



DARTMOUTH-HITCHCOCK MEDICAL CENTER

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DEPARTMENT OF RADIOLOGY

DIAGNOSTIC SECTION

DIGITAL IMAGE STANDARDS FOR ROUTINE RADIOGRAPHY

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Acknowledgment

The digital radiographic images displayed in this manual are the product of the skill, ingenuity, and perseverance of the radiographers of the Dartmouth-Hitchcock Medical Center diagnostic radiology department. This manual would not have been possible without their professionalism and their dedication to adhering to the highest standards of image quality.

GJB

Preface

Digital Image Standards for Routine Radiography was developed for radiographers and clinicians for the purpose of standardizing the production, storage and display of digital images. Radiographers are provided a reference for image qualities and orientation and for the sequencing of digital images before archiving to PACS. Clinicians have a reference for selecting the appropriate positions/projections and exams to meet their imaging needs and expectations. Clinicians must be aware that the resulting diagnostic value of an exam is affected by the patient's ability to comply with the demands of the exam requested.

Digital Image Standards for Routine Radiography describes both routine and non-routine positions/projections performed at Dartmouth-Hitchcock Medical Center. The routine as indicated by an asterisk is required by radiology, and positions/projections can be omitted from, substituted for or added to the routine at the discretion of the radiology staff. The patient's ability to safely comply with imaging requirements and/or the concerns for minimizing radiation exposure will be determining factors for altering the routine. Additional images may be acquired if the benefit of the diagnostic information outweighs the risk.

This manual does not describe how to perform the positions/projections listed. The reader is referred to the many excellent radiographic positioning textbooks available. A partial listing is included at the end of this manual.

Image Formation Standards

- ALARA (As Low As Reasonably Achievable) for minimum radiation dose accomplished with the following:
 - Collimate to radiate only the area of interest.
 - Shield sensitive body parts.
 - Accurate exposure factor selection as indicated by the exposure value indicator.
 - Exposure factors optimized for lowest dose (high kVp, low mAs) consistent with acceptable image quality.
- Electronic shuttering adjusted to display edge of collimated area.

Image Annotation Standards

- Lead side marker with technologist initials visible without obscuring crucial anatomy. Electronic side marker used only when lead marker is not visible.
- In addition to the electronic position annotations indicated in this manual, position annotation is to be added to any image not acquired in the routine manner - example: "SUPINE" or "AP SEMI-ERECT at DEGREES" and "____SID" annotations added to a chest x-ray not performed PA Erect at 72" S.I.D (Source Image Distance).

Image Orientation Standards

- AP and PA images oriented as if viewing patient from front (patient's left to viewer's right).
- Left and right laterals of spines, thorax and abdomen are oriented with anterior anatomy to viewer's left.
- Cross-table lateral spines oriented as if done in routine position (vertical orientation with anterior anatomy to viewer's left).
- Lateral decubitus images oriented as AP projection. Decubitus image is labeled "Right Lateral Decubitus" or "Left Lateral Decubitus" depending on which side is down.
- Hand, wrist, forearm and foot are to have distal part uppermost in image. All other extremities are to have distal part lowermost.
- Extremities oriented vertically or horizontally as indicated in this manual. Only lateral hip, AP/lateral humerus and AP/lateral tibia/fibula oriented diagonally if too long for image receptor. Diagonal positioning on a CR cassette is to be from upper left corner to lower right corner.



Example of proper diagonal orientation

How To Use This Manual

for

- ① Essentials for Image Acceptability**
- ② Image Orientation**
- ③ Image Sequencing**
- ④ Routine Projections/Positions**
- ⑤ Positioning, Centering and Collimation**

❖ Sample Page Layout ❖

① Image essentials in the right column define proper positioning, annotation and visual qualities.

② Displayed image is in proper orientation for side indicated by 'L' or 'R'. Opposite side would be a mirror image.

③ Images are displayed in the sequence to be sent to PACS.

④ Asterisk after projection/position indicates routinely acquired when exam requested.

⑤ Displayed image represents acceptable exposure, positioning, centering and collimation.

Wrist	
	PA * <ul style="list-style-type: none">Distal ulna and radius and proximal 2/3 of metacarpals visible.3rd metacarpal in alignment with long axis of radius.No rotation of wrist evident.Ulna/radius and metacarpals aligned to vertical center of image with metacarpals uppermost.
	PA Oblique * <ul style="list-style-type: none">Distal ulna and radius and the proximal 2/3 of the metacarpals visible.3rd metacarpal in alignment with long axis of radius.Navicular well demonstrated.Ulna/radius and metacarpals aligned to vertical center of image with metacarpals uppermost.
	Lateral * <ul style="list-style-type: none">Distal ulna and radius and the proximal 2/3 of metacarpals visible.Shafts of distal ulna/radius superimposed.2nd to 5th metacarpals superimposed.2nd to 5th metacarpals in alignment with long axis of radius.Pisiform midline centered between anterior surfaces of navicular and capitate.Ulna/radius and metacarpals aligned to vertical center of image with metacarpals uppermost.
	Navicular (Stecher) View (*routine when hx of trauma) <ul style="list-style-type: none">Distal ulna/radius, proximal metacarpals and all of carpal bones visible.Wrist in ulnar flexion.1st metacarpal in alignment with long axis of radius.Metacarpals uppermost.
	Carpal Tunnel <ul style="list-style-type: none">Anterior portions of trapezium, navicular tuberosity, capitate, hamate hook, triquetrum and all of pisiform visible.Anterior wrist surfaces uppermost.



Digital Image Standards for Routine Radiography

Imaging Terminology

The following definitions apply to the terminology used in this manual:

- *Position:* The position of the patient's body at the time of imaging. Prone, supine, erect, standing, decubitus, oblique and lateral describe a patient's position.
- *Projection:* The path of the x-ray beam through the body sometimes expressed as a double term with the first term indicating entrance side and the second indicating exit side. AP (antero-posterior). PA (postero-anterior), supero-inferior, infero-superior, lateral (for the head and trunk of the body), medio-lateral or latero-medial (for extremities) describe projections. Axial and semi-axial describe a projection along or nearly along the long axis (sagittal or coronal plane) of the body.
- *View:* The orientation of an image as viewed by the detector or the viewer. The terms anterior, posterior, superior, inferior, oblique and lateral used as a view describe the patient's side closest to the detector. The use of the term *view* has been avoided in this manual to eliminate confusion with positions and projections.

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ABDOMEN

Abdomen



AP Supine *

- Symphysis pubis to upper abdomen including both hemidiaphragms visible - a second high transverse image may be needed.
- Spine and pelvis aligned with image midline.
- No evidence of rotation.

Abdomen Series



AP Supine *

- Symphysis pubis to upper abdomen including both hemidiaphragms visible - a second high transverse image may be needed.
- Spine and pelvis aligned with image midline.
- No evidence of rotation.



AP Erect * (do left lateral decubitus if patient unable to stand)

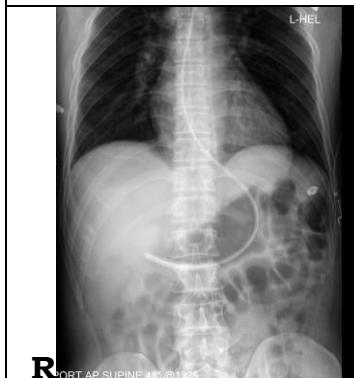
- Highest point of hemidiaphragms visible including adjacent lung anatomy.
- Spine and pelvis aligned with image midline.
- No evidence of rotation.
- "ERECT" or "UPRIGHT" annotation visible.



Left Lateral Decubitus (done only if AP Erect not possible)

- Right costophrenic angle and upper half of pelvis visible.
- Both sides are to be included without sacrificing the skin edge of elevated side.
- No evidence of rotation.
- "LEFT LAT DECUBITUS" annotation visible.

Abdomen - Naso-Gastric Tube Position



AP Supine *

- Hemidiaphragms aligned to image center to maximally visualize thorax and abdomen.
- Carina visible at top of image.
- If N-G tube not visible or not in proper position, notify requesting clinician.
- Spine aligned to image midline.
- No evidence of rotation.

Acute Abdominal Series



AP Supine *

- Symphysis pubis to upper abdomen including both hemidiaphragms visible - a second high transverse image may be needed.
- Spine and pelvis aligned with image midline.
- No evidence of rotation.



