1. Coffee bean sign is seen in?

a) Gastric volvulus

b) Sigmoid volvulus

c) Hypertrophic pyloric stenosis

d) Midgut volvulus

Correct Answer - B

Sigmoid volvulus REF: Wofganag 5th e p· 846/748

Sign	Disease
Rat tail appearance	Carcinoma esophagus
Bird beak appearance	Achalasia
Beak sign/double track/ tram track	Hypertrophic pyloric stenosis
Medusa head colonies on CT	Round worm
Pincer/claw/coiled spring/target/meniscus sign	Intussception
Coffee bean sign	Sigmoid volvulous
Lead pipe appearance	Ulcerative colitis
String of kantor/bull's eye	Chron's disease
Thumb printing sign	Ischemic colitis
Saw tooth appeance on barium enema	Diverticulosis
Apple core sign	Carcinoma colon
Cork screw appearance	Diffuse esophageal spasm
String sign	Hypertrophic pyloric stenosis

2. Rat tail appearance in contrast radiography is seen in?

a) Achalasia cardia

b) Carcinoma esophagus

c) Cork screw esophagus

d) Diffuse esophageal spasms

Correct Answer - B
Carcinoma esophagus REF: sabiston's 18' edition chapter 41 See table in the previous question
"Rat-tail" appearance on barium study is seen in carcinoma esophagus.

3. Which chamber enlargement shows a double right heart border with a wide subcarinal angle?

a) Left atrium

b) Left ventricle

c) Right atrium

d) Right ventricle

Correct Answer - A
Answer- A- Left atrium
Radiological signs of left atrial enlargement:

- A 'double' right heart border
- Elevation of the left main bronchus
- Splaying of the carina
- Enlargement of the left atrial appendage
- The prominence of the portion of the left heart border at the level of the left main bronchus

4. Mercedes Benz sign is seen in:

a) Gall stone

b) Bladder stone

c) Renal stones

d) Foreign body bronchus

Correct Answer - A
Gall stone REF: Sutton's textbook of radiology, T^{h} edition, volume 1 page 713
Mercedes Benz sign/Seagull sign/Crow feet sign:
Gall bladder stone if radiopaque has a stellate faceted appearance with gas containing fissures on the plain radiograph and is called as Mercedes Benz sign/Seagull sign or Crow feet sign

5. Chain of lakes appearance is seen in?

a) Chronic pancreatitis

b) Acute pancreatitis

c) Gall stone ileus

d) Sub-acute intestinal obstruction

Correct Answer - A
Chronic pancreatitis REF: Sutton's Radiology 7th edition volume 1 page 798, Sabiston textbook of surgery 18th ed chapter 5
Chronic pancreatitis is characterized by irregularities of the pancreatic ducts, ductal strictures, and areas of duct dilation. The major as well as the side-branch ducts may be involved. For unexplained reasons, some patients with chronic pancreatitis develop dilated main pancreatic ducts (large duct disease), whereas others retain ducts of normal or even smaller than normal caliber (small duct disease). Some patients with chronic pancreatitis can be shown to have major ducts that have the appearance of a "chain of lakes" or a "string of pearls" that is the result of segments of dilated duct separated by areas of ductal stricture

6. "Cork screw appearance" is characteristic of?

a) Carcinoma esophagus

b) Hypertrophic pyloric stenosis

c) Diffuse esophageal spasm

d) Sigmoid volvulous

Correct Answer - C
Diffuse esophageal spasm REF: Wofganag 5th e p. 846/748

Sign	Disease
Rat tail appearance	Carcinoma esophagus
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Saw tooth appeance on barium enema	Diverticulosis
Apple core sign	Carcinoma colon
Cork screw appearance	Diffuse esophageal spasm
String sign	Hypertrophic pyloric stenosis

7. An absolute contraindication of MRI is:

a) Pacemaker

b) Prosthetic cardiac valves

c) Insulin pump

d) Choclear implants

Correct Answer - A
Pacemaker *[Ref: Harrison 17/e p2494; Grainger Diagnostic Radiology 4/e p122;*
various websites-http://www.mr-tip.com/servl.php?ope=dbl &dbs=Prosthetic%20Heart%20Valves
http://www. imrser.org/PDF/Shellock.HeartValves.JMRLpdf; http ://www. mrtip. com/se r^y 1.php ?type = dh 1 &dbs= Prosthetic %20Heart %20Valves
;and journal- _RadioGraphic s 2004 ;24 : 1257- 1267

- MR is considered among the *safest imaging modalities* for patients, even at very high field strengths, more than 3-4 tesla.
- But Ferromagnetic objects under magnetic field can be vulnerable to *4 adverse effects:*
- Movement (causing structural injury),
- Current conduction (potentially causing electrical shock),
- Heating (possibly causing burn injury), and
- Artifact generation
- Serious injuries can be caused by attraction of ferromagnetic objects into the magnet, which would act as missiles if brought too close to the magnet.
- Ferromagnetic implants, such as aneurysm clips, may torque (turn or twist) due to the magnetic field, causing damage to vessels and even death.

- Metallic foreign bodies in the eye have moved and caused intraocular hemorrhage.
- Pacemakers and pacemaker leads are a contraindication, as the pacemaker can malfunction and cause arrhythmia or even death.
- However with growing expansion of MR, increasing number of implant medical devices are being MR safe. So newer pacemaker and aneurysm clips are being made which are MR safe.

Absolute Contraindications for the **MRI** scan:

- *Electronically, magnetically, and mechanically activated implants*
- *Ferromagnetic or electronically operated active devices like automatic cardioverter defibrillators*
- *Cardiac pacemakers*
- *Metallic splinters in the eye*
- *Ferromagnetic haemostatic clips in the central nervous system (CNS)*

Patients with an implanted cardiac pacemaker have been scanned on rare occasions, but pacemakers are generally considered an absolute contraindication.

Relative Contraindications for the MRI scan:

- *Cochlear implants*
- *Other pacemakers, e.g. for the carotid sinus*
- *Insulin pumps and nerve stimulators*
- *Lend wires or similar wires (MRI Safety risk)*
- *Prosthetic heart valves (in high fields, if dehiscence is suspected)*
- *Haemostatic clips (body)*
- *Nonierromagnetic stapedial implants*
- *Women with a first-trimester pregnancy*
- *Tattoos (only a problem in higher-strength magnetic field i.e. more than 3 tesla)*

1Reflittp://www.mr-tip.com/se r[y] 1 .php?type=dbl &dbs= Prosthetic %20Heart%20Valvesi

8. Floating water lily sign is seen in

a) Aspergillosis

b) Hamartoma

c) Hydatid cyst

d) Cavitating metastasis

Correct Answer - C
Hydatid cyst *[Ref Radiology Review Manual by Dahnert 5/e, p 699;* vviviv.emedicine.00In/Ined/TOPIC629.htn]

- Separated membranes floating with the cyst give the appearance of water lily.
- It is pathognomonic of hydatid cyst.

9. **The scan with highest sensitivity to detect adrenal metastasis due to bronchogenic carcinoma is:**

a) Contrast Enhanced CT abdomen with Adrenal protocol

b) PET scan

c) MRI scan

d) Radionuclide scan

Correct Answer - B

Scans to differentiate adrenal adenoma from adrenal metastasis are:

- CECT -
- Chemical shift MRI
- FDG-PET

PETscan has almost 100 % sensitivity for detecting adrenal metastasis, so a negative study excludes the possibility of adrenal mets. But adenomas can give false positive test.

Ref: Fundamentals of Diagnostic Radiology, Edition - 4, Page - 427.

10. Which of the following agents is used to measure Glomerular Filtration Rate (GFR)?

a) Iodohippurate

b) Tc99m-DTPA

c) Tc99m-MAG3

d) Tc99m-DMSA

Correct Answer - B

Tc99m-Diethylene Triamine Pentothenic Acid (DTPA) is an agent of choice widely used in measuring GFR.

Ref: Renal Disease: Techniques and Protocols By Michael S Goligorsky, Page 87; Paediatric Uroradiology By Richard Fotter, ALbert L Baert, Page 47

11. **The CT severity index in acute pancreatitis is described by:**

a) Balthazar

b) Mengini

c) Chapman

d) Napelon

Correct Answer - A

The CT severity index (CTSI)-described by Balthazar

Balthazar CT Severity Index

CT Grade Score

- A. Normal- 0
- B. Enlarged gland -1
- C. Peri-pancreatic inflammation- 2
- D. One fluid collection- 3
- E. Two or more collections- 4

Necrosis Score

-
- 30%-50%- (4)
- >50% -(6)

Ref: ACR Appropriateness Criteria,Acute Pancreatitis.

12. **Radiocontrast is contraindicated in all of the following conditions except?**

a) Renal failure

b) Patient on metformin

c) Dehydration

d) Obesity

Correct Answer - D

Obesity is not a contra-indication for the administration of radio-contrast agent.

Ref: Radiologic Technology at a Glance By Theresa S. Reid-Paul; pages 66.

13. **A PET scan uses which of the following tracer materials?**

a) FDG

b) CDF

c) ADP

d) MIBG

Correct Answer - A

- *Positron emission tomography (PET) uses positron-emitting radioisotope (tracer) - 18F-FDG*
- *A PET scan uses a small amount of a radioactive drug,* or tracer, to show differences between healthy tissue and diseased tissue.
- The most commonly used tracer is called FDG (fluorodeoxyglucose), so the test is sometimes called an FDG-PET scan.
- Very expensive.
- Better contrast and spatial resolution

14. **Which one of the following has the maximum ionization potential?**

a) Proton

b) Electron

c) Helium ion

d) Gamma (y) – Photon

Correct Answer - C

Helium ion has maximum ionizing potential.
The ionizing potential of atoms ranges from a few eV for alkali elements to 24.6eV for helium which has the maximum ionizing potential.
Ref: Radiation Physics for Medical Physicists By Ervin B. Podgoršak, Page 7

15. All of the following about MRI are correct except:

a) MRI is contraindicated in patients with pacemakers

b) MRI is useful for evaluating bone marrow

c) MRI is better for calcified lesions

d) MRI is useful for localizing small lesione in the brain

Correct Answer - C
C i.e. MRI is better for calcified lesions
* MRI is very poor in detection of calcification. It is *inferior to CT scan, mammography and x-ray* in detecting calcification. That is why it *lags behind mammography in early detection of noninvasive ductal carcinoma in situ (DCIS)Q,* which most commonly
has *microcalcification* as its only presenting feature. And similarly it has *a very limited role in detection of renal stones and gall stonesQ.* However, it is important to note that only upto 60% of gall stones have enough calcium density (more than that of bile) to get visualized on CT. Becaus of its superior calcification detection abilities, MDCT is used in Agatston scoring (Coronary calcium scoring) of *calcified plaques of coronary artery* using coronary calcium as a surrogate marker to detect the presence and measure the amount of coronary atherosclerosis. Because with *exception of patients with renal failure calcification of arteries occurs exclusively in context of atherosclerosis.*
Similarly nonenhanced helical **CT** is *superior to all other imaging modalities in diagnosis of urinary tract calculiQ* but at the cost of higher radiation exposure.
Now there is no need to say that MRI is better that CT for evaluation of bone marrow, small brain lesions, meniscus/ ligament injuries,

soft tissue tumors and meningeal pathology. But MRI is very poor in detection of calcification.

