**Clinical:**

1) 33 y/o female with progressive paraplegia. CT showed biparital hypodensities with areas of hyperdensities. Dx:
- MS……..unlikely, on CT: multiple hypodensity with some area of enhancement.
- Thromboembolic disease on CT: non-territorial infarction with hemorrhagic transformation, in addition to increased density of dural sinus in non enhanced study. In enhanced CT, you will see empty delta sign. The common risk factor is OCP.
- Inflammatory myelitis……..Unlikely, it involve the spinal cord, not the brain.
- SCD……..Could be, usually patient with SCD are presented with picture of Ischaemic strokes and cognitive impairment.

2) 30 y/o athletic male with acute onset hemiplegia. Best modality to assess:
- CTA
- MRI brain
This scenario is not clear……..however if you suspect infarction……..Do MRI. And if you suspect aneurysm……..Do CTA.( from Dr. Mohanned alsehaibani)

3) regarding unilateral hyperlucent thorax. Child with acute onset SOB. Causes:
- pleural effusion

**DDx of UNILATERAL HYPERLUCENT HEMITHORAX:** Chapman p 114

**ROTATION**
1. Poor technique 2. Scoliosis

**CHEST WALL**

**PLEURA:**
1. Pneumothorax

**LUNG**

4) child with bilateral multiple lung nodules on CXR. Causes include……..except:
- Neurofibromatosis (it cause interstitial lung disease)

**DDx of bilateral multiple lung nodules:** Chapman: p 137

**NEOPLASTIC**
1. Metastases

**INFECTIONS**

**IMMUNOLOGICAL**
1. Wegener's granulomatosis 2. Rheumatoid nodules 3. Caplan's syndrome

**INHALATIONAL**
1. Progressive massive fibrosis

**VASCULAR**
1. Arteriovenous malformation
5) regarding signs of ACL tear. False answer:
- posterior displacement of tibia

Imaging of ACL tears should be divided into primary and secondary signs. Primary signs are those that pertain to the ligament itself. Secondary signs are those which are closely related to ACL injuries.

**Primary signs**

ACL tears typically occur in the middle portion of the ligament, and appear as
discontinuity of the ligament or abnormal contour or signal.

**Secondary signs**

Secondary signs include:

- bone contusion
- >7mm of anterior tibial translation (known as anterior tibial translocation sign)
- uncovered posterior horn of the lateral meniscus
- Segond fracture, and to a lesser degree arcuate sign
- ACL angle that is less steep than Blumensaat's line. "RADIOPAEDIA".

6) **Common site for early MS**:  
- pericallosal  
It include also callososeptal and periventricular region.  
McDonald criteria: a- time ( remit and relapse)  
b- location: supratentorial (periventricular, juxtracortical, subcortical) & infratentorial.

7) ? 30 y/o male. X-ray hand showed DIP joints OA changes, soft tissue calcifications and no soft tissue swelling and. Most likely Dx:  
- scleroderma.

Musculoskeletal manifestations of scleroderma:  

**Bone changes**

- acro-osteolysis (resorption of the distal phalanges)  
- periarticular osteoporosis  
- joint space narrowing  
- erosions

**Soft tissue changes**

- subcutaneous and periarticular calcification  
- atrophy especially at tips of fingers  
- flexion contractures

8) child with cystic lung lesion. Unlikely:
- hernia

**DDx of cystic lung lesions**: chapman p139
VASCULAR 1. Infarction
TRAUMATIC 1. Haematoma 2. Traumatic lung cyst

9) causes of 3rd nerve palsy. Except:
- cerebellar artery aneurysm

An oculomotor nerve palsy results in eye that is "down and out". It has numerous possible aetiologies which can be divided according to which portion of the nerve is affected.

- dorsal midbrain (nuclear lesions)
- ventral midbrain (fascicular)
- interpeduncular (subarachnoid):
  - posterior communicating artery aneurysm - rapidly enlarging with or without SAH - is the most common cause, and usually involves only the oculomotor nerve. Ischaemic involvement of the nerve will usually be pupil sparing whereas aneurysmal compression usually involves the pupil.
  - basal meningeal processes, including infection, neoplastic infiltration, and inflammatory conditions.
- cavernous sinus portion:
  - neoplasms, most commonly pituitary macroadenomas, meningiomas of the sella or sinus and any other sinus mass (e.g. trigeminal schwannomas)
  - when the process is more diffuse, such as in cavernous sinus syndrome then other cranial nerves are also involved (e.g. Tolosa-Hunt syndrome).
- orbital portion:
  - conditions include intraorbital tumours (optic nerve glioma, optic nerve meningioma) and inflammatory orbital pseudotumor.

