SGPGI SYLLABUS BASED
MODEL TEST PAPER

50 important questions on anatomy

1. Which of the following factors affects the signal-to-noise ratio (SNR) in an MRI scan?

a) Flip angle

b) Field of view

c) Repetition time

d) Matrix size

Correct answer: c) Repetition

2. In MRI, what is the purpose of the RF (radiofrequency) pulse?

a) To create a magnetic field

b) To excite hydrogen nuclei

c) To control slice thickness

d) To encode spatial information

Correct answer: b) To excite hydrogen nuclei

3. What is the term for the process of aligning the magnetic moments of hydrogen nuclei with the external magnetic field in MRI?

a) T1 relaxation

b) T2 relaxation

c) Spin echo

d) RF excitation

Correct answer d) RF excitation

4. Which MRI sequence is particularly sensitive to changes in tissue relaxation times and is commonly used for anatomical imaging?

a) Gradient echo
b) Spin echo
c) Inversion recovery
d) Echo planar imaging

Correct answer: b) Spin echo

5. What is the main advantage of using a higher magnetic field strength in MRI?

a) Improved spatial resolution

b) Decreased signal-to-noise ratio

c) Shorter imaging time

d) Reduced susceptibility artifacts

Correct answer: a) Improved spatial resolution

6. In diffusion-weighted imaging (DWI), what property of tissue does the imaging contrast primarily depend on?

a) T1 relaxation

b) T2 relaxation

c) Water diffusion

d) Susceptibility

Correct answer: c) Water diffusion

7. Which imaging parameter is responsible for the contrast in T2-weighted images?

a) Long echo time (TE)

b) Short repetition time (TR)

c) Small flip angle

d) Large field of view

Correct answer: a) Long echo time (TE)

8. In magnetic resonance angiography (MRA), which technique is commonly used to suppress background tissues and enhance vascular structures?

a) Inversion recovery

b) Phase-contrast imaging

c) Fat saturation

d) Parallel imaging

Correct answer: c) Fat saturation

9. What is the purpose of a 180-degree refocusing pulse in a spin echo sequence?

a) To generate the MR signal

b) To dephase the transverse magnetization

c) To flip the magnetization into the transverse plane

d) To reduce T1 relaxation effects

Correct answer: b) To dephase the transverse magnetization

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10. Which contrast mechanism is exploited in functional magnetic resonance imaging (fMRI) to detect changes in neural activity?

a) T1 relaxation

b) T2 relaxation

c) Blood-oxygen-level-dependent (BOLD) contrast

d) Diffusion-weighted contrast

Correct answer: c) Blood-oxygen-level-dependent (BOLD) contrast

11. In MRI, what parameter determines the contrast between different tissues in a T1-weighted image?

a) Echo time (TE)

b) Repetition time (TR)

c) Flip angle

d) Inversion time (TI)

Correct answer: c) Flip angle

12. Which of the following artifacts is commonly associated with magnetic susceptibility differences in MRI?

a) Motion artifact

b) Aliasing artifact

c) Chemical shift artifact

d) Eddy current artifact

Correct answer: c) Chemical shift artifact

13. What is the purpose of the phase-encoding gradient in MRI?

a) To select the imaging slice

b) To encode spatial information along the frequency-encoding direction

c) To control the flip angle

d) To enhance T2* contrast

Correct answer: b) To encode spatial information along the frequency-encoding direction

14. Which type of MRI sequence is particularly sensitive to blood flow and is commonly used in perfusion imaging?

a) Turbo spin echo

b) Gradient echo

c) Spin echo

d) Inversion recovery

Correct answer: b) Gradient echo

15. What is the purpose of the spoiler gradient in a gradient echo sequence?

a) To spoil the signal from fat

b) To enhance the signal from water

c) To increase the signal-to-noise ratio

d) To reduce susceptibility artifacts

Correct answer: a) To spoil the signal from fat

16. In magnetic resonance spectroscopy (MRS), which nucleus is commonly studied to assess brain metabolism?

a) Hydrogen (1H)

b) Carbon (13C)

c) Phosphorus (31P)

d) Sodium (23Na)

Correct answer: a) Hydrogen (1H)

17. What is the primary role of the receiver coil in MRI?

a) To generate the main magnetic field

b) To transmit RF pulses

c) To receive the MR signal

d) To control the gradient fields

Correct answer: c) To receive the MR signal

18. In diffusion tensor imaging (DTI), what information is obtained from the measurement of water diffusion in multiple directions?

a) Tissue perfusion

b) Structural connectivity

c) T1 relaxation times

d) Susceptibility effects

Correct answer: b) Structural connectivity.

