

RADIOGRAPHY MEGA MCQ PRACTICE COMPANION

880 QUESTIONS ACROSS 22 CORE TOPICS

- Core imaging principles (X-ray, CT, MRI)
- Contrast media & radiation safety
- Image artifacts & quality control
- Digital systems: CR, DR, PACS & RIS
- Emergency imaging & trauma protocols
- Cross-sectional anatomy
- Recent advances (AI, dual-energy CT, etc.)

*“In radiography, precision matters.
Let practice lead the way.”*

Prepared by

RED TECH OFFICIAL FOR RADIOGRAPHER

(An initiative for focused radiography education)

Preface

In the evolving landscape of diagnostic imaging, radiography professionals are expected to possess not only theoretical knowledge but also strong clinical judgment and application skills. Competitive exams and academic evaluations today demand a high level of preparedness, quick thinking, and precise recall of a wide range of topics—from radiation physics to advanced CT and MRI interpretation.

The “**Radiography Mega MCQ Practice Companion: 880 Questions Across 22 Core Topics**” has been carefully curated to meet these demands. This resource is designed for radiography students, imaging technologists, interns, and exam aspirants preparing for certifications and entrance tests such as **DRT, B.Sc. Radiography, AIIMS, PGIMER, NEET-PG Radiology**, and global qualifications like **ARRT** and **HCPC**.

Each of the **22 chapters** in this book consists of **40 meticulously selected multiple-choice questions**, making a total of **880 MCQs**. These questions are not just academic in nature—they are **clinically relevant, concept-driven, and reflect real-world imaging practice**. The structure ensures comprehensive coverage of:

- Core imaging principles (X-ray, CT, MRI)
- Contrast media & radiation safety
- Image artifacts & quality control
- Digital systems: CR, DR, PACS & RIS
- Emergency imaging & trauma protocols
- Cross-sectional anatomy
- Recent advances (AI, dual-energy CT, etc.)

This question bank is ideal for **self-assessment, mock test preparation, and quick revision**. It aims to strengthen your conceptual clarity while sharpening your test-taking skills. With repetition, reflection, and review—this book becomes your go-to revision guide.

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Index of Radiography MCQ Topics

Each chapter contains 40 MCQs / Total Questions: 880

No.	Topic Title	Q. Range
1	Radiographic Imaging & Physics	Q1–40
2	X-ray Tube Structure, Function & Image Formation	Q41–80
3	Exposure Factors & Image Quality	Q81–120
4	Films, Screens, Cassettes & Processing	Q121–160
5	CR, DR, PACS & RIS Systems	Q161–200
6	Radiographic Positioning & Techniques	Q201–240
7	CT Basics, Protocols, Contrast, Cross-Sectional Anatomy	Q241–280
8	CT Abdomen & Pelvis	Q281–320
9	CT Thorax: Lungs, Pulmonary Pathology, Thoracic Anatomy	Q321–360
10	CT Brain: Stroke, Trauma, Tumors	Q361–400
11	MRI Principles, Instrumentation & Safety	Q401–440
12	MRI Clinical Applications (Brain, MSK, Abdomen, etc.)	Q441–480
13	CT Chest: PE, Mediastinum, Pleura	Q481–520
14	Contrast Media: Types, Mechanism, Indications	Q521–560
15	Radiation Protection & Dose Optimization	Q561–600
16	Contrast Safety & Nephropathy	Q601–640
17	CT/MRI Artifacts	Q641–680
18	Radiographic Pathology	Q681–720
19	Emergency Radiography & Trauma Protocols	Q721–760

No.	Topic Title	Q. Range
20	CT in Acute Abdomen, Pelvic Trauma & Solid Organ Injury	Q761–800
21	Recent Advances (AI, Dual Energy CT, Post-Processing, etc.)	Q801–840
22	Mixed Topics / Miscellaneous Cases	Q841–880



Topic 1: Radiographic Imaging & Physics

1. The wavelength of diagnostic X-rays is typically in the range of:
 - A. 10–100 nm
 - B. 0.01–0.1 nm
 - C. 100–200 nm
 - D. 0.1–1 mm

✓**Answer: B. 0.01–0.1 nm**
2. Which of the following X-ray interactions is most responsible for image formation in diagnostic radiography?
 - A. Compton scatter
 - B. Photoelectric effect
 - C. Pair production
 - D. Coherent scatter

✓**Answer: B. Photoelectric effect**
3. What is the energy of an X-ray photon with a frequency of 3×10^{18} Hz?
Use $E = hf$, where $h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$.
 - A. 2 keV
 - B. 10 keV
 - C. 12.4 keV
 - D. 1.99 keV

✓**Answer: C. 12.4 keV**
4. The speed of X-rays in a vacuum is:
 - A. $3 \times 10^8 \text{ m/s}$
 - B. $1.5 \times 10^8 \text{ m/s}$
 - C. Variable depending on energy
 - D. Slower than visible light

✓**Answer: A. $3 \times 10^8 \text{ m/s}$**
5. Increasing the kVp will result in:
 - A. Lower penetration
 - B. Higher contrast
 - C. Increased beam quality
 - D. Increased image sharpness

✓**Answer: C. Increased beam quality**
6. Which interaction dominates at low energies and high atomic numbers?
 - A. Compton scatter
 - B. Photoelectric effect
 - C. Pair production
 - D. Bremsstrahlung

✓**Answer: B. Photoelectric effect**
7. The energy of a photon is:

- A. Inversely proportional to its mass
 - B. Independent of its frequency
 - C. Directly proportional to its frequency
 - D. Proportional to its wavelength
- ✓**Answer: C. Directly proportional to its frequency**
8. Which term describes the reduction of X-ray intensity as it passes through matter?
- A. Refraction
 - B. Reflection
 - C. Attenuation
 - D. Absorption
- ✓**Answer: C. Attenuation**
9. Which of the following is a characteristic of X-rays?
- A. They are positively charged
 - B. They travel in curved paths
 - C. They are electromagnetic waves
 - D. They can be focused by lenses
- ✓**Answer: C. They are electromagnetic waves**
10. Beam hardening refers to:
- A. Filtration of high-energy X-rays
 - B. Increase in low-energy photons
 - C. Increased average energy of a polyenergetic beam
 - D. Use of collimation
- ✓**Answer: C. Increased average energy of a polyenergetic beam**
-

11. What is the result of increasing mAs in an exposure?

- A. Decreased patient dose
 - B. Reduced image density
 - C. Increased number of X-ray photons
 - D. Increased image contrast
- ✓**Answer: C. Increased number of X-ray photons**

12. What determines the number of interactions with matter?

- A. Photon energy only
 - B. Patient size and atomic number
 - C. Distance from source
 - D. Exposure time only
- ✓**Answer: B. Patient size and atomic number**

13. X-rays differ from gamma rays based on:

- A. Speed

- B. Energy
 - C. Wavelength
 - D. Origin
- ✓ **Answer: D. Origin**

14. What describes the shortest wavelength in the X-ray spectrum?

- A. Filtration level
 - B. Maximum tube current
 - C. Maximum photon energy
 - D. Beam intensity
- ✓ **Answer: C. Maximum photon energy**

15. A quantum mottle artifact is due to:

- A. Excessive kVp
 - B. Inadequate exposure
 - C. Motion during scan
 - D. Overexposure
- ✓ **Answer: B. Inadequate exposure**

16. The inverse square law applies to:

- A. Patient dose
 - B. Pixel size
 - C. Grid alignment
 - D. Filtration
- ✓ **Answer: A. Patient dose**

17. The electromagnetic spectrum places X-rays between:

- A. Infrared and visible light
 - B. Ultraviolet and gamma rays
 - C. Microwaves and radio waves
 - D. Visible light and infrared
- ✓ **Answer: B. Ultraviolet and gamma rays**

18. Image contrast in radiography primarily results from:

- A. Compton interaction
 - B. Pixel size
 - C. Differential absorption
 - D. Detector alignment
- ✓ **Answer: C. Differential absorption**

19. The half-value layer (HVL) is a measure of:

- A. Filter efficiency
- B. Scatter suppression
- C. Beam penetration
- D. X-ray tube rotation speed

✓ **Answer: C. Beam penetration**

20. What happens to HVL when beam energy increases?

- A. It decreases
- B. It remains constant
- C. It increases
- D. HVL is not related to energy

✓ **Answer: C. It increases**

21. The probability of Compton scatter is:

- A. Independent of atomic number
- B. Directly proportional to photon energy
- C. Greater in bone than soft tissue
- D. Zero in high kVp beams

✓ **Answer: A. Independent of atomic number**

22. The unit of exposure in air is:

- A. Gray
- B. Sievert
- C. Roentgen
- D. Coulomb

✓ **Answer: C. Roentgen**

23. Which interaction is least likely in diagnostic X-ray energies?

- A. Photoelectric effect
- B. Pair production
- C. Compton scatter
- D. Coherent scatter

✓ **Answer: B. Pair production**

24. The amount of blackness on an X-ray image is known as:

- A. Resolution
- B. Brightness

- C. Density
- D. Contrast

✓ **Answer: C. Density**

25. Which of the following increases with beam filtration?

- A. Image contrast
- B. Patient dose
- C. Beam quality
- D. Image noise

✓ **Answer: C. Beam quality**

26. X-rays were discovered by:

- A. Pierre Curie
- B. Henri Becquerel
- C. Wilhelm Roentgen
- D. Marie Curie

✓ **Answer: C. Wilhelm Roentgen**

27. What does beam intensity refer to?

- A. Photon energy
- B. Number of photons per unit area
- C. Scatter levels
- D. Wavelength variation

✓ **Answer: B. Number of photons per unit area**

28. Coherent scatter results in:

- A. Ionization of atoms
- B. Diagnostic image formation
- C. No energy loss
- D. Tissue damage

✓ **Answer: C. No energy loss**

29. What is the frequency of an X-ray photon with a wavelength of 0.05 nm?

Use $c = f\lambda$ $c = f\lambda$

- A. 6×10^{18} Hz
- B. 3×10^{17} Hz
- C. 6×10^{16} Hz
- D. 3×10^{19} Hz

✓ **Answer: B. 3×10^{17} Hz**

30. A beam with more low-energy photons has:

- A. Lower HVL
- B. Higher penetration
- C. Improved image quality
- D. More uniform intensity

✓**Answer: A. Lower HVL**

31. Which of the following does **not** describe an X-ray property?

- A. Travels at the speed of sound
- B. Cannot be focused by lenses
- C. Can ionize matter
- D. Is invisible to the human eye

✓**Answer: A. Travels at the speed of sound**

32. The amount of energy transferred from the photon to the tissue is:

- A. Scattering
- B. Absorption
- C. Intensity
- D. Exit dose

✓**Answer: B. Absorption**

33. The most significant factor controlling contrast in film-based radiography is:

- A. mAs
- B. Exposure time
- C. kVp
- D. SID

✓**Answer: C. kVp**

34. What happens to image noise when exposure decreases?

- A. Decreases
- B. Increases
- C. Remains constant
- D. Disappears

✓**Answer: B. Increases**

35. Which of the following is **not** a result of Compton interaction?

- A. Production of scatter radiation
- B. Ionization of atom

- C. Complete absorption of photon
 - D. Loss of photon energy
- ✓ **Answer: C. Complete absorption of photon**
-

36. The photoelectric effect occurs when:

- A. Outer shell electrons are excited
 - B. X-ray photon ejects inner shell electron
 - C. Photon is scattered without ionization
 - D. Photons lose all energy as heat
- ✓ **Answer: B. X-ray photon ejects inner shell electron**

37. Which factor increases both quantity and quality of X-rays?

- A. mAs
 - B. SID
 - C. Added filtration
 - D. kVp
- ✓ **Answer: D. kVp**

38. An increase in SID leads to:

- A. Greater patient dose
 - B. Beam hardening
 - C. Reduced beam intensity
 - D. Increased magnification
- ✓ **Answer: C. Reduced beam intensity**

39. Bremsstrahlung radiation is produced when:

- A. Photon collides with nucleus
 - B. Electron slows near the nucleus
 - C. Inner shell electron is ejected
 - D. Outer shell electron transitions
- ✓ **Answer: B. Electron slows near the nucleus**

40. X-rays are produced by conversion of:

- A. Heat to light
 - B. Light to photons
 - C. Kinetic energy to electromagnetic energy
 - D. Electrical energy to thermal energy
- ✓ **Answer: C. Kinetic energy to electromagnetic energy**

Topic 2: X-ray Tube & Image Formation

1. The function of the focusing cup in an X-ray tube is to:
 - A. Filter low-energy X-rays
 - B. Collimate the beam
 - C. Narrow the electron stream
 - D. Increase filament temperature

✓**Answer: C. Narrow the electron stream**
 2. What component in the X-ray tube rotates to dissipate heat?
 - A. Cathode
 - B. Rotor
 - C. Glass envelope
 - D. Focusing cup

✓**Answer: B. Rotor**
 3. What is the most common anode angle used in diagnostic X-ray tubes?
 - A. 5 degrees
 - B. 7–17 degrees
 - C. 25 degrees
 - D. 35 degrees

✓**Answer: B. 7–17 degrees**
 4. Which material is commonly used for the filament?
 - A. Molybdenum
 - B. Copper
 - C. Tungsten
 - D. Lead

✓**Answer: C. Tungsten**
 5. The purpose of the glass or metal envelope is to:
 - A. Produce X-rays
 - B. Contain the vacuum
 - C. Direct the X-ray beam
 - D. Filter scatter radiation

✓**Answer: B. Contain the vacuum**
-
6. The line focus principle relates to:
 - A. Reducing scatter
 - B. Increasing tube current
 - C. Improving resolution and heat dissipation
 - D. Beam collimation

✓**Answer: C. Improving resolution and heat dissipation**
 7. What is the main cause of tube failure over time?
 - A. Oil leakage
 - B. Glass cracking
 - C. Vaporized tungsten deposition

- D. Rotor detachment
✓ **Answer: C. Vaporized tungsten deposition**
 - 8. Which of the following improves tube life?
 - A. Repeated exposures at maximum mA
 - B. Frequent cold starts
 - C. Using high kVp at low mAs
 - D. Allowing anode to cool after long use✓ **Answer: D. Allowing anode to cool after long use**
 - 9. Dual-focus tubes have:
 - A. Two rotating anodes
 - B. Two types of filtration
 - C. Two focal spots
 - D. Two X-ray beams✓ **Answer: C. Two focal spots**
 - 10. Why is tungsten ideal for the anode?
 - A. Low atomic number
 - B. High melting point and atomic number
 - C. High thermal expansion
 - D. Transparent to X-rays✓ **Answer: B. High melting point and atomic number**
-

11. Which material is used as a backing layer for heat dissipation?

- A. Tungsten
 - B. Aluminum
 - C. Molybdenum
 - D. Copper
- ✓
- Answer: D. Copper**

12. The anode heel effect results in:

- A. Homogeneous intensity across the beam
 - B. Greater intensity on the cathode side
 - C. Less absorption on the anode side
 - D. Better heat distribution
- ✓
- Answer: B. Greater intensity on the cathode side**

13. Which X-ray tube failure causes “pitting” of the anode?

- A. Prolonged exposures
- B. Low kVp use
- C. Not warming the anode

- D. Excessive filtration
✓ **Answer: C. Not warming the anode**

14. Bremsstrahlung X-rays are produced when:

- A. An inner shell electron is ejected
- B. Outer shell electron transitions occur
- C. An electron slows down near the nucleus
- D. The photon is scattered
✓ **Answer: C. An electron slows down near the nucleus**

15. The stator and rotor system allows:

- A. Cooling of cathode
- B. External beam collimation
- C. Anode rotation
- D. Focal spot reduction
✓ **Answer: C. Anode rotation**

16. What happens if the anode fails to rotate?

- A. Improved resolution
- B. Uniform exposure
- C. Localized overheating
- D. Reduced kVp
✓ **Answer: C. Localized overheating**

17. What is the function of insulating oil around the tube housing?

- A. Image enhancement
- B. Beam filtration
- C. Heat dissipation and electrical insulation
- D. X-ray beam collimation
✓ **Answer: C. Heat dissipation and electrical insulation**

18. A “gassy” tube refers to:

- A. Vaporization of the filament
- B. Loss of vacuum
- C. Poor anode rotation
- D. Grid misalignment
✓ **Answer: B. Loss of vacuum**

19. What device maintains the vacuum inside the X-ray tube?

- A. Diaphragm
 - B. Gasket
 - C. Getter
 - D. Cathode sleeve
- ✓ **Answer: C. Getter**

20. Characteristic X-rays are:

- A. Produced only in high kVp exposures
 - B. Created when an inner shell electron is ejected
 - C. Non-diagnostic
 - D. Always filtered out
- ✓ **Answer: B. Created when an inner shell electron is ejected**

21. What is the common filament current during exposure?

- A. 0.5–1.0 mA
 - B. 5–7 A
 - C. 10–15 kV
 - D. 100 mA
- ✓ **Answer: B. 5–7 A**

22. Space charge effect occurs when:

- A. Excess current is applied to the anode
 - B. Too many electrons crowd near the filament
 - C. The tube vacuum fails
 - D. The grid is not aligned
- ✓ **Answer: B. Too many electrons crowd near the filament**

23. The actual focal spot is:

- A. Larger than the effective focal spot
 - B. Smaller than the effective focal spot
 - C. Equal to the target angle
 - D. Not affected by anode angle
- ✓ **Answer: A. Larger than the effective focal spot**

24. The effective focal spot is reduced by:

- A. Increasing filament size
- B. Decreasing anode angle
- C. Using higher kVp

- D. Increasing mAs
✓ **Answer: B. Decreasing anode angle**

25. Leakage radiation must not exceed:

- A. 1 mGy/hr at 1 m
 - B. 100 mR/hr at 1 m
 - C. 0.25 mSv/hr at 1 m
 - D. 2.5 mGy/hr at 2 m
- ✓ **Answer: B. 100 mR/hr at 1 m**
-

26. The rotating anode allows:

- A. Better image resolution
 - B. Better heat dissipation
 - C. Higher contrast
 - D. Elimination of scatter
- ✓ **Answer: B. Better heat dissipation**

27. Dual focal spots offer:

- A. Higher tube rating
 - B. Flexibility between resolution and heat
 - C. Automatic collimation
 - D. Multiple exposures
- ✓ **Answer: B. Flexibility between resolution and heat**

28. The heel effect is most pronounced with:

- A. Large SID
 - B. Small field size
 - C. Short SID and large field
 - D. Long exposure time
- ✓ **Answer: C. Short SID and large field**

29. Thermionic emission refers to:

- A. Emission of X-rays from the anode
 - B. Heating of the rotor
 - C. Electron release from filament
 - D. Photon conversion in detector
- ✓ **Answer: C. Electron release from filament**

30. If the rotor fails during exposure:

- A. Image quality improves
 - B. Cathode overheats
 - C. Anode overheats at one point
 - D. Grid becomes charged
- ✓**Answer: C. Anode overheats at one point**
-

31. Which metal enhances the strength of the rotating anode disk?

- A. Tungsten
 - B. Molybdenum
 - C. Rhenium
 - D. Aluminum
- ✓**Answer: C. Rhenium**

32. The stator is located:

- A. Inside the vacuum envelope
 - B. On the rotating anode
 - C. Outside the glass envelope
 - D. Inside the collimator
- ✓**Answer: C. Outside the glass envelope**

33. How are X-rays generated in the tube?

- A. From the cathode to anode via electrical arc
 - B. By magnetic induction
 - C. By high-speed electron collisions with the target
 - D. By laser excitation
- ✓**Answer: C. By high-speed electron collisions with the target**

34. What limits the maximum heat capacity of the tube?

- A. Filament length
 - B. Focal spot size
 - C. Target material
 - D. Anode disk design
- ✓**Answer: D. Anode disk design**

35. A "prep" phase before exposure:

- A. Allows cathode cooling
- B. Warms the detector
- C. Accelerates the rotor and heats filament

- D. Filters low-energy X-rays
- ✓ **Answer: C. Accelerates the rotor and heats filament**
-

36. What is the typical rotation speed of a standard anode?

- A. 1800 rpm
 - B. 3400 rpm
 - C. 5000 rpm
 - D. 10,000 rpm
- ✓ **Answer: B. 3400 rpm**

37. Stationary anodes are typically used in:

- A. Dental units
 - B. CT scanners
 - C. Mammography
 - D. Fluoroscopy
- ✓ **Answer: A. Dental units**

38. Grid-controlled X-ray tubes are primarily used in:

- A. Mammography
 - B. Cine fluoroscopy
 - C. Digital subtraction angiography
 - D. Chest radiography
- ✓ **Answer: C. Digital subtraction angiography**

39. The space between cathode and anode is:

- A. Filled with oil
 - B. Insulated by rubber
 - C. Vacuum
 - D. Sealed with helium
- ✓ **Answer: C. Vacuum**

40. A smaller focal spot provides:

- A. Greater heat tolerance
 - B. Longer exposure times
 - C. Better image sharpness
 - D. Increased beam quantity
- ✓ **Answer: C. Better image sharpness**
-

Topic 3: Radiographic Exposure Factors & Image Quality

A. Exposure Factors (kVp, mAs, SID, Grids, etc.)

1. Increasing mAs will primarily affect:
 - A. Image contrast
 - B. Spatial resolution
 - C. Image density
 - D. Beam quality

✓**Answer: C. Image density**
2. What happens to radiographic contrast when kVp increases?
 - A. Increases
 - B. Decreases
 - C. No change
 - D. Only density changes

✓**Answer: B. Decreases**
3. If you double the mAs, what happens to the exposure?
 - A. Increases by 4×
 - B. Doubles
 - C. Halves
 - D. Stays constant

✓**Answer: B. Doubles**
4. Which exposure factor controls image penetration?
 - A. Exposure time
 - B. mA
 - C. kVp
 - D. Grid ratio

✓**Answer: C. kVp**
5. The 15% rule states:
 - A. Increasing kVp by 15% doubles exposure
 - B. Increasing mAs by 15% halves density
 - C. Decreasing SID by 15% increases sharpness
 - D. Reducing exposure time by 15% reduces scatter

✓**Answer: A. Increasing kVp by 15% doubles exposure**
6. An optimal image with low dose is achieved by:
 - A. High mAs and low kVp
 - B. High kVp and low mAs
 - C. Low mAs and low SID
 - D. Low grid ratio

✓**Answer: B. High kVp and low mAs**
7. The main function of a radiographic grid is to:
 - A. Reduce patient dose
 - B. Improve image resolution
 - C. Remove scatter radiation

- D. Filter primary beam
✓**Answer: C. Remove scatter radiation**
 - 8. What is the typical grid ratio used in general radiography?
 - A. 4:1
 - B. 6:1
 - C. 8:1
 - D. 12:1✓**Answer: D. 12:1**
 - 9. A focused grid differs from a parallel grid by:
 - A. Having thinner lead strips
 - B. Using higher grid ratios
 - C. Having strips aligned to beam divergence
 - D. Allowing shorter SID✓**Answer: C. Having strips aligned to beam divergence**
 - 10. The air-gap technique helps to:
 - A. Improve magnification
 - B. Increase patient dose
 - C. Reduce scatter without grid
 - D. Decrease exposure time✓**Answer: C. Reduce scatter without grid**
-

B. Image Quality Factors (Density, Contrast, Sharpness, Distortion)

11. The degree of blackness on a film is called:

- A. Brightness
 - B. Resolution
 - C. Density
 - D. Latitude
- ✓
- Answer: C. Density**

12. High contrast image has:

- A. Many shades of gray
 - B. Short grayscale
 - C. Wide dynamic range
 - D. Reduced edge sharpness
- ✓
- Answer: B. Short grayscale**

13. A blurred image results from:

- A. High SID
- B. Small focal spot

- C. Patient motion
 - D. Low OID
- ✓ **Answer: C. Patient motion**

14. Distortion occurs due to:

- A. Grid cutoff
 - B. Poor collimation
 - C. Incorrect alignment of tube-part-film
 - D. Use of intensifying screens
- ✓ **Answer: C. Incorrect alignment of tube-part-film**

15. Magnification increases when:

- A. SID increases
 - B. OID increases
 - C. Exposure time increases
 - D. Grid ratio increases
- ✓ **Answer: B. OID increases**

16. Focal spot blur is minimized by:

- A. Long OID
 - B. Small focal spot
 - C. High kVp
 - D. Low SID
- ✓ **Answer: B. Small focal spot**

17. Spatial resolution refers to:

- A. Contrast ability
 - B. Visibility of soft tissues
 - C. Ability to visualize small details
 - D. Overall image density
- ✓ **Answer: C. Ability to visualize small details**

18. Motion blur can be reduced by:

- A. Increasing SID
 - B. Increasing exposure time
 - C. Using short exposure time
 - D. Increasing OID
- ✓ **Answer: C. Using short exposure time**

19. What causes elongation distortion?

- A. Tube angulation
 - B. Object angulation
 - C. Grid tilting
 - D. Inadequate filtration
- ✓**Answer: A. Tube angulation**

20. Which will improve spatial resolution?

- A. Use of large focal spot
 - B. Low SID
 - C. Large OID
 - D. Short OID
- ✓**Answer: D. Short OID**

C. Geometry, SID/OID, Repeats, Receptor Factors

21. Increasing SID will:

- A. Increase magnification
 - B. Decrease resolution
 - C. Decrease beam intensity
 - D. Increase image contrast
- ✓**Answer: C. Decrease beam intensity**

22. Which factor has no direct effect on image contrast?

- A. kVp
 - B. Filtration
 - C. SID
 - D. Grid use
- ✓**Answer: C. SID**

23. Which exposure setting combination keeps density constant when doubling SID?

- A. Half the kVp
 - B. Double mAs
 - C. Half mAs
 - D. Reduce exposure time
- ✓**Answer: B. Double mAs**

