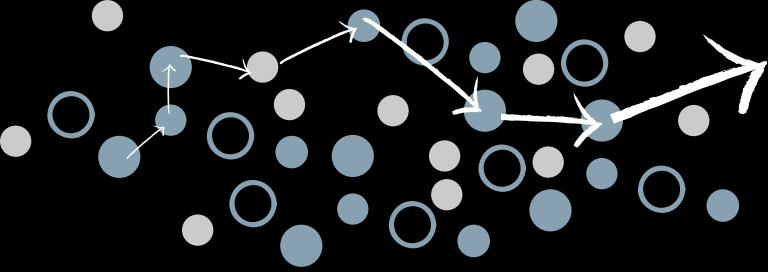


route to radiology

a quick and easy guide to the most high-yield scans in radiology

made for students by students

Created with cases from:

Radiopaedia

2024 NC & AS

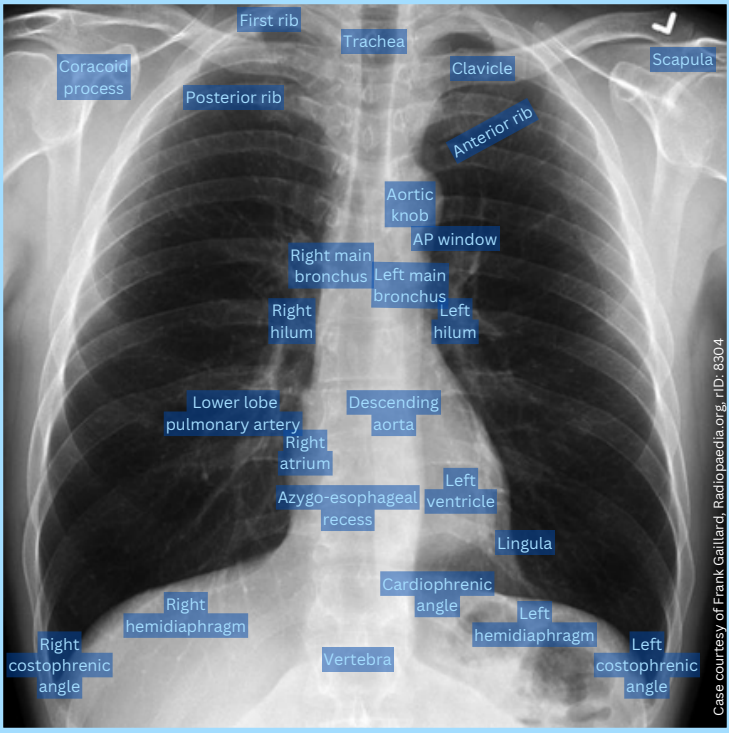
What study should I request first?

Pathology	Appropriate Scan
Pulmonary Embolism	CT PE
Pneumonia	Chest X-Ray
Pulmonary TB	Chest X-Ray
Pleural Effusion	U/S & CXR
PTX	U/S & CXR
AAA screening	U/S
Aortic dissection	CTA with contrast
CHF	Chest X-Ray
Pericarditis	U/S
Kidney stones	U/S or CT contrast
Gallstones	U/S
Liver cirrhosis	U/S
Cauda equina	MRI
Stroke	CT
Hemorrhage	CT
Osteomyelitis	X-Ray or MRI

Radiation levels to be aware of: US/MRI = 0 < X-Ray < CT

CXR Essentials

Normal CXR



what do I need to know about chest x-rays?