19. Which sequence is commonly used in functional MRI (fMRI) to acquire a series of images with minimal time delay between successive acquisitions?

a) Echo planar imaging
b) Turbo spin echo
c) Inversion recovery
d) Fast spin echo

Correct answer: a) Echo planar imaging

20. What is the purpose of the pre-saturation pulse in a fat-suppressed MRI sequence?

a) To reduce T1 relaxation effects

b) To enhance T2 relaxation effects

c) To saturate the fat signal

d) To improve spatial resolution

Correct answer: c) To saturate the fat signal

21. Which imaging parameter has a direct impact on the thickness of the MRI slices?

a) Field of view

b) Slice thickness

c) Repetition time (TR)

d) Echo time (TE)

Correct answer: b) Slice thickness

22. In a 3D gradient echo sequence, what imaging parameter controls the number of partitions or slices acquired in each TR?

a) Matrix size

b) Flip angle

c) Phase-encoding steps

d) Repetition time (TR)

Correct answer: c) Phase-encoding steps

23. What is the purpose of the inversion recovery pulse sequence in MRI?

a) To nullify the signal from fat

b) To enhance T2* contrast

c) To suppress the signal from cerebrospinal fluid

d) To nullify the signal from background tissues

Correct answer: c) To suppress the signal from cerebrospinal fluid

24. In magnetic resonance arthrography (MRA), what is commonly used as a contrast agent to improve the visualization of joint structures?

a) Gadolinium
b) Iodine
c) Barium
d) Iron oxide

Correct answer: a) Gadolinium

25. Which imaging sequence is most commonly employed for assessing the spinal cord in MRI?

a) Turbo spin echo

b) Gradient echo

c) Fast spin echo

d) STIR (Short Tau Inversion Recovery)

Correct answer: a) Turbo spin echo

26. In cardiac MRI, what technique is used to synchronize image acquisition with the cardiac cycle?

a) Gating

b) Triggering

c) ECG (electrocardiogram)

d) Breath-holding

Correct answer: c) ECG (electrocardiogram)

27. What is the purpose of parallel imaging techniques in MRI?

a) To reduce imaging time

b) To increase signal-to-noise ratio

c) To enhance spatial resolution

d) To minimize motion artifacts

Correct answer: a) To reduce imaging time

28. In breast MRI, which contrast enhancement pattern is often associated with malignancies?

a) Washout
b) Persistent
c) Plateau
d) Slow uptake

Correct answer: a) Washout.

29. What is the primary advantage of using a phased-array coil in MRI?

a) Improved signal-to-noise ratio

b) Reduced susceptibility artifacts

c) Increased gradient strength

d) Enhanced T1 relaxation

Correct answer: a) Improved signal-to-noise ratio

30. In functional MRI (fMRI), what does the blood-oxygen-level-dependent (BOLD) signal reflect?

a) Blood flow

b) Oxygen consumption

c) Cerebral blood volume

d) Tissue density

Correct answer: b) Oxygen consumption

31. In brain MRI, what imaging sequence is commonly used to detect acute hemorrhage?

a) T1-weighted imaging

b) T2-weighted imaging

c) Gradient echo imaging

d) Diffusion-weighted imaging

Correct answer: c) Gradient echo imaging

32. Which type of MRI contrast agent is typically used to enhance visualization of the blood-brain barrier disruption in brain tumors?

a) Gadolinium-based contrast agents
b) Iron oxide nanoparticles
c) Barium sulfate
d) Iodinated contrast agents

Correct answer: a) Gadolinium-based contrast agents

33. In musculoskeletal MRI, what imaging sequence is useful for evaluating the integrity of ligaments and tendons?

a) T1-weighted imaging
b) T2-weighted imaging
c) Fat-suppressed proton density imaging
d) Short Tau Inversion Recovery (STIR)

Correct answer: c) Fat-suppressed proton density imaging

34. What is the primary advantage of using diffusion-weighted imaging (DWI) in the evaluation of stroke?

a) Increased signal-to-noise ratio

b) Improved spatial resolution

c) Sensitivity to water diffusion changes

d) Enhanced T1 contrast

Correct answer: c) Sensitivity to water diffusion changes

35. In abdominal MRI, which sequence is often employed for evaluating liver lesions based on their vascularity?

a) T1-weighted imaging
b) T2-weighted imaging
c) Dynamic contrast-enhanced imaging
d) Diffusion-weighted imaging