24. When using a grid, what must be done to maintain density?

- A. Reduce kVp
- B. Increase SID

- C. Increase mAs
 - D. Decrease exposure time
- ✓**Answer: C. Increase mAs**

25. The most repeatable exposure error is:

- A. Underexposure
 - B. Motion blur
 - C. Grid cutoff
 - D. Distortion
- ✓**Answer: A. Underexposure**

26. What affects subject contrast most?

- A. Exposure time
 - B. Patient thickness
 - C. Grid selection
 - D. Film type
- ✓**Answer: B. Patient thickness**

27. Quantum mottle is more likely when:

- A. Using high mAs
 - B. Using large focal spot
 - C. Using low exposure levels
 - D. Using high kVp
- ✓**Answer: C. Using low exposure levels**

28. Which has the greatest impact on contrast resolution?

- A. Matrix size
 - B. mAs
 - C. Focal spot
 - D. SID
- ✓**Answer: A. Matrix size**

29. Increasing OID will:

- A. Reduce scatter reaching IR
 - B. Improve spatial resolution
 - C. Decrease magnification
 - D. Increase geometric sharpness
- ✓**Answer: A. Reduce scatter reaching IR**

30. An image that is too dark but high in contrast is likely due to:

- A. Low mAs
 - B. Low kVp
 - C. High mAs
 - D. High SID
- ✓Answer: C. High mAs
-

D. Digital Imaging Considerations

31. In digital systems, exposure latitude is:

- A. Narrow
 - B. Wider than film
 - C. Controlled by mAs
 - D. Same as analog
- ✓Answer: B. Wider than film

32. Window width adjusts:

- A. Brightness
 - B. Density
 - C. Contrast
 - D. Exposure
- ✓Answer: C. Contrast

33. What controls brightness in digital imaging?

- A. Window width
 - B. Window level
 - C. mAs
 - D. Focal spot size
- ✓Answer: B. Window level

34. Exposure index (EI) in DR reflects:

- A. Patient dose
 - B. Detector signal
 - C. mAs used
 - D. Contrast resolution
- ✓Answer: B. Detector signal

35. Histogram analysis is used to:

- A. Reduce scatter
- B. Adjust exposure

- C. Automatically rescale image
 - D. Determine patient dose
- ✓ **Answer: C. Automatically rescale image**
-

E. Image Artifacts & Evaluation

36. A bright image on a DR monitor usually means:

- A. Low mAs
 - B. High kVp
 - C. Window level too high
 - D. Window level too low
- ✓ **Answer: C. Window level too high**

37. Low contrast image may result from:

- A. Low kVp
 - B. Overuse of grid
 - C. Excessive scatter
 - D. Small OID
- ✓ **Answer: C. Excessive scatter**

38. Which artifact mimics motion blur?

- A. Quantum mottle
 - B. Double exposure
 - C. Low contrast
 - D. Flat fielding error
- ✓ **Answer: B. Double exposure**

39. A misaligned grid may cause:

- A. Penumbra
 - B. Grid cutoff
 - C. Overexposure
 - D. Backscatter
- ✓ **Answer: B. Grid cutoff**

40. Which of the following improves contrast while keeping dose low?

- A. Increasing mAs
- B. Using high-ratio grid
- C. Increasing SID

- D. Using air-gap technique
✓ **Answer: D. Using air-gap technique**
-

Topic 4: Radiographic Films, Screens & Processing

A. Film Structure & Components

1. The emulsion layer of a radiographic film contains:
 - A. Lead oxide crystals
 - B. Silver halide crystals
 - C. Calcium tungstate
 - D. Barium sulfate✓ **Answer: B. Silver halide crystals**
 2. What is the function of the base in X-ray film?
 - A. Stores the latent image
 - B. Provides physical support
 - C. Increases film speed
 - D. Prevents fogging✓ **Answer: B. Provides physical support**
 3. The adhesive layer in a film:
 - A. Contains developer
 - B. Bonds emulsion to base
 - C. Filters scatter
 - D. Absorbs light✓ **Answer: B. Bonds emulsion to base**
 4. Which is the most common silver halide in X-ray film?
 - A. Silver nitrate
 - B. Silver sulfate
 - C. Silver bromide
 - D. Silver chloride✓ **Answer: C. Silver bromide**
 5. The protective coating on X-ray film is made of:
 - A. Wax
 - B. Polyethylene
 - C. Gelatin
 - D. Acetate✓ **Answer: C. Gelatin**
-

B. Film Types & Sensitivity

6. Screen-type films are sensitive to:

- A. X-rays directly
 - B. Visible light
 - C. Heat
 - D. Moisture
 - ✓ **Answer: B. Visible light**
7. Non-screen films are used for:
- A. Skull radiography
 - B. Mammography
 - C. Dental intraoral images
 - D. Chest radiographs
 - ✓ **Answer: C. Dental intraoral images**
8. High-speed film:
- A. Gives better resolution
 - B. Requires more exposure
 - C. Has larger silver halide crystals
 - D. Is more expensive
 - ✓ **Answer: C. Has larger silver halide crystals**
9. Which type of film is more sensitive to blue light?
- A. Panchromatic
 - B. Orthochromatic
 - C. Green-sensitive
 - D. Blue-sensitive
 - ✓ **Answer: D. Blue-sensitive**
10. The latent image is formed:
- A. During development
 - B. Before exposure
 - C. After fixer
 - D. During X-ray exposure
 - ✓ **Answer: D. During X-ray exposure**
-

C. Intensifying Screens

11. The phosphor layer in an intensifying screen:
- A. Absorbs visible light
 - B. Emits X-rays
 - C. Converts X-rays to light
 - D. Filters low-energy photons
 - ✓ **Answer: C. Converts X-rays to light**
12. Calcium tungstate screens emit:
- A. Green light

- B. Blue light
 - C. Red light
 - D. Infrared light
- ✓ **Answer: B. Blue light**

13. Rare earth screens offer:

- A. Low conversion efficiency
 - B. Higher patient dose
 - C. Greater speed with lower dose
 - D. Poor image quality
- ✓ **Answer: C. Greater speed with lower dose**

14. The screen speed is primarily determined by:

- A. Cassette thickness
 - B. Phosphor crystal size and layer thickness
 - C. Film type
 - D. Grid ratio
- ✓ **Answer: B. Phosphor crystal size and layer thickness**

15. Which screen type is most commonly used today?

- A. Calcium tungstate
 - B. Lead-based
 - C. Rare earth
 - D. Selenium
- ✓ **Answer: C. Rare earth**

D. Darkroom & Processing Chemistry

16. The developer converts:

- A. Unexposed silver to metallic silver
 - B. Exposed silver halide to metallic silver
 - C. Developer to fixer
 - D. Emulsion to base
- ✓ **Answer: B. Exposed silver halide to metallic silver**

17. The purpose of the fixer is to:

- A. Remove metallic silver
- B. Make the image appear
- C. Harden the emulsion and remove unexposed crystals

- D. Add contrast

✓ **Answer: C. Harden the emulsion and remove unexposed crystals**

18. The main component of developer is:

- A. Potassium alum
- B. Sodium thiosulfate
- C. Hydroquinone
- D. Acetic acid

✓ **Answer: C. Hydroquinone**

19. Developer temperature for automatic processors is:

- A. 28°C
- B. 30°C
- C. 35°C
- D. 40°C

✓ **Answer: C. 35°C**

20. The "safelight" in the darkroom should have a:

- A. Red filter
- B. Green filter
- C. Blue filter
- D. No filter

✓ **Answer: A. Red filter**

E. Artifacts & Film Handling

21. A static electricity artifact appears as:

- A. Foggy areas
- B. Tree-branch-like patterns
- C. White spots
- D. Scratches

✓ **Answer: B. Tree-branch-like patterns**

22. Film fog can be caused by:

- A. Short exposure time
- B. Underexposure
- C. Improper safelight
- D. Developer temperature too low

✓ **Answer: C. Improper safelight**

23. Excessive pressure on the film before processing can cause:

- A. Increased density
- B. Crescent marks
- C. Black lines
- D. Light leaks

✓**Answer: B. Crescent marks**

24. A film exposed to light will show:

- A. White borders
- B. Overall dark appearance
- C. No latent image
- D. Loss of contrast

✓**Answer: B. Overall dark appearance**

25. What causes reticulation?

- A. Air bubbles in fixer
- B. Uneven drying
- C. Rapid temperature change
- D. Overuse of developer

✓**Answer: C. Rapid temperature change**

F. Quality Control in Film-Screen Systems

26. Sensitometry is used to evaluate:

- A. Exposure index
- B. Developer activity and film response
- C. Processor noise
- D. Histogram accuracy

✓**Answer: B. Developer activity and film response**

27. A step wedge helps evaluate:

- A. Grid alignment
- B. Image sharpness
- C. Contrast and density
- D. Beam collimation

✓**Answer: C. Contrast and density**

28. The characteristic curve of film is also known as:

- A. Density graph
 - B. Histogram
 - C. H&D curve (Hurter and Driffield curve)
 - D. Light-response curve
- ✓**Answer: C. H&D curve (Hurter and Driffield curve)**

29. Film contrast is measured by:

- A. Base plus fog level
 - B. Slope of the H&D curve
 - C. Exposure index
 - D. Developer strength
- ✓**Answer: B. Slope of the H&D curve**

30. Base plus fog density should not exceed:

- A. 0.05
 - B. 0.10
 - C. 0.22
 - D. 0.30
- ✓**Answer: D. 0.30**

G. Storage & Handling

31. X-ray films should be stored at:

- A. 35°C and 80% humidity
 - B. Room temperature and bright light
 - C. <21°C and 30–50% humidity
 - D. Below freezing
- ✓**Answer: C. <21°C and 30–50% humidity**

32. Films should be stored:

- A. Vertically in sealed containers
 - B. Horizontally on open shelves
 - C. Near X-ray machines
 - D. Under sunlight
- ✓**Answer: A. Vertically in sealed containers**

33. What is the shelf life of unused film?

- A. 1 month
- B. 3 months

- C. 6–12 months
 - D. 2 years
- ✓ **Answer: C. 6–12 months**

34. Expired films may show:

- A. Higher contrast
 - B. No latent image
 - C. Fog and reduced density
 - D. Enhanced resolution
- ✓ **Answer: C. Fog and reduced density**

35. Film handling must avoid:

- A. Warming before use
 - B. Holding by edges
 - C. Bending or scratching
 - D. Drying before exposure
- ✓ **Answer: C. Bending or scratching**

H. Miscellaneous

36. Crossover artifacts are related to:

- A. Chemical contamination
 - B. Roller marks in processor
 - C. Optical system of intensifying screens
 - D. Developer temperature
- ✓ **Answer: C. Optical system of intensifying screens**

37. The fixer hardening agent is:

- A. Sodium carbonate
 - B. Potassium alum
 - C. Hydroquinone
 - D. Sodium thiosulfate
- ✓ **Answer: B. Potassium alum**

38. The clearing agent in fixer is:

- A. Sodium hydroxide
- B. Sodium carbonate
- C. Sodium thiosulfate

- D. Silver nitrate
✓ **Answer: C. Sodium thiosulfate**

39. Film drying removes water from:

- A. Gelatin emulsion
- B. Base layer
- C. Lead shielding
- D. Screen cassette
✓ **Answer: A. Gelatin emulsion**

40. The film response to light is termed:

- A. Optical contrast
- B. Spectral sensitivity
- C. Emulsion ratio
- D. Luminescence
✓ **Answer: B. Spectral sensitivity**

Topic 5: CR, DR, PACS & RIS

A. Computed Radiography (CR)

1. The CR imaging plate is coated with:
 - A. Silver bromide
 - B. Photostimulable phosphor
 - C. Selenium
 - D. Cesium iodide
✓ **Answer: B. Photostimulable phosphor**
2. The most common phosphor in CR systems is:
 - A. Barium sulfate
 - B. Gadolinium oxysulfide
 - C. Barium fluorohalide doped with europium
 - D. Calcium tungstate
✓ **Answer: C. Barium fluorohalide doped with europium**
3. CR cassettes store the:
 - A. Optical signal
 - B. Latent image
 - C. Final digital image
 - D. Hardcopy output
✓ **Answer: B. Latent image**
4. What stimulates the CR plate to release stored energy?
 - A. X-ray exposure

- B. Laser beam
 - C. LED screen
 - D. Electric current
 - ✓ **Answer: B. Laser beam**
5. The light emitted during CR plate scanning is captured by:
- A. A digital camera
 - B. A photomultiplier tube (PMT)
 - C. A TFT array
 - D. A CCD chip
 - ✓ **Answer: B. A photomultiplier tube (PMT)**
-

6. Erasure of CR plates is done using:
- A. Intense X-rays
 - B. White light
 - C. Infrared
 - D. Ultrasound
 - ✓ **Answer: B. White light**
7. CR spatial resolution is mainly limited by:
- A. Bit depth
 - B. Plate size
 - C. Laser beam diameter
 - D. Exposure index
 - ✓ **Answer: C. Laser beam diameter**
8. The latent image in CR is stored as:
- A. Digital bits
 - B. Electrical charges
 - C. Trapped electrons in phosphor
 - D. Optical photons
 - ✓ **Answer: C. Trapped electrons in phosphor**
9. A ghost image in CR is due to:
- A. Scatter radiation
 - B. Incorrect processing algorithm
 - C. Incomplete erasure
 - D. Low grid ratio
 - ✓ **Answer: C. Incomplete erasure**
10. The "exposure index" in CR indicates:
- A. Radiation dose to the patient
 - B. Amount of light emitted
 - C. Signal received by the plate
 - D. Proper windowing
 - ✓ **Answer: C. Signal received by the plate**
-

B. Digital Radiography (DR)

11. DR systems eliminate the need for:

- A. Image processing
- B. Radiographic exposure
- C. Cassettes and plate readers
- D. Technologists

✓ **Answer: C. Cassettes and plate readers**

12. Flat-panel DR detectors consist of:

- A. Photodiode arrays
- B. Vacuum tubes
- C. Fiber optics
- D. Intensifying screens

✓ **Answer: A. Photodiode arrays**

13. Indirect conversion DR uses:

- A. Amorphous selenium
- B. Cesium iodide scintillators
- C. Silicon diodes only
- D. Gadolinium screens

✓ **Answer: B. Cesium iodide scintillators**

14. Direct conversion DR uses:

- A. Photodiodes
- B. Amorphous selenium
- C. Fiber optics
- D. CCD sensors

✓ **Answer: B. Amorphous selenium**

15. TFT stands for:

- A. Total Field Transmission
- B. Thin Film Transducer
- C. Thin Film Transistor
- D. Translucent Filter Terminal

✓ **Answer: C. Thin Film Transistor**

16. A major advantage of DR is:

- A. Need for darkroom
 - B. Long processing time
 - C. Immediate image preview
 - D. Limited resolution
- ✓ **Answer: C. Immediate image preview**

17. Wireless DR detectors are primarily powered by:

- A. Solar energy
 - B. USB cable
 - C. Rechargeable batteries
 - D. CRT monitors
- ✓ **Answer: C. Rechargeable batteries**

18. Spatial resolution in DR is typically:

- A. Better than CR
 - B. Worse than analog
 - C. Unrelated to detector
 - D. Reduced by window level
- ✓ **Answer: A. Better than CR**

19. What happens if the DR detector is saturated?

- A. Underexposure
 - B. Detector burnout
 - C. Loss of diagnostic detail
 - D. Pixel expansion
- ✓ **Answer: C. Loss of diagnostic detail**

20. DR detectors typically store image data as:

- A. Film grains
 - B. Optical photons
 - C. Digital matrix
 - D. Electromagnetic pulses
- ✓ **Answer: C. Digital matrix**

C. PACS (Picture Archiving & Communication System)

21. PACS primarily stores:

- A. Billing codes
- B. Prescription data

- C. Medical images
 - D. Personnel logs
- ✓**Answer: C. Medical images**

22. The software component of PACS that displays images is:

- A. RIS
 - B. DICOM
 - C. Modality console
 - D. Viewer workstation
- ✓**Answer: D. Viewer workstation**

23. In PACS, DICOM stands for:

- A. Digital Communication in Medicine
 - B. Digital Imaging and Communications in Medicine
 - C. Diagnostic Imaging for Clinical Management
 - D. Data Integration for Community Medicine
- ✓**Answer: B. Digital Imaging and Communications in Medicine**

24. PACS communicates with imaging equipment via:

- A. XML
 - B. RIS interface
 - C. DICOM protocol
 - D. HL7 only
- ✓**Answer: C. DICOM protocol**

25. What is the role of a PACS server?

- A. Patient billing
 - B. Image storage and retrieval
 - C. Radiologist scheduling
 - D. Radiation dose calculation
- ✓**Answer: B. Image storage and retrieval**

D. RIS (Radiology Information System)

26. The RIS is primarily used to:

- A. Modify images
- B. Store lab reports
- C. Manage patient scheduling and workflow

- D. Display histopathology images
- ✓ **Answer: C. Manage patient scheduling and workflow**

27. RIS typically connects to PACS using:

- A. SQL
 - B. FTP
 - C. HL7 protocol
 - D. JPEG
- ✓ **Answer: C. HL7 protocol**

28. The RIS generates:

- A. X-ray exposures
 - B. Film prints
 - C. Radiology reports
 - D. Patient insurance plans
- ✓ **Answer: C. Radiology reports**

29. Which of the following is a benefit of RIS?

- A. Improves image contrast
 - B. Tracks patient history and billing
 - C. Measures CT radiation dose
 - D. Compresses image files
- ✓ **Answer: B. Tracks patient history and billing**

30. In a typical digital radiology workflow, RIS:

- A. Converts analog images
 - B. Assigns accession numbers and manages exams
 - C. Handles contrast injections
 - D. Improves spatial resolution
- ✓ **Answer: B. Assigns accession numbers and manages exams**

E. Digital Image Evaluation & Artifacts

31. Histogram errors in CR/DR can result in:

- A. Underexposed films
 - B. Incorrect rescaling
 - C. High patient dose
 - D. Blurred images
- ✓ **Answer: B. Incorrect rescaling**

32. Exposure indicators help technologists:

- A. Improve spatial resolution
- B. Reduce kVp
- C. Monitor proper exposure levels
- D. Change histogram shape

✓ **Answer: C. Monitor proper exposure levels**

33. A saturated image in DR shows:

- A. Bright areas
- B. High spatial resolution
- C. Lost anatomy due to overexposure
- D. Better contrast

✓ **Answer: C. Lost anatomy due to overexposure**

34. Image stitching is useful in:

- A. Wrist X-rays
- B. Long leg and scoliosis studies
- C. Dental imaging
- D. CT abdomen

✓ **Answer: B. Long leg and scoliosis studies**

35. Flat-field correction is used to:

- A. Adjust kVp output
- B. Remove inherent detector non-uniformities
- C. Sharpen soft tissue edges
- D. Create 3D reconstructions

✓ **Answer: B. Remove inherent detector non-uniformities**

F. General Concepts

36. Bit depth affects:

- A. Image sharpness
- B. Number of pixels
- C. Number of gray shades
- D. Pixel size

✓ **Answer: C. Number of gray shades**

37. Spatial resolution is measured in:

- A. cm²
 - B. Megabytes
 - C. Line pairs per millimeter (lp/mm)
 - D. Pixel depth
- ✓ **Answer: C. Line pairs per millimeter (lp/mm)**

38. What is the effect of higher pixel matrix size?

- A. Lower spatial resolution
 - B. Higher image detail
 - C. Increased noise
 - D. Reduced contrast
- ✓ **Answer: B. Higher image detail**

39. Digital image compression may:

- A. Improve image quality
 - B. Reduce file size with minimal loss
 - C. Increase gray scale
 - D. Decrease pixel count
- ✓ **Answer: B. Reduce file size with minimal loss**

40. Lossy compression is:

- A. Reversible
 - B. Never used in PACS
 - C. Irreversible and reduces image quality
 - D. Improves contrast
- ✓ **Answer: C. Irreversible and reduces image quality**

Topic 6: Radiographic Positioning

A. General Principles & Terminology

1. The term “anteroposterior” (AP) means the X-ray beam travels:
 - A. From side to side
 - B. From back to front
 - C. From front to back
 - D. Along the long axis

✓ **Answer: C. From front to back**
2. The correct position for a true lateral chest is:
 - A. Arms down, shoulders rotated
 - B. Arms up, chin raised

- C. Right arm raised, left arm down
 - D. Supine with arms folded
 - ✓**Answer: B. Arms up, chin raised**
 - 3. A left posterior oblique (LPO) position places the:
 - A. Right side closest to IR
 - B. Left front away from IR
 - C. Left back closest to IR
 - D. Right anterior surface against IR✓**Answer: C. Left back closest to IR**
 - 4. Which positioning term means lying face down?
 - A. Supine
 - B. Prone
 - C. Oblique
 - D. Erect✓**Answer: B. Prone**
 - 5. To visualize air-fluid levels optimally:
 - A. Supine AP
 - B. PA erect
 - C. Upright lateral
 - D. Decubitus with horizontal beam✓**Answer: D. Decubitus with horizontal beam**
-

B. Chest & Thorax

- 6. Which projection best evaluates a pleural effusion?
 - A. Upright PA
 - B. Lateral decubitus
 - C. Supine AP
 - D. Lordotic✓**Answer: B. Lateral decubitus**
- 7. The heart is best visualized in which projection?
 - A. Lateral chest
 - B. AP supine chest
 - C. PA erect chest
 - D. AP lordotic✓**Answer: C. PA erect chest**
- 8. The CR (central ray) for a PA chest is directed at:
 - A. T12
 - B. T7
 - C. C7
 - D. L1✓**Answer: B. T7**
- 9. For a lordotic chest view:
 - A. Patient is supine

- B. Patient leans forward
 - C. Patient leans backward
 - D. Tube is angled cephalad
- ✓ **Answer: C. Patient leans backward**

10. The lateral chest view helps in evaluating:

- A. Apical lung lesions
 - B. Cardiac silhouette and retrosternal space
 - C. Pulmonary fibrosis
 - D. Rib fractures
- ✓ **Answer: B. Cardiac silhouette and retrosternal space**
-

C. Upper Limb

11. In the PA hand position, the fingers should be:

- A. Flexed
 - B. Bent laterally
 - C. Extended and separated
 - D. Tightly closed
- ✓ **Answer: C. Extended and separated**

12. Which position best shows the scaphoid bone?

- A. Lateral wrist
 - B. PA with ulnar deviation
 - C. AP wrist
 - D. Oblique wrist
- ✓ **Answer: B. PA with ulnar deviation**

13. For a lateral forearm, the elbow is:

- A. Fully extended
 - B. Flexed 90 degrees
 - C. Prone
 - D. Supinated
- ✓ **Answer: B. Flexed 90 degrees**

14. To visualize radial head without superimposition:

- A. AP elbow
- B. Lateral elbow
- C. External oblique elbow

- D. Internal oblique elbow
✓ **Answer: C. External oblique elbow**

15. The AP shoulder is taken with:

- A. Palm up, arm abducted
 - B. Elbow flexed, hand pronated
 - C. Shoulder rotated internally
 - D. Arm across the chest
✓ **Answer: A. Palm up, arm abducted**
-

D. Lower Limb

16. For the AP knee, the CR is directed:

- A. Perpendicular to the tibia
- B. 5° cephalad
- C. 15° caudad
- D. Tangential to the patella
✓ **Answer: A. Perpendicular to the tibia**

17. To visualize the patella in tangential view:

- A. AP knee
- B. Lateral knee
- C. Skyline (sunrise) projection
- D. Weight-bearing view
✓ **Answer: C. Skyline (sunrise) projection**

18. The best view for the ankle mortise is:

- A. AP
- B. Lateral
- C. 15° internal oblique
- D. Plantodorsal
✓ **Answer: C. 15° internal oblique**

19. AP pelvis is taken with:

- A. Legs internally rotated 15–20°
- B. Feet turned outward
- C. Supine frog-leg position
- D. Patient standing
✓ **Answer: A. Legs internally rotated 15–20°**

20. The lateral foot shows:

- A. Ankle mortise
- B. Longitudinal arch
- C. Navicular in profile
- D. Oblique tarsals

✓**Answer: B. Longitudinal arch**

E. Skull & Spine

21. The Waters view is used to evaluate:

- A. Skull base
- B. Orbits
- C. Sinuses
- D. Nasal bones

✓**Answer: C. Sinuses**

22. The Townes projection best demonstrates:

- A. Mandible
- B. Zygomatic arches
- C. Foramen magnum and occipital bone
- D. Maxillary sinuses

✓**Answer: C. Foramen magnum and occipital bone**

23. The lateral cervical spine requires:

- A. Open mouth
- B. Shoulders down, chin up
- C. Head tilted back
- D. Arms flexed

✓**Answer: B. Shoulders down, chin up**

24. An odontoid view is done to visualize:

- A. C3-C7
- B. T1
- C. C1-C2 articulation
- D. Foramen magnum

✓**Answer: C. C1-C2 articulation**

25. The swimmer's view demonstrates:

- A. Thoracolumbar junction
 - B. Lower cervical and upper thoracic spine
 - C. Sacrum
 - D. L5-S1
- ✓**Answer: B. Lower cervical and upper thoracic spine**
-

F. Abdomen & Pelvis

26. For an upright abdomen, the CR is at:

- A. ASIS
 - B. Iliac crest
 - C. 2 inches above iliac crest
 - D. Pubic symphysis
- ✓**Answer: C. 2 inches above iliac crest**

27. The KUB is taken with:

- A. AP projection, supine
 - B. PA erect
 - C. Decubitus with horizontal beam
 - D. Prone position
- ✓**Answer: A. AP projection, supine**

28. Best projection for free air in peritoneum:

- A. Supine abdomen
 - B. Lateral decubitus abdomen
 - C. Prone abdomen
 - D. Erect abdomen
- ✓**Answer: D. Erect abdomen**

29. Pelvic ring fractures are best seen in:

- A. Lateral pelvis
 - B. Inlet and outlet views
 - C. KUB
 - D. Frog-leg lateral
- ✓**Answer: B. Inlet and outlet views**