GENERAL

Radiopacity: metal>bone>soft tissues>fat>air

PA view: gold standard, patients who can stand up

AP view: enlarged heart and mediastinum, patients who cannot stand up

Lateral view: image receptor on left, right-sided structures look enlarged

LUNGS

Lobar pneumonia: opacification in a lobar pattern, consolidation

Aspiration pneumonia: patchy airspace opacities, air bronchograms

Foreign object aspiration: air trapping, bronchial cut-off sign

Interstitial lung disease: reticular, nodular or reticulonodular patterns

Pneumothorax: lucency at the lung edge, mediastinal shift (tension PTX)

Tuberculosis: Ghon lesion, cavitary lesion, opacification within parenchyma

Atelectasis: small volume linear shadows, peripheral or lung bases

Pleural effusion: blunting of costophrenic angle, meniscus sign

Pulmonary edema: bat-wing appearance, Kerley A and B lines

Pulmonary emphysema: flattened hemidiaphragms, increased AP diameter

CARDIOVASCULAR

Congestive heart failure: Kerley B lines, fluid in fissures, pleural effusion

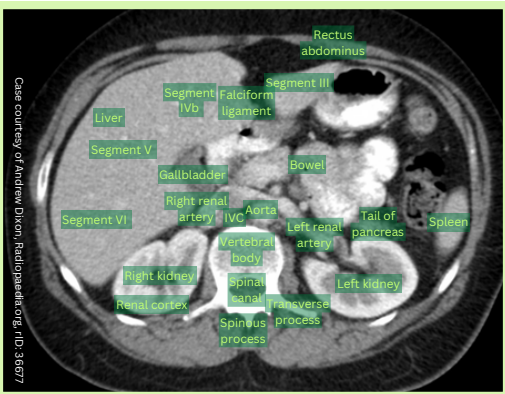
Cardiomegaly: enlargement of cardiac silhouette, cardiothoracic ratio >0.5

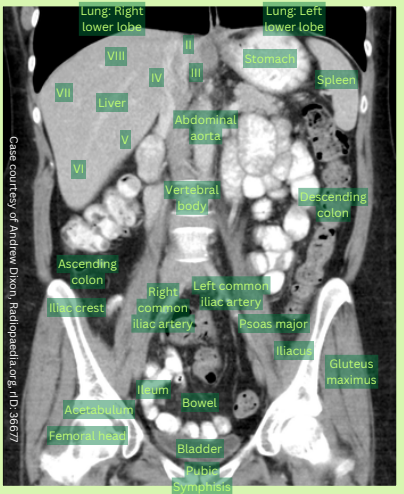
Thoracic aortic aneurysm: enlargement of aortic knob

Anterior mediastinal mass: 5Ts - thymus, teratoma, thyroid, terrible lymphoma, thoracic aorta

CT ABDO Essentials

Normal CT Abdomen - Axial View





Normal CT Abdomen - Coronal View

what do I need to know about CT abdomen?

STOMACH
Gastric ulcer: (barium) most on lesser curvature, edema, gastric fold radiation

LIVER AND GALLBLADDER
Gallstones: lamellar calcifications in gallbladder
Hepatocellular carcinoma: hypodense without contrast, tumour necrosis
Liver metastasis: most common malignant hepatic lesions, > from GI

PANCREAS
Acute pancreatitis: enlarged pancreas, peripancreatic infiltration
Chronic pancreatitis: amorphous/“popcorn” calcification

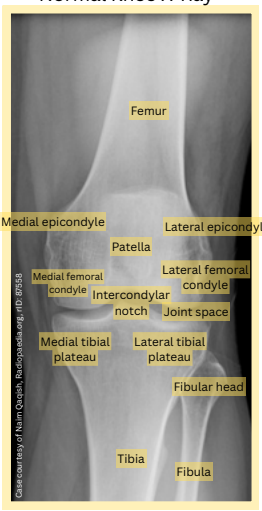
KIDNEYS
Renal cysts: low-attenuation, homogeneous, circumscribed
Renal calculus: calcification (most are calcium oxalate crystals)

