A large, stylized version of the OMS XR Review Course logo. The 'Y' shape is white and surrounded by a dotted circle. The letters 'OMS' are in a large, bold, white font. Below 'OMS' are the words 'XR REVIEW COURSE' in a smaller, bold, white font.

Mok Ying Ren

*Updated September 2024*

These slides accompany the **OMS XR Review Course** video here:



For the complete course, including quizzes and flashcards, visit [mokingren.sg](https://mokingren.sg). Please fill up the guestbook and provide your feedback too! 😊

# Goals

1. Understand the key **principles** in ordering XRs
2. Review of XRs you can order and some abnormal findings



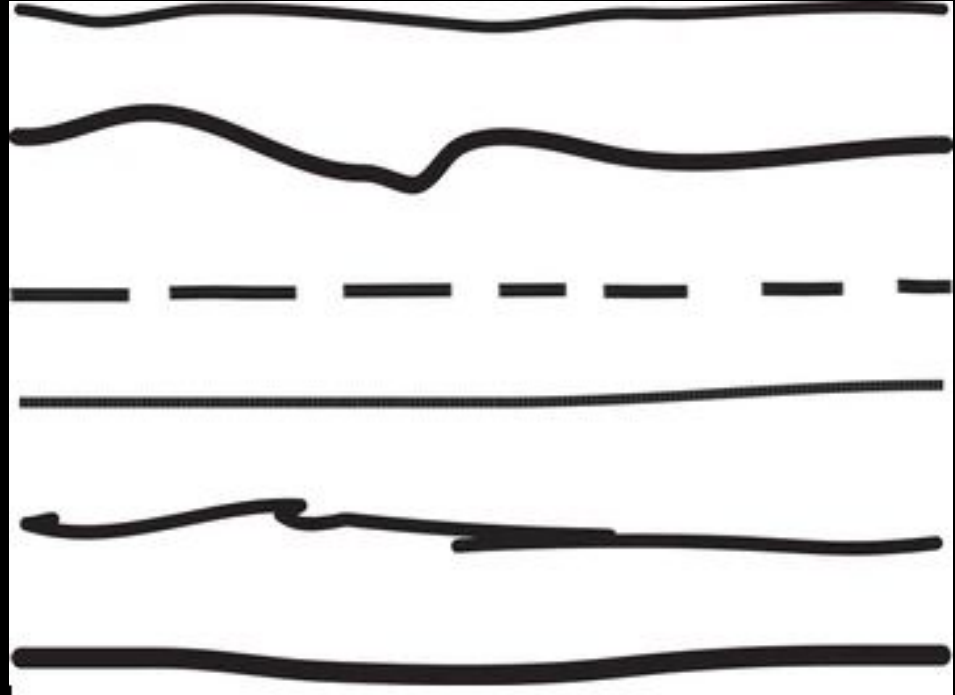
# Key Principles

1. Two **views**—AP and Lateral except in the hand and feet (oblique)
2. Two **joints**—image the joint above and the joint below
3. Two **occasions**—always compare with old films if available
4. Identify skeletal **maturity** - immature vs mature



# Reading XR

- Reading XRs is like how you tell a curved line from a straight line
  - You either compare with a physical ruler
  - Or you compare with an imaginary ruler etched in your mind
- Pattern recognition



# Two Views

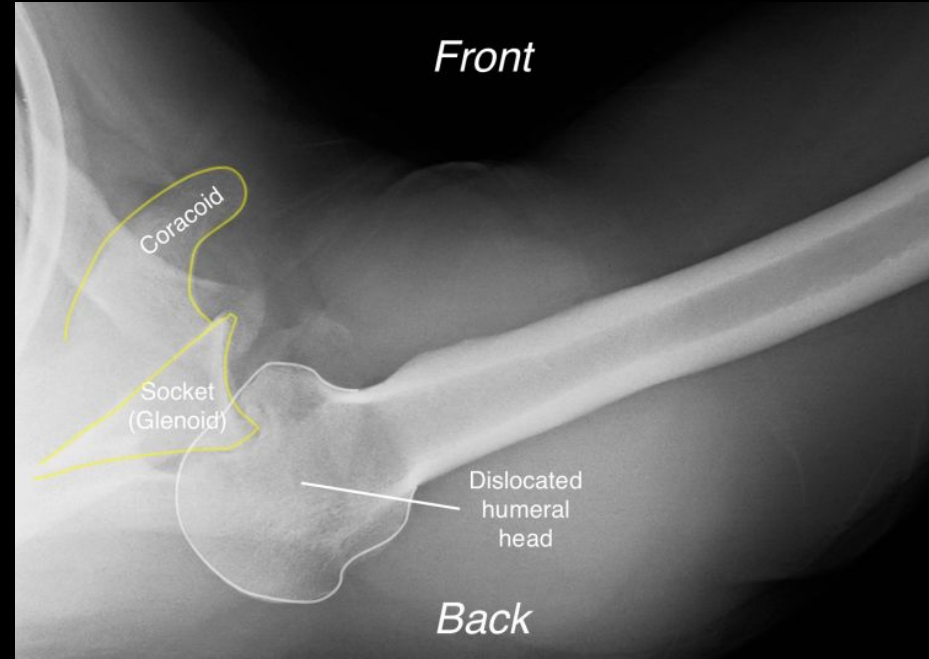
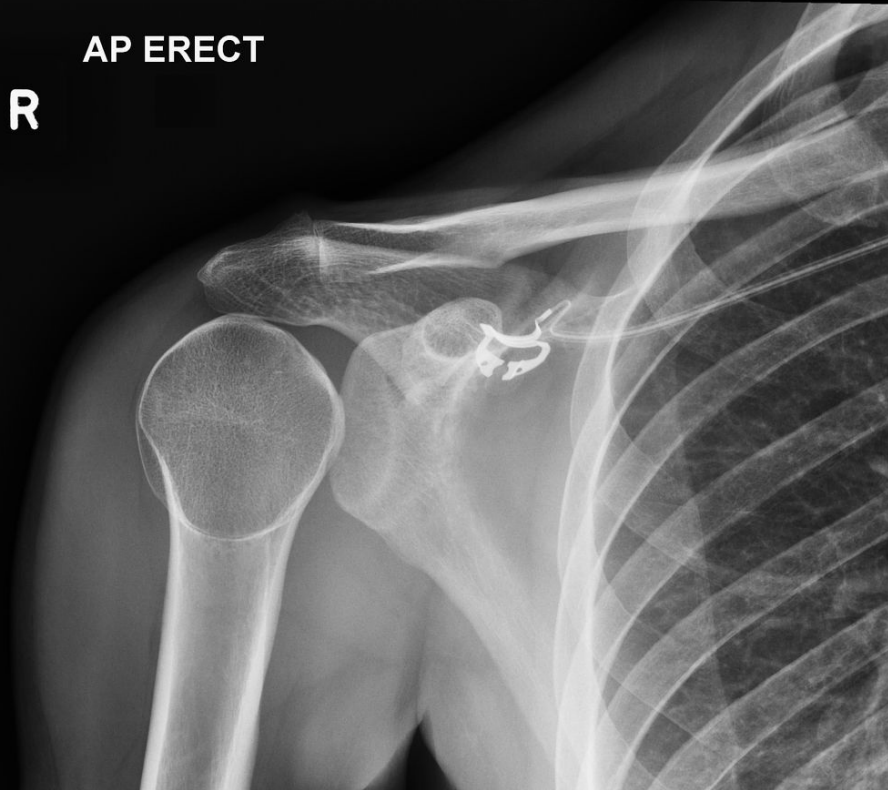


(a)



(b)

# Two Views



# Two Joints



# Two Joints



**Comminuted  
displaced  
fracture of the  
radial head**



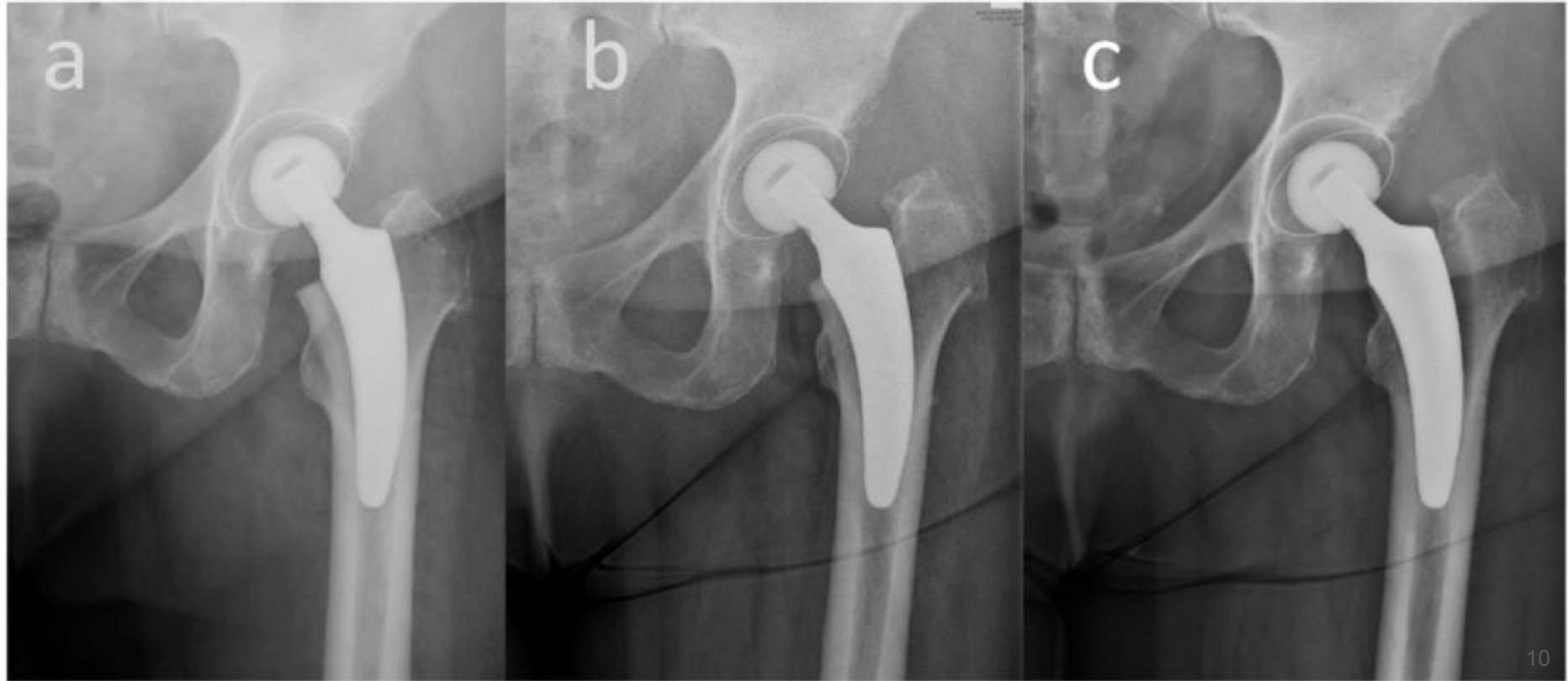
**Disruption of the  
interosseous  
membrane.**