16. Tufting of distal phalanx is characteristically seen in

a) Gout

b) Hyperkalemia

c) Hypoparathyroidism

d) Hyperparathyroidism

Correct Answer - D

Ans. is. D. Hyperparathyroidism

Acro-osteolysis is the term used to describe resorption of the distal phalangeal tufts. Causes are : -

1. Scleroderma
2. Trauma & thermal injury
3. Hyperparathyroidism
4. Epidermalysis bullosa
5. Arthropathy (RA, Psoriasis)
6. Neuropathy (diabetes, syringomyelia

17. Calcification of Intervertebral Disc is seen in

a) Gout

b) Rheumatoid

c) Alkaptonuria

d) Psoriasis

Correct Answer - C

C i.e. Alkaptonuria

Features	Disease
Fish Mouth Vertebrae	*- Sickel Cell AnemiaQ* *HomocystinuriaQ*
Cod Fish Vertebra (Biconcave vertebra)	- Osteomalacia, Osteoporosis, Hyperparathyroid
Rugger jersey spine (sclerosis of upper & lower spine borders)	*- CRF induced osteomalaciaQ* - Osteopterosis (marbel bone disease)
Calcification of Intervertebral disc	*- Alkaptonuria (m.c.)*
Picture Frame vertebrae	- Paget's disease
Vertebrae plana	*- Eosinophilic granulomaQ*

18. Schober's sign is for :

a) Flexion of lumbar spine

b) Chest expansion

c) Pain with motion of hip

d) Neck pain and stiffness

Correct Answer - A
A i.e. Flexion of lumber spine
Schober's test is measure of *flexion on lumber spineQ.* This test is done in *ankylosing spondylitisQ*

19. Bone within bone appearance is seen in?

a) CML

b) Osteoporosis

c) Osteopetrosis

d) Bone infarct

Correct Answer - C
C i.e. Osteopetrosis
In osteopetrosis, there is reduced osteoclastic bone resorption resulting in diffuse symmetrical skeleton sclerosis. Also k/a marble bone disease d/t its stone like quality of bones; however the bones are abnormally brittle & fracture like a piece of chalk. It can present radiologically as?
Sclerosis of all bones *more prominent at base of skullQ.*
Sclerosis of vertebral end plate 1/t characteristic *sandwitch or broad stripped (rugby jersey spine) Q Bone in bone appearanceQ* d/t sclerotic foci within the bone.

20. "Sunray appearance" on X-rays is suggestive of:

a) **A** Chondrosarcoma

b) A metastatic tumour in the bone

c) An Osteogenic sarcoma

d) An Ewing's sarcoma

Correct Answer - C
C i.e. Osteogenic Sarcoma

- Sunray appearance is classically seen in *osteosarcoma.* It may also occur in *metastases, Ewings sarcoma,* Haemang oma, Meningioma and tuberculosis.

21. Inferior rib notching is seen in

a) Coarctation of aorta

b) Rickets

c) ASD

d) Multiple myeloma

Correct Answer - A
A i.e. Coarctation of aorta
Inferior rib notching in coarctation of aorta is d/t pressure erosion of intercostal arteriesQ It usually takes several years to develop, so is unusual before 10 years of age.

22. Flask shaped heart is seen in following except:

a) Ebstein anomaly

b) Pericardial effusion

c) TOF

d) TAPVC

Correct Answer - D
D i.e. TAPVC
Due to dilation of SVC (superior vena cava) & left vertical vein, TAPVC (total anomalous pulmonary venous connection / return) of supra diaphragmatic variety shows *double contour/ "Figger of 8"/ Snowman configuration of cardiac silhouetteQ.*

23. Soap Bubble appearance in X-ray is seen in

a) Multiple cystic Kidney

b) Neuroblastoma

c) Cystic lymphagiectasis

d) Meconium ileus

Correct Answer - D
D i.e. Meconium ileus

- Soap bubble appearance in X ray is seen in meconium ileus due to admixture of gas with meconium.

24. Rim sign in IVP is seen in

a) Polycystic Kidney

b) Hydronephrosis

c) Chronic pyelonephritis

d) Hypernephroma

Correct Answer - B
B i.e. Hydronephrosis
Rim Sign in Nephrogram-
1. Severe hydronephrosis of the kidneys
2. Acute complete arterial obstruction

25. The most accurate investigation for assessing ventricular function is:

a) Multislice CT

b) Echocardiography

c) Nuclear scan

d) MRI

Correct Answer - B
B i.e. Echocardiography
Transthoracic echocardiography is the most commonly used cardiac imaging examination after the chest X-ray and probably approaches the electrocardiogram in its clinical utility. It is harmless and relatively comfortable for the patient and is the first-line technique for evaluating most abnormalities of the cardiac chambers, valves and great vessels.

Diagnotic utility	Chest X-ray	Transthoracic echocardiogram	Transesophageal echocardiogram	Nuclear medicine technique	Multislic CT
Anatomy					
Myocardium	+	++	+++	+	++
Valves	+	++	+++	0	+
Coronaries	0	0	+	0	++
Pericardium	+	+	+	0	++
Pulmonary vessels	+++	0	0	0	+++
Calcification	+++	+	+	0	+++
Function					
Myocardium	++	++	+++	++	+

Valves	+	++	+++	0	+
Coronaries	0	0	+	++	++
Limitations					
Radiation hazard	-	0	0	- -	
Risk/ discomfort	0	0	- -	-	-
Spatial resolution	- -		-		
Temporal resolution		-	-		
Operator skill	-		- - -		-
Cost				--	

+++ = Major utility; ++ = moderate utility, + = minor utility; 0 = no utility/no limitations; - = minor limitation-- - = moderate limitation; - - - major limitation

26. In patient with high clinical suspicion of pulmonary thromboembolism, best investigation would be?

a) D-dimer

b) CT angiography

c) Catheter angiography

d) Color Doppler

Correct Answer - B

B i.e. CT angiography

- Spiral or helical chest CT scan with intravenous contrast (CT pulmonary angiography) is the *principal imaging test for the diagnosis of pulmonary embolsmQ.* It acquires image with < *1 m resolution* and visualizes *up to 6th order branches* and small peripheral emboli with a resolution *superior to conventional invasive contrast pulmonary angiography.* It obtains excellent images of right & left ventricle and can be used for diagnosis as well as *risk stratification.* In patients with pulmonary embolism, *RV enlargement indicates 5 times more likelihood of death within next 30 days.*
- Inadequate breath holding can impair the image quality b/o change in arterial flow rates and motion artefact during breathing. The advent of multidetector CT *(MDCT)* allows examination of whole lung during single breath -hold. It is noninvasive.
- Ventilation - perfusion lung scanning is now *second line diagnostic testa* for PE, and mostly used in patients who *cannot tolerate intravenous contrast. Its utility is greatest when accompanied with a normal chest x-ray* implying that a ventilation - perfusion mismatch is not due to parenchymal disease. High probability (>80%) scan have

2 large segmental V-P mismatches (perfusion defects & normal ventilation) with a normal chest radiograph. And very low probability scans have microparticles (10 - 100 1.1 m) of Tc99 micro - aggregate albumin (MAA) in patients lying supine. Ventilation scintigraphy is performed by inhalating Krypton - 81, (best), Xenon 133, Tc99 - diethylenetriamine penta acetic acid (DTPA), or technegas. Last two can't be administered during perfusion scan as both are labelled with Tc99. *Eight images* (anterior, posterior, obtique & lateral on both sides) are aquired.

- Conventional pulmonary angiography: Non invasive CT with contrast have virtually replaced invasive pulmonary angiography as a diagnostic tool. However, it remains the *gold standard testa.*

27. Investigation of choice for studying Renal Cortical mass

a) 99 Tc DTPA

b) 53 Cr Study

c) 99 Tc DMSA

d) 99 Tc Pyrophosphate

Correct Answer - C

C i.e. 99 - Tc - DMSA

DTPA (Renogram)	DMSA (Isotope Scanning)
- DTPA is freely filtered at glomerulus with no tubular reabsorption or excretion (i.e. GFR = Excretory function)	- Tc.99 DMSA is used for *renal morphological (anatomic) imagine* - This compound gets fixed in renal tubules & images
- DTPA is useful for *evaluating perfusion and excretory function of each kidneyQ*	may be obtained after 1-2 hours of injection. Lesions such as *tumors & benign lesions as cysts show filling defectQ*
- Indications:	
1. Measurement of *relative renal functionQ in each kidney.*	- Used to assess *cortical function of KidneyQ* and *detect renal scarringQ.*
2. *Urinary tract obstructionQ*	
3. Diagnosis of *Renovascular cause of hypertensionQ*	

4. Investigation of *Renal transplantQ*

28. Investigation of choice for screening of proximal internal carotid artery stenosis is :

a) Doppler flow USG

b) CT substraction angiography

c) MRI

d) Angiography (DSA)

Correct Answer - A

Answer is A (Doppler flow USG):

'Stenosis at the origin of the internal carotid Artery can be identified and quantified reliably by ultrasonography that combines B mode ultrasound image with a Doppler ultrasound assessment of flow velocity.'

29. Roentgen is the unit of:
March 2010

a) Radioactivity

b) Radiation exposure

c) Absorbed dose

d) None of the above

Correct Answer - B
Ans. B: Radiation Exposure
The curie, named after scientist Marie Curie, is a unit of measurement used to measure how radioactive an object is, or how much radiation it produces.
This is done by examining how fast its atoms disintegrate and measuring their disintegration per second.
Roentgen, on the other hand, **is a radiation unit that indicates how much radiation is present in the air of a specific environment.**
This is used to show how much radiation may be absorbed by standing in a particular place for a certain amount of time. One roentgen of gamma- or X-ray exposure produces approximately 1 rad (0.01 gray) tissue dose.
More common than these two are the rad and the rem.
These two units can measure any type of ionizing radiation, including alpha, beta, neutron, gamma and "X," and deal with how much radiation is absorbed by objects.
Rad stands for "radiation absorbed dose."
One rad equals 100 ergs (an energy unit) absorbed by 1 g of material.
Rads are used to show how much radiation any object,

especially things like metal and stone, has absorbed. Rem (dose equivalent)is a strictly biological measurement, and stands for "roentgen equivalent man," meaning that it is the same essential measurement as a roentgen, only applied to the human body, although this works only with gamma and "X" types of radiation. Rem is used to define limits of exposure for people who work in nuclear power plants.
Rem is often divided in millirems and assigned a length of time, such as millirems per hour.
Curie/ becquerel is the unit of radioactivity.

30. Adder head appearance is seen in:
March 2011

a) Posterior urethral valve

b) Uretrocoele

c) Bladder tumour

d) Horse shoe kidney

Correct Answer - B
Ans. B: Ureterocoele
The 'adder head' on excretory urography is typical of ureterocoele

- Ureterocele is a cystic dilatation of the distal ureter.
- Cobra head or Adder head appearance is diagnostic of ureterocele.
- Spider leg appearance in polycystic kidney.

Ref: Bailey & Love, 25th Edition, Page 1290

31. White line of Frenkel is seen in:
September 2008

a) Osteoporosis

b) Osteomalacia

c) Scurvy

d) Beri-Beri

Correct Answer - C
Ans. C: Scurvy
Clinical symptoms and signs of infantile scurvy, in order of frequency are irritability, tenderness and weakness of lower extremities, a scorbutic rosary of the legs, bleeding of the gums (usually where teeth have erupted), and fever.
Radiographic findings of scurvy:

- Dense metaphyseal line-This is due to an intensification of the zone of preparatory calcification, resulting from matrix formation failing, is has been referred to as the white line of Frenkel, but is non-specific, as it is also seen in healing rickets, and lead or phosphorus poisoning.
- Ground glass osteoporosis: This appears at the end of the shaft with blurring or disappearance of trabecular markings.
- Halo ossification centre: Also called the Wimberger's ring, it is the same effect that produces the white line of Frenkel, affecting the epiphyseal ossification center.
- Corner sign-Seen due to subepiphyseal infarction, or separation of the epiphysis from the metaphysis.
- Lateral spurs-These metaphyseal spurs project at right angles to the axis of the shaft, they may be seen due to mushrooming of epiphysis on the metaphysis, or may represent earliest calcification of

periosteum elevated by a subperiosteal hemorrhage.

- Subperiosteal hematomas-These occur at the end of long bones, seen after about 2 weeks of onset of clinical symptoms; it is not the periosteal hemorrhage that calcifies, but the elevated periosteum, secondary to resumption of bone formation.
- Metaphyseal fractures-Subperiosteal comminuted fractures at the end of long bones, extending only partially through the width of the bone.
- Atrophy scurvy line-A radiolucent zone on the shaft side of Frenkel's white line, it has been referred to as the Trummerfeld Zone.