RADIOPAEDIA.
10) cerebral aneurysm. True answer: All answer were wronge
As the secular aneurysm is the most common below are some important notes.
It is the most common type of intracrainial aneurysm, about 90%.
Etiology: degenerative vascular injury > trauma, infection, tumor, vasculopathies.
Present in approximately 2% of population: multiple in 20%; 25% are giant aneurysms (>25 mm).
Location:
- anterior circulation: ~ 90%
  - ACA / AComm complex: ~30 - 40%
  - supraclinoid ICA and ICA / PComm junction: ~30%
  - MCA (M1/M2 junction) bi/trifurcation: ~ 20 - 30%
- posterior circulation: ~ 10%
  - basilar tip
  - SCA
  - PICA

Increased incidence of aneurysm in:
- Adult dominant polycystic kidney disease (ADPKD)
- Aortic coarctation
- FMD
- Structural collagen disorders (Marfan syndrome, Ehlers-Danlos syndrome).

Digital subtraction catheter angiography, especially with 3D acquisitions, is considered the gold standard for diagnosis of sacular aneurysm. Other modalities are CTA and MRA.

11) fat density in mediastinal mass. Except:
- broncogenic cyst

DDx fat containing mediastinal mass: chapman p 189
1. Teratodermoid
2. Diaphragmatic hernia — bowel, liver, kidney or stomach may also be present.
   Anterior (Morgagni) hernias are usually on the right, and posterior (Bochdalek) hernias usually on the left.
3. Lipoma
4. Liposarcoma
5. Thymolipoma
8. Chylolymphatic cyst
9. Neurofibroma
12) Case of fits and posterior shoulder dislocation. Signs are. Except:
- loss of parallelism between humerus and glenoid.

POSTERIOR SHOULDER DISLOCATION:
- Typically, a scapular Y view or transthoracic lateral of the humeral head demonstrate a posterior dislocation better.
- Posterior dislocation may be missed initially on frontal radiographs in 50% of cases, as the humeral head appears to be almost normally aligned with the glenoid.

- Imaging signs of posterior dislocation
  - Rim sign (66%) = distance between medial border of humeral head and anterior glenoid rim >6 mm
  - Humeral head is fixed in internal rotation no matter how forearm is turned – “lightbulb sign”
  - May be associated with:
    - Trough sign (75%) = "reverse Hill-Sachs" = compression fracture of anteromedial humeral head
    - Fracture of posterior glenoid rim "reverse bankrt"
      - Avulsion fracture of lesser tuberosity
      - Isolated fractures of the lesser tuberosity should raise suspicion of an associated posterior dislocation

LEARNING RADIOLOGY.

13) regarding nephrogenic systemic sclerosis. True answer:
- no case reported having normal renal function.
- progressive and can fatal.

Nephrogenic systemic sclerosis:
Rare disease involving fibrosis of skin, joints, eyes, and internal organs. <5% patients with NSF experience rapid and fulminant course that may contribute to death by affecting effective ventilation or mobility
- To date, has only occurred in patients with kidney disease
- Have occurred after single high doses (routine dose is 0.01 mmol/kg) of gadolinium or more commonly after repeated examinations performed in a relatively short period of time.
- Have occurred in patients with end-stage renal disease.
- Guidelines • Avoid gadolinium agents in patients with estimated GFR <30 mL/min

14) Gardner syndrome. All true except
- exostosis.

Gardner Syndrome:
- Polyposis: colon 100%, duodenum 90%, other bowel segments <10%
- Hamartomas of stomach
- Soft tissue tumors: inclusion cysts, desmoids (30%), fibrosis
- Osteoma in calvarium, mandible, sinuses.
- Malignant transformation in 100% if untreated
- Small bowel and pancreaticoduodenal malignancies
- Total colectomy recommended. primer fifth edition p 140
15) absent sphenoid sign: true answer.

- neurofibromatosis type 1

sphenoid dysplasia is one of the features of NF-1, but the absence of a sphenoid wing is very rare.

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2667581/

16) blood brain barrier: all except.

- pineal gland.

Parts of brain with no blood-brain barrier include:

- area postrema
- median eminence
- posterior part of pituitary gland
- sub fornixal region
- pineal gland
- organum vasculosum
- lamina terminalis
- choroid plexus

http://radiopaedia.org/articles/blood-brain-barrier

17) 20 y/o male. U/S showed multiple cortical and medullary cysts. His brother died of SAH at 30 years of age. Most likely Dx.:

- ADPCKD.

Associated Findings with ADPCKD include :

- Hepatic cysts, 70%
- Intracranial berry aneurysm, 20%
- Cysts in pancreas and spleen, <5.

Tuberous sclerosis (bourneviLLe disease):

The clinical triad of adenoma sebaceum, seizures, and mental retardation.