**Subluxation or  
dislocation of  
the distal  
radioulnar joint.**

**AcrossPG**

# Two Occasions

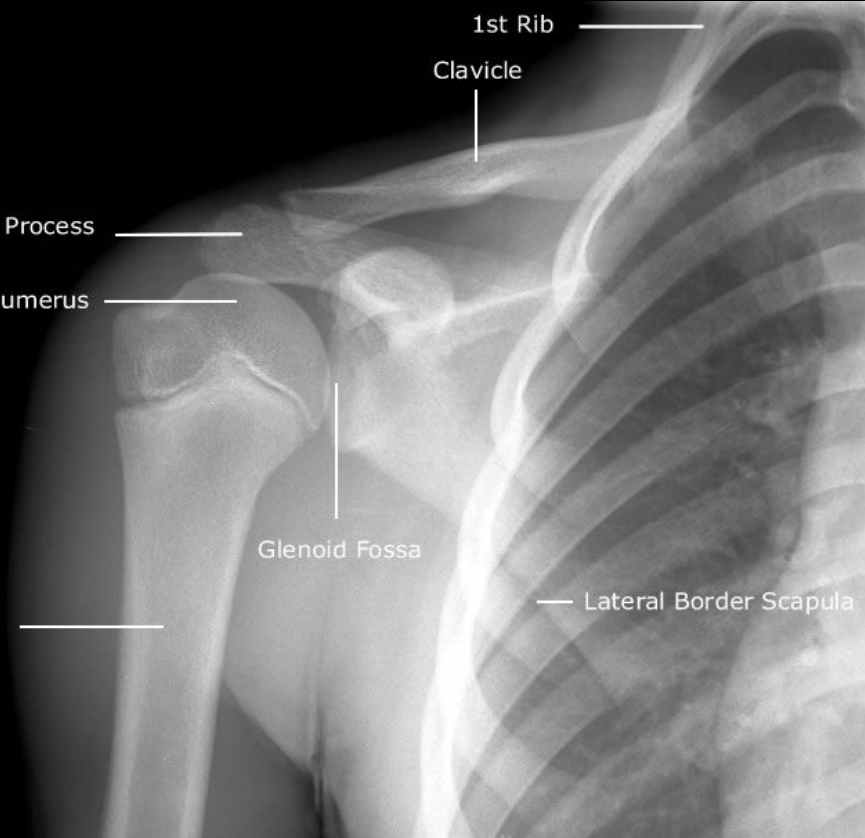


# Two Occasions

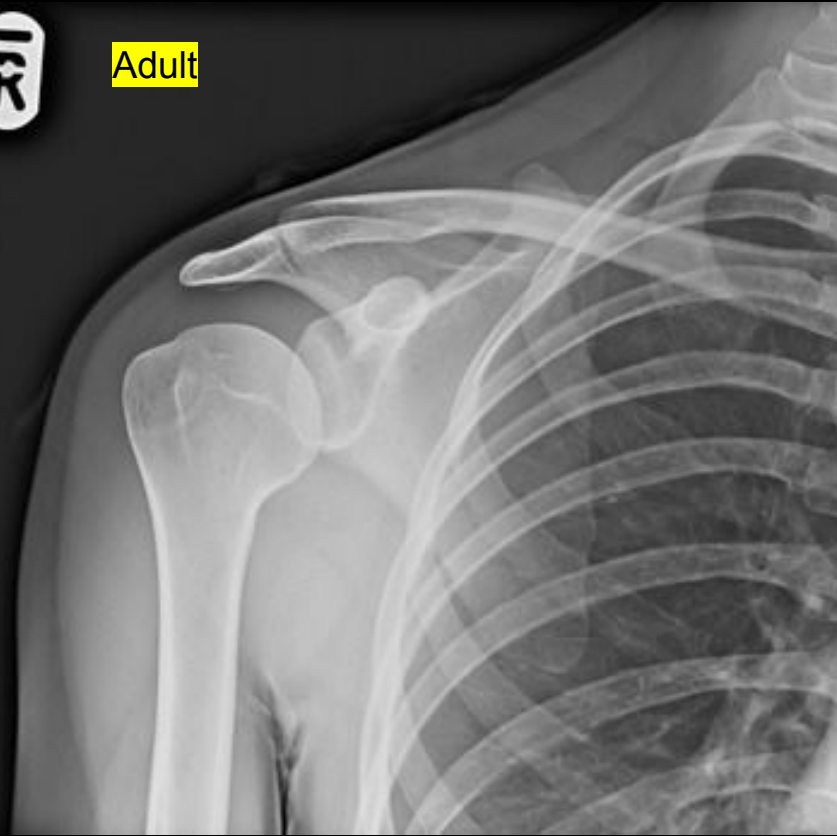


# Skeletally Immature XR

# Skeletally Immature Upper Limb XR



Adult



# Skeletally Immature Upper Limb XR

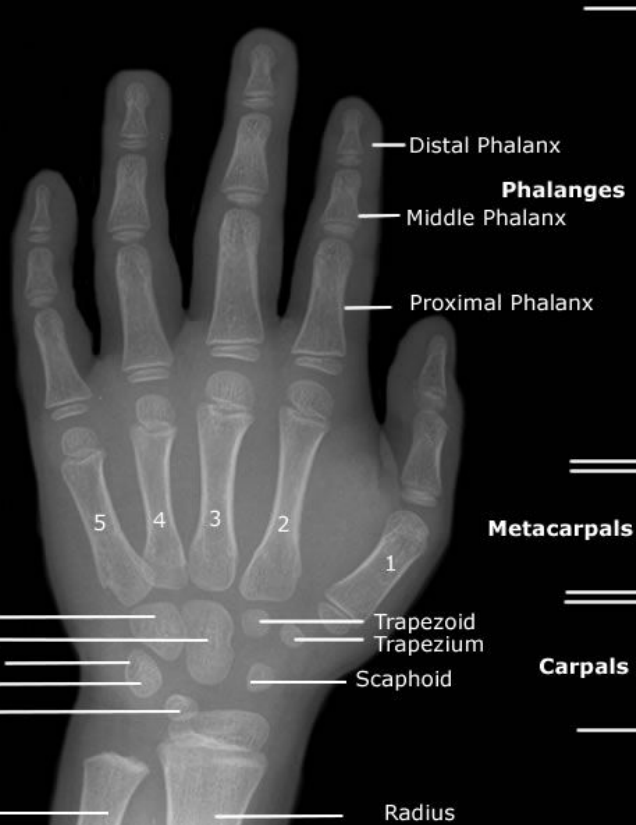


# Skeletally Immature Upper Limb XR

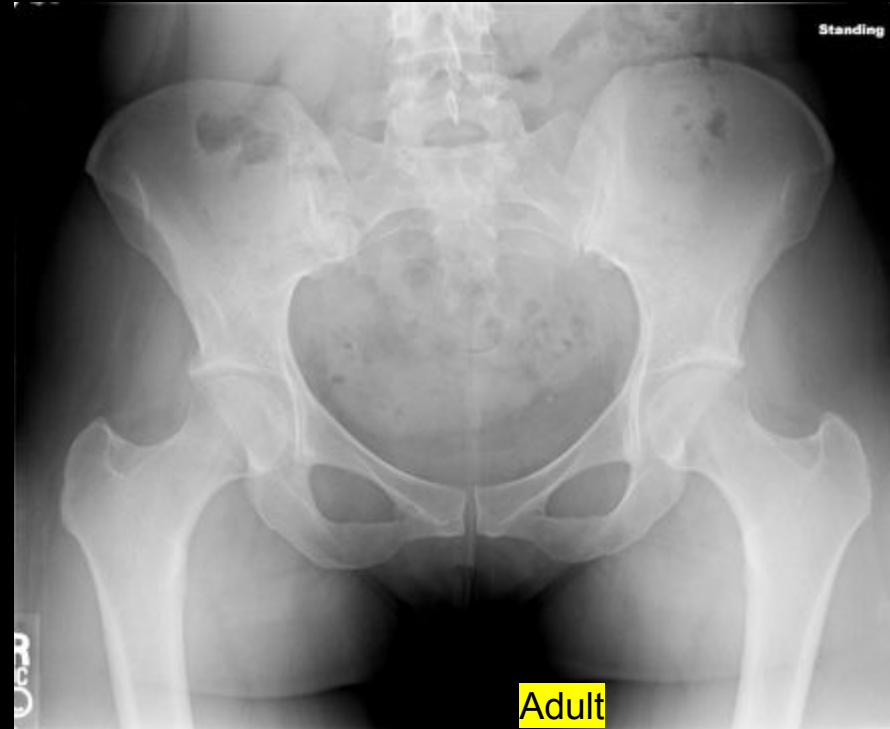
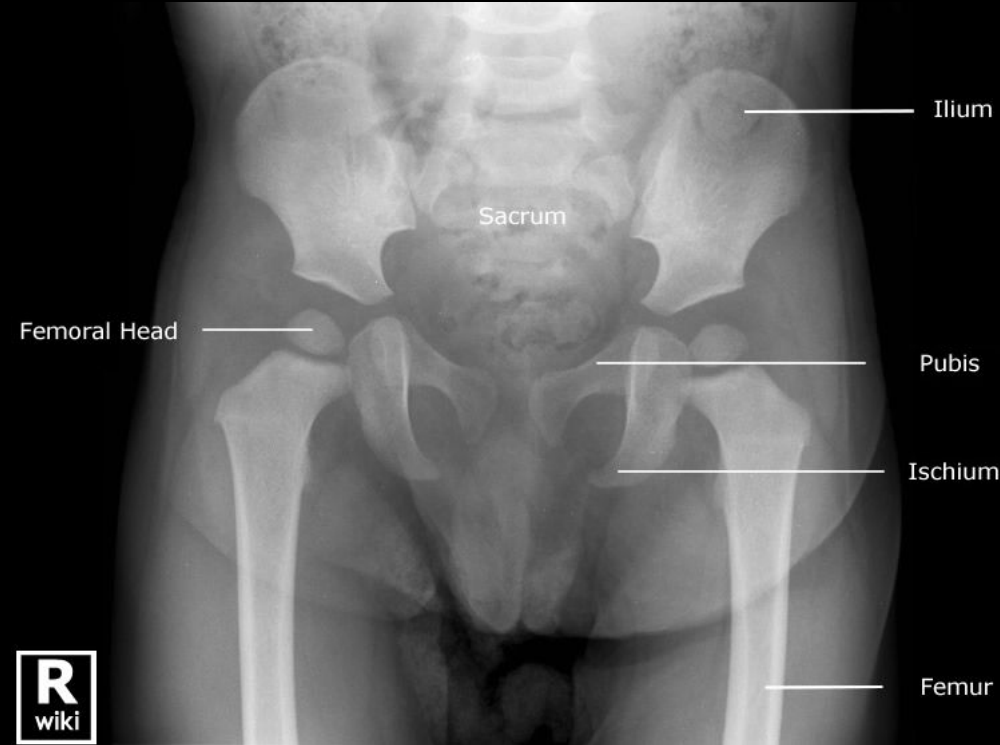


# Skeletally Immature Upper Limb XR

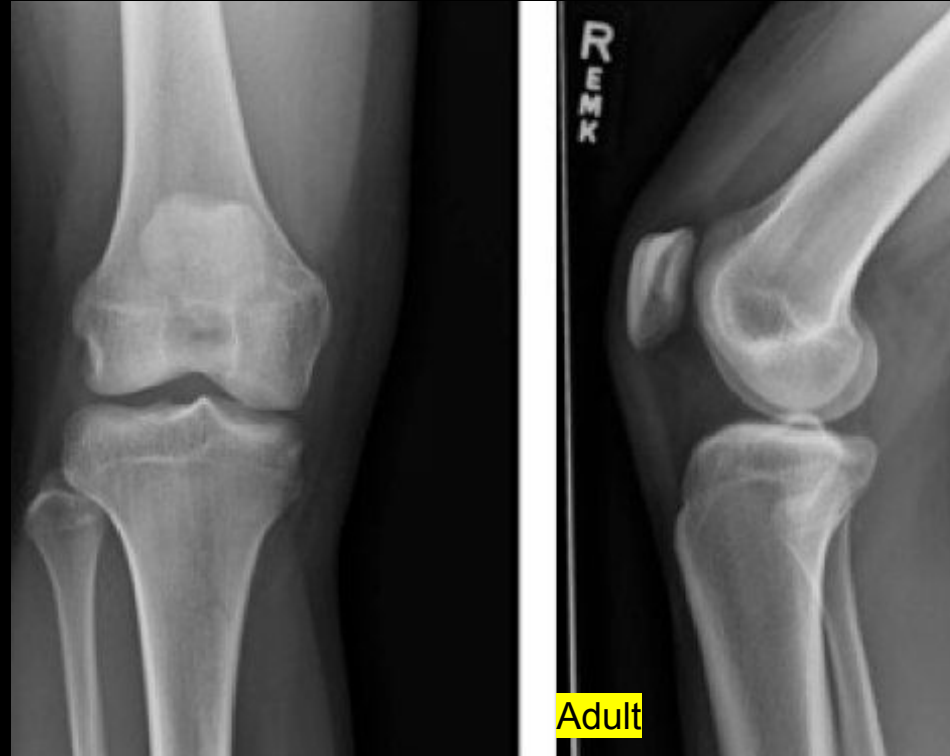
L  
wiki



# Skeletally Immature Lower Limb XR



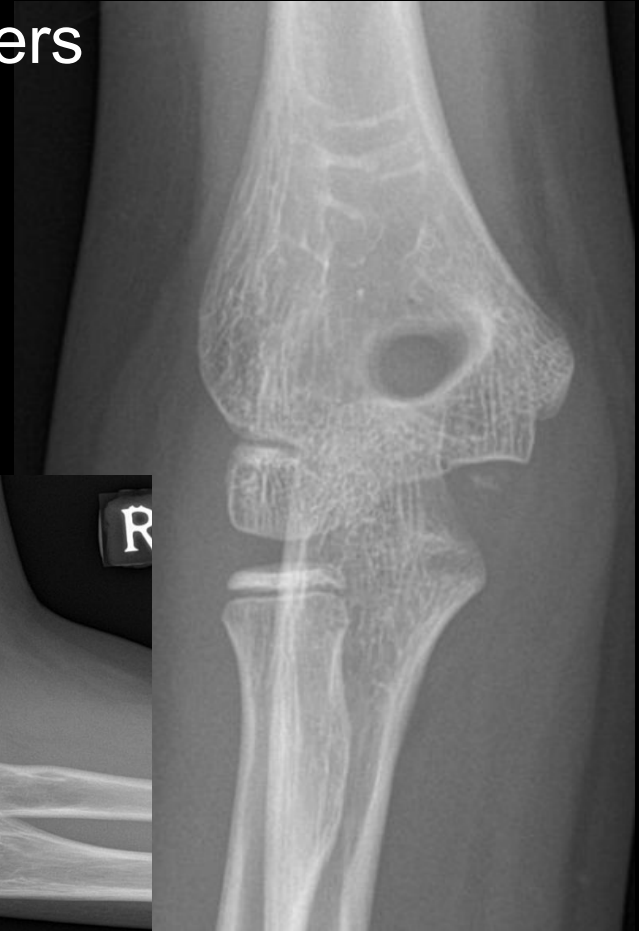
# Skeletally Immature Lower Limb XR



# How mature? Elbow Ossification Centers



- C**apitellum **1 yr.**
- R**adial Head **3 yrs.**
- I**nternal Epicondyle **5 yrs.**  
(medial)
- T**rochlea **7 yrs.**
- O**lecranon **9 yrs.**
- E**xternal Epicondyle **11 yrs.**  
(lateral)



# How mature?

## RADIOGRAPHIC ATLAS OF SKELETAL DEVELOPMENT OF THE HAND AND WRIST

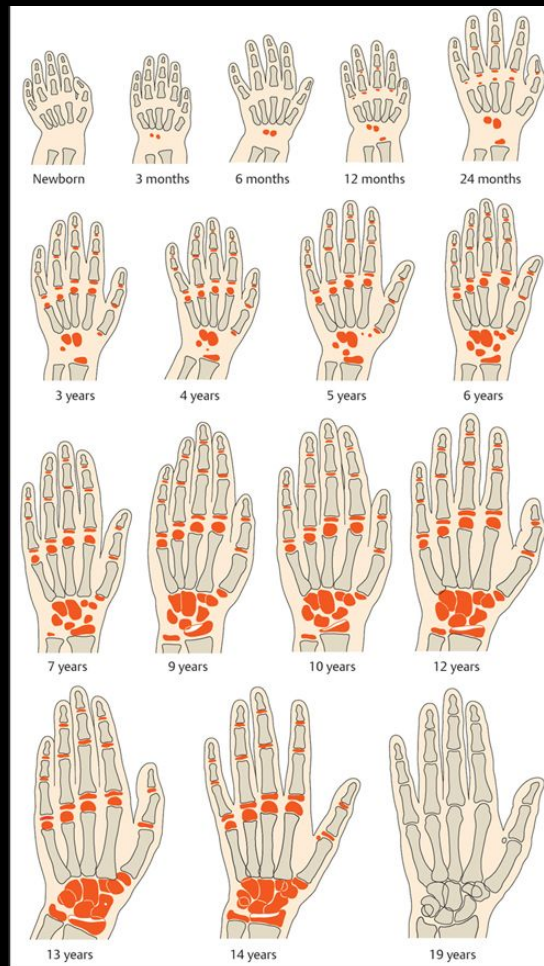
SECOND EDITION

WILLIAM WALTER GREULICH

*Professor of Anatomy, Stanford University School of Medicine*

S. IDELL PYLE

*Research Associate, Departments of Anatomy,  
Western Reserve University and Stanford University Schools of Medicine*



# Key Principles

1. Two **views**—AP and Lateral except in the hand and feet (oblique)
2. Two **joints**—image the joint above and the joint below
3. Two **occasions**—always compare with old films if available
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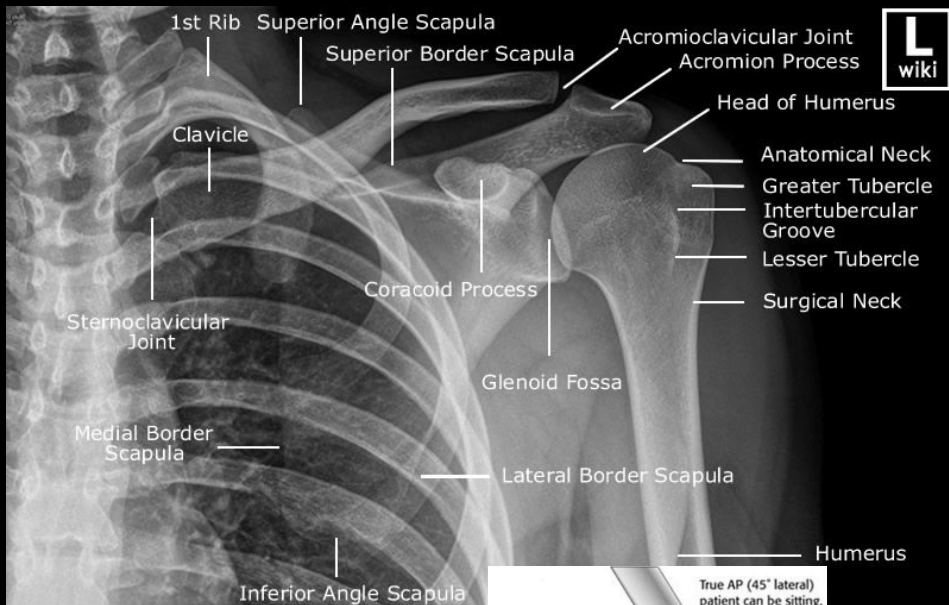
# Goals Today

1. Understand the key **principles** in ordering XRs
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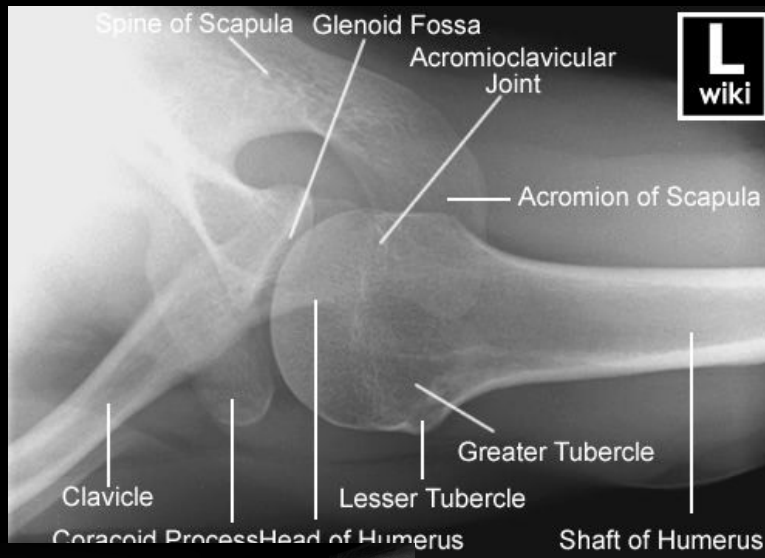
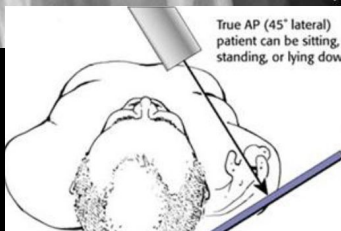


# Shoulder to Proximal Humerus

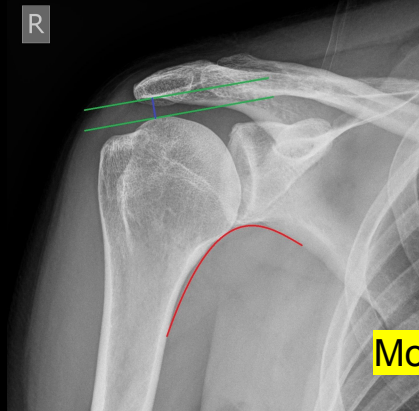
# Normal Shoulder XR



**Shoulder AP**



**Shoulder Axial (Coracoid determines Anterior)**



**Moloney's Arc**



# Shoulder Special Views

Coracoacromial Arch

Coracoid Process

Acromion

Outlet

Shaft of Humerus

Y-Scapula View



For more notes, visit [mokyngren.sg](http://mokyngren.sg)



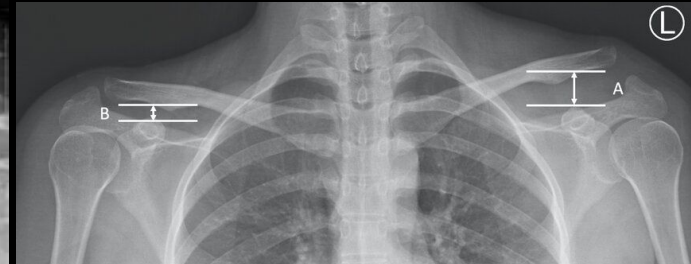
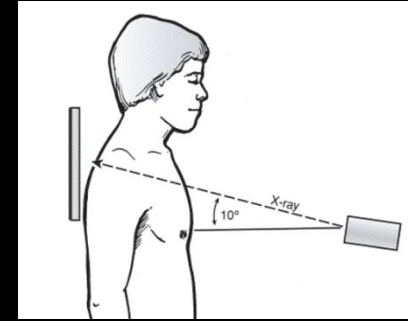
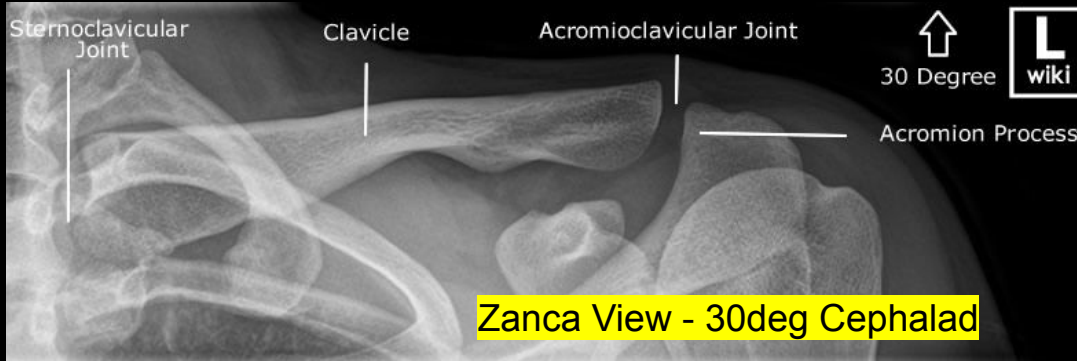
Axial View - requires abduction of arm