32. SI unit of radioactivity is:

March 2013 (c, f)

a) Rem

b) Rad

c) Becuerel

d) Curie

e) None

Correct Answer - C

Ans. C i.e. Becquerel

Old unit of radioactivity is Curie and new unit (SI) is Becquerel.

33. CSF on MRI appears:

a) Hyperintense on T_1 weighed image and hypointense on T_2 weighed image

b) Hypointense on T_1 weighed image and hyperintense on T_2 weighed image

c) Hyperintense on T_1 and T_2 weighed images

d) Hypointense on T_1 and T_2 weighed images

Correct Answer - B
Ans. Hypointense on T_1 weighed image and hyperintense on T_2 weighed image
Fluid- Edema, Urine, Bile, CSF- T1 weighted signal low & T2 weighted signal high

34. Best imaging modality in patients with breast implants is:

a) MRI scan

b) CT scan

c) Mammography

d) Radionuclide scan

Correct Answer - A
Ans. MRI scan
It is the best imaging modality for the breasts of women with implants.
MRI can be usefirl to distinguish scar from recurrence in women who have had previous breast conservation therapy for cancer

35. Well defined rounded opacity is the lung with cause irregular calcification is a feature of:

a) Hamartoma

b) Hydatid cyst

c) Amoebic abscess

d) Ca lung

Correct Answer - A
Ans. Hamartoma

- Irregular central calcification (Popcorn calcification) is characteristic of hamartoma.

36. Commonly used type of radiation in radiotherapy is:

a) Alpha rays

b) Beta rays

c) Gamma rays

d) X-rays

Correct Answer - C
Ans. Gamma rays

- Radioiodine generates both beta and gamma rays but predominantly beta rays.

37. Radiation protection shields are made up of:

a) Copper

b) Silver

c) Lead

d) Tin

Correct Answer - C
Ans. Lead

38. The photosensitive material used in X-rays films consist of:

a) Cellulose

b) Silver bromide

c) Zinc sulphide

d) Cadmium tungstate

Correct Answer - B
Ans. Silver bromide

- After the image has been developed, the resultant image is then fixed by a *fixer (Hypo-sodium thiosulphate)* which removes unused silver halide, which would make the film appear milky or cloudy. X-ray film should be developed in dark room, otherwise light will spoil the film (x-ray film has photosensitive silver bromide). Blue and green light are most sensitive whereas yellow and red light are least.

39. Among the causes of rib notching are:

a) Coarctation of aorta

b) Congenital interruption of aorta

c) Chronic superior venacava obstruction

d) All of the above

Correct Answer - D
Ans. All of the above

40. Thickness of lead apron to prevent radiation:

a) 1 mm

b) 3 mm

c) 0.5 mm

d) 7 mm

Correct Answer - C
Ans. C. 0.5 mm
"It is recommended that for general purpose radiography the minimal thickness of lead equivalent in the protective apparel should be 0.5mm."
- Textbook of Radiology Physics p. 39
Lead apron of 0.5mm thickness reduce intensity of scattered X-rays by over 90%.

41. Hilar dance on fluoroscopy is seen in:

a) ASD

b) TOF

c) VSD

d) TGV

Correct Answer - A
Ans. ASD
Fluoroscopic examination done in a patient with ASD shows hilar dance sign due to pulsation of central pulmonary artery.

CXR features of ASD:

- There is no enlargement of left atrium except in few cases of Lutembacher syndrome.
- The heart in ASD is sometimes displaced to the left.
- The ascending aorta and its arch tends to appear smaller than normal, probably due to rotation of the ascending aorta by enlarged right atrium and right ventricle causing sagittal alignment of the aortic arch. Kerley B lines in a patient with ASD should always suggest an associated mitral valve abnormality**(Lutembacher syndrome).**
- **The Goose neck deformity** is seen in ASD on cardioangiography.

Ref: Clinical Diagnosis of Congenital Heart Disease By M. Satpathy page 78, Radiodiagnosis, Nuclear Medicine, Radiotherapy and Radiation Oncology By Bipin Valchandji Daga page 139.

42. Half life of Technetium 99 is:

a) 2 hours

b) 6 hours

c) 12 hours

d) 24 hours

Correct Answer - B
Ans. 6 hours
Tc-99 - Technitium - 6 hours
Half life (t_in) of radium (Ra^{226})is *1602-1626 years (longest)Q; Cesium (^{137}Cs) is 30 yearsQ;* Cobalt (^{60}Co) is *5.2 yearsQ;* iridium (^{192}1r)is *74.5 daysQ;* Iodine (P^{31})is *8 daysQ;* ^{1123} is *13 hoursQ; technitium (Tc^{99}) is 6 hoursQ;* and 1^{132} is *2.3 hoursQ.*

43. Popcorn calcification is seen in:

a) Pulmonary hamartoma

b) Fungal infection

c) Metastasis

d) Tuberculosis

Correct Answer - A
Ans. Pulmonary hamartoma
Popcorn calcification
o Popcorn calcification is a cluster of sharply defined, irregularly lobulated, calcification, usually in a pulmonary nodule.
o *Popcorn calcification is characteristic of hamartoma on chest X-ray examination.*
o It may also be seen in mediastinal lymph nodes of *acute histoplasmosis.*
Egg-shell calcification
o Egg-shell calcification means peripheral rim calcification of lymph nodes:
o It is seen in:
N Silicosis (most common cause)
(vi) Histoplasmosis *(vii)* Tuberculosis
(ii) Coal worker pneumoconiosis *(v)* Sarcoidosis (viii) Coccidiodomycosis
(iii) Lymphoma following radiotherapy *(vi)* Progressive massive fibrosis

44. The principle used in radiotherapy is:

a) Cytoplasmic coagulation

b) Ionising the molecules

c) DNA damage

d) Low dose causes tissue necrosis

Correct Answer - C
Ans. DNA damage
Radiotherapy is the treatment of cancer with ionizing radiation.
It works by damaging the DNA within the tumor cells, making them unable to divide and grow.
The goal of radiation therapy is to maximize the dose to tumor cells while minimizing exposure to normal, healthy cells.

Ref: Emami B et al. 1991

45. In a patient with renal cell carcinoma with a thrombus in IVC renal vein, which is the best investigation for diagnosis?

a) CT scan

b) Angiography

c) Colour doppler imaging

d) IVP

Correct Answer - A
Ans. CT scan

- Investigation of choice in RCC-CT scan.

46. The X-ray view for supra orbital fissure is:

a) Towne's

b) Caldwell

c) AP

d) nasal

Correct Answer - B
Ans. Caldwell

- Superior orbital fissure can also be seen on water's view, but best is caldwell view.
"The superior orbital fissure can easily indentified and normally has a slightly concave lateral appearacne"
- Text book of oral radiology

47. Which of the following techniques uses piezoelectric crystals?

a) Ultrasonography

b) NMR imaging

c) X-ray diffraction

d) Xeroradiography

Correct Answer - A
Ans. Ultrasonography

- Ultrasonography is based on *piezoelectric effect.*
- **MRI** is based on *gyeromagnetic property of proton (IP).*

48. "String of beads" appearance on horizontal abdominal view X-ray is suggestive of:

a) Intussusception

b) Sigmoid volvulus

c) Small bowel obstruction

d) Large bowel obstruction

Correct Answer - C
Ans. Small bowel obstruction
String of beads sign is virtually diagnostic of small bowel obstruction

49. Puff of smoke appearance on cerebral angiography is seen in:

a) ACA aneurysm

b) Cavernous sinus thrombosis

c) Moyamoya disease

d) Vein of Galen malformation

Correct Answer - C
Ans. c. Moyamoya disease

- **Moyamoya disease** is an idiopathic, non inflammatory, non atherosclerotic progressive vasculo-occlusive disease involving the circle of Willis, typically the supraclinoid internal carotid arteries.
- **Small abnormal net-like vessels proliferate giving the characteristic "puff of smoke" appearance on direct angiography.** CTA and MRA is not always able to demonstrate this appearance on account of lower flow and spatial resolution.

50. Which of the following is water soluble contrast?

a) Barium

b) Iodine

c) Bromium

d) Calcium

Correct Answer - B
Answer-B. Iodine
Radiocontrast agents are typically iodine, barium-sulphate or gadolinium based compounds.

51. Solitary lytic lesions seen in

a) Atherosclerosis

b) Multiple myeloma

c) Mitral stenosis

d) Osteoblast

Correct Answer - B
Answer- B. Multiple myeloma
F: fibrous dysplasia (FD) or fibrous cortical defect (FCD)
O: osteoblastoma
G: giant cell tumor (GCT)
M: metastasis(es)/myeloma
A: aneurysmal bone cyst (ABC)
C: chondroblastoma or chondromyxoid fibroma
H: hyperparathyroidism (brown tumor)
I: infection (osteomyelitis)
N: non-ossifying fibroma (NOF)
E: enchondroma or eosinophilic granuloma (EG)
S: simple (unicameral) bone cyst

52. Confusion assessment scale used for which of the following?

a) Schizophrenia

b) Delirium

c) Dementia

d) Depression

Correct Answer - B
Ans:B. Delirium

- Confusion Assessment Method (CAM), a widely-used instrument and diagnostic algorithm for identification of delirium.
  The CAM instrument assesses the presence, severity, and fluctuation of 9 delirium features:
- Acute onset
- Inattention
- Disorganized thinking
- Altered level of consciousness
- Disorientation
- Memory impairment
- Perceptual disturbances
- Psychomotor agitation or retardation
- Altered sleep-wake cycle.
  The CAM diagnostic algorithm is based on four cardinal features of delirium:
- Acute onset and fluctuating course
- Inattention
- Disorganized thinking
- Altered level of consciousness.

53. Hummingbird sign in brain MRI is seen in ?

a) Multiple sclerosis

b) Progressive supranuclear palsy

c) Parkinson's disease

d) Alzheimer disease

Correct Answer - B
Ans. is 'b' i.e., Progressive supranuclear palsy
[Ref Clinical neurology - 113]

- Hummingbird sign on brain MRI is a radiological sign of progressive supranuclear palsy.

54. Tigriod pattern on MRI is seen in -

a) Wilson's disease

b) Metachromatic leukodystrophy

c) Parkinsonism

d) GB syndrome

Correct Answer - B
Answer- B. Metachromatic leukodystrophy
It is characteristically seen in -

- Metachromatic leukodystrophy
- Pelizaeus-Merzbacher disease
- Autosomal recessive spastic ataxia of charlevoix.

55. Which of the following is not a contraindication of MRI

a) Cardiac pacemaker

b) Cochlear implant

c) Ryle's tube

d) Metallic splinter in eye

Correct Answer - C

Answer- C. Ryle's tube

Contraindications for MRI

A) Absolute

- Electronically, magnetically, and mechanically activated implants.
- Ferromagnetic or electronically operated active devices like automatic cardioverter defibrillators.
- Cardiac pacemaker
- Metallic splinters in the eye.
- Ferromagnetic haemostatic clips in the CNS.

B) Relative contraindications

- Cochlear implants
- Prosthetic heart valves
- Other pacemakers, e.g., for Carotid sinus
- Haemostatic clips
- Insulin pumps and nerve stimulators
- Non-ferromagentic stapedial implants
- Lead wires or similar wires
- Women with a first - trimester pregnancy

56. All are done to minimize radiation, exposure to the patient under fluroscopy, except

a) Decrease in field of view

b) Increasing the Kv of radiation

c) Decreasing fluroscopic time

d) Using low dose of radiation

Correct Answer - A

Answer- A. Decrease in field of view

Decreasing the field of view during fluroscopy increase the radiation dose rate :-

1. Field of view diameter 25 cm has dose rate 0.3 mGy/s
2. Field of view diameter 17 cm has dose 0.6 mGy/s

57. Investigation of choice for soft tissue sarcoma is -

a) CT

b) MRI

c) Ultrasound

d) X-ray

Correct Answer - B
Answer- B. MRI
"Any patient with a suspected STS should be referred to a diagnostic centre for triple assessment with clinical history, imaging and biopsy. Whilst the preferred method of imaging is MRI, other options including computerized tomography (CT) or ultrasound may be appropriate depending on local expertise."