Imaging Features of tuberous sclerosis:

CNS • Hamartoma • Tubers • Subependymal giant cell astrocytoma
- Disorganized/dysplastic WM lesions.

Kidney • Angiomyolipoma, 50%; usually multiple and bilateral • Multiple cysts

Bone, 50% • Bone islands in multiple bones • Periosteal thickening of long bones • Bone cysts.

Other • Pulmonary lymphangioleiomyomatosis • Spontaneous pneumothorax, 50%
- Chylothorax • Cardiac rhabdomyomas, 5% • Aortic aneurysm
18) regarding urethral stricture. All true except: ??? \textbf{I am not sure.}
Anterior Urethra: bulbus >> penile
Posterior urethra: prostatic >> membrabous
- bulbous urethra is commonest site for trauma,
- Membranous is most common injury during pelvic floor injury.
- cathitirization classically cause short smooth stricture

\textbf{Urethral strictures} are typically occur either in the setting of trauma or infection.

Common causes of urethral strictures include:

- \textbf{Infection} "gonococcal urethritis"
- inflammatory
- trauma : straddle injury : most common , and pelvic fractures
- iatrogenic : instrumentation , prolonged catheterisation , transurethral resection of the prostate and open radical prostatectomy.
- \textbf{http://radiopaedia.org/articles/urethral-stricture}

For more information , pls read this article :
\textbf{http://radiographics.rsna.org/content/24/suppl_1/S195.full}

19) \textbf{Monteggia fracture:}
\textit{fractured Ulna, displaced Radius}

Monteggia fracture is fracture of the ulna with a dislocation of the proximal radius. The dislocated radial head can bemissed clinically and develop into AVN, with subsequent elbowdysfunction. Whenever the forearm is fractured, the elbow must be examined to exclude a dislocation.

Galeazzi Fracture is fracture of the radius with dislocation of the distal ulna. This is less common than a Monteggia fracture.

20) infratentorial mass in a 50 y/o male most likely due to:
- metastasis.
A \textbf{posterior fossa tumour} has a very different differential in an adult as opposed to a child.

\textbf{Adult}

- cerebellar metastases (most common)
- haemangioblastoma : most common primary brain tumour
- astrocytomas and medulloblastomas are rare in the posterior fossa of adults.

\textbf{Child : posterior fossa astrocytoma}

- pilocytic astrocytoma : most common
- brainstem glioma
- medulloblastoma : (also known as posterior fossa PNET)
- ependymoma \textbf{http://radiopaedia.org/articles/posterior-fossa-tumours}
21) regarding cervical rib:
All choices are false.
"Cervical ribs: these are bony or fibrous bands between C7 and the first rib and are found in 1–2% of subjects. Of these, 50% are bilateral and often they are asymmetrical."

22) which is true regarding patient with past history of drug allergy:
Doses of premedications.
1). 32 mg methylprednisolone PO 12 and 2 hours prior to contrast injection.

2). 50 mg prednisone PO 13 + 7 + 1 hour prior to contrast injection, plus 50 mg diphenhydramine (Benadryl®) IV / IM / PO 1 hour prior to contrast injection.

3). Nonionic low-osmolality contrast agent: Indication: previous respiratory adverse contrast reaction, history of significant allergies / severe asthma. Caution in patients with: active tuberculosis, diabetes mellitus, peptic ulcer disease
- Antihistamines alone have not proved to be effective.

23) regarding acromegaly. False answer:
- Calcification of the ear pinna (actually it is very rare, I found this manifestation in some websites like this one http://jama.jamanetwork.com/article.aspx?articleid=332575)

RADIOGRAPHIC FEATURES OF ACROMEGALY : PRIMER P 337
The key feature is appositional bone growth: ends of bones, exostoses on toes, increase in size and number of sesamoid bones:
Hands • Spade-shaped tufts • Exostoses at tufts • Widened joint spaces • Secondary DJD
Feet • Heel pad >25 mm (typical) • Increased number of sesamoid bones • Exaggerated bony tuberosities at tendon insertion sites • Exostoses on 1st toe
Skull • Thickening of skull bones and increased density • Prognathism: protrusion of jaw • Overgrowth of frontal sinuses (frontal bossing) • Accentuation of orbital ridges • Enlargement of nose and soft tissues • Enlarged sella
Spine • Posterior vertebral scalloping • Lordosis

24) best modality to assess recurrent laryngeal nerve: ??? IAM NOT SURE
MR Neck • Not sure.
25) neuroblastoma metastasis to. Fales answer: No false answer.