RIGHT VELPEAU

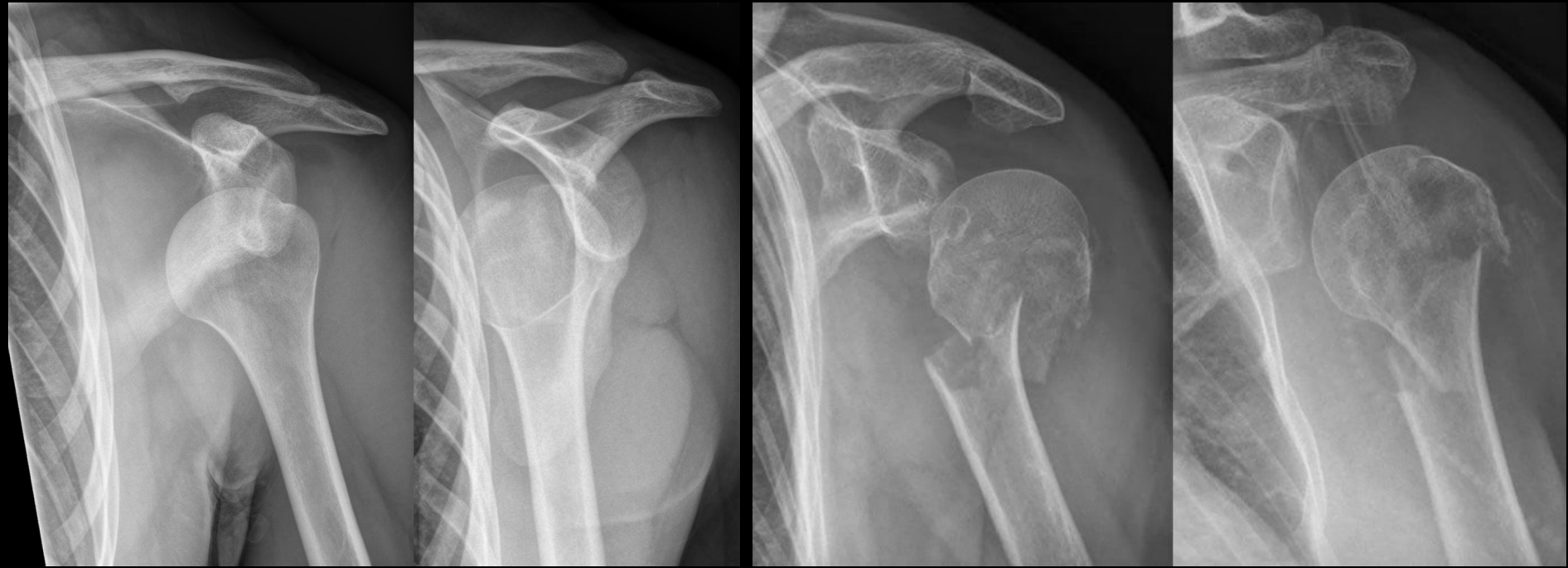
Velpeau View



# Shoulder Special Views - Acromioclavicular Joints



# Abnormal Shoulder XRs



Anterior Shoulder  
Dislocation

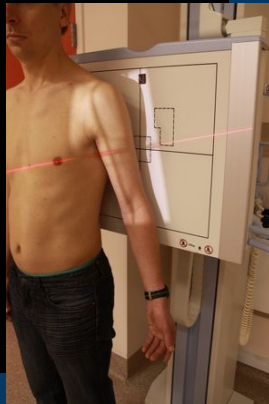
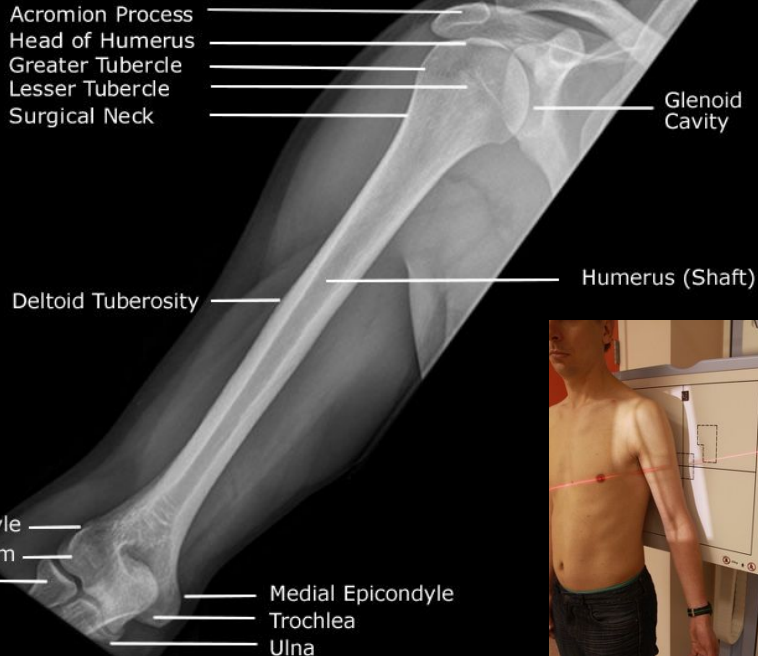
Proximal Humerus #

# Humerus Shaft to Elbow

# Normal Humerus XR

**R**  
wiki

## Humerus AP



**R**  
wiki

## Humerus Lateral

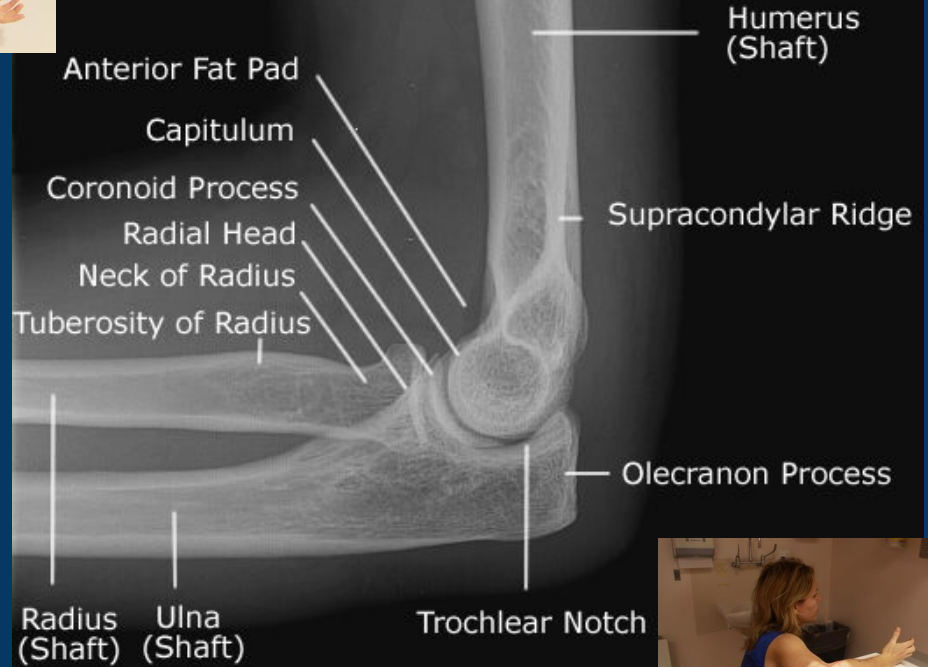


# Normal Elbow XR

## Elbow AP



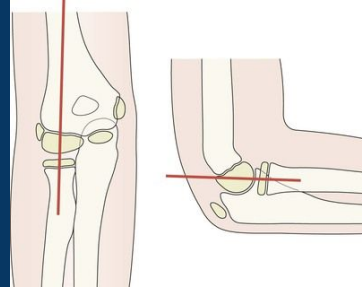
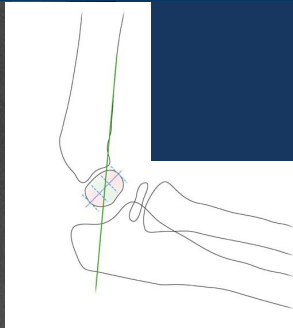
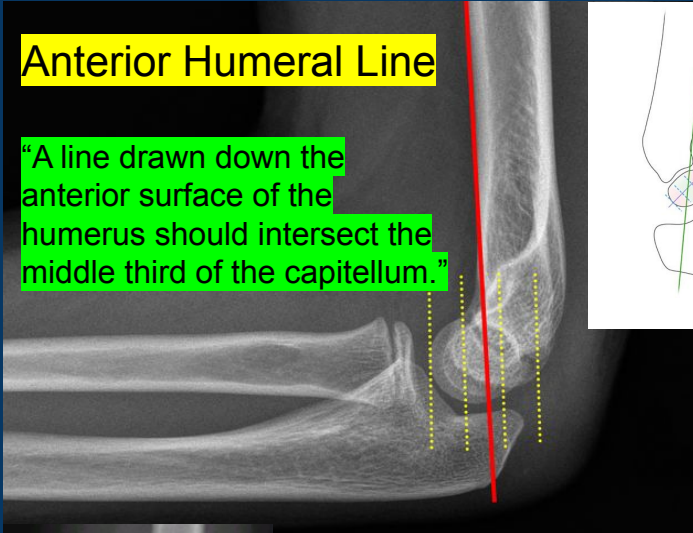
## Elbow Lateral



# 2 Lines for Elbow (*Paeds*)

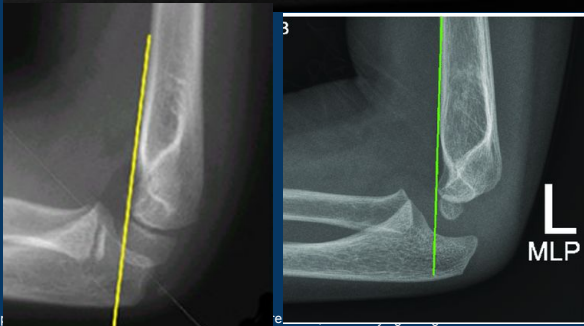
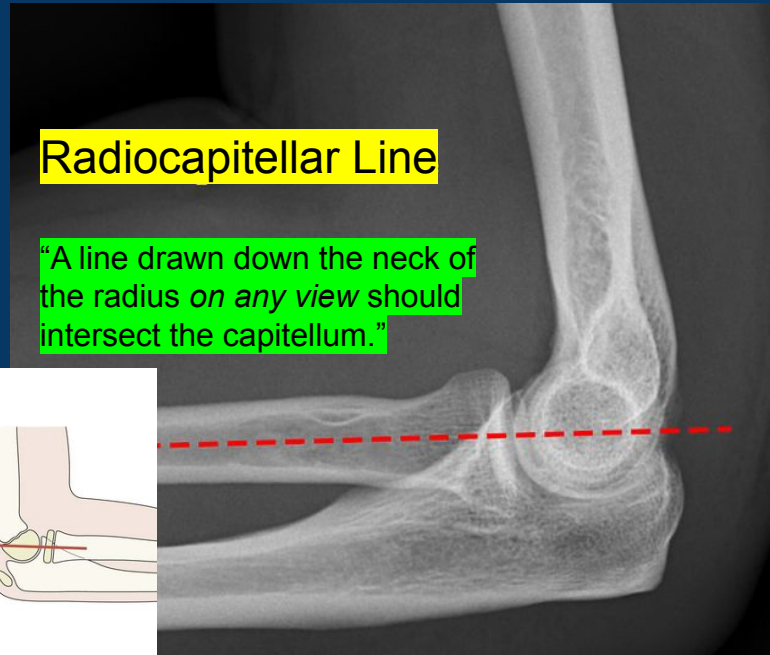
## Anterior Humeral Line

"A line drawn down the anterior surface of the humerus should intersect the middle third of the capitellum."

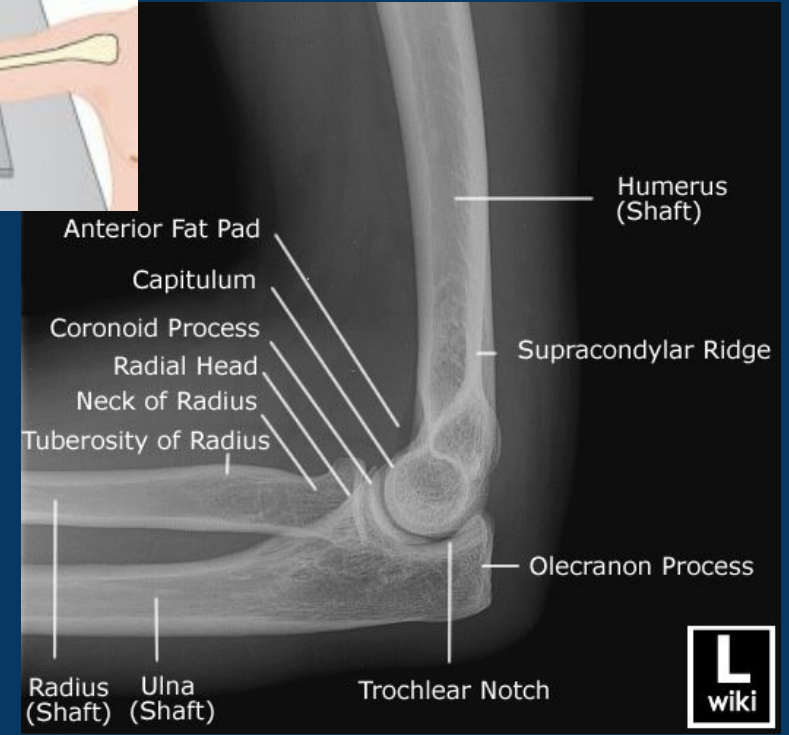
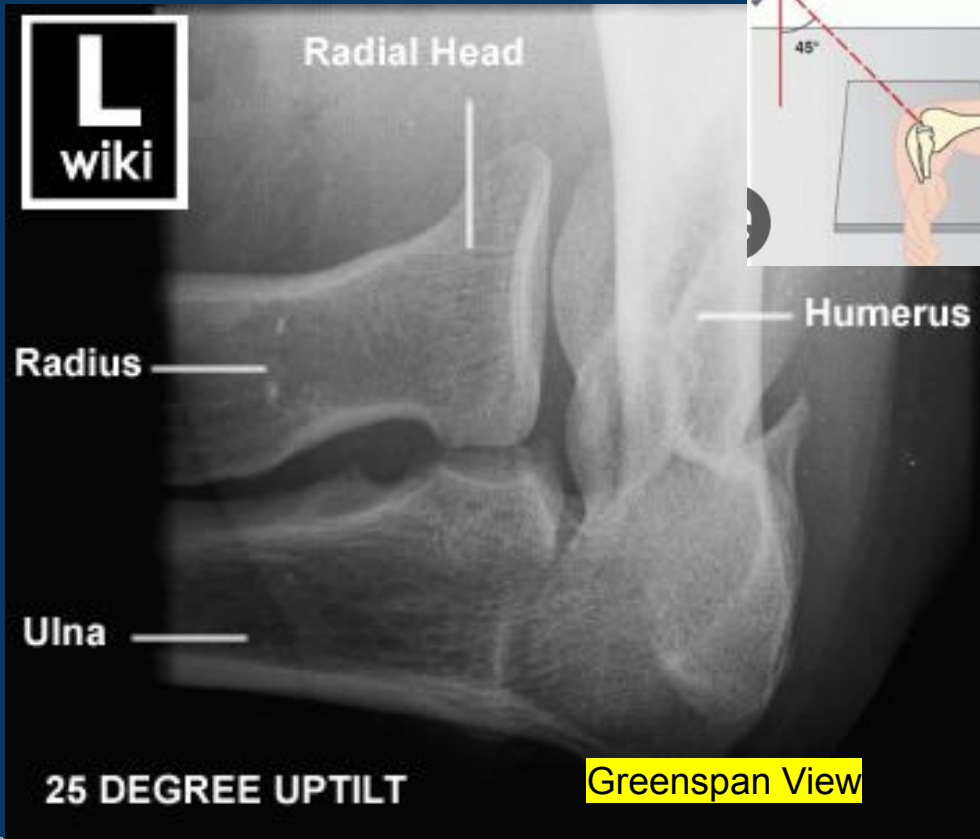
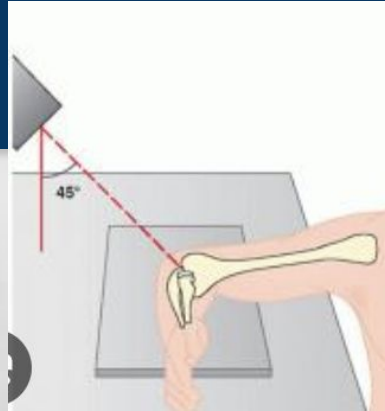


## Radiocapitellar Line

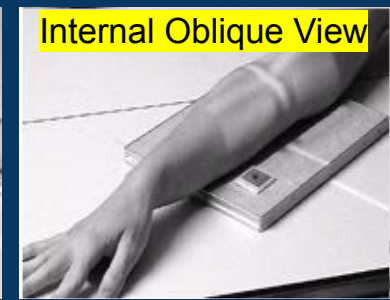
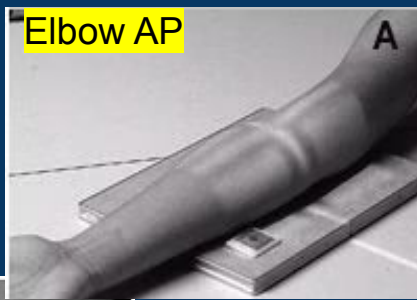
"A line drawn down the neck of the radius on any view should intersect the capitellum."