58. Amount of radiation exposure in 1 CT-scan of chest is

a) 1 mSv

b) 3 mSv

c) 5 mSv

d) 7 mSv

Correct Answer - D
Answer- D. 7 mSv
CT chest causes radiation exposure of 7mSv.
CT abdomen-pelvis causes radiation exposure of 10 mSv.
CT head causes radiation exposure of 2 mSv.

59. Which of the following is a late severe adverse effect of radiation therapy

a) Nausea

b) Erythema

c) Anemia

d) Osteoradionecrosis

Correct Answer - D
Answer- D. Osteoradionecrosis
Osteoradionecrosis is a late complication of radiation while nausea, erythema and anemia are early complications.

60. Skyline view X-ray is useful in diagnosing -

a) Patellofemoral problem

b) Radioulnars problem

c) Tibiofibular problem

d) Skull fracture

Correct Answer - A
Answer- A. Patellofemoral problem
A 'Skyline' or 'Sunrise' or 'sunset' or 'axial' or 'tangential' or 'mountain view' gives most information about patellofemoral joint.

61. Substance used for PET scan is

a) 18FPCT

b) Gadolinium

c) Gastrogarfin

d) Iodine

Correct Answer - A

Answer- A. 18FPCT

- Fluorine-18-labeled 2Ali-carbomethoxy-3AY-(4-chloropheny1)-8-(-3-fluoropropyl) nortropane (FPCT) has been synthesized as a new dopamine transporter imaging agent.

Other substances used for PET scan are :

1. FDG
2. 64Cu-ATSM (4Cu diacetyl-bis(N4-methylthiosemicarbazone)
3. 18F-fluoride
4. FLT (3'-deoxy-3'-[18F]fluorothymidine)
5. FMISO (18F-fluoromisonidazole)
6. Gallium
7. Technetium-99m
8. Thallium

62. Sausage finger appearance is seen in -

a) Psoriatic arthritis

b) Rickets

c) Hyperthyroidism

d) Addison's disease

Correct Answer - A

Answer- A. Psoriatic arthritis

The common causes of sausage digit are :

- Psoriatic arthropathy.
- Ankylosing spondylitis
- Tuberculosis
- Osteomyelitis.
- Sickle cell disease
- Leprosy

63. Which common tracer in PET is usually administered in the form of a glucose sugar

a) Oxygen 15

b) Fluorine 18

c) Saccharide - 12

d) Aluminum - 12

Correct Answer - B

Answer- B. Fluorine 18

- Fluorine-18 is used in the form of FDG in PET scan.
- The most **common tracer** has a complicated name but is mostly known as FDG (which stands for 2-[18F]fluoro-2-deoxy-D-**glucose**).
- The biologically active molecule most commonly used for PET is 2-deoxy-2-18F-fluoro-β-D-glucose (18F-FDG), an analogue of glucose, for early detection of tumors.

64. Investigation of choice for acute subarachnoid hemorrhage is -

a) MRI

b) CT scan

c) Enhance MRI

d) Angiography

Correct Answer - B
Answer- B. CT scan
Investigation of choice for acute SAH - CT scan
Investigation of choice for chronic SAH - MRI

65. Intraoperative radiotherapy is used in

a) Gastric cancer

b) Colon carcinoma

c) Pancreatic carcinoma

d) All of the above

Correct Answer - D

Answer- D. All of the above

Intraoperative radiotherapy can be used In -

1. Pancreatic carcinoma
2. Retroperitoneal sarcomas
3. Gastric carcinoma
4. Genitourinary cancers
5. Colorectal carcinoma
6. Brain tumor
7. Head & Neck cancers
8. Some gynecological malignancies

66. Precisely directed high dose radiation is used in

a) IMRT

b) EBRT

c) Stereotectic radiosurgery

d) None of the above

Correct Answer - A
Answer- A. IMRT
Intensity modulated radiation therapy (IMRT) is an advanced mode of high precision radiotherapy that utilizes computer controlled X-ray accelerators to deliver precise radiation doses to a malignant tumour or specific areas within the tumour.

67. Epidural hematoma on CT scan shows -

a) Crescent shaped hyperdense lesion

b) Biconvex hyperdense lesion

c) Biconcave hyperdense lesion

d) Crescent shaped hypodense lesion

Correct Answer - B

Answer- B. Biconvex hyperdense lesion

Acute extradural (epidural) hematoma is biconvex hyperdense or mixed density lesion.

Extradural (epidural) hematoma appearance radiolgically :-

- Biconvex (lens shaped or lenticular)
- In Acute cases 4 Hyperdense (2/3) or mixed density (1/3).
- In chronic cases 4 Hypodense

68. Not used for internal radiotherapy

a) Iodine-125

b) Iodine-131

c) Cobalt-60

d) Iridium-192

Correct Answer - B
Answer- B. Iodine-131
Isotpes used for internal radiotherapy (brachy therapy)
A) Interstitial brachytherapy

- Permanent implants of interstitial brachytherapy :- Cesium - 131, Yttrium, Gold - 198 (Au - 198), 125I, Radon - 222 (Rn - 222), Pallidum - 103 (Pd - 103).
- Temporary implants of Interstitial brachytherapy :- Iridium - 192 (Ir - 192), Cesium - 137 (Cs - 137), Cobalt - 60 (Co -60), Californium, Radium - 226 (Ra - 226), Tantolum.

69. Radioiodine generates which type of radiation

a) X-rays

b) Alpha and beta rays

c) Beta and gamma rays

d) Alpha and beta rays

Correct Answer - C
Answer- C. Beta and gamma rays
Radioiodine generates both beta and gamma rays but predominantly beta rays.

70. Radioactive iodine is administered through which route

a) Intravenous

b) Subcutaneous

c) Oral

d) All of the above

Correct Answer - D
Answer- D. All of the above
Radioactive iodine is administered orally as well as parentrally i.e. IV, SC & IM.

71. Investigation of choice for acute intracerebral hemorrhage is -

a) NCCT

b) MRI

c) PET scan

d) None of the above

Correct Answer - A
Answer- A. NCCT
"NCCT remains the main stay of emergency imaging of stroke in order to exclude intracranial hemorrhage".
"In investigation of stroke with delayed presentation gradient-echo MRI is the investigation of choice for exclusion of old hemorrhage".

72. "Tree in bud appearance" on CT is seen in

a) Pulmonary tuberculosis

b) Silicosis

c) Pulmonary hydatid cyst

d) Small cell carcinoma

Correct Answer - A

Answer- A. Pulmonary tuberculosis

- It is usually visible on standard CT, however, it is best seen on HRCT chest.
- Typically the centrilobular nodules are 2-4 mm in diameter and peripheral, within 5 mm of the pleural surface.
- The connection to opacified or thickened branching structures extends proximally (representing the dilated and opacified bronchioles or inflamed arterioles)
- Associated CT findings of bronchiolitis are seen in about 70% of patients with bronchiectasis. Small centrilobular nodular and linear branching opacities (tree-in-bud sign) express inflammatory and infectious bronchiolitis

Pathogenesis-

The tree-in-bud sign occurs as a result of a number of processes, although often they co-exist in the same condition:

a. bronchioles filled with pus or inflammatory exudate
e.g. pulmonary tuberculosis, aspiration bronchopneumonia

b. bronchiolitis: thickening of bronchiolar walls and bronchovascular bundle
e.g. cytomegalovirus pneumonitis, obliterative bronchiolitis

c. bronchiectasis with mucus plugging
e.g. cystic fibrosis

d. tumor emboli to centrilobular arteries (or carcinomatous endarteritis)
e.g. breast cancer, stomach cancer

e. bronchovascular interstitial infiltration
e.g. sarcoidosis, lymphoma, leukemia

73. Investigation of choice to evaluate intracranial hemorrhage of less than 48 hours is -

a) CT scan

b) MRI

c) PET

d) SPECT

Correct Answer - A
Answer- A. CT scan
Primary procedure of choice for evaluating intracranial complications of acute head injury 4 CT scan.
Best modality for assessing fractures of the skull base, calvarium and facial bone 4 CT scan.
Investigation of choice for demyelinating disorders 4 MRI.

74. Investigation of choice for lung abscess is

a) Chest X-ray

b) CECT scan

c) MRI

d) Ultrasound

Correct Answer - B

Answer- B. CECT scan

Contrast enhanced CT in usually considered to be investigation of choice for lung abscess, showing a cavity with thick walls and central mobile fluid. It helps to differentiate abscess from empyma, necrotizing pneumonia, sequestration, pneumatocele or underlying congenital abnormalities such as bronchogenic cyst.

75. CT of gastric Volvulus shows -

a) Shortened twisted stomach

b) Enlarged twisted stomach

c) Normal twisted stomach

d) None of the above

Correct Answer - B
Answer- B. Enlarged twisted stomach
CT scan of gastric Volvulus shows enlarged twisted stomach in thorax with one or more sites of torsion. It is useful in showing the sites of ischemia.

76. On CT chest 'halo sign' is noted in

a) Pulmonary hydatid cyst

b) Invasive pulmonary aspergilossis

c) Round pneumonia

d) Bronchiectasis

Correct Answer - B
Answer- B. Invasive pulmonary aspergilossis
The halo sign (HS) in chest imaging is a feature seen on lung window settings (typically HRCT), ground glass opacity surrounding a pulmonary nodule or mass and represents hemorrhage.
It is typically seen in angioinvasive aspergillosis.

77.

A 50 year old male presents with fever and malaise for 4 months& pain in the knees and ankles. Blood tests are normal apart from a raised ESR. Chest x-ray shows bilateral hilar adenopathy and pulmonary infiltrates most severe in the upper and mid zones. Mantoux test is negative. What is the most likely diagnosis

a) Tuberculosis

b) Sarcoidosis

c) Asbestosis

d) Berylliosis

Correct Answer - B

Answer- B. Sarcoidosis

Sarcoidosis is the most likely diagnosis given the presentation with malaise, arthralgia and a chest x-ray showing bilateral hilar adenopathy.

"The characteristic radiological finding in patients with pulmonary sarcoidosis is bilateral hilar lymphadenopathy"

78. Ultrasonographic finding of autosomal recessive polycystic kidney disease [ARPKD] are all except

a) Cysts more than 2 cm

b) Corticomedullary differentiation is eventually lost

c) Enlarged kidney

d) Oligohydramnios

Correct Answer - A

Answer- A. Cysts more than 2 cm

On antenatal ultrasound associated oligohydramnios may be identified

- Cysts
- Initially too small to resolve but with time may become discernible
- Unlike ADPKD the cysts rarely exceed 1-2 cm in diameter

The kidneys appear enlarged and echogenic but usually retain a reniform shape

- Medullary pyramids

79. 22-year-old women presents to the emergency department with a chief complaint of severe left upper quadrant [LUQ] pain after being punched by her husband. Her blood pressure is 110/76, her pulse is 80 bpm, and her respiration rate is 24 breaths per minute. The best means to establish a diagnosis is which of the following ?

a) Four-quadrant tap of the abdomen

b) CT of the abdomen

c) Peritoneal lavage

d) Upper gastrointestinal [GI] series

Correct Answer - B

Answer- B. CT of the abdomen

Clinical picture of the patient in above question indicates that patient is hemodynamically stable. Therefore best mode of evaluation should be CT scan of abdomen to see the extent of injury.

If the patients is hemodynamically stable and can be shifted - CT scan

80. A 35 year-old female presented to the emergency department with the sudden onset of severe epigastric pain. She had a history of heart burn and dyspeptic symptoms for past 10 years. On physical exam, she had a temperature of 101.4°F, a pulse of 118 and a blood pressure of 128/72. Abdomen was tender & rigid. Expected finding on X-ray will be

a) Blood under diaphragm

b) Air under diaphragm

c) Hazy lung fields

d) Prominent markings

Correct Answer - B

Answer- B. Air under diaphragm

Above clinical picture is suggestive of perforated peptic ulcer, Which is the most common cause of pneumoperitoneum (air under diaphragm).