AP Erect * (do left lateral decubitus if patient unable to stand - see page 1)

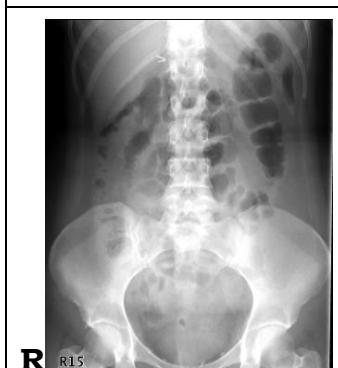
- Symphysis pubis to upper abdomen, and ideally, both hemidiaphragms visible.
- Hemidiaphragms must be included if erect CXR is not requested or performed.
- Spine and pelvis aligned with image midline.
- No evidence of rotation.
- "ERECT" or "UPRIGHT" annotation visible.



PA Erect Chest at 72" S.I.D. *

- Entire lung fields from apices to both costophrenic angles visible.
- Ten posterior ribs above diaphragm visible.
- No evidence of rotation.
- No blurring of heart or diaphragm.
- Thorax aligned with image midline.

KUB (Kidneys Ureters Bladder)

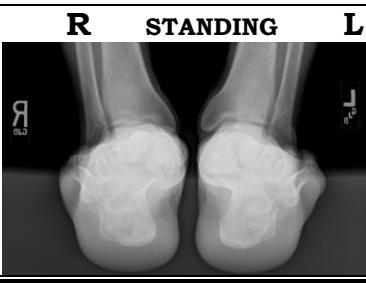


AP Supine *

- Both kidney shadows visible - a second high transverse image may be needed.
- Pubic symphysis visible.
- No evidence of rotation.
- Spine and pelvis aligned with image midline.

EXTREMITIES - LOWER

Ankle

 L STANDING	<p><u>AP Weight Bearing *</u></p> <ul style="list-style-type: none"> • Ankle joint open except near fibula. • Distal 1/4 of tibia/fibula visible. • Medial and lateral malleoli visible. • "STANDING" annotation visible (if applicable).
 L STANDING	<p><u>Internal Oblique (Mortise View) Weight Bearing *</u></p> <ul style="list-style-type: none"> • Entire ankle joint open. • Distal fibula not superimposed over talus or os calcis. • Proximal end of 5th metatarsal visible. • Distal 1/4 of tibia/fibula visible. • Medial and lateral malleoli visible. • "STANDING" annotation visible (if applicable).
 L STANDING	<p><u>Lateral Weight Bearing *</u></p> <ul style="list-style-type: none"> • Ankle joint open. • Fibula superimposed over the posterior half of tibia. • Distal 1/4 of tibia/fibula visible. • Proximal half of 5th metatarsal to be included. • Achilles tendon included by visualizing posterior skin edge. • "STANDING" annotation visible (if applicable).
 R STANDING L	<p><u>Tibio-calcaneal (Morrey) View</u></p> <ul style="list-style-type: none"> • Distal 1/4 of both tibias visible. • Ankle joint visible above shadow of forefoot. • Sufficient penetration to visualize talo-calcaneal joint. • Entire os calcis visible bilaterally. • "STANDING" annotation visible.
<h3>Femur</h3>	
 L L	<p><u>AP *</u></p> <ul style="list-style-type: none"> • Most of femur and joint nearest area of interest to be included - a second image to include opposite end is to be done if femur not imaged in its entirety. • Femoral neck visible without foreshortening. • Gonadal shielding evident. • Demonstrate complete orthopedic device if present.
 L L	<p><u>Lateral*</u></p> <ul style="list-style-type: none"> • Most of femur and joint nearest area of interest to be included - a second image to include opposite end is to be done if femur not imaged in its entirety. • Greater trochanter superimposed over femoral neck. • Space between distal femur and patella open. • Gonadal shielding evident. • Demonstrate complete orthopedic device if present.

Foot

 Right Standing	<p><u>Dorsoplantar Weight Bearing *</u></p> <ul style="list-style-type: none"> • Metatarsal-phalangeal joint spaces open. • Overlapping of metatarsals only at proximal ends. • Cuneiforms, cuboid and navicular visible. • Foot aligned with vertical center of image with toes uppermost. • "STANDING" annotation visible (if applicable).
 Right Standing	<p><u>Dorsoplantar Medial Oblique Weight Bearing *</u></p> <ul style="list-style-type: none"> • 5th metatarsal tuberosity visualized in profile. • Cuboid-os calcis joint space visible. • 3rd cuneiform-cuboid joint space open. • Foot aligned with vertical center of image with toes uppermost. • "STANDING" annotation visible (if applicable).
 Right Standing	<p><u>Lateral Weight Bearing *</u></p> <ul style="list-style-type: none"> • Superimposition of metatarsals will vary according to transverse arch of foot. • Ankle joint and distal tibia/fibula visible. • Plantar surface parallel with horizontal plane with ankle uppermost. • "STANDING" annotation visible (if applicable).
 L	<p><u>Tangential Sesamoid</u></p> <ul style="list-style-type: none"> • Sesamoid bones free of superimposition with 1st metatarsal. • Sesamoid bones uppermost in image.
 R	<p><u>Talar Neck (Canale View)</u></p> <ul style="list-style-type: none"> • Talar neck not superimposed by os calcis. • All tarsal bones visible.

Hip



AP Pelvis * (If recent fx evident, include AP CXR & AP entire affected femur)

- Entire iliac bones visible.
- Spine and pubic symphysis aligned with image midline.
- Lower extremities internally rotated to prevent foreshortening of femoral necks.
- Greater trochanter prominently demonstrated.
- Obturator foramina equal in size and shape.
- Any orthopedic device seen in its entirety.



Frog Lateral * (routine only for non acute trauma)

- Hip joint, acetabulum, and femoral neck visible.
- Proximal 1/4 of femoral shaft visible.
- Greater trochanter superimposed over femoral neck.
- Any orthopedic device seen in its entirety.



Cross-Table Lateral * (routine only for acute trauma or if specifically requested)

- Hip joint and acetabulum visible.
- Proximal 1/4 of femoral shaft visible.
- Minimal foreshortening of femoral neck.
- Femur aligned with vertical center of image.
- Any orthopedic device seen in its entirety.

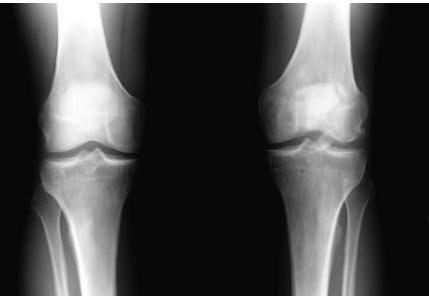


AP Hip With Magnification Marker

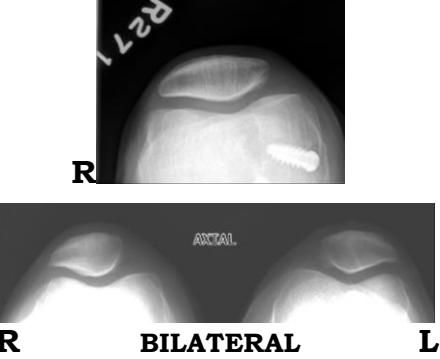
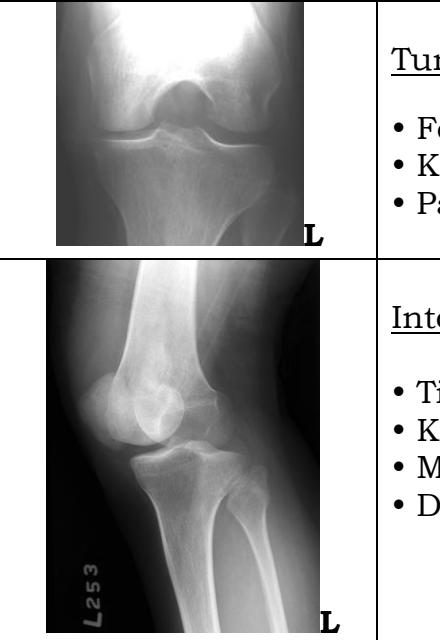
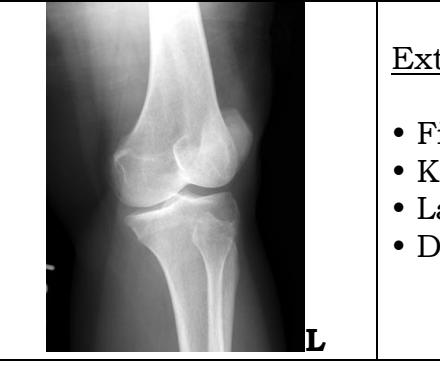
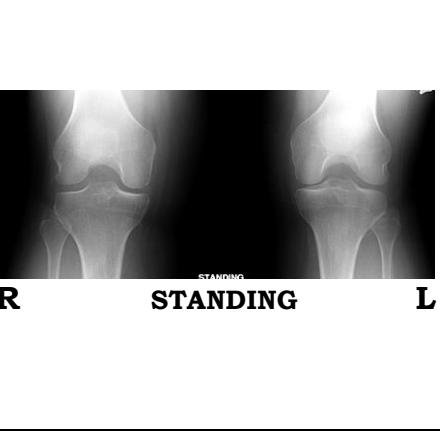
- Femoral neck visible without foreshortening.
- Magnification marker is seen in its entirety.
- Magnification marker in transverse alignment with greater trochanter and central ray.
- Proximal 12 inches of femur visualized.
- Any orthopedic device seen in its entirety.