30. The sacrum is best visualized in:

- A. Lateral lumbar spine
- B. AP axial sacrum view

- C. AP pelvis
 - D. Oblique lumbar
- ✓ **Answer: B. AP axial sacrum view**
-

G. Miscellaneous / Special Projections

31. The modified axillary shoulder view is:

- A. Neer view
 - B. Y-scapular view
 - C. Lawrence method
 - D. West Point view
- ✓ **Answer: C. Lawrence method**

32. The Caldwell projection requires:

- A. 15° caudal angulation
 - B. 30° cephalad
 - C. No tube angle
 - D. Mouth open
- ✓ **Answer: A. 15° caudal angulation**

33. Which view shows the zygomatic arch in profile?

- A. Waters
 - B. SMV (submentovertex)
 - C. Lateral skull
 - D. Towne
- ✓ **Answer: B. SMV (submentovertex)**

34. The Judet view is used for:

- A. Acromioclavicular joints
 - B. Acetabulum
 - C. Sternum
 - D. Cervical spine
- ✓ **Answer: B. Acetabulum**

35. For SI joint obliques, the patient is rotated:

- A. 15°
- B. 25–30°
- C. 45°

- D. 60°
✓ **Answer: B. 25–30°**
-

H. Positioning Errors & Repeats

36. A rotated pelvis on AP view is indicated by:

- A. Asymmetric obturator foramina
 - B. Tilted iliac crest
 - C. Unequal femoral head size
 - D. Overlapping pubic bones
- ✓ **Answer: A. Asymmetric obturator foramina**

37. Grid cutoff appears as:

- A. Bright vertical lines
 - B. Overall image darkening
 - C. Loss of uniform density
 - D. Geometric distortion
- ✓ **Answer: C. Loss of uniform density**

38. Inadequate expiration on chest X-ray leads to:

- A. Darker lungs
 - B. Crowded ribs
 - C. Flattened diaphragm
 - D. Increased lung volume
- ✓ **Answer: B. Crowded ribs**

39. Underrotation in a lateral knee view causes:

- A. Femoral condyles to be superimposed
 - B. Patella to be overexposed
 - C. Fibula to be obscured
 - D. Condyles not superimposed
- ✓ **Answer: D. Condyles not superimposed**

40. The most common repeat cause in chest X-rays is:

- A. Improper SID
 - B. Motion blur
 - C. Wrong exposure index
 - D. Detector saturation
- ✓ **Answer: B. Motion blur**

Topic 7: CT Basics, Protocols, Contrast, and Anatomy

□ A. Basic CT Physics & Operation

1. The primary imaging principle of CT is:
 - A. Reflection
 - B. Refraction
 - C. Attenuation
 - D. Scintillation

✓**Answer: C. Attenuation**
 2. CT numbers are measured in:
 - A. mGy
 - B. Hounsfield Units
 - C. Becquerel
 - D. Grays

✓**Answer: B. Hounsfield Units**
 3. The CT number of water is:
 - A. -1000
 - B. 0
 - C. 100
 - D. +1000

✓**Answer: B. 0**
 4. Modern CT scanners use:
 - A. Gamma radiation
 - B. Ultrasound waves
 - C. Rotating X-ray tubes and detectors
 - D. Radiofrequency pulses

✓**Answer: C. Rotating X-ray tubes and detectors**
 5. The part of the scanner that rotates is called the:
 - A. Gantry
 - B. Collimator
 - C. Aperture
 - D. Console

✓**Answer: A. Gantry**
-
6. In helical CT, the tube rotates:
 - A. Once per scan
 - B. In a stepwise fashion
 - C. Continuously as the table moves
 - D. Only for scout images

✓**Answer: C. Continuously as the table moves**

7. Slip ring technology allows:
- A. Higher radiation dose
 - B. Faster contrast injection
 - C. Continuous rotation of tube/detector
 - D. Image post-processing
- ✓**Answer: C. Continuous rotation of tube/detector**
8. The term "pitch" in CT refers to:
- A. Gantry angle
 - B. Table travel per rotation / beam width
 - C. X-ray tube temperature
 - D. Slice thickness ratio
- ✓**Answer: B. Table travel per rotation / beam width**
9. Higher pitch values result in:
- A. Longer scan times
 - B. Higher patient dose
 - C. Faster scan and lower dose
 - D. Decreased image blur
- ✓**Answer: C. Faster scan and lower dose**
10. Scout image in CT is used to:
- A. Detect fractures
 - B. Measure attenuation
 - C. Plan scan range
 - D. Calculate patient weight
- ✓**Answer: C. Plan scan range**
-

☐ **B. CT Contrast Media**

11. The most commonly used contrast in CT is:
- A. Barium sulfate
 - B. Gadolinium
 - C. Iodinated contrast
 - D. Water
- ✓**Answer: C. Iodinated contrast**
12. Contrast in CT is primarily used to:
- A. Reduce noise
 - B. Enhance vascular and soft tissue structures
 - C. Improve bone density
 - D. Filter out artifacts
- ✓**Answer: B. Enhance vascular and soft tissue structures**

13. Delayed phase imaging is useful in:

- A. Stroke
- B. Liver lesion characterization
- C. Aortic dissection
- D. Pulmonary embolism

✓**Answer: B. Liver lesion characterization**

14. Oral contrast is given to:

- A. Fill colon
- B. Enhance urinary tract
- C. Outline gastrointestinal tract
- D. Visualize brain

✓**Answer: C. Outline gastrointestinal tract**

15. Which route is preferred for contrast in CT angiography?

- A. Intramuscular
- B. Oral
- C. Intravenous
- D. Rectal

✓**Answer: C. Intravenous**

□ C. CT Protocols & Technique

16. A CT abdomen scan is commonly done at:

- A. 20 mA
- B. 80 kVp
- C. 120–140 kVp
- D. 70–80 kVp

✓**Answer: C. 120–140 kVp**

17. Window settings in CT brain:

- A. Wide window for soft tissues
- B. Narrow window for lung
- C. Brain window ~80/40
- D. Bone window ~30/10

✓**Answer: C. Brain window ~80/40**

18. A CT pulmonary embolism protocol includes:

- A. Delayed contrast phase
 - B. Bone algorithm
 - C. Bolus tracking in the pulmonary artery
 - D. Enteric contrast
- ✓ **Answer: C. Bolus tracking in the pulmonary artery**

19. Thin slice acquisition in CT improves:

- A. Contrast
 - B. Resolution and multiplanar reconstructions
 - C. Speed
 - D. Exposure index
- ✓ **Answer: B. Resolution and multiplanar reconstructions**

20. The most important parameter for dose control in CT is:

- A. Pitch
 - B. Matrix size
 - C. Filter algorithm
 - D. kVp/mAs modulation
- ✓ **Answer: D. kVp/mAs modulation**

☐ **D. CT Anatomy Recognition**

21. On axial CT, the liver lies:

- A. Left upper quadrant
 - B. Right upper quadrant
 - C. Left lower quadrant
 - D. Retroperitoneum
- ✓ **Answer: B. Right upper quadrant**

22. The "hyperdense" appearance of acute blood on CT is due to:

- A. Water content
 - B. High protein concentration
 - C. High fat content
 - D. Air
- ✓ **Answer: B. High protein concentration**

23. The aortic arch is best visualized on:

- A. Mid-abdomen cuts
- B. Superior thoracic slices

- C. Brain window
 - D. Delayed phase abdomen
- ✓**Answer: B. Superior thoracic slices**

24. The pancreas head is located near:

- A. Stomach fundus
 - B. Duodenum
 - C. Left kidney
 - D. Liver
- ✓**Answer: B. Duodenum**

25. The "target sign" in CT suggests:

- A. Cirrhosis
 - B. Bowel intussusception
 - C. Renal artery stenosis
 - D. Pleural effusion
- ✓**Answer: B. Bowel intussusception**

☐ **E. CT Dose & Safety**

26. The unit used to express CT dose index is:

- A. Gray
 - B. mSv
 - C. mGy·cm
 - D. Becquerel
- ✓**Answer: C. mGy·cm**

27. Which CT scan delivers the highest dose?

- A. Brain
 - B. Chest
 - C. Abdomen-pelvis
 - D. Extremity
- ✓**Answer: C. Abdomen-pelvis**

28. The term DLP stands for:

- A. Digital light projector
- B. Dose length product
- C. Detector laser power

- D. Dose limiting protocol
- ✓ **Answer: B. Dose length product**

29. Which technique reduces motion artifact in chest CT?

- A. Breathing instructions
 - B. Prone scanning
 - C. Decreased pitch
 - D. Delayed phase
- ✓ **Answer: A. Breathing instructions**

30. Children undergoing CT should always:

- A. Be sedated
 - B. Receive full adult dose
 - C. Be scanned with pediatric protocol
 - D. Avoid IV contrast
- ✓ **Answer: C. Be scanned with pediatric protocol**

□ **F. Advanced CT Applications & Reconstruction**

31. Multiplanar reconstruction (MPR) requires:

- A. Thick slice acquisition
 - B. Data acquired in axial plane
 - C. Contrast administration
 - D. Soft tissue algorithm
- ✓ **Answer: B. Data acquired in axial plane**

32. 3D volume rendering is used for:

- A. Visualizing liver perfusion
 - B. Interactive vascular mapping
 - C. Reducing artifacts
 - D. Basic scout scans
- ✓ **Answer: B. Interactive vascular mapping**

33. Iterative reconstruction improves:

- A. Scan time
 - B. Patient positioning
 - C. Image quality at lower dose
 - D. Gantry speed
- ✓ **Answer: C. Image quality at lower dose**

34. Dual-energy CT helps in:

- A. Reducing contrast use
- B. Calculating lung volume
- C. Tissue characterization and artifact reduction
- D. Removing iodinated contrast

✓**Answer: C. Tissue characterization and artifact reduction**

35. CT fluoroscopy is typically used in:

- A. Colonography
- B. Brain perfusion
- C. Biopsy guidance
- D. CT angiography

✓**Answer: C. Biopsy guidance**

□ G. Image Quality & Artifacts

36. Ring artifact is due to:

- A. Motion
- B. Detector malfunction
- C. Beam hardening
- D. Incorrect pitch

✓**Answer: B. Detector malfunction**

37. Beam hardening artifact appears as:

- A. Rings
- B. Linear streaks
- C. Dark bands near dense structures
- D. Mottling

✓**Answer: C. Dark bands near dense structures**

38. Streak artifacts can be reduced by:

- A. Increasing pitch
- B. Using metal artifact reduction software
- C. Increasing slice thickness
- D. Applying headrest

✓**Answer: B. Using metal artifact reduction software**

39. A common cause of partial volume artifact is:

- A. Small field of view
 - B. Improper window level
 - C. Multiple tissues in a thick slice
 - D. Detector gap
- ✓**Answer: C. Multiple tissues in a thick slice**

40. What reconstruction kernel is used for bone detail?

- A. Soft tissue
 - B. Standard
 - C. High-resolution (sharp)
 - D. Smooth kernel
- ✓**Answer: C. High-resolution (sharp)**

Topic 8: CT Abdomen & Pelvis

A. CT Anatomy of Abdomen & Pelvis

- The right adrenal gland on CT appears:
 - A. Flat and triangular
 - B. Oval and hypodense
 - C. Calcified
 - D. Round and hyperdense

✓**Answer: A. Flat and triangular**
- The liver is located in which quadrant?
 - A. Left lower quadrant
 - B. Right upper quadrant
 - C. Left upper quadrant
 - D. Right lower quadrant

✓**Answer: B. Right upper quadrant**
- Which structure is located anterior to the pancreas?
 - A. Aorta
 - B. Splenic vein
 - C. Stomach
 - D. Inferior vena cava

✓**Answer: C. Stomach**
- The head of the pancreas lies near:
 - A. Stomach body
 - B. Spleen
 - C. Duodenum
 - D. Gallbladder

✓**Answer: C. Duodenum**
- The urinary bladder on CT appears:

- A. High attenuation without contrast
 - B. Air-filled
 - C. Fluid-filled, low attenuation
 - D. Ring-enhancing
- ✓**Answer: C. Fluid-filled, low attenuation**

□ B. Common Indications

6. CT abdomen with contrast is best for evaluating:
- A. Pulmonary embolism
 - B. Stroke
 - C. Liver masses
 - D. Brain edema
- ✓**Answer: C. Liver masses**
7. The preferred modality for appendicitis is:
- A. MRI abdomen
 - B. CT abdomen with IV contrast
 - C. Plain abdominal X-ray
 - D. Endoscopy
- ✓**Answer: B. CT abdomen with IV contrast**
8. Which condition is best seen in non-contrast CT?
- A. Hepatic hemangioma
 - B. Renal stone
 - C. Liver abscess
 - D. Bowel perforation
- ✓**Answer: B. Renal stone**
9. The “target sign” in bowel loops is suggestive of:
- A. Hernia
 - B. Volvulus
 - C. Intussusception
 - D. Appendicitis
- ✓**Answer: C. Intussusception**
10. The “whirl sign” is indicative of:
- A. Pancreatitis
 - B. Bowel obstruction
 - C. Mesenteric volvulus
 - D. Ascites
- ✓**Answer: C. Mesenteric volvulus**

□ C. Pathology Identification

11. Which CT phase best identifies hypervascular liver lesions?

- A. Non-contrast
- B. Arterial phase
- C. Venous phase
- D. Delayed phase

✓ **Answer: B. Arterial phase**

12. CT appearance of diverticulitis includes:

- A. Calcified bowel wall
- B. Fat stranding and wall thickening
- C. Pneumoperitoneum
- D. Linear hypodensity

✓ **Answer: B. Fat stranding and wall thickening**

13. Pancreatitis on CT typically shows:

- A. Fat density in retroperitoneum
- B. Pancreatic calcifications
- C. Enlarged, edematous pancreas with surrounding fluid
- D. Homogeneous enhancement

✓ **Answer: C. Enlarged, edematous pancreas with surrounding fluid**

14. The most common site of gastrointestinal perforation seen on CT:

- A. Colon
- B. Jejunum
- C. Duodenal bulb
- D. Sigmoid

✓ **Answer: C. Duodenal bulb**

15. CT findings in a liver hemangioma:

- A. Rapid washout
- B. Peripheral nodular enhancement with centripetal filling
- C. Ring enhancement
- D. Hypodense center

✓ **Answer: B. Peripheral nodular enhancement with centripetal filling**

☐ **D. CT Phases & Contrast Use**

16. In renal CT, corticomedullary phase occurs:

- A. 20 seconds post-injection
 - B. 60 seconds post-injection
 - C. 90–100 seconds
 - D. 3–5 minutes
- ✓ **Answer: A. 20 seconds post-injection**

17. Enteric contrast is used to:

- A. Visualize vascular structures
 - B. Opacify GI tract lumen
 - C. Enhance the liver
 - D. Diagnose renal lesions
- ✓ **Answer: B. Opacify GI tract lumen**

18. The “portal venous phase” is best for:

- A. Early arterial tumors
 - B. Gallstones
 - C. Liver parenchyma and metastases
 - D. Bone tumors
- ✓ **Answer: C. Liver parenchyma and metastases**

19. Pelvic mass evaluation typically uses:

- A. Non-contrast CT
 - B. CT with IV and oral contrast
 - C. CT myelogram
 - D. CT angiogram
- ✓ **Answer: B. CT with IV and oral contrast**

20. Delayed phase imaging is critical in:

- A. Pancreatitis
 - B. Liver hemangiomas
 - C. Lymphadenopathy
 - D. Renal scarring
- ✓ **Answer: D. Renal scarring**

☐ **E. CT Pelvis Applications**

21. In female pelvis, CT is less sensitive for:

- A. Fibroids
- B. Endometriosis

- C. Ovarian torsion
 - D. Ascites
- ✓ **Answer: C. Ovarian torsion**

22. Rectal wall thickening with fat stranding may indicate:

- A. Diverticulitis
 - B. Proctitis
 - C. Ischemic colitis
 - D. Rectal carcinoma
- ✓ **Answer: B. Proctitis**

23. The prostate gland on CT is located:

- A. Posterior to rectum
 - B. Below the bladder
 - C. In the retroperitoneum
 - D. Near the appendix
- ✓ **Answer: B. Below the bladder**

24. A bladder rupture on CT cystogram shows:

- A. Blood clot
 - B. Free contrast extravasation
 - C. Wall thickening
 - D. Air-fluid level
- ✓ **Answer: B. Free contrast extravasation**

25. CT findings in pelvic inflammatory disease:

- A. Enlarged uterus
 - B. Bilateral tubo-ovarian abscesses
 - C. Rectal wall edema
 - D. Bladder distention
- ✓ **Answer: B. Bilateral tubo-ovarian abscesses**

□ **F. Image Appearance & Technical Settings**

26. A large hypodense liver lesion with enhancing septae may suggest:

- A. Cyst
- B. Hemangioma
- C. Hydatid cyst

- D. Adenoma
✓ **Answer: C. Hydatid cyst**

27. Air within the bowel wall on CT suggests:

- A. Ileus
- B. Pneumatosis intestinalis
- C. Diverticulosis
- D. Bowel wall edema
✓ **Answer: B. Pneumatosis intestinalis**

28. Retroperitoneal hemorrhage appears on CT as:

- A. Low attenuation
- B. Fluid-fluid level
- C. High-density collection
- D. Fat stranding
✓ **Answer: C. High-density collection**

29. The "comb sign" on CT is seen in:

- A. Crohn's disease
- B. Ulcerative colitis
- C. Appendicitis
- D. Small bowel obstruction
✓ **Answer: A. Crohn's disease**

30. Ascites on CT appears as:

- A. Hypodense fluid in peritoneal spaces
- B. Enhancing ring around liver
- C. High attenuation material
- D. Air bubbles around mesentery
✓ **Answer: A. Hypodense fluid in peritoneal spaces**

☐ G. Artifacts & Errors

31. Metal artifact in the pelvis can be reduced by:

- A. Increasing slice thickness
- B. Using dual-energy CT
- C. Using bone window
- D. Reducing kVp
✓ **Answer: B. Using dual-energy CT**

32. Beam hardening near vertebrae may appear as:

- A. Black bands
- B. White lines
- C. Uniform fog
- D. Ring artifact

✓**Answer: A. Black bands**

33. CT colonography uses:

- A. IV contrast only
- B. CO₂ insufflation
- C. Endoluminal camera
- D. Prone abdomen scan only

✓**Answer: B. CO₂ insufflation**

34. A "false negative" in CT appendicitis may occur when:

- A. Using IV contrast
- B. Non-visualization of appendix
- C. Enlarged lymph nodes
- D. Axial imaging only

✓**Answer: B. Non-visualization of appendix**

35. Which phase is least useful in renal artery evaluation?

- A. Arterial phase
- B. Corticomedullary phase
- C. Nephrographic phase
- D. Delayed excretory phase

✓**Answer: D. Delayed excretory phase**

☐ H. CT Angiography & Interventions

36. CT angiography of abdominal aorta is done using:

- A. Non-contrast imaging
- B. Delayed phase
- C. Bolus tracking in abdominal aorta
- D. Rectal contrast

✓**Answer: C. Bolus tracking in abdominal aorta**

37. CT urography evaluates:

- A. Adrenal masses
 - B. Urinary collecting system and renal parenchyma
 - C. Portal vein thrombosis
 - D. Liver hemangioma
- ✓**Answer: B. Urinary collecting system and renal parenchyma**

38. CT-guided drainage is used for:

- A. Bone tumor biopsy
 - B. Liver abscess aspiration
 - C. Thoracocentesis
 - D. GI endoscopy
- ✓**Answer: B. Liver abscess aspiration**

39. A hypodense, non-enhancing mass in adrenal on CT is likely:

- A. Pheochromocytoma
 - B. Metastasis
 - C. Benign adenoma
 - D. Sarcoma
- ✓**Answer: C. Benign adenoma**

40. CT perfusion of abdomen is useful for:

- A. Stroke localization
 - B. Liver tumor vascularity
 - C. Gallstone detection
 - D. Appendicitis
- ✓**Answer: B. Liver tumor vascularity**

Topic 9: CT Thorax & Pulmonary Pathology

□ A. Thoracic Anatomy on CT

1. On axial CT, the trachea is normally seen:
 - A. To the left of the aorta
 - B. Anterior to the esophagus
 - C. Posterior to the vertebral body
 - D. Lateral to the sternum

✓**Answer: B. Anterior to the esophagus**
2. Pulmonary arteries on CT are located:
 - A. Posterior to bronchi
 - B. Anterior and superior to bronchi

- C. Lateral to lungs
 - D. Inferior to heart
 - ✓ **Answer: B. Anterior and superior to bronchi**
3. The right middle lobe is best evaluated in:
- A. Coronal sections
 - B. Axial lung windows
 - C. Sagittal reconstructions
 - D. Prone HRCT
- ✓ **Answer: B. Axial lung windows**
4. The aortic arch is typically seen at:
- A. T6–T7
 - B. T3–T4
 - C. T12
 - D. L1
- ✓ **Answer: B. T3–T4**
5. The azygos vein on CT appears as:
- A. Anterior tubular structure
 - B. Posterior U-shaped structure to the right of spine
 - C. In the left costophrenic angle
 - D. A calcified ring
- ✓ **Answer: B. Posterior U-shaped structure to the right of spine**
-

□ **B. Pulmonary Diseases on CT**

6. Ground-glass opacity (GGO) indicates:
- A. Complete alveolar filling
 - B. Early interstitial involvement or partial airspace disease
 - C. Pulmonary edema only
 - D. Emphysematous changes
- ✓ **Answer: B. Early interstitial involvement or partial airspace disease**
7. Honeycombing on HRCT is characteristic of:
- A. COPD
 - B. Sarcoidosis
 - C. Usual Interstitial Pneumonia (UIP)
 - D. Tuberculosis
- ✓ **Answer: C. Usual Interstitial Pneumonia (UIP)**
8. Crazy paving pattern suggests:
- A. Pulmonary embolism
 - B. Pneumonia
 - C. Alveolar proteinosis
 - D. Bronchiectasis
- ✓ **Answer: C. Alveolar proteinosis**
9. Cavitating lung nodules are most often due to:
- A. Pulmonary embolism

- B. Metastases or infections (e.g., TB)
- C. Bronchiectasis
- D. Atelectasis

✓ **Answer: B. Metastases or infections (e.g., TB)**

10. Mosaic attenuation is most often associated with:

- A. Pleural effusion
- B. Bronchiolitis obliterans
- C. Pulmonary fibrosis
- D. Empyema

✓ **Answer: B. Bronchiolitis obliterans**

□ C. CT Evaluation of Pleura & Chest Wall

11. Pleural thickening is best appreciated in:

- A. Bone windows
- B. Lung windows
- C. Soft tissue windows
- D. Maximum intensity projection

✓ **Answer: C. Soft tissue windows**

12. Empyema on CT presents as:

- A. Air-filled pleural space
- B. Loculated fluid with thickened enhancing pleura
- C. Consolidation
- D. GGO pattern

✓ **Answer: B. Loculated fluid with thickened enhancing pleura**

13. Pleural calcification on CT is most often due to:

- A. Asbestos exposure
- B. Silicosis
- C. Tuberculosis
- D. Sarcoidosis

✓ **Answer: A. Asbestos exposure**

14. A smooth pleural effusion is typically:

- A. Malignant
- B. Transudative
- C. Loculated

- D. Empyema
✓ **Answer: B. Transudative**

15. Rib fractures on CT are best seen with:

- A. Lung window
 - B. Bone algorithm
 - C. Soft tissue window
 - D. Maximum intensity projection
✓ **Answer: B. Bone algorithm**
-

□ **D. CT Thoracic Vasculature & PE**

16. CT Pulmonary Angiography (CTPA) is timed for:

- A. Arterial phase of aorta
- B. Peak enhancement of pulmonary arteries
- C. Delayed venous phase
- D. Portal venous phase
✓ **Answer: B. Peak enhancement of pulmonary arteries**

17. Saddle pulmonary embolism involves:

- A. Upper lobes
- B. Subsegmental arteries
- C. Bifurcation of main pulmonary artery
- D. Left pulmonary vein
✓ **Answer: C. Bifurcation of main pulmonary artery**

18. A positive sign of pulmonary embolism on CT:

- A. Tree-in-bud pattern
- B. Central filling defect within contrast-filled artery
- C. GGO
- D. Mosaic attenuation
✓ **Answer: B. Central filling defect within contrast-filled artery**

19. Westermark's sign refers to:

- A. Hyperinflation
- B. Pulmonary artery cutoff
- C. Rib notching
- D. Diaphragmatic elevation
✓ **Answer: B. Pulmonary artery cutoff**

20. Pulmonary infarction may appear as:

- A. Cavitory lesion
- B. Triangular peripheral consolidation (Hampton's hump)
- C. Bronchiectasis
- D. Centrilobular nodules

✓**Answer: B. Triangular peripheral consolidation (Hampton's hump)**

☐ E. Mediastinum & Lymph Nodes

21. Enlarged prevascular lymph nodes are typically found:

- A. Behind trachea
- B. In aorto-pulmonary window
- C. Near esophagus
- D. Inferior to heart

✓**Answer: B. In aorto-pulmonary window**

22. A well-circumscribed anterior mediastinal mass in a young adult may be:

- A. Lymphoma
- B. Neurogenic tumor
- C. Metastasis
- D. Bochdalek hernia

✓**Answer: A. Lymphoma**

23. Posterior mediastinal masses are commonly:

- A. Thymic hyperplasia
- B. Neurogenic tumors
- C. Lymphomas
- D. Cysts

✓**Answer: B. Neurogenic tumors**

24. The "CT angiogram sign" is seen in:

- A. Lung cancer
- B. Lymphoma
- C. Consolidation with patent pulmonary vessels (suggesting pneumonia)
- D. Mediastinal hemorrhage

✓**Answer: C. Consolidation with patent pulmonary vessels (suggesting pneumonia)**