Perforation results in pneumoperitoneum and the best view to see pneumoperitoneum is chest x-ray in erect position which detects air under the domes of diaphragm.

81. Following X-ray finding is associated with Chilaiditi syndrome -

a) Pseudopneumoperitoneum

b) Pseudopneumothorax

c) Pneumothorax

d) Hydropneumothorax

Correct Answer - A
Answer- A. Pseudopneumoperitoneum
Chilaiditi syndrome is the anterior interposition of the colon (usually tranverse colon) to the liver reaching the under-surface of the right hemidiaphragm with associated upper abdominal pain.
It is one ofthe causes ofpseudopneumoperitoneum

82. A 50 year-old chronic alcoholic male patient, after a large binge of alcohol, presented to the emergency department in subconscious state. He vomited several times, few of them mixed with blood. He had a history of heart burn and dyspeptic symptoms for past few tears. On physical exam, he had a temperature of 102°F, a pulse of 110, respiratory rate of 20 per minute and a blood pressure of 90/60. On physical examination there was abdominal guarding and tenderness. A plane erect chest X-ray reveals air under diaphragm. Probable diagnosis is

a) Perforated peptic ulcer

b) Acute MI

c) Dissected abdominal aorta

d) None of the above

Correct Answer - A

Answer- A. Perforated peptic ulcer

History of heart burn and dyspepsia, acute onset of bloody vomiting after binge alcohol, general and physical examination findings and air under diaphragm on chest X-ray, all these indicate towards the perforation of peptic ulcer

perforation of peptic ulcer.

83. Ring enhancing lesion on CT is a feature of

a) Toxoplasmsis

b) Intracranial hemorrhage

c) Cysts

d) Hamartoma

Correct Answer - A

Answer- A. Toxoplasmsis

Ring enhancing brain lesions

1. Neoplasms :- High grade glioma, meningioma, lymphoma, acoustic schwannoma, craniopharyngioma, metastasis.
2. Abscess :- Pyogenic, tuberculoma, toxoplasmosis, cysticercosis, empyema.
3. Hemorrhagic - ischemic lesion :- Resolving infarction, Aging hematoma, operative bed following resection.
4. Demyelinating disorder

84. About lipoma, radiologically true is -

a) Low attenuation on CT

b) Anechoic on US

c) Hypo-intense on T1 -MRI

d) Hypo-intense on T2-MRI

Correct Answer - A
Answer- A. Low attenuation on CT
Lipomas are benign fat tumors which show

- Variable echos on US
- Hyper-intense shadows on both T1 & T2 MRI
- Low attenuation on CT.

85. USG is done to visualize all except -

a) Fluid

b) Bile

c) Blood flow

d) Bone

Correct Answer - D
Answer- D. Bone
USG is done to visualize soft tissues and fluids. But not for bone.

86. Regarding HRCT, all are true except -

a) Means high reconstruction CT imaging

b) Has narrow beam collimation

c) Investigation of choice for interstitial lung disease

d) Has small field of vision

Correct Answer - A

Answer- A. Means high reconstruction CT imaging

Principles of HRCT (High resolution CT) are :

1. Narrow beam collimation (Thin collimation)
2. High frequency reconstruction algorythm, e.g., bone algorithm
3. Small field of vision

87. All of the following are true about neutron contrast study except -

a) Provides spatial resolution

b) Hydrogen and boron have high neutron cross section

c) Allows visualization of light elements inside heavy metallic objects

d) Is an example of destructive testing

Correct Answer - D

Answer- D. Is an example of destructive testing

Neutrons interact with matter in a way that is quite complementary to X-rays, and so neutron imaging and neutron radiography are important techniques for non-destructive testing, most suited for visualization of light elements in the interior of (heavy) metallic objects.

Examples of high absorption cross- section materials include hydrogen and boron while iron has lower neutron cross-section.

88. In normal X-ray of shoulder which is superior most structure -

a) Greater tubercle

b) Surgical neck of humerus

c) Coracoid process

d) Head of humerus

Correct Answer - C
Answer- C. Coracoid process
From superior to inferior (important structure on X-ray sholder) :- Clavicle : Acromian : Coracoid : Superior margin of humeral head : greater tubercle : anatomical neck : surgical neck.

89. Maximal valve of HU Unit -

a) Water

b) Fat

c) Soft tissue

d) Bone

Correct Answer - D
Answer- D. Bone
Bone has maximum HU → +1000

90. Piezoelectric crystal most widely used in ultrasonography probes is -

a) Quartz

b) Molybdenum

c) Titanium

d) Lead zircona tetitanate

Correct Answer - D
Answer- D. Lead zircona tetitanate
Lead zirconate titanate (PZT) is the most widely used material in the ultrasound transducers / probes replacing the firstly discovered barium titanate.

91. Most sensitive investigation for minimum gas in abdomen is -

a) Chest X-ray AP View

b) CT Scan

c) X-ray abdomen in supine position

d) X-ray abdomen in erect position

Correct Answer - B
Answer- B. CT Scan
CT Scan is superior to plain radiographs in detection of minute quatities of pneumoperitoneum
Thus CT Scan is regarded as the most sensitive investigation for detection of minute quantities of intraperitoneal gas.
Best radiographic view for pneumoperitoneum is Chest x-ray. It is usually the first investigation of choice.

92. Cotton wool skull is a radiological feature of -

a) Pagets disease

b) Eosinophilic granuloma

c) Fibrous dysplasia

d) Fibrous dysplasia

Correct Answer - A
Answer- A. Pagets disease
Cotton wool skull-Paget's disease
Groundglass skull- Fibrous dysplasia
Punched out/Raindrop lesion of skull- Multiple myeloma
Geographic skull- Eosinophilic granuloma

93. The most sensitive imaging modality for diagnosis of ureteric stone in patient with acute renal colic is -

a) X ray KUB

b) USG

c) Non contrast CT abdomen

d) Contrast enhanced CT abdomen

Correct Answer - C
Answer- C. Non contrast CT abdomen
Non-contrast spiral CT has now become the investigation of choice to diagnose renal and ureteric stones.
Investigation of choice for renal and ureteric stones non - contrast spiral CT

94. Radiological features of coarctation of aorta is/ are -

a) Reverse figure of 3 sign

b) Dock sign

c) Double aortic knuckle

d) All of the above

Correct Answer - D
Answer- D. All of the above
Radiological signs of COA are : i) Reverse figure of 3 sign (double bulge sign or E sign), ii) Dock's sign; iii) Double aortic knuckle.
Globular heart with oligemic lung fields
Reverse figure of '3' sign
Double aortic knuckle

95. Eye of tiger appearance is seen in -

a) Halle vorden Spatza

b) Suparanuclear palsy

c) Levodopa-responsive

d) All

Correct Answer - D
Answer- D. All
This appearance can be seen in:
1. Hallervorden-Spatz syndrome: classical but not 100% pathognomonic
2. Progressive supranuclear palsy
3. Early-onset levodopa-responsive parkinsonism
4. Cortical-basal ganglionic degeneration

96. Following are suggestive of benign lesion on mammogram -

a) Macrocalcification

b) Floating calcification

c) Tramline calcification

d) All the above

Correct Answer - D
Answer- D. All the above
Calcification patterns in benign lesions of breast on mammography:
1. Macrocalcification
2. Popcorn (in fibroadenoma)
3. Rod like wide-spread
4. Egg shell curvilinear
5. Tramline / tortous

97. Anamoly scan done at how many weeks of gestation -

a) 14

b) 16

c) 18

d) 20

Correct Answer - D
Answer- D. 20
Anamoly Scan is done between 18-21 weeks of pregnancy. It is also called as mid pregnancy or 20-week scan.

98. Flowing wax appearance on anterior and posterior borders of vertebrae is seen in -

a) Ankylosing spondylitis

b) DISH

c) Psoriatic arthropathy

d) Rheumatoid arthritis

Correct Answer - B
Answer- B. DISH
Diffuse idiopathic skeletal hyperostosis : DISH (hyperostotic spondylosis, Forestier's disease) is a multifocal entity of older people characterized by 'flowing ossifications of the spine" involving four or more contiguous vertebrae and hyperostosis of some ligamentous attachments.

99. Radiological view which best shows maxillary sinus and orbit is -

a) Water's view

b) Caldwell view

c) Lateral view

d) Towne view

Correct Answer - A
Answer- A. Water's view
Best view for maxillary sinus → Water's view (occipito-mental view)
Best view for frontal sinus → Caldwell view (occipito-frontal view)
Best view for sphenoid sinus → Basal view (submentovertical view)

100. Best view for sphenoid sinus is -

a) Water's view

b) Caldwell view

c) Basal view

d) Towne's view

Correct Answer - C
Answer- C. Basal view
Best view for maxillary sinus → Water's view (occipito-mental view)
Best view for frontal sinus → Caldwell view (occipito-frontal view)
Best view for sphenoid sinus → Basal view (submentovertical view)

101. Following are the indications of barium meal X-ray except -

a) Duodenal ulcer

b) Carcinoma stomach

c) Carcinoma head of pancreas

d) Ischemic Colitis

Correct Answer - D
Answer- D. Ischemic Colitis
Indications for Barium meal X-ray

- Duodenal ulcer
- Periampulary carcinoma
- Psendocyst of pancreas
- Carcinoma stomach
- Chronic duodenal ileus
- Carcinoma head of pancreas
- Duodenal diverticula

102. In a children ectopic kidneys can be diagnosed by -

a) DTPA

b) DMSA

c) MAG 3

d) None of the above

Correct Answer - B
Answer- B. DMSA
Indications for static renal scintigraphy (Tc - 99m - DMSA) :
1. Assessment of reflux nephropathy (scars)
2. Space occupying lesions (cortical mass)
3. Investigation of horse shoe, solitary or ectopic kidney

103. First line investigation for deep venous thrombosis is -

a) Ultrasonography

b) Venography

c) MRI

d) Nuclear imaging

Correct Answer - A
Answer- A. Ultrasonography
Ultrasonography is the current first-line imaging examination for DVT because of its relative ease of use.

104. Which of the following is not a chest radiographic feature of left atrial enlargement?

a) Double left heart border

b) Elevated left main bronchous

c) Splaying of carina

d) Enlargement of left atrila appendage

Correct Answer - A

Answer- A. Double left heart border

Sings of left atrial enlargement

- Straightening of left heart border (due to enlargement of left atrial appendage).
- Elevation of left main bronchus with widening (Splaying) of carina.
- Double density (atrial) sign.
- Posterior displacement of esophagus on barium swallow.

105. HRCT features of interstitial pneumonia are all except -

a) Reticular opacities

b) Honeycombing

c) Ground glass opacities

d) No bronchieactatic features

Correct Answer - D
Answer- D. No bronchieactatic features
Classical HRCT features of interstitial pneumonia are:
1. Reticular opacities in basal and peripheral distribution.
2. Traction bronchiestasis.
3. Honeycombing (clustered airspaces 3-10mm diameter/in subpleural location.

106. Following are the causes of cavity in lungs except -

a) Staphylococcus

b) Wegeners

c) Hydatid

d) Sarcoidosis

Correct Answer - D
Answer- D. Sarcoidosis
Causes of lung cavities are :
1) Necrotizing infections
2) Vascular : Pulmonary infarction.
3) Neoplastic :
Carcinoma bronchus :- Especially squamous cell carcinoma.
Metastases
Lymphoma
4) Granulomas :- Wegener's granulomatosis, Rheumatoid arthritis (also Kaplan's syndrome)
5) Abnormal lung :- Infected emphysematos bulla, sequestrated segment, bronchogenic cyst.
6) Traumatic :- Haematoma

107. Beaded lumen with fimbrial fluid is seen in -

a) TB of fallopian tube

b) TB of endometrium

c) TB of Ovary

d) None

Correct Answer - A

Answer- A. TB of fallopian tube

Fallopian tube is the most common site of female genital tract which is affected in tuberculosis.