Radiographic Features • Solid tumor • Hyperechoic by US • Calcification in 85% • Readily extends across midline • Frequently encases vessels MIBG is the best NM scan.
• 65% are metastatic at initial presentation; common extensions include: Bone
Neural foramina (evaluate)
Lymph nodes
Liver, lung (uncommon)

26) regarding diffuse axonal injury. True answer:
- poor prognosis.
- can presented with coma.

Diffuse Axonal Injury DAI : Primer fifth edition p:375
It is most commonly seen in severe head injury. Loss of consciousness occurs at time of injury.

Imaging Features:
• Characteristic location of lesions:
Lobar gray matter (GM)/white matter (WM) junction
Corpus callosum
Dorsolateral brainstem
• Initial CT is often normal.
• Petechial hemorrhage develops later.
• Multifocal T2W bright lesions
• Susceptibility-sensitive gradient-echo sequences are most sensitive in detecting hemorrhagic shear injuries (acute or chronic).

27) regarding ulcerative colitis:
- presacral widening.

DDx of presacral widening include: Ulcerative colitis, Pelvic lipomatosis, Crohn’s Disease, Rectal tumor and Sacral tumor.
28) regarding crohn's disease. False answer:
- string sign indicates non-stenotic stage .......Correction: it indicate stenosis

<table>
<thead>
<tr>
<th>Ulcerative Colitis</th>
<th>Crohn Colitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumferential disease</td>
<td>Eccentric disease</td>
</tr>
<tr>
<td>Regional (continuous disease)</td>
<td>Skip lesions (discontinuous disease)</td>
</tr>
<tr>
<td>Predominantly left-sided</td>
<td>Predominantly right-sided</td>
</tr>
<tr>
<td><strong>Rectum</strong> usually involved</td>
<td>Rectum normal in 50% of cases</td>
</tr>
<tr>
<td>Confluent shallow ulcers</td>
<td>Confluent deep ulcers</td>
</tr>
<tr>
<td>No aphthous ulcers</td>
<td>Aphthous ulcers early</td>
</tr>
<tr>
<td>Collar button ulcers</td>
<td>Transverse and longitudinal ulcers</td>
</tr>
<tr>
<td>Terminal ileum usually normal</td>
<td><strong>Terminal ileum</strong> usually diseased</td>
</tr>
<tr>
<td>Terminal ileum patulous</td>
<td>Terminal ileum narrowed</td>
</tr>
<tr>
<td>No pseudodiverticula</td>
<td>Pseudodiverticula</td>
</tr>
<tr>
<td>No fistulas</td>
<td><strong>Fistulas</strong> common</td>
</tr>
<tr>
<td>High risk of cancer</td>
<td>Low risk of cancer</td>
</tr>
<tr>
<td>Risk of toxic megacolon</td>
<td>No toxic megacolon</td>
</tr>
<tr>
<td></td>
<td>Mouth to anal</td>
</tr>
</tbody>
</table>

29) regarding malrotation:

**MALROTATION**: Primer p 590, fifth edition.

Associations: • Gastroscisis • Omphalocele • Diaphragmatic hernia • Duodenal or jejunal atresia

Radiographic Features:
Plain film:
• Suspect diagnosis in the setting of bowel obstruction and abnormally positioned bowel loops.

US:
• Reversal of SMA (right) and SMV (left) location.

UGI:
• Abnormal position of duodenojejunal junction because of absence of ligament of Treitz
• Spiraling of small bowel as it twists around SMA (corkscrew)

Barium enema:
• A normal barium enema will rule out 97% of malrotation.

CT:
• SMA to right of SMV
About Klipple Feil syndrome:

Klippel-Feil Syndrome is a complex heterogenous entity that results in cervical vertebral fusion. Two or more non-segmented cervical vertebrae are usually sufficient for diagnosis. There is a recognised female predilection.

The classic clinical triad of a short neck, low posterior hairline, and restricted neck motion, seen in less than 50% of patients with this syndrome. Verterbal images may show a wasp-waist sign.

Associations: Sprengel deformity of the shoulder and omovertebral bar (see image). Wildervanck syndrome, anomalies of the aortic arch and branching vessels, spinal scoliosis, intervertebral disc herniation and cervical spondylosis.

31) Trauma patient with c-spine injury and neurological deficit. Apical pleural cap. Best modality:
- CT aortogram….Aortic dissection.

32) MRI uterus. False answer: (pre~5, 10 , 15 and post ~ 2, 10)
- Endometrial thickness post menopausal non-hormonal <10mm.

In pre menopausal the endometrial thickness is measuring 4 mm- 9 mm -14 mm during menses, Proliferative stage and secretory stages, respectively.
- In the postmenopausal woman the endometrium atrophies and measures 2–3 mm.
- In postmenopausal women who take hormone replacement therapy the endometrium may measure up to 10 mm." Stephe 246.