AORTA
Aortic aneurysm: aorta >3cm from outer wall to outer wall

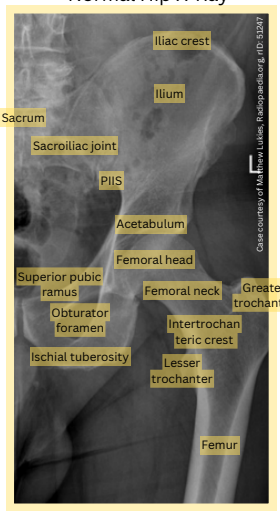
SMALL AND LARGE BOWEL
Small bowel obstruction: dilated and fluid-filled loops proximally (frequent cause: adhesions, intussusception, IBD). cut-off > 3 cm
Large bowel obstruction: cut-off > 6 cm
Sentinel loops: 2-3 dilated loops of small bowel, air in rectosigmoid
Acute appendicitis: appendicolith, dilated appendix (>6mm), inflammation
Large bowel obstruction: dilatation of colon, no gas in rectum
Crohn’s disease: usually affects ileum and right colon, skip areas, fistula
Diverticulosis: round outpouchings in colon (>sigmoid)
Diverticulitis: inflammation of diverticula following history of diverticulosis, +/- perforation of colon (air), hazy areas
Apple core sign: constriction of lumen, stenosing annular carcinoma
Thumbprinting sign: colitis, narrowing of lumen due to edema
Free intraperitoneal air: air rises! under diaphragm (X-ray) or under anterior abdominal wall (CT)

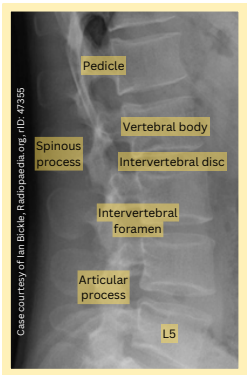
MSK Lower Limb Essentials

Normal Knee X-Ray



Normal Hip X-Ray





Normal Spine X-Ray

what do I need to know about MSK lower limb scans?

GENERAL
Paget disease: thickening of cortex, increased bone density, coarsening of trabeculae
Osteoporosis: decreased bone density, cortex thinning, decrease in visible number of trabeculae
Multiple Myeloma: diffuse osteoporosis, multiple punched-out lytic lesions
Osteomyelitis: focal cortical bone destruction, soft-tissue swelling (inflammatory changes)
Gout: erosion with sclerotic border (overhanging edge, punched out lesions), tophi

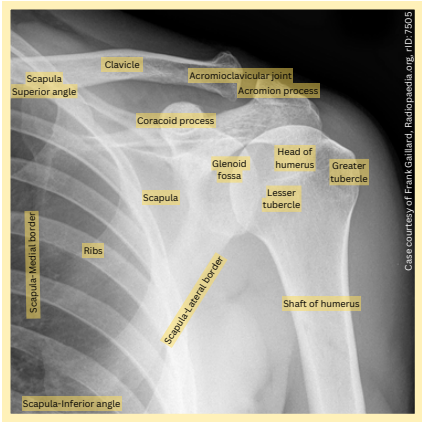
KNEE
Patellar dislocation: lateral displacement of patella noted on skyline projection
Meniscal tear: high intrameniscal signal (MRI), extends to at least one articular surface
ACL tear: anterior tibial translocation sign, Segond fracture, joint effusion
Osteoarthritis: marginal osteophyte formation, subchondral sclerosis, subchondral cyst, joint space narrowing
Baker cyst: fluid-filled structure, posteromedial knee

HIP
Ankylosing spondylitis: Fusion of sacroiliac joints and vertebral bodies (bamboo spine)
Avascular necrosis: crescent sign, decreased signal on MRI, > femoral and humeral head
Hip fracture: Shenton's line disruption, prominent lesser trochanter (ext rotation of hip), femoral head/neck asymmetry

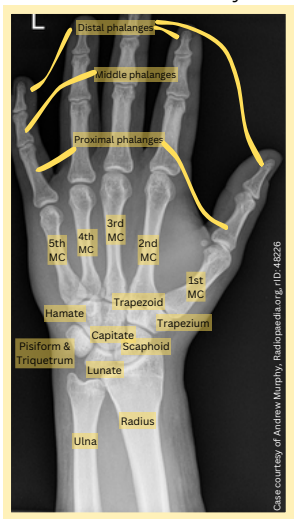
SPINE
Disk herniation: disk compressing nerve root, hypointense (T2) focal and asymmetric protusion
Compression fracture: most often anterior and superior aspect of vertebral body, wedge-shaped deformity (Dowager's hump)
Cauda equina: clinical diagnosis, compression of cauda equina
Scoliosis: lateral spinal curvature, Cobb angle > 10 degrees
**MRI is the preferred modality to assess for nerve/spinal cord damage*

MSK Upper Limb Essentials

Normal Shoulder X-Ray



Normal Hand X-Ray



what do I need to know about MSK upper limb scans?