On hysterosalpingography, the fallopian tube often show ragged outlines with multiple strictures, giving a beaded appearance; in some patients the entire tube appears rigid and may exhibit small terminal sacculation of the ampullary end.

108. Following are radiological findings in rheumatoid arthritis except -

a) Symmetrical involvement

b) Juxta-articiular osteopenia

c) Marginal erosion

d) Subchondral sclerosis

Correct Answer - D

Answer- D. Subchondral sclerosis

Rheumatoid arthritis

- Bilateral symmetrical involvement
- Marginal erosion
- Ankylosis
- Periarticular soft tissue swelling
- Subchondral cysts
- Subluxation or dislocation
- Juxta - articular osteopenia
- Narrowing of joint space (Later)
- Arthritis multilans (late)

109. Which of the following is/are radiological features of fluorosis?

a) Osteosclerosis

b) Cortical thickening

c) Enthesopathy

d) All the above

Correct Answer - D
Answer- D. All the above
Radiological features of fluorosis are :

- Osteosclerosis - particularly affecting the axial skeleton.
- Cortical thickening with encroachment on medullary cavity.
- Enthesopathy with ligamentous ossification.
- Large spinal osteophytes.

110. Depth of gastric carcinomas is assessed by -

a) Abdominal ultrasound

b) Barium meal

c) Endoluminal ultrasound

d) Laproscopy

Correct Answer - C
Answer- C. Endoluminal ultrasound
Five layers of the gastric wall can be identified by endoluminal ultrasound and the depth of invasion of tumor can be assessed by exquisite accuracy.

111. Radiological signs of acute pancreatitis on plain radiography are -

a) Sentinel loop sign

b) Colon cut off sign

c) Renal halo sign

d) All the above

Correct Answer - D

Answer- D. All the above

Radiological features of acute pancreatitis :-

1. Air in duodenal C-loop
2. Colon cut off sign
3. Gasless abdomen
4. Sentinal loop sign
5. Renal Halo sign

112. Most sensitive investigation for Diffuse axonal injury is -

a) MRI

b) CT

c) X ray

d) PET scan

Correct Answer - A
Answer- A. MRI
MRI is the most sensitive investigation for diffuse axonal injuries. It shows multiple small faces of increased intensity on T,IAT and decreased intensity on Ty.

113. Most common view used for X-ray chest -

a) PA view

b) AP view

c) Lateral view

d) Oblique view

Correct Answer - A
Answer- A. PA view
Important views for chest x-ray are :
1. Posterior - anterior view (PA view)
2. Anterior - posterior view (AP view)
3. Lateral view
4. Lateral decubitus view

114. Best investigation for bone metastases is -

a) MRI

b) CT

c) Bone Scan

d) X Ray

Correct Answer - C
Answer- C. Bone Scan
Bone scan (scintigraphy) is the investigation of choice for bone metastasis.

115. Double track sign is seen in -

a) Duodenal atresia

b) CHPS

c) Gastric ulcer

d) Achalasia

Correct Answer - B
Answer- B. CHPS
Double/triple track sign is seen in congenital hypertrophic pyloric stenosis.

116. Half life of Ra-226 -

a) 8 days

b) 28 years

c) 16-22 years

d) 38 years

Correct Answer - C
Answer- C. 16-22 years
Half life of Ra-226 is 16-22 years.

117. Which view is taken for aortic window -

a) AP

b) LAO

c) RAO

d) LPO

Correct Answer - B
Answer- B. LAO
`A left anterior oblique (LAO) view is useful to assess thoracic aorta, aortic window and the chamber of heart".
Clinicalradiology

- Aortic window is the space between ascending and descending thoracic aorta.

118. The primary diagnostic evaluation for developmental dyslasia of hip is -

a) Clinical examination

b) X-ray

c) USG

d) CT Scan

Correct Answer - C
Answer- C. USG
Ultrasonography is now the primary imaging technique in the diagnosis and follow up of DDH and has been shown to be more accurate than clinical and radiological assessment with a sensitivity of 100% and specificity of 98%.

119. Investigation of choice for pancoast tumor is -

a) MRI

b) HRCT

c) CECT

d) Bronchography

Correct Answer - A
Answer- A. MRI
Radiological investigation of choice for pubnonary malignencies is CT scan excep in superior sulcus (pancoast tumor) where MRI is preferred.

120. Doppler effect results from change in -

a) Amplitude of sound

b) Frequency of sound

c) Direction of sound

d) None of the above

Correct Answer - B

Answer- B. Frequency of sound

The Doppler effect results from an apparent shift in sound frequency as sound wave are reflected from moving targets, usually blood cells.

If motion is toward the transducer, the frequency of returning echo is higher that of the transmitted sound.

121. X-ray Artifact is -

a) A radiolucent area

b) Any abnormal opacity in the radiograph

c) Produced when patient moves while taking the shoot

d) All the above

Correct Answer - C

Answer- C. Produced when patient moves while taking the shoot

Artifacts can present in a variety of ways including abnormal shadow noted on a radiograph or degraded image quality and have been produced by artificial means from hardware failure, operator error and software (post-processing) artifacts.

Common causes :-

- Improper handling of the films
- Errors while processing the films
- Patient movement while taking the shoot

122. Frequency of ultrasound waves in USG -

a) 2000 Hz

b) 5000 Hz

c) < 2 MHz

d) >2 MHz

Correct Answer - D
Answer- D. >2 MHz
The ultrasound machine emits high-frequency sound waves, ranging from 2-15 MHz. Whose frequencies are considerably above the upper limit of human ear's audible range, i.e., greater than 20000 Hz. Speed of these sound waves in the body is 1540 m/s (in comparison to air, where velocity of sound wave is 330m/s).

123. Gyromagnetic property of proton is seen in -

a) MRI

b) CT

c) PET scan

d) USG

Correct Answer - A
Answer- A. MRI
Ultrasonography is based on piezoelectric effect.
MRI is based on gyeromagnetic property of proton W9.

124. Enhancement in CT contrast is due to -

a) Iodine

b) Gadolinium

c) Silver

d) Mercury

Correct Answer - A
Answer- A. Iodine
Iodinated contrasts are the most commonly used radiocontrast media in radiography and CT.
Gadolinium is the most commonly used MR contrast agent.

125. Which delivers highest dose of radiation -

a) Cardiac perfusion scan

b) CT chest

c) CT brain

d) Mammogram

Correct Answer - A
Answer- A. Cardiac perfusion scan
Medical diagnostic imaging is a major source of radiation exposure to clinitians and the patients. Following table depicts the radiation exposure through the routine medical imaging.

126. Best view for collapse of middle lobe lung is -

a) Lateral

b) AP

c) Oblique

d) Lordotic

Correct Answer - D
Answer- D. Lordotic
The lordotic view is also useful for recognizing collapse of lingula or middle lobe when these areas become very thin and cast minimal shadow on the PA view.

127. Double shadow behind right atrium and straightening of left main bronchus indicates -

a) Right atrium enlargement

b) Right ventricle enlargement

c) Left atrium enlargement

d) Left ventricle enlargement

Correct Answer - C
Answer- C. Left atrium enlargement
Left atrium enlargement
Ref Sutton 7h/e p. 280-350]

128. Left atrial enlargement is seen in -

a) Mitral stenosis

b) Tricuspid regurgitation

c) AR

d) None

Correct Answer - A
Answer- A. Mitral stenosis
Due to left atrial enlargement :- Straightening of left heart border, elevation of left main bronchus with widening of carina, double atrial shadow (Double density sign), posterior displacement of esophagus on barium swallow, Prominent posterosuperior part of cardiac shadow.

129. Air bronchogram on chest Xray denotes -

a) Intrapulmonary lesion

b) Extrapulmonary lesion

c) Intrathoracic lesion

d) Extrathoracic lesion

Correct Answer - A

Answer- A. Intrapulmonary lesion

Air in bronchi is visualized it is called air bronchogram. Air bronchogram indicates intrapulmonary pathology, It excludes any pleural or mediastinal pathology.

130. Calcified pulmonary metastasis is seen in which carcinoma -

a) Pancreatic carcinoma

b) Thyroid carcinoma

c) Endometrial carcinoma

d) None

Correct Answer - B

Answer- B. Thyroid carcinoma

Differential diagnosis of calcified pulmonary metastasis :-

1. Osteosarcoma
2. Colon carcinoma
3. Chondrosarcoma
4. Giant cell tumor of bone
5. Thyroid carcinoma
6. Ovarian cancer
7. Synovial sarcoma
8. Breast carcinoma

131. Differential diagnosis of solitary pulmonary nodule are all except -

a) Bronchogenic carcinoma

b) Mycetoma

c) Tuberculoma

d) Hamartoma

Correct Answer - B
Answer- B. Mycetoma
Granulomas : - Tuberculoma (most common cause), Histoplasma, Coccidioidomycosis, cryptococcosis.
Other infections : - Organizing pneumonia, hydatid cyst.
Benign neoplams : - Hamartoma, Fibroma, Neurofibroma, Carcinoid tumours, Lipoma, Bronchial adenoma
Malignant neoplasm : - Carcinoma bronchus, Alveolar cell carcinoma, metastasis (from breast, Sarcoma, Renal cell carcinoma, Seminoma), Pulmonary blastoma, Pulmonary sarcoma.
Inflammatory - Wegener's granulomatosis, rheumatoid arthritis, Sarcoidosis.
Congenital : - Sequestration, Bronchogenic cyst, AV malformation.
Miscellaneous : - Pulmonary infarct, Rounded atelectasis, Mucoid impaction.

132. The sign with patch of dullness beneath the angle of left scapula in a patient with pericardial effusion is named as -

a) Carvallo's sign

b) Ewart's sign

c) Homan's sign

d) Hoffmann's sign

Correct Answer - B

Answer- B. Ewart's sign

Heart sounds become faint -

- The apex impulse vanishes; but sometimes it remains palpable, medial to the left border of cardiac dullness.
- The base of the left lung may be compressed by pericardial fluid, producing Ewart's sign, a patch of dullness beneath the angle of the left scapula.
- The chest roentgenogram may show a "water bottle" or "flask shaped" configuration of the cardiac silhouette

133. Water bottle heart is seen in -

a) PDA

b) Chronic emphysema

c) Pericardial effusion

d) Constrictive pericarditis

Correct Answer - C
Answer- C. Pericardial effusion
"Water-bottle" or flasked shaped or money bag heart - Pericardial effusion, hypothyroidism

134. For pericardial calcifications, which is the best investigation -

a) MRI

b) Transesophageal echocardiography

c) USG

d) CT scan

Correct Answer - D
Answer- D. CT scan
CT is the best method for depiction of pericardial calcification, a finding suggestive of constrictive pericarditis in the appropriate clinical setting.

135. Fluorescin angiography is used to examine -

a) Ciliary vasculature

b) Retinal vasculature

c) Corneal vasculature

d) Conjuctival vasculature

Correct Answer - B
Answer- B. Retinal vasculature
Fluorescein angiography is a radiological examination of retinal vasculature after the administration of a fluorescein dye.

136. Barium swallow is used for -

a) Colon

b) Esophagus

c) Duodenum

d) Jejunum

Correct Answer - B
Answer- B. Esophagus
Barium swallow -Mainly for esophagus

137. Pulled up cecum is seen in -

a) Ileocecal TB

b) Carcinoma cecum

c) Intussuption

d) Carcinoma

Correct Answer - A
Answer- A. Ileocecal TB
Conical cecum or Amputed cecum Cecum is shrunken in size and pulled out of the iliac fossa due fibrosis and contraction of mesocolon.
Stierlin sign :- Narrowing of terminal ileum with rapid emptying into a shortened, rigid or obliterated cecum.
String sign

138. The study using barium for small intestine is known as -

a) Barium meal follow through

b) Barium swallow

c) Barium enema

d) None of the above

Correct Answer - A
Answer- A. Barium meal follow through
In most cases the jejunum and Ileum are examined following the barium examination of the upper gastrointestinal tract, referred to as the "barium meal and follow through" or simply "barium follow through".