 R	<p><u>False Profile</u></p> <ul style="list-style-type: none"> • Anterior acetabular surface visible. • Greater trochanter superimposed over femoral neck. • Lesser trochanter visible. • Acetabulum and femur free of superimposition from soft tissue of contra lateral thigh. • Femur aligned with vertical center of image. • If requested with magnification marker, marker is to be in transverse alignment with greater trochanter and central ray. Also, proximal 12 inches of femur visualized.
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 R	<p><u>Clements-Nakayama</u> (routine for post-op total hip replacement)</p> <ul style="list-style-type: none"> • Acetabulum and proximal femur visible. • Acetabulum and femur free of superimposition from soft tissue of contra lateral thigh. • Any orthopedic device seen in its entirety. • Femur aligned with vertical center of image.
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Knee	
 R STANDING L	<p><u>Bilateral AP Standing</u> * (AP of affected knee only if patient unable to stand)</p> <ul style="list-style-type: none"> • Knee joints aligned to horizontal center of image. • Knee joint spaces open. • Patellar edges should not extend beyond edge of femur. • Distal 1/4 of femurs and proximal 1/4 of tib/fib visible. • Any orthopedic device seen in its entirety. • "STANDING" annotation visible (if applicable).

 L Tec	<p><u>Lateral</u> *</p> <ul style="list-style-type: none"> • Knee joint aligned to center line of image. • Superimposed femoral condyles evident. • Space between distal femur and patella open. • Knee joint flexed 20° to 30°. • Distal 1/4 of femurs and proximal 1/4 of tib/fib visible. • Any orthopedic device seen in its entirety.
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	<p><u>Axial (Sunrise)</u></p> <ul style="list-style-type: none"> • Joint space between distal femur and patella open. • Femoral condyles visualized. • Patella uppermost in image. • Side marker visible near lateral aspect of patella.
	<p><u>Tunnel</u></p> <ul style="list-style-type: none"> • Fossa aligned to center of image. • Knee joint space open. • Patella should not superimpose fossa.
	<p><u>Internal Oblique</u></p> <ul style="list-style-type: none"> • Tibia/fibula joint space open. • Knee joint aligned to center of image. • Medial edge of patella projected beyond the femoral edge. • Distal 1/4 of femur and proximal 1/4 of tib/fib visible.
	<p><u>External Oblique</u></p>
	<p><u>Schuss View (Bilateral PA flexed weight bearing - Rosenberg Method)</u></p> <ul style="list-style-type: none"> • Knee joints aligned to horizontal center of image. • Articular surface of femoral condyles free of superimposition with tibial plateaus. • Joint space between distal femurs and proximal tibias open. • Anterior and posterior rims of the tibial plateau superimposed. • "STANDING" annotation visible.

Knee (Standing) Alignment



AP Standing Digital Merged (Stitched) Image*

- Must include ankle joint to hip joint bilaterally.
- Bare or stocking feet parallel to produce true AP projection of ankles, knees and hips.
- Ruler not superimposed over ankle, knee or hip joints.
- 2mm or less of anatomy shift visible.
- Gonad shield visible.



AP *

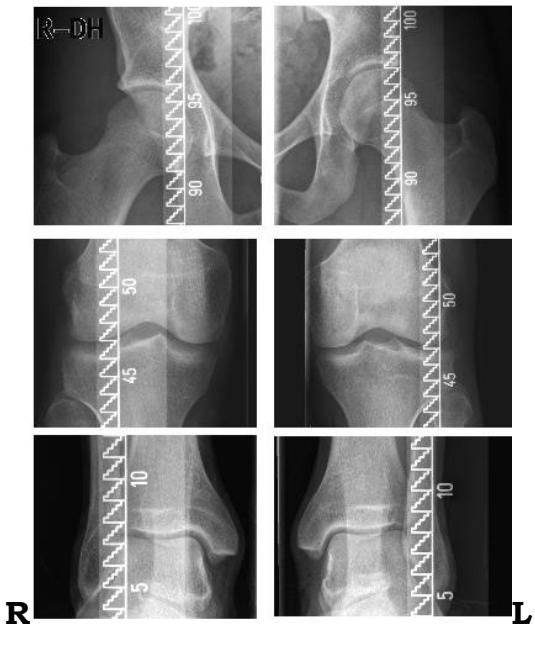
- Preferably, both ankle and knee joints included on one image. Do 2nd image if needed.
- Ankle and knee joints in true AP position.



Lateral *

- Preferably, both ankle and knee joints included on one image. Do 2nd image if needed.
- Ankle and knee joints in lateral position with knee joint flexed.

Leg Length (Orthoroentgenography)



Bilateral AP Ankle, knee, and hip with Ruler

- Each side and joint imaged separately with ruler markings visible.
- Central ray directed through each joint space.
- Technique must clearly visualize ruler markings through superimposed joint space.
- Images archived in PACS in following order:
 - Right side:
 - AP Hip
 - AP Knee
 - AP Ankle
 - Left side:
 - AP Hip
 - AP Knee
 - AP ankle

Os Calcis (calcaneus)



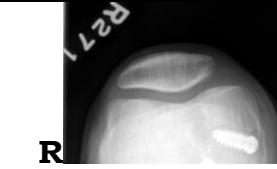
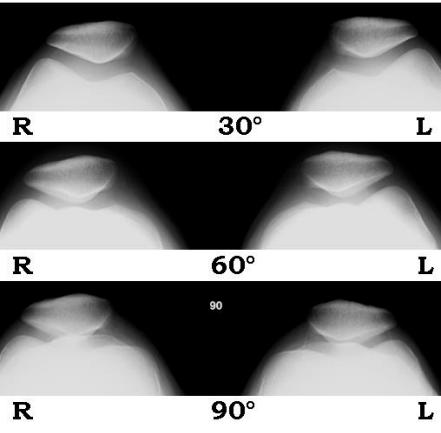
Plantodorsal Semi-axial Weight Bearing (Harris View) *

- Entire os calcis visualized from medial and posterior subtalar joints anteriorly to tuberosity posteriorly.
- Plane of os calcis aligned with vertical midline of image with anterior surface uppermost.
- "STANDING" annotation visible.



Lateral Weight Bearing *

- Sinus tarsi visualized (space between talus and calcaneus).
- Ankle joint visible.
- Tarsals anterior to os calcis visible.
- Achilles tendon included by visualizing posterior skin edge.
- "STANDING" annotation visible.

Patella		
 L	<p><u>PA *</u></p> <ul style="list-style-type: none"> • Patellar edges not to extend beyond edge of femur. • Patella in center of image. • Knee joint including proximal fibula included. • Tibia and femur aligned to vertical center of image. 	
 L	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> • Space between distal femur and patella open. • Knee joint including proximal fibula included. 	
 R  R BILATERAL L	<p><u>Axial (Sunrise)*</u></p> <ul style="list-style-type: none"> • Joint space between distal femur and patella open. • Femoral condyles visualized. • Patella uppermost in image. • Side marker visible near lateral aspect of patella. 	
 R 30° L R 60° L R 90° L	<p><u>30°- 60°- 90° Bilateral Axials (Sunrises)</u></p> <ul style="list-style-type: none"> • Joint spaces between distal femurs and patellas open. • Femoral condyles visualized. • Patellas uppermost in image. • Side marker visible near lateral aspect of patella. • Degrees of flexion annotated on appropriate images. 	
Pelvis		
 R	<p><u>AP Pelvis *</u> (If recent fx evident, include AP CXR and include AP entire affected femur if hip fx'd)</p> <ul style="list-style-type: none"> • Entire iliac bones visible. • Spine and pubic symphysis aligned with image midline. • Lower extremities internally rotated to prevent foreshortening of femoral neck. • Greater trochanter prominently demonstrated. • Obturator foramina equal in size and shape. • Any orthopedic device seen in its entirety. 	



