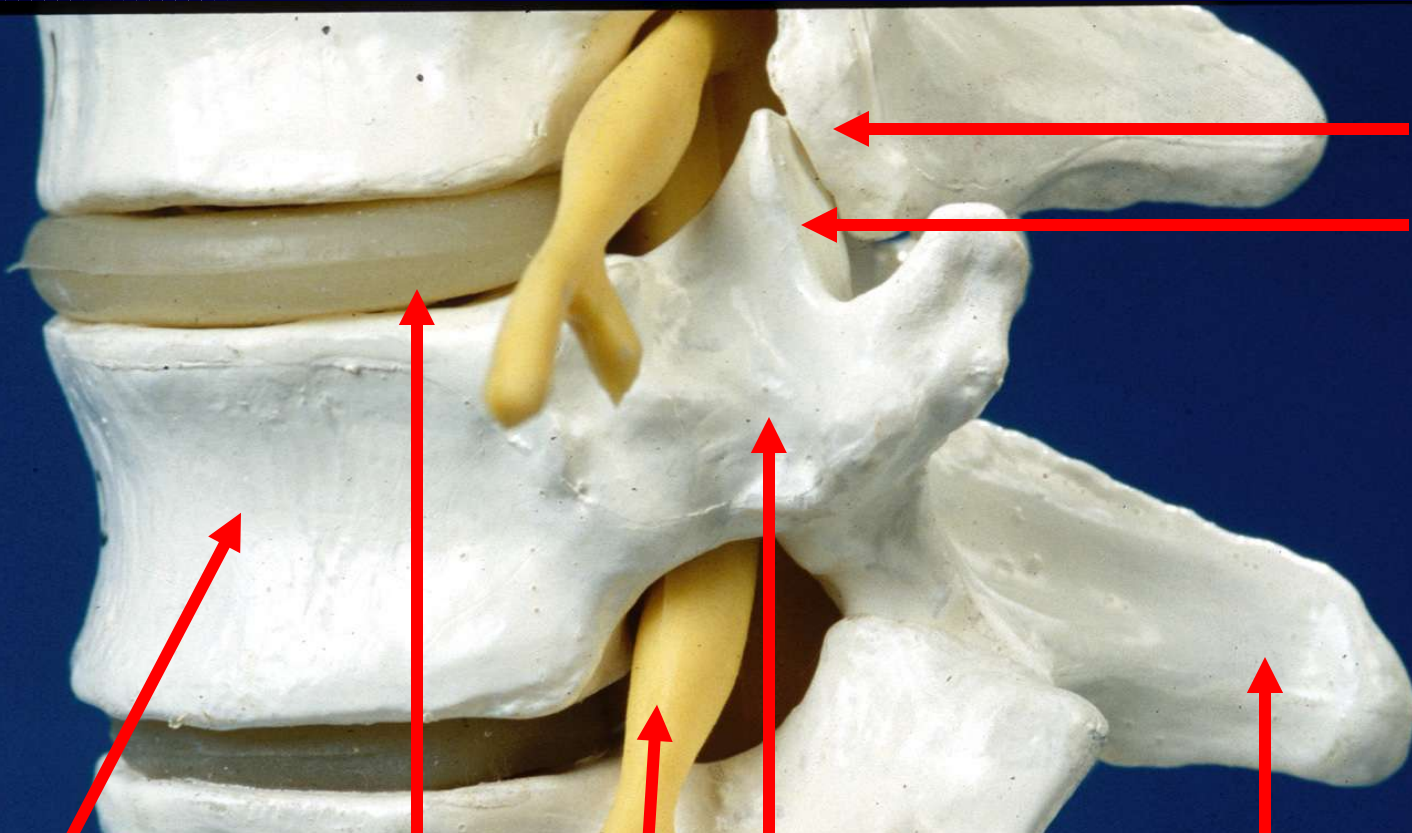
Intervertebral Disc Space



**NEURAL
FORAMEN**

**INTERVERTEBRAL
DISC**

Nerve Roots



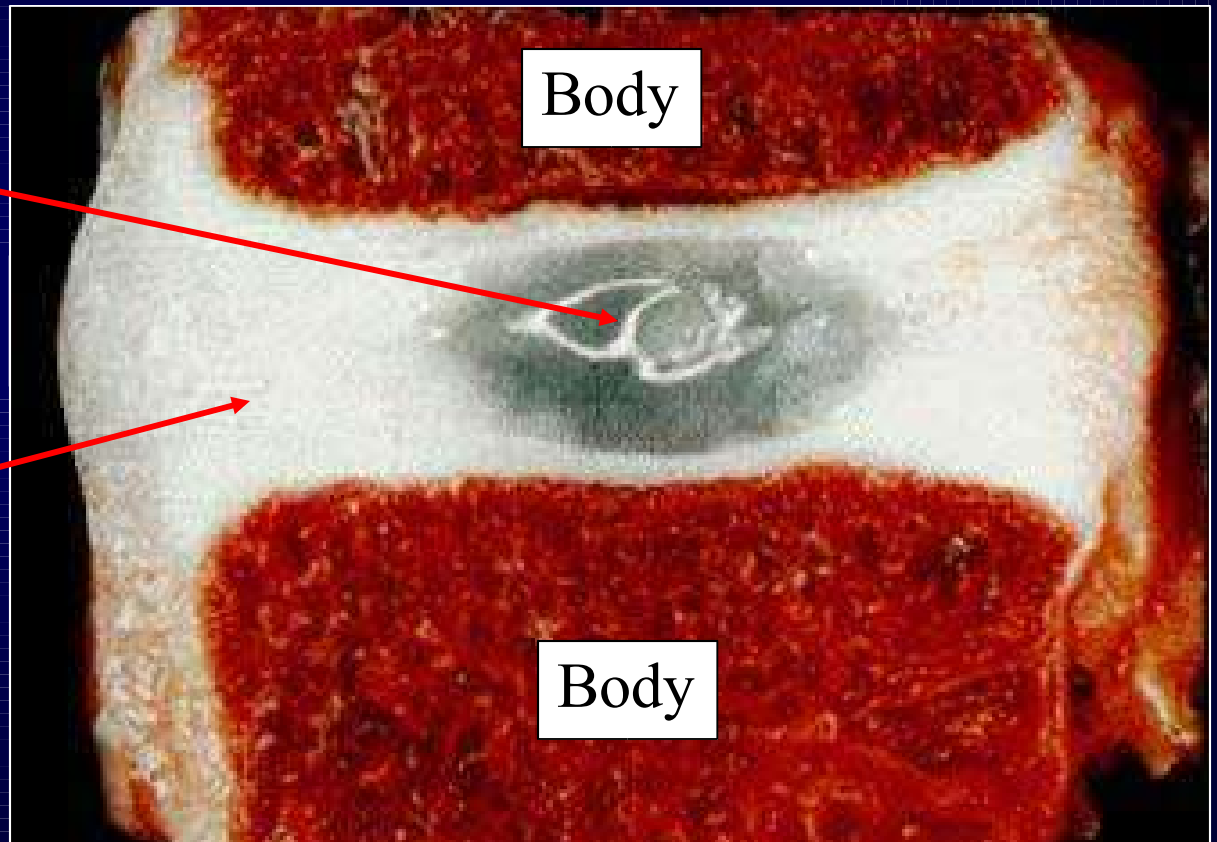
INF FACET
SUP FACET

BODY **DISC** **PEDICLE** **SPINOUS**
NERVE ROOT **PROCESS**

Intervertebral Disc

Nucleus Pulposus

Annulus Fibrosus



Sagittal Section Lumbar Spine

MRI: Intervertebral Disc

Spinal Cord

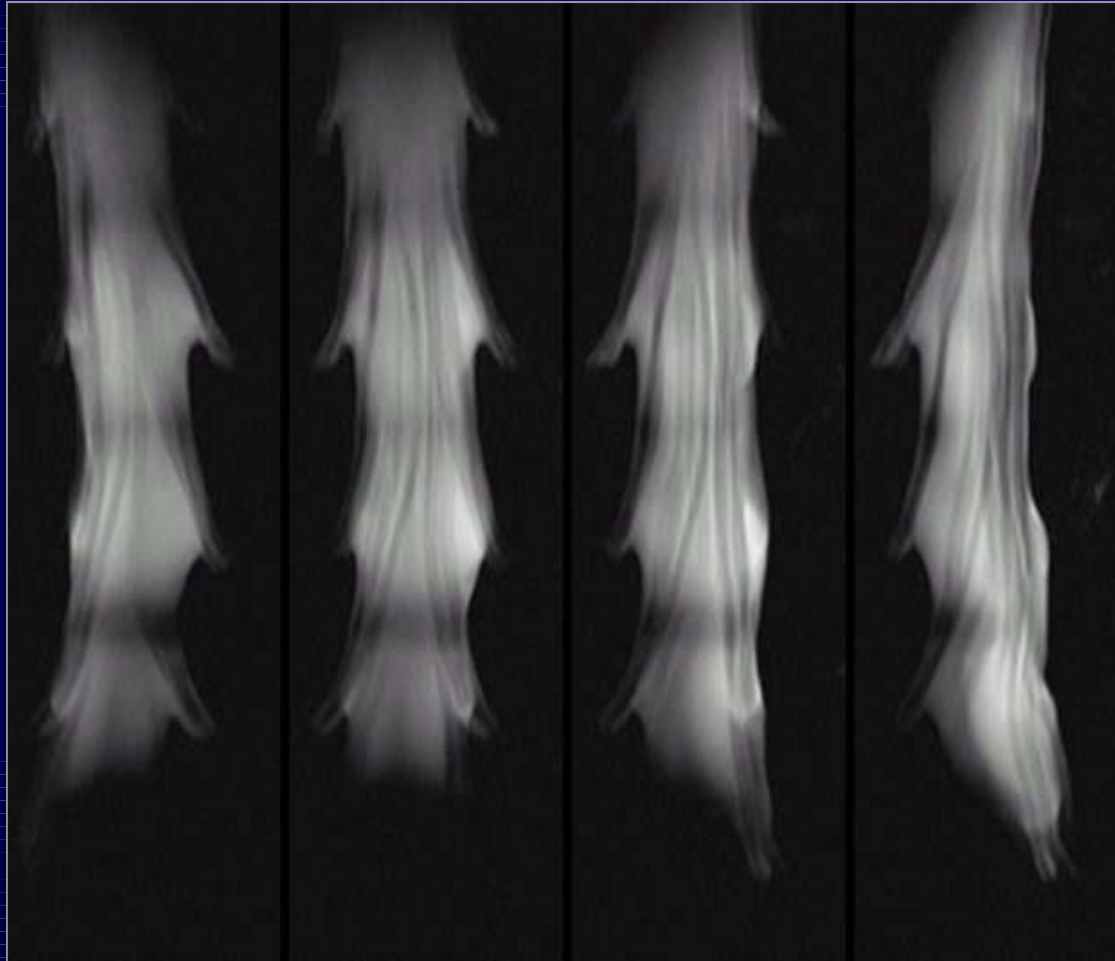
(Cauda Equina)

Intervertebral Disc

- Nucleus Pulposus
- Annulus Fibrosus

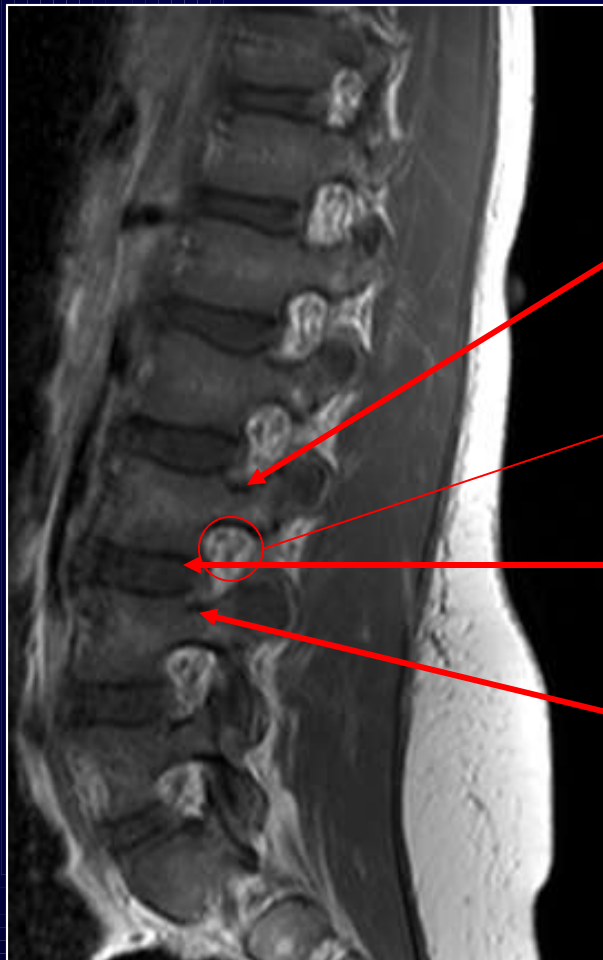


Cauda Equina



MRI Myelogram

Neural Foramen



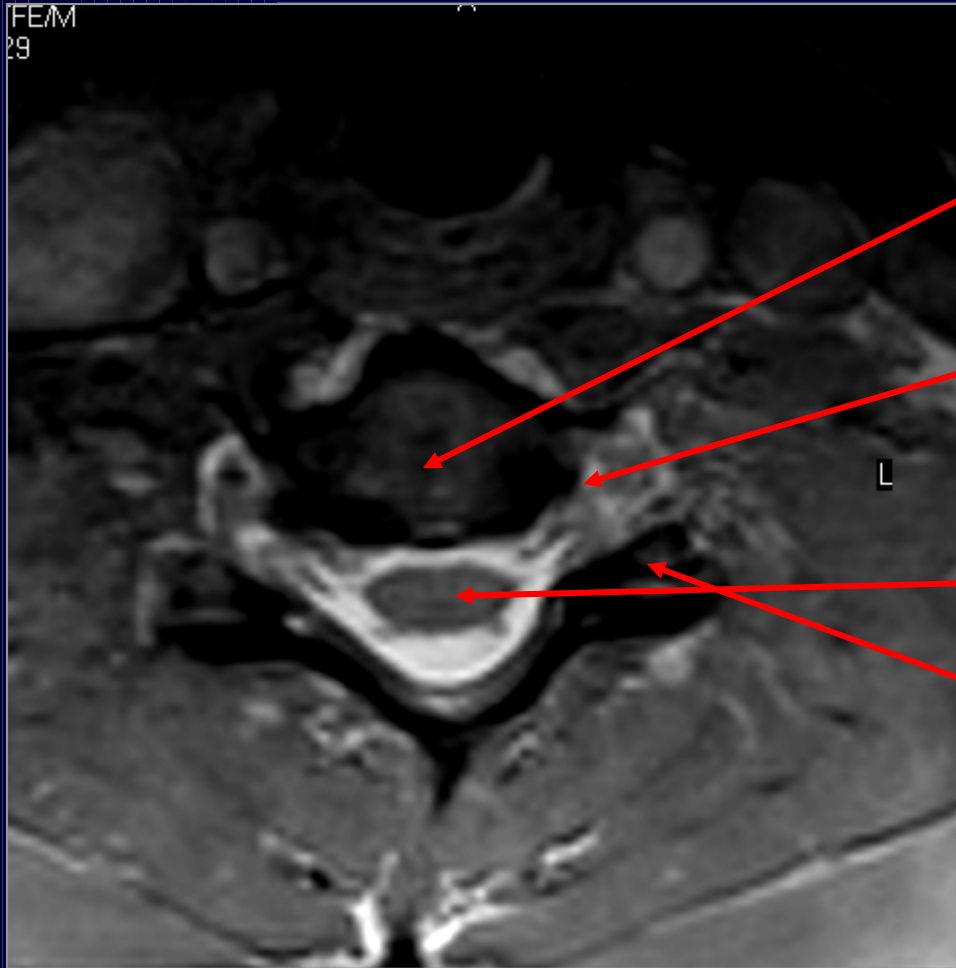
Pedicle (L3)

L3 Nerve Root

L3/L4 Intervertebral Disc

Pedicle (L4)