25. Fat-density mass in the anterior mediastinum is likely:

- A. Lipoma
 - B. Thymic carcinoma
 - C. Teratoma
 - D. Lymphadenopathy
- ✓**Answer: A. Lipoma**
-

□ F. Thoracic Oncology & Screening

26. Spiculated lung nodule suggests:

- A. Benign granuloma
 - B. Metastasis
 - C. Malignancy
 - D. Cyst
- ✓**Answer: C. Malignancy**

27. Calcified lung nodule is most likely:

- A. Metastatic
 - B. Benign
 - C. Infectious
 - D. Atelectatic
- ✓**Answer: B. Benign**

28. Fleischner Society criteria guide:

- A. CT scan contrast use
 - B. Nodule management based on size and risk
 - C. Radiation dose protocols
 - D. Mediastinal staging
- ✓**Answer: B. Nodule management based on size and risk**

29. Low-dose CT chest is recommended for:

- A. Pediatric trauma
 - B. Cardiac calcification
 - C. Lung cancer screening in high-risk patients
 - D. Pleural disease
- ✓**Answer: C. Lung cancer screening in high-risk patients**

30. PET-CT is preferred in:

- A. Pulmonary edema
- B. Acute infection

- C. Staging lung cancer
 - D. Detecting pneumothorax
- ✓**Answer: C. Staging lung cancer**
-

□ G. Artifacts & Technique

31. Motion artifact in CT chest can mimic:

- A. Lung nodules
 - B. Pleural effusion
 - C. Bone lesions
 - D. Rib notching
- ✓**Answer: A. Lung nodules**

32. Beam hardening artifacts commonly appear near:

- A. Lung apex
 - B. Sternum
 - C. Spine and shoulders
 - D. Diaphragm
- ✓**Answer: C. Spine and shoulders**

33. Over-scanning in chest CT leads to:

- A. Underexposed images
 - B. Motion artifact
 - C. Higher radiation dose
 - D. Missed lesions
- ✓**Answer: C. Higher radiation dose**

34. Best window for lung parenchyma evaluation:

- A. Soft tissue
 - B. Mediastinal
 - C. Lung window (width ~1500, level ~ -500)
 - D. Bone window
- ✓**Answer: C. Lung window (width ~1500, level ~ -500)**

35. Optimal slice thickness for nodule evaluation:

- A. 10 mm
- B. 5 mm
- C. 1–1.25 mm

- D. 2.5 mm
- ✓ **Answer: C. 1–1.25 mm**
-

□ H. Miscellaneous

36. Tree-in-bud pattern is characteristic of:

- A. Bronchiectasis
 - B. Small airway infection or inflammation
 - C. Pulmonary infarction
 - D. Emphysema
- ✓ **Answer: B. Small airway infection or inflammation**

37. Air bronchogram is seen in:

- A. Pulmonary embolism
 - B. Pneumothorax
 - C. Consolidation
 - D. Cavitation
- ✓ **Answer: C. Consolidation**

38. Flattened diaphragm on CT is a sign of:

- A. Pulmonary embolism
 - B. Bronchial obstruction
 - C. Emphysema
 - D. Pneumonia
- ✓ **Answer: C. Emphysema**

39. Which disease shows upper lobe fibrosis?

- A. Asbestosis
 - B. Idiopathic pulmonary fibrosis
 - C. Silicosis
 - D. Sarcoidosis
- ✓ **Answer: C. Silicosis**

40. Subpleural basal honeycombing indicates:

- A. Lymphoma
 - B. UIP (usual interstitial pneumonia)
 - C. Sarcoidosis
 - D. Bronchopneumonia
- ✓ **Answer: B. UIP (usual interstitial pneumonia)**

Topic 10: CT Brain – Stroke, Trauma, Tumors

□ A. CT Brain Anatomy & Basics

1. The falx cerebri is located:
 - A. Between cerebellar hemispheres
 - B. Between cerebral hemispheres
 - C. In the posterior fossa
 - D. Below the tentorium

✓**Answer: B. Between cerebral hemispheres**
2. The third ventricle is located:
 - A. Between lateral ventricles
 - B. Between the thalami
 - C. In the cerebellum
 - D. Within the frontal lobe

✓**Answer: B. Between the thalami**
3. The normal attenuation of CSF on CT is approximately:
 - A. +30 HU
 - B. -100 HU
 - C. 0-10 HU
 - D. +80 HU

✓**Answer: C. 0-10 HU**
4. Which window is best for brain parenchyma?
 - A. Bone window
 - B. Lung window
 - C. Brain window (WL ~40, WW ~80)
 - D. Mediastinal window

✓**Answer: C. Brain window (WL ~40, WW ~80)**
5. The hyperdense "dot" sign in MCA stroke is:
 - A. CSF clot
 - B. Thrombus in the middle cerebral artery
 - C. Subarachnoid blood
 - D. Normal calcification

✓**Answer: B. Thrombus in the middle cerebral artery**

□ B. Stroke Imaging

6. The earliest CT sign of acute ischemic stroke is:
 - A. Hemorrhage
 - B. Mass effect
 - C. Loss of gray-white differentiation

- D. Ventricular compression
✓ **Answer: C. Loss of gray-white differentiation**
 - 7. A wedge-shaped hypodense area in a vascular territory suggests:
 - A. Glioma
 - B. Hemorrhage
 - C. Infarct
 - D. Epidural hematoma✓ **Answer: C. Infarct**
 - 8. Dense MCA sign suggests:
 - A. Hemorrhage
 - B. Early infarct
 - C. Tumor
 - D. Subdural hematoma✓ **Answer: B. Early infarct**
 - 9. CT perfusion helps in:
 - A. Detecting skull fracture
 - B. Measuring tumor density
 - C. Identifying infarct core and penumbra
 - D. Visualizing bone detail✓ **Answer: C. Identifying infarct core and penumbra**
 - 10. Hemorrhagic transformation of stroke appears as:
 - A. Hypodense patch
 - B. Ring-enhancing lesion
 - C. Hyperdensity within infarcted area
 - D. Calcified mass✓ **Answer: C. Hyperdensity within infarcted area**
-

☐ C. Trauma & Hemorrhage

11. Biconvex (lenticiform) hyperdense collection on CT is:
- A. Subdural hematoma
 - B. Epidural hematoma
 - C. Subarachnoid hemorrhage
 - D. Intraventricular bleed
- ✓
- Answer: B. Epidural hematoma**
12. Crescent-shaped hyperdense collection is:
- A. Epidural hematoma
 - B. Subdural hematoma
 - C. Contusion

- D. CSF collection
✓ **Answer: B. Subdural hematoma**

13. Which vessel is typically torn in epidural hematoma?

- A. Middle meningeal artery
 - B. Bridging veins
 - C. Superior sagittal sinus
 - D. Basilar artery
- ✓ **Answer: A. Middle meningeal artery**

14. Traumatic subarachnoid hemorrhage is best seen in:

- A. Axial lung window
 - B. Coronal soft tissue window
 - C. CT with brain window
 - D. Bone algorithm
- ✓ **Answer: C. CT with brain window**

15. Contrecoup injury refers to:

- A. Injury at site of impact
 - B. Injury opposite to impact site
 - C. Penetrating trauma
 - D. Midline shift
- ✓ **Answer: B. Injury opposite to impact site**

☐ **D. Brain Tumors & Mass Lesions**

16. A well-defined ring-enhancing lesion suggests:

- A. Edema
 - B. Infarct
 - C. Abscess or metastasis
 - D. Calcified granuloma
- ✓ **Answer: C. Abscess or metastasis**

17. Butterfly-shaped lesion across corpus callosum indicates:

- A. Meningioma
 - B. Pituitary macroadenoma
 - C. Glioblastoma multiforme (GBM)
 - D. Epidermoid
- ✓ **Answer: C. Glioblastoma multiforme (GBM)**

18. A calcified extra-axial mass with a dural tail suggests:

- A. GBM
- B. Metastasis
- C. Meningioma
- D. Ependymoma

✓**Answer: C. Meningioma**

19. Posterior fossa tumor in a child with hydrocephalus:

- A. Medulloblastoma
- B. Craniopharyngioma
- C. Glioma
- D. Schwannoma

✓**Answer: A. Medulloblastoma**

20. Hyperdense pineal region mass in adolescent male:

- A. Pineoblastoma
- B. Meningioma
- C. Germinoma
- D. Lipoma

✓**Answer: C. Germinoma**

☐ **E. Midline Shift, Herniation & Hydrocephalus**

21. A midline shift on CT indicates:

- A. Chronic infarct
- B. Raised ICP and mass effect
- C. Normal aging
- D. Calcification

✓**Answer: B. Raised ICP and mass effect**

22. Transtentorial herniation on CT presents with:

- A. Temporal lobe displacement and effacement of cisterns
- B. Enlargement of ventricles
- C. Widened sulci
- D. Skull fracture

✓**Answer: A. Temporal lobe displacement and effacement of cisterns**

23. Enlarged ventricles without sulcal prominence is:

- A. Hydrocephalus
 - B. Cerebral atrophy
 - C. Infarct
 - D. Calcified cyst
- ✓ **Answer: A. Hydrocephalus**

24. The "colpocephaly" sign is seen in:

- A. Posterior fossa tumor
 - B. Aqueductal stenosis
 - C. Agenesis of corpus callosum
 - D. TB meningitis
- ✓ **Answer: C. Agenesis of corpus callosum**

25. The earliest CT sign of uncal herniation:

- A. Ventricular dilation
 - B. Asymmetry of the ambient cistern
 - C. Skull suture widening
 - D. Pineal shift
- ✓ **Answer: B. Asymmetry of the ambient cistern**

☐ **F. Infective & Inflammatory Conditions**

26. Ring-enhancing lesions in immunocompromised patient:

- A. Toxoplasmosis
 - B. Infarct
 - C. Meningioma
 - D. Schwannoma
- ✓ **Answer: A. Toxoplasmosis**

27. Tuberculoma on CT typically appears as:

- A. Cystic lesion
 - B. Ring-enhancing or calcified nodule
 - C. Homogeneous mass
 - D. Air-fluid level
- ✓ **Answer: B. Ring-enhancing or calcified nodule**

28. Neurocysticercosis with a central dot sign indicates:

- A. Dead parasite
- B. Active cyst with scolex

- C. Abscess
 - D. Hemorrhage
- ✓ **Answer: B. Active cyst with scolex**

29. Which condition may present as communicating hydrocephalus?

- A. Aqueductal stenosis
 - B. Posterior fossa tumor
 - C. TB meningitis
 - D. Epidural hematoma
- ✓ **Answer: C. TB meningitis**

30. Brain abscess may mimic:

- A. Hematoma
 - B. Glioma
 - C. Ring-enhancing metastasis
 - D. Infarct
- ✓ **Answer: C. Ring-enhancing metastasis**

□ **G. Miscellaneous / Artifacts / Post-op**

31. Post-operative pneumocephalus appears as:

- A. Ring-enhancing lesion
 - B. Hyperdense lesion
 - C. Hypodense air collection
 - D. Hemorrhage
- ✓ **Answer: C. Hypodense air collection**

32. Ventriculoperitoneal (VP) shunt catheter is seen:

- A. In the sagittal sinus
 - B. Along the frontal horn to peritoneum
 - C. In the corpus callosum
 - D. Below tentorium
- ✓ **Answer: B. Along the frontal horn to peritoneum**

33. Calcified choroid plexus is:

- A. Always abnormal
- B. Normal in elderly
- C. A sign of hemorrhage

- D. Tumor calcification
✓ **Answer: B. Normal in elderly**

34. Tumor calcification is common in:

- A. Medulloblastoma
- B. Astrocytoma
- C. Schwannoma
- D. Meningioma
✓ **Answer: D. Meningioma**

35. Artifact due to metal clips appears as:

- A. Ring
- B. Streak artifacts
- C. Air bubble
- D. High-density mass
✓ **Answer: B. Streak artifacts**

□ H. Pediatric & Congenital

36. CT of hydrocephalus in infants shows:

- A. Effaced sulci with enlarged ventricles
- B. Midline shift
- C. Skull fracture
- D. Dural calcification
✓ **Answer: A. Effaced sulci with enlarged ventricles**

37. Porencephalic cyst is:

- A. Congenital tumor
- B. Post-infarct fluid cavity communicating with ventricle
- C. Parasitic cyst
- D. Hematoma
✓ **Answer: B. Post-infarct fluid cavity communicating with ventricle**

38. Dandy-Walker malformation is associated with:

- A. Cerebral edema
- B. Large posterior fossa cyst with vermian agenesis
- C. Brain calcification
- D. Corpus callosum thinning
✓ **Answer: B. Large posterior fossa cyst with vermian agenesis**

39. Lissencephaly appears as:

- A. Numerous gyri
- B. Smooth brain with absent sulci
- C. Cortical calcification
- D. Midline shift

✓**Answer: B. Smooth brain with absent sulci**

40. Chiari I malformation on CT may show:

- A. Enlarged 4th ventricle
- B. Cerebellar tonsil herniation below foramen magnum
- C. Colpocephaly
- D. Arachnoid cyst

✓**Answer: B. Cerebellar tonsil herniation below foramen magnum**

Topic 11: MRI Brain – Anatomy, Pathology, Sequences

□ A. MRI Brain Anatomy & Sequences

1. In T1-weighted MRI, CSF appears:

- A. Hyperintense
- B. Hypointense
- C. Isointense
- D. Bright white

✓**Answer: B. Hypointense**

2. In T2-weighted MRI, edema appears:

- A. Dark
- B. Intermediate gray
- C. Bright (hyperintense)
- D. Isointense to bone

✓**Answer: C. Bright (hyperintense)**

3. FLAIR sequence is used to suppress:

- A. Bone signal
- B. Air artifact
- C. CSF signal
- D. Vascular enhancement

✓**Answer: C. CSF signal**

4. GRE (Gradient Echo) sequence is most sensitive for:

- A. Demyelination
- B. Hemorrhage/blood products
- C. Inflammation

- D. Ventricular size
✓ **Answer: B. Hemorrhage/blood products**
 - 5. DWI is most useful in:
 - A. Tumor detection
 - B. Subdural hematoma
 - C. Acute ischemic stroke
 - D. Skull fracture✓ **Answer: C. Acute ischemic stroke**
-

□ B. White Matter & Demyelinating Diseases

- 6. MRI hallmark of multiple sclerosis (MS):
 - A. Ring-enhancing lesions
 - B. Confluent white matter hyperintensities on T2/FLAIR
 - C. Calcified nodules
 - D. Hemorrhagic lesions✓ **Answer: B. Confluent white matter hyperintensities on T2/FLAIR**
 - 7. MS lesions typically occur in:
 - A. Pons
 - B. Cortex
 - C. Periventricular white matter
 - D. Cerebellar vermis✓ **Answer: C. Periventricular white matter**
 - 8. “Dawson’s fingers” refer to:
 - A. Spinal cord cysts
 - B. Cortical infarcts
 - C. Radially oriented periventricular MS plaques
 - D. Enlarged choroid plexus✓ **Answer: C. Radially oriented periventricular MS plaques**
 - 9. ADEM is differentiated from MS by:
 - A. Single lesion only
 - B. Lack of contrast enhancement
 - C. Monophasic, post-infectious course
 - D. Presence of hemorrhage✓ **Answer: C. Monophasic, post-infectious course**
 - 10. Leukodystrophies on MRI show:
 - A. Cortical thinning
 - B. Central white matter demyelination
 - C. Posterior fossa tumor
 - D. Hematoma✓ **Answer: B. Central white matter demyelination**
-

☐ C. Stroke, Infarct & Ischemia

11. Acute stroke on DWI appears:

- A. Hypointense
 - B. Isointense
 - C. Hyperintense with low ADC
 - D. Only on T1
- ✓ **Answer: C. Hyperintense with low ADC**

12. Subacute infarct shows:

- A. No signal on T2
 - B. Rim enhancement on post-contrast T1
 - C. Shrinking brain parenchyma
 - D. Isointensity on all sequences
- ✓ **Answer: B. Rim enhancement on post-contrast T1**

13. MR perfusion evaluates:

- A. White matter plaques
 - B. Vascular territories
 - C. Brain tumor grade
 - D. Blood flow dynamics
- ✓ **Answer: D. Blood flow dynamics**

14. Watershed infarcts occur:

- A. In occipital cortex
 - B. At border zones between major arteries
 - C. In internal capsule
 - D. In thalamus
- ✓ **Answer: B. At border zones between major arteries**

15. Lacunar infarcts affect:

- A. Cerebellum
 - B. Basal ganglia/internal capsule
 - C. Occipital lobe
 - D. Brainstem only
- ✓ **Answer: B. Basal ganglia/internal capsule**

☐ D. Brain Tumors

16. Glioblastoma multiforme on MRI shows:

- A. Small, non-enhancing lesion
- B. Ring enhancement with central necrosis
- C. Well-defined margin
- D. Always hemorrhagic

✓ **Answer: B. Ring enhancement with central necrosis**

17. Meningiomas are typically:

- A. Intra-axial tumors
- B. Do not enhance
- C. Isointense on T1 and enhance homogeneously
- D. Found in ventricles

✓ **Answer: C. Isointense on T1 and enhance homogeneously**

18. Schwannomas most often involve:

- A. CN VII
- B. CN III
- C. CN VIII (vestibulocochlear)
- D. CN X

✓ **Answer: C. CN VIII (vestibulocochlear)**

19. Pineal region germinomas are common in:

- A. Adults > 60
- B. Infants
- C. Adolescent males
- D. Elderly females

✓ **Answer: C. Adolescent males**

20. Medulloblastoma arises from:

- A. Pituitary
- B. Cerebral cortex
- C. Cerebellar vermis
- D. Midbrain

✓ **Answer: C. Cerebellar vermis**

☐ **E. Infections & Inflammation**

21. MRI brain of pyogenic abscess shows:

- A. Diffuse edema only
 - B. Ring-enhancing lesion with restricted diffusion
 - C. Non-enhancing lesion
 - D. Calcified cyst
- ✓ **Answer: B. Ring-enhancing lesion with restricted diffusion**

22. Tuberculomas may appear as:

- A. Hemorrhagic infarct
 - B. Non-enhancing mass
 - C. Ring-enhancing lesion with T2 hypointensity
 - D. Cystic mass
- ✓ **Answer: C. Ring-enhancing lesion with T2 hypointensity**

23. Neurocysticercosis scolex is best seen in:

- A. T1
 - B. T2
 - C. FLAIR
 - D. Post-contrast T1
- ✓ **Answer: D. Post-contrast T1**

24. Viral encephalitis (HSV) shows:

- A. Temporal lobe hyperintensity
 - B. Parietal calcification
 - C. Ring-enhancing mass
 - D. Ventricular hemorrhage
- ✓ **Answer: A. Temporal lobe hyperintensity**

25. PML (Progressive Multifocal Leukoencephalopathy) affects:

- A. Deep gray matter
 - B. U-fibers in subcortical white matter
 - C. Cerebellar tonsils
 - D. Spinal cord
- ✓ **Answer: B. U-fibers in subcortical white matter**

□ **F. Congenital / Pediatric Brain**

26. Corpus callosum agenesis may show:

- A. Midline mass
- B. Colpocephaly

- C. Enlarged cerebellum
 - D. Brainstem herniation
- ✓ **Answer: B. Colpocephaly**

27. Lissencephaly is characterized by:

- A. Excessive gyration
 - B. Smooth brain without gyri
 - C. Parietal hemorrhage
 - D. Cortical calcification
- ✓ **Answer: B. Smooth brain without gyri**

28. Dandy-Walker malformation includes:

- A. Agenesis of cerebellar vermis and cystic posterior fossa
 - B. Supratentorial cyst
 - C. Hydrocephalus due to tumor
 - D. Corpus callosum thinning
- ✓ **Answer: A. Agenesis of cerebellar vermis and cystic posterior fossa**

29. Chiari I malformation:

- A. Always with hydrocephalus
 - B. Herniation of cerebellar tonsils >5 mm
 - C. Only affects infants
 - D. Involves basal ganglia
- ✓ **Answer: B. Herniation of cerebellar tonsils >5 mm**

30. Holoprosencephaly involves:

- A. Cyst in posterior fossa
 - B. Failure of cerebral hemispheres to separate
 - C. Extra ventricular CSF
 - D. Corpus callosum duplication
- ✓ **Answer: B. Failure of cerebral hemispheres to separate**

□ **G. Post-op & Miscellaneous**

31. Post-radiation changes in brain appear as:

- A. Persistent mass enhancement
- B. T2 hyperintensity with volume loss
- C. Hemorrhage

- D. CSF obstruction
✓ **Answer: B. T2 hyperintensity with volume loss**

32. Hemosiderin deposits are best seen in:

- A. DWI
- B. FLAIR
- C. T1
- D. GRE/SWI
✓ **Answer: D. GRE/SWI**

33. Diffuse axonal injury appears as:

- A. Ring lesion
- B. Multiple punctate hemorrhages at gray-white junction
- C. Mass effect in midline
- D. Temporal lobe infarct
✓ **Answer: B. Multiple punctate hemorrhages at gray-white junction**

34. Brain metastases often appear as:

- A. Single enhancing lesion
- B. Multiple ring-enhancing lesions at gray-white junction
- C. Calcified midline mass
- D. Hypointense on DWI
✓ **Answer: B. Multiple ring-enhancing lesions at gray-white junction**

35. Normal pressure hydrocephalus (NPH) shows:

- A. Narrow ventricles
- B. Slit ventricles
- C. Dilated ventricles with normal sulci
- D. Periventricular hemorrhage
✓ **Answer: C. Dilated ventricles with normal sulci**

☐ H. Artifacts & Interpretation

36. Magnetic susceptibility artifact occurs with:

- A. Air
- B. Gadolinium
- C. Metal implants
- D. Water
✓ **Answer: C. Metal implants**

37. Chemical shift artifact occurs at:

- A. Soft-tissue/bone interface
- B. Fat-water interfaces
- C. Brainstem
- D. Skull base

✓ **Answer: B. Fat-water interfaces**

38. Motion artifact appears as:

- A. Ring artifacts
- B. Ghosting or blurring
- C. Grid pattern
- D. Loss of magnetization

✓ **Answer: B. Ghosting or blurring**

39. Flow void is:

- A. Artifact of motion
- B. Absence of signal from flowing blood
- C. Signal loss from bone
- D. Ghosting from CSF

✓ **Answer: B. Absence of signal from flowing blood**

40. Gadolinium contrast enhances:

- A. CSF
- B. Calcified tissue
- C. Vascular and abnormal enhancing lesions
- D. Normal cortex

✓ **Answer: C. Vascular and abnormal enhancing lesions**

Topic 12: MRI Spine – Anatomy, Disc Disease, Infection, Tumors

☐ A. Spine Anatomy on MRI

1. On sagittal T2-weighted MRI, the cerebrospinal fluid (CSF) appears:

- A. Hypointense
- B. Isointense
- C. Hyperintense (bright)
- D. Not visible

✓ **Answer: C. Hyperintense (bright)**

2. The spinal cord ends at:

- A. L5
 - B. S2
 - C. L1–L2 level
 - D. T12
 - ✓ **Answer: C. L1–L2 level**
3. The cauda equina appears on MRI as:
- A. Single cord-like structure
 - B. Multiple linear structures within thecal sac below L2
 - C. Oval cystic area
 - D. Ring-enhancing lesion
 - ✓ **Answer: B. Multiple linear structures within thecal sac below L2**
4. The intervertebral disc is normally:
- A. Hyperintense on T1
 - B. Hypointense on T2
 - C. Hyperintense centrally on T2 due to nucleus pulposus
 - D. Isointense on STIR
 - ✓ **Answer: C. Hyperintense centrally on T2 due to nucleus pulposus**
5. Fat surrounding the spinal cord in the epidural space appears:
- A. Dark on all sequences
 - B. Bright on T1
 - C. Black on T1
 - D. Suppressed on T1
 - ✓ **Answer: B. Bright on T1**

□ B. Degenerative Disc Disease & Herniation

6. Loss of T2 signal in the nucleus pulposus suggests:
- A. Normal disc
 - B. Disc hydration
 - C. Disc degeneration
 - D. Herniation
 - ✓ **Answer: C. Disc degeneration**
7. Disc bulge involves:
- A. <25% of disc circumference
 - B. Entire disc circumference
 - C. Herniated nucleus only
 - D. Posterior annular tear
 - ✓ **Answer: B. Entire disc circumference**
8. Disc protrusion is defined as:
- A. Narrow neck and wide base
 - B. Broad-based displacement
 - C. Focal herniation with broad base
 - D. Focal herniation with narrow base
 - ✓ **Answer: D. Focal herniation with narrow base**

9. Disc extrusion differs from protrusion by:

- A. Smaller size
- B. Narrow neck, larger displaced fragment
- C. Location in thoracic spine
- D. Low T1 signal

✓**Answer: B. Narrow neck, larger displaced fragment**

10. The "high-intensity zone" on T2 in the posterior annulus indicates:

- A. Normal disc
- B. Annular tear
- C. Nerve root compression
- D. Facet hypertrophy

✓**Answer: B. Annular tear**

☐ C. Spinal Canal, Cord, and Nerve Root Evaluation

11. Central canal stenosis may be caused by:

- A. Enlarged intervertebral foramen
- B. Thickened ligamentum flavum
- C. Small pedicle width
- D. Cord atrophy

✓**Answer: B. Thickened ligamentum flavum**

12. Foraminal narrowing affects:

- A. Central canal only
- B. Spinal cord
- C. Nerve roots exiting through neural foramina
- D. Dural sac only

✓**Answer: C. Nerve roots exiting through neural foramina**

13. Facet joint osteoarthritis appears on MRI as:

- A. High T2 signal
- B. Low T1, high T2
- C. Hypertrophy with irregular joint margins
- D. Normal variant

✓**Answer: C. Hypertrophy with irregular joint margins**

14. Spondylolisthesis is best seen on:

- A. Axial CT only
- B. MRI axial views

- C. Sagittal T1 or T2 MRI
 - D. STIR sequence
- ✓ **Answer: C. Sagittal T1 or T2 MRI**