# Elbow Special XR



# Elbow Special XR (Paeds)

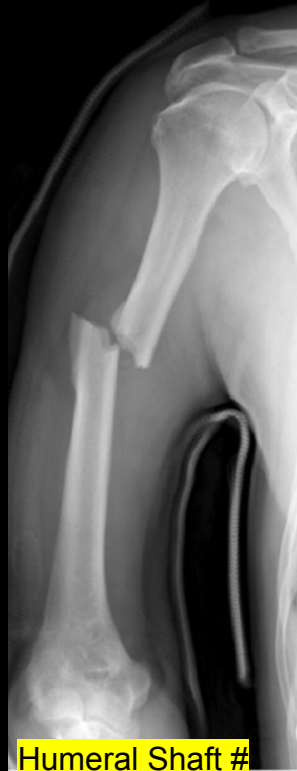


Good to visualize **Lateral Condyle Fractures**  
**(#2 Most common Paediatric Elbow Fracture)**

# Abnormal Humerus/ Elbow XRs



Humeral Shaft #



Humeral Shaft #

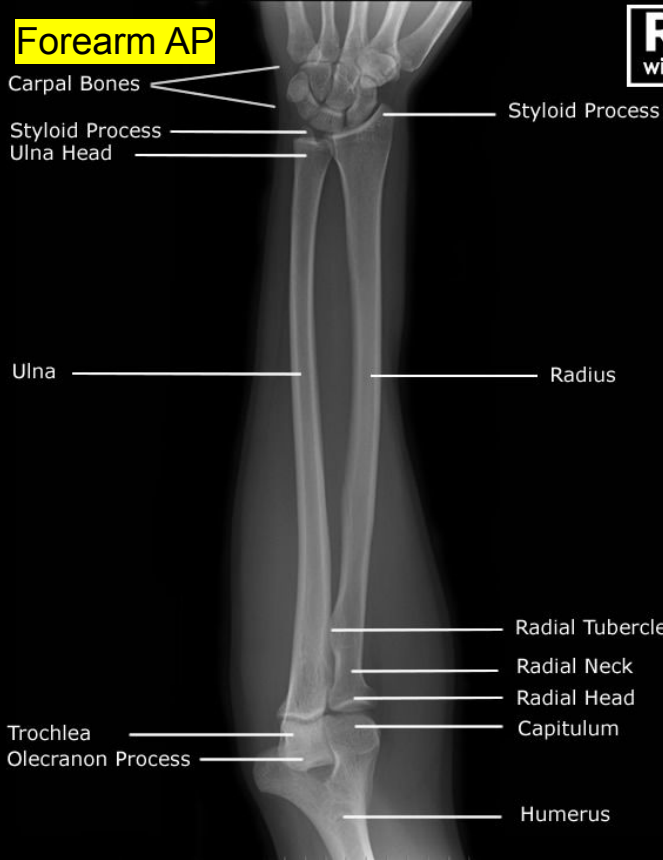


Distal humerus #

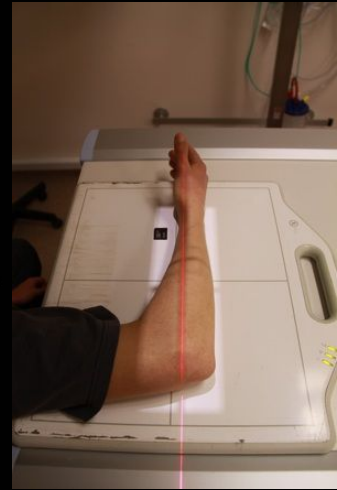
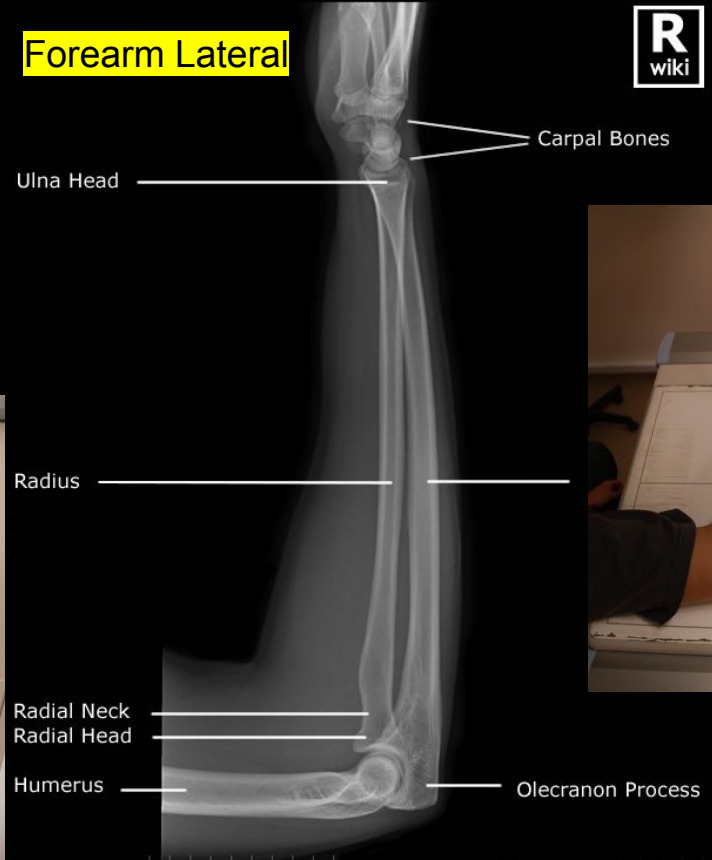


# Normal Forearm XR

## Forearm AP



## Forearm Lateral

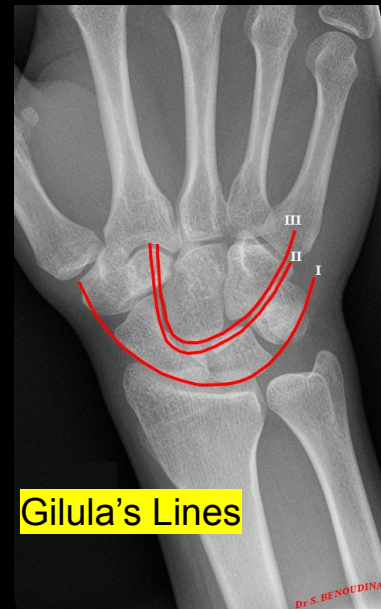


# Normal Wrist XR

**L**  
wiki



**L**  
wiki



**Gilula's Lines**

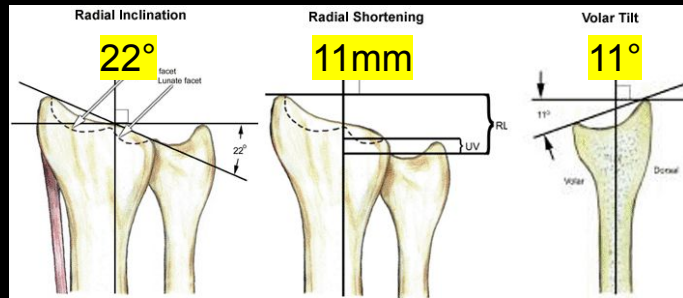
Dr. S. BENOUDINA

- Base of 5th Metacarpal
- Hook of Hamate
- Hamate
- Capitate
- Pisiform
- Triquetrum
- Lunate
- Ulna Styloid Process
- Head of Ulna
- Ulna
- Radius
- Base of 1st Metacarpal
- Trapezoid
- Trapezium
- Scaphoid
- Radial Styloid Process
- Capitate
- Ulna Styloid Process

- 1st Metacarpal
- Trapezium
- Scaphoid
- Pisiform
- Lunate
- Radius
- Ulna

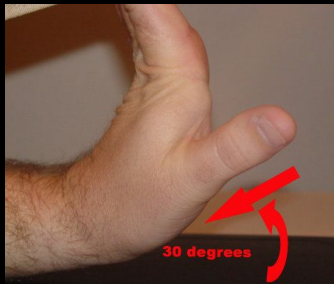
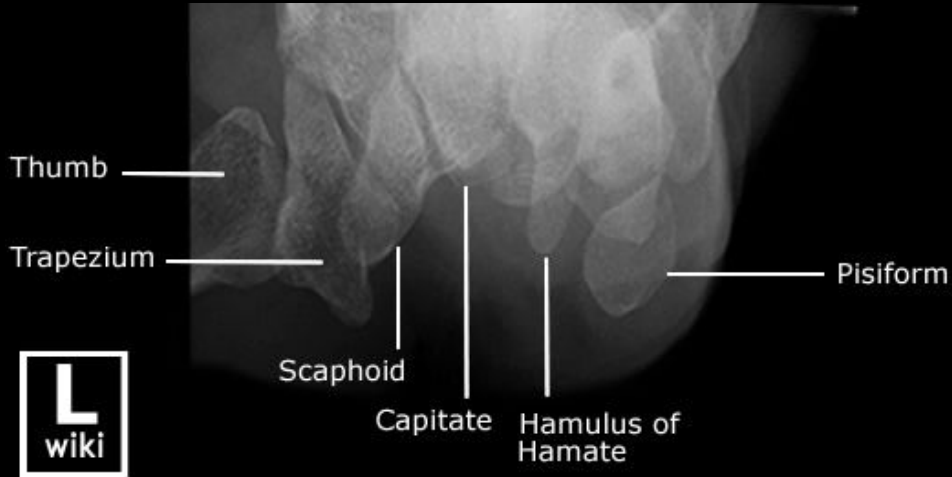
**Wrist PA**

**Wrist Lateral**

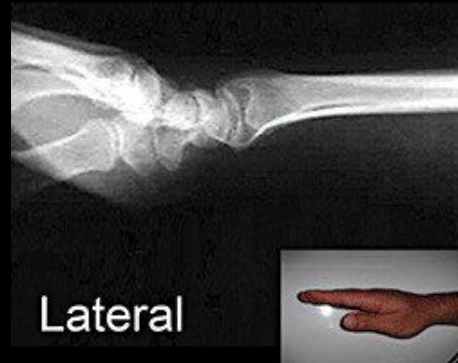
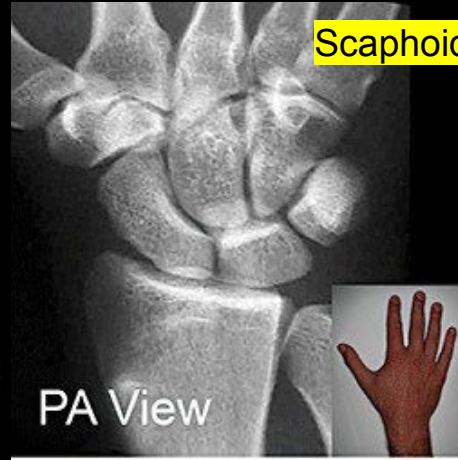


**Radial parameters - Rule of 11**

# Wrist Special Views



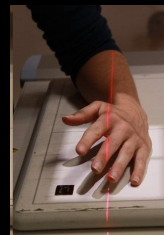
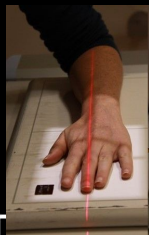
**Carpal Tunnel View**



# Normal Hand XR



## Hand PA



## Hand Oblique



## Hand Lateral



# Normal Finger XR



PA



Oblique



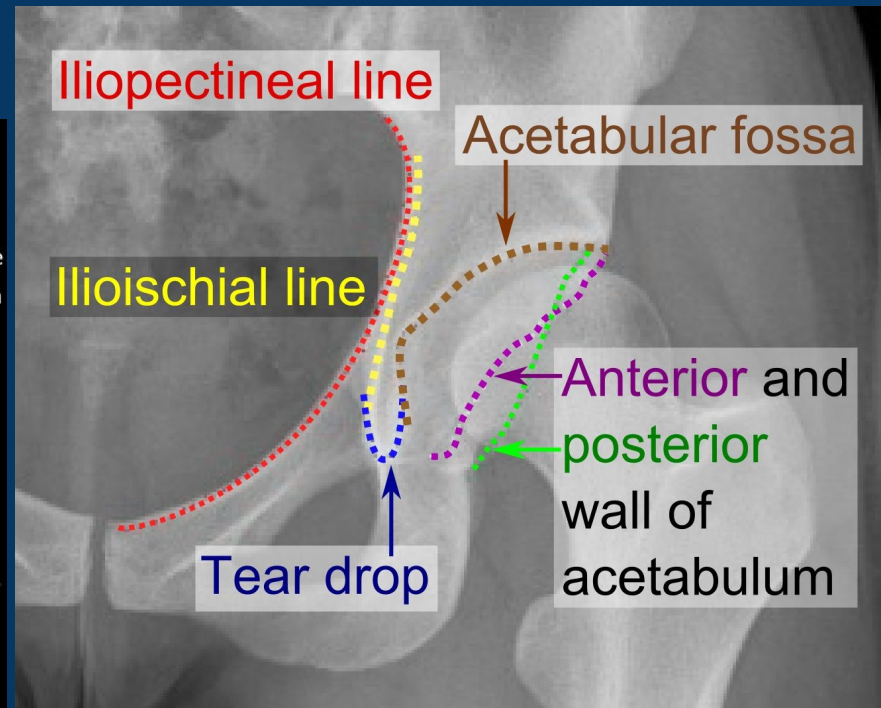
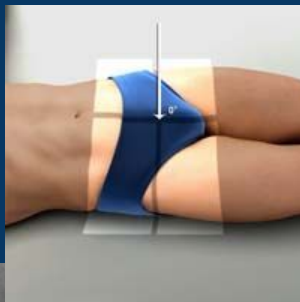
Lateral

# Abnormal Forearm/ Wrist/ Hand XRs



# Pelvis and Acetabulum

# Normal Pelvis XR

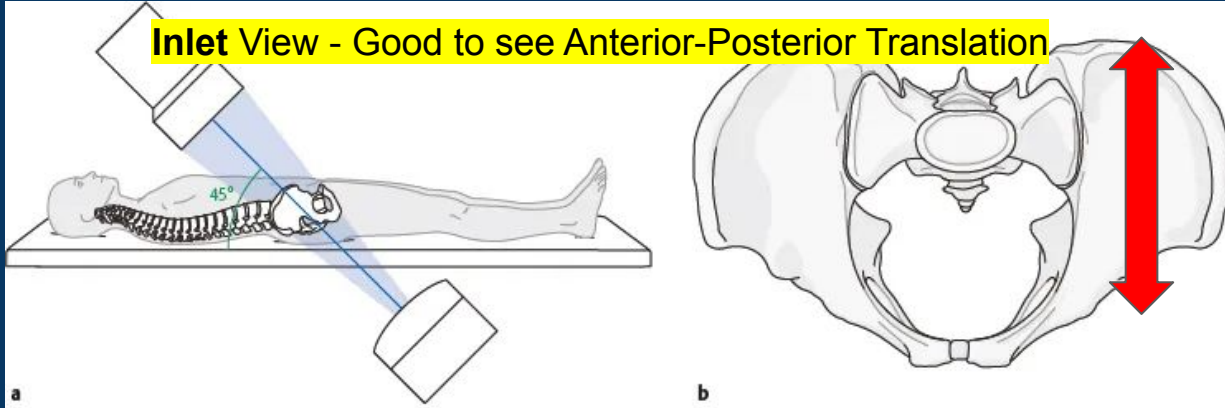


**Pelvis AP**

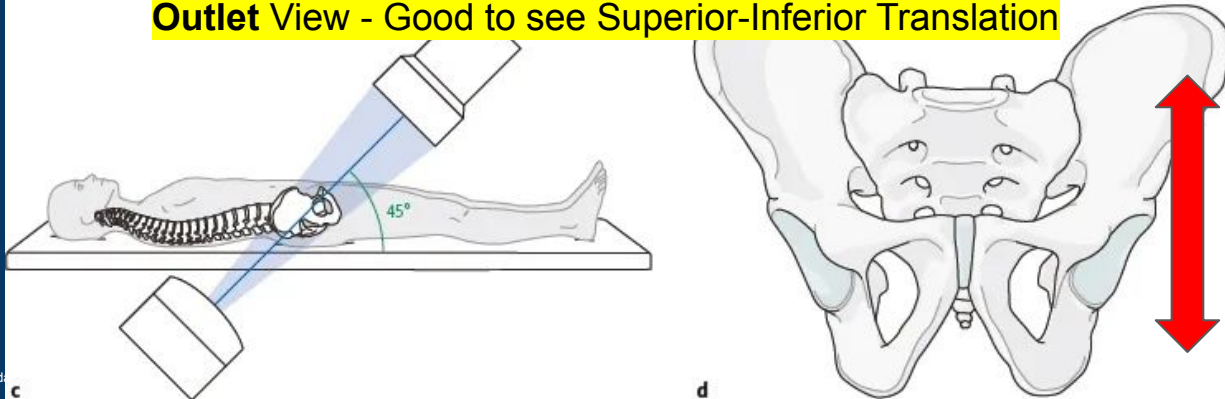
**Acetabular Lines**

# Pelvis Special XR

**Inlet View - Good to see Anterior-Posterior Translation**

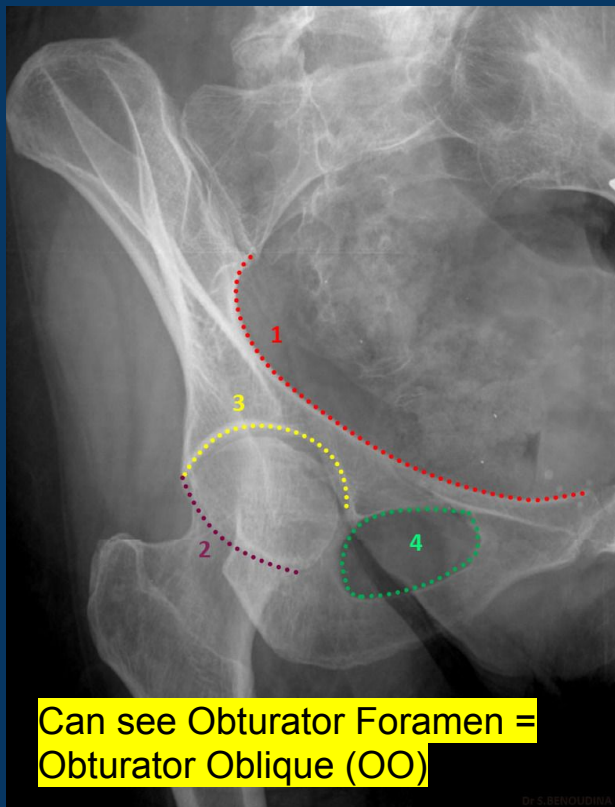


**Outlet View - Good to see Superior-Inferior Translation**



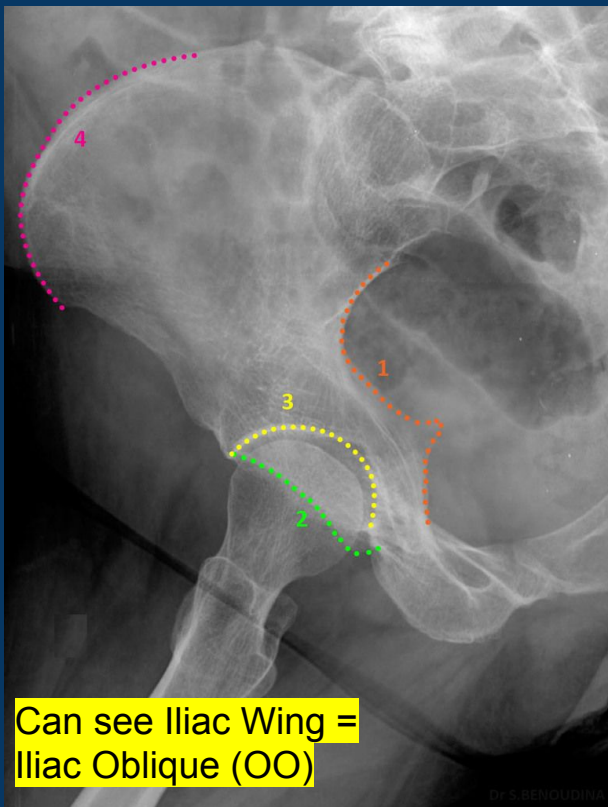
# Acetabular Special XR

**P<sub>1</sub>C<sub>0</sub> = Posterior Column (+ Anterior Wall) in Iliac Oblique**  
**OO = Opposite: Anterior Column + Posterior Wall**