33) Repeat MCQ. Pneumoperitonium source. True answer:

The most common cause is a perforation of the abdominal viscus—most commonly, a perforated ulcer. The exception is a perforated appendix, which seldom causes a pneumoperitoneum.

A pneumoperitoneum is common after abdominal surgery; it usually resolves 3-6 days after surgery, although it may persist for as long as 24 days after surgery.

CT is regarded as the criterion standard for the detection of a pneumoperitoneum.

Signs of a large pneumoperitoneum include the following:

- The football sign: abdominal cavity is outlined by gas from a perforated viscus
- Falciform ligament sign: air surrounding the falciform ligament.
- The gas-relief sign, the Rigler sign, and the double-wall sign: visualization of the outer wall of bowel loops caused by gas outside the bowel loop and normal intraluminal gas. Free intraperitoneal gas and intraperitoneal fluid in excess of 1000 mL are usually required to elicit this sign.
- The urachus sign: air outlines the urachus.
- The lateral umbilical sign, : air surrounding inferior epigastric vessels, may become visible as an inverted V sign in the pelvis.
- A telltale triangle sign represents a triangular pocket of air between 2 loops of bowel and the abdominal wall.
- Scrotal air may be seen in children as a result of peritoneal intrascrotal extension (through patent process vaginalis).
- Free air under the diaphragm.
- Air within the lesser sac is seen with a perforation of the posterior wall of the stomach.

**Anatomy:**

34) *pass through superior orbital fissure except:*
- maxillary nerve...........correction:pass through foramen rotandum.
Stephen p 9, table 1-1 foramina of skull base.

35) *pass through cavernous sinus except:*
3rd (mandibular) division of 5th CN.......correction:pass through foramen ovale.
Stephen p 9, table 1-1 foramina of skull base

36) *regarding ossification centres. False answer:*
Q is not clear, pls read about ossification center b/c it is common in exam.
Clavicle is first bone to ossify
Wrist: Scaphoid 1st and pisiform last
C-R-I-T-O-E of the elbow : 1-3-5-7-9-11 years.

37) *ophthalmic artery is a branch of:*
- cliniod part of ICA

"Branches of the internal carotid artery: stephen p 81-84.
The cervical portion has no branches. Two small branches each arise from the petrous and cavernous parts of the internal carotid artery but are seldom visible on angiography. These are:
- the caroticotympanic artery
- the pterygoid artery
- the cavernous artery
- the meningohipphypseal artery.

**Ophthalmic artery:**
This is the first large (visible on angiography) branch of the internal carotid artery and is its first branch after emerging from the cavernous sinus.
Posterior communicating artery.
Anterior choroidal artery.
Striate arteries
Anterior and middle cerebral arteries.
38) regarding systemic venous drainage: true answer
No true answer amongst the available choices.
"Tributaries of the inferior vena cava:
• third and fourth lumbar veins (upper two to the azygos vein, the fifth to the ileolumbar vein)
• right gonadal vein
• right renal vein
• right adrenal vein
• small veins from right and caudate lobes of liver
• right, middle and left hepatic veins
• right inferior phrenic vein (left drains to left adrenal vein)
• left renal vein (which has already received the left gonadal and adrenal veins)"

39) Portal vein. False answer: (CAP = CBD, HA, PV << ant to post)
- anterior to CBD. Correction: it pass posterior to the bile ducts and hepatic arteries.
- behind 2nd part of duodenum. Correction: it formed behind the 1st part of duodenum and the pancreatic neck, at level of L1, L2.
Stephen p178.

40) which is the correct articulation:
- trapezoid with 2nd metacarpal.

41) regarding knee. False answer:
Q is not clear, pls read about knee joint in stephen p 289-299.
"(The tendon of the popliteus is not attached to the lateral meniscus.)" stephen p 293
"The popliteus muscle extends from its inferomedial insertion in the Achilles tendon superiorly through the calf and laterally to buttress the posterolateral aspect of the knee at its tendinous insertion in the popliteus recess of the posterolateral aspect of the lateral femoral condyle. Two additional insertion sites are the posterior fibular head (popliteofibular ligament) and the posterior horn of the lateral meniscus???!" stephen p 299

42) pancreas anatomy.
Accessory duct opens proximal to ampulla.
Stephen p 187 pancreatic duct and their development, common Q, read about it.
"The main pancreatic duct is derived from both embryological parts of the pancreas. The dorsal pancreas provides the main duct in the tail and body of the gland and the ventral pancreas provides the main duct in the head of the gland. The accessory duct (of Santorini) is the remaining part of the duct in the dorsal pancreas and may drain to an accessory papilla proximal to the ampulla of Vater in the duodenum."
43) liver anatomy. **False answer.**
- left lobe consist of caudate and most of the quadrate.