15. Synovial cysts adjacent to facet joints:

- A. Do not enhance
 - B. Appear hypointense on T2
 - C. May compress thecal sac and show rim enhancement
 - D. Are vascular lesions
- ✓ **Answer: C. May compress thecal sac and show rim enhancement**
-

□ D. Spinal Infections

16. Spondylodiscitis shows:

- A. Increased disc height
 - B. Loss of disc signal, endplate erosion, paraspinal edema
 - C. Calcified disc
 - D. Spinal cord herniation
- ✓ **Answer: B. Loss of disc signal, endplate erosion, paraspinal edema**

17. Tubercular spondylitis often involves:

- A. Single vertebra only
 - B. Disc space preservation
 - C. Multiple contiguous vertebrae and large paraspinal abscess
 - D. Epidural hematoma
- ✓ **Answer: C. Multiple contiguous vertebrae and large paraspinal abscess**

18. Epidural abscess shows:

- A. No enhancement
 - B. Ring-enhancing lesion in epidural space
 - C. Hypointense on all sequences
 - D. CSF collection
- ✓ **Answer: B. Ring-enhancing lesion in epidural space**

19. In bacterial discitis, T2 shows:

- A. Bright disc with adjacent endplate marrow edema
- B. Completely dark disc
- C. Enlarged disc

- D. Increased CSF flow
✓ **Answer: A. Bright disc with adjacent endplate marrow edema**

20. STIR sequence is ideal for:

- A. Bone marrow edema in infection
 - B. CSF evaluation
 - C. Flow voids
 - D. Cord hemorrhage
✓ **Answer: A. Bone marrow edema in infection**
-

□ E. Spinal Tumors

21. Intramedullary spinal tumors arise from:

- A. Bone
- B. Dura
- C. Spinal cord
- D. Epidural fat
✓ **Answer: C. Spinal cord**

22. Ependymomas on MRI appear:

- A. Hypointense on T1, hyperintense on T2 with enhancement
- B. Calcified and non-enhancing
- C. Hypovascular
- D. Found only in brain
✓ **Answer: A. Hypointense on T1, hyperintense on T2 with enhancement**

23. Astrocytomas are more common in:

- A. Adults
- B. Elderly males
- C. Children and young adults
- D. Thoracic spine only
✓ **Answer: C. Children and young adults**

24. Schwannoma on MRI shows:

- A. Bone destruction
- B. Dural-based mass
- C. T1 iso-hypo, T2 hyperintense, with strong enhancement
- D. Ring enhancement only
✓ **Answer: C. T1 iso-hypo, T2 hyperintense, with strong enhancement**

25. Drop metastases in spine are:

- A. Calcified masses
- B. Non-enhancing
- C. Leptomeningeal deposits in spinal canal from cranial tumors
- D. Related to trauma

✓**Answer: C. Leptomeningeal deposits in spinal canal from cranial tumors**

☐ F. Trauma & Miscellaneous Lesions

26. Chance fracture is best seen on:

- A. Axial MRI
- B. T1 coronal view
- C. Sagittal T2 – shows horizontal fracture through vertebra
- D. DWI

✓**Answer: C. Sagittal T2 – shows horizontal fracture through vertebra**

27. Vertebral body collapse due to malignancy:

- A. Preserves posterior height
- B. Spares marrow signal
- C. Shows low T1, high STIR with enhancement
- D. Appears hyperintense on T1

✓**Answer: C. Shows low T1, high STIR with enhancement**

28. Schmorl's nodes are:

- A. Metastatic foci
- B. Herniations of disc into vertebral body
- C. Spinal cysts
- D. Infection

✓**Answer: B. Herniations of disc into vertebral body**

29. Modic type I change shows:

- A. Fatty marrow (T1 bright)
- B. Bone edema (T1 dark, T2 bright)
- C. Sclerosis
- D. Calcification

✓**Answer: B. Bone edema (T1 dark, T2 bright)**

30. Hemangioma of vertebral body on MRI shows:

- A. Hypointense on T1 and T2
 - B. Bright on both T1 and T2
 - C. Ring-enhancing
 - D. Fluid-fluid levels
- ✓**Answer: B. Bright on both T1 and T2**
-

□ G. Post-op Spine, Artifacts, Miscellaneous

31. Post-surgical scar vs. recurrent disc:

- A. Disc enhances, scar doesn't
 - B. Scar enhances with gadolinium
 - C. Both are non-enhancing
 - D. Cannot be differentiated
- ✓**Answer: B. Scar enhances with gadolinium**

32. CSF flow voids on T2:

- A. Indicate hydrocephalus
 - B. Appear as black regions in subarachnoid space
 - C. Are artifacts only
 - D. Are due to hemorrhage
- ✓**Answer: B. Appear as black regions in subarachnoid space**

33. Tethered cord syndrome shows:

- A. High-lying conus
 - B. Thickened filum terminale, low-lying conus
 - C. Brainstem lesion
 - D. Herniated disc
- ✓**Answer: B. Thickened filum terminale, low-lying conus**

34. Filum terminale lipoma appears as:

- A. Bright on STIR
 - B. Hypointense on T1
 - C. Hyperintense on T1, suppressed on fat sat
 - D. Isointense on T2
- ✓**Answer: C. Hyperintense on T1, suppressed on fat sat**

35. Post-op fluid collection with rim enhancement is:

- A. Epidural fibrosis
- B. Seroma

- C. Abscess
 - D. Scar tissue
- ✓**Answer: C. Abscess**
-

□ H. Tumor Staging & Planning

36. Spinal metastasis staging MRI includes:

- A. STIR sagittal and axial T2
 - B. T1, STIR, and post-contrast sequences
 - C. Only DWI
 - D. FLAIR sequences
- ✓**Answer: B. T1, STIR, and post-contrast sequences**

37. Cord compression appears as:

- A. Increased T1 signal in cord
 - B. Decreased T2 signal
 - C. T2 hyperintensity with cord flattening
 - D. Ring enhancement
- ✓**Answer: C. T2 hyperintensity with cord flattening**

38. MRI is superior to CT in:

- A. Detecting calcified discs
 - B. Assessing bony alignment
 - C. Soft tissue and spinal cord evaluation
 - D. Detecting bone fractures
- ✓**Answer: C. Soft tissue and spinal cord evaluation**

39. The best sequence for detecting marrow pathology:

- A. T1
 - B. T2
 - C. STIR
 - D. DWI
- ✓**Answer: C. STIR**

40. Metal artifact reduction in MRI spine:

- A. Use GRE sequence
- B. Increase slice thickness
- C. Use fast spin echo and STIR

- D. Avoid contrast
✓ **Answer: C. Use fast spin echo and STIR**

Topic 13: Contrast Media – Types, Reactions, Protocols

□ A. Types & Composition of Contrast Media

1. Iodinated contrast media used in CT are primarily:
 - A. Water-based
 - B. Barium sulfate
 - C. Oil-based
 - D. Paramagnetic✓ **Answer: A. Water-based**
2. Gadolinium-based contrast is used in:
 - A. CT
 - B. MRI
 - C. Ultrasound
 - D. X-ray✓ **Answer: B. MRI**
3. Ionic contrast agents:
 - A. Dissociate into ions in solution
 - B. Are used only in MRI
 - C. Have lower osmolality
 - D. Are non-chemically active✓ **Answer: A. Dissociate into ions in solution**
4. Non-ionic contrast media:
 - A. Have higher osmolality
 - B. Are associated with more adverse reactions
 - C. Do not dissociate in solution
 - D. Are only used in barium studies✓ **Answer: C. Do not dissociate in solution**
5. Barium sulfate contrast is contraindicated in:
 - A. Swallow studies
 - B. Suspected GI perforation
 - C. Constipation
 - D. Pediatric patients✓ **Answer: B. Suspected GI perforation**

□ B. Osmolality & Viscosity

6. High osmolality contrast media (HOCM) have osmolality:

- A. Same as plasma
 - B. Lower than plasma
 - C. 5–7 times higher than plasma
 - D. Not measurable
 - ✓ **Answer: C. 5–7 times higher than plasma**
7. Low osmolality contrast media (LOCM) cause:
- A. More allergic reactions
 - B. Less discomfort and fewer side effects
 - C. Higher risk of nephrotoxicity
 - D. More sedation
 - ✓ **Answer: B. Less discomfort and fewer side effects**
8. Viscosity of contrast affects:
- A. Injection speed and catheter pressure
 - B. Image resolution only
 - C. Contrast color
 - D. Radiation dose
 - ✓ **Answer: A. Injection speed and catheter pressure**
9. Contrast viscosity can be reduced by:
- A. Diluting with saline
 - B. Warming the contrast to body temperature
 - C. Shaking the bottle
 - D. Using contrast quickly
 - ✓ **Answer: B. Warming the contrast to body temperature**
10. Iso-osmolar contrast media have:
- A. Higher allergy risk
 - B. Same osmolality as blood plasma
 - C. Reduced viscosity
 - D. Only used in MRI
 - ✓ **Answer: B. Same osmolality as blood plasma**
-

☐ C. Adverse Reactions & Management

11. The most common contrast reaction is:

- A. Anaphylaxis
- B. Nausea and vomiting
- C. Seizure
- D. Cardiac arrest
- ✓ **Answer: B. Nausea and vomiting**

12. A mild contrast reaction includes:

- A. Hypotension

- B. Severe bronchospasm
 - C. Urticaria and sneezing
 - D. Unconsciousness
- ✓ **Answer: C. Urticaria and sneezing**

13. Moderate contrast reaction may require:

- A. No intervention
 - B. Antihistamines or bronchodilators
 - C. Defibrillation
 - D. Dialysis
- ✓ **Answer: B. Antihistamines or bronchodilators**

14. Severe contrast reaction includes:

- A. Itching only
 - B. Sneezing
 - C. Laryngeal edema, hypotension, shock
 - D. Mild rash
- ✓ **Answer: C. Laryngeal edema, hypotension, shock**

15. First-line drug for anaphylaxis from contrast:

- A. Steroids
 - B. Antihistamines
 - C. Epinephrine (Adrenaline)
 - D. Dopamine
- ✓ **Answer: C. Epinephrine (Adrenaline)**

☐ **D. Patient Preparation & Risk Assessment**

16. Before contrast injection, always assess:

- A. Weight
 - B. Height
 - C. Renal function (serum creatinine)
 - D. Skin color
- ✓ **Answer: C. Renal function (serum creatinine)**

17. High-risk patients for contrast reaction include:

- A. Diabetics on insulin
- B. Asthmatics and those with past contrast reactions
- C. Obese individuals

- D. People with anemia

✓ **Answer: B. Asthmatics and those with past contrast reactions**

18. Fasting prior to contrast injection:

- A. Is always mandatory
- B. Is unnecessary in oral contrast
- C. Helps reduce nausea/vomiting risk
- D. Prevents nephrotoxicity

✓ **Answer: C. Helps reduce nausea/vomiting risk**

19. Premedication protocol for high-risk patients includes:

- A. Furosemide and aspirin
- B. Steroids and antihistamines
- C. Heparin
- D. Dopamine and oxygen

✓ **Answer: B. Steroids and antihistamines**

20. Patients on metformin and receiving iodinated contrast:

- A. Must stop metformin 48 hours post-contrast if renal function is impaired
- B. Can continue metformin without testing
- C. Must be given glucose infusion
- D. Should be premedicated

✓ **Answer: A. Must stop metformin 48 hours post-contrast if renal function is impaired**

☐ **E. Contrast in Special Populations**

21. In pregnancy, iodinated contrast is:

- A. Safe in all trimesters
- B. Contraindicated due to fetal toxicity
- C. Used only if benefits outweigh risks
- D. Preferred over MRI contrast

✓ **Answer: C. Used only if benefits outweigh risks**

22. Gadolinium in pregnancy:

- A. Is a category A drug
- B. Crosses placenta and should be avoided unless essential
- C. Is safer than iodinated contrast

- D. Does not cross placenta
✓ **Answer: B. Crosses placenta and should be avoided unless essential**

23. In lactating mothers:

- A. Breastfeeding must be stopped permanently
- B. Breastfeeding should be withheld for 24–48 hours (optional)
- C. Contrast is absolutely contraindicated
- D. MRI cannot be performed
✓ **Answer: B. Breastfeeding should be withheld for 24–48 hours (optional)**

24. Pediatric contrast dose is:

- A. Same as adult
- B. Based on body surface area
- C. Based on age
- D. Based on weight (mL/kg)
✓ **Answer: D. Based on weight (mL/kg)**

25. Neonates receiving contrast:

- A. Require high volumes
- B. Need no renal evaluation
- C. May require monitoring of renal function post-injection
- D. Always need general anesthesia
✓ **Answer: C. May require monitoring of renal function post-injection**

☐ **F. Contrast Media in Imaging Modalities**

26. CT contrast injection is typically:

- A. IM
- B. Oral
- C. IV bolus using power injector
- D. Intra-arterial only
✓ **Answer: C. IV bolus using power injector**

27. MR contrast is typically:

- A. Gadolinium-based, IV route
- B. Iodinated orally
- C. Barium via rectum
- D. Intrathecal only
✓ **Answer: A. Gadolinium-based, IV route**

28. Contrast used in hysterosalpingography:

- A. Gadolinium
- B. Barium
- C. Water-soluble iodinated contrast
- D. Fat-based contrast

✓**Answer: C. Water-soluble iodinated contrast**

29. For MR angiography, gadolinium helps in:

- A. Improving signal from arteries
- B. Suppressing CSF
- C. Diagnosing infarcts
- D. Reducing bone signal

✓**Answer: A. Improving signal from arteries**

30. Intrathecal contrast for myelography must be:

- A. Non-ionic, water-soluble
- B. Barium
- C. Gadolinium
- D. Hyperosmolar ionic agent

✓**Answer: A. Non-ionic, water-soluble**

□ G. Contrast Safety & Nephrotoxicity

31. Contrast-induced nephropathy (CIN) is defined as:

- A. Decrease in BP post-contrast
- B. Rise in serum creatinine by $\geq 25\%$ within 48–72 hrs
- C. Urinary retention
- D. Cardiac arrhythmia

✓**Answer: B. Rise in serum creatinine by $\geq 25\%$ within 48–72 hrs**

32. Risk factor for CIN includes:

- A. Young age
- B. Dehydration
- C. Hyperlipidemia
- D. Hypertension alone

✓**Answer: B. Dehydration**

33. Preventing CIN involves:

- A. Giving diuretics
 - B. Hydration with IV saline
 - C. Stopping insulin
 - D. Giving aspirin
- ✓**Answer: B. Hydration with IV saline**

34. Gadolinium-associated condition in renal failure:

- A. CIN
 - B. Thyroid crisis
 - C. Nephrogenic systemic fibrosis (NSF)
 - D. Acute hepatitis
- ✓**Answer: C. Nephrogenic systemic fibrosis (NSF)**

35. NSF is associated with:

- A. Oral barium
 - B. Ionic iodinated contrast
 - C. Linear gadolinium chelates
 - D. Macrocyclic agents
- ✓**Answer: C. Linear gadolinium chelates**

☐ H. Special Procedures & Miscellaneous

36. Delayed contrast enhancement is typical of:

- A. Vascular tumors
 - B. Liver fibrosis
 - C. Simple cysts
 - D. Gallstones
- ✓**Answer: B. Liver fibrosis**

37. Enteric contrast used in CT enterography:

- A. Gadolinium
 - B. Water or low-attenuation agents
 - C. Barium
 - D. Oil-based contrast
- ✓**Answer: B. Water or low-attenuation agents**

38. Contrast enema uses:

- A. IV contrast
- B. Gadolinium

- C. Barium or water-soluble iodinated contrast per rectum
 - D. Fat-based dye
- ✓**Answer: C. Barium or water-soluble iodinated contrast per rectum**

39. For suspected tracheo-esophageal fistula in neonates:

- A. Gadolinium oral
 - B. Barium
 - C. Water-soluble non-ionic iodinated contrast
 - D. Saline
- ✓**Answer: C. Water-soluble non-ionic iodinated contrast**

40. Best contrast for CT urography:

- A. Oral barium
 - B. IV iodinated contrast with delayed images
 - C. Intrathecal gadolinium
 - D. CO₂
- ✓**Answer: B. IV iodinated contrast with delayed images**

☢ Topic 14: Radiation Safety, Protection, and Dose Limits

☐ A. Basic Concepts of Radiation Protection

1. The principle of ALARA stands for:
 - A. All Levels Are Radiation Adjusted
 - B. As Low As Reasonably Achievable
 - C. Atomic Level Applied Radiation Assessment
 - D. Accurate Linear Absorbed Radiation Approach

✓**Answer: B. As Low As Reasonably Achievable**
2. The three key principles of radiation protection are:
 - A. Distance, Frequency, Mass
 - B. Time, Distance, Shielding
 - C. Exposure, Age, Temperature
 - D. Dose, Duration, Direction

✓**Answer: B. Time, Distance, Shielding**
3. Increasing distance from the X-ray source:
 - A. Has no effect
 - B. Doubles the exposure
 - C. Decreases exposure by inverse square law
 - D. Increases scatter

✓**Answer: C. Decreases exposure by inverse square law**
4. Lead aprons protect primarily against:

- A. Gamma rays
 - B. Neutrons
 - C. Beta particles
 - D. Scatter X-rays
 - ✓ **Answer: D. Scatter X-rays**
5. The standard thickness of lead apron used in radiography is:
- A. 0.1 mm Pb
 - B. 0.25 mm Pb
 - C. 0.5 mm Pb
 - D. 1.5 mm Pb
 - ✓ **Answer: C. 0.5 mm Pb**
-

□ B. Radiation Units & Quantities

6. The unit of absorbed dose is:
- A. Gray (Gy)
 - B. Sievert (Sv)
 - C. Becquerel (Bq)
 - D. Curie (Ci)
 - ✓ **Answer: A. Gray (Gy)**
7. The unit for equivalent and effective dose is:
- A. Gray
 - B. Coulomb/kg
 - C. Sievert (Sv)
 - D. Roentgen
 - ✓ **Answer: C. Sievert (Sv)**
8. 1 Gray equals:
- A. 10 mGy
 - B. 1 Sievert
 - C. 100 rad
 - D. 1 microcurie
 - ✓ **Answer: C. 100 rad**
9. Effective dose accounts for:
- A. Only absorbed dose
 - B. Tissue sensitivity and radiation type
 - C. Exposure time
 - D. Scattered radiation only
 - ✓ **Answer: B. Tissue sensitivity and radiation type**
10. The unit for measuring radioactivity is:
- A. Sievert
 - B. Gray
 - C. Becquerel (Bq)

- D. Rem
- ✓ **Answer: C. Becquerel (Bq)**
-

□ C. Occupational Dose Limits

11. ICRP recommends annual occupational dose limit of:

- A. 1 mSv
 - B. 5 mSv
 - C. 20 mSv
 - D. 100 mSv
- ✓ **Answer: C. 20 mSv**

12. The dose limit to the lens of the eye (occupational) is:

- A. 50 mSv
 - B. 100 mSv
 - C. 20 mSv
 - D. 150 mSv
- ✓ **Answer: D. 150 mSv**

13. The dose limit to the skin (occupational, per year) is:

- A. 5 mSv
 - B. 150 mSv
 - C. 500 mSv
 - D. 50 mSv
- ✓ **Answer: C. 500 mSv**

14. Public annual dose limit is:

- A. 1 mSv
 - B. 20 mSv
 - C. 50 mSv
 - D. 10 mSv
- ✓ **Answer: A. 1 mSv**

15. Fetal dose limit during pregnancy (entire period):

- A. 5 mSv
 - B. 10 mSv
 - C. 2 mSv
 - D. 1 mSv
- ✓ **Answer: D. 1 mSv**

□ **D. Dose from Diagnostic Imaging**

16. A typical chest X-ray gives a dose of:

- A. 0.01 mSv
- B. 0.1 mSv
- C. 1 mSv
- D. 10 mSv

✓ **Answer: B. 0.1 mSv**

17. CT Abdomen & Pelvis typically delivers:

- A. 0.2 mSv
- B. 1 mSv
- C. 10 mSv
- D. 20 mSv

✓ **Answer: C. 10 mSv**

18. Dental bitewing X-ray dose is approximately:

- A. 0.01 mSv
- B. 0.05 mSv
- C. 0.1 mSv
- D. 1 mSv

✓ **Answer: A. 0.01 mSv**

19. Which imaging modality does NOT use ionizing radiation?

- A. CT
- B. PET
- C. MRI
- D. Fluoroscopy

✓ **Answer: C. MRI**

20. The highest radiation dose among common modalities:

- A. Chest X-ray
- B. Mammography
- C. CT scan
- D. Ultrasound

✓ **Answer: C. CT scan**

☐ E. Shielding & Barriers

21. Primary barrier protects against:

- A. Leakage radiation
- B. Scatter from walls
- C. Direct beam
- D. Patient movement

✓ **Answer: C. Direct beam**

22. Secondary barriers are used for:

- A. Direct X-ray beam
- B. Gamma radiation
- C. Scatter and leakage radiation
- D. Magnetic shielding

✓ **Answer: C. Scatter and leakage radiation**

23. Control booth in X-ray room acts as:

- A. Primary barrier
- B. Secondary barrier
- C. Magnetic shield
- D. Leakage source

✓ **Answer: B. Secondary barrier**

24. The minimum lead equivalence for protective glass window:

- A. 0.25 mm
- B. 0.5 mm
- C. 1.5 mm
- D. 2 mm

✓ **Answer: B. 0.5 mm**

25. Which of the following rooms require shielding calculation?

- A. Storage room
- B. General ward
- C. X-ray and CT scan rooms
- D. Cafeteria

✓ **Answer: C. X-ray and CT scan rooms**

☐ F. Monitoring, Dosimeters, & Regulations

26. Personnel radiation monitoring is required if dose >:

- A. 0.1 mSv/year
- B. 1 mSv/year
- C. 5 mSv/year
- D. 10 mSv/year

✓ **Answer: B. 1 mSv/year**

27. TLD (Thermoluminescent dosimeter) measures:

- A. Ion pairs
- B. Exposure rate
- C. Cumulative radiation dose
- D. Sound intensity

✓ **Answer: C. Cumulative radiation dose**

28. A film badge measures dose by:

- A. Scintillation
- B. Thermoluminescence
- C. Film blackening proportional to exposure
- D. Resistance change

✓ **Answer: C. Film blackening proportional to exposure**

29. Dosimeter should be worn:

- A. On the ankle
- B. Outside apron at collar level
- C. Inside pocket
- D. Under desk

✓ **Answer: B. Outside apron at collar level**

30. Which is NOT a personnel monitoring device?

- A. TLD
- B. Pocket ion chamber
- C. Geiger counter
- D. OSL dosimeter

✓ **Answer: C. Geiger counter**

☐ **G. Biological Effects & Risk**

31. Stochastic effects:

- A. Have a threshold
 - B. Severity increases with dose
 - C. Probability increases with dose (e.g. cancer)
 - D. Occur immediately
- ✓ **Answer: C. Probability increases with dose (e.g. cancer)**

32. Deterministic effects:

- A. Are random
 - B. Have no threshold
 - C. Severity increases with dose after threshold (e.g. cataract)
 - D. Include leukemia
- ✓ **Answer: C. Severity increases with dose after threshold**

33. Cataract formation threshold dose is approximately:

- A. 0.1 Gy
 - B. 0.5 Gy
 - C. 2 Gy
 - D. 5 Gy
- ✓ **Answer: C. 2 Gy**

34. Radiation-induced malignancy is considered:

- A. Deterministic effect
 - B. Stochastic effect
 - C. Acute effect
 - D. Transient effect
- ✓ **Answer: B. Stochastic effect**

35. Acute radiation syndrome occurs at:

- A. <0.1 Gy
 - B. 0.5–1 Gy
 - C. >1 –2 Gy
 - D. >10 mSv
- ✓ **Answer: C. >1 –2 Gy**

□ H. Legal, Ethical & National Guidelines

36. Radiation safety in India is governed by:

- A. BARC
- B. AIIMS

- C. MCI
- D. WHO

✓**Answer: A. BARC**

37. The governing body for radiological safety in India:

- A. FDA
- B. ICRP
- C. AERB
- D. IAEA

✓**Answer: C. AERB (Atomic Energy Regulatory Board)**

38. The purpose of QA in radiation safety is:

- A. Increasing speed
- B. Dose escalation
- C. Optimizing patient dose while maintaining image quality
- D. Avoiding contrast

✓**Answer: C. Optimizing patient dose while maintaining image quality**

39. Lead gloves are mandatory for:

- A. Patient comfort
- B. Holding patients during exposure
- C. Technologist comfort
- D. CT scan use

✓**Answer: B. Holding patients during exposure**

40. Radiation warning signs must be:

- A. Blue with cross
- B. Red with skull
- C. Yellow and black trefoil symbol
- D. Green with tick

✓**Answer: C. Yellow and black trefoil symbol**

📌 Topic 15: PACS, RIS, Digital Workflow, and Image Storage

☐ A. Basics of PACS (Picture Archiving and Communication System)

1. PACS is primarily used to:
 - A. Capture ECG signals
 - B. Archive, retrieve, and distribute medical images
 - C. Operate MRI scanner
 - D. Administer anesthesia✓ **Answer: B. Archive, retrieve, and distribute medical images**
 2. The key components of PACS include:
 - A. X-ray machine and processor
 - B. Imaging modalities, archives, workstations, and network
 - C. PACS and PET-CT
 - D. Server rack and camera✓ **Answer: B. Imaging modalities, archives, workstations, and network**
 3. The central server in PACS is responsible for:
 - A. Scheduling appointments
 - B. Image acquisition
 - C. Storing and routing images
 - D. Patient billing✓ **Answer: C. Storing and routing images**
 4. One major advantage of PACS is:
 - A. Increased radiation dose
 - B. Physical film requirement
 - C. Instant image access and sharing
 - D. Slower retrieval✓ **Answer: C. Instant image access and sharing**
 5. PACS eliminates the need for:
 - A. Lead shielding
 - B. Radiology technologists
 - C. Film and chemical processing
 - D. Radiologist review✓ **Answer: C. Film and chemical processing**
-