R

Total Hip (THR) AP *

- Inferior border of pubic symphysis in center of image.
- Spine and pubic symphysis aligned with image midline.
- No foreshortening of femoral neck.
- Greater trochanter prominently demonstrated.
- Obturator foramina equal in size and shape.
- Any orthopedic device seen in its entirety.



R

Judet Views (Bilateral 45° posterior obliques)

- Entire iliac bones visible.
- Both hip joints visualized on each image.
- Downside acetabulum and femoral head demonstrated in profile.
- Posterior rim of acetabulum should superimpose mid way through femoral head on downside hip joint.
- Acetabulum and femoral head almost completely superimposed on up side.



R

Inlet View

- No rotation as evident by the ischial spines fully demonstrated and equal in size.
- All of pelvic ring (inlet) including S-I joints and pubic symphysis visible.
- Spine and pubic symphysis aligned with vertical center of image.



R

Outlet View

- No rotation as evident by obturator foramina and bilateral ischia equal in size and shape.
- Inferior and superior pubic rami and ischia rami demonstrated with minimal foreshortening or superimposition.
- Spine and pubic symphysis aligned with vertical center of image.



R

Subtalar Joint



Broden Series with 10°, 20°, 30° and 40° Cephalic Angles

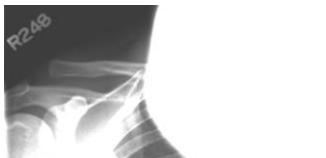
- Distal tibia/fibula and entire talus and os calcis visible in all views.
- Posterior subtalar joint space visible in all views.
- Tibia/fibula aligned to vertical center of image.
- Each image annotated with appropriate degrees of angle.

Toes

 L	<p><u>Dorsoplantar *</u></p> <ul style="list-style-type: none"> • Joint spaces open. • Majority of adjacent metatarsal visible. • Distal phalanx uppermost in image.
 L	<p><u>Dorsoplantar (or Plantodorsal) Oblique *</u></p> <ul style="list-style-type: none"> • Joint spaces open. • Majority of adjacent metatarsal visible. • Distal phalanx uppermost in image.
 L	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> • Toes separated to prevent superimposition. • Metatarsal-phalangeal joint visible. • Joint spaces open. • Distal phalanx uppermost in image.

UPPER EXTREMITIES

Acromio-Clavicular Joints

 R	<p><u>Simultaneous Bilateral AP Erect *</u></p> <ul style="list-style-type: none"> • A-C joint including distal 1/3 of clavicle, coracoid process and acromion process visible. • No rotation of body evident. • Thyroid shield visible. • "WITHOUT WEIGHTS" annotation visible.
 R	<p><u>Simultaneous Bilateral AP Erect Axial *</u></p> <ul style="list-style-type: none"> • A-C joint including distal 1/3 of clavicle, coracoid process and acromion process visible. • Thyroid shield visible. • 30 Deg cephalic central ray angle.

Clavicle

 R	<p><u>AP or PA *</u></p> <ul style="list-style-type: none"> • Entire clavicle visible. • At least half of the clavicle free of superimposition from ribs. • Clavicle aligned to horizontal center of image.
 R	<p><u>AP 30° Cephalic or PA 30° Caudal Angle *</u></p> <ul style="list-style-type: none"> • Entire clavicle visible. • At least 2/3 of the clavicle free of superimposition from ribs. • Clavicle aligned to horizontal center of image.

Elbow

	<p><u>AP *</u></p> <ul style="list-style-type: none">• Elbow joint aligned to center of image.• Forearm/humerus aligned to vertical center of image with humerus uppermost.• Epicondyles prominently demonstrated.• Elbow joint space open.
	<p><u>Lateral *</u></p> <ul style="list-style-type: none">• Elbow joint open and centered to central ray.• Elbow joint flexed 90°.• Humerus parallel to vertical plane and forearm parallel to horizontal plane of image.
	<p><u>Externally Rotated Oblique *</u></p> <ul style="list-style-type: none">• Radial head free of superimposition with ulnar coronoid process.• Forearm and humerus aligned to vertical center of image with humerus uppermost.
	<p><u>Cubital Tunnel (PA axial)</u></p> <ul style="list-style-type: none">• Ulnar sulcus visible.• Radial head-capitulum joint space visible.• Forearm/humerus aligned to vertical center of image with olecranon process uppermost.

Finger

	<p><u>PA, Oblique and Lateral *</u></p> <ul style="list-style-type: none">• Include distal 1/3 of adjacent metacarpal. If for thumb, include all of first metacarpal.• No soft tissue overlap from adjacent fingers.• Interphalangeal and metacarpophalangeal joint space open.• Finger aligned to vertical image plane with distal phalanx uppermost.
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Forearm

 R	<p><u>AP *</u></p> <ul style="list-style-type: none"> • Carpal bones and humeral epicondyles visible with no rotation. • Forearm aligned to vertical center of image with wrist uppermost.
 R	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> • Carpal bones and distal 1/4 of humerus visible. • 90° flexion of elbow. • Distal ulna and radius superimposed. • Forearm aligned to vertical center of image with wrist uppermost.

Hand

 R	<p><u>PA *</u></p> <ul style="list-style-type: none"> • Include wrist and distal ends of radius and ulna. • No rotation of hand. • No soft tissue overlap from adjacent fingers. • Interphalangeal and metacarpophalangeal joint spaces open. • Hand aligned to vertical center of image with fingers uppermost.
 R	<p><u>PA Oblique *</u></p> <ul style="list-style-type: none"> • Include wrist and distal ends of radius and ulna. • Fingers extended so interphalangeal joint spaces are open and phalanges are not foreshortened. • 2nd and 3rd metacarpals free of overlap and minimal overlap of 3rd through 5th metacarpals. • No soft tissue overlap from adjacent fingers. • Hand aligned to vertical center of image with fingers uppermost.

	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> • Include wrist and distal ends of radius and ulna. • Phalanges individually demonstrated on fan lat. • 2nd to 5th metacarpals superimposed. • 2nd to 5th metacarpals in alignment with long axis of radius. • Distal radius and ulna superimposed. • Hand aligned to vertical center of image with fingers uppermost.
	<p><u>Noorgaard (Ballcatcher's or AP Oblique Projection) (* routine if for arthritis)</u></p> <ul style="list-style-type: none"> • Both hands included from distal tips of fingers to distal ulna and radius. • Degree of obliquity must be so metacarpal heads and the pisiform bone are free of superimposition. • Medial aspect of hands aligned to vertical center of image with fingers uppermost.
	<p><u>Brewerton (AP Flexed)</u></p> <ul style="list-style-type: none"> • 2nd through 5th metacarpal phalangeal joints visible without superimposition of palmar soft tissue. • Hand aligned to vertical center of image with fingers uppermost.
Humerus	
	<p><u>AP *</u></p> <ul style="list-style-type: none"> • Proximal ulna and radius, shoulder and A-C joints visible. • Epicondyles prominent with no rotation.
	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> • Proximal ulna and radius, shoulder and A-C joints visible • 90° flexion of elbow with either internal or external rotation of arm.

Scapula	
	<p><u>AP *</u></p> <ul style="list-style-type: none"> • Humeral head, acromion process and all of scapula visible. • Axillary border not superimposed by ribs.
	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> • Acromion process and distal end of clavicle visible. • Axillary and vertebral borders of scapula superimposed. • Ribs and humerus not superimposed over body of scapula.
Shoulder	
	<p><u>AP Oblique External Rotation (Grashey Method) *</u></p> <ul style="list-style-type: none"> • Shoulder joint space open. • Anterior and posterior rim of glenoid fossa superimposed. • Greater tuberosity in profile on lateral aspect of humerus. • Acromion process and distal end of clavicle visible.
	<p><u>AP Internal Rotation *</u></p> <ul style="list-style-type: none"> • Proximal humerus, scapula and clavicle visible. • Humeral head not superimposed by acromion process.
	<p><u>Scapular "Y" View *</u></p> <ul style="list-style-type: none"> • Acromion process and distal end of clavicle visible. • Axillary and vertebral borders of scapula superimposed. • Humerus superimposed over scapular body. • Glenoid fossa in center of humeral head.