"the caudate lobe is located posteriorly between the IVC and the fissure for the ligamentum venosum, and the quadrate lobe anteroinferiorly between the gallbladder bed and the fissure for the ligamentum teres. **These lobes are part of the conventional right lobe.**" stephen p 177

44) regarding anatomy of pulmonary vessels. **True answer:**
*No true answer among the available choices.*
Stephen p 126.
"The right pulmonary artery is anterior to the right bronchus, and the right superior pulmonary vein may be seen anterior to this. The left pulmonary artery is seen anterior to the left main bronchus, and above it on a higher section"
"in Pulmonary angiography catheter is inserted via the femoral vein to the inferior vena cava (IVC), right heart and pulmonary trunk"
"The bronchial arteries are catheterized from the thoracic aorta if they arise from it."

45) MRI, shoulder ligaments. ?? I **don't know**
- subscapularis is inferior boundary of rotator cuff

46) wrist anatomy flexor carpi ulnaris which compartment: ?? I **don't know**

47) carpal bones. Extensor tendons ? insertion ?? I **don't know**

48) regarding arteries of the lower limb. **False answer:**
- Peroneal artery is a branch of anterior tibial artery.
"The posterior tibial artery is the larger of the two terminal branches of the popliteal artery. It gives rise to the peroneal artery 2.5 cm from its origin"
49) Component of sinus tarsi:

The **sinus tarsi** is a cavity between the talus and calcaneus. It is situated on the lateral side of the hindfoot, distal and slightly anterior to the lateral malleolus. It separates the anterior from the posterior subtalar joint. It contains fat, blood vessels, nerves, and complex ligamentous structures.

**Morphology:**

The ligamentous layers form slips around the synovial sheaths of the extensor tendons under the inferior extensor retinaculum.

There are two strong interosseous ligaments in the sinus tarsi, the lateral cervical ligament, and the medial talocalcaneal interosseous ligament. By some authors, they are seen as one single structure, and referred to as "fundiform ligament" with one lateral and one medial band.

Fibres of the lateral inferior extensor retinaculum also traverse the tarsal sinus and canal, where they are anchored to the talus and calcaneus. It contain also reflection of the extensor digitorum brevis muscle belly distally.

The interosseous talocalcaneal ligament and the medial component of the extensor retinaculum root form a V shape in the tarsal sinus and canal.

50) Ureter anatomy. False answer:  
- No true answer

Relations of the ureter:
posterior: psoas muscle, genitofemoral nerve, sacroiliac joint and common iliac vessels, tips of the transverse processes of L2-L5 lumbar vertebrae

anterior: Right - duodenum, gonadal and colic artery
Left - gonadal and colic artery, sigmoid mesentery.

In the male pelvis the ureter is Superior and anterior to seminal vesicle and it is Inferior to vas deferens

51) Riolan's ring formed of anastomosis between:
- SMA (middle colic artery) & IMA (left colic artery)

The **arc of Riolan (AOR)** is also known as the meandering mesenteric artery or central anastomotic mesenteric artery. It is an *inconstant artery that connects the proximal superior mesenteric artery (SMA) or one of its primary branches to the proximal inferior mesenteric artery (IMA) or one of its primary branches. It is classically described as connecting the middle colic branch of the SMA with the left colic branch of the IMA. It forms a short loop that runs close to the root of the mesentery. [http://ourhumananatomy.blogspot.com/2012/10/68-arc-of-riolan.html](http://ourhumananatomy.blogspot.com/2012/10/68-arc-of-riolan.html)
52) regarding adrenal gland. True answer:  
1/3 the size of the kidney in infant.  
"At birth the adrenal glands are relatively much larger than in the adult – one-third the size of the kidney at birth and one-thirtieth in the adult. The size of the gland is somewhat variable, but as a rule of thumb on cross-sectional imaging the limbs of the adrenal should not be thicker than the diameter of the adjacent crus of the diaphragm."

53) PICA is a branch of:  
Vertebral artery.  
The vertebral artery arises from the first part of the subclavian artery. The left vertebral artery is the dominant artery in 80% of cases.

In the neck the branches of the vertebral artery (small branches rarely seen on angiograms) are as follows:
- Spinal branches
- Muscular branches to the deep muscles of the neck.
- Meningeal branch to the cerebellar fossa and falx.
- Posterior spinal artery (more frequently arises from PICA)
- Anterior spinal artery
- Small branches to the medulla oblongata.
- Posterior inferior cerebellar artery (PICA) – the largest branch of the vertebral artery. It is occasionally absent. The PICA arises from the intracranial part of the vertebral artery"

54) anatomy of the larynx:  
Vallecula is inferior to epiglottis

55) MCQ about aortic nipple:  
Left superior intercostal vein.