139. Investigation with least radiation dose in the diagnosis Meckel's diverticulum is -

a) CT

b) MRI

c) Contrast radiography

d) Technetium -99m scanning

Correct Answer - C
Answer- C. Contrast radiography
It is a general rule that the ascending order of the radiation dose is MRI < X- ray < CT - Scan. Technetium - 99m has the radiation exposure more than X - ray but less than CT - Scan. So contrast radiography will have the minimum radiation exposure as it involves taking a radiograph after small bowel enema for diagnosis of meckel's diverticulum.

140. Endoscopic USG criteria for chronic pancreatitis, when echogenic lesion is -

a) > 1 mm

b) 1.5 mm

c) > 2 mm

d) > 3 mm

Correct Answer - D

Answer- D.\uf0d8> 3 mm

Parenchymal features

- Echo-poor lesion
- Echo-rich lesion (> 3 mm in diameter)
- Accenuation of lobular pattern
- Gland size, cyst

Ductal features

- Increased duct wall echogenicity
- Narrowing, dilatation
- Calculi

141. Most sensitive test to detect early renal TB is -

a) Intravenous urography

b) CT

c) MRI

d) USG

Correct Answer - A
Answer- A. Intravenous urography
IVP remains the primary modality used to image the patients with renal, ureteric, and bladder tuberculosis. Early findings are best detected on IVP. It is the investigation of choice for urinary TB.

142. Investigation of choice for focal neurologic deficit in emergency room is -

a) CT

b) MRI

c) Lumbar puncture

d) CECT

Correct Answer - A
Answer- A. CT
In Indian set up CT Scan is the investigation of choice in the emergency room to screen patients of acute focal neurologic deficit.

143. CT Scan finding in carotid cavernous sinus fistula is -

a) Enlarged superior ophthalmic vein

b) Enlarged inferior ophthalmic vein

c) Enlarged superior ophthalmic artery

d) Enlarged inferior ophthalmic artery

Correct Answer - A

Answer- A. Enlarged superior ophthalmic vein

Contrast-enhanced CT scan and MRI will demonstrate a dilated superior ophthalmic vein and cavernous sinus.

Ultrasonography may also demonstrate superior ophthalmic vein engorgement.

Magnetic resonance angiography (MRA) is also very useful in identifying fistulas as well as particular vessel involvement.

144. On imagning diffuse axonal injury is characterized by -

a) Multiple small petechial hemorrhage

b) Patch ill defined low density lesion mixed with small hyperdens of petechial hemorrhage

c) Crescentic extra-axial hematoma

d) White matter lucencies

Correct Answer - A
Answer- A. Multiple small petechial hemorrhage
Multiple small petechial hemorrhage <2cm diameter in cerebral hemisphere.

145. Rhese view is used for -

a) Superior orbital foramen

b) Inferior orbital foramen

c) Optic foramen

d) Sella turcica

Correct Answer - C
Answer- C. Optic foramen
Optic foramen- Rhese view

146. Prevertebral space thickness in adult is -

a) 7mm

b) 14mm

c) 22mm

d) 30mm

Correct Answer - A:C
Answer- A & C. 22mm (A) 7mm
< 7mm at C1 level
< 5mm at C3 - C9level
< 22mm at C6 level

147. Osteolytic metastasis is seen with -

a) Lung

b) Kidney

c) Thyroid

d) All of the above

Correct Answer - D
Answer- D. All of the above
Osteolytic, characterized by destruction of normal bone, present in multiple myeloma (MM), renal cell carcinoma, melanoma, non-small cell lung cancer, non-hodgkin lymphoma, thyroid cancer or langerhans-cell histiocytosis.

148. Investigation of choice in whole body imaging in metastasis is -

a) Magnetic Resonance Imaging

b) Angiography

c) Venography

d) CT Scan

Correct Answer - A
Answer- A. Magnetic Resonance Imaging
Whole-body MR imaging with use of a rolling table platform in conjunction with fast T2-weighted turbo spin-echo and 3D gradient-echo sequences is a time-saving and accurate alternative to conventional multimodality evaluation of patients with tumors for metastases.

149. T sign is seen in -

a) Genital TB

b) Membrane in twin pregnancy

c) Molar pregnancy

d) Choriocarcinoma

Correct Answer - B
Answer- B. Membrane in twin pregnancy
'T sign' refers to appearance of the inter-twin membrane in a monochorionic twin pregnancy.

150. Investigation of choice in congenital uterine anamoly is -

a) MRI

b) CT

c) HSG

d) Hysteroscopy

Correct Answer - D
Answer- D. Hysteroscopy
Hysteroscopy is the gold standard in the diagnosis as well as therapeutic management.

151. Maximum radiation dose tolerable tissue is -

a) Hemopoietic tissue

b) Testis

c) Ovary

d) Bone

Correct Answer - D
Answer- D. Bone
Highly radiosensitive

- Lymphoid tissue
- Bone marrow
- GIT epithelium
- Gonads (Testis, ovary)
- Embryonic tissue

152. Epidermoid cyst can be differentiated from arachnoid cyst by -

a) MRI

b) USG

c) Myelography

d) CT scan

Correct Answer - A
Answer- A. MRI
Myelography cannot differentiate reliably between an epidermoid cyst and a noncommunicating arachnoid cyst.
It has largely been replaced by MRI.

153. Soap bubble appearance on MRI brain is characteristic of?

a) Tubercular meningitis

b) Neurocysticercosis

c) Cryptococcal cysts

d) Ependymoma

Correct Answer - C
Answer- C. Cryptococcal cysts
Cryptococcomas
T1: low signal
T2 / FLAIR: high signal
T1 C+ (Gd): variable, ranging from no enhancement to peripheral nodular enhancement.
Gelatinous pseudocysts caused by Cryptococcus tend to give a "soap bubble" appearance on MRI. MRI findings in neural cryptococcosis.

154. T2 image in MRI is -

a) Good to detect pathology

b) Good to detect anatomy

c) Good for both

d) Good for none

Correct Answer - A
Answer- A. Good to detect pathology
Many pulse-sequence techniques are used in MRI, but most classic are T1 and T2 weighted images. As a general rule, TI-weighted images are good for viewing anatomy, and T2 weighted images are good for detecting pathology.
[Ref Fundamentals of diagnostic radiology p. 18]

155. Keyhole sign on ultrasound is seen in -

a) Polycystic kidney

b) Hydronephrosis

c) Chronic pyelonephritis

d) Posterior urethral valves

Correct Answer - D
Answer- D. Posterior urethral valves
The keyhole sign is an ultrasonographic sign seen in boys with posterior urethral valves. lt refers to the appearance of the proximal urethra (which is dilated) and associated thick walled distended bladder which on ultrasound may resemble a key hole.

156. MIBG dose is -

a) 40-80MBq

b) 80-100MBq

c) 100-120MBq

d) 120-150MBq

Correct Answer - A
Answer- A. 40-80MBq
MIBG scan is a scintigraphic study that uses metaiodobenzylguanidine labeled to Iodine- 123 or Iodine- 131.
The activity administered to adults should be: for 131I-mIBG: 40-80 MBq (1.2 - 2.2 mCi); for 123ImIBG: 400 MBq (10.8 mCi).
For minimum and maximum recommended activities in children one should consult the Guidelines for Radioiodinated MIBG Scintigraphy in Children (minimum activity 20 MBqfor 123I-mIBG and 35 MBqfor 131I-nIBG; maximum activity 400 MBqfor 123I-mIBG and 80 MBqfor 131I-mIBG).

157. Barium meal follow through is helpful in diagnosing -

a) Colonic stricture

b) Ileal stricture

c) Rectal stricture

d) Esophageal stricture

Correct Answer - B

Answer- B. Ileal stricture

Following abnormalities of small intestine can be identified:-

1. Malabsorption
2. BD (CD & UC)
3. Tumors of small intestine
4. Small bowel obstruction
5. Intestinal strtcture

158. Radiographic sign characteristic of pulmonary edema is -

a) Westermark's sign

b) Hampton's hump

c) Palla sign

d) Bat wing sign

Correct Answer - D
Answer- D. Bat wing sign
Acute pulmonary edema : - Acute pulmonary edema is characterized by centrally located alveolar sign, with hazy or fluffy increased density in perihilar distribution, creating a bat-wing or angel-wing paftern. There is relative sparing of the more peripheral zones of lung fields. Air bronchogram become evident as edema becomes more opaque.

159. Gamma knife utilizes -

a) Strontium 89

b) 1-131

c) Cobalt -60

d) P-32

Correct Answer - C
Answer- C. Cobalt -60
Gamma knife contains Cobalt-60 sources of approximately 30 curis placed in circular array in a heavily shielded unit. The unit directs the gamma rirys to the target.

160. Snow storm appearance on chest X-ray is seen in -

a) Anthracosis

b) Byssinosis

c) Silicosis

d) Bagassosis

Correct Answer - C
Answer- C. Silicosis
Simple form z- Multiple small rounded (nodular) opacities in the lung parenchyna (snow stonn appeoraace).
These nodules tend to be located predominantly in the middle and upper lung fields with relative sparing of lower lung fields (Though lower lung fields can also be involved later in disease process).
There is bilateral hilar lymphadenopathy with characteristic egg shell calcification.

161. "Droop lily sign" is seen in -

a) "Droop lily sign" is seen in

b) Duplicated collecting system

c) Chronic pyelonephritis

d) Hypernephroma

Correct Answer - B
Answer- B. Duplicated collecting system
The drooping lily srgl (dropping flower sign) is a urographic sign in some patients with a duplicated collecting system. It refers to the inferolateral displacement of the opacified lower pole moiety due to an obstructed (and unopacified) upper pole moeity.

162. Sonographic appearance of hydatid cyst is -

a) Hyperechoic aseptate lesion

b) Hypoechoic aseptate lesion

c) Hyperechoic septate lesion

d) Hypoechoic septate lesion

Correct Answer - D
Answer- D. Hypoechoic septate lesion
Type I (Simple cyst):- Single (solitary) hnrcechoic/anechoic aseptate (without septa) lesion. The diagnosis of hydatid cyst may be considered when focal thickening of wall is present or when hlperechoic spots, due to hydatid sand, appear in the dependent areas.

163. SI unit of absorbed dose is -

a) Becquerel

b) Columb/cm

c) Gray

d) Sievert [Sv]

Correct Answer - C
Answer- C. Gray
Old unit of absorbed dose is Rad and new unit (SI) is Gray.

164. Stenver's view is used for -

a) Superior orbital foramen

b) Inferior orbital foramen

c) Internal auditory canal

d) Sella turcica

Correct Answer - C
Answer- C. Internal auditory canal
Skull trauma (sella turcica) (pituitary fossa)- Lateral view
Internal auditory view (both side)- Stenver's view

165. Acute myocarditis schintigraphy is done with -

a) Thallium

b) Technetium

c) Gallium

d) None

Correct Answer - C
Answer- C. Gallium
Gallium-67 uptake is increased in inflamed myocardium. Gallium-67 citrate injected intravenously binds to transferrin, and it is incorporated into the transferrin receptor of inflammatory cells or malignant tumor cells.
Gallium-67 scintigraphy is useful for examination of heart disease including cardiac sarcoidosis and acute myocarditis

166. Radiation used most commonly for pain management due to bone metastasis is -

a) Co60

b) Iridium 192

c) Tritium

d) Tin-117

Correct Answer - A
Answer- A. Co60
Radiopharmaceuticals (radioactive isotopes) used for metastatic bone pain are strontium (Sr89), Samarium (Sm153), rhenium (Re186), Phosphorus-32 and Tin-117 (Sn-177).

167. Minimum radiation dose which may lead to oligospermia is -

a) <1 Gy

b) 2-3 Gy

c) 7-10 Gy

d) 15 Gy

Correct Answer - A
Answer- A. <1 Gy
Fractionated doses 0.7-0.9 Gy lead to oligospermia/azoospermia but with frequent recovery at 1-1.5 years. Permanent azoospermia may occur after fractionated doses as low as 1.2 Gy, and is likely >2 Gy.