Neural Foramina Cervical Spine



Vertebral Body

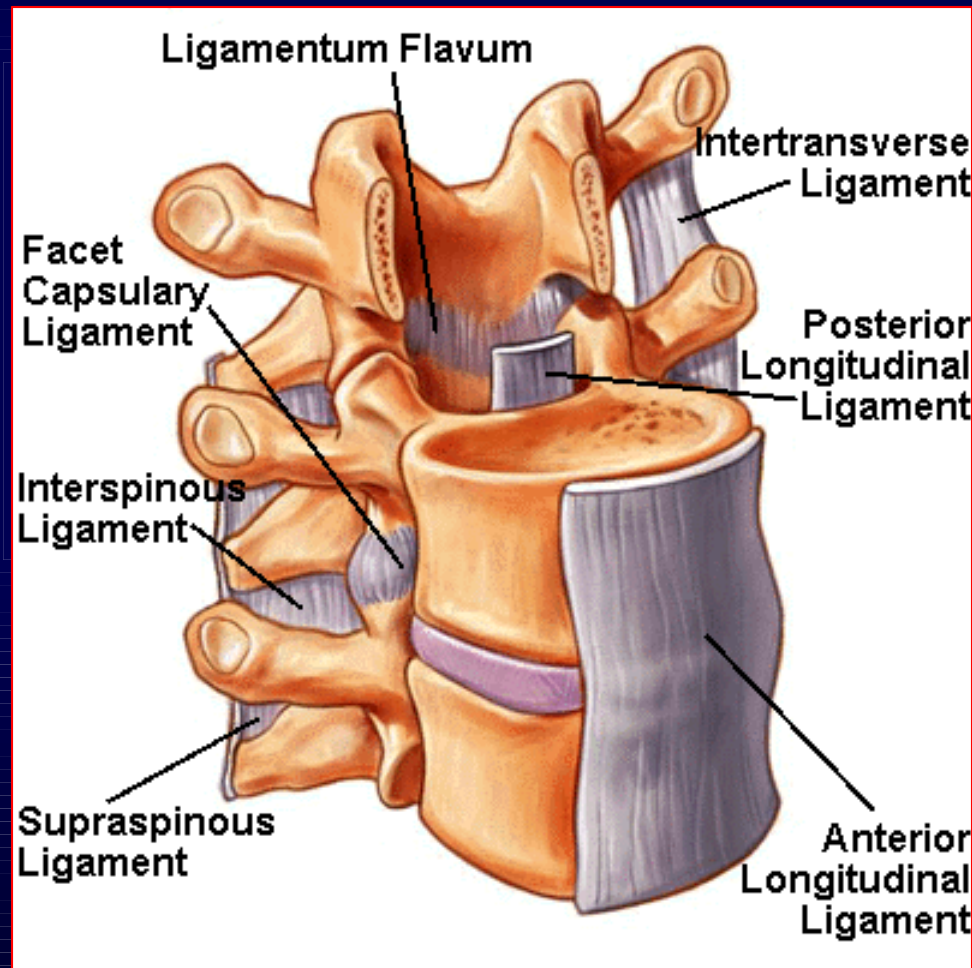
Nerve Roots

Cervical Spinal Cord

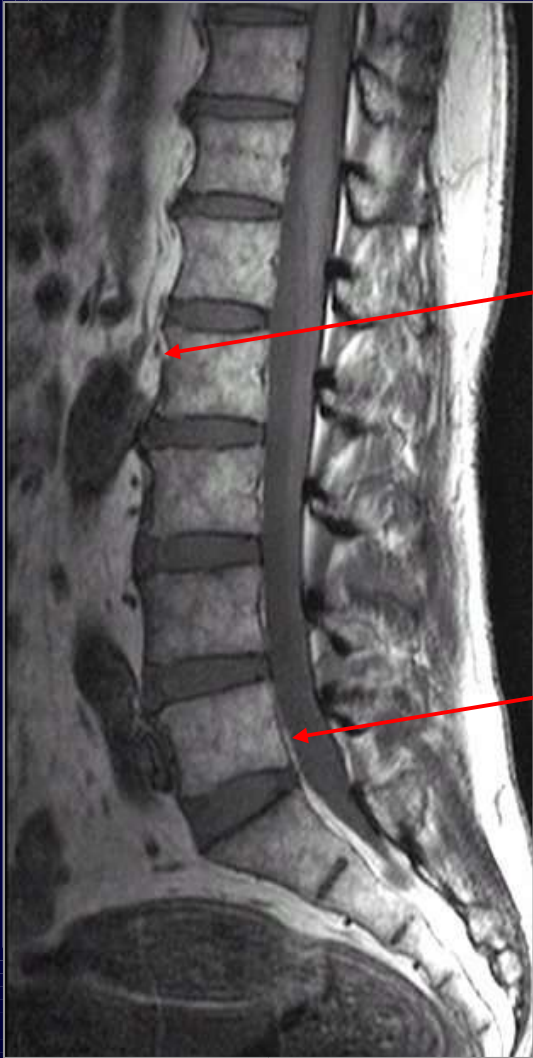
Facet Joint

Viewed from bottom

Spinal Ligaments



Spinal Ligament



Anterior Longitudinal
Spinal Ligament

Posterior Longitudinal
Spinal Ligament

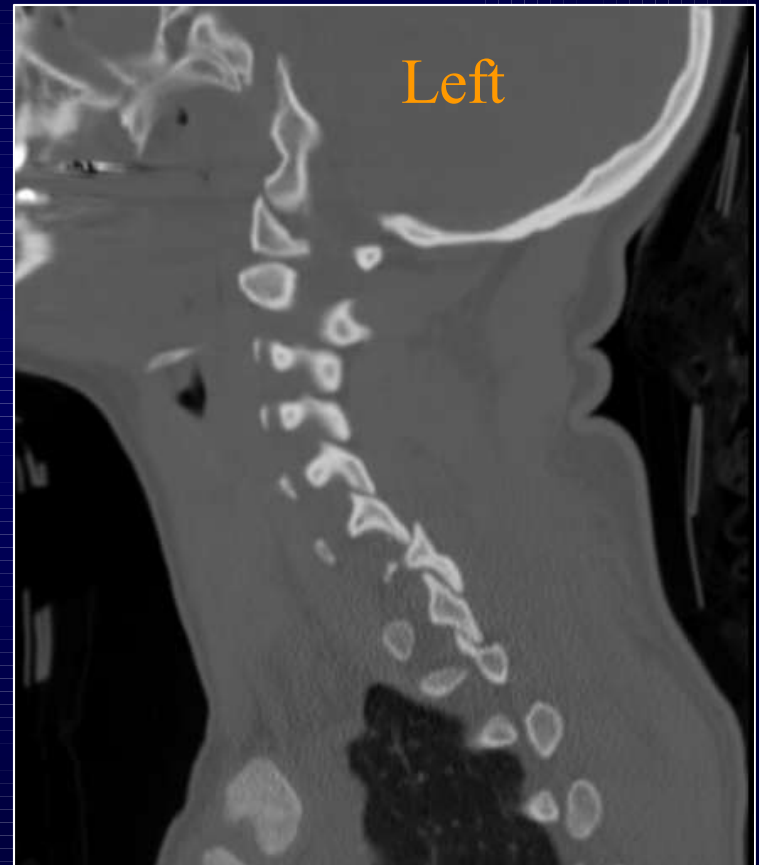
Case Study: 17 year-old Male involved in a MVA



Do you see a fracture?

Fracture of C7 vertebral body

Case Study: 17 year-old Male involved in a MVA



What Bilateral Facets Dislocation at C6/7 injured?

Case Study: 17 year-old Male involved in a MVA



Spinal Cord Injury

*Anterior Longitudinal
Spinal Ligament*

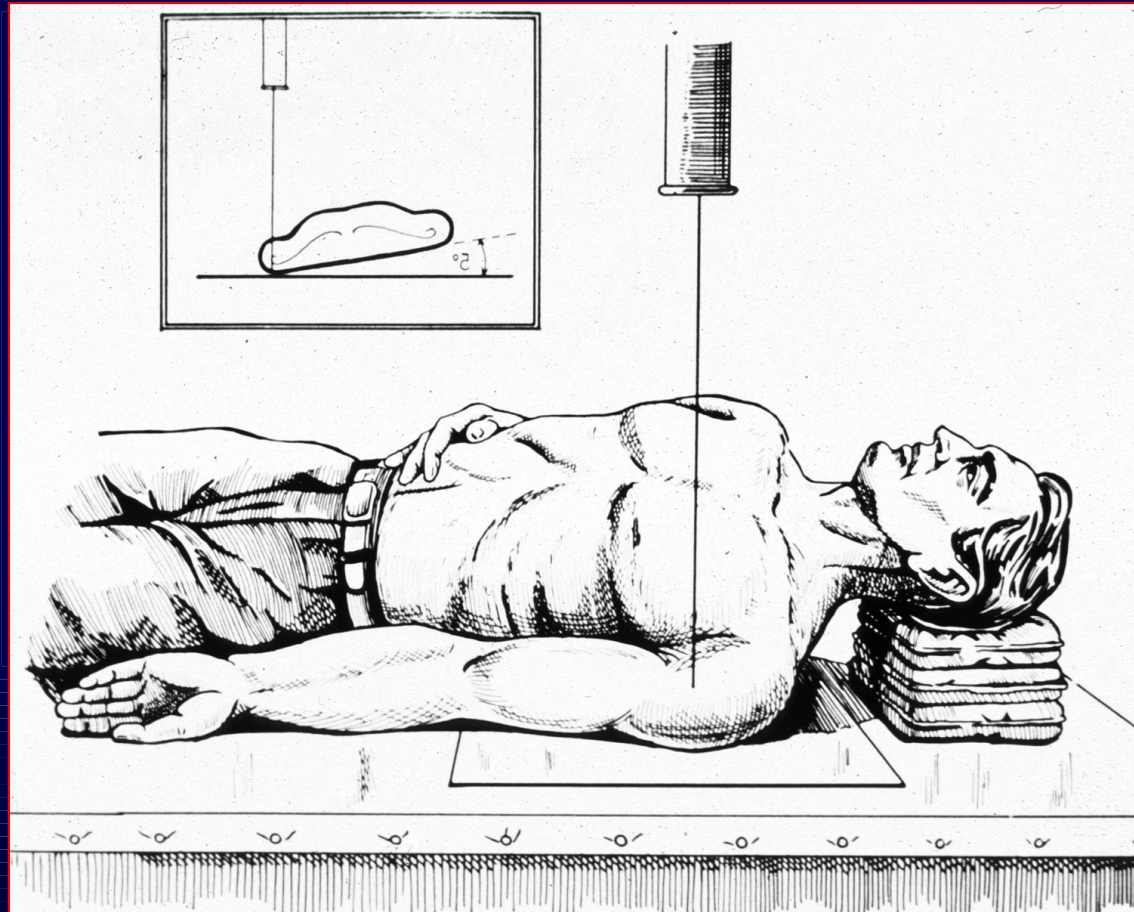
*Posterior Longitudinal
Spinal Ligament*

Upper Extremity



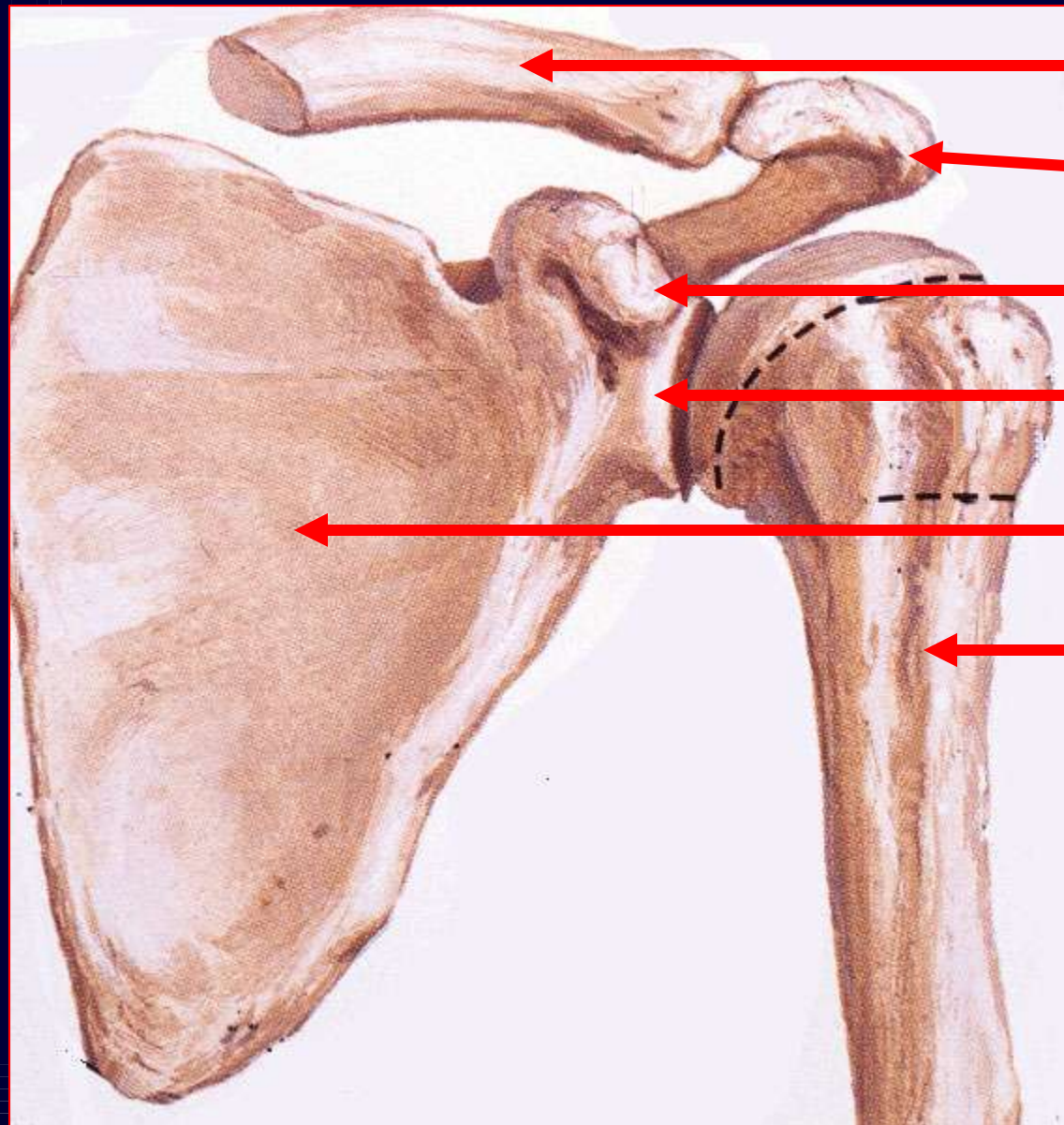
Radiographic Anatomy

X-RAY BEAM



FILM

LEFT SHOULDER (FRONT)



CLAVICLE

ACROMION

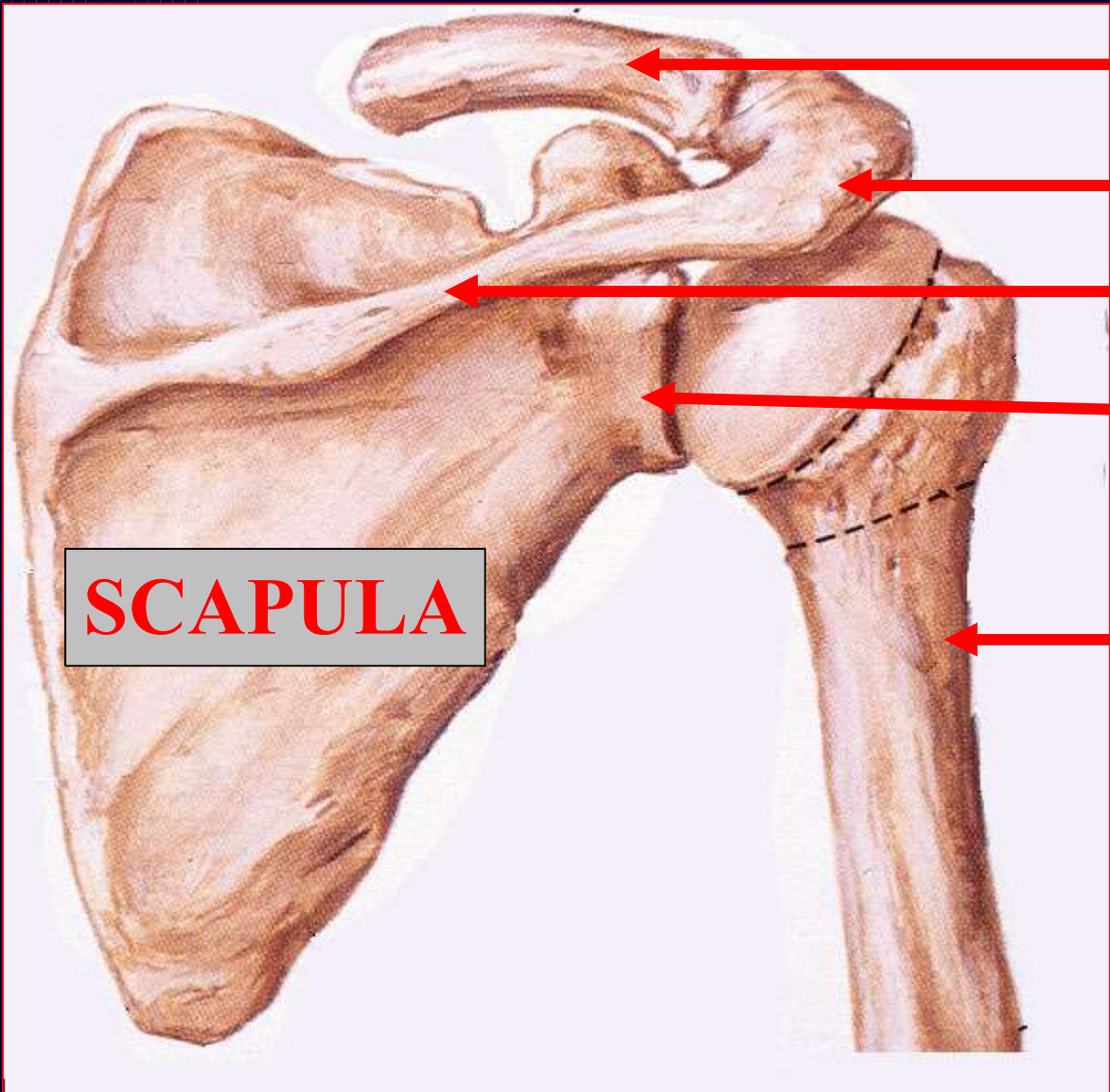
CORACOID

GLENOID

SCAPULA

HUMERUS

SHOULDER (BACK)