56) about aortopulmonary window:
THE AORTOPULMONARY (AP) WINDOW

Definition:
represents a mediastinal space that is seen as an interface on frontal chest radiographs. The AP window actually lies posterior to the aortic-pulmonary stripe.

Boundaries:
It is bounded superiorly by the inferior wall of the aortic arch and inferiorly by the superior wall of the left pulmonary artery. The posterior wall of the ascending aorta forms the anterior boundary of the AP window, whereas the anterior wall of the descending aorta forms the posterior boundary. The medial border is formed by the trachea anteriorly, the lateral wall of the left main bronchus, and the esophagus posteriorly. The lateral border forms the interface representing the AP window on frontal chest radiographs. It is formed by the left lung and pleura coming in contact with the aortic arch and extending inferiorly to contact the left pulmonary artery. The left lung extends into the space connecting the aortic arch and the left pulmonary artery, thereby forming the normal concave reflection (reflection B) along the mediastinal side.

Related pathology:
A convex contour of the AP window is considered abnormal. A straight contour of the AP window may be normal but is considered abnormal when previous chest radiographs showed the contour to be concave.

An abnormal appearance of the AP window may be related to disease of its underlying contents, which include the left recurrent laryngeal nerve, left vagus nerve, ligamentum arteriosum, mediastinal fat, lymph nodes, and left bronchial arteries. Abnormal convexity of the AP window may be due to prominent mediastinal fat, lymphadenopathy, bronchial artery aneurysms, or nerve sheath tumors (1). Paralysis of the left vocal cord or diaphragm should also prompt a search for disease in the AP window. Disease in structures that form the borders of the AP window (e.g., aortic aneurysms) can also cause the window to have an abnormal appearance.
57) component of osteomeatal complex:

ostiomeatal complex, which consists of four structures: hiatus semilunaris, uncinate process, infundibulum, ethmoidal bulla, and maxillary ostium

OMC is a functional entity that includes middle turbinate, uncinate process, ethmoid bulla, semilunar hiatus, and ethmoid infundibulum.

OMC is the final common pathway for drainage and ventilation of frontal, maxillary sinuses, and ant. ethmoidal cells.

OMC is related with pathogenesis of nasal sinusitis and it is the basis of functional nasal endoscopic surgery.

Physics:

58) x-ray and gamma ray differ in:
   - means of production.

-X-ray are produced by electrons, whereas gamma rays originate in nuclear transformation.

W.H page 13, Q14.

59) MR "shimming" is used to:
Correct for magnetic-field inhomogeneicities.
W.H page 208, Q8.

60) double filaments role:
To allow a choice of two focal spot size.
61) **Dose equivalent more than absorbed dose in:** 
**Neutron.**

Equivalent dose \( (H) = \text{absorbed dose} (D) \times \text{Radiation weighting factor} (wR) \)

Radiation weighting factor \( (wR) \) is high (about 20) for high-LET* radiation sources (heavy ions like alpha particle, neutron and proton)

Radiation weighting factor \( (wR) \) is low (about 1) for low-LET radiation sources (electron, x-ray, gamma rays)  

* LET is Linear Energy Transfer.

So, Dose equivalent more than absorbed dose for high-LET* radiation sources (heavy ions like alpha particle, neutron and proton).

W.H, page 169, Q 7

62) **why molybdenum used in mamo instead of tungsten:** 
**Characteristic x-ray of about 18 keV.**

W.H, P217, Q A62.

63) **increasing the matrix size will:**
- increase resolution

The matrix size is the number of frequency encoding steps, in one direction; and the number of phase encoding steps, in the other direction of the image plane. Assuming everything else is constant, increasing the number of frequency encodings or the number of phase steps results in improved resolution.

The FOV is the total area that the matrix of phase and frequency encoding cover. Dividing the FOV by the matrix size gives you the voxel size; hence, increasing the FOV in either direction increases the size of the voxels and decreases the resolution. Decreasing the FOV improves the resolution.

[http://www.mritutor.org/mritutor/resolut.htm](http://www.mritutor.org/mritutor/resolut.htm)

64) **CT numbers (HF units) depends primarily on:**
- KvP (Kilovolt Peak) mainly & filtration. \( CT = 120 \text{ KeV} \)

W.H, P 121.

65) **Q factor concerns with which of the following:**
**Purity of the frequency.**

Q is defined as the operating frequency (MHz) divided by bandwidth, so the high Q value correspond to pure frequency and narrow bandwidth and vice versa, and it is not related to the intensity.