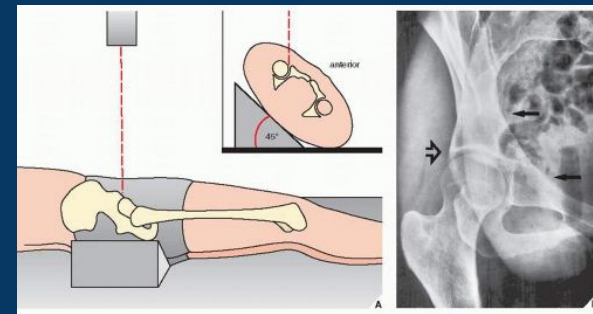
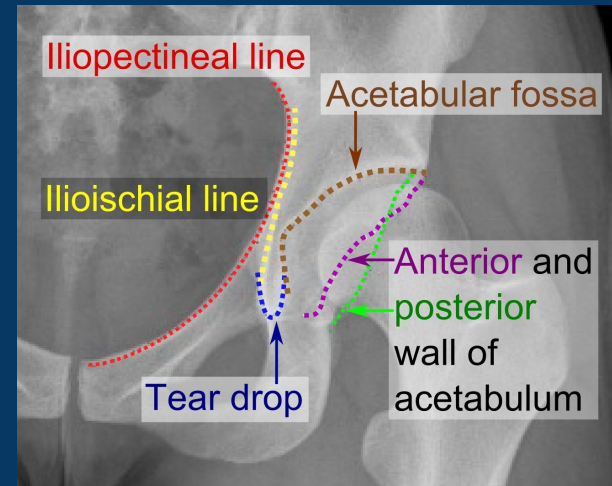
Can see Obturator Foramen =  
Obturator Oblique (OO)

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Can see Iliac Wing =  
Iliac Oblique (OO)

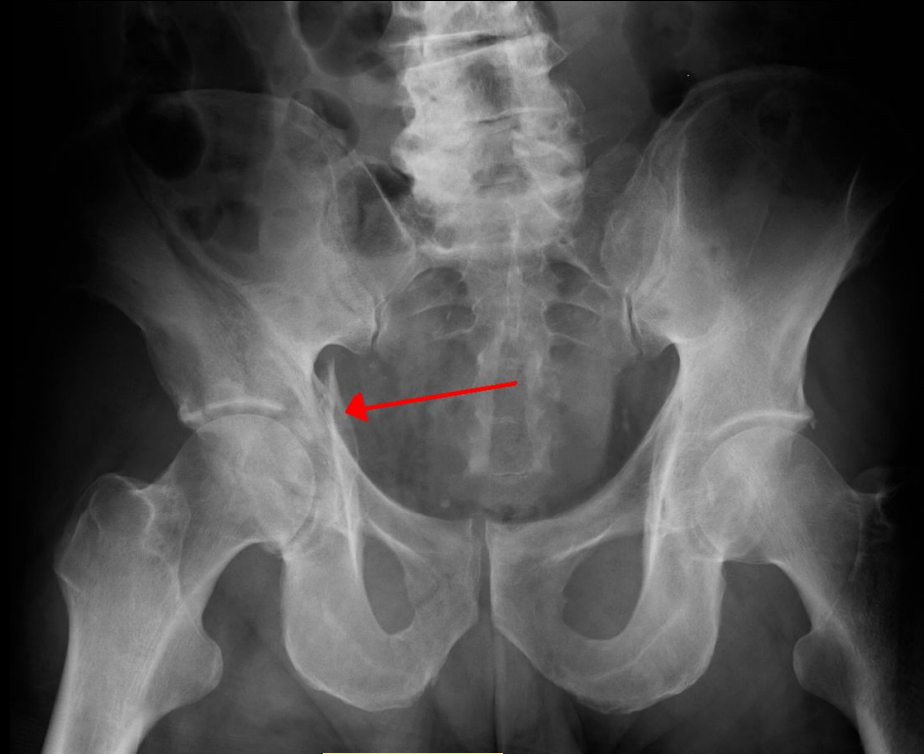
Dr S. BENOUADIA



# Abnormal Pelvis XRs



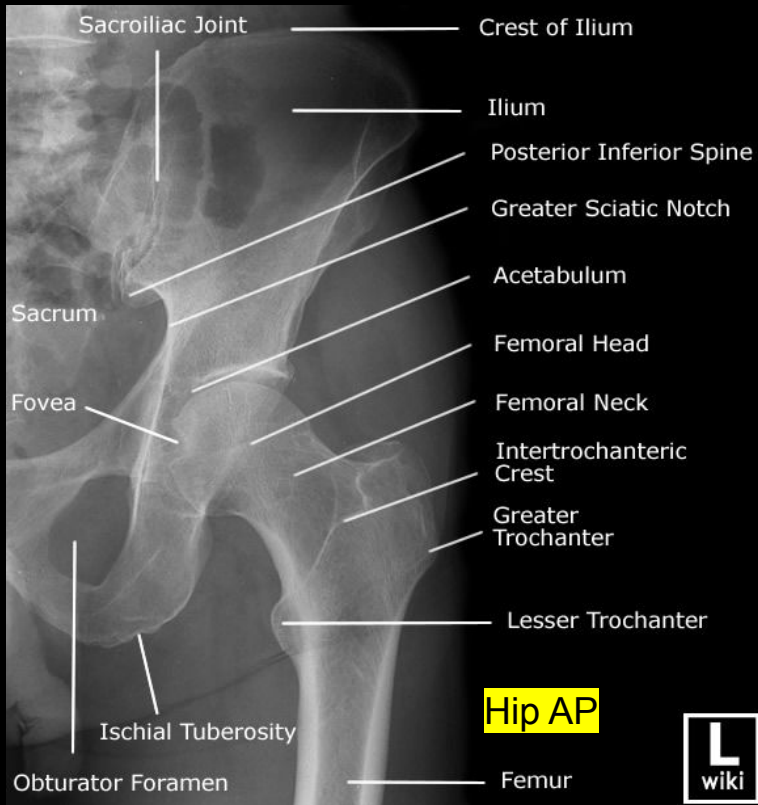
Open book pelvic #



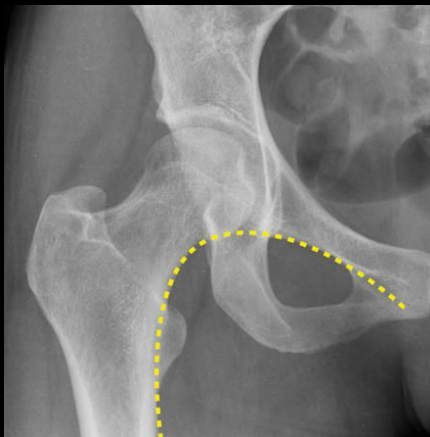
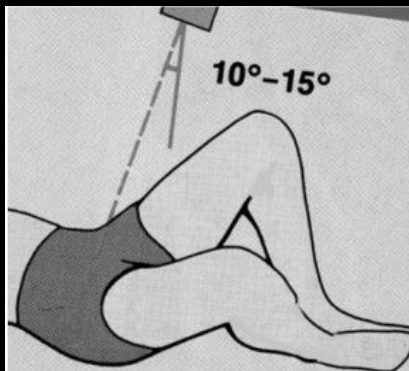
Acetabular #

# Hip and Femur

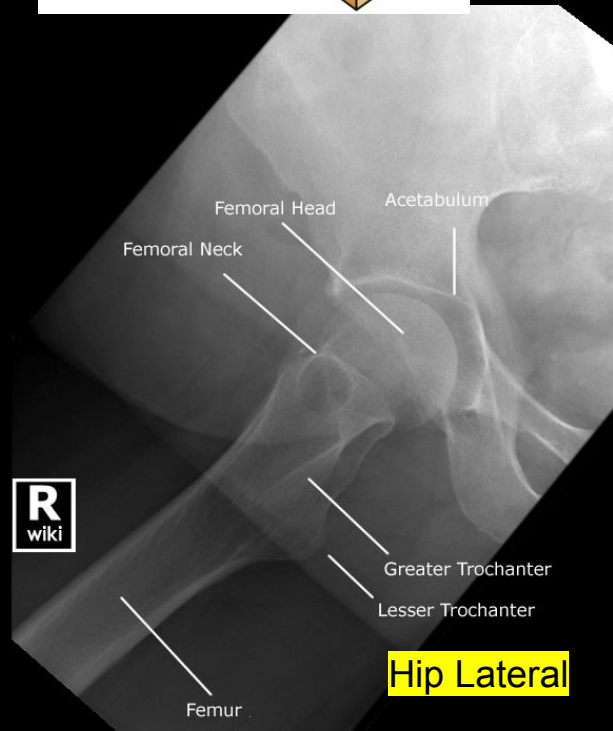
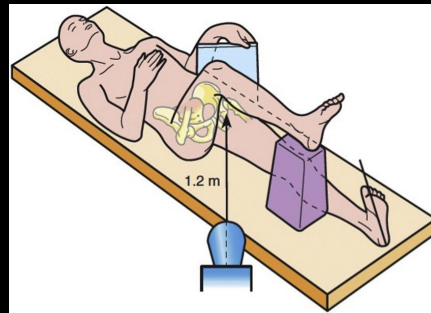
# Hip XR



**Hip AP**



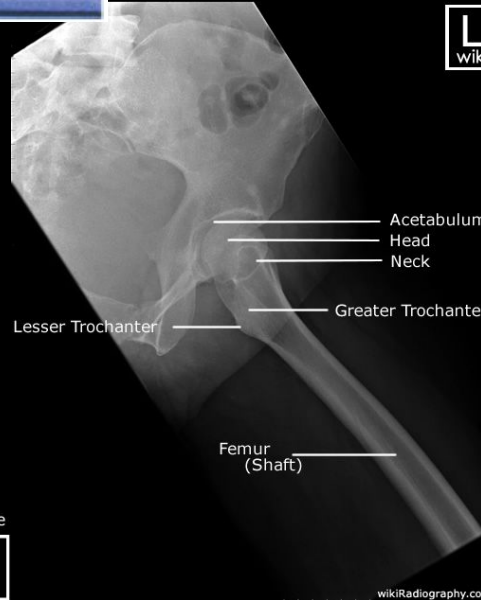
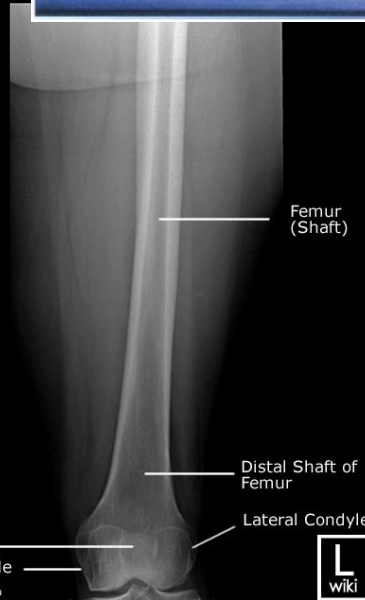
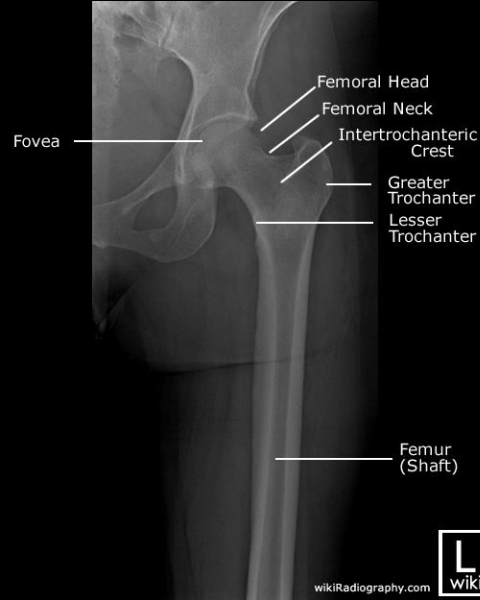
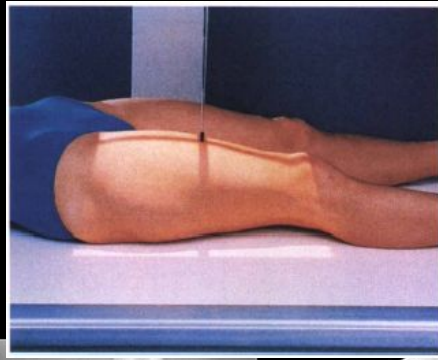
**Shenton's Line**



**Hip Lateral**



# Femur Normal XR



wikiRadiography.com



Patella  
Medial Condyle  
wikiRadiography.com



wikiRadiography.com

Lateral & Medial  
Femoral Condyles  
Tibia  
wikiRadiography.com

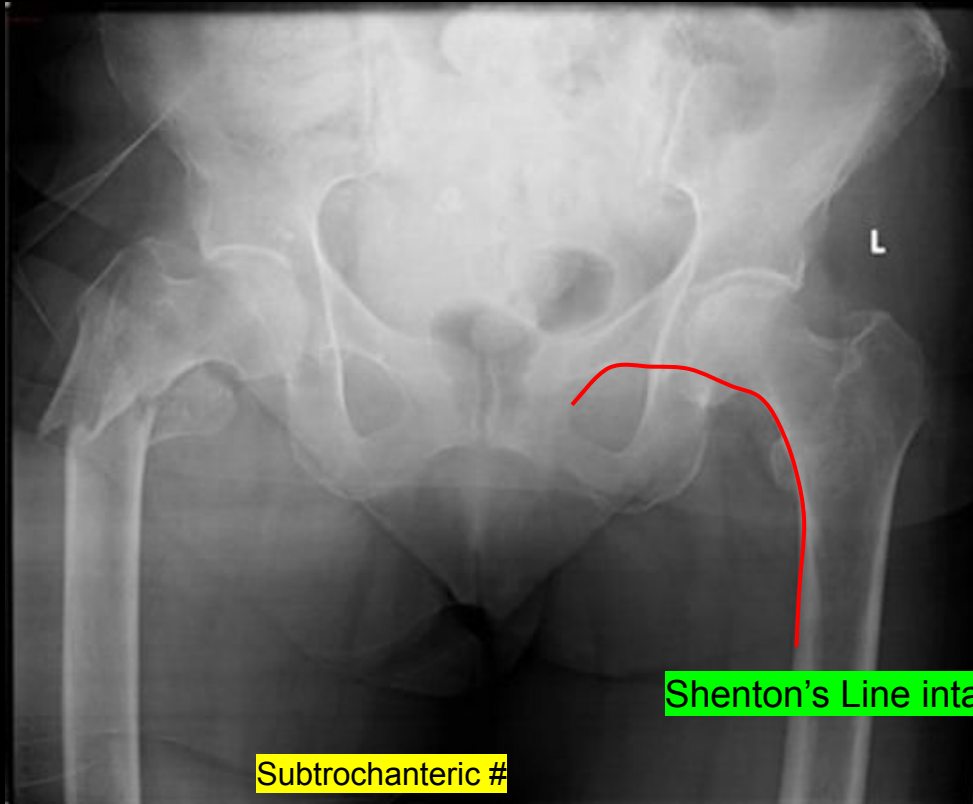
wikiRadiography.com



**Femur AP**

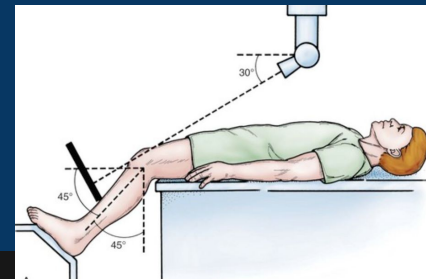
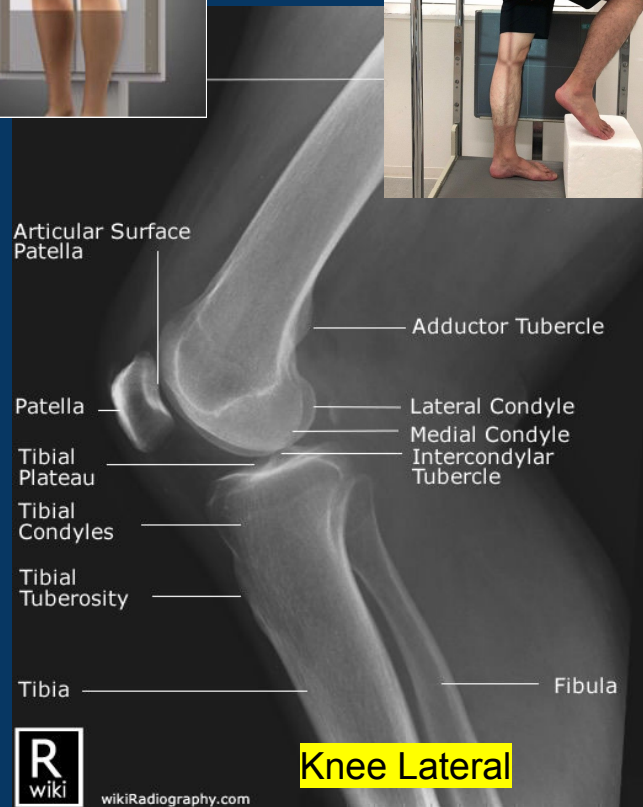
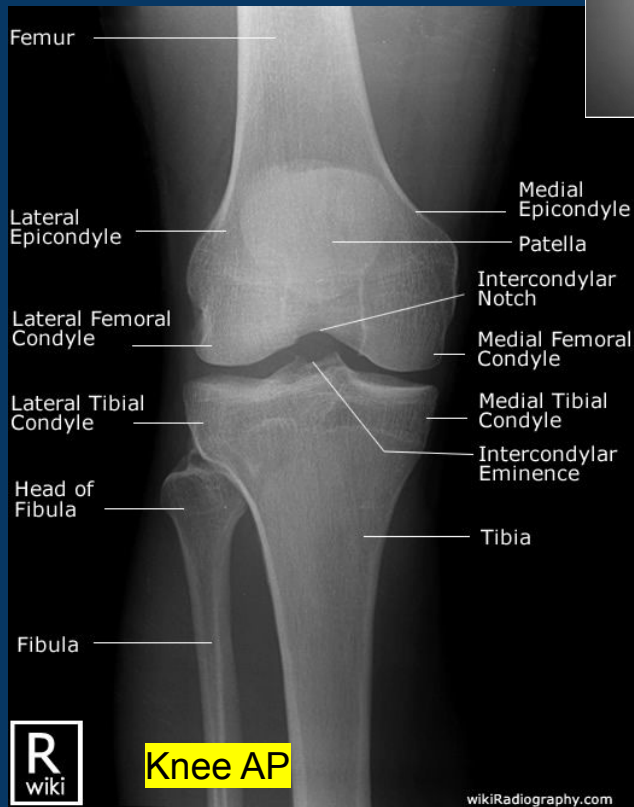
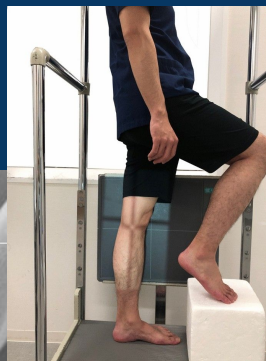
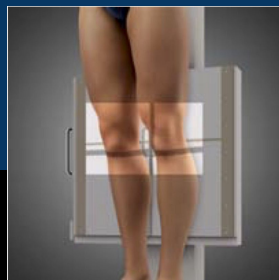
**Femur Lateral**