Axial (Axillary) View *

- Shoulder joint space open.
 - Inferior and superior rim of glenoid fossa superimposed.
 - A-C joint demonstrated through humeral head.
 - Humerus aligned to horizontal image center.
 - Anterior surface uppermost (coracoid process projected upward)



Velpeau (Trauma) Axillary (*routine only when axial view not possible due to immobile adducted arm)

- Scapular neck, glenoid fossa and humeral head visible.
 - Coracoid process visualized in profile and projected downward.



Arch (Supraspinatus Outlet) View

- Supraspinatus outlet maximally opened (outlet is area enclosed by superior border of scapula, acromion process and distal clavicle).
 - Upper half of scapular body, acromion process, distal clavicle and coracoid process visible.
 - Axillary and vertebral scapular borders superimposed.
 - Scapular body free of superimposition with ribs.
 - Humerus superimposed over scapular body.



Stryker Notch

- Posterolateral surface of humeral head visible.
 - Rim of glenoid fossa visible.
 - Corocoid process superimposed over clavicle.
 - Scapular body free of superimposition with ribs.

Sternoclavicular (S-C) Joints



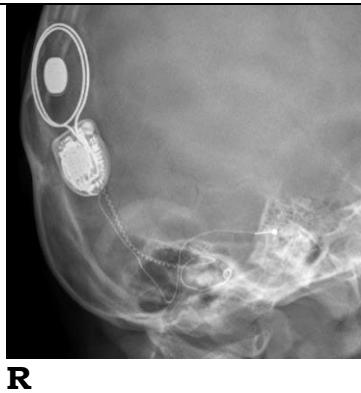
PA Obliques (RAO and LAO) *

- S-C joint of interest (joint closest to detector during exposure) in center of image.
 - Manubrium and medial end of clavicle articulating with joint of interest visible.
 - S-C joint space open.

Wrist	
	<p><u>PA *</u></p> <ul style="list-style-type: none"> • Distal ulna and radius and proximal 2/3 of metacarpals visible. • 3rd metacarpal in alignment with long axis of radius. • No rotation of wrist evident. • Ulna/radius and metacarpals aligned to vertical center of image with metacarpals uppermost.
	<p><u>PA Oblique *</u></p> <ul style="list-style-type: none"> • Distal ulna and radius and the proximal 2/3 of the metacarpals visible. • 3rd metacarpal in alignment with long axis of radius. • Navicular well demonstrated. • Ulna/radius and metacarpals aligned to vertical center of image with metacarpals uppermost.
	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> • Distal ulna and radius and the proximal 2/3 of metacarpals visible. • Shafts of distal ulna/radius superimposed. • 2nd to 5th metacarpals superimposed. • 2nd to 5th metacarpals in alignment with long axis of radius. • Anterior pisiform edge midline between anterior surfaces of navicular and capitate. • Ulna/radius and metacarpals aligned to vertical center of image with metacarpals uppermost.
	<p><u>Navicular (Stecher) View</u> (* routine when hx of trauma)</p> <ul style="list-style-type: none"> • Distal ulna/radius, proximal metacarpals and all of carpal bones visible. • Wrist in ulnar deviation (away from radius). • Navicular well demonstrated with minimal superimposition by adjacent bones. • Metacarpals uppermost.
	<p><u>Carpal Tunnel</u></p> <ul style="list-style-type: none"> • Anterior portions of trapezium, navicular tuberosity, capitate, hamate hook, triquetrum and all of pisiform visible. • Anterior wrist surfaces uppermost.

HEAD / NECK

Cochlear Implant



Axiolateral Oblique Projection (Stenvers or Arcelin) *

- All internal components visible (receiver and electrode system).

Eyes - Pre MRI



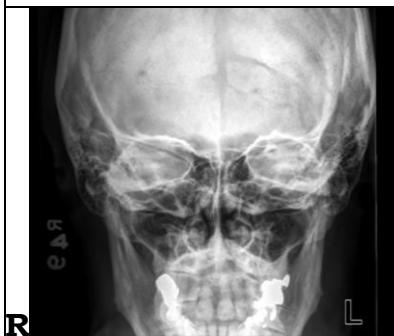
Waters View - *

- Entire frontal and maxillary sinuses and margin of both orbits visible.
- No evidence of head rotation visible.
- Nasal spine aligned to vertical center of image.

Lateral Erect *

- Frontal sinuses, all of sella turcica visible.
- No evidence of head rotation visible.
- If not done erect, lateral must be exposed with beam projected horizontally.

Facial Bones



PA Erect (no angle) *

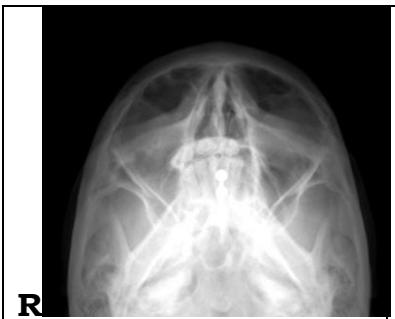
- No evidence of head rotation visible.
- Petrous bones fill orbits.
- Midsagittal plane aligned to vertical center of image.



Waters Erect (Parietoacanthal Projection) *

- Entire frontal and maxillary sinuses, margin of both orbits and zygomatic arches visible.
- Petrous ridges projected immediately below maxillary sinuses.
- No evidence of head rotation visible.
- Nasal spine aligned to vertical center of image.

20



60° SMV Erect (PA Axial) *

- Zygomatic arches, maxillary sinuses, nasal spine and infraorbital margins visible.
- No evidence of head rotation visible.
- Nasal spine aligned to vertical center of image.



90° SMV Erect *

- Zygomatic arches visible.
- No evidence of head rotation visible.
- Symphysis menti uppermost and aligned to vertical center of image.



Lateral Erect *

- Frontal sinuses, all of mandible and sella turcica visible.
- No evidence of head rotation visible.
- If not done erect, lateral must be exposed with beam projected horizontally.

Mandible



PA (Nose/forehead position) *

- Entire mandible visible
- No evidence of head rotation visible.



Bilateral Oblique (Axiolateral Projection) *

- Mandibular condyle to symphysis menti visible.
- Condyle not superimposed by cervical vertebra.
- Angle of opposite side slightly above coronoid process of side closest to imaging plate/detector

Mastoids

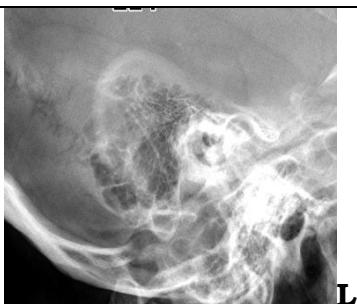


Towne (AP Axial Projection) *

- Entire petrous and mastoid areas visible bilaterally.
- No evidence of head rotation visible.

Right

21



Bilat. Axiolateral Projection (Law or Schuller Projection) *

- Mastoid and petrous areas in center of image.
- Opposite mastoid and petrous regions not to superimpose side of interest.



Bilat. Axiolateral Oblique Projection (Stenvers Method) *

- Mastoid process projected below cranial plate.
- Mastoid process not superimposed over cervical vertebrae.



Nasal Bones

Waters Erect (Parietoacanthal Projection) *

- Entire frontal and maxillary sinuses, margin of both orbits and zygomatic arches visible.
- Petrous ridges projected immediately below maxillary sinuses.
- No evidence of head rotation visible.
- Nasal spine aligned to vertical center of image.



Lateral Erect *

- Nasal bone, anterior nasal spine and soft tissue of nose visible.