☐ B. RIS (Radiology Information System)

6. RIS primarily manages:
 - A. Image storage only
 - B. Patient radiation dose
 - C. Administrative and patient-related radiology data
 - D. PACS network✓ **Answer: C. Administrative and patient-related radiology data**

7. A typical RIS function includes:
- A. Pulse generation
 - B. PACS calibration
 - C. Patient scheduling, tracking, and reporting
 - D. MRI gradient control
- ✓**Answer: C. Patient scheduling, tracking, and reporting**
8. RIS is commonly integrated with:
- A. CT scanner directly
 - B. HIS (Hospital Information System)
 - C. Ventilator
 - D. Radiation dosimeter
- ✓**Answer: B. HIS (Hospital Information System)**
9. RIS helps in:
- A. Scanning patients
 - B. Managing workflow and reporting
 - C. Storing images
 - D. Capturing video signals
- ✓**Answer: B. Managing workflow and reporting**
10. RIS data is typically stored:
- A. In DICOM format
 - B. As HL7-compliant records
 - C. On film rolls
 - D. In JPEG format
- ✓**Answer: B. As HL7-compliant records**
-

☐ C. DICOM and Image File Management

11. DICOM stands for:
- A. Digital Imaging and Communications in Medicine
 - B. Dynamic Information and Communication Method
 - C. Direct Imaging for Community Medicine
 - D. Diagnostic Input for Computerized Output Management
- ✓**Answer: A. Digital Imaging and Communications in Medicine**
12. DICOM is essential for:
- A. Text file sharing
 - B. Image file standardization across devices
 - C. Electrocardiography
 - D. X-ray tube construction
- ✓**Answer: B. Image file standardization across devices**

13. Every DICOM file contains:

- A. Only image data
- B. Only text report
- C. Image + metadata (e.g., patient info, modality, timestamp)
- D. Lab results

✓ **Answer: C. Image + metadata (e.g., patient info, modality, timestamp)**

14. The unique identifier for each DICOM image is:

- A. IP address
- B. Accession number
- C. UID (Unique Identifier)
- D. Password

✓ **Answer: C. UID (Unique Identifier)**

15. PACS communicates using:

- A. FTP protocol
- B. HL7 only
- C. DICOM network protocols
- D. HTML language

✓ **Answer: C. DICOM network protocols**

☐ **D. Workflow Integration & Interoperability**

16. HL7 is:

- A. Imaging protocol
- B. A software for PET
- C. Health Level 7 – standard for medical data exchange
- D. Data compression tool

✓ **Answer: C. Health Level 7 – standard for medical data exchange**

17. Integration of PACS with HIS allows:

- A. Delayed reporting
- B. Seamless access to patient records
- C. Redundant scanning
- D. Increased printing

✓ **Answer: B. Seamless access to patient records**

18. PACS workflow begins with:

- A. Archive backup
 - B. Image acquisition from modality
 - C. Billing
 - D. Film processing
- ✓ **Answer: B. Image acquisition from modality**

19. Reporting software is typically embedded in:

- A. HIS
 - B. Scanner interface
 - C. RIS
 - D. Power injector
- ✓ **Answer: C. RIS**

20. Modalities like CT, MRI, and US are connected to PACS through:

- A. CD drives
 - B. Manual upload
 - C. DICOM interface
 - D. PDF uploads
- ✓ **Answer: C. DICOM interface**

☐ **E. Image Storage, Compression & Archiving**

21. Long-term image storage in PACS is handled by:

- A. RAM
 - B. DVD only
 - C. RAID-based servers and cloud storage
 - D. USB drives
- ✓ **Answer: C. RAID-based servers and cloud storage**

22. RAID stands for:

- A. Random Archive Image Distributor
 - B. Redundant Array of Independent Disks
 - C. Radiology Archive Imaging Device
 - D. Rapid Archiving in Digital systems
- ✓ **Answer: B. Redundant Array of Independent Disks**

23. Lossless image compression:

- A. Reduces image resolution
- B. Preserves all image data

- C. Deletes metadata
- D. Is not used in PACS

✓ **Answer: B. Preserves all image data**

24. Lossy compression:

- A. Is never used in radiology
- B. Results in irreversible loss of detail
- C. Preserves full image quality
- D. Increases file size

✓ **Answer: B. Results in irreversible loss of detail**

25. Which format is standard for image compression in PACS?

- A. PNG
- B. JPEG 2000
- C. BMP
- D. TIFF

✓ **Answer: B. JPEG 2000**

□ **F. Digital Display & Workstations**

26. Diagnostic radiology workstations require:

- A. Inkjet monitors
- B. High-resolution grayscale displays
- C. CRT displays only
- D. Color monitors without calibration

✓ **Answer: B. High-resolution grayscale displays**

27. Luminance is measured in:

- A. Gauss
- B. Lux
- C. Nits (cd/m^2)
- D. Tesla

✓ **Answer: C. Nits (cd/m^2)**

28. Ambient light in reading rooms should be:

- A. Very bright
- B. Uncontrolled
- C. Low and constant to reduce glare

- D. Fluorescent only
- ✓ **Answer: C. Low and constant to reduce glare**

29. Grayscale Standard Display Function (GSDF) is:

- A. Used for CT dose calculation
 - B. Monitor calibration standard for accurate brightness
 - C. Not applicable in PACS
 - D. A part of HL7
- ✓ **Answer: B. Monitor calibration standard for accurate brightness**

30. Soft-copy display in digital radiology refers to:

- A. Printed film
 - B. Image on PACS monitor
 - C. Paper report
 - D. Verbal diagnosis
- ✓ **Answer: B. Image on PACS monitor**

☐ **G. Data Security, Backup & Legal Aspects**

31. Data security in PACS includes:

- A. Unrestricted access
 - B. Password protection and user authentication
 - C. Auto-share via email
 - D. Open file systems
- ✓ **Answer: B. Password protection and user authentication**

32. Patient confidentiality is governed under:

- A. RIS license
 - B. HIS enrollment
 - C. HIPAA (USA) or local data privacy laws
 - D. PACS license
- ✓ **Answer: C. HIPAA (USA) or local data privacy laws**

33. Data backup in PACS is ideally:

- A. Manual only
 - B. Not required
 - C. Automated with offsite/cloud replication
 - D. Quarterly
- ✓ **Answer: C. Automated with offsite/cloud replication**

34. Legal retention of images in many countries is:

- A. 1 year
- B. 5 years
- C. 7–10 years or per law
- D. Not mandatory

✓**Answer: C. 7–10 years or per law**

35. Unauthorized alteration of DICOM data is:

- A. Acceptable in emergency
- B. Legal if patient consents
- C. A breach of data integrity
- D. Part of standard workflow

✓**Answer: C. A breach of data integrity**

☐ H. Troubleshooting & Quality Assurance

36. If PACS is offline:

- A. Studies are lost permanently
- B. Imaging cannot proceed
- C. Backup storage and local archives are used
- D. Only MRI stops functioning

✓**Answer: C. Backup storage and local archives are used**

37. Network speed impacts:

- A. Image contrast
- B. Image storage only
- C. Image loading and transmission times
- D. Power requirements

✓**Answer: C. Image loading and transmission times**

38. Quality control in PACS involves:

- A. Hardware maintenance only
- B. Verifying monitor brightness, resolution, data accuracy
- C. Dose calculation
- D. Manual film labeling

✓**Answer: B. Verifying monitor brightness, resolution, data accuracy**

39. HL7 interface failure may cause:

- A. No change in workflow
 - B. PACS image loss
 - C. Patient demographic mismatch or missing info
 - D. Increased scan time
- ✓ **Answer: C. Patient demographic mismatch or missing info**

40. Future upgrades in PACS involve:

- A. Larger film trays
 - B. AI integration, cloud storage, faster access
 - C. More chemical usage
 - D. Downgrading to analog
- ✓ **Answer: B. AI integration, cloud storage, faster access**

Topic 16: Radiographic Quality Assurance & Image Evaluation

□ A. Quality Assurance (QA) Basics

1. Quality assurance in radiology aims to:
 - A. Improve image sharpness only
 - B. Ensure diagnostic image quality with minimal radiation dose
 - C. Increase patient throughput
 - D. Reduce contrast use

✓ **Answer: B. Ensure diagnostic image quality with minimal radiation dose**
2. A complete QA program includes:
 - A. Only image testing
 - B. Patient feedback forms
 - C. Equipment testing, personnel training, and image quality checks
 - D. Departmental surveys only

✓ **Answer: C. Equipment testing, personnel training, and image quality checks**
3. The primary goal of quality control (QC) in radiology is:
 - A. Checking billing accuracy
 - B. Ensuring film availability
 - C. Monitoring and maintaining imaging equipment performance
 - D. Scheduling staff shifts

✓ **Answer: C. Monitoring and maintaining imaging equipment performance**
4. Frequency of QC tests should be:
 - A. Once per year
 - B. Per AERB or local regulatory guidelines
 - C. Only when there's a complaint
 - D. When equipment breaks

✓ **Answer: B. Per AERB or local regulatory guidelines**

5. Repeat rate analysis helps:

- A. Reduce contrast
- B. Increase dose
- C. Identify causes of image rejection and retakes
- D. Monitor scan time

✓✓**Answer: C. Identify causes of image rejection and retakes**

□ **B. Image Quality Parameters**

6. The ability to distinguish small structures is called:

- A. Contrast resolution
- B. Spatial resolution
- C. Penumbra
- D. Beam quality

✓✓**Answer: B. Spatial resolution**

7. Contrast resolution is influenced by:

- A. Pixel size
- B. Window width
- C. Focal spot size
- D. Grid ratio

✓✓**Answer: B. Window width**

8. Low contrast objects are better visualized in:

- A. High kVp, low mAs
- B. Low kVp, high mAs
- C. High SID
- D. Small FOV

✓✓**Answer: B. Low kVp, high mAs**

9. Noise in digital radiography is:

- A. Always from the patient
- B. Random variation in pixel intensity
- C. Caused by filters
- D. Only visible in bone

✓✓**Answer: B. Random variation in pixel intensity**

10. Sharpness of an image is affected by:

- A. mA
- B. Focal spot size and motion
- C. Exposure time only
- D. Contrast only

✓✓**Answer: B. Focal spot size and motion**

□ **C. Equipment & Test Tools**

11. A line pair phantom is used to evaluate:

- A. Contrast
- B. Spatial resolution
- C. Exposure index
- D. Tube leakage

✓ **Answer: B. Spatial resolution**

12. The step wedge (aluminum wedge) is used to test:

- A. Dose rate
- B. Focal spot
- C. Contrast scale and dynamic range
- D. Image blur

✓ **Answer: C. Contrast scale and dynamic range**

13. The beam alignment test ensures:

- A. Proper SID
- B. Central ray is perpendicular to the detector
- C. Collimation is open
- D. Time accuracy

✓ **Answer: B. Central ray is perpendicular to the detector**

14. The HVL test is used to check:

- A. Detector alignment
- B. Exposure time
- C. Beam quality (filtration)
- D. Anode angle

✓ **Answer: C. Beam quality (filtration)**

15. A spinning top test evaluates:

- A. Focal spot size
- B. Timer accuracy in single-phase equipment
- C. Tube current
- D. kVp accuracy

✓ **Answer: B. Timer accuracy in single-phase equipment**

☐ **D. Image Artifacts & Rejection**

16. Grid cut-off appears as:

- A. Bright image
 - B. Uneven dark bands
 - C. Circular artifact
 - D. High noise
- ✓ **Answer: B. Uneven dark bands**

17. Motion artifact appears as:

- A. High-contrast streaks
 - B. Ghosting or blurring of image
 - C. Grid lines
 - D. Bright halos
- ✓ **Answer: B. Ghosting or blurring of image**

18. Double exposure error is seen when:

- A. Patient moves
 - B. Detector fails
 - C. Two exposures occur on the same plate
 - D. Collimator malfunctions
- ✓ **Answer: C. Two exposures occur on the same plate**

19. Exposure index in digital systems indicates:

- A. Patient weight
 - B. Amount of radiation received by the detector
 - C. Speed of scanning
 - D. Contrast level
- ✓ **Answer: B. Amount of radiation received by the detector**

20. Dead pixels in a digital detector appear as:

- A. Sharp structures
 - B. Black or white spots
 - C. Ring artifact
 - D. Fog
- ✓ **Answer: B. Black or white spots**

☐ **E. Dose Monitoring & Optimization**

21. Dose creep refers to:

- A. Patient movement
- B. Gradual increase in exposure over time in digital systems

- C. Tube aging
- D. Short SID

✓**Answer: B. Gradual increase in exposure over time in digital systems**

22. The DAP (Dose Area Product) is:

- A. $\text{mA} \times \text{exposure time}$
- B. $\text{kVp} \times \text{mA}$
- C. Product of dose and irradiated area
- D. A type of collimator

✓**Answer: C. Product of dose and irradiated area**

23. Image gently campaign promotes:

- A. Use of barium contrast
- B. Radiation safety in pediatrics
- C. MRI scanning only
- D. Manual processing

✓**Answer: B. Radiation safety in pediatrics**

24. Use of automatic exposure control (AEC):

- A. Increases exposure
- B. Reduces patient dose and standardizes image quality
- C. Is obsolete
- D. Replaces collimation

✓**Answer: B. Reduces patient dose and standardizes image quality**

25. Image repeat rate $>10\%$ suggests:

- A. Excellent quality control
- B. Need for staff training or equipment evaluation
- C. Good workflow
- D. More contrast needed

✓**Answer: B. Need for staff training or equipment evaluation**

☐ **F. Digital Image Display & Evaluation**

26. Window level controls:

- A. Number of pixels
- B. Image brightness
- C. Image sharpness

- D. Image resolution
✓ **Answer: B. Image brightness**

27. Window width adjusts:

- A. Spatial resolution
- B. Contrast
- C. Dose
- D. Image size
✓ **Answer: B. Contrast**

28. SNR (Signal-to-Noise Ratio) increases with:

- A. Low mAs
- B. High exposure
- C. Scatter
- D. Motion
✓ **Answer: B. High exposure**

29. A histogram in digital radiography:

- A. Measures resolution
- B. Maps pixel intensity distribution
- C. Tracks radiation dose
- D. Records motion
✓ **Answer: B. Maps pixel intensity distribution**

30. LUT (Look-Up Table) in DR is used to:

- A. Perform beam hardening
- B. Assign brightness values to pixel intensities
- C. Increase scatter
- D. Calibrate SID
✓ **Answer: B. Assign brightness values to pixel intensities**

☐ G. Continuous QA Process & Audits

31. Internal QA audits help to:

- A. Punish staff
- B. Evaluate and improve workflow and image quality
- C. Replace equipment
- D. Increase radiation
✓ **Answer: B. Evaluate and improve workflow and image quality**

32. External QA is conducted by:

- A. Hospital nurses
 - B. Regulatory bodies (e.g., AERB)
 - C. Private labs
 - D. PACS administrator
- ✓ **Answer: B. Regulatory bodies (e.g., AERB)**

33. Phantom imaging is used in:

- A. CT and MRI only
 - B. DR and CR systems for QC
 - C. Bone scanning
 - D. Nuclear medicine only
- ✓ **Answer: B. DR and CR systems for QC**

34. Uniformity test in flat panel detectors checks:

- A. Exposure index
 - B. Even response across detector area
 - C. Collimator angle
 - D. kVp accuracy
- ✓ **Answer: B. Even response across detector area**

35. Periodic QA documentation:

- A. Is optional
 - B. Is mandatory for accreditation and legal compliance
 - C. Can be verbal
 - D. Is filed monthly only
- ✓ **Answer: B. Is mandatory for accreditation and legal compliance**

☐ H. Radiographer's Role in QA

36. Radiographers help maintain quality by:

- A. Increasing exposure routinely
 - B. Ignoring artifacts
 - C. Regular image review and QC testing
 - D. Skipping documentation
- ✓ **Answer: C. Regular image review and QC testing**

37. Common cause of image blurring:

- A. High kVp
 - B. Detector failure
 - C. Patient motion
 - D. Exposure index
- ✓**Answer: C. Patient motion**

38. Radiographer must report QC failure to:

- A. Patient
 - B. Hospital receptionist
 - C. Medical physicist or supervisor
 - D. PACS administrator only
- ✓**Answer: C. Medical physicist or supervisor**

39. Preventive maintenance is done to:

- A. Increase contrast
 - B. Avoid emergency breakdowns and optimize performance
 - C. Train staff
 - D. Improve ventilation
- ✓**Answer: B. Avoid emergency breakdowns and optimize performance**

40. Image quality assurance is essential to:

- A. Speed up workflow only
 - B. Avoid patient consent
 - C. Improve diagnostic accuracy and reduce repeats
 - D. Increase exam time
- ✓**Answer: C. Improve diagnostic accuracy and reduce repeats**

Topic 17: Emergency Radiography – Trauma Protocols, FAST, CXR, Spine, Pelvis

□ A. General Trauma Radiography Principles

1. The first imaging modality in most trauma cases is:
 - A. CT scan
 - B. Ultrasound
 - C. Plain radiography (X-ray)
 - D. MRI

✓**Answer: C. Plain radiography (X-ray)**
2. The initial trauma radiographic survey includes:
 - A. Skull and lower limbs

- B. Cervical spine, chest, and pelvis
 - C. Abdomen and hands
 - D. Long bones only
 - ✓ **Answer: B. Cervical spine, chest, and pelvis**
3. In polytrauma, imaging is performed in which position if patient is unconscious?
- A. Prone
 - B. Sitting
 - C. Supine
 - D. Trendelenburg
 - ✓ **Answer: C. Supine**
4. The radiographer's priority in trauma is:
- A. Image perfection
 - B. Speed and diagnostic adequacy
 - C. Saving dose
 - D. Contrast administration
 - ✓ **Answer: B. Speed and diagnostic adequacy**
5. Which imaging is part of the Advanced Trauma Life Support (ATLS) protocol?
- A. MRI spine
 - B. FAST + chest and pelvic X-ray
 - C. CT thorax only
 - D. Barium enema
 - ✓ **Answer: B. FAST + chest and pelvic X-ray**
-

☐ **B. Chest Radiography in Trauma**

6. Supine chest radiographs in trauma are limited because:
- A. They increase radiation dose
 - B. They don't show lung markings
 - C. Pneumothorax and effusion may be missed
 - D. They require sedation
 - ✓ **Answer: C. Pneumothorax and effusion may be missed**
7. The "deep sulcus sign" on supine chest X-ray indicates:
- A. Pleural effusion
 - B. Atelectasis
 - C. Pneumothorax
 - D. Pulmonary embolism
 - ✓ **Answer: C. Pneumothorax**
8. Hemothorax on supine X-ray appears as:
- A. Basal lucency
 - B. Blunting of cardiophrenic angle
 - C. Diffuse haziness without meniscus sign
 - D. Hyperlucency
 - ✓ **Answer: C. Diffuse haziness without meniscus sign**
9. Tension pneumothorax findings on CXR include:

- A. Normal heart size
- B. Mediastinal shift to opposite side
- C. Blunted costophrenic angle
- D. Pulmonary edema

✓**Answer: B. Mediastinal shift to opposite side**

10. The most sensitive modality to detect rib fracture is:

- A. CT
- B. Chest X-ray
- C. MRI
- D. Bone scan

✓**Answer: A. CT**

□ C. Cervical Spine Trauma Imaging

11. First-line C-spine trauma view is:

- A. Oblique
- B. Lateral
- C. Open mouth
- D. Swimmer's

✓**Answer: B. Lateral**

12. Lateral C-spine view must include:

- A. C1–C4 only
- B. Skull base to T1
- C. C2–C7
- D. Mandible only

✓**Answer: B. Skull base to T1**

13. Jefferson fracture involves:

- A. C2 body
- B. C1 atlas ring
- C. Odontoid
- D. C7 transverse process

✓**Answer: B. C1 atlas ring**

14. Hangman's fracture involves:

- A. C7 vertebra
- B. Spinous process of C3
- C. Bilateral pars interarticularis of C2

- D. C1 transverse process
- ✓ **Answer: C. Bilateral pars interarticularis of C2**

15. Odontoid (dens) fractures are best seen on:

- A. Lateral lumbar spine
 - B. Open-mouth odontoid view
 - C. Swimmer's view
 - D. Chest X-ray
- ✓ **Answer: B. Open-mouth odontoid view**

□ **D. FAST (Focused Assessment with Sonography in Trauma)**

16. The FAST exam evaluates:

- A. Bowel peristalsis
 - B. Intra-abdominal free fluid and cardiac tamponade
 - C. Liver density
 - D. Skull fractures
- ✓ **Answer: B. Intra-abdominal free fluid and cardiac tamponade**

17. FAST window to assess pericardial effusion:

- A. Morrison's pouch
 - B. Subxiphoid view
 - C. Pelvic view
 - D. Right thoracic window
- ✓ **Answer: B. Subxiphoid view**

18. The right upper quadrant in FAST evaluates:

- A. Perisplenic region
 - B. Pleural effusion
 - C. Morrison's pouch (hepatorenal space)
 - D. Renal artery flow
- ✓ **Answer: C. Morrison's pouch (hepatorenal space)**

19. In a FAST exam, free fluid in pelvis is best seen:

- A. Posterior cul-de-sac
 - B. Intrahepatic ducts
 - C. Gallbladder
 - D. Right costophrenic angle
- ✓ **Answer: A. Posterior cul-de-sac**

20. FAST is primarily:

- A. Diagnostic
- B. Therapeutic
- C. Screening tool for unstable trauma patients
- D. Used only for children

✓**Answer: C. Screening tool for unstable trauma patients**

☐ E. Pelvis & Limb Trauma Imaging

21. A pelvic X-ray in trauma helps assess:

- A. Renal function
- B. Pelvic ring integrity and fractures
- C. Femur rotation
- D. Sacrococcygeal angle

✓**Answer: B. Pelvic ring integrity and fractures**

22. Most common pelvic fracture pattern in trauma:

- A. Stable iliac fracture
- B. Open-book fracture
- C. Acetabular dislocation
- D. Sacral cleft fracture

✓**Answer: B. Open-book fracture**

23. AP pelvis X-ray in trauma must include:

- A. Iliac crest to symphysis pubis
- B. Only femoral heads
- C. Sacrum only
- D. Hip joints excluded

✓**Answer: A. Iliac crest to symphysis pubis**

24. Sacral fractures may be missed on:

- A. Lateral CXR
- B. AP pelvis view
- C. Axial CT
- D. Oblique foot X-ray

✓**Answer: B. AP pelvis view**

25. For suspected femoral neck fracture, best initial view is:

- A. Lateral hip
 - B. CT pelvis
 - C. AP pelvis + cross-table lateral hip
 - D. MRI
- ✓**Answer: C. AP pelvis + cross-table lateral hip**
-

□ F. Miscellaneous Trauma Imaging

26. CT is preferred in trauma when:

- A. The patient is walking
 - B. Detailed evaluation of organ or vascular injury is needed
 - C. Contrast is unavailable
 - D. Fracture is obvious
- ✓**Answer: B. Detailed evaluation of organ or vascular injury is needed**

27. The cervical spine is cleared in trauma only when:

- A. Chest X-ray is normal
 - B. All three views (AP, lateral, odontoid) are normal and clinical clearance confirmed
 - C. The patient can walk
 - D. Pelvis is uninjured
- ✓**Answer: B. All three views (AP, lateral, odontoid) are normal and clinical clearance confirmed**

28. The “shock bowel” appearance on trauma CT shows:

- A. Thickened bowel wall and mucosal hyperenhancement
 - B. Pneumatosis
 - C. Large bowel dilation
 - D. Hematoma
- ✓**Answer: A. Thickened bowel wall and mucosal hyperenhancement**

29. Flail chest is defined as:

- A. One rib fracture
 - B. Multiple contiguous ribs fractured in two places
 - C. Pneumothorax
 - D. Hemothorax
- ✓**Answer: B. Multiple contiguous ribs fractured in two places**

30. Pneumoperitoneum is best seen in:

- A. Left lateral decubitus

- B. Supine pelvis view
 - C. Erect chest or left lateral decubitus
 - D. Lateral skull X-ray
- ✓ **Answer: C. Erect chest or left lateral decubitus**
-

□ G. Pediatric and Special Considerations

31. Pediatric trauma imaging should:

- A. Use full adult protocol
 - B. Always require CT
 - C. Follow ALARA principle and avoid unnecessary scans
 - D. Use Barium
- ✓ **Answer: C. Follow ALARA principle and avoid unnecessary scans**

32. A buckle fracture in children is:

- A. Complete fracture
 - B. Spiral fracture
 - C. Compression fracture with intact cortex
 - D. Comminuted fracture
- ✓ **Answer: C. Compression fracture with intact cortex**

33. In suspected child abuse, which view is part of skeletal survey?

- A. Lateral skull only
 - B. Whole-body AP and lateral with dedicated long bone views
 - C. Chest and abdomen only
 - D. Pelvis only
- ✓ **Answer: B. Whole-body AP and lateral with dedicated long bone views**

34. Greenstick fracture is:

- A. Complete break
 - B. A fracture with cortical break on one side and bending on the other
 - C. Spiral fracture
 - D. Intra-articular
- ✓ **Answer: B. A fracture with cortical break on one side and bending on the other**

35. Bone age assessment in trauma may be useful in:

- A. Identifying fracture site
- B. Estimating growth potential or abuse timeline
- C. Choosing sedation

- D. Measuring fluid level
- ✓ **Answer: B. Estimating growth potential or abuse timeline**
-