# Abnormal Hip/ Femur XRs



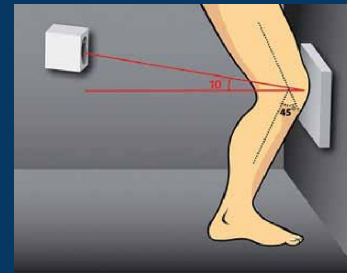
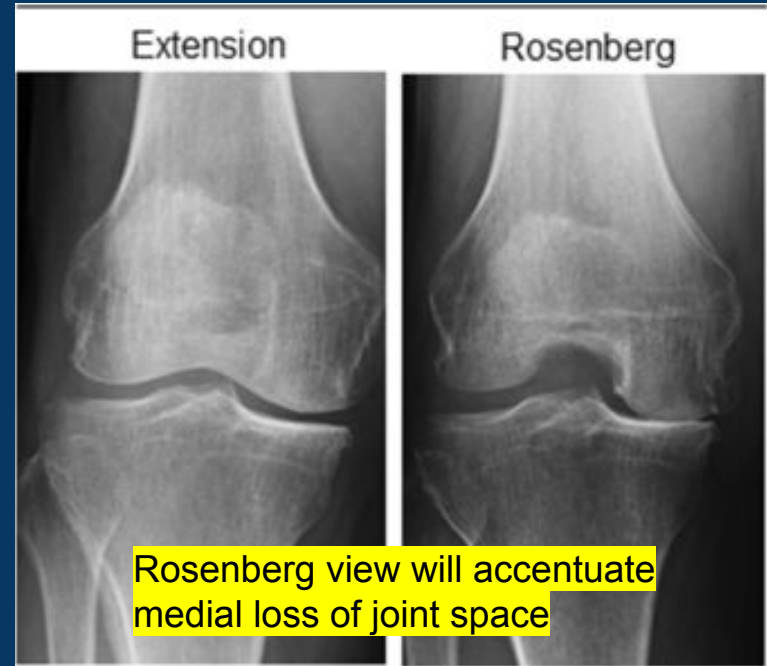
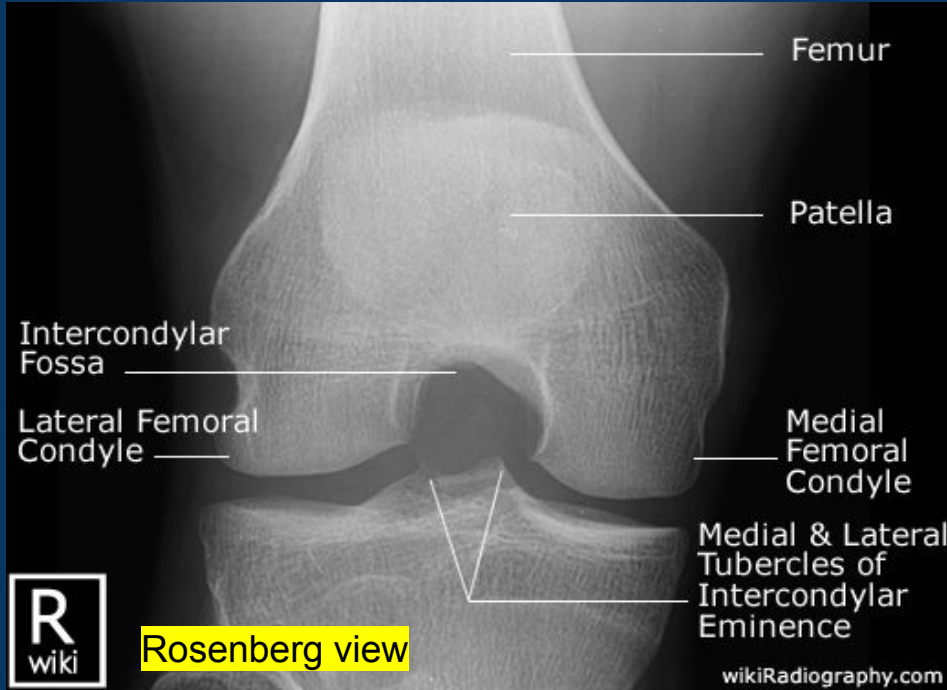
# Knee

# Normal Knee XR

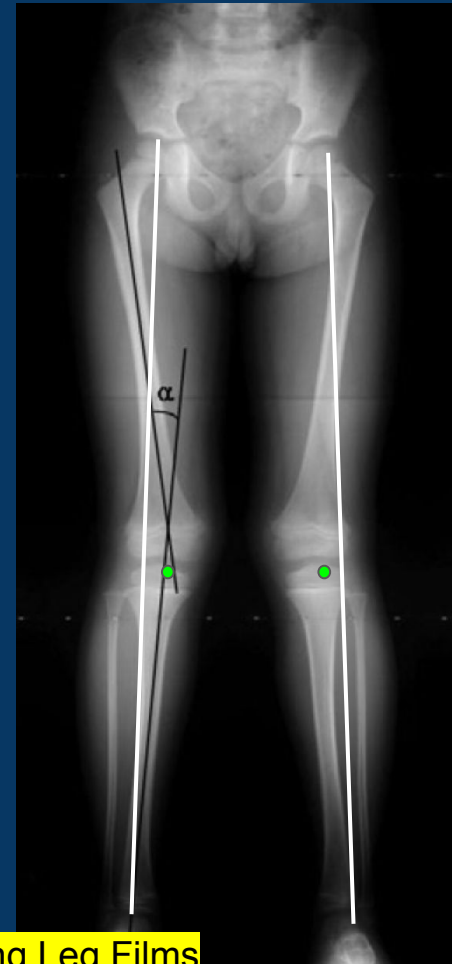
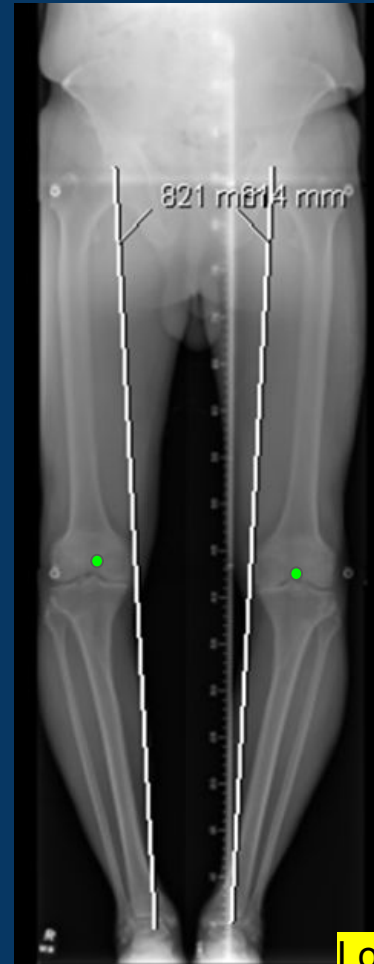
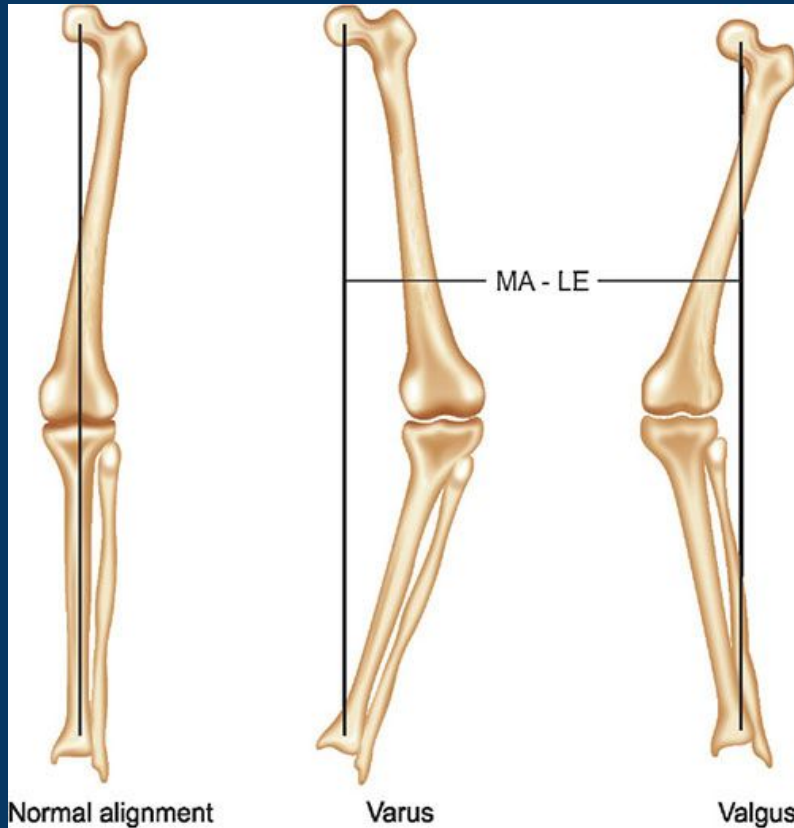


**Weight bearing will reveal loss of joint space better**

# Knee XR Special Views



# Knee XR Special Views



Long Leg Films

# Abnormal Knee XRs



Distal Femur #

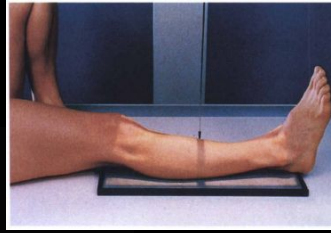


Knee Anterior Dislocation

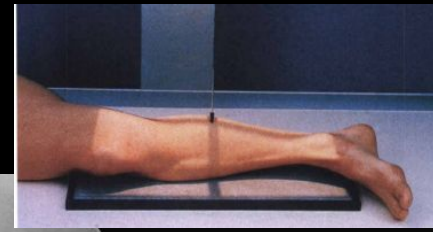
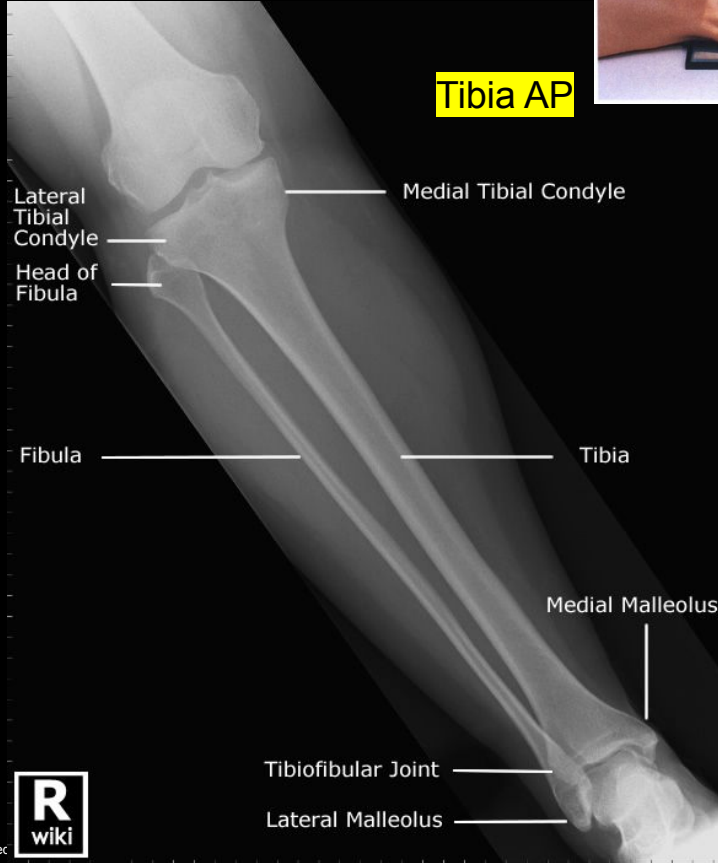


# Tibia to Ankle

# Normal Tibia XR



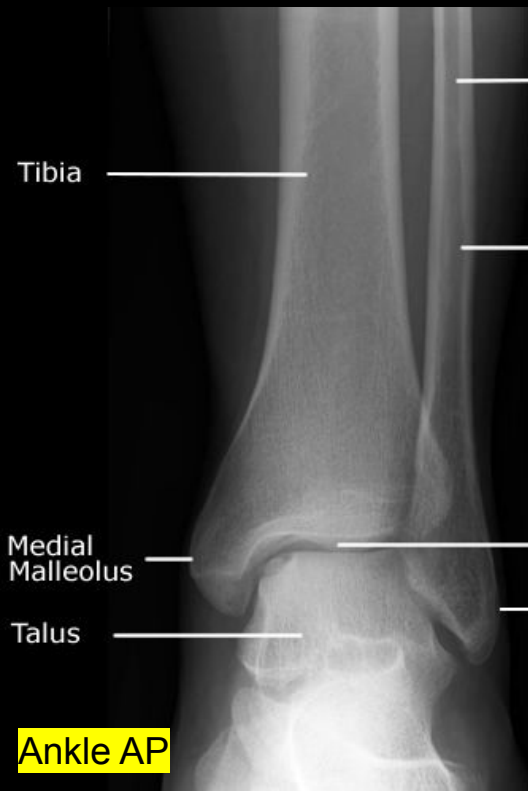
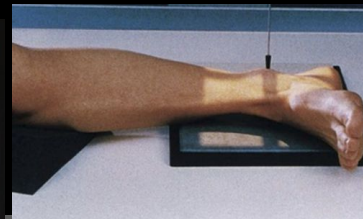
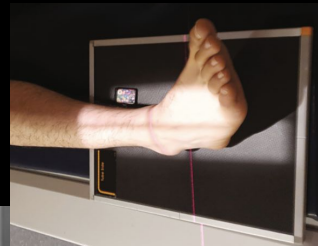
**Tibia AP**



**Tibia Lateral**

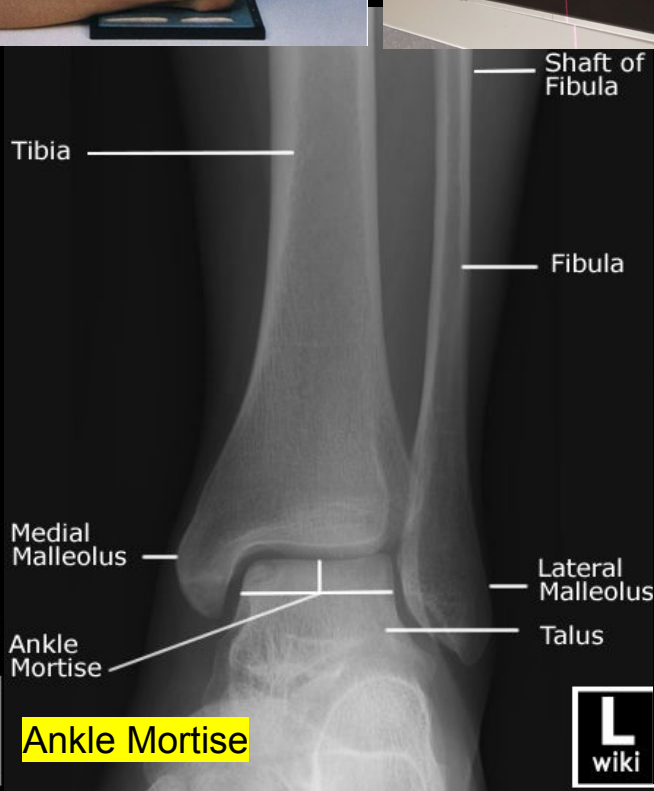


# Normal Ankle XR



Shaft of Fibula

Fibula



Shaft of Fibula

Fibula



# Abnormal Tibia/ Ankle XRs



Tibia plateau #



Tibia Shaft Comminuted #



Distal Tibia Comminuted #

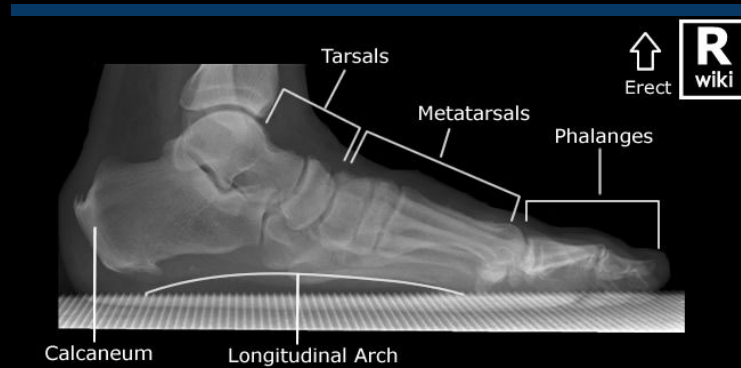
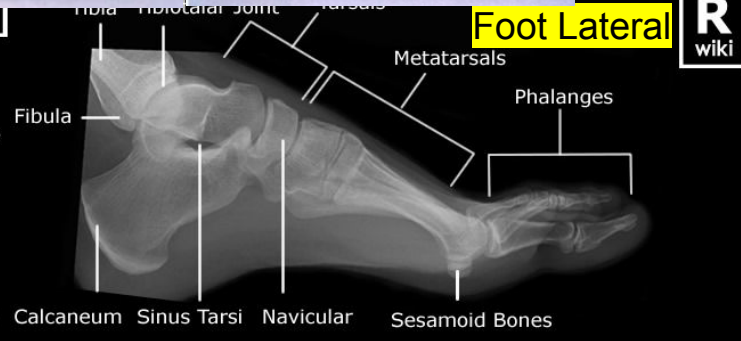