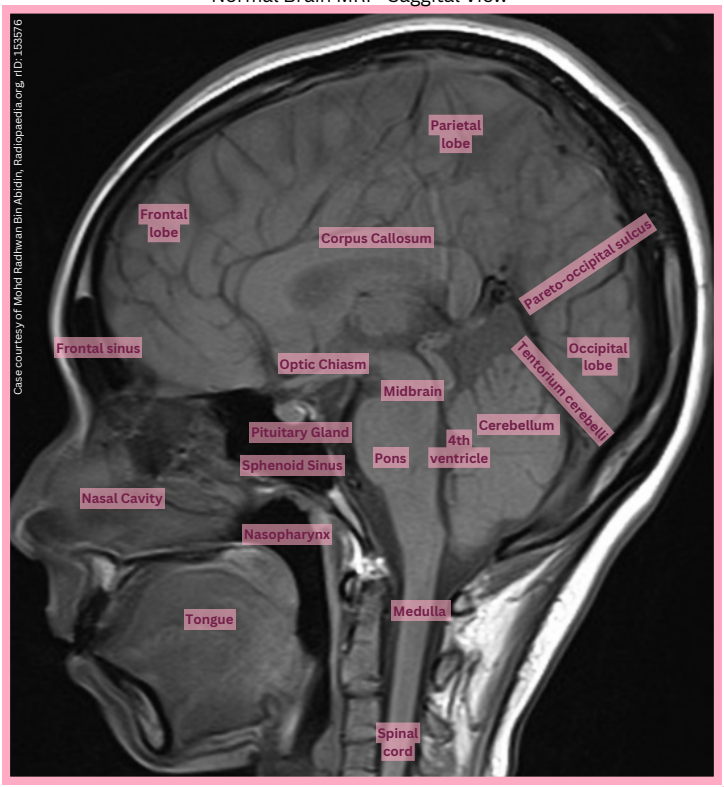
FRACTURES
Transverse: line is perpendicular to long axis
Oblique: diagonal orientation relative to normal axis
Spiral: twisting/torque injury

SHOULDER
Anterior dislocation: abduction+ext rotation+extension, humeral head is inferior and anterior to glenoid
Posterior dislocation: humeral head in int rotation (light bulb sign), head is under acromion
Bursitis: fluid accumulation within distended bursa (anechoic fluid-filled on U/S)
Rotator cuff tear: no visualization of tendon, hypoechoic discontinuity (U/S)
Tendinopathy: thickened tendon, fibrillar pattern loss

FOREARM/HAND
Tennis elbow (lateral epicondylitis): thickening and hyperintensity (T2) of common extensor origin, possibly radial collateral ligament too
Golfer's elbow (medial epicondylitis): thickening and hyperintensity (T2) of common flexor tendon, edema
Colles fracture: distal radial fracture with dorsal angulation and impaction
Carpal tunnel syndrome: distal flattening and proximal enlargement of median nerve at the flexor retinaculum, palmar bowing
Rheumatoid arthritis: soft tissue swelling, erosion of the PIPs, ulnar deviation if advanced (*RA usually spares DIPs, as opposed to OA)
Boutonniere deformity: flexion contracture of PIP and extension of DIP joints
Mallet/baseball finger: extensor tendon tears, fluid at the insertion, loss of movement/extension at DIP
Scaphoid fracture: visualization of fracture, scaphoid fat pad sign (lateral displacement of lucent line on lateral aspect of scaphoid)