W.H, P189, Q16…also P234, QB105 and P220, Q A106
66) Compton interaction at which energy level:
Occur most commonly with electron with low binding energy. W.H, P37

PE and compton effect are equal at 25 keV with the PE more important at lower energies and vice versa. W.H, P45, Q8, Q10 ……W.H, P214, QA23,
The energy of the scattered photon in compton process depends primarily on the scattering angle. W.H, P228, QB22,
The compton scatter is the primary interaction for soft tissue at high photon energy level (i.e., more than 25 keV or more than 75 kVp). W.H, P228, QB23,

67) not emitted in radioactive decay:
Protons (I believe the wrong is neutron)

Neutrino, anti-neutrino, alpha particle, beta particle (electrons), gamma rays, positron are emitted in radioactive decay. W.H, P227, QB10,

68) effective half life:
Effective half life is shorter or equal to the physical half life.

Physical half life is the time required for radionuclide to decay to half its original activity.
Biological half life is determined by clearance of the radionuclide from the organ, tissue or body.
Effective half life of radionuclide in any organ encompasses both radioactive decay and biological clearance, and is shorter than the physical or biological half-life. (pls do not forget the equation)
W.H, P135, Q26……. W.H, P219, QA90.

69) upside down grid:
Is one of the grid error result in severe cutoff toward the edge of the image.
Other grid error include:

- off level: cutoff across entire image, light image
- off center: cutoff across entire image, light image
- off focus: cutoff toward the edge of the image
- off focus & off center: dark on one side & light on the other

http://www.mccc.edu/~kerrs/documents/GRIDPP_student_s12_001.pdf
70) **Increasing which temperature is most likely result in high for level:**
> Developer.
> W.H, P64, Q 3.

71) **anode heat capacity:**
The rotating anode greatly increases the effective target area used during an exposure and therefore raises the heat capacity.
W.H, P 24.

72) **in the Inversion recovery (IR sequence), The TI value is the time:**
Between an initial 180 degree and subsequent 90 degree pulse.
W.H, P 209, Q 18.

73) **thermoionic emission:**
The high resistant in the filament causes temperature to rise ( > 2200 C ), resulting in thermoionic emission of electrons.
W.H, P 24.

74) **focal spot and resolution:**
The focal spot is the source of x-rays in the tube. Smaller focal spots produce sharper images, but larger focal spots can tolerate greater amounts of heat. As such, small focal spots are used for mammography (which has few exposures, but very sharp images are required). Large focal spots are used in fluoroscopy (for continuous exposure, but lesser resolution). Regular diagnostic x-rays use focal spot sizes between those used for mammography and fluoroscopy.
Radiology secretes.

75) **The maximum MR signal is obtained by using a**
90 degree RF tip, short TE, long TR.
W.H, P209, Q18

76) **which coil adjust the uniformity of magnet field strength:**
Shim.
W.H, P235, Q 113

76) **Changing x-ray tube current (MA) is most likely to modify the x-ray beam:**
quantity of x-rays.
W.H, P30, Q 10

77) **HU for the cortical bone, fat, lung and muscle, respectively, are typically:**
1600, -100, -600, 30
W.H, P232, QB71.
W.H, P122 table 8-1 and P124 table 8-2 (very very important)
Positioning & techniques:
78) regarding lumbar mylography. All true except: ( ??? I don't know )
- true lateral is the standard position  ?F
- differentiate extra from intra dural or ?spinal masses
- detect CSF leak
- amount of contrast

79) about abdominal radiography. True answer: ( ??? I don't know )
- upper limit is xiphisternum  F
- lower limit is upper border of symphysis pubis  T
- 1 mm of free air can be detected on lateral decubitus ??

80) barium meal ( ??? I don't know )
- amount of air required in mls  ? 200-400 ml. (600-1000 ml in enema)

- positioning

81) regarding non-surgical reduction of intussception. True answer: ( ??? I don't know )
- air method is contra indicated in children ? over/ less 1 y/o
- contraindicated if intestinal obstruction more than 24hrs  T
- air method has less radiation dose and ?faster than barium method

82) to assess right cervical foramina: ( ??? I don't know )
- left anterior oblique  T
- left posterior oblique
- lateral

83) shoulder MRI protocol ( ??? I don't know )

84) shoulder arthrogram. Best access.
1 cm inf & 1 cm lat to coracoid, 15 ml of contrast

85) abdominal aortogram: us guided something ( ??? I don't know what's Q)

86) tarsal trauma. Best view:
- oblique dorsiplanter

87) Hepatic artery embolization leads to hepatic infarction

88) SI joint position

89) judet view
((Oblique views of the acetabulum. 1. Raise the affected side by 45 degrees and centre to the affected hip. 2. Raise the unaffected side by 45 degrees and centre to the affected hip.))

90) angio.
Femoral artery at level of femoral head  T