# Foot

# Normal Foot XR

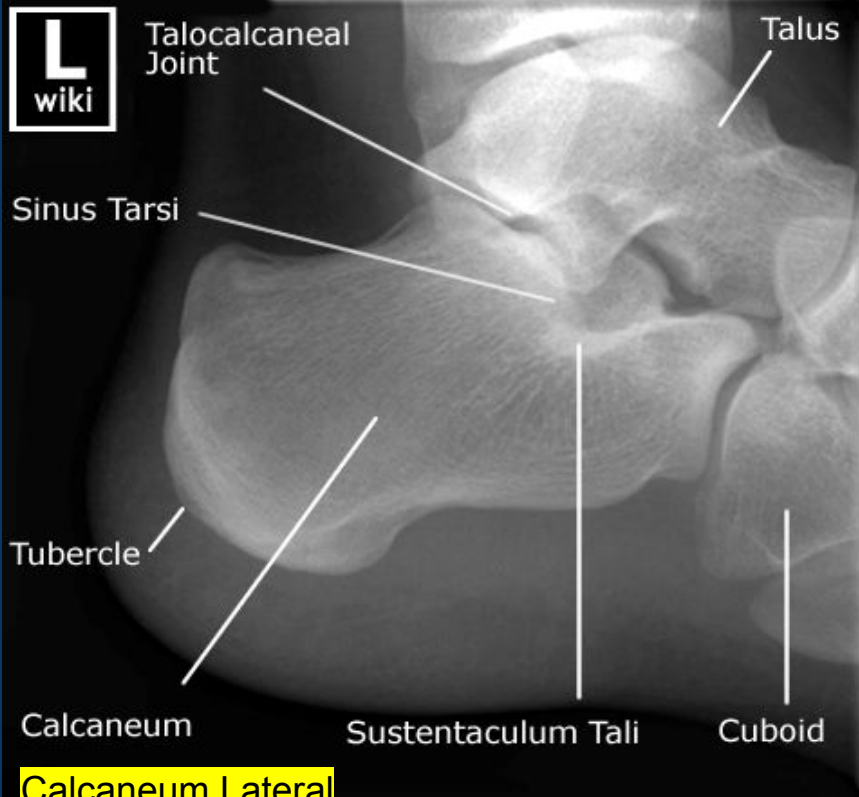


**Foot Oblique**

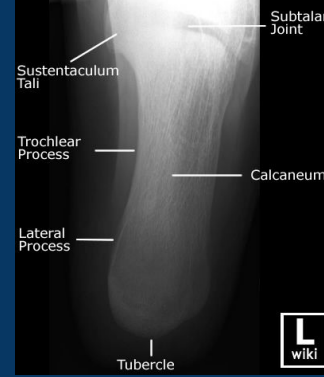


**Foot Lateral weight bearing**

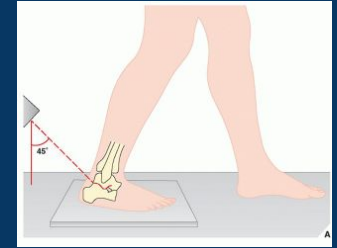
# Normal Calcaneus XR



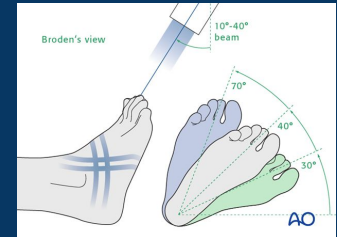
**Calcaneum Lateral**



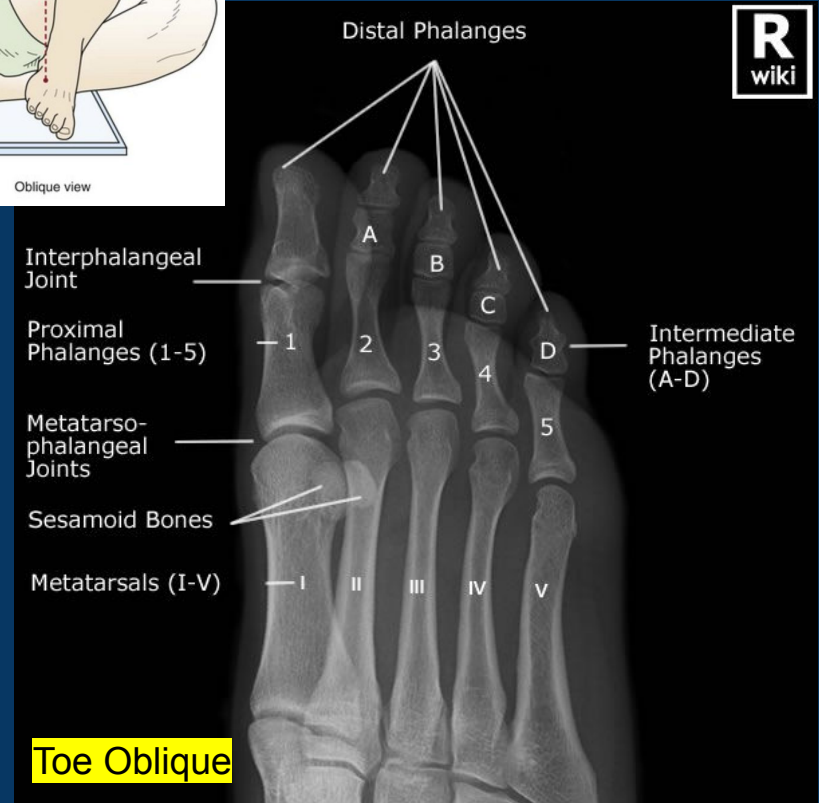
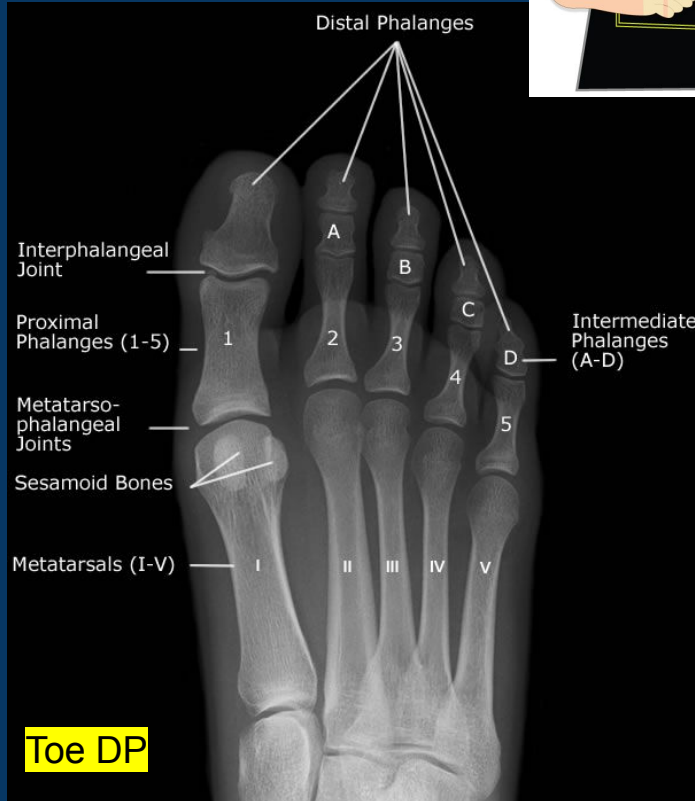
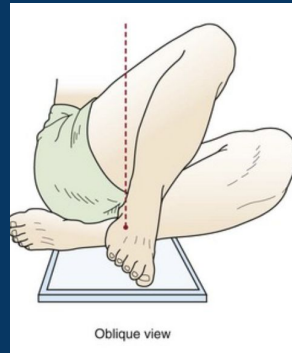
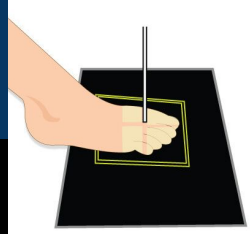
**Calcaneum Axial  
Harris View**



**Calcaneum Oblique  
Broden's View**



# Normal Toe XR

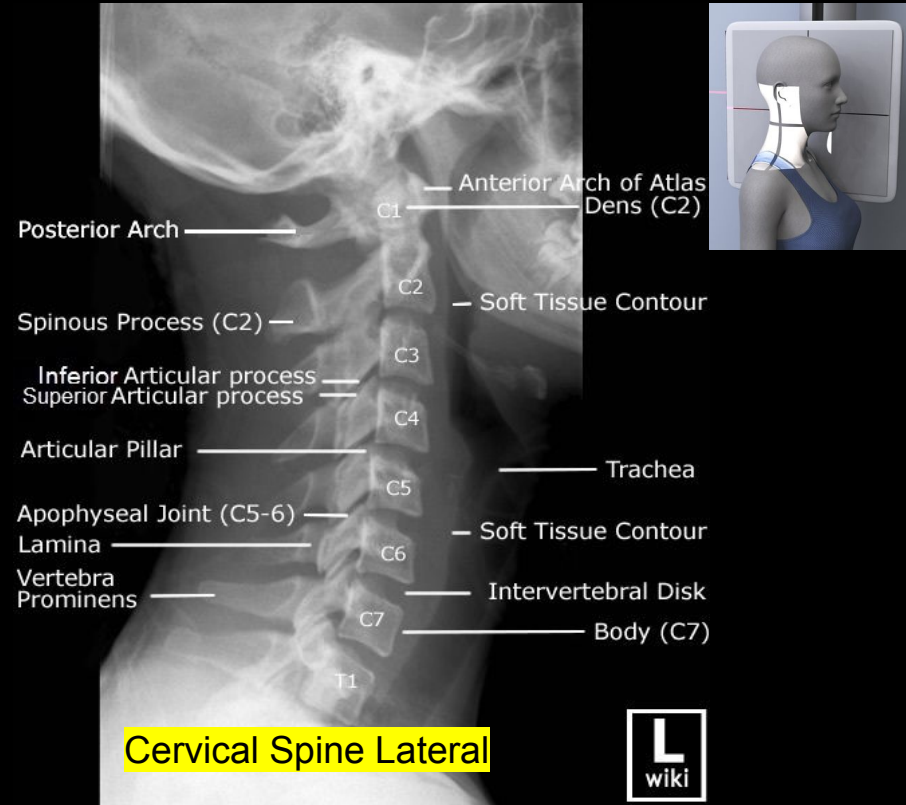
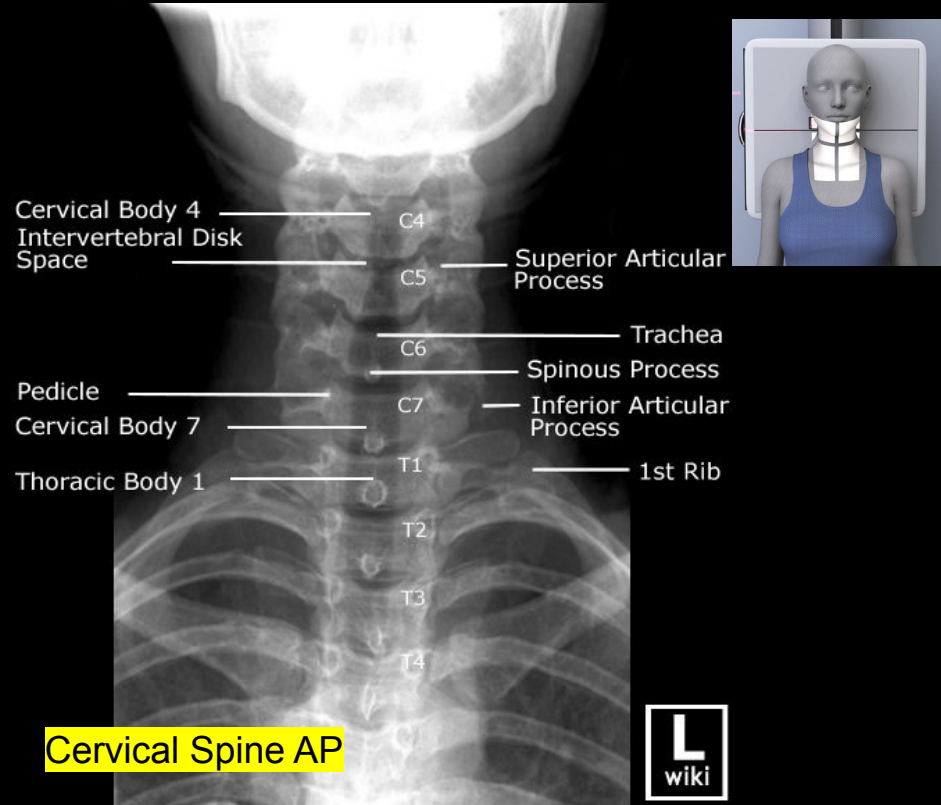


# Abnormal Foot XRs

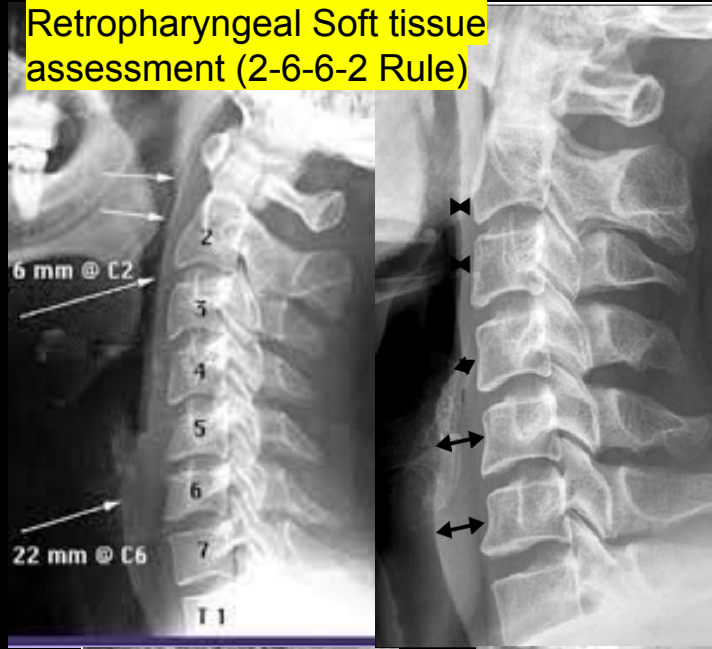
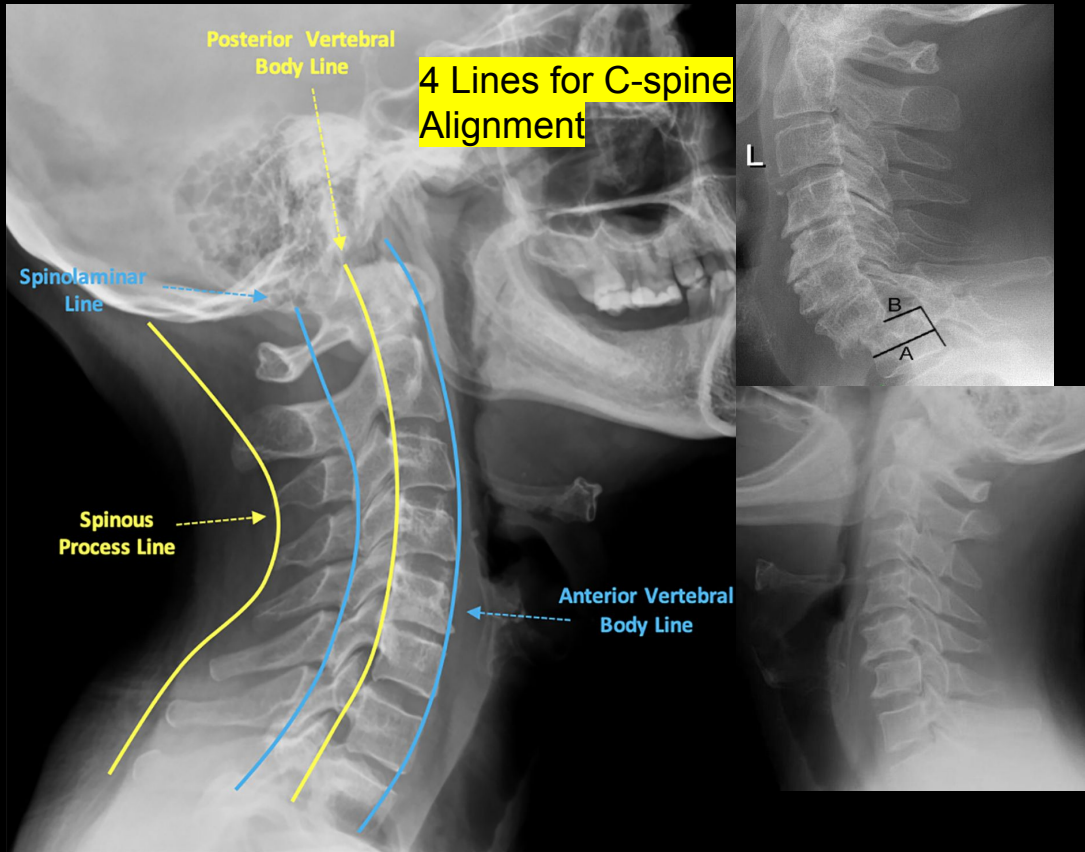