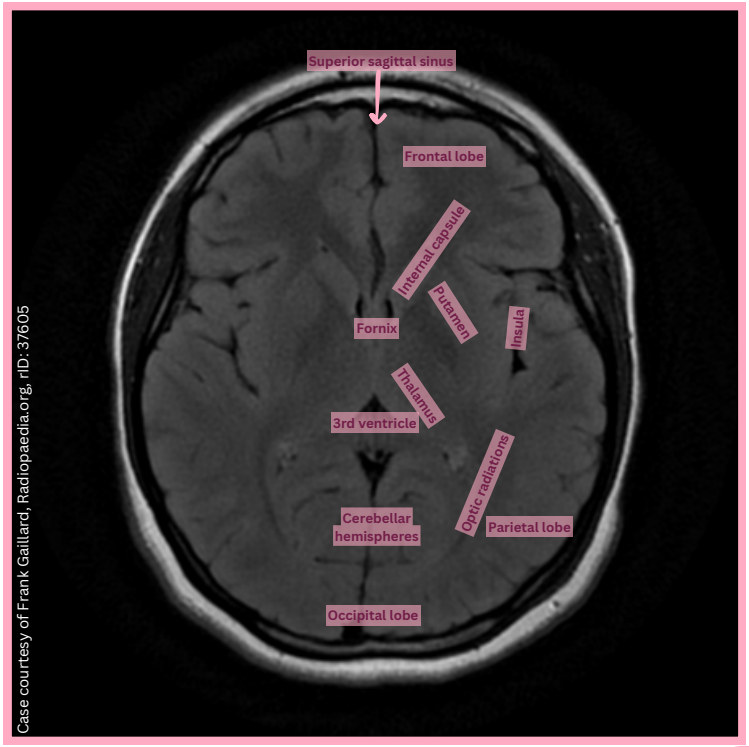
BRAIN MRI Essentials

Normal Brain MRI - Saggital View



BRAIN MRI Essentials

Normal Brain MRI - Axial View



what do I need to know about brain MRI?

HEMORRHAGE AND STROKE
Epidural hematoma: hyperdense, biconvex, lens-shaped, mostly middle meningeal artery rupture (temporoparietal)
Subarachnoid hematoma: crescent-shaped, concave inward
Subarachnoid hemorrhage: hyperdensity in fissures, subarachnoid space, most commonly near Circle of Willis (berry aneurysm rupture); trauma
Intraparenchymal hemorrhage: multiple, small areas of high attenuation, hypoattenuation around (edema)
Ischemic stroke: area of low attenuation in a vascular distribution (MCA*)
Hemorrhagic stroke: increased density, clot decreases in density with time
-- Acutely, hematomas may appear hyperdense and then subacutely or chronically, they may appear isodense or hypodense. --

HERNIATION
Subfalcine herniation: supratentorial brain and lateral ventricle shift across midline
Uncal herniation: medial portion of temporal lobe (uncus) shifting laterally
Tonsilar herniation: Infratentorial brain shifts downward through foramen magnum

EDEMA
Vasogenic edema: mostly affects white matter, extracellular accumulation (BBB disruption). Usually for space occupying lesions.
Cytotoxic edema: affects both grey and white matter, cellular edema due to cerebral ischemia (i.e. stroke, loss of grey white matter differentiation)

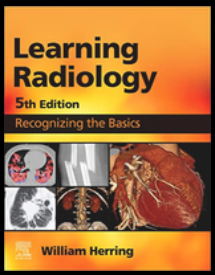
HYDROCEPHALUS
Non-communicating hydrocephalus: lateral and 3rd ventricles dilated, 4th ventricle normal, obstruction of the outflow
Communicating hydrocephalus: 4th ventricle dilated, inhibition of resorption of CSF at arachnoid villi

OTHER DISEASES
Diffuse axonal injury: small petechial hemorrhages, corpus callosum often affected
Multiple sclerosis: hyperdense lesions in periventricular area, corpus callosum, optic nerves, Dawson's fingers perpendicular to lateral ventricles
Alzheimer's disease: diffuse cortical atrophy (> temporal lobes), lateral ventricles and sulci enlarged
Brain tumour (meningioma): hyperdense mass, vasogenic edema

radiology resources

Radiopaedia

RADIOLOGY masterclass



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