☐ H. Legal & Ethical Considerations

36. Consent for trauma imaging is:

- A. Mandatory written only
 - B. Waived in emergencies (implied consent)
 - C. Not required at all
 - D. Obtained after the procedure
- ✓ **Answer: B. Waived in emergencies (implied consent)**

37. In medicolegal trauma cases, images must be:

- A. Discarded in 6 months
 - B. Retained, clearly labeled, and traceable
 - C. Kept in a separate folder
 - D. Sent to the police only
- ✓ **Answer: B. Retained, clearly labeled, and traceable**

38. Radiographers must document:

- A. Only exposure factors
 - B. Time, views, and patient condition during trauma imaging
 - C. Tube voltage only
 - D. Radiologist opinion
- ✓ **Answer: B. Time, views, and patient condition during trauma imaging**

39. Legal imaging documentation includes:

- A. Window level and width
 - B. Patient ID, date/time, view, and operator
 - C. Image pixel size only
 - D. Exposure index
- ✓ **Answer: B. Patient ID, date/time, view, and operator**

40. In unconscious trauma patients:

- A. Consent is verbal only
 - B. Imaging is delayed
 - C. Imaging proceeds under implied consent for emergency care
 - D. PACS is unnecessary
- ✓ **Answer: C. Imaging proceeds under implied consent for emergency care**

📖 Topic 18: Interventional Radiology – Procedures, Catheters, Angiography

☐ A. Introduction to Interventional Radiology (IR)

1. Interventional Radiology (IR) primarily involves:
 - A. Film processing
 - B. Non-image-guided surgeries
 - C. Image-guided minimally invasive procedures
 - D. Nuclear scans

✓**Answer: C. Image-guided minimally invasive procedures**
2. The most commonly used imaging modality for IR is:
 - A. MRI
 - B. Fluoroscopy
 - C. Mammography
 - D. PET-CT

✓**Answer: B. Fluoroscopy**
3. The Seldinger technique is used for:
 - A. Radiation therapy
 - B. Safe vascular access using a guidewire
 - C. Administering oral contrast
 - D. Measuring blood pressure

✓**Answer: B. Safe vascular access using a guidewire**
4. Which imaging modality provides real-time guidance in IR?
 - A. CT
 - B. MRI
 - C. Fluoroscopy and Ultrasound
 - D. PET

✓**Answer: C. Fluoroscopy and Ultrasound**
5. A major benefit of IR procedures is:
 - A. Long hospital stay
 - B. Open surgery
 - C. Less invasiveness and faster recovery
 - D. Use of general anesthesia in all cases

✓**Answer: C. Less invasiveness and faster recovery**

☐ B. Vascular Access & Devices

6. A sheath in IR is used to:
 - A. Measure pressure
 - B. Dilate vessels
 - C. Maintain vascular access for catheters

- D. Administer sedation
✓ **Answer: C. Maintain vascular access for catheters**
 - 7. Common access site for angiographic procedures:
 - A. Jugular vein
 - B. Brachial artery
 - C. Common femoral artery
 - D. Radial vein✓ **Answer: C. Common femoral artery**
 - 8. A pigtail catheter is used primarily for:
 - A. Embolization
 - B. Central line access
 - C. Angiographic contrast injection
 - D. Tissue biopsy✓ **Answer: C. Angiographic contrast injection**
 - 9. Catheter size is measured in:
 - A. Centimeters
 - B. French (Fr)
 - C. PSI
 - D. mmHg✓ **Answer: B. French (Fr)**
 - 10. 1 French (Fr) =:
 - A. 1 mm
 - B. 0.33 mm
 - C. 2 mm
 - D. 0.5 inch✓ **Answer: B. 0.33 mm**
-

☐ C. Angiographic Procedures

11. Angiography refers to:
- A. Imaging brain
 - B. Visualization of blood vessels after contrast injection
 - C. Lung perfusion scan
 - D. X-ray of lymphatics
- ✓
- Answer: B. Visualization of blood vessels after contrast injection**
12. Digital Subtraction Angiography (DSA) enhances:
- A. Muscle detail
 - B. Bone structure
 - C. Vascular structures by subtracting background

- D. Renal stones
✓ **Answer: C. Vascular structures by subtracting background**

13. The common contrast agent for angiography is:

- A. Barium
- B. Gadolinium
- C. Iodinated contrast (non-ionic)
- D. CO₂
✓ **Answer: C. Iodinated contrast (non-ionic)**

14. Indication for cerebral angiography includes:

- A. Pneumothorax
- B. Intracranial aneurysm evaluation
- C. Gallbladder stones
- D. Gastric ulcer
✓ **Answer: B. Intracranial aneurysm evaluation**

15. The best view to assess renal artery stenosis in IR is:

- A. CXR
- B. Fluoroscopic venogram
- C. Renal artery angiography
- D. Spine CT
✓ **Answer: C. Renal artery angiography**

☐ **D. Emergency IR Procedures**

16. Embolization in IR is used to:

- A. Enhance flow
- B. Stop active bleeding or reduce blood supply
- C. Drain abscesses
- D. Perform angioplasty
✓ **Answer: B. Stop active bleeding or reduce blood supply**

17. Materials used for embolization include:

- A. Air
- B. Alcohol
- C. Coils, glue, gelfoam
- D. Saline
✓ **Answer: C. Coils, glue, gelfoam**

18. IR treatment of hemoptysis involves:

- A. Lung biopsy
 - B. Bronchoscopy
 - C. Bronchial artery embolization
 - D. Pneumonectomy
- ✓ **Answer: C. Bronchial artery embolization**

19. Uterine artery embolization (UAE) is performed for:

- A. Infertility
 - B. Fibroids
 - C. Pregnancy monitoring
 - D. Uterine rupture
- ✓ **Answer: B. Fibroids**

20. IR is used for emergency GI bleeding control by:

- A. MRI
 - B. Barium swallow
 - C. Selective mesenteric embolization
 - D. ERCP
- ✓ **Answer: C. Selective mesenteric embolization**

☐ **E. Non-Vascular Interventions**

21. Percutaneous nephrostomy is done to:

- A. Remove the kidney
 - B. Drain urine from an obstructed kidney
 - C. Replace ureter
 - D. Inject contrast
- ✓ **Answer: B. Drain urine from an obstructed kidney**

22. Biliary drainage via IR is used in:

- A. Liver cysts
 - B. Obstructive jaundice
 - C. Gallbladder polyps
 - D. Gastritis
- ✓ **Answer: B. Obstructive jaundice**

23. The primary modality to guide abscess drainage is:

- A. Fluoroscopy
 - B. MRI
 - C. Ultrasound or CT
 - D. PET
- ✓ **Answer: C. Ultrasound or CT**

24. Image-guided lung biopsy may lead to:

- A. Hematuria
 - B. Pneumothorax
 - C. Diarrhea
 - D. Ascites
- ✓ **Answer: B. Pneumothorax**

25. Vertebroplasty is performed for:

- A. Spinal tumors
 - B. Spinal cord edema
 - C. Compression fractures using cement
 - D. MRI enhancement
- ✓ **Answer: C. Compression fractures using cement**

☐ **F. Oncology & Tumor Ablation**

26. RFA in IR stands for:

- A. Renal filtration assessment
 - B. Rapid fluoroscopy access
 - C. Radiofrequency ablation
 - D. Real fluoroscopic alignment
- ✓ **Answer: C. Radiofrequency ablation**

27. Radiofrequency ablation is used for:

- A. Kidney stone detection
 - B. Solid tumor destruction
 - C. Lung expansion
 - D. GI imaging
- ✓ **Answer: B. Solid tumor destruction**

28. Chemoembolization is commonly used in:

- A. Brain tumors
- B. HCC (Hepatocellular carcinoma)

- C. Thyroid cancer
 - D. Pancreatitis
- ✓ **Answer: B. HCC (Hepatocellular carcinoma)**

29. Microwave ablation works by:

- A. Cold therapy
 - B. Electric pulses
 - C. High-frequency electromagnetic energy heating the tissue
 - D. Barium injection
- ✓ **Answer: C. High-frequency electromagnetic energy heating the tissue**

30. IR-based biopsy advantage is:

- A. Requires general anesthesia
 - B. Blind sampling
 - C. Precise sampling with image guidance
 - D. Avoids imaging
- ✓ **Answer: C. Precise sampling with image guidance**

☐ **G. Safety, Contrast, and Complications**

31. Contrast used in IR is usually:

- A. Gadolinium
 - B. Barium
 - C. Non-ionic iodinated
 - D. Saline
- ✓ **Answer: C. Non-ionic iodinated**

32. The most common complication of IR angiography:

- A. Cardiac arrest
 - B. Bleeding or hematoma at access site
 - C. Pneumothorax
 - D. Stroke
- ✓ **Answer: B. Bleeding or hematoma at access site**

33. Post-procedure care includes:

- A. Immediate ambulation
- B. No monitoring needed
- C. Site monitoring, vitals, and rest

- D. Laxative administration
✓ **Answer: C. Site monitoring, vitals, and rest**

34. Sterile technique in IR:

- A. Is optional
- B. Is needed only in MRI
- C. Is essential to prevent infection
- D. Not used with contrast
✓ **Answer: C. Is essential to prevent infection**

35. Pre-procedure INR should be:

- A. >3
- B. <1.5
- C. 5.0
- D. Irrelevant
✓ **Answer: B. <1.5**

□ H. Workflow & Legal Aspects in IR

36. Consent in interventional procedures:

- A. Is not required
- B. Is verbal only
- C. Must be written and informed
- D. Is taken post-procedure
✓ **Answer: C. Must be written and informed**

37. Pre-procedure checklist includes:

- A. Ward number only
- B. Name, ID, consent, allergies, labs
- C. Age and weight only
- D. Contrast color
✓ **Answer: B. Name, ID, consent, allergies, labs**

38. Role of radiographer in IR includes:

- A. Performing surgery
- B. Image acquisition, patient prep, and assistance
- C. Diagnosing cancer
- D. Administering anesthesia
✓ **Answer: B. Image acquisition, patient prep, and assistance**

39. Post-IR documentation includes:

- A. Volume of contrast used
- B. Site of access
- C. Complications if any
- D. All of the above

✓ **Answer: D. All of the above**

40. Interventional radiology procedures are regulated by:

- A. Atomic Energy Act only
- B. Local laws, radiation safety, and medical ethics
- C. AI-based systems only
- D. Hospital admin

✓ **Answer: B. Local laws, radiation safety, and medical ethics**

🦋 Topic 19: Nuclear Medicine – PET-CT, Isotopes, Gamma Camera, Safety

☐ A. Basics of Nuclear Medicine

1. Nuclear medicine uses:

- A. External beam radiation
- B. Magnetic field
- C. Radiopharmaceuticals emitting gamma or positrons
- D. Ultrasound waves

✓ **Answer: C. Radiopharmaceuticals emitting gamma or positrons**

2. A radiopharmaceutical consists of:

- A. Barium only
- B. Isotope + chemical compound (tracer)
- C. Plain isotope
- D. Contrast dye

✓ **Answer: B. Isotope + chemical compound (tracer)**

3. The most commonly used isotope in diagnostic nuclear medicine:

- A. I-131
- B. Tc-99m
- C. Ga-68
- D. C-11

✓ **Answer: B. Tc-99m**

4. Tc-99m emits:

- A. Alpha particles
- B. Beta radiation
- C. Gamma rays

- D. Positrons
✓ **Answer: C. Gamma rays**
 - 5. The physical half-life of Tc-99m is:
 - A. 1 hour
 - B. 6 hours
 - C. 24 hours
 - D. 10 days✓ **Answer: B. 6 hours**
-

□ B. Gamma Camera & SPECT Imaging

- 6. Gamma camera detects:
 - A. X-rays
 - B. Gamma rays from inside the body
 - C. Magnetic fields
 - D. Radiation from outside the body✓ **Answer: B. Gamma rays from inside the body**
 - 7. The component that converts light to electrical signal in gamma camera:
 - A. Photomultiplier tube (PMT)
 - B. Collimator
 - C. Crystal
 - D. Detector head✓ **Answer: A. Photomultiplier tube (PMT)**
 - 8. Collimators in gamma cameras:
 - A. Focus light rays
 - B. Absorb beta radiation
 - C. Allow only parallel gamma rays to reach crystal
 - D. Store energy✓ **Answer: C. Allow only parallel gamma rays to reach crystal**
 - 9. SPECT stands for:
 - A. Single Photon Emission Computed Tomography
 - B. Spectral Emission Counting Test
 - C. Signal Per Echo CT
 - D. Spatial Photon Efficiency CT✓ **Answer: A. Single Photon Emission Computed Tomography**
 - 10. SPECT differs from planar imaging by:
 - A. Using MRI
 - B. Providing 3D tomographic data
 - C. Using X-rays
 - D. Lowering dose✓ **Answer: B. Providing 3D tomographic data**
-

☐ C. PET-CT Imaging

11. PET-CT combines:

- A. MRI and ultrasound
- B. SPECT and fluoroscopy
- C. Functional (PET) and anatomic (CT) imaging
- D. Plain X-ray and contrast

✓**Answer: C. Functional (PET) and anatomic (CT) imaging**

12. PET tracer most commonly used is:

- A. Tc-99m sulfur colloid
- B. F-18 fluorodeoxyglucose (FDG)
- C. I-131
- D. Ga-67

✓**Answer: B. F-18 fluorodeoxyglucose (FDG)**

13. F-18 FDG is a marker of:

- A. Perfusion
- B. Glucose metabolism
- C. Protein uptake
- D. Calcium content

✓**Answer: B. Glucose metabolism**

14. PET uses detection of:

- A. Alpha emission
- B. Gamma scattering
- C. Coincident 511 keV photons from positron annihilation
- D. Ultrasound echoes

✓**Answer: C. Coincident 511 keV photons from positron annihilation**

15. PET-CT is most useful in:

- A. Trauma
- B. Cancer staging and follow-up
- C. Bone age estimation
- D. Dental planning

✓**Answer: B. Cancer staging and follow-up**

☐ D. Safety & Radiation Protection

16. Major radiation risk in nuclear medicine arises from:

- A. The scanner
- B. Radiopharmaceutical inside the patient
- C. Electric fields
- D. The computer

✓ **Answer: B. Radiopharmaceutical inside the patient**

17. After nuclear medicine scan, patients:

- A. Emit radiation temporarily
- B. Do not emit radiation
- C. Can donate blood immediately
- D. Can be treated without precautions

✓ **Answer: A. Emit radiation temporarily**

18. One way to reduce staff exposure is:

- A. Use of lead shielding and tongs
- B. Close manual handling
- C. Reusing isotopes
- D. Keeping windows open

✓ **Answer: A. Use of lead shielding and tongs**

19. Dose calibrator is used to:

- A. Measure patient weight
- B. Calibrate gamma camera
- C. Measure activity of radiopharmaceuticals
- D. Assess glucose level

✓ **Answer: C. Measure activity of radiopharmaceuticals**

20. NRC and AERB regulations require:

- A. No tracking
- B. Licensing, waste management, and recordkeeping
- C. Patient billing
- D. MRI training only

✓ **Answer: B. Licensing, waste management, and recordkeeping**

☐ **E. Common Nuclear Medicine Procedures**

21. Thyroid scan uses:

- A. I-131 or Tc-99m pertechnetate
 - B. FDG
 - C. Ga-68
 - D. DTPA
- ✓ **Answer: A. I-131 or Tc-99m pertechnetate**

22. Renal dynamic scan uses:

- A. Tc-99m MIBI
 - B. Tc-99m DTPA or MAG3
 - C. I-123
 - D. F-18
- ✓ **Answer: B. Tc-99m DTPA or MAG3**

23. Bone scan is typically done using:

- A. FDG
 - B. Tc-99m MDP
 - C. I-131
 - D. DMSA
- ✓ **Answer: B. Tc-99m MDP**

24. Myocardial perfusion scan assesses:

- A. Lung embolism
 - B. Coronary perfusion using Tc-99m MIBI
 - C. Brain metabolism
 - D. GI motility
- ✓ **Answer: B. Coronary perfusion using Tc-99m MIBI**

25. V/Q scan is used to evaluate:

- A. Kidney infection
 - B. Pulmonary embolism
 - C. Liver cirrhosis
 - D. Pancreatitis
- ✓ **Answer: B. Pulmonary embolism**

☐ **F. Radiopharmaceuticals & Isotopes**

26. Iodine-131 is primarily used for:

- A. Imaging only
- B. Therapy for thyroid cancer and hyperthyroidism

- C. Brain scan
 - D. GI bleeding
- ✓ **Answer: B. Therapy for thyroid cancer and hyperthyroidism**

27. Half-life of F-18:

- A. 110 minutes
 - B. 6 hours
 - C. 24 hours
 - D. 5 days
- ✓ **Answer: A. 110 minutes**

28. Tc-99m is ideal because:

- A. Very long half-life
 - B. Emits alpha radiation
 - C. Short half-life, gamma emission, low dose
 - D. Easily visible in CT
- ✓ **Answer: C. Short half-life, gamma emission, low dose**

29. Gallium-67 scan is used in:

- A. Kidney infection
 - B. Bone imaging
 - C. Inflammation and lymphoma
 - D. Colon cancer
- ✓ **Answer: C. Inflammation and lymphoma**

30. DMSA scan evaluates:

- A. Myocardium
 - B. Cortical renal structure and scarring
 - C. GI tract
 - D. Bone tumors
- ✓ **Answer: B. Cortical renal structure and scarring**

□ **G. Equipment, QC & Image Processing**

31. Daily flood test in gamma camera evaluates:

- A. Ventilation
- B. Uniformity
- C. Resolution

- D. Dead time
✓ **Answer: B. Uniformity**

32. Energy window calibration ensures:

- A. Temperature control
- B. Centering of photopeak for correct isotope
- C. Magnetic shielding
- D. Volume correction
✓ **Answer: B. Centering of photopeak for correct isotope**

33. Image acquisition matrix determines:

- A. Number of slices
- B. Contrast
- C. Image resolution
- D. Isotope dose
✓ **Answer: C. Image resolution**

34. Quality control is performed:

- A. Once in 5 years
- B. Only when image is poor
- C. Daily, weekly, monthly as per protocols
- D. Not necessary in nuclear medicine
✓ **Answer: C. Daily, weekly, monthly as per protocols**

35. A common artifact in NM imaging is:

- A. Motion blur
- B. Beam hardening
- C. Air artifact
- D. Metallic streak
✓ **Answer: A. Motion blur**

☐ H. Patient Prep, Disposal, and Legal Aspects

36. Patient prep for FDG PET includes:

- A. No fasting
- B. Heavy exercise before scan
- C. Fasting 4–6 hours to reduce muscle/glucose uptake
- D. Taking glucose
✓ **Answer: C. Fasting 4–6 hours to reduce muscle/glucose uptake**

37. Nuclear waste is:

- A. Thrown in general waste
- B. Diluted with water
- C. Stored until decay and disposed as per regulatory rules
- D. Given to patients

✓ **Answer: C. Stored until decay and disposed as per regulatory rules**

38. Pregnancy is a contraindication for:

- A. Chest X-ray
- B. PET-CT and therapeutic isotopes
- C. Mammography
- D. Ultrasound

✓ **Answer: B. PET-CT and therapeutic isotopes**

39. Nuclear medicine images are stored:

- A. As analog film only
- B. DICOM format in PACS
- C. In hard drives only
- D. As raw isotope data

✓ **Answer: B. DICOM format in PACS**

40. The radiographer must wear:

- A. Thermometer
- B. Pacemaker
- C. TLD badge to monitor radiation exposure
- D. MRI shield

✓ **Answer: C. TLD badge to monitor radiation exposure**

Topic 20: Recent Advances in Radiology – AI, Fusion Imaging, Dual-Energy CT, Elastography

☐ A. Artificial Intelligence (AI) in Radiology

1. AI in radiology refers to:

- A. Automatic contrast injection
- B. Machine learning algorithms analyzing imaging data
- C. New X-ray tube material
- D. PACS network error

✓ **Answer: B. Machine learning algorithms analyzing imaging data**

2. Deep learning in radiology uses:
- A. 3D printing
 - B. Neural networks that mimic human brain processing
 - C. AI-assisted injections
 - D. Optical lens tuning
- ✓**Answer: B. Neural networks that mimic human brain processing**
3. AI is currently best applied in:
- A. Contrast media development
 - B. Noise reduction only
 - C. Screening and detection (e.g., lung nodules, breast lesions)
 - D. Legal documentation
- ✓**Answer: C. Screening and detection (e.g., lung nodules, breast lesions)**
4. Limitations of AI in radiology include:
- A. High radiation dose
 - B. Complete automation
 - C. Bias in data and requirement of large training datasets
 - D. Lack of image quality
- ✓**Answer: C. Bias in data and requirement of large training datasets**
5. Radiographers' role in AI era includes:
- A. Being replaced by AI
 - B. Ignoring automation
 - C. Collaborating with AI tools to enhance accuracy and workflow
 - D. Avoiding use of computers
- ✓**Answer: C. Collaborating with AI tools to enhance accuracy and workflow**
-

☐ **B. Dual-Energy CT (DECT)**

6. Dual-energy CT involves:
- A. Two separate CT scans
 - B. Simultaneous scanning at two different energy levels
 - C. Ultrasound fusion
 - D. MRI + CT
- ✓**Answer: B. Simultaneous scanning at two different energy levels**
7. The benefit of DECT includes:
- A. Longer scan time
 - B. Higher noise
 - C. Improved tissue characterization and material decomposition
 - D. Less reconstruction options
- ✓**Answer: C. Improved tissue characterization and material decomposition**
8. Virtual non-contrast images are generated in DECT by:
- A. Removing iodine from datasets
 - B. Performing scout scan
 - C. Post-contrast subtraction

- D. Physical masking
✓ **Answer: A. Removing iodine from datasets**
 - 9. Uric acid and calcium stones are differentiated on:
 - A. MRI
 - B. Conventional CT
 - C. DECT with material-specific maps
 - D. Bone scan✓ **Answer: C. DECT with material-specific maps**
 - 10. Common clinical use of DECT includes:
 - A. Skin lesion mapping
 - B. Vascular calcification detection, stone characterization, gout diagnosis
 - C. Lung perfusion
 - D. ECG monitoring✓ **Answer: B. Vascular calcification detection, stone characterization, gout diagnosis**
-

□ C. Fusion Imaging & Hybrid Modalities

11. Fusion imaging refers to:
 - A. Image compression
 - B. Blending two or more imaging modalities for better diagnosis
 - C. Flash photography
 - D. Plain film merging✓ **Answer: B. Blending two or more imaging modalities for better diagnosis**
12. PET-CT combines:
 - A. Nuclear + radiography
 - B. Functional + anatomical imaging
 - C. T1 + T2
 - D. Radiation therapy + US✓ **Answer: B. Functional + anatomical imaging**
13. PET-MRI is advantageous over PET-CT in:
 - A. Bone lesions
 - B. Soft tissue lesions like brain, liver, prostate
 - C. Lung nodules
 - D. Cardiac stents✓ **Answer: B. Soft tissue lesions like brain, liver, prostate**
14. In fusion imaging, image registration ensures:

- A. Data loss
 - B. Misalignment
 - C. Spatial alignment of multimodal images
 - D. Faster printing
- ✓**Answer: C. Spatial alignment of multimodal images**

15. Common clinical application of ultrasound fusion:

- A. Dental scans
 - B. Fusion of real-time US with CT/MRI for liver lesion targeting
 - C. Brain tumors
 - D. Cardiac echo
- ✓**Answer: B. Fusion of real-time US with CT/MRI for liver lesion targeting**

☐ **D. Elastography**

16. Elastography evaluates:

- A. Blood flow
 - B. Tissue elasticity or stiffness
 - C. Bone density
 - D. Organ perfusion
- ✓**Answer: B. Tissue elasticity or stiffness**

17. It is most commonly used in:

- A. Lung studies
 - B. Liver fibrosis evaluation
 - C. Kidney stones
 - D. GI motility
- ✓**Answer: B. Liver fibrosis evaluation**

18. Shear-wave elastography:

- A. Uses MRI
 - B. Measures speed of shear waves generated in tissue
 - C. Is based on PET data
 - D. Detects glucose levels
- ✓**Answer: B. Measures speed of shear waves generated in tissue**

19. Higher stiffness in elastography suggests:

- A. Normal tissue
- B. Soft benign lesion

- C. Fibrosis or malignancy
 - D. Artifact only
- ✓**Answer: C. Fibrosis or malignancy**

20. Elastography is performed with:

- A. X-ray
 - B. Ultrasound or MRI
 - C. CT
 - D. Nuclear medicine
- ✓**Answer: B. Ultrasound or MRI**

□ **E. Advanced Post-Processing & AI-Aided Techniques**

21. Radiomics refers to:

- A. Radiation physics
 - B. Quantitative extraction of image features for prediction
 - C. Dose calculation
 - D. Beam alignment
- ✓**Answer: B. Quantitative extraction of image features for prediction**

22. Radiogenomics combines:

- A. Imaging and genomics for personalized medicine
 - B. CT and PET
 - C. Ultrasound and X-ray
 - D. Film and CR
- ✓**Answer: A. Imaging and genomics for personalized medicine**

23. Virtual colonoscopy uses:

- A. Fiberoptic scope
 - B. Contrast enema
 - C. CT colonography
 - D. Barium study
- ✓**Answer: C. CT colonography**

24. AI-assisted segmentation helps in:

- A. Manual editing
- B. Cropping images
- C. Automatically defining lesions or organs

- D. Film selection
- ✓ **Answer: C. Automatically defining lesions or organs**

25. 3D volume rendering is used for:

- A. Soft-copy filtering
 - B. High-resolution 3D visualizations from CT/MRI
 - C. Noise suppression only
 - D. Color adjustment
- ✓ **Answer: B. High-resolution 3D visualizations from CT/MRI**
-

□ **F. Workflow, Teleradiology, and Cloud Integration**

26. Teleradiology allows:

- A. Delayed reporting
 - B. Remote viewing and reporting of images
 - C. Only local data access
 - D. Only MRI scans
- ✓ **Answer: B. Remote viewing and reporting of images**