# Cervical Spine

# Cervical Spine Normal XR



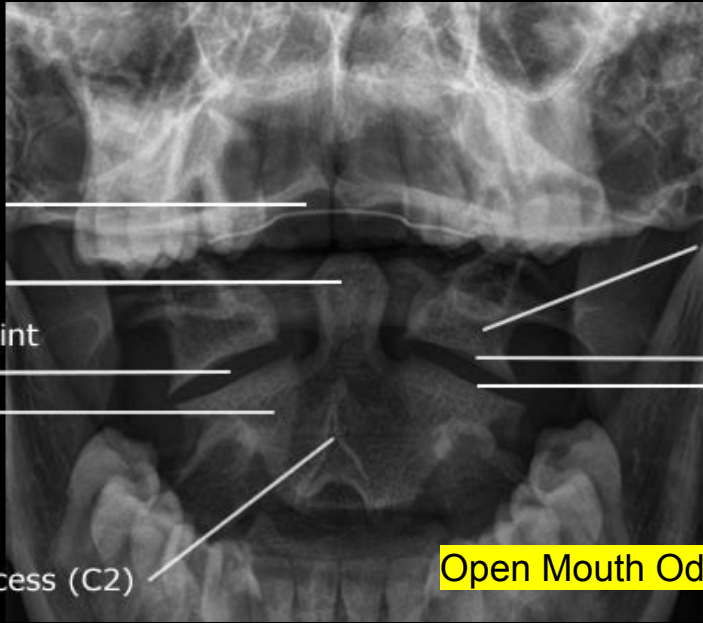
# Important Lines for Cervical Spine



# Cervical Spine Flexion/ Extension views

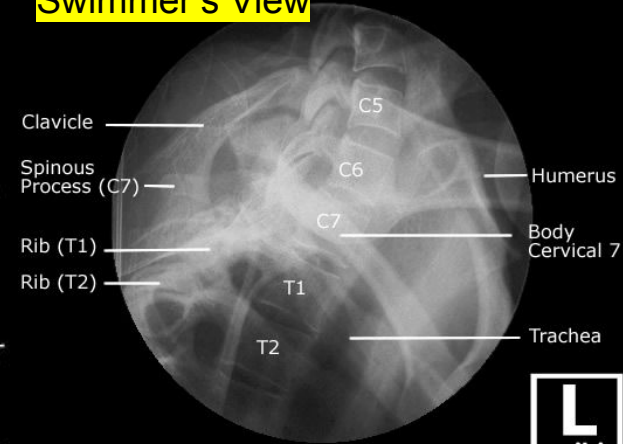


# Cervical Special XR (Largely replaced with CT scan)



Open Mouth Odontoid View

Swimmer's View

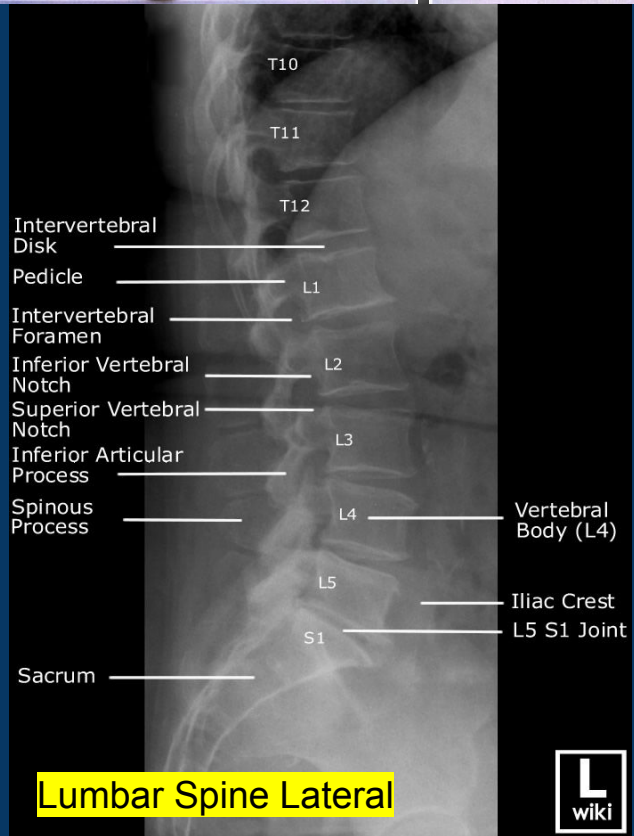
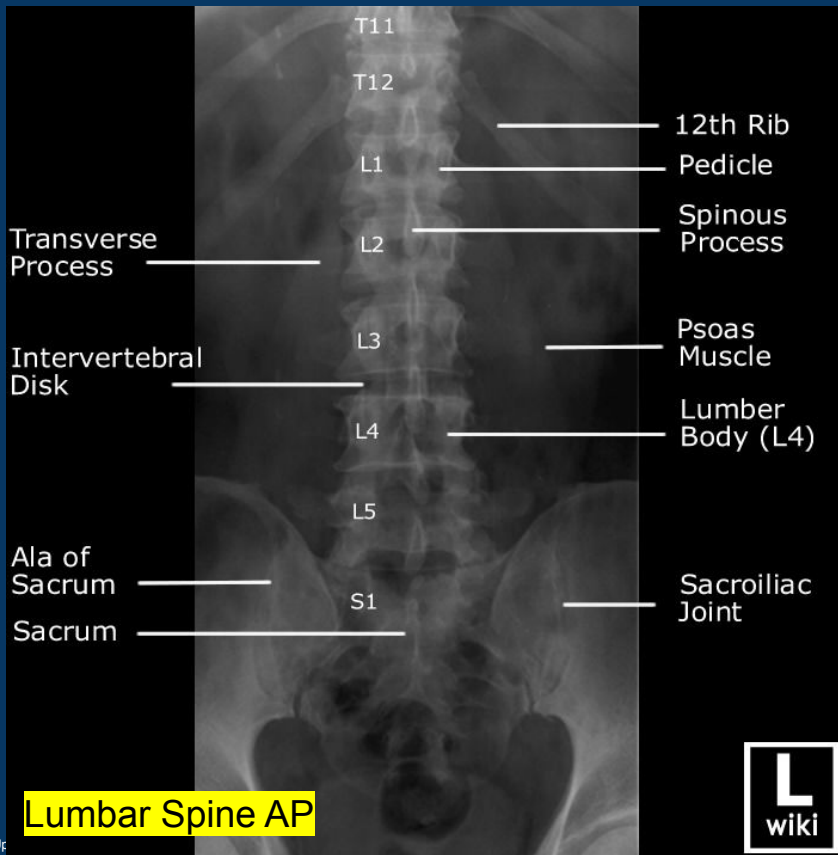
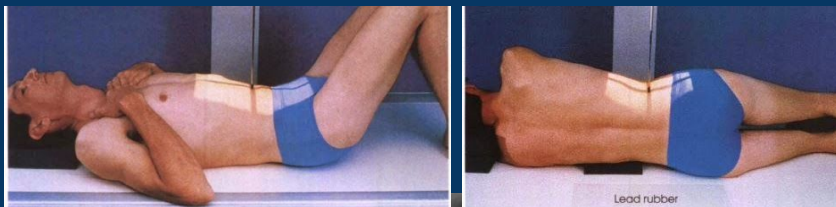


# Abnormal Cervical XRs



# Lumbar Spine

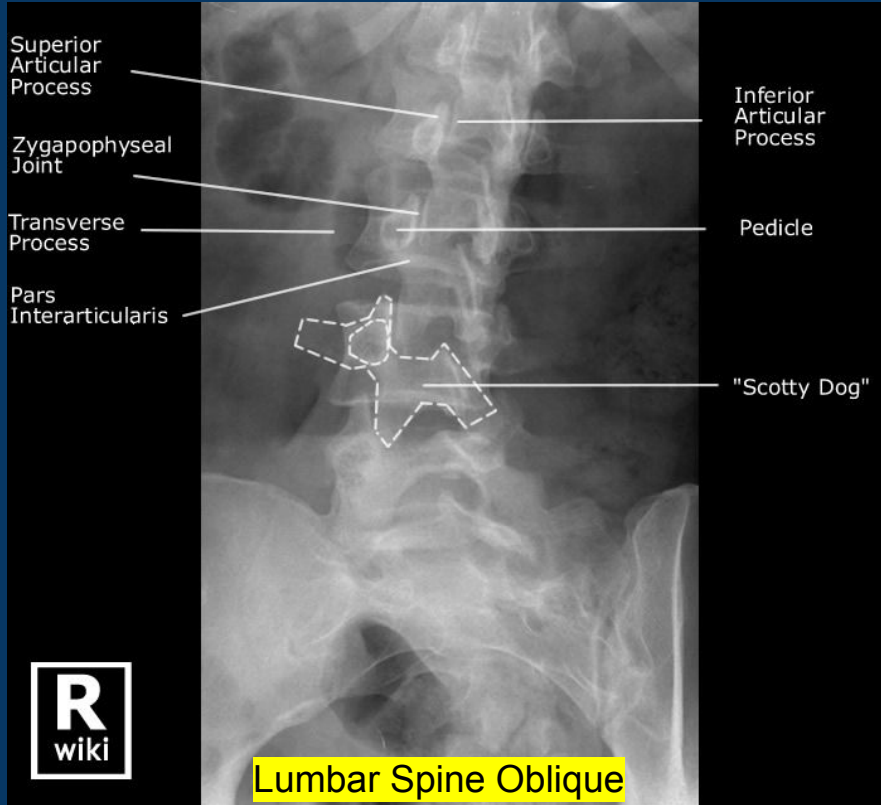
# Lumbar Spine Normal XR



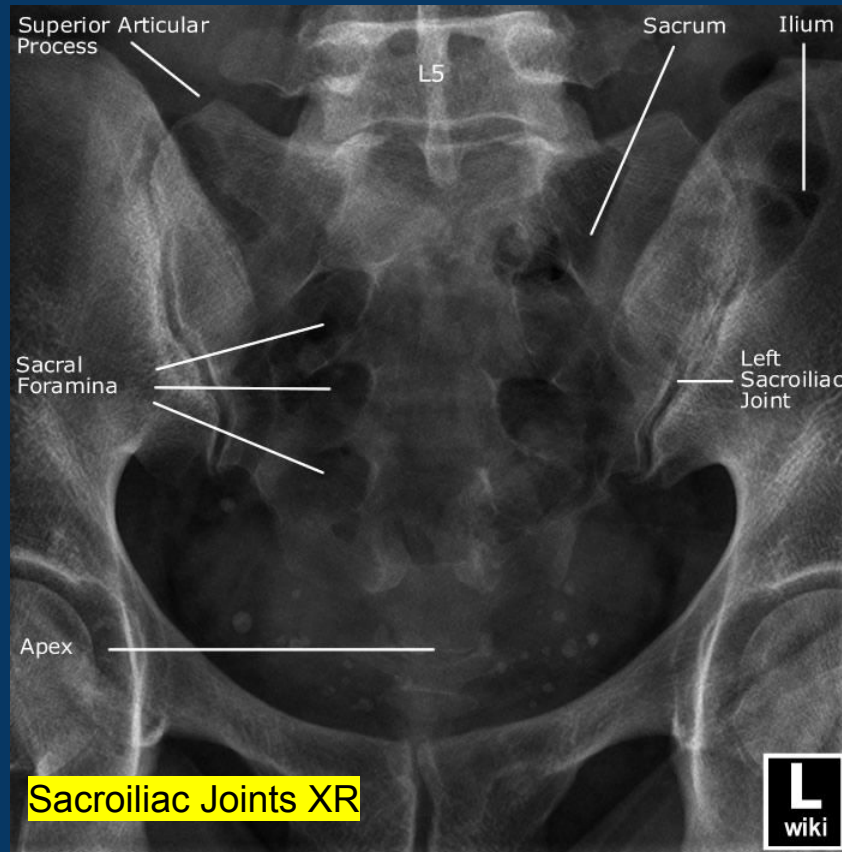
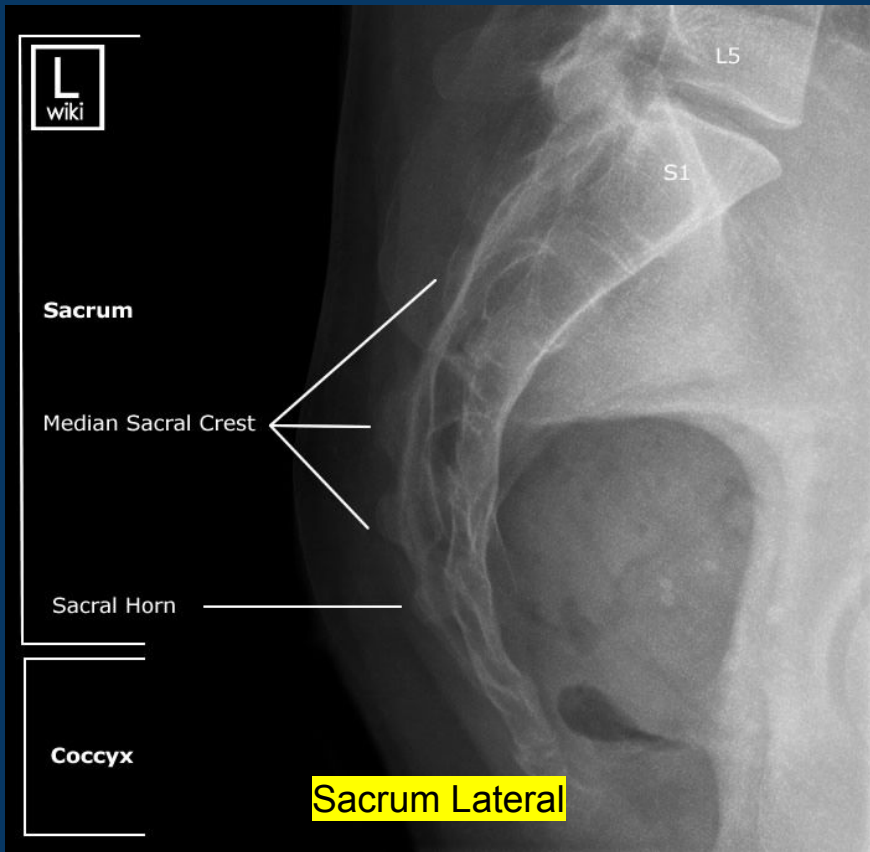
# Lumbar Spine Flexion/ Extension Views



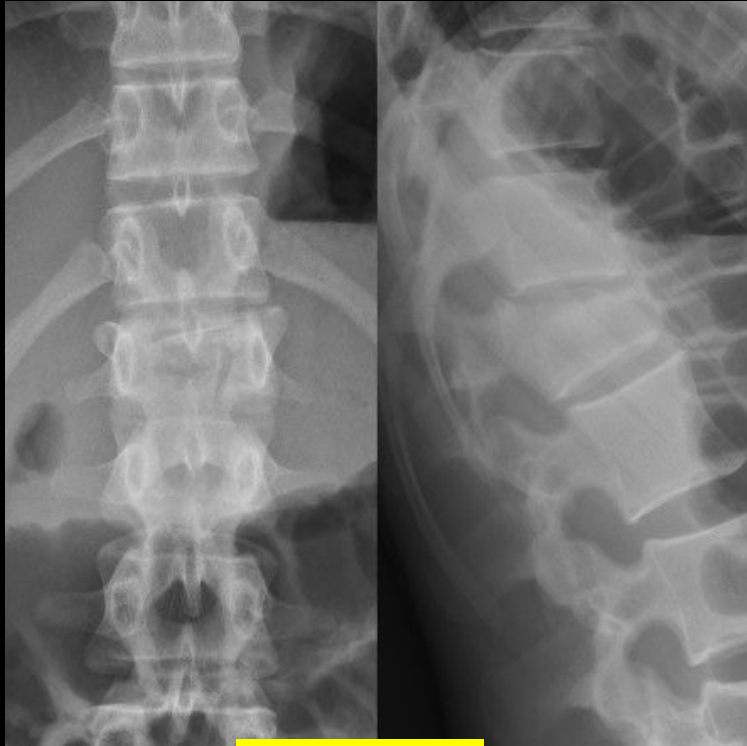
# Lumbar Spine Special Views (largely replaced with CT)



# Sacrum/ Sacroiliac Joint Normal XR



# Abnormal Lumbar XRs



L1 Burst Fracture



L? Compression Fracture



L5/S1 DDD

# Summary Table of XRs

Region (Lines)	Orthogonal Sets	Special Views
Shoulder <i>(Moloney's Arch)</i>	AP/ Axial	Y-Scapula, Velpeau Zanca (ACJ)
Humerus	AP/ Lateral	
Elbow <i>(Anterior Humeral, Radiocapitellar Lines)</i>	AP/ Lateral	Greenspan (Radial head) Internal Oblique (Lateral Condyle #)
Forearm	AP/ Lateral	
Wrist <i>(Gilula Lines, Radial Parameters)</i>	PA/ Lateral	Scaphoid Carpal Tunnel
Hand	PA/ Lateral/ Oblique	
Finger	PA/ Lateral/ Oblique	
Pelvis <i>(Acetabular Lines)</i>	AP	Inlet/ Outlet Iliac/Obturator Oblique
Sacroiliac Joint	AP Sacrum lateral	

Region (Lines)	Orthogonal Sets	Special Views
Hip <i>(Shenton's Line)</i>	AP/ Lateral	
Femur	AP/ Lateral	
Knee	AP/ Lateral (Weight bearing for OA)	Skyline (PFJ) Rosenberg (Medial Joint Space) Long Leg (Mech axis)
Tibia	AP/ Lateral	
Ankle	AP/ Lateral/ Mortise	
Foot	AP/ Lateral/ Oblique	Harris, Broden's (Calcaneum)
Toes	AP/ Lateral/ Oblique	
Cervical Spine <i>(4 Lines for alignment) (Retropharyngeal Swelling 2-6-6-2)</i>	AP/ Lateral	Open mouth (C2) Swimmer's (C7) Flexion/ Extension
Lumbar Spine	AP/ Lateral	Flexion/ Extension