Neck - soft tissue

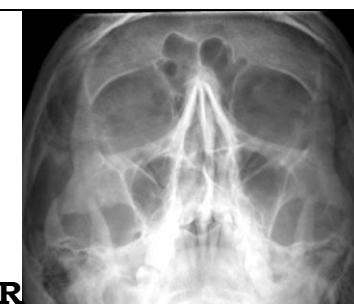
 L	<p><u>AP</u> * (Not routine for adenoid size)</p> <ul style="list-style-type: none"> • Inferior borders of symphysis menti and occipital bone superimposed. • Air filled trachea visible.
 L	<p><u>Lateral</u> *</p> <ul style="list-style-type: none"> • Airway from nose to base of neck visible. • Nasopharynx visible by shallow inspiration through nose. • Neck slightly extended.

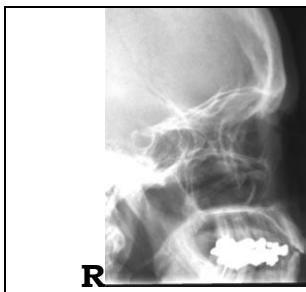
22

Optic Foramen

 L	<p><u>Rhese (Parieto-orbital Oblique Projection)</u> *</p> <ul style="list-style-type: none"> • Optic foramen in lateral portion of orbit. • Entire orbital rim visible.
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Orbits

 R	<p><u>PA Erect with 15° Caudal Angle (Modified Caldwell)</u> *</p> <ul style="list-style-type: none"> • No evidence of head rotation visible. • Entire orbital rim visible bilaterally. • Petrous bone in lower portion of orbits. • Midsagittal plane aligned to vertical center of image.
 R	<p><u>Waters Erect (Parietoacanthal Projection)</u> *</p> <ul style="list-style-type: none"> • Entire frontal and maxillary sinuses, margin of both orbits and zygomatic arches visible. • Petrous ridges projected immediately below maxillary sinuses. • No evidence of head rotation visible. • Nasal spine aligned to vertical center of image.



Lateral Erect *

- Frontal sinuses, all of mandible and sella turcica visible.
- No evidence of head rotation visible.
- If not done erect, lateral must be exposed with beam projected horizontally.



Petrous Ridges

Bilat. Axiolateral Oblique Projection (Stenvers Method) *

- Internal auditory canal visible within petrous bone.
- Outer cranial bone to lateral margin of orbit included.
- Mastoid process visible.



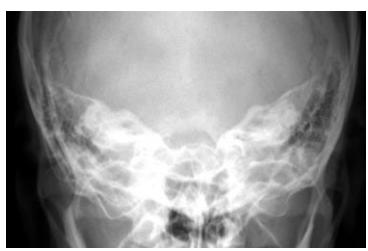
SMV *

- Mandibular condyles, mastoid air cells, posterior sphenoid sinuses and foramen magnum visible.
- No evidence of head rotation visible.



PA with 15° Caudal Angle (Modified Caldwell) *

- Entire orbital rim visible bilaterally.
- Petrous bone in lower portion of orbits.
- No evidence of head rotation visible.
- Midsagittal plane aligned to vertical center of image.



Towne (AP Axial Projection) *

- Entire petrous and mastoid areas visible bilaterally.
- No evidence of head rotation visible.

Sella Turcica



Lateral *

- Sella turcica not rotated.
- Anterior and posterior clinoid processes superimposed.
- Sella turcica in center of image.

Sinuses



PA Erect with 15° Caudal Angle (Modified Caldwell) *

- Entire orbital rim visible bilaterally.
- Petrous bone in lower portion of orbits.
- No evidence of head rotation visible.
- Midsagittal plane aligned to vertical center of image.



Open Mouth Waters Erect *

- Entire frontal and maxillary sinuses and margin of both orbits visible.
- Petrous ridges projected immediately below maxillary sinuses.
- No evidence of head rotation visible.
- Nasal spine aligned to vertical center of image.
- Sphenoid sinuses visualized through the open mouth.



Lateral Erect *

- All paranasal sinuses visible.
- No evidence of head rotation visible.
- If not done erect, lateral must be exposed with beam projected horizontally.



Skull

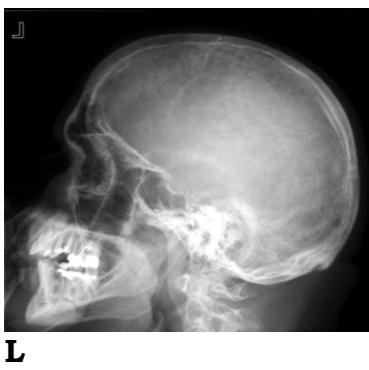
PA (no angle) *

- Entire cranium visible.
- Petrous bones fill orbits.
- No evidence of head rotation visible.
- Midsagittal plane aligned to vertical center of image.



Towne (AP Axial Projection) *

- Occipital bone, temporal and parietal bones visible.
- Posterior clinoid processes visible within foramen magnum.
- Entire petrous and mastoid areas visible bilaterally.
- No evidence of head rotation visible.



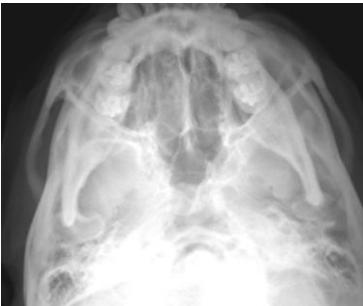
Right and Left Lateral *

- Entire cranium visible.
- No evidence of head rotation visible.

Temporomandibular Joints

 L closed  L open	<p><u>Bilat. Open and Closed Axial Transcranial (Schuller or Law Projection) *</u></p> <ul style="list-style-type: none"> • Position of mandibular condyle in relation to fossa visible. • T-M joint in center of image. • "OPEN" and "CLOSED" annotation visible on appropriate image.
 R	<p><u>Towne *</u></p> <ul style="list-style-type: none"> • Mandibular rami and condyles visible bilaterally. • No evidence of head rotation visible.

Zygomatic Arches

 R	<p><u>Waters Erect *</u></p> <ul style="list-style-type: none"> • Entire frontal and maxillary sinuses, margin of both orbits and zygomatic arches visible. • Petrous ridges projected immediately below maxillary sinuses. • No evidence of head rotation visible. • Nasal spine aligned to vertical center of image.
 R	<p><u>SMV *</u></p> <ul style="list-style-type: none"> • Zygomatic arches visible. • No evidence of head rotation visible. • Symphysis menti uppermost and aligned to vertical center of image.

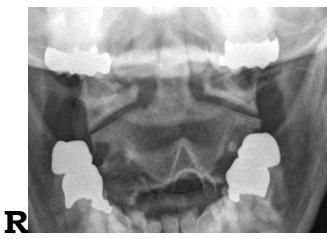
Spines

Cervical Spine



AP with 15° Cephalic Angle *

- Vertebrae from C3 to T2 visible.
- Inferior border of symphysis menti superimposed over inferior border of occipital bone.
- Intervertebral disc spaces open.
- No evidence of rotation.
- Spine aligned to vertical midline of image.



AP Open-Mouth *

- C1 and most of C2 including odontoid process visible within open mouth.
- Inferior margins of upper teeth and base of skull superimposed.
- No evidence of rotation.
- If open-mouth AP unsuccessful, then a Fuchs Method or "Wagging" jaw maneuver is to be done.



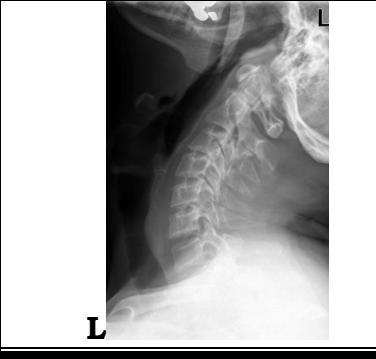
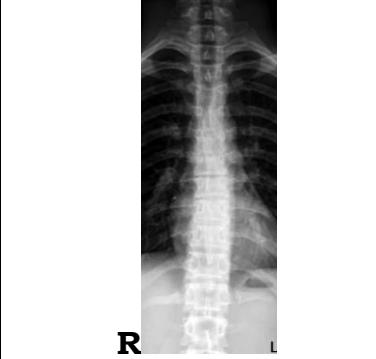
Lateral *

- All seven cervical vertebrae visible including articulation with T1. A separate radiograph of cervicothoracic region (Swimmers) is required if C7-T1 articulation not visualized.
- Sella turcica included to insure visualization of clivus (area between dorsum sellae and foramen magnum).
- Air filled Pharynx and trachea visible.
- No evidence of rotation.