CLAVICLE

ACROMION

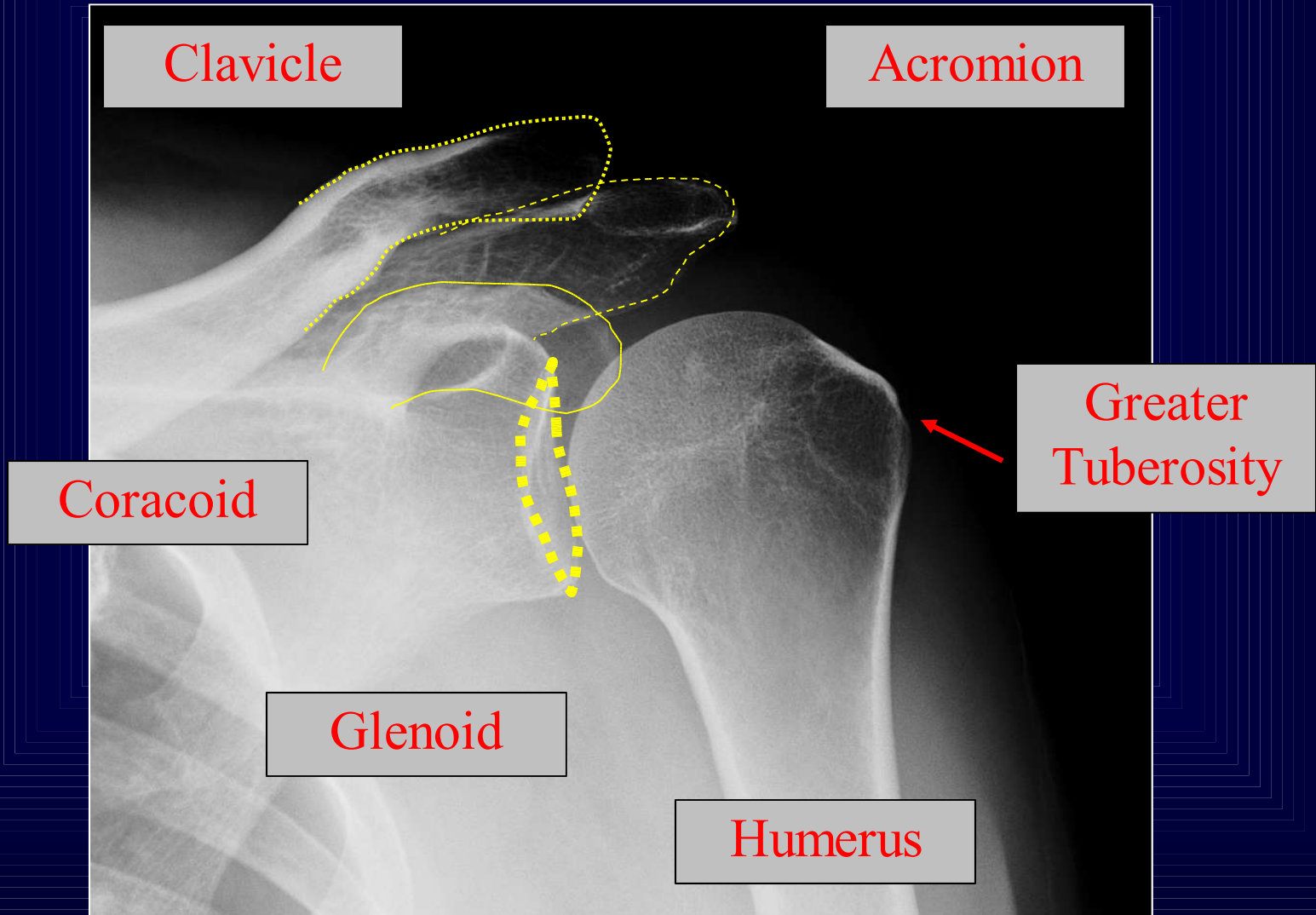
SPINE

GLENOID

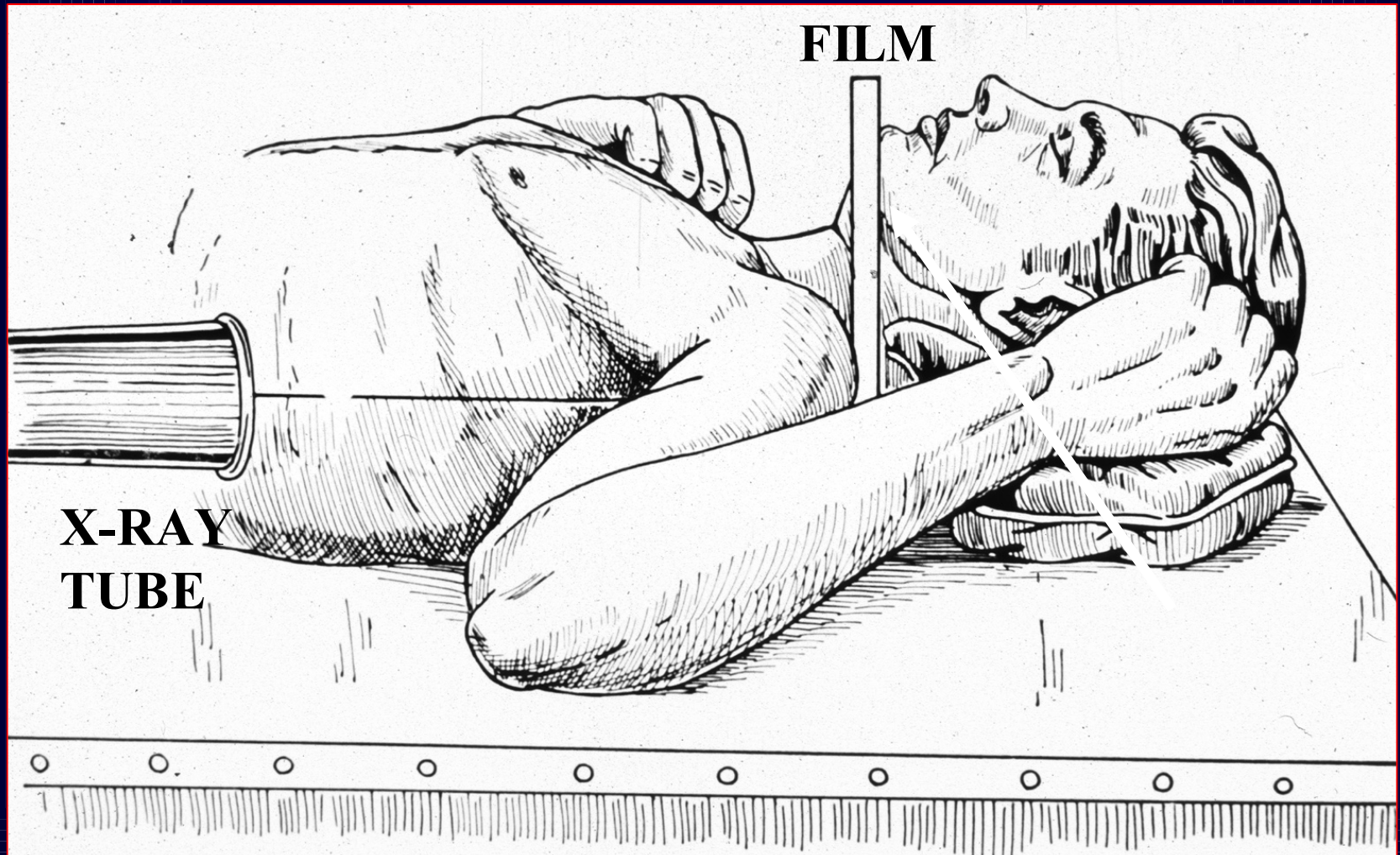
HUMERUS

SCAPULA

AP Shoulder



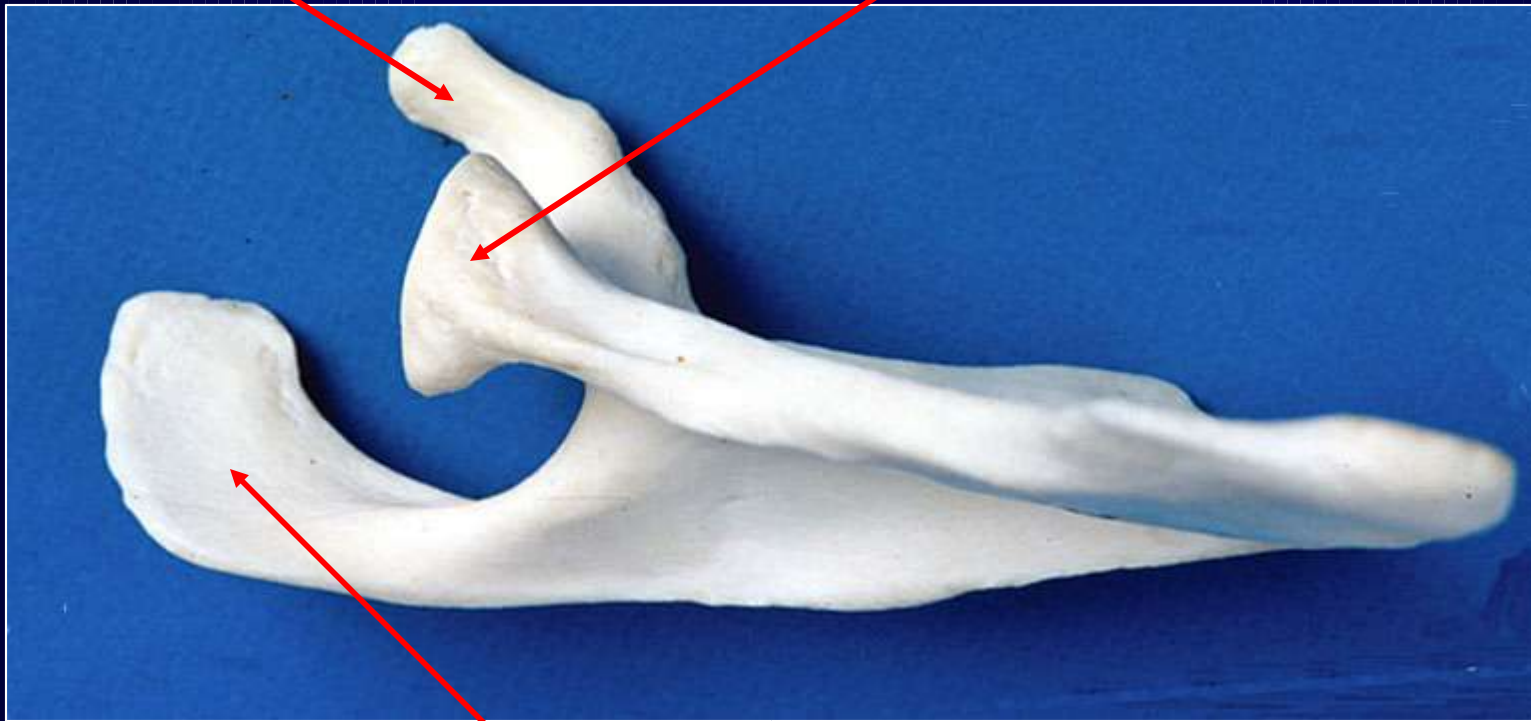
LEFT SHOULDER AXILLARY VIEW



RIGHT SCAPULA FROM BELOW

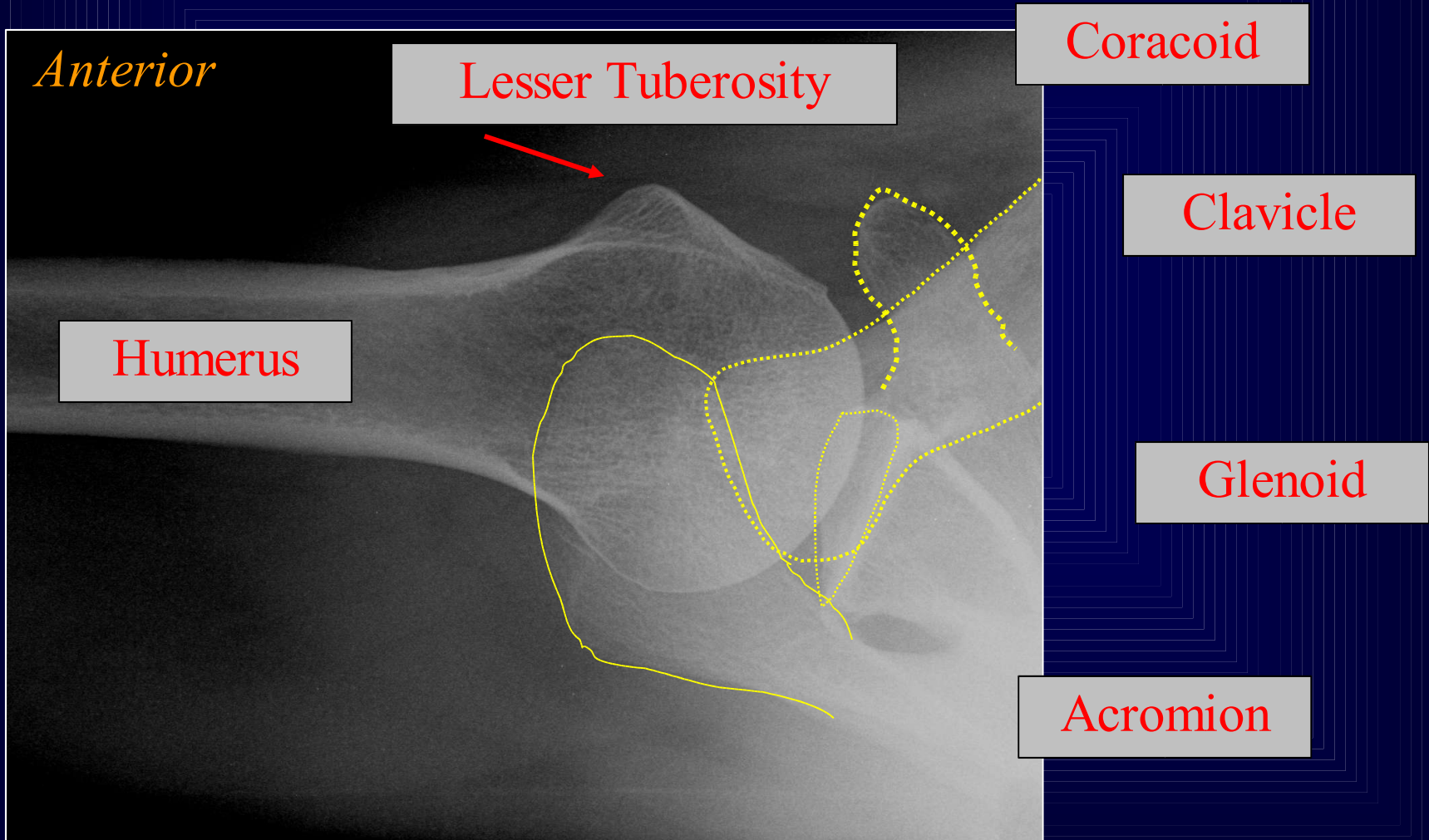
CORACOID

GLENOID

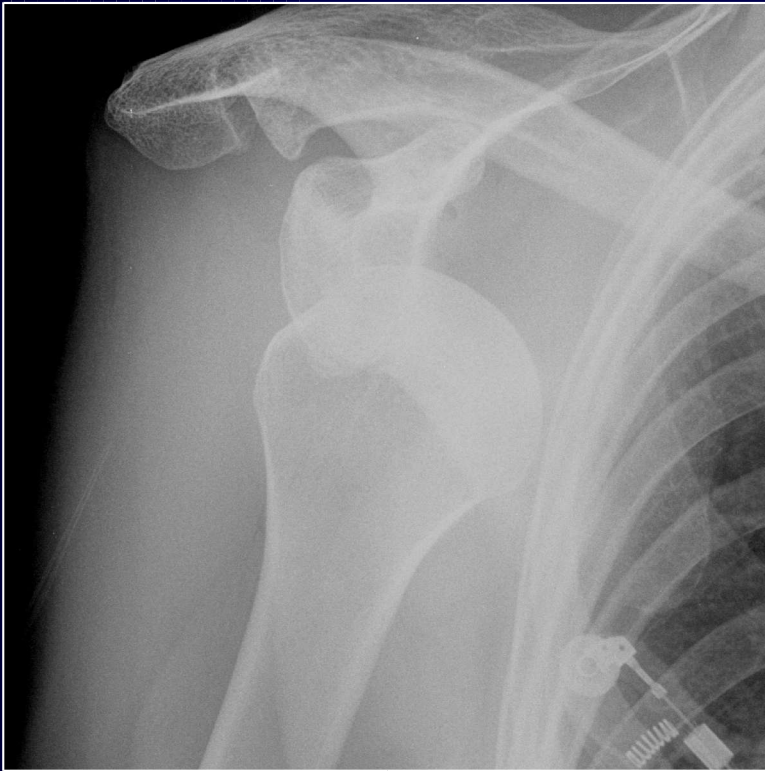


ACROMION

LEFT SHOULDER (AXILLARY)