Correct answer: c) Dynamic contrast-enhanced imaging

36. Which MRI finding is characteristic of multiple sclerosis (MS) lesions on T2-weighted imaging?

a) Hypointensity

b) Ring enhancement

c) Hyperintensity

d) Calcifications

Correct answer: c) Hyperintensity

37. In breast MRI, what is the typical appearance of benign breast lesions on dynamic contrast-enhanced imaging?

a) Rapid washout
b) Persistent enhancement
c) Plateau pattern
d) Slow initial uptake

Correct answer: b) Persistent enhancement

38. What does the term "signal void" often represent in cardiovascular MRI?

a) Blood flow

b) Myocardial perfusion

c) Fat suppression

d) Susceptibility artifacts

Correct answer: a) Blood flow

39. In prostate MRI, what imaging sequence is commonly used for the detection and localization of prostate cancer?

a) T1-weighted imaging

b) T2-weighted imaging

c) Diffusion-weighted imaging

d) Dynamic contrast-enhanced imaging

Correct answer: b) T2-weighted imaging

40. What is the primary role of functional MRI (fMRI) in the evaluation of neurologic disorders?

a) Detection of structural abnormalities

b) Assessment of tissue perfusion

c) Localization of brain function

d) Evaluation of cerebrospinal fluid flow

Correct answer: c) Localization of brain function

41. Which imaging finding is characteristic of rheumatoid arthritis on MRI?

a) Bony erosions

b) Synovial hypertrophy

c) Marrow edema

d) Tendon calcifications

Correct answer: a) Bony erosions

42. In spinal cord MRI, what sequence is particularly useful for assessing the integrity of the spinal cord and nerve roots?

a) T1-weighted imaging
b) T2-weighted imaging
c) Diffusion-weighted imaging
d) Myelography

Correct answer: b) T2-weighted imaging

43. What is the purpose of the arterial phase in liver MRI?

a) Detection of hepatic steatosis

b) Evaluation of portal venous flow

c) Assessment of hepatic arterial perfusion

d) Identification of biliary abnormalities

Correct answer: c) Assessment of hepatic arterial perfusion

44. Which MRI sequence is commonly used for evaluating joint effusions and synovial inflammation in rheumatologic conditions?

a) T1-weighted imaging
b) T2-weighted imaging
c) Fat-suppressed proton density imaging
d) Dynamic contrast-enhanced imaging

Correct answer: c) Fat-suppressed proton density imaging

45. In cardiac MRI, what parameter is typically assessed to evaluate left ventricular function?

a) Myocardial perfusion

b) T1 relaxation time

c) Ejection fraction

d) Myocardial strain

Correct answer: c) Ejection fraction

46. What does the term "DWI-FLAIR mismatch" suggest in the context of acute stroke imaging?

a) Hemorrhagic transformation

b) Subacute ischemic infarct

c) Acute ischemic infarct

d) Chronic infarct

Correct answer: c) Acute ischemic infarct

47. Which MRI sequence is particularly sensitive to detecting meniscal tears in the knee?

a) T1-weighted imaging

b) T2-weighted imaging

c) Fat-suppressed proton density imaging

d) Gradient echo imaging

Correct answer: c) Fat-suppressed proton density imaging

48. In neuroimaging, what does the term "FLAIR" stand for?

a) Fast Low-Angle Inversion Recovery

b) Fluid-Attenuated Inversion Recovery

c) Free Lumbar Angiography Imaging Reconnaissance

d) Functional Localization And Image Reconstruction

Correct answer: b) Fluid-Attenuated Inversion Recovery

49. In abdominal MRI, which sequence is commonly used for evaluating the biliary system?

a) T1-weighted imaging

b) T2-weighted imaging

c) MR cholangiopancreatography (MRCP)

d) Dynamic contrast-enhanced imaging

Correct answer: c) MR cholangiopancreatography (MRCP)

50. What is the primary advantage of using 3T (Tesla) MRI over 1.5T in clinical practice?

a) Increased signal-to-noise ratio

b) Shorter imaging time

c) Improved spatial resolution

d) Reduced susceptibility artifacts

Correct answer: a) Increased signal-to-noise ratio.