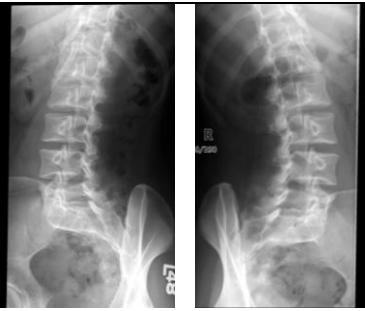


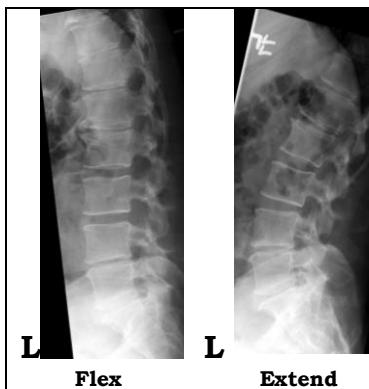
Swimmers *routine only if C7-T1 not seen on Lateral

- Vertebrae from C1 to T3 visible especially C7 and T1.
- Air filled Pharynx and trachea visible.
- No evidence of rotation.

	<p><u>Obliques (AP or PA)</u> *routine for non trauma - omit Open Mouth</p> <ul style="list-style-type: none"> • Intervertebral foramina from C1-2 to C7-T1 open. (PA oblique demonstrates those closest to detector and AP oblique those farthest from detector) • Intervertebral disc spaces open. • Mandible and occipital bone not to overlap C1 and C2.
	<p><u>Flexion Lateral</u></p> <ul style="list-style-type: none"> • Body of mandible perpendicular to lower border of detector. • C1 to C7 vertebrae visible. If C7 not visible, do additional flexion image in swimmers position. • No evidence of rotation.
	<p><u>Extension Lateral</u></p> <ul style="list-style-type: none"> • Body of mandible at 45° to border of detector. • C1 to C7 vertebrae visible. If C7 not visible, do additional extended image in swimmers position. • No evidence of rotation.
Thoracic Spine	
	<p><u>AP *</u></p> <ul style="list-style-type: none"> • Vertebrae C7 to L1 visible. • No evidence of rotation. • Spine aligned to vertical midline of image.
	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> • Uppermost thoracic vertebrae possible to L1 visible. Include Swimmers if upper vertebrae are area of interest. • Lung markings blurred by shallow breathing. • No evidence of rotation.

Lumbar Spine

 L	<p><u>AP or PA *</u></p> <ul style="list-style-type: none"> Vertebrae from T12 to lower sacrum visible. Intervertebral disc spaces open. Sacroiliac joints visible. No evidence of rotation. Spine aligned to vertical midline of image.
 L	<p><u>Lateral *</u></p> <ul style="list-style-type: none"> Vertebrae from T12 to lower sacrum visible. Intervertebral disc spaces open. Spinous processes visible. Posterior margins of each vertebral body superimposed.
 L	<p><u>L5, S1 Lateral Spot *</u> (omit if image essentials listed below are visible on lateral lumbar spine)</p> <ul style="list-style-type: none"> L4-L5 interspace to mid sacrum visible. L5-S1 joint space open. Posterior margins of L5 vertebral body superimposed.
 R	<p><u>L5-S1 AP Spot with 30° Cephalic Angle (Ferguson's View)</u></p> <ul style="list-style-type: none"> L4-L5 interspace to mid sacrum and upper S-I joints visible. L5-S1 joint space open with inferior L5 vertebral body anterior and posterior end plate margins superimposed. If joint space not open, determine cephalic angle correction from lateral lumbar image.
 RPO LPO	<p><u>Obliques (AP or PA)</u></p> <ul style="list-style-type: none"> Vertebrae from T12 to lower sacrum visible. SI joint area visible. Apophyseal joints closest to detector on AP oblique and apophyseal joints furthest from detector on PA oblique open.



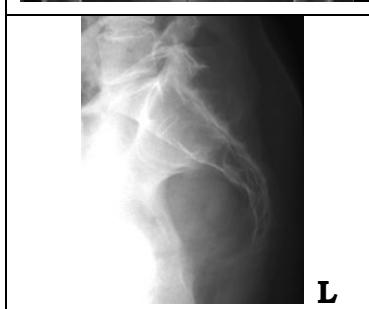
Flexion and Extension Lateral

- Vertebrae from T12 to lower sacrum visible.
- Intervertebral disc spaces open.
- Spinous processes visible.
- Posterior margins of each vertebral body superimposed.



AP with 15° Cephalic Angle *

- Portion of L5 vertebra to coccyx visible.
- SI joints visible.
- No evidence rotation visible.
- Sacrum centered to midline of image.



Lateral *

- Portion of L5 vertebra to last coccygeal segment visible.
- Posterior margins of L5 vertebral body and Iliac bones superimposed.



AP with 10° Caudal Angle *

- Separation of coccygeal segments visible.
- No evidence of rotation.
- Coccyx centered to midline of image.



Lateral *

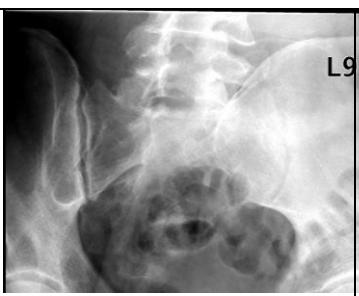
- Mid sacrum to last coccygeal segment visible.
- Posterior margins of iliac bones superimposed.



Sacro-iliac Joints

AP Sacrum with 15° Cephalic Angle *

- Portion of L5 vertebra to coccyx visible.
- SI joints visible.
- No evidence of rotation.
- Sacrum centered to midline of image.

	L95 <u>25° to 30° RPO and LPO *</u> <ul style="list-style-type: none">• SI joint space open on elevated side.• Both sacroiliac joints visible.
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Scoliosis Study

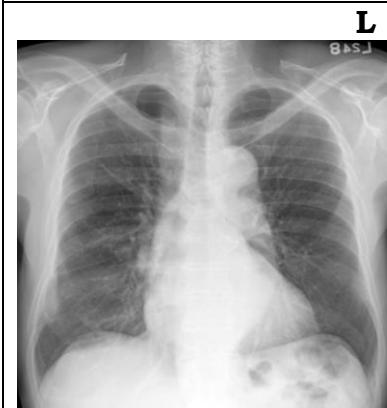
	<u>PA Standing at 72" S.I.D. in bare feet Digital Merged (Stitched) Image *</u> <ul style="list-style-type: none">• Ruler not superimposed over spine.• 2mm or less of anatomy shift visible at stitch level.• Iliac crest growth centers bilaterally visible.• Lower portion of skull to upper half of sacrum visible.• End plates of vertebrae at upper and lower extremes of curvature(s) visible for calculation of Cobb's angle(s).• No evidence of rotation.• Breast and gonad shields properly positioned.
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	<u>Lateral Standing at 72" S.I.D. in bare feet Digital Merged (Stitched) Image</u> <ul style="list-style-type: none">• Ruler not superimposed over spine.• 2mm or less of anatomy shift visible at stitch level.• Lower portion of skull to upper half of sacrum visible.• End plates of vertebrae at upper and lower extremes of curvature(s) visible for calculation of Cobb's angles(s).• Breast and gonad shields properly positioned.
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	<u>Lateral Bending Left and Right Standing at 72" S.I.D.</u> <ul style="list-style-type: none">• 2 inches of iliac crests visible.• No evidence of rotation.
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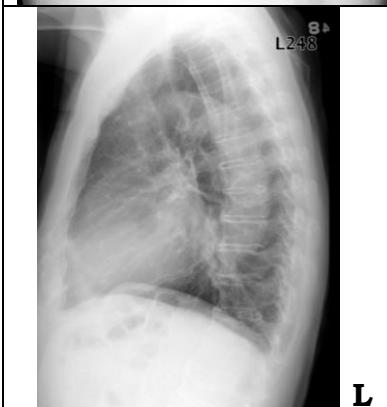
Thorax

Chest (lungs)



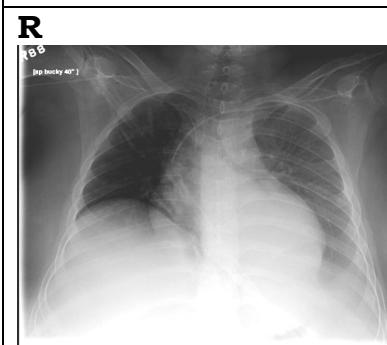
PA Erect at 72" S.I.D. *

- Entire lung fields from apices to both costophrenic angles visible.
- Ten posterior ribs above diaphragm visible.
- No evidence of rotation.
- No blurring of heart or diaphragm.
- Thorax aligned with image midline.