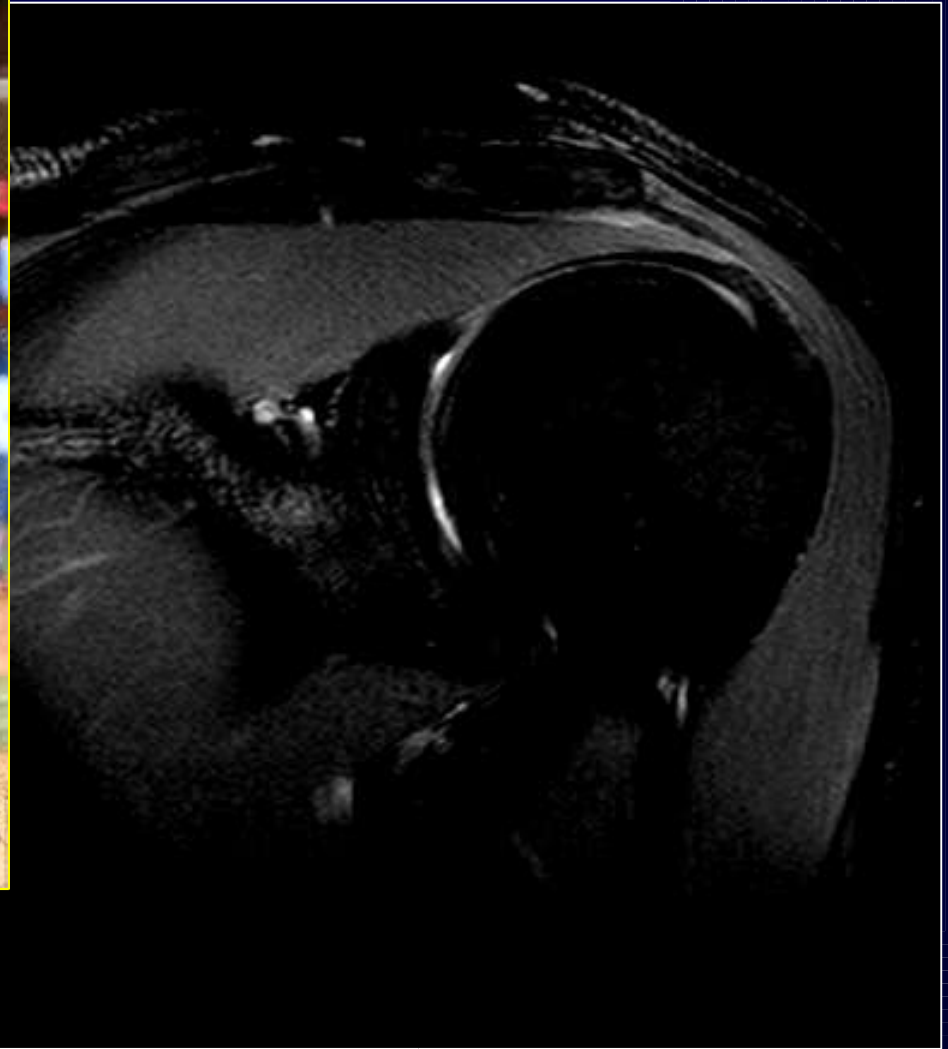


Case Study: *52 year old male with shoulder pain*



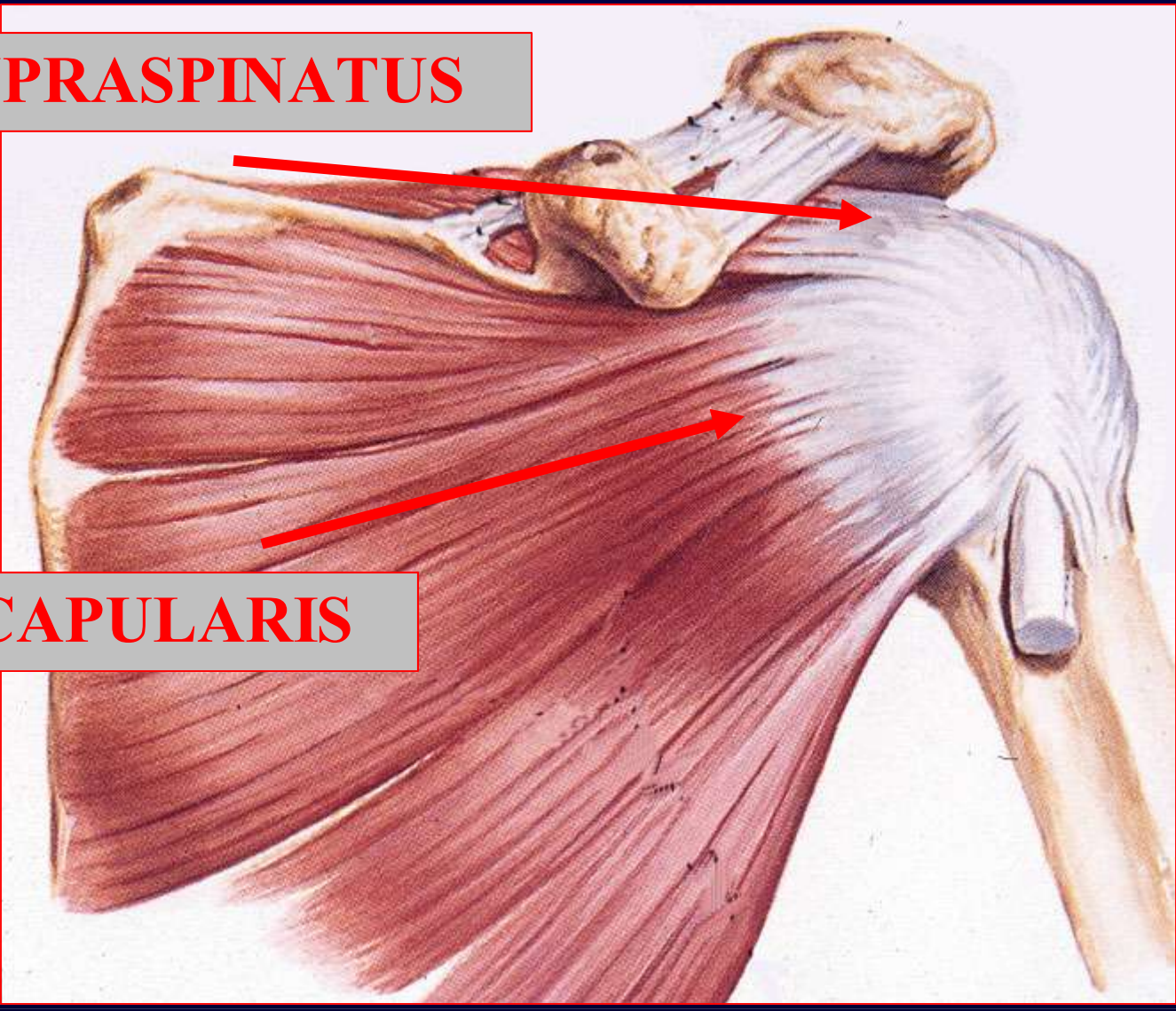
Do you identify the cause of the shoulder pain?