168. Half life of tritium is -

a) 10.2 years

b) 12.3 years

c) 15.5 years

d) 20.7 years

Correct Answer - B
Answer- B. 12.3 years
Tritium (hydrogen-3) is a radioactive isotope of hydrogen. The nucleus of tritium (sometimes called a triton) contains one proton and two neutrons.
Whereas the nucleus of protium contains one proton and no neutrons.
Tritium has a half-life of 12.3 years

169. Safe light in radiographic dark room is ideally should be of following color -

a) Red

b) Yellow

c) Purple

d) Blue

Correct Answer - A
Answer- A. Red
Red- Some blue sensitive materials, most phototypesetting materials, most blue and most green sensitive medical x-ray films (used in darkroom).
Dark amber- Color negative papers and materials, panchromatic black and white papers.
Amber- Color negative papers, panchromatic black and white papers

170. Least penetrating power among following mentioned rays is in -

a) Alpha rays

b) Beta rays

c) Gamma rays

d) X-ray

Correct Answer - A
Answer- A. Alpha rays
Penetration power : Gamma rays> X rays > Beta particle > Alpha particle (or helium ion)
Ionizing & damaging power : Alpha particle (or helium ion) > Beta particle > X ray> Gamma ray
Alpha particles (Helium nuclei) have highest ionizing power because they have a large charge.
Alpha particles have the highest damaging power as they are relatively slow and heavy.

171. Non - ionizing radiation among the following is -

a) MRI

b) CT Scan

c) X-ray

d) Position emission scintigraphy

Correct Answer - A
Answer- A. MRI
Non- ionizing radiation-

- USG
- MRI
- Thermography (infrared rays)
- UV rays
- Radiofrequency waves
- Microwaves

172. Mechanism of heat loss in modern X-ray tube is

a) Radiation

b) Evaporation

c) Conduction

d) Convection

Correct Answer - A

Ans. A. Radiation

The mechanism of heat loss in the modern X-ray tube is radiation.

Classical X-ray tube:

- The outer tube is made up of **glass.**
- Cathode- **tungsten** filament.
- An anode is the target and is made of **tungsten.**
- The mechanism of heat loss is **conduction.**
- The atomic number of tungsten is **74.**

Modern X-ray tube:

- The outer tube is made up of **stainless steel**
- Cathode- **tungsten + thorium**
  Anode- **tungsten + 10% rhenium**. An anode is **rotating** and the mechanism of heat loss is **radiation.**

173. Nonionic dye is

a) Ioxaglate

b) Iohexol

c) Iothalamate

d) None

Correct Answer - B

Answer- B. Iohexol

- Iohexol is a nonionic monomer contrast agent.
- The non-iodine radicals at positions 1, 3 and 5 (including the ionic carboxyl radical) were replaced by long amino hydrocarbons that provide adequate solubility without ionizing.
- Examples of this type of compound are iopromide, iohexol, iopamidol, ioversol, iopentol, iobitridol, and iomeprol.

174. HU is measure of

a) CT

b) MRI

c) PET

d) USG

Correct Answer - A
Answer- A. CT
Hounsfield's contribution is memorialized in the Hounsfield scale, which is used to measure the x-ray attenuation in CT scanning. Water is arbitrarily assigned a value of 0 Hounsfield units (HU).
[Ref Essential radiology p. 86]

175. Which looks same on Ti & T2 on MRI

a) Gall bladder

b) Fat

c) Kidney

d) CSF

Correct Answer - B
Answer- B. Fat
Fat (adipose tissue) has high signal intensity on both T1 & T2 images.
Other three options have low signal intesity on T1 and high signal intensity on T2 images.

176. Hypertranslucent chest X-ray is seen in all except

a) Mcleod syndrome

b) Emphysema

c) Pneumonectomy

d) Poland syndrome

Correct Answer - C

Answer- C. Pneumonectomy

Causes of opaque hemithorax

- Technical : - Rotation, Scoliosis.
- Pleural : - Pleural effusion, Pleural thickening, Mesothelioma.
- Surgical : - Pneumonectomy, Thoracoplasty.
- Congenital : - Pulmonary agenesis.
- Mediastinal : - Gross cardiomegaly, tumors.
- Pulmonary : - Collapse, Consolidation, fibrosis, Foreign body.
- Diaphragmatic hernia

177. What is not seen on chest X-ray in pulmonary artery hypertension

a) Enlargement of central arteries

b) Peripheral prunning

c) Narrowing of central arteries

d) None

Correct Answer - C

Answer- C. Narrowing of central arteries

Characteristic radiological feature of pulmonary hypertension is enlargement of central arteries with peripheral prunning.

Increased pulmonary artery pressure and pulmonary vascular resistance characterize pulmonary hypertension. PAH is defined as systolic pressure in the pulmonary artery exceeding 30 mm Hg.

178. Colon is identified on X-ray

a) Haustra

b) Valvulae conniventes

c) String of beads sign

d) More number of loops

Correct Answer - A
Answer- A. Haustra
Haustra (incomplete band across the bowel gas shadow) are seen in colon.

179. Double track sign is seen in

a) Duodenal atresia

b) CHPS

c) Gastric ulcer

d) Achalasia

Correct Answer - B
Answer- B. CHPS
Double/triple track sign is seen in congenital hypertrophic pyloric stenosis.

180. Investigation of choice for multiple sclerosis

a) CT

b) MRI

c) USG

d) PET

Correct Answer - B
Answer- B. MRI
MRI is the investigation of choice for demyelinating disorder, e.g. multiple sclerosis.

181. Investigation of choice for intramedullary SOL is -

a) MRI

b) USG

c) CT

d) X-ray

Correct Answer - A
Answer- A. MRI
Investigation of choice for intramedullary space occupy lesion is MRI.

182. Von Rosen's view is for

a) CDH

b) Perthe's disease

c) CTEV

d) None

Correct Answer - A
Answer- A. CDH
In Von Rosen's view is used in DDH/CDH.

183. Nuchal translucency is used in

a) Head scan

b) MRI neck

c) ANC USG

d) Anthropometry

Correct Answer - C
Answer- C. ANC USG
Nuchal translucency is used for screening of down syndrome in antenatal USG.

184. Half-life of Iodine 131 is

a) 8 hours

b) 8 days

c) 8 weeks

d) 8 months

Correct Answer - B
Answer- B. 8 days
Iodine - 131 Half life 8 days
Iodine - 123 -3 Half life 13 hours
Iodine - 132 Half life 2.3 hours

185. Dye used in diagnosis of esophageal perforation:

a) Iohexol

b) Barium sulphate

c) Gadolinium

d) Iodine dye

Correct Answer - B

Answer-B. Barium sulphate

Barium sulfate in suspension is frequently used medically as a radiocontrast agent for X-ray imaging and other diagnostic procedures.

It is most often used in imaging of the GI tract during what is colloquially known as a "barium meal".

Fluoroscopy

- most sensitive within the first 24 hours.
- patient examined semi-supine (~20 degrees) on fluoroscopy table
- a water-soluble agent should be used initially as **barium** can cause mediastinitis
- esophageal perforation may be represented as mucosal irregularity or gross extraluminal contrast extravasation
- some authors suggest the use of small amounts of low or high concentrations of barium if no leak is evident on initial screening with water soluble contrast

Iohexol, trade names **Omnipaque** among others, is a contrast agent used during X-rays.This includes when visualizing arteries, veins, ventricles of the brain, the urinary system, and joints, as well as during computer tomography. It is given by mouth, injection into a vein, or into a body cavity.

186. Bragg peak effect pronounced in:

a) X ray

b) Proton

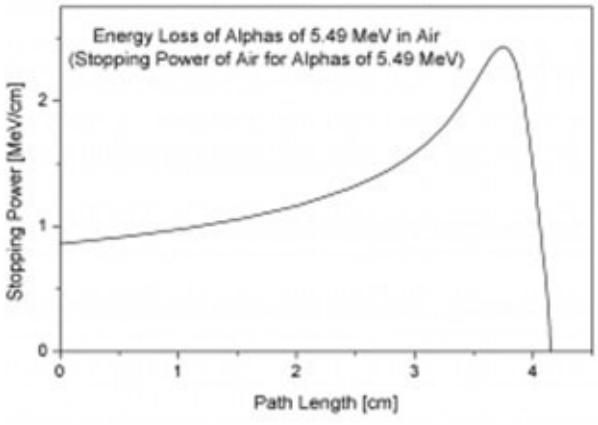
c) Neutron

d) Electron

Correct Answer - B

Answer- B. Proton

- Nowadays proton therapy (PT) represents an established alternative to photon radiotherapy for the treatment of specific types of cancer.
- The therapeutic use of proton beams (and of charged particles in general) is motivated primarily by their inverted depth-dose profile compared to photons, being characterized by the so-called Bragg peak.
- Several beams of different energy can then be combined in order to achieve the prescribed dose in a region as large as the target volume, resulting in the production of what is defined as the Spread-Out Bragg Peak (SOBP).



187. Salt and Pepper pot appearance of skull seen in:

a) Hyperparathyroidism

b) Multiple myeloma

c) Hyperthyroidism

d) Pseudo hyperparathyroidism

Correct Answer - A
Answer- A. Hyperparathyroidism
Pepperpot skull is occasionally used in place of salt and pepper skull to describe the typical radiographic appearance of multiple small radiolucent lesions of the skull vault.
In **primary hyperparathyroidism**, extensive resorption bone in the skull in combination with cystic areas of osteopenia are termed **pepper pot skul**l.
Classically seen in hyperparathyroidism, and is occasionally used (inaccurately) to describe the raindrop skull of multiple myeloma.

: Sull X-ray with a typical "pepper-pot" appearance

188. Imaging techniques used in Uterus anomalies EXCEPT:

a) HSG

b) MRI guided HSG

c) CT guided HSG

d) USG

Correct Answer - C
Answer C. CT guided HSG
Imaging studies, such as a **hysterosalpingogram (HSG)** and **ultrasound**, or an **MRI** are required to visualise the uterus and confirm that a congenital uterine anomaly is present. A hysterosalpingogram is not considered as useful due to the inability of the technique to evaluate the exterior contour of the uterus and distinguish between a bicornuate and septate uterus. In addition,laparoscopy and/orhysteroscopy may be indicated.

189. Which is the treatment of choice for irradiation in Chordoma?

a) Protons

b) Electrons

c) Gamma radiation

d) 3D - CRT

Correct Answer - A

Answer: **A - Proton Therapy**

Chordoma:

- Slow-growing neoplasm
- Arising from cellular remnants of notochord.
- Arise from bone in skull base and along spinal cord.

Most common locations -

- Cranially at clivus
- In sacrum at bottom of spine

Radiation therapy:

- Are relatively radioresistant
- High doses of radiation required to control.
- Hence, high focus radiation like proton therapy and carbon ion therapy are preferred than conventional radiation methods.
- Close proximity to vital structures like brain stem, requires high precision and accuracy for any planned surgical resection.
- Radiation with high accuracy and minimal damage with maximal safety is delivered.

190. Cancer patient undergoes radiotherapy, pick the true statement for radiosensitivity of tissues?

a) Rapidly dividing cells are resistant to radiation

b) GI mucosa is one of the most radioresistant tissues in the body

c) The intensity of radiation is inversely proportional to the square of distance from the source

d) Small blood vessels are least resistant to radiation

Correct Answer - C

Answer- C- The intensity of radiation is inversely proportional to the square of distance from the source

The **inverse square law** describes the principle of dose reduction as the distance from the source increases.

The dose is proportional to the inverse of the square of the radius. Thus if you double the distance you reduce the dose by a factor of four.

Ref- 1. Shafiei SA, Hasanzadeh H, Shafiei SA. A simple calculation method for determination of equivalent square field. J Med Phys. 2012;37 (2): 107-11. DOI:10.4103/0971-6203.94746 - Free text at PubMed - Pubmed citation