Left Lateral Erect at 72" S.I.D. *

- Entire lung field from apices to costophrenic angles visible.
- All of sternum to posterior ribs visible.
- No evidence of rotation.
- No blurring of heart or diaphragm.



AP Supine or Semi-erect at 48" S.I.D. (only if upright not possible)

- Entire lung fields from apices to both costophrenic angles visible.
- No evidence of rotation.
- No blurring of heart or diaphragm.
- Thorax aligned with image midline.
- Annotation must be visible stating position and SID.



Lateral Decubitus

- Entire side of interest visible;
 - lower side if for pleural effusion,
 - elevated side if for pneumothorax.
- No evidence of rotation.
- Annotation indicating side down visible.

**Right Lateral Decubitus
(right side down)**



AP Lordotic

- Apices and lungs to costophrenic angles visible.
- Clavicles projected superior to lungs.
- Thorax aligned with image midline.
- No evidence of rotation.



PA Obliques (RAO and LAO) Erect at 72" S.I.D.

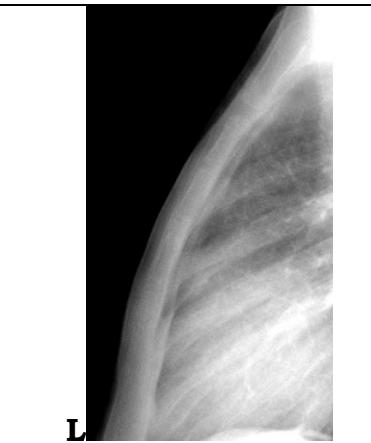
- Entire lung fields from apices to both costophrenic angles visible.
- No blurring of heart or diaphragm.

Sternum



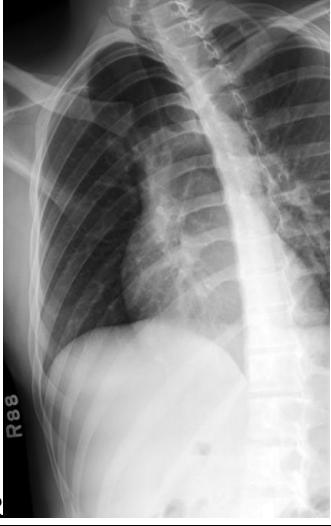
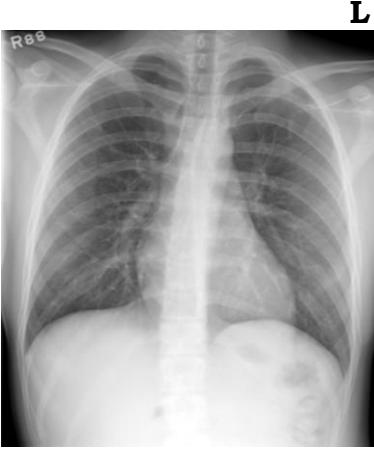
Right Anterior Oblique

- Entire manubrium to tip of xiphoid visible.
- Sternum and thorax obliqued minimally:
- Sternum and sterno-clavicular joint free of superimposition from vertebral column.
- Visibility of sternum through thorax improved by:
 - 1) blurring lung markings through shallow breathing
 - 2) magnifying posterior rib shadows with short S.I.D. (28").



Lateral

- Entire sternum visible.
- No evidence of rotation.

Ribs	
 R	<p><u>AP or PA *</u></p> <ul style="list-style-type: none"> • Ribs of affected side visible from spine to lateral rib margins. • Ribs visible through lungs or abdomen according to region of interest. • 1st rib visible if ribs above diaphragm are of interest. • 12th (or last) rib visible if ribs below diaphragm are of interest.
 R	<p><u>AP or PA Oblique *</u></p> <ul style="list-style-type: none"> • Ribs of affected side visible from spine to lateral rib margins. • Ribs visible through lungs or abdomen according to region of interest. • 1st rib visible if ribs above diaphragm are of interest. • 12th (or last) rib visible if ribs below diaphragm are of interest.
 L	<p><u>PA Erect at 72° S.I.D. *</u></p> <ul style="list-style-type: none"> • Entire lung fields from apices to both costophrenic angles visible. • Ten posterior ribs above diaphragm visible. • No evidence of rotation. • No blurring of heart or diaphragm. • Thorax aligned with image midline.

SURVEY EXAMS	
Exam	PROJECTION/POSITION
ANKYLOSING Spondylitis SCREENING	PA/Lat Chest (p. 32)
	AP Pelvis (p. 10)
	Lateral Cervical Spine (p. 27)
	Lateral Lumbar Spine (p. 29)
BONE AGE	PA Left Hand and Wrist single image (p. 15)
CHILD ABUSE (Trauma X)	Towne, AP, Waters and Lateral Skull (p. 20, 25)
	AP and Lateral Cervical Spine (p. 27)
	Lateral Lumbar Spine (p. 29)
	AP, RPO, LPO and Lateral chest (rib technique) (p. 32)
	AP Abdomen including Pelvis (p. 1)
	AP Femurs (separate images) (p. 3)
	AP Lower Legs (separate images) (p. 8)
	AP Feet (separate images) (p. 4)
	AP Humeri (separate images) (p. 16)
	AP Forearms (separate images) (p. 15)
	PA Hands including wrists (p. 15)
LEAD INGESTION	Bilateral AP knees (p. 6)
METASTATIC or DYSPLASIA SURVEY for Child 18 years and younger	AP and Lateral Skull (p. 25)
	AP and Lateral Cervical Spine (p. 27)
	Lateral Lumbar Spine (p. 29)
	AP and Lateral chest (rib technique) (p. 32)
	AP Abdomen including Pelvis (p. 1)
	AP Femurs (p. 3)
	AP Lower Legs (p. 8)
	AP and Lateral Feet (p. 4)
	AP Humeri (p. 16)
	AP Forearms (p. 15)
	PA Hands including wrists (p. 15)
METASTATIC SURVEY For Adults	Lateral Cervical Spine (p. 27)
	Lateral Skull (p. 25)
	AP and Lateral Thoracic Spine (p. 28)
	AP and Lateral Lumbar Spine (p. 29)
	AP Pelvis (p. 10)
	AP Femurs (p. 3)
	AP Humeri (p. 16)
MYELOMENINGOCELE AND MYELODYSPLASIA SPINE STUDIES	PA Standing or AP Sitting at 72" S.I.D.
	Lateral Standing or Sitting at 72" S.I.D.
	AP Supine at 40" S.I.D.
PRE E.C.T.SPINES	Lateral Cervical Spine (p. 27)
	Lateral Thoracic Spine (p. 28)
	Lateral Lumbar Spine (p. 29)
RHEUMATOID ARTHRISTIS SURVEY	PA, Obl, Lat and Ballcather's Hands/Wrists (pages 15, 16)
	AP and Lateral Knees (p. 6)
	AP Shoulders (p. 18)
	AP, Oblique and Lateral Feet Standing (p. 4)
	AP and Lateral Ankles Standing (p. 3)
	Lateral Cervical Spine (p. 27)
SHUNTOGRAM WITH CONTRAST	Scout AP Chest, Neck, Lat Skull single image
	Post injection 1, 3, 5, 7 minute images
SHUNT SERIES	AP/Lat Skull and Neck
	AP/Lat Chest and Abdomen
	NOTE: Skull/Neck and Chest/Abdomen images must overlap.

Radiographic Positioning Textbooks

Textbook of Radiographic Positioning and Related Anatomy

Kenneth L. Bontrager, MA, RT(R)

Mosby, Inc

Positioning in Radiography

K. C. Clark, M.B.E.

Intercontinental Medical Book Corporation

Merrill's Atlas of Radiographic Positions and Radiologic Procedures

Philip W. Ballinger, MS, RT(R), FAERS

Eugene D. Frank, MA, RT(R), FASRT

Mosby, Inc

Orthopaedist's Guide to Plain Film Imaging

Helene Pavlov, MD, FACR

Michele Burke, BS, RT

Mary Giesa, RT

Kathleen R. Seager, BS, RT

Edward T. White, RT

Thieme Medical Publishers, Inc.