MRI Anatomy of the Shoulder



MUSCLES FROM THE FRONT

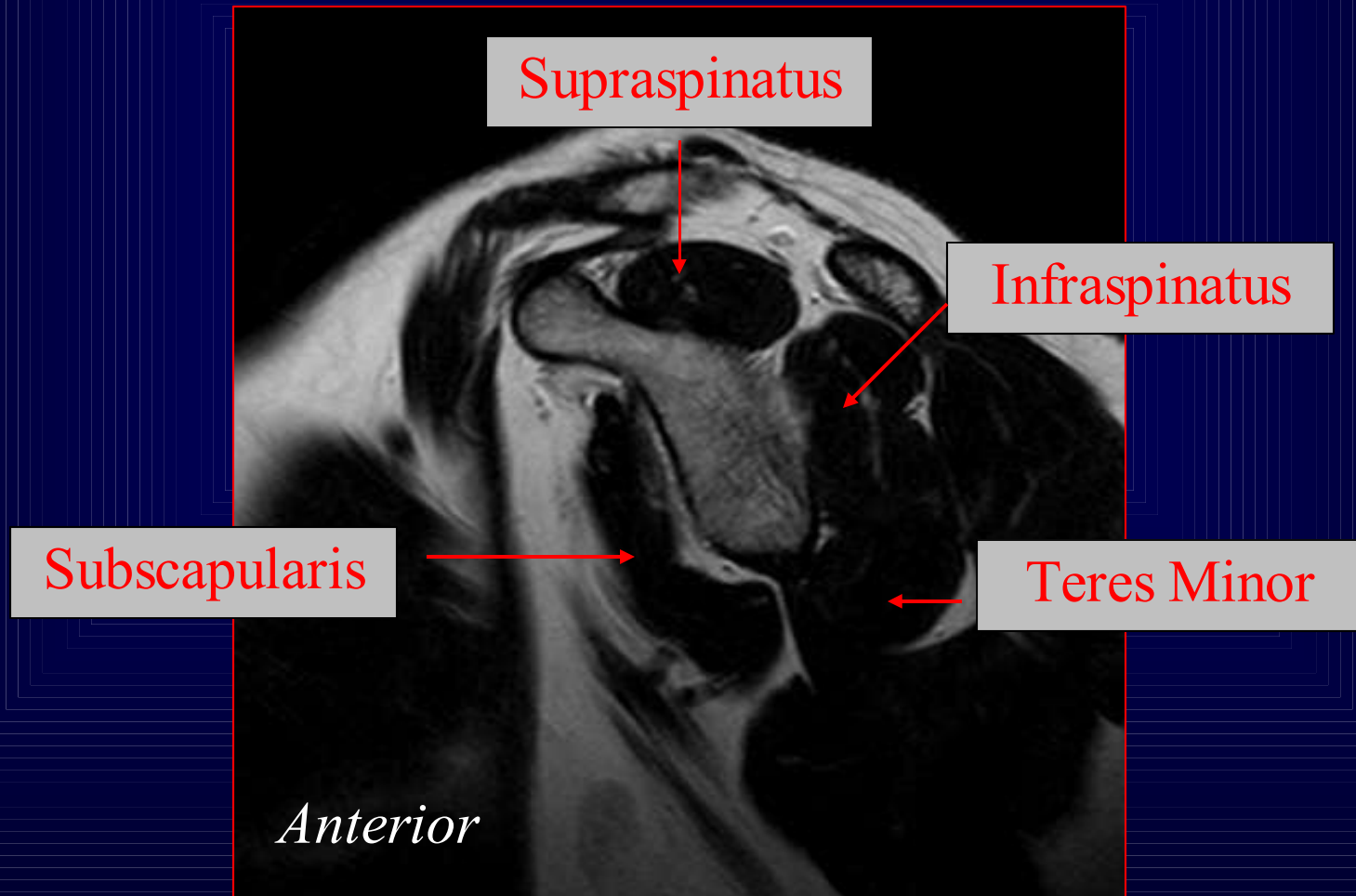
SUPRASPINATUS



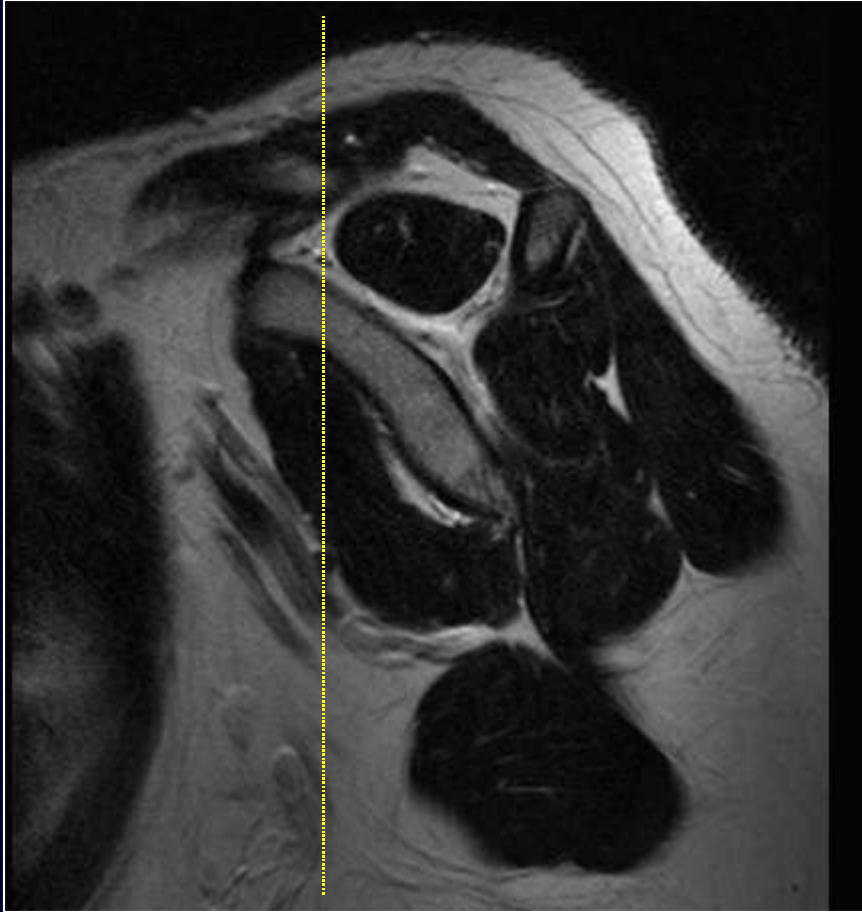
SUBSCAPULARIS

Rotator Cuff Muscles

Sagittal View



Rotator Cuff: *Subscapularis*

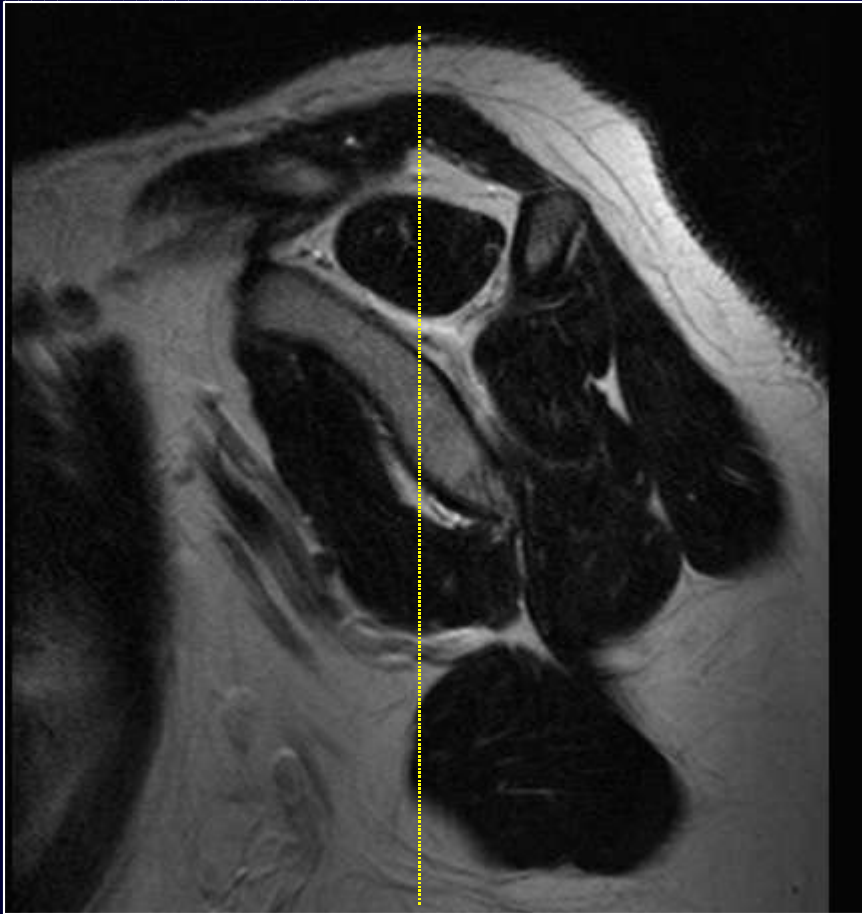


Sagittal View

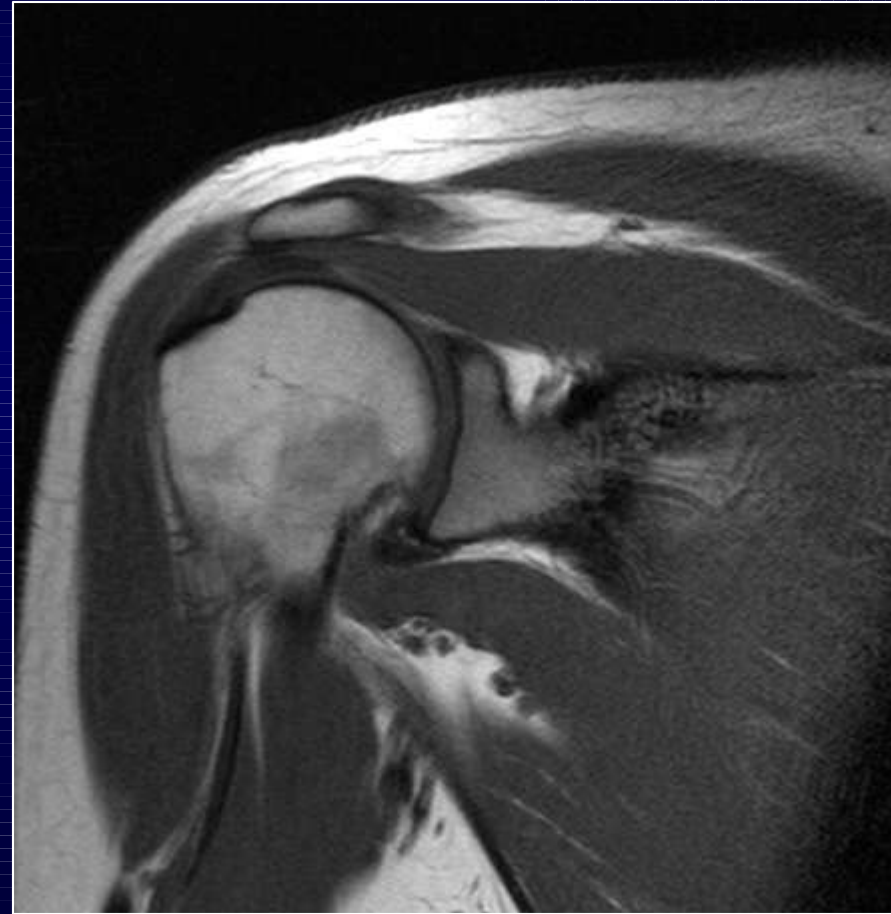


Coronal View

Rotator Cuff: *Supraspinatus*



Sagittal View



Coronal View

MUSCLES FROM THE BACK

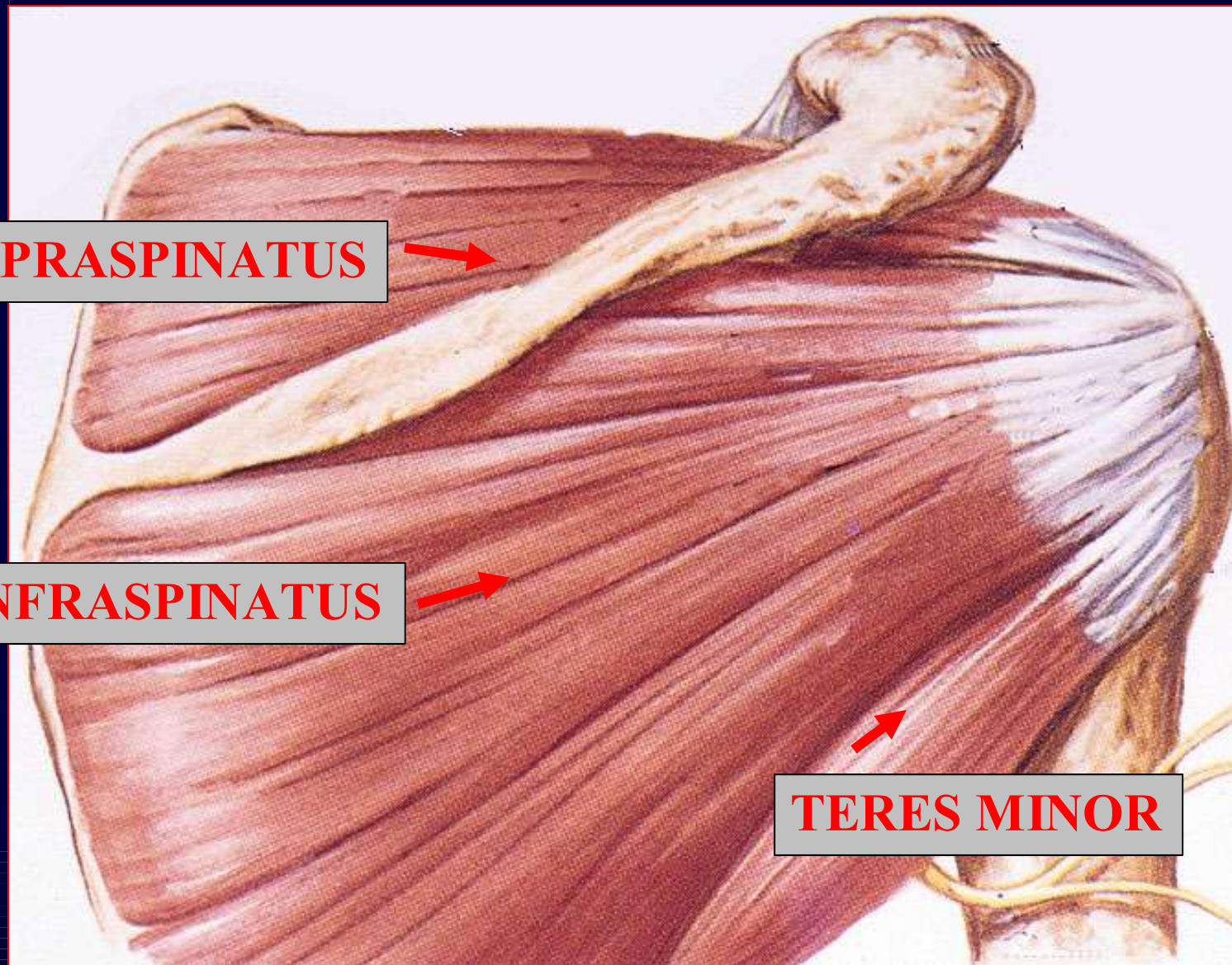
SUPRASPINATUS



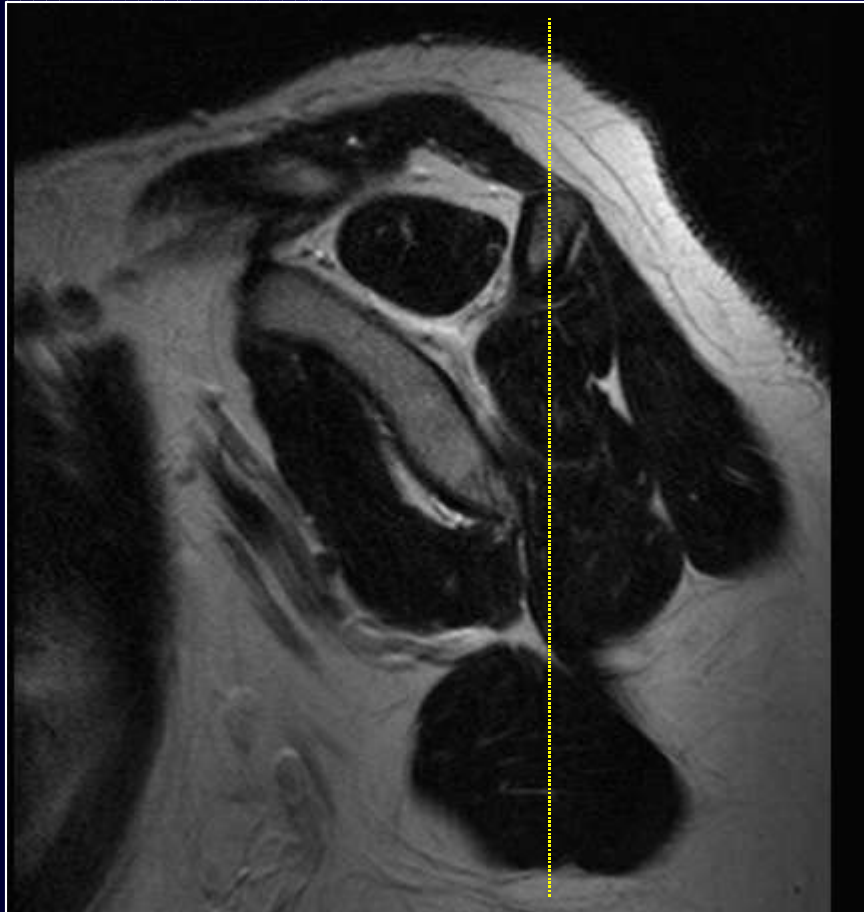
INFRASPINATUS