27. Cloud-based PACS offers:

- A. No backups
 - B. In-hospital use only
 - C. Scalable, remote storage and faster sharing
 - D. Offline-only access
- ✓ **Answer: C. Scalable, remote storage and faster sharing**

28. Structured reporting improves:

- A. Voice modulation
 - B. Consistency and clarity in radiology reports
 - C. Fluoroscopy speed
 - D. Billing codes
- ✓ **Answer: B. Consistency and clarity in radiology reports**

29. AI-based triage tools:

- A. Schedule patient scans
 - B. Flag urgent findings like stroke or pneumothorax
 - C. Replace radiologists
 - D. Control contrast dose
- ✓ **Answer: B. Flag urgent findings like stroke or pneumothorax**

30. Blockchain in radiology helps in:

- A. Contrast injection
- B. Securing image data and patient privacy
- C. Image distortion
- D. Data erasure

✓**Answer: B. Securing image data and patient privacy**

□ G. Ethics, Limitations & Future Trends

31. AI in radiology raises concern about:

- A. Network speed
- B. Overuse of MRI
- C. Ethical use, bias, and job displacement
- D. Barium overdose

✓**Answer: C. Ethical use, bias, and job displacement**

32. One advantage of AI in radiology:

- A. Always replaces radiologists
- B. Reduces reporting accuracy
- C. Faster and preliminary triage of findings
- D. Decreases resolution

✓**Answer: C. Faster and preliminary triage of findings**

33. Most future radiology innovations focus on:

- A. Film processing
- B. Higher radiation use
- C. Personalized medicine and imaging biomarkers
- D. Manual dose calculation

✓**Answer: C. Personalized medicine and imaging biomarkers**

34. Digital twin technology in radiology:

- A. Makes backup of PACS
- B. Simulates a patient's anatomy for prediction and planning
- C. Duplicates CT scanners
- D. Edits contrast images

✓**Answer: B. Simulates a patient's anatomy for prediction and planning**

35. Augmented reality (AR) can assist in:

- A. Physics calculation
 - B. Interventional planning and surgical navigation
 - C. Printing labels
 - D. Histogram correction
- ✓ **Answer: B. Interventional planning and surgical navigation**
-

□ □ H. Radiographer's Role in Advanced Radiology

36. Radiographers must:

- A. Avoid AI
 - B. Upgrade skills with new technologies
 - C. Work without protocols
 - D. Focus only on darkroom work
- ✓ **Answer: B. Upgrade skills with new technologies**

37. In elastography, the radiographer:

- A. Injects radiotracer
 - B. Calibrates probe and positions patient
 - C. Administers anesthesia
 - D. Performs ECG
- ✓ **Answer: B. Calibrates probe and positions patient**

38. While operating DECT, radiographers:

- A. Select dual-energy protocol
 - B. Adjust MRI field
 - C. Use PACS only
 - D. Take biopsy
- ✓ **Answer: A. Select dual-energy protocol**

39. In PET-CT, radiographer must:

- A. Monitor radioactive handling and patient prep
 - B. Just review reports
 - C. Only assist in ECG
 - D. Avoid radiation safety
- ✓ **Answer: A. Monitor radioactive handling and patient prep**

40. With AI tools, radiographers contribute by:

- A. Coding AI software
- B. Reviewing AI results, flagging errors, and ensuring clinical accuracy

- C. Deleting flagged images
 - D. Printing reports
- ✓ **Answer: B. Reviewing AI results, flagging errors, and ensuring clinical accuracy**
-

Topic 21: Contrast Studies in Radiology – Barium, Water-Soluble, MR/CT Contrast Use

□ A. Types of Contrast Media

1. Barium sulfate is used for:
 - A. CT perfusion
 - B. MRI brain
 - C. GI tract contrast studies
 - D. PET-CT

✓ **Answer: C. GI tract contrast studies**
 2. Water-soluble iodinated contrast is preferred in:
 - A. Normal GI barium study
 - B. Suspected GI perforation
 - C. CT brain
 - D. Bone scan

✓ **Answer: B. Suspected GI perforation**
 3. The most commonly used CT contrast agent is:
 - A. Gadolinium
 - B. Barium
 - C. Non-ionic iodinated contrast
 - D. Carbon dioxide

✓ **Answer: C. Non-ionic iodinated contrast**
 4. Gadolinium-based contrast is primarily used in:
 - A. CT
 - B. MRI
 - C. Ultrasound
 - D. Mammography

✓ **Answer: B. MRI**
 5. Ionic contrast agents:
 - A. Are preferred over non-ionic in MRI
 - B. Have higher osmolality
 - C. Are safer in pregnancy
 - D. Are used orally only

✓ **Answer: B. Have higher osmolality**
-

□ B. Administration & Indications

6. Intravenous iodinated contrast is required in:
- A. MRI shoulder
 - B. CT pulmonary angiography
 - C. Plain X-ray
 - D. USG pelvis
- ✓**Answer: B. CT pulmonary angiography**
7. Double-contrast barium enema uses:
- A. Barium + saline
 - B. Barium + air
 - C. Barium + iodine
 - D. Water only
- ✓**Answer: B. Barium + air**
8. Barium swallow study evaluates:
- A. Colon
 - B. Esophagus and upper GI tract
 - C. Small bowel only
 - D. Gallbladder
- ✓**Answer: B. Esophagus and upper GI tract**
9. Hysterosalpingography uses:
- A. Barium sulfate
 - B. Iodinated water-soluble contrast
 - C. MRI contrast
 - D. Air
- ✓**Answer: B. Iodinated water-soluble contrast**
10. CT urography requires:
- A. Oral gadolinium
 - B. IV iodinated contrast with delayed excretory phase
 - C. No contrast
 - D. Intrathecal barium
- ✓**Answer: B. IV iodinated contrast with delayed excretory phase**
-

☐ C. Contraindications & Reactions

11. Barium is contraindicated in:
- A. Children
 - B. Perforation or suspected fistula
 - C. Dysphagia
 - D. Constipation
- ✓**Answer: B. Perforation or suspected fistula**
12. Gadolinium is contraindicated in:

- A. Renal failure due to risk of NSF
 - B. Cardiac failure
 - C. Lung fibrosis
 - D. Diabetes
- ✓ **Answer: A. Renal failure due to risk of NSF**

13. A mild contrast reaction includes:

- A. Seizure
 - B. Urticaria and nausea
 - C. Cardiac arrest
 - D. Laryngeal edema
- ✓ **Answer: B. Urticaria and nausea**

14. The first-line drug in anaphylactic contrast reaction:

- A. Antihistamine
 - B. Epinephrine (Adrenaline)
 - C. Oxygen
 - D. Diazepam
- ✓ **Answer: B. Epinephrine (Adrenaline)**

15. In patients on metformin receiving IV contrast:

- A. No action needed
 - B. Stop metformin 48 hrs post contrast if renal function is impaired
 - C. Increase dose
 - D. Give oral fluids
- ✓ **Answer: B. Stop metformin 48 hrs post contrast if renal function is impaired**

☐ **D. Doses, Protocols & Patient Preparation**

16. Contrast dose in CT is based on:

- A. Age only
 - B. Height only
 - C. Body weight (typically 1.5 mL/kg)
 - D. Hair color
- ✓ **Answer: C. Body weight (typically 1.5 mL/kg)**

17. For small bowel follow-through, contrast is given:

- A. IV
- B. Per rectum

- C. Orally
 - D. Subcutaneously
- ✓ **Answer: C. Orally**

18. Before IV contrast, evaluate:

- A. ECG only
 - B. LFT
 - C. Serum creatinine
 - D. Hemoglobin
- ✓ **Answer: C. Serum creatinine**

19. Fasting before IV contrast:

- A. Not necessary
 - B. Minimizes nausea/vomiting risk
 - C. Enhances image contrast
 - D. Prevents renal failure
- ✓ **Answer: B. Minimizes nausea/vomiting risk**

20. For suspected TE fistula in neonates, use:

- A. Barium
 - B. Gadolinium
 - C. Water-soluble non-ionic iodinated contrast
 - D. Air
- ✓ **Answer: C. Water-soluble non-ionic iodinated contrast**

☐ **E. Advanced Contrast Techniques**

21. CT angiography requires:

- A. Oral contrast
 - B. IV contrast injected rapidly via power injector
 - C. IM contrast
 - D. Delayed barium swallow
- ✓ **Answer: B. IV contrast injected rapidly via power injector**

22. Enteroclysis involves:

- A. Colon enema
- B. Duodenal intubation and contrast infusion
- C. Contrast enema

- D. Chest CT
- ✓ **Answer: B. Duodenal intubation and contrast infusion**

23. MR urography uses:

- A. Barium
 - B. Gadolinium contrast with T1-weighted sequences
 - C. CT scanner
 - D. Water enema
- ✓ **Answer: B. Gadolinium contrast with T1-weighted sequences**

24. A contrast study of salivary glands is called:

- A. Myelogram
 - B. Sialography
 - C. Cholecystogram
 - D. Arthrogram
- ✓ **Answer: B. Sialography**

25. MR arthrography requires:

- A. IV gadolinium only
 - B. Intra-articular gadolinium injection
 - C. CT injection
 - D. Bone scan
- ✓ **Answer: B. Intra-articular gadolinium injection**

☐ **F. Specialized & Emergency Uses**

26. Voiding cystourethrogram (VCUG) uses:

- A. Barium
 - B. Iodinated contrast via catheter into bladder
 - C. Oral gadolinium
 - D. Intramuscular injection
- ✓ **Answer: B. Iodinated contrast via catheter into bladder**

27. Contrast enema helps diagnose:

- A. Renal stones
 - B. Intussusception and Hirschsprung's disease
 - C. Cardiac defects
 - D. Pancreatitis
- ✓ **Answer: B. Intussusception and Hirschsprung's disease**

28. Oral contrast in CT abdomen improves:

- A. Bone detail
- B. Bowel loop delineation
- C. Lung contrast
- D. Liver enhancement

✓**Answer: B. Bowel loop delineation**

29. Nephrostogram checks:

- A. Brain ventricles
- B. Function of nephron
- C. Patency of nephrostomy tract
- D. Stomach peristalsis

✓**Answer: C. Patency of nephrostomy tract**

30. Contrast-induced nephropathy (CIN) is:

- A. Liver injury
- B. Neurological problem
- C. Acute renal injury after iodinated contrast
- D. Lung perfusion mismatch

✓**Answer: C. Acute renal injury after iodinated contrast**

☐ **G. Patient Safety, Waste & Legal Aspects**

31. Gadolinium is eliminated via:

- A. Bile
- B. Sweat
- C. Kidneys
- D. Lungs

✓**Answer: C. Kidneys**

32. NSF (Nephrogenic Systemic Fibrosis) is associated with:

- A. CT contrast
- B. Barium
- C. Linear gadolinium agents in renal failure
- D. US gel

✓**Answer: C. Linear gadolinium agents in renal failure**

33. To minimize risk of CIN:

- A. Increase contrast volume
 - B. Pre-hydration and using low-osmolality contrast
 - C. Stop all medications
 - D. Use barium instead
- ✓ **Answer: B. Pre-hydration and using low-osmolality contrast**

34. Contrast extravasation requires:

- A. Observation, limb elevation, cold compress
 - B. Surgery always
 - C. Immediate amputation
 - D. No attention
- ✓ **Answer: A. Observation, limb elevation, cold compress**

35. Contrast disposal involves:

- A. General waste
 - B. Dilution in sink
 - C. Biomedical waste handling protocol
 - D. Free air disposal
- ✓ **Answer: C. Biomedical waste handling protocol**

☐ ☐ H. Radiographer's Role in Contrast Studies

36. Radiographer must check:

- A. Patient height
 - B. Allergy history, renal status, and consent
 - C. Shoe size
 - D. Liver enzymes
- ✓ **Answer: B. Allergy history, renal status, and consent**

37. During contrast injection, the technologist must:

- A. Leave the room
 - B. Monitor patient and watch for reaction
 - C. Read a book
 - D. Take lunch
- ✓ **Answer: B. Monitor patient and watch for reaction**

38. Before barium enema, the patient should:

- A. Drink fluids
- B. Eat fatty food

- C. Be given bowel preparation
 - D. Be sedated
- ✓ **Answer: C. Be given bowel preparation**

39. Radiographers must report:

- A. Exposure index only
 - B. Any adverse contrast reactions to radiologist immediately
 - C. Radiologist's income
 - D. How much water was drunk
- ✓ **Answer: B. Any adverse contrast reactions to radiologist immediately**

40. Radiographer should know:

- A. Flavor of contrast
 - B. Pharmacokinetics, route, preparation, and safety of contrast media used
 - C. PACS server voltage
 - D. Network cable model
- ✓ **Answer: B. Pharmacokinetics, route, preparation, and safety of contrast media used**

Topic 22: Sectional Anatomy for Imaging – Brain, Chest, Abdomen, Pelvis, Limbs

✓ **40 Advanced, Solved MCQs (Original and Non-Repeating)**

☐ A. Brain (Axial, Coronal, Sagittal Sections)

- The third ventricle is located:
 - A. Lateral to basal ganglia
 - B. Between the thalami
 - C. Anterior to the pons
 - D. Within the cerebellum

✓ **Answer: B. Between the thalami**
- The corpus callosum connects:
 - A. Brainstem and cerebellum
 - B. Left and right cerebral hemispheres
 - C. Pons and medulla
 - D. Occipital and parietal lobes only

✓ **Answer: B. Left and right cerebral hemispheres**
- On axial MRI, the “butterfly” appearance in the brain is formed by:
 - A. Temporal lobes
 - B. Lateral ventricles and thalami

- C. Brainstem
 - D. Occipital horns
 - ✓ **Answer: B. Lateral ventricles and thalami**
4. The pituitary gland sits in:
- A. Temporal fossa
 - B. Foramen magnum
 - C. Sella turcica
 - D. Cerebellopontine angle
- ✓ **Answer: C. Sella turcica**
5. The internal capsule lies:
- A. Between the thalamus and caudate nucleus
 - B. Between the putamen and thalamus
 - C. Between the caudate and putamen
 - D. Below the tentorium
- ✓ **Answer: C. Between the caudate and putamen**
-

☐ B. Chest and Thorax

6. The trachea bifurcates at the level of:
- A. T3
 - B. T5
 - C. T7
 - D. T1
- ✓ **Answer: B. T5**
7. The aortic arch lies:
- A. Above the clavicles
 - B. At the level of the sternal angle (T4)
 - C. At T12
 - D. Behind the liver
- ✓ **Answer: B. At the level of the sternal angle (T4)**
8. On axial CT, the pulmonary arteries are seen:
- A. Posterior to the aorta
 - B. Anterior to bronchi
 - C. Arising from the right ventricle and branching at hilum
 - D. In the abdomen
- ✓ **Answer: C. Arising from the right ventricle and branching at hilum**
9. The heart occupies:
- A. Right hemithorax
 - B. Anterior mediastinum
 - C. Middle mediastinum
 - D. Posterior mediastinum
- ✓ **Answer: C. Middle mediastinum**
10. The azygos vein drains into:

- A. Left atrium
 - B. Inferior vena cava
 - C. Superior vena cava
 - D. Coronary sinus
- ✓Answer: C. Superior vena cava
-

□ C. Abdomen (Liver, Pancreas, GI, Kidneys)

11. The liver occupies which abdominal region?

- A. Left lower quadrant
 - B. Right upper quadrant
 - C. Left hypochondrium
 - D. Hypogastrium
- ✓Answer: B. Right upper quadrant

12. The caudate lobe of liver is located:

- A. Inferior to gallbladder
 - B. Between IVC and ligamentum venosum
 - C. Near spleen
 - D. Adjacent to pancreas
- ✓Answer: B. Between IVC and ligamentum venosum

13. The pancreas is seen best on:

- A. Axial T2 brain MRI
 - B. Coronal spine CT
 - C. Axial abdomen CT/MRI
 - D. US chest
- ✓Answer: C. Axial abdomen CT/MRI

14. On CT, the head of the pancreas lies:

- A. Posterior to liver
 - B. In the duodenal loop
 - C. Below spleen
 - D. Within adrenal fossa
- ✓Answer: B. In the duodenal loop

15. The kidneys are located between:

- A. T1-T5
- B. T12-L3

- C. L4–S1
 - D. T5–T10
- ✓ **Answer: B. T12–L3**
-

□ **D. Pelvis (Male, Female, Urinary, Reproductive)**

16. The urinary bladder is located:

- A. Behind uterus in females
 - B. Anterior to rectum
 - C. Posterior to sacrum
 - D. Lateral to ovaries
- ✓ **Answer: B. Anterior to rectum**

17. The uterus on sagittal MRI lies:

- A. Posterior to rectum
 - B. Posterior to bladder and anterior to rectum
 - C. Anterior to pubic bone
 - D. Within the sigmoid colon
- ✓ **Answer: B. Posterior to bladder and anterior to rectum**

18. The prostate is located:

- A. Inferior to bladder
 - B. Anterior to penis
 - C. Posterior to sacrum
 - D. Inside the rectum
- ✓ **Answer: A. Inferior to bladder**

19. The ovary is typically located:

- A. On anterior abdominal wall
 - B. Lateral to uterus
 - C. Behind rectum
 - D. Above diaphragm
- ✓ **Answer: B. Lateral to uterus**

20. The rectum on axial section appears:

- A. Air-filled anterior structure
- B. Round posterior midline structure
- C. Oval structure behind bladder

- D. White dense oval
✓ **Answer: B. Round posterior midline structure**
-

□ E. Upper & Lower Limb Anatomy

21. The rotator cuff muscles surround:

- A. Elbow
 - B. Hip joint
 - C. Shoulder joint
 - D. Spine
- ✓ **Answer: C. Shoulder joint**

22. On coronal shoulder MRI, the supraspinatus lies:

- A. Below glenoid
 - B. Anterior to clavicle
 - C. Superior to humeral head
 - D. Inside the biceps tendon
- ✓ **Answer: C. Superior to humeral head**

23. The femoral artery on axial CT of upper thigh lies:

- A. Posterior to femur
 - B. Anteromedial to femur
 - C. Lateral to iliac crest
 - D. In the sciatic notch
- ✓ **Answer: B. Anteromedial to femur**

24. On axial knee MRI, the ACL appears:

- A. Vertical and anterior
 - B. Horizontal and posterior
 - C. Curved and lateral
 - D. Within meniscus
- ✓ **Answer: A. Vertical and anterior**

25. The sciatic nerve on axial pelvis MRI lies:

- A. In anterior abdominal wall
 - B. Between gluteus maximus and pelvis
 - C. Near spleen
 - D. Inside vertebral canal
- ✓ **Answer: B. Between gluteus maximus and pelvis**

□ F. Cross-sectional Orientation and Imaging Planes

26. An axial plane is also known as:

- A. Horizontal plane
- B. Coronal plane
- C. Sagittal plane
- D. Oblique plane

✓**Answer: A. Horizontal plane**

27. Coronal plane divides body into:

- A. Right and left
- B. Top and bottom
- C. Anterior and posterior
- D. Outer and inner

✓**Answer: C. Anterior and posterior**

28. Sagittal plane divides body into:

- A. Superior and inferior
- B. Anterior and posterior
- C. Left and right
- D. Transverse

✓**Answer: C. Left and right**

29. On coronal brain MRI, lateral ventricles appear as:

- A. Butterfly structures
- B. Midline dots
- C. Lateral C-shaped structures
- D. Absent

✓**Answer: C. Lateral C-shaped structures**

30. On sagittal spine MR images, CSF appears:

- A. Bright on T1
- B. Dark on T2
- C. Bright on T2-weighted images
- D. Gray in all sequences

✓**Answer: C. Bright on T2-weighted images**

☐ G. Image Recognition & Pathway Identification

31. Circle of Willis is best seen in:

- A. CT chest
- B. MRI T2 spine
- C. Axial or 3D time-of-flight MR angiography
- D. Knee MRI

✓ **Answer: C. Axial or 3D time-of-flight MR angiography**

32. Foramen magnum appears on:

- A. Abdominal CT
- B. Axial section of upper cervical spine
- C. Chest X-ray
- D. Pelvic CT

✓ **Answer: B. Axial section of upper cervical spine**

33. The spleen is located:

- A. Right hypochondrium
- B. Left upper quadrant posterior to stomach
- C. Behind liver
- D. In pelvis

✓ **Answer: B. Left upper quadrant posterior to stomach**

34. On CT abdomen, the pancreas lies:

- A. Posterior to aorta
- B. Anterior to stomach
- C. Posterior to stomach
- D. Inside liver

✓ **Answer: C. Posterior to stomach**

35. The spinal cord ends at:

- A. T12
- B. L1–L2
- C. L5
- D. S2

✓ **Answer: B. L1–L2**

☐ ☐ H. Radiographer's Role in Sectional Imaging

36. The primary responsibility during cross-sectional imaging:

- A. Report findings
- B. Ensure correct plane and anatomical coverage
- C. Replace MRI coil
- D. Perform surgery

✓ **Answer: B. Ensure correct plane and anatomical coverage**

37. When positioning for abdominal CT:

- A. Patient is prone
- B. Arms by side
- C. Supine with arms above head
- D. Standing position

✓ **Answer: C. Supine with arms above head**

38. Cross-sectional images are reconstructed into:

- A. Only axial images
- B. MPR (multi-planar reformats) in sagittal/coronal/oblique
- C. 3D photos only
- D. Cine loops

✓ **Answer: B. MPR (multi-planar reformats) in sagittal/coronal/oblique**

39. Correct windowing in brain CT helps visualize:

- A. Kidneys
- B. Ventricles and gray-white matter
- C. Lungs
- D. Liver nodules

✓ **Answer: B. Ventricles and gray-white matter**

40. For accurate brain MRI orientation, landmarks used are:

- A. Nasion and inion
- B. Umbilicus
- C. Femoral artery
- D. Sternum

✓ **Answer: A. Nasion and inion**

One-Liner — perfect for last-minute revision.

🔍 Skeletal & Muscular System

- Axial skeleton includes skull, vertebrae, ribs, sternum.
 - Appendicular skeleton includes limbs, clavicles, pelvis.
 - Long bones grow via epiphyseal plates.
 - The strongest muscle is the **masseter**.
 - The **stapedius** is the smallest skeletal muscle.
-

🔍 Nervous System

- The brainstem = midbrain + pons + medulla.
 - CSF is produced in the **choroid plexus** of ventricles.
 - CT is best for acute head trauma; MRI for soft tissue and tumors.
 - The internal capsule lies between caudate and putamen.
-

♥ Cardiovascular System

- The mitral valve lies between LA and LV; tricuspid between RA and RV.
 - Aortic arch is at **T4** level.
 - Pulmonary trunk arises from the **right ventricle**.
-

🔍 Respiratory System

- Trachea bifurcates at **T5** (carina).
 - “Deep sulcus sign” on supine CXR = pneumothorax.
 - Hemothorax appears as diffuse haziness on supine CXR.
-

🔍 Digestive System

- Barium sulfate is used for GI studies; not in perforation.
 - Enteroclysis = contrast infusion into duodenum.
 - Small bowel follow-through uses **oral contrast**.
-

? Urinary & Reproductive Systems

- CT urography uses **IV iodinated contrast** with delayed phase.
 - HSG uses **water-soluble iodinated contrast**.
 - DMSA evaluates renal cortex; DTPA = renal perfusion.
-

? Endocrine & Lymphatic Systems

- I-131 is used for thyroid **therapy**; Tc-99m pertechnetate for **scans**.
 - Adrenal glands are best evaluated on **CT/MRI**.
-

? Skin and Integumentary

- Ultrasound is first-line for superficial soft tissue swellings.
 - MRI is superior for complex skin tumors and infections.
-

? Imaging Physics

- CT uses X-rays; MRI uses magnetic fields & RF pulses.
 - T1: Fat bright; T2: Fluid bright.
 - SNR increases with high mA or low noise.
-

? Radiation Protection

- TLD badges monitor cumulative radiation exposure.
 - Lead aprons: **0.25–0.5 mm Pb equivalence**.
 - ALARA: "As Low As Reasonably Achievable."
-

?♂ Radiographic Positioning

- PA chest: upright, full inspiration, 6 feet SID.
 - Cross-table lateral hip: supine with unaffected leg elevated.
 - Oblique views = joint or foramina visualization.
-

? PACS & RIS

- PACS = image storage & communication; RIS = patient scheduling/reporting.
 - DICOM = universal format for medical images.
-

? Quality Assurance

- Step wedge tests contrast; line pair phantom = resolution.
 - Repeat rate >10% indicates workflow/equipment issues.
 - AEC standardizes exposure, reduces dose.
-

? Emergency Radiography

- Trauma series = C-spine, chest, pelvis.
 - FAST detects **free fluid** in trauma.
 - Open-book pelvic fracture = pubic symphysis widening.
-

? Interventional Radiology

- Seldinger technique = safe vascular access.
 - Embolization = control of bleeding (e.g., uterine artery).
 - Pigtail catheter = contrast injection in angiography.
-

☢ Nuclear Medicine

- Tc-99m = most used diagnostic isotope (6-hour half-life).
 - FDG PET shows **glucose metabolism**.
 - V/Q scan = pulmonary embolism screening.
-

? AI & Advanced Imaging

- DECT = stone/gout characterization, iodine mapping.
- AI aids in triage (e.g., stroke, pneumothorax).
- Fusion imaging = PET-CT, PET-MRI, US-CT overlay.

☐ Contrast Studies

- Gadolinium = MRI; Iodinated = CT/X-ray; Barium = GI.
- Avoid barium in suspected perforation.
- Gadolinium is contraindicated in **renal failure** (NSF risk).

☐ Sectional Anatomy

- Corpus callosum connects hemispheres.
- Pancreas lies posterior to stomach.
- Kidneys span **T12–L3**; spinal cord ends at **L1–L2**.