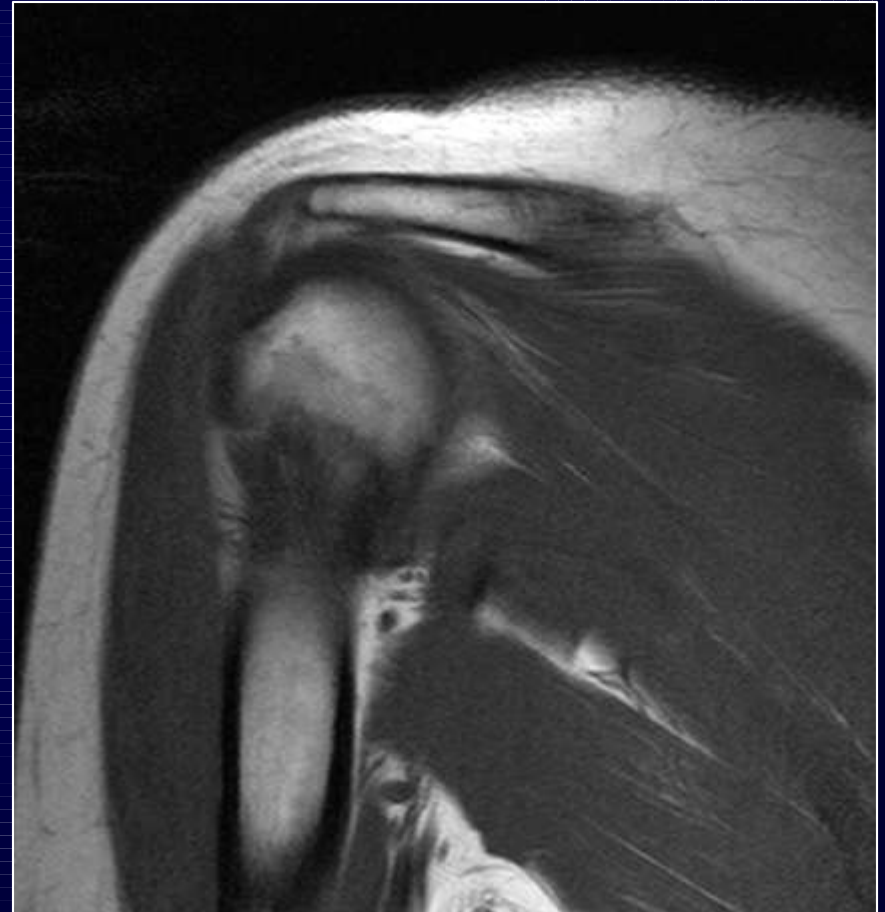
TERES MINOR



Rotator Cuff: *Infraspinatus*

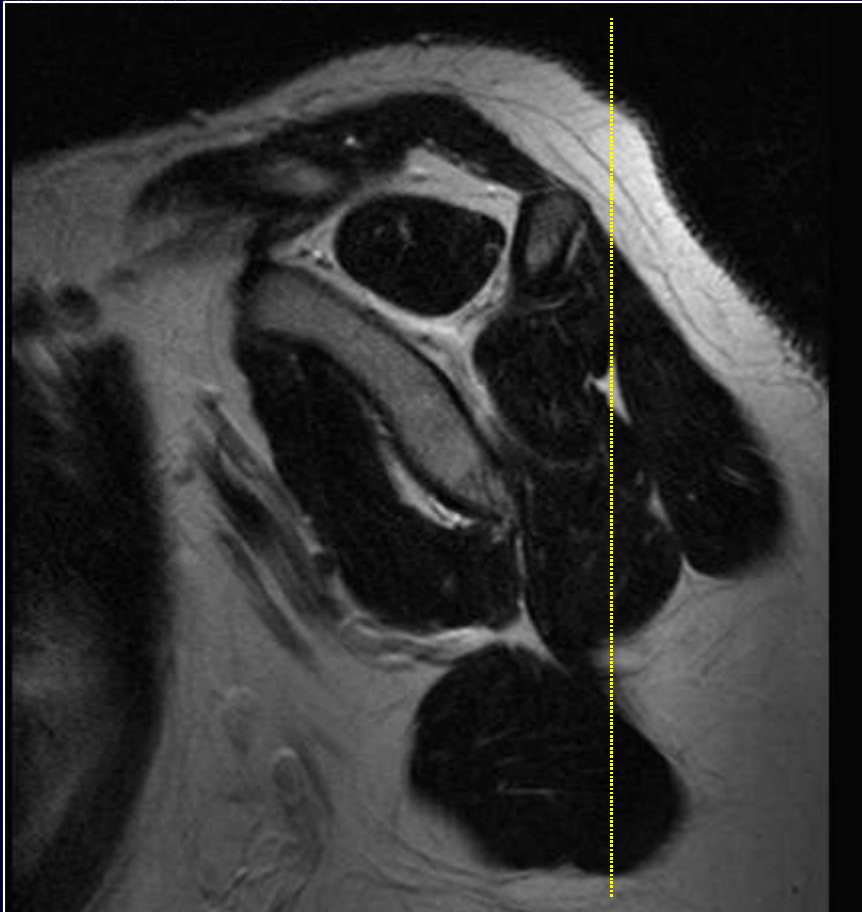


Sagittal View

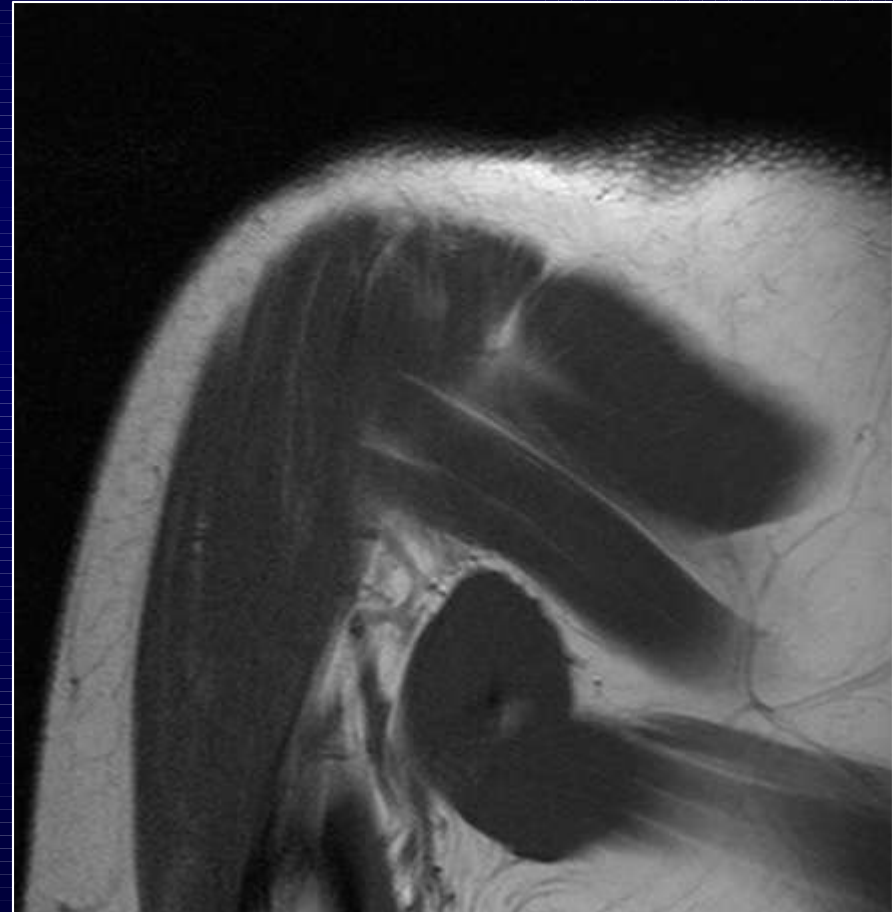


Coronal View

Rotator Cuff: *Teres Minor*



Sagittal View



Coronal View

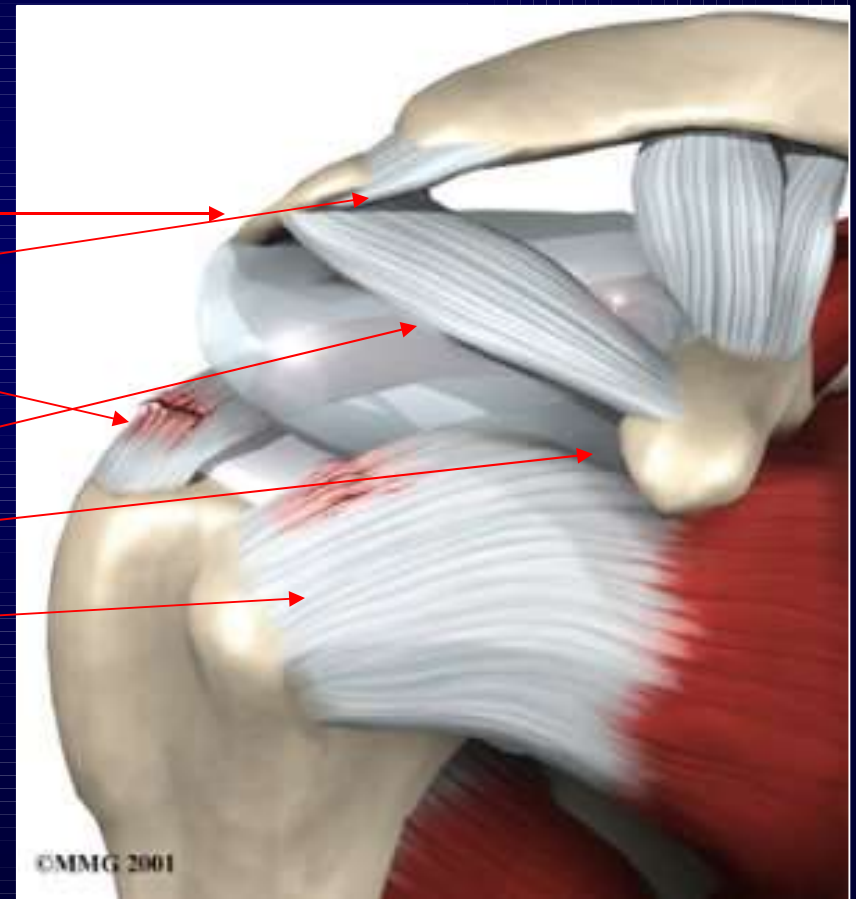
Anatomy Considerations in Rotator Cuff Tears



Impingement of the Rotator Cuff

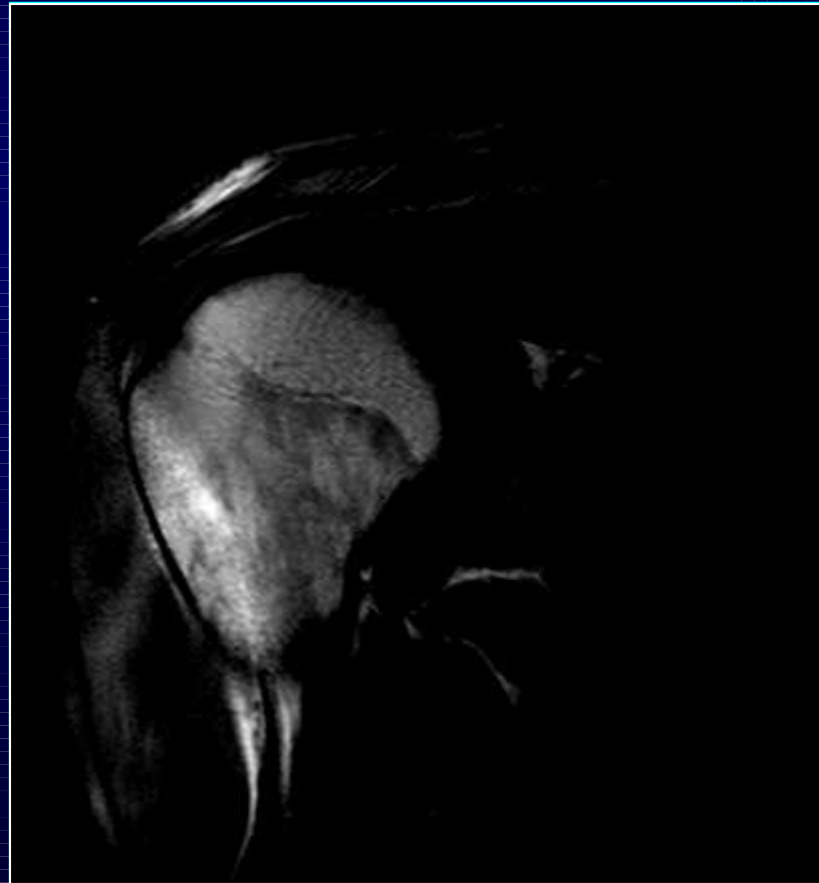
Coracoacromial Arch

- Acromion
- AC Joint
- Supraspinatus
- Coracoacromial ligament
- Coracoid Process
- Subscapularis



Anterior View

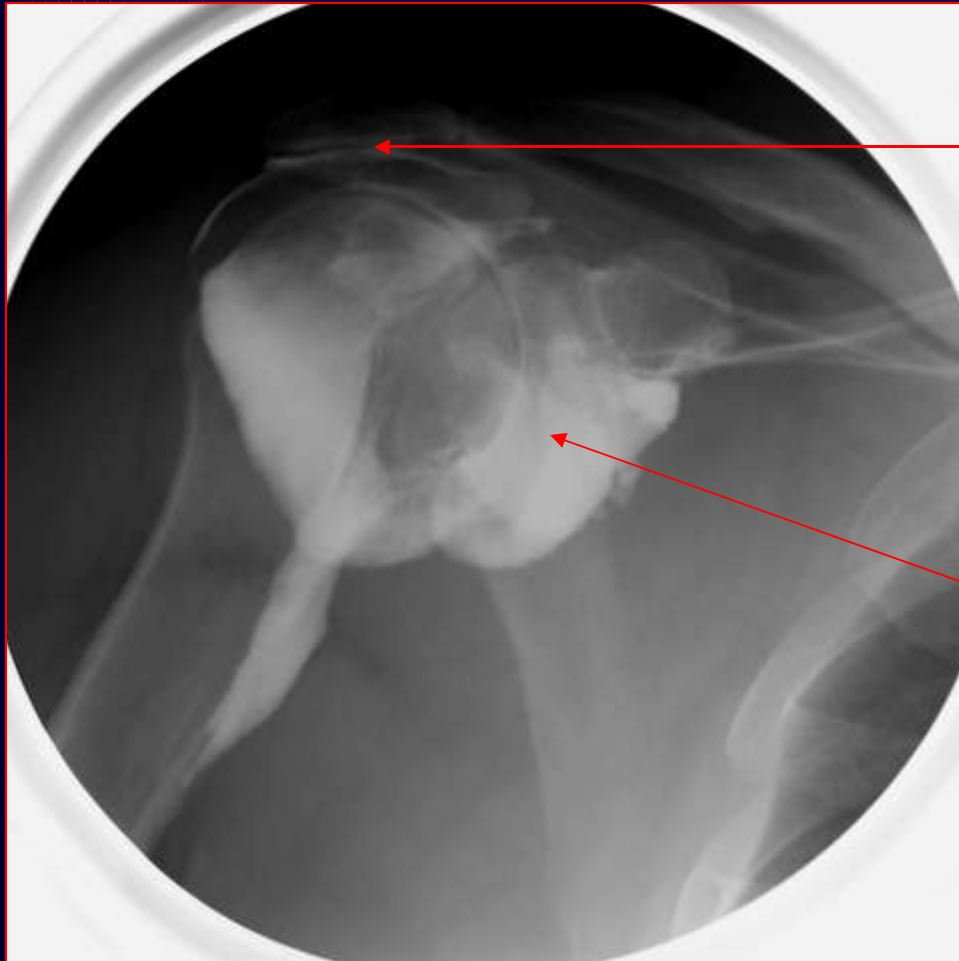
MRI Anatomy of the Rotator Cuff



MRI Anatomy of the Rotator Cuff



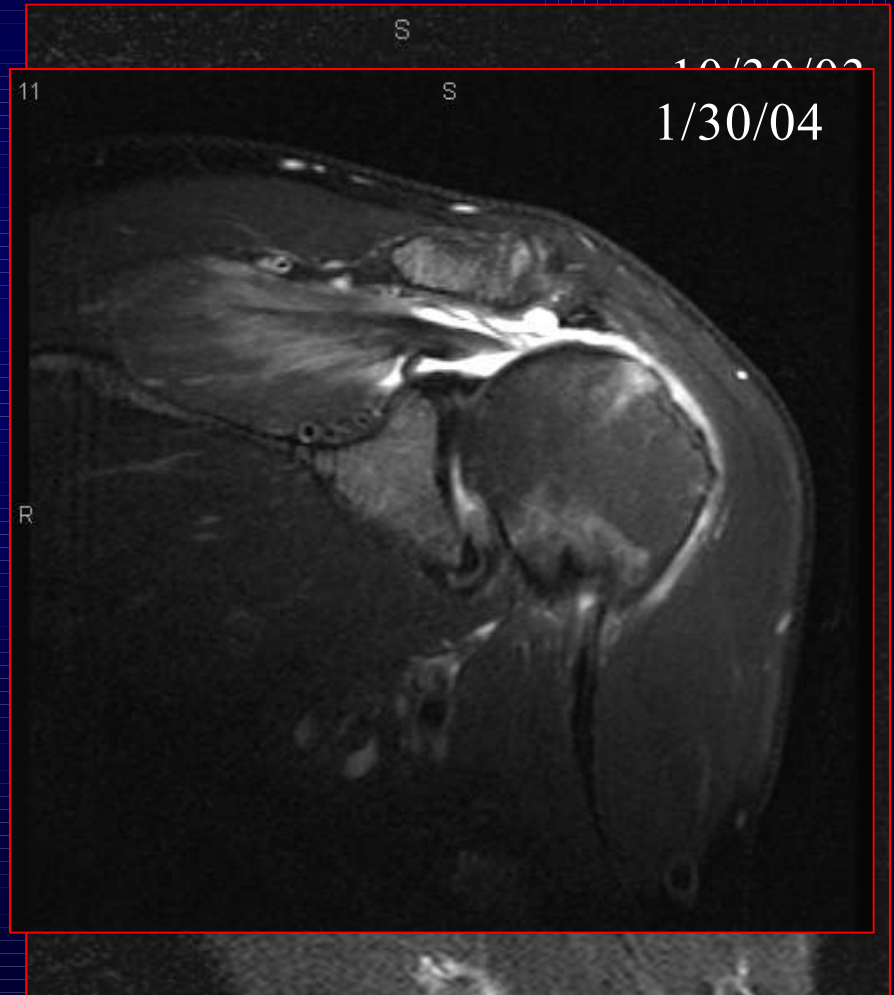
Rotator Cuff Tear



Contrast leaking into subacromial bursa through tear in supraspinatus

Contrast injected into glenohumeral joint

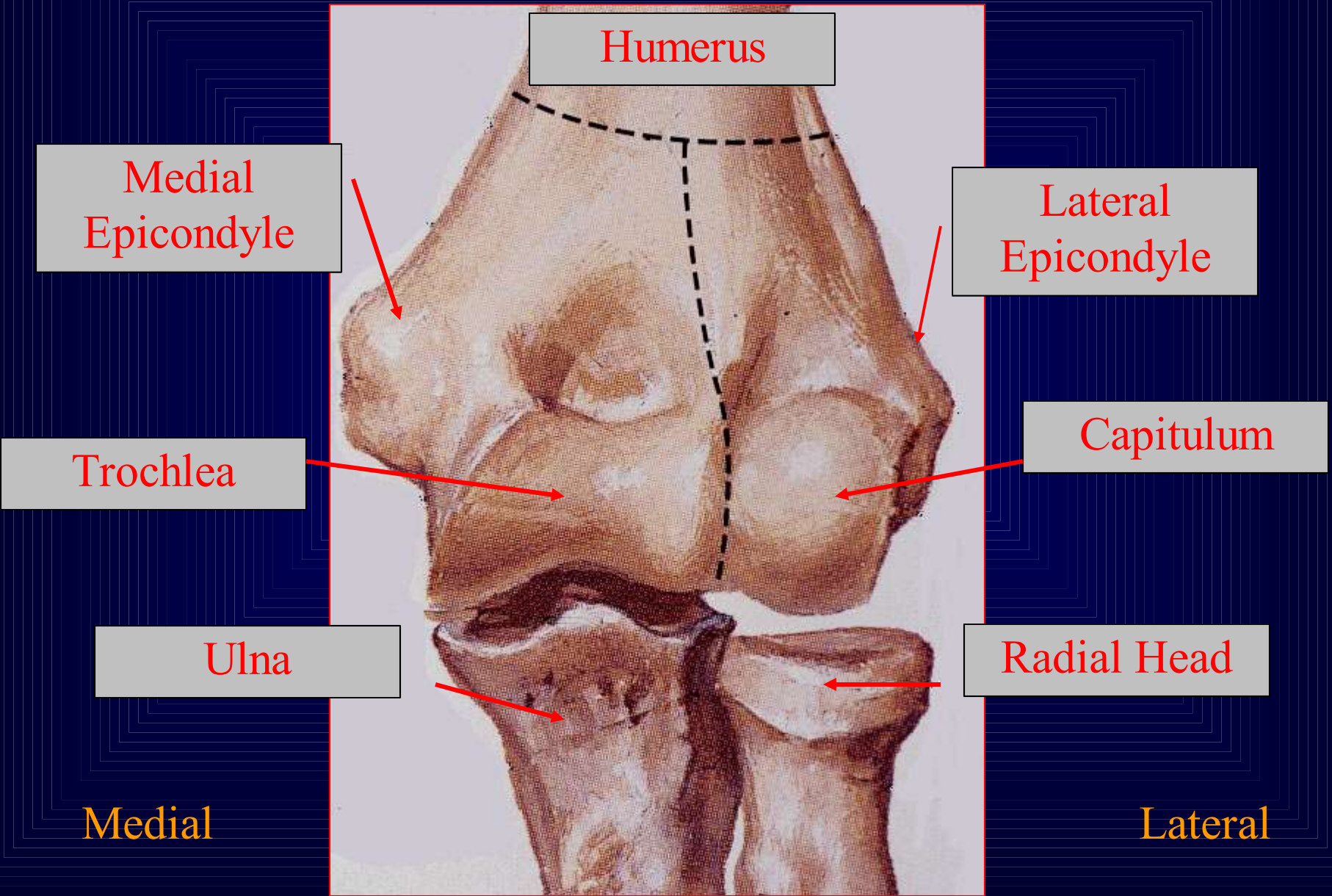
ROTATOR CUFF TEAR



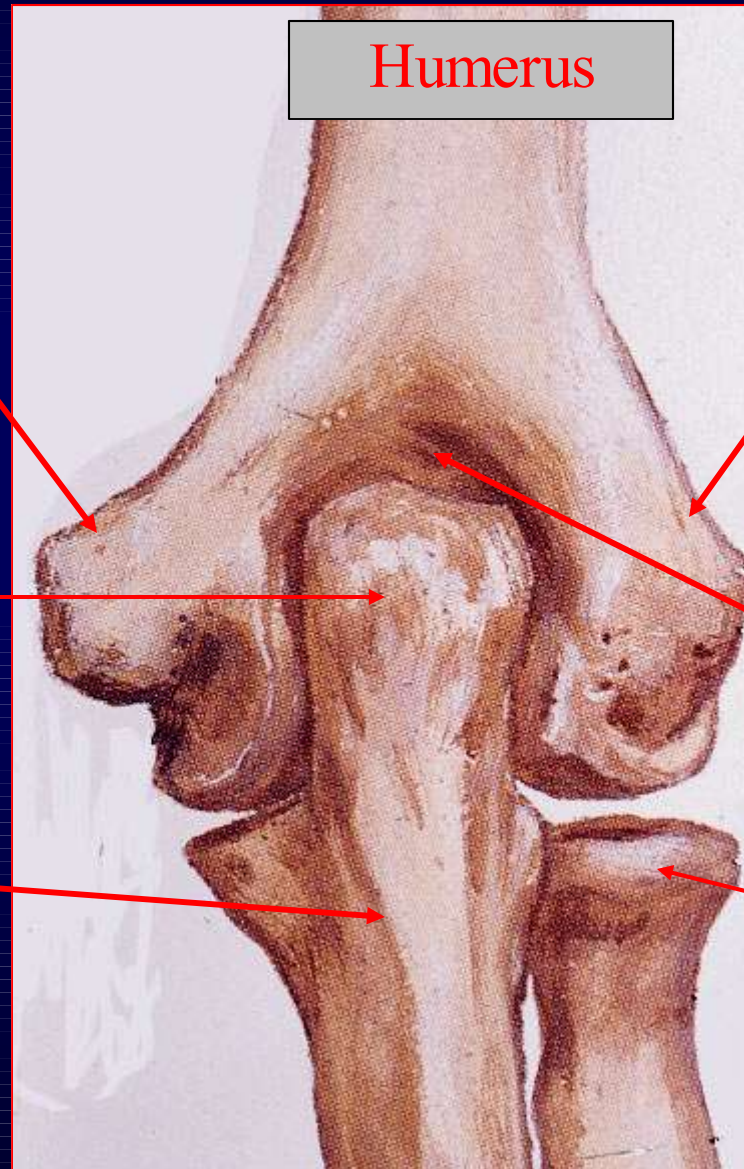
The Elbow



LEFT ELBOW FROM FRONT



Elbow from the Back



Humerus

Medial
Epicondyle

Lateral
Epicondyle

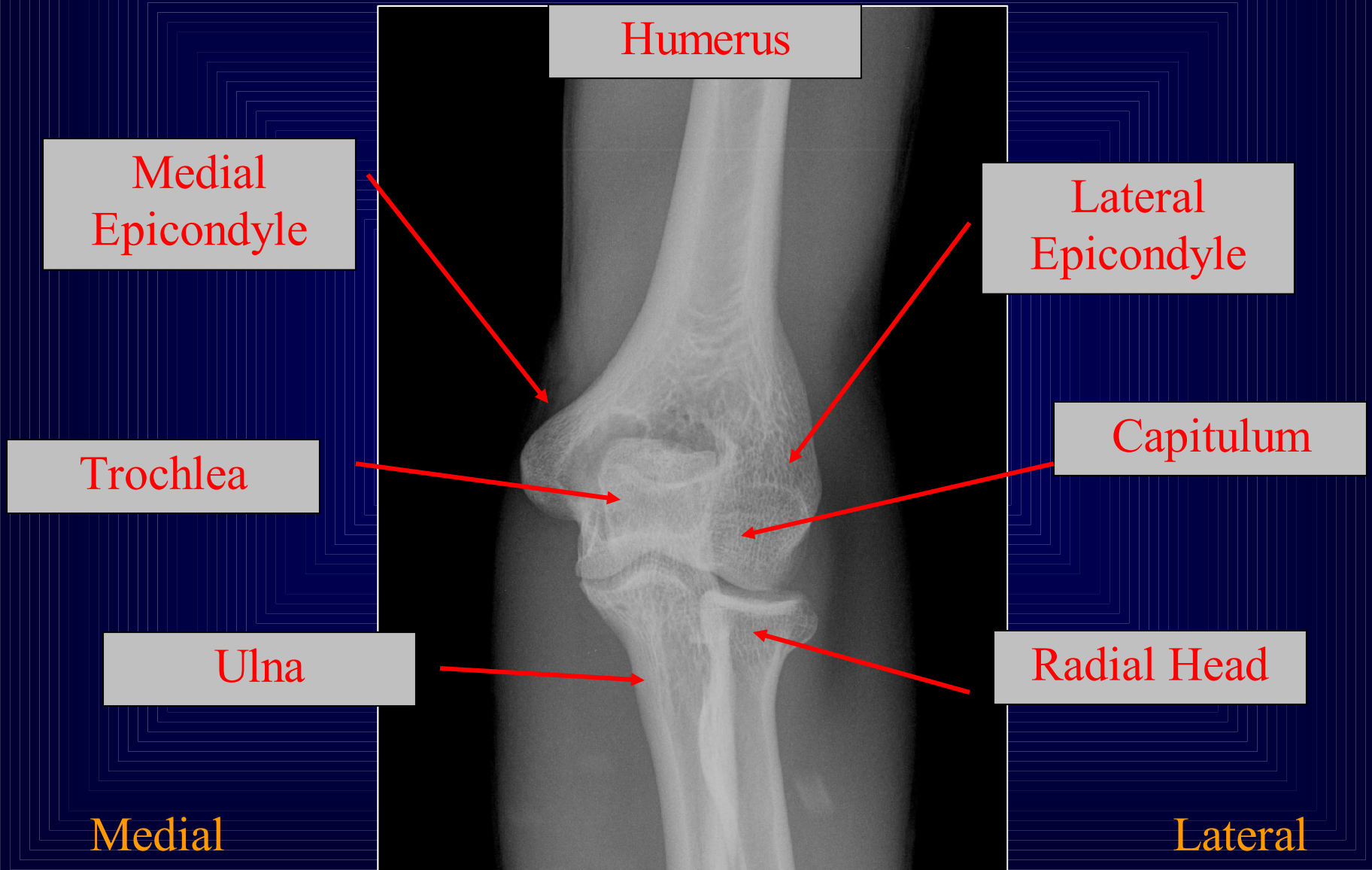
Olecranon

Olecranon
fossa

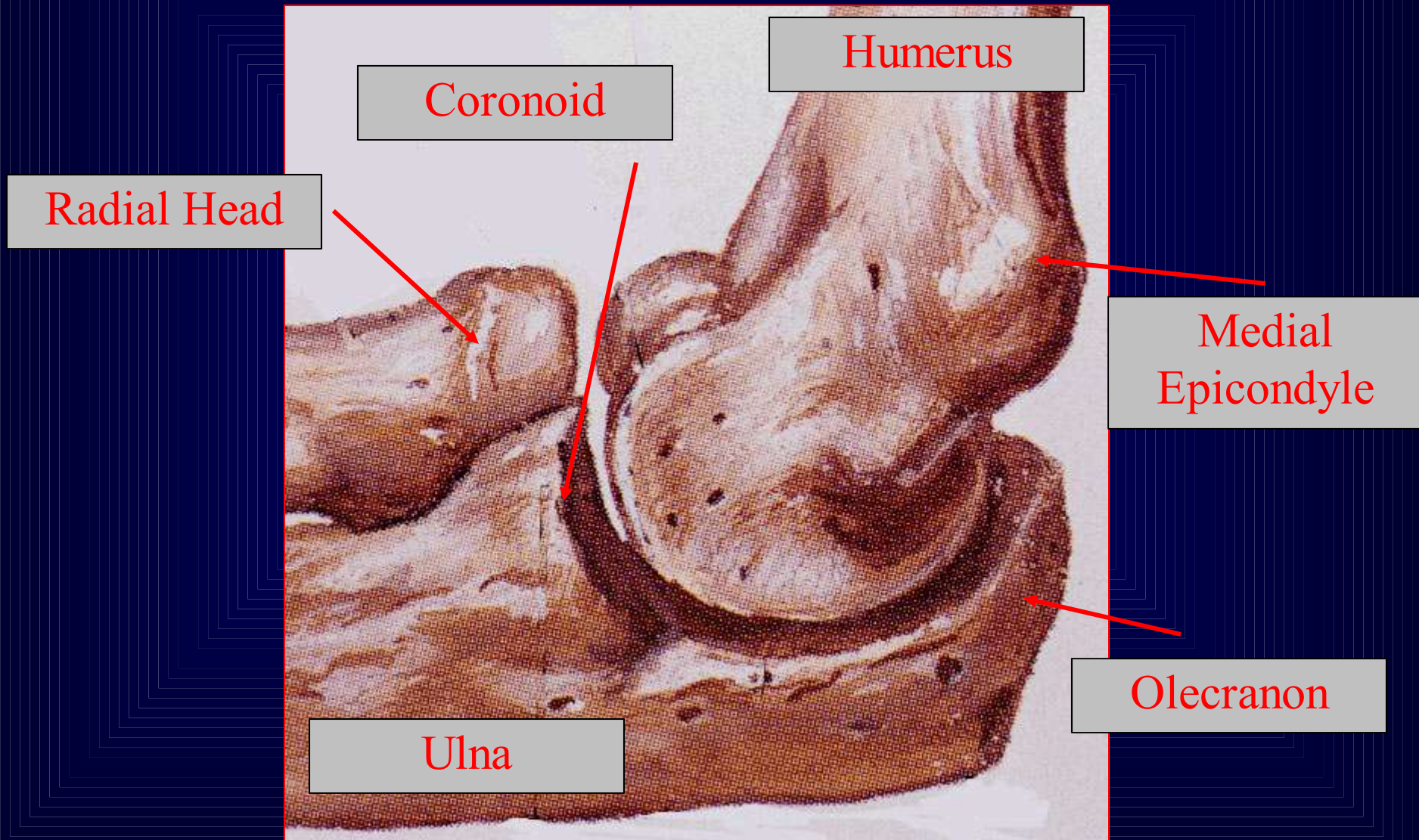
Ulna

Radial Head

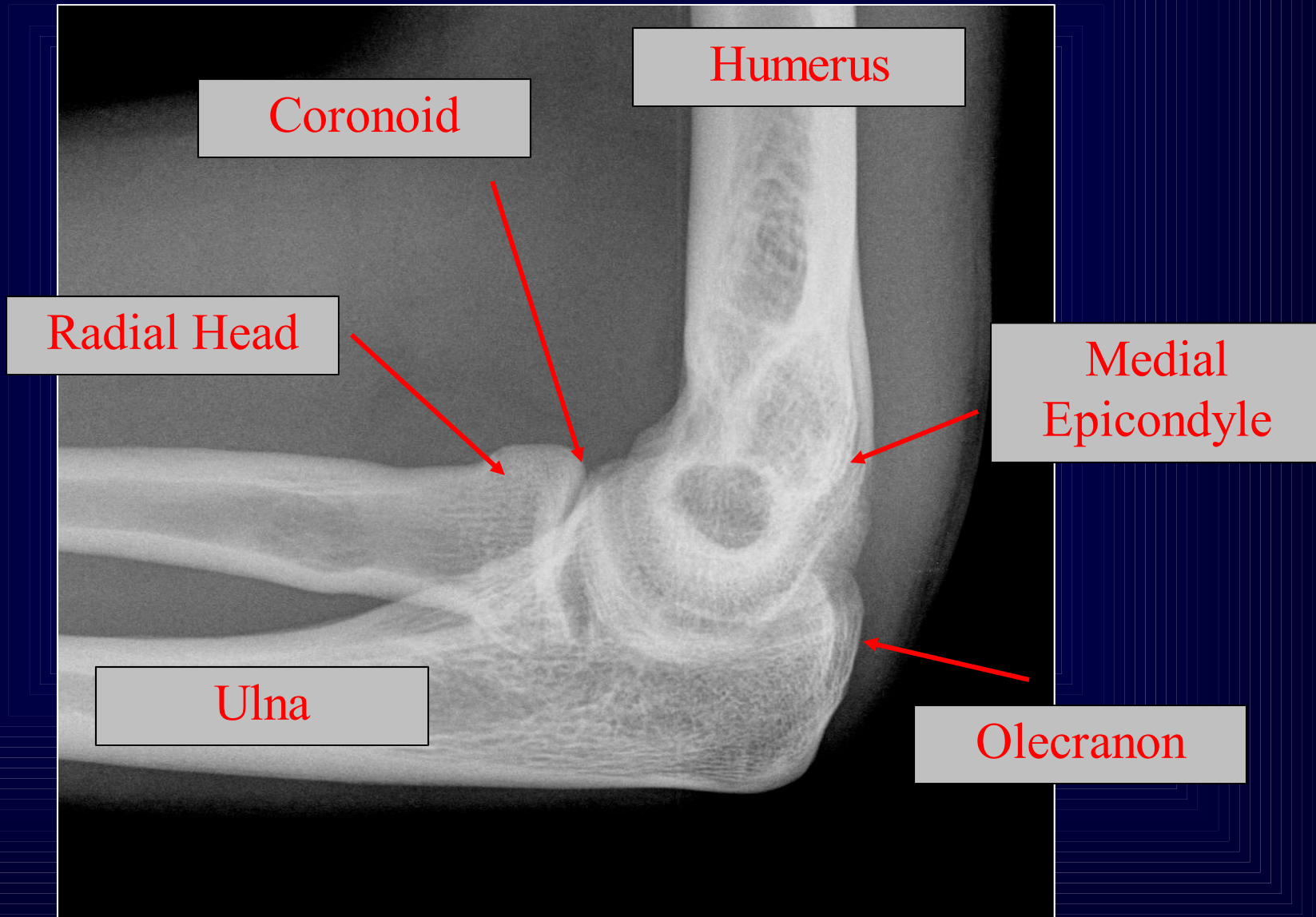
AP ELBOW



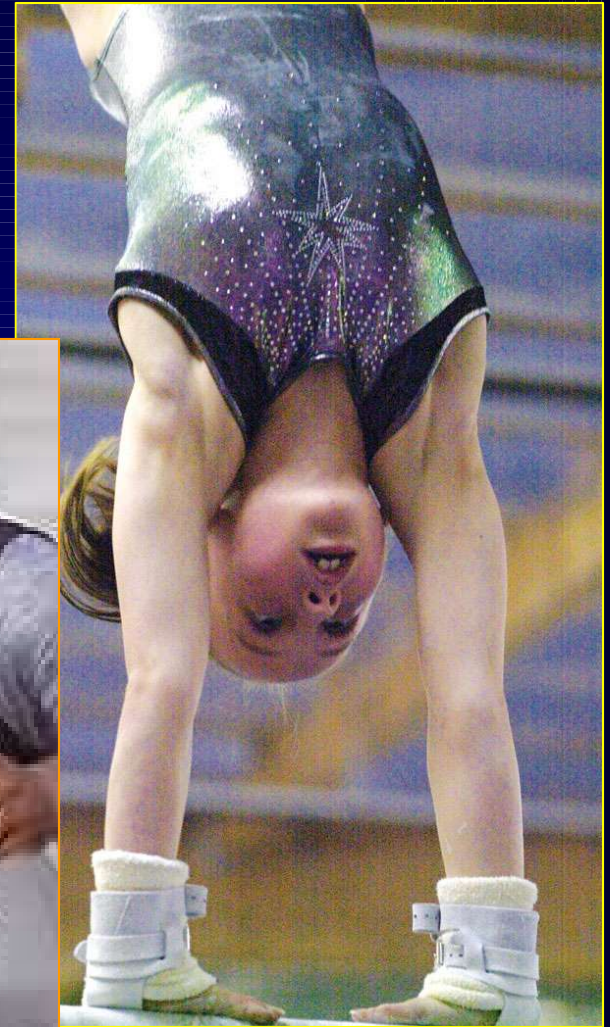
Medial View of Elbow



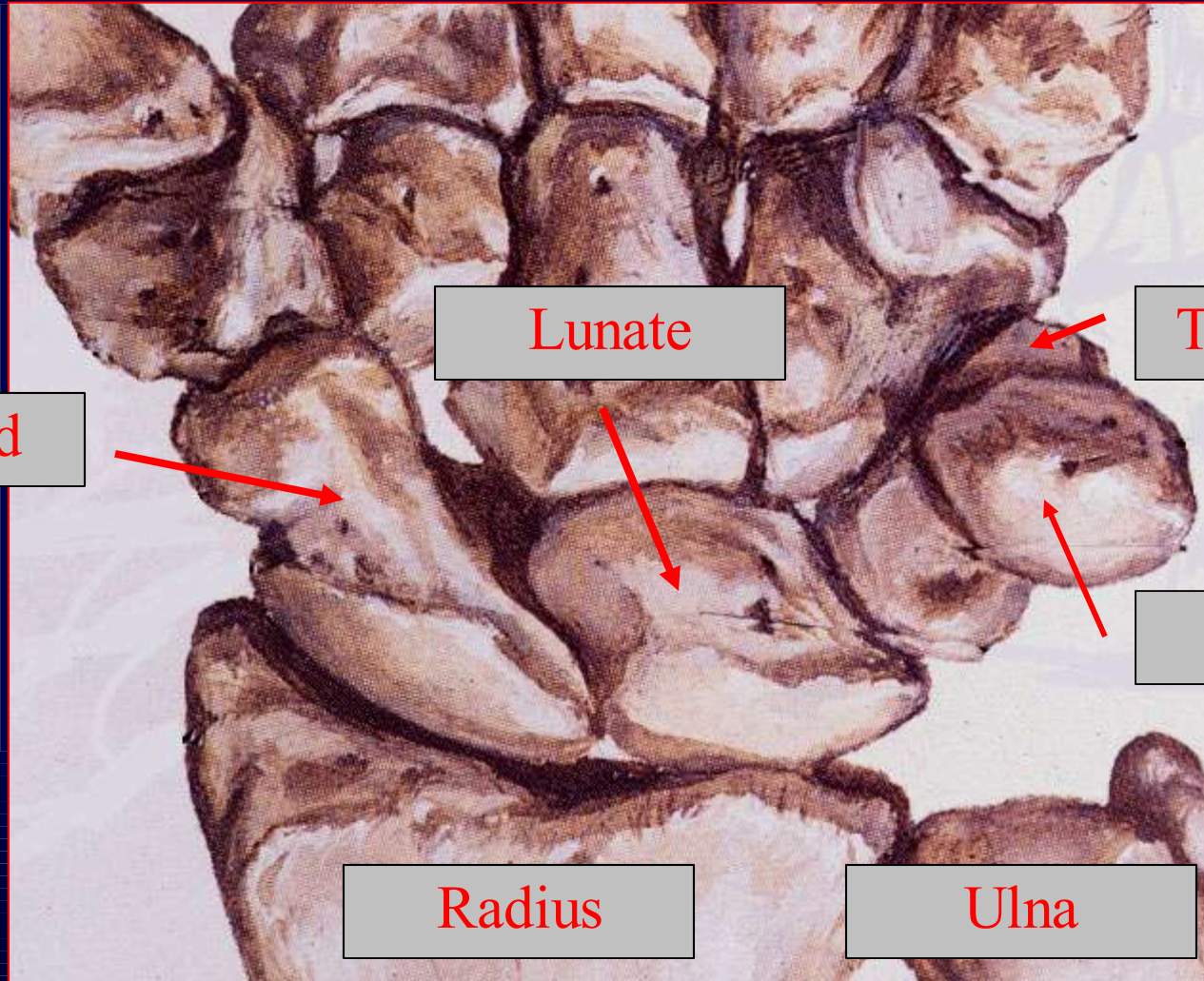
Medial View of Elbow



The Wrist



The Wrist Palmar View Carpal Bones (*Proximal Row*)



Scaphoid

Lunate

Triquetrum

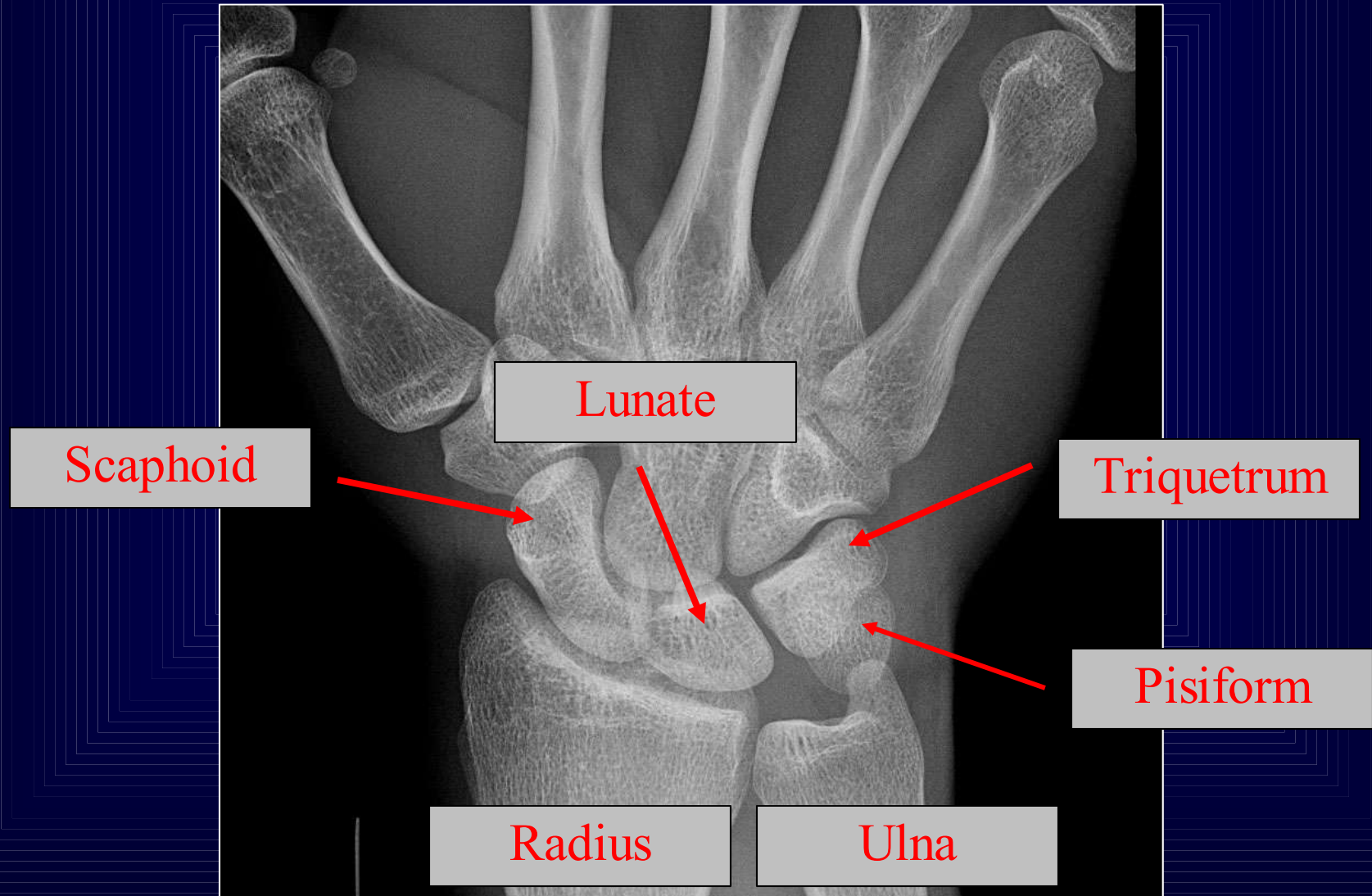
Pisiform

Radius

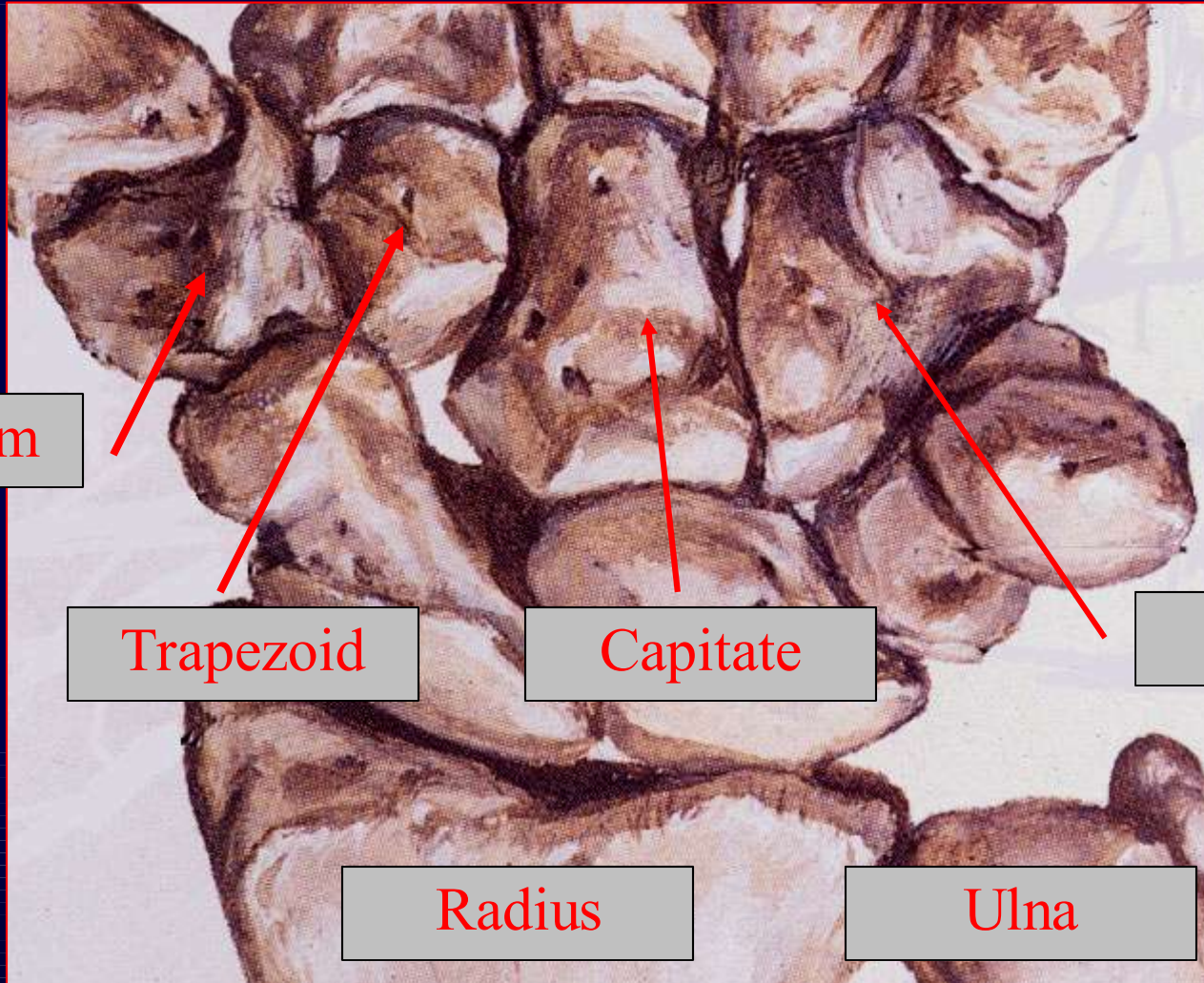
Ulna

The Wrist Palmar View

Carpal Bones (*Proximal Row*)



The Wrist Palmar View Carpal Bones (*Distal Row*)



Trapezium

Trapezoid

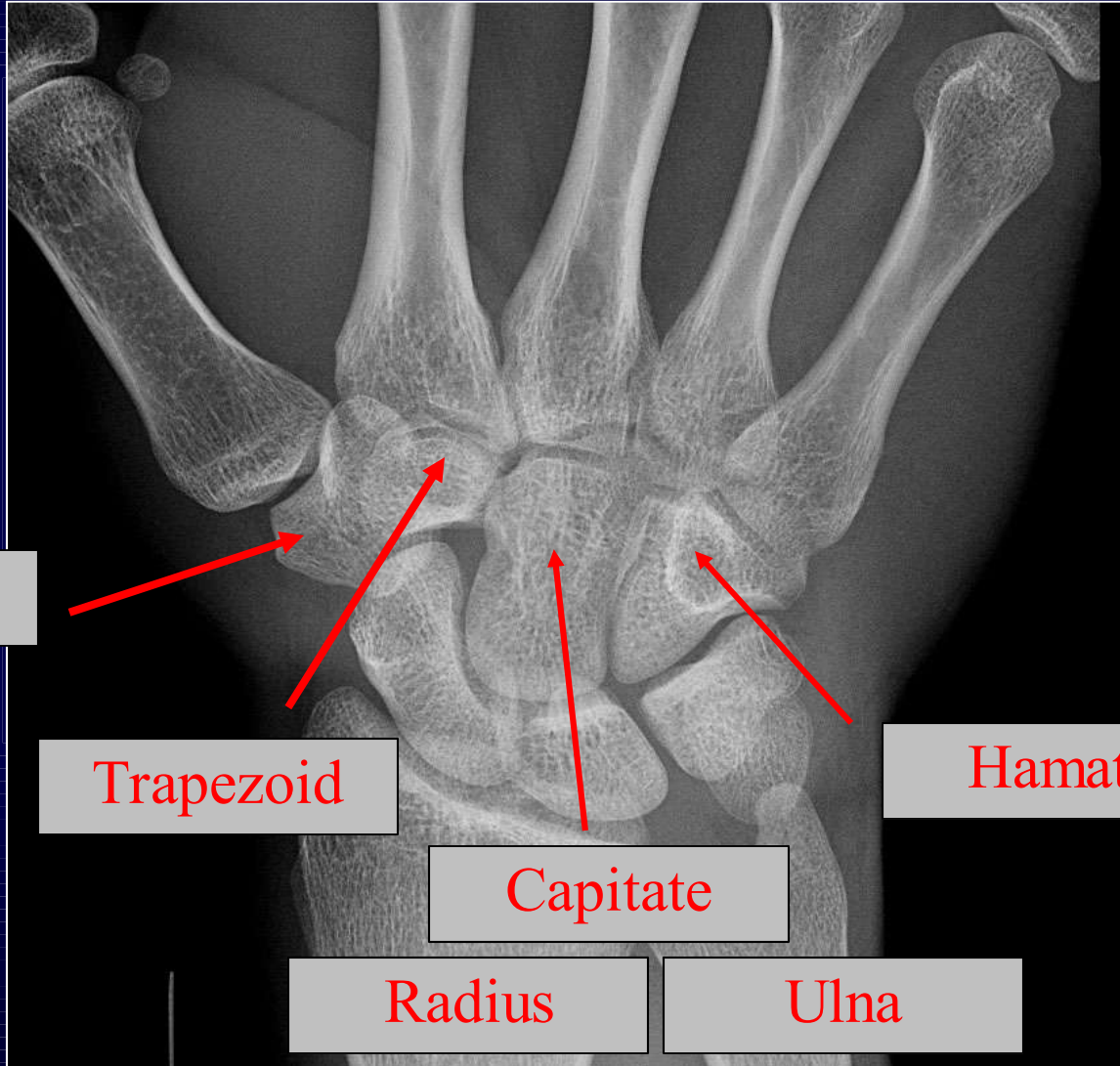
Capitate

Hamate

Radius

Ulna

The Wrist Palmar View Carpal Bones (*Distal Row*)



Trapezium

Trapezoid

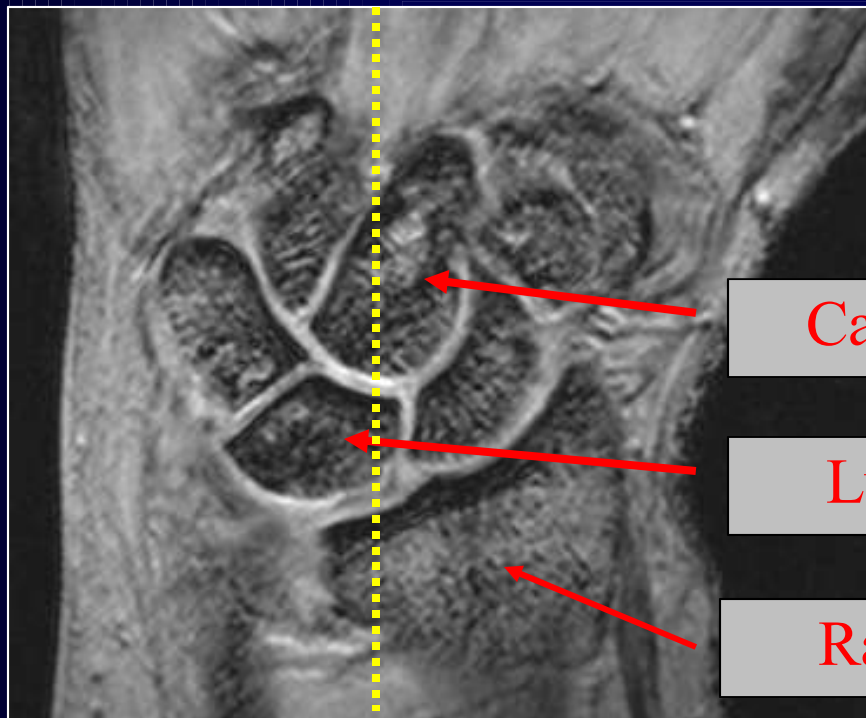
Capitate

Hamate

Radius

Ulna

MR Anatomy of the Wrist



Capitate

Lunate

Radius

Coronal Wrist

