

Intro to MRI

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ___ 1. MRI depends on interactions with:
- electrons.
 - the nucleus.
 - soft tissue.
 - ionizing radiation.
- ___ 2. Hydrogen is used for imaging in MRI because it:
- has a large nucleus.
 - has a large precession.
 - is the most common element in the body.
 - is the only nucleus that can be imaged.
- ___ 3. The MRI signal is generated in the receiving antenna by:
- Lenz's law of induction.
 - a silicon detector.
 - Newton's first law of motion.
 - Faraday's law of induction.
- ___ 4. Strong MRI signals are represented by _____ in the image.
- black
 - light gray
 - white
 - dark gray
- ___ 5. There are a variety of magnet types that can be used for MRI. Resistive and superconductive magnets are both:
- permanent magnets.
 - weak magnets.
 - electromagnets.
 - used at up to 3 tesla.
- ___ 6. Compared with CT image acquisition, MRI can obtain images:
- independently in any plane.
 - only in the sagittal plane.
 - only in the coronal plane.
 - in the sagittal and coronal planes.
- ___ 7. The wobbling motion of the proton when it is placed in a strong magnetic field is called:
- frequency.
 - precession.
 - resonance.
 - a signal.

- ___ 8. MRI has been useful for imaging many areas of the body, particularly the brain, because of:
- the ability to see calcium deposits.
 - differentiation of gray matter from white matter.
 - new motion techniques.
 - fat suppression.
- ___ 9. MR spectroscopy is used to look at:
- abdominal lesions.
 - blood flow.
 - chemical composition.
 - diffusion and perfusion.
- ___ 10. The rotation of electrons on their axis is the property called ____.
- magnetic force
 - electron spin
 - unified field theory
 - magnetic induction
- ___ 11. When a group of dipoles are aligned, they create a ____.
- magnetic domain
 - paramagnetic material
 - magnetic resonance
 - a north pole
- ___ 12. What is the SI unit of magnetic field strength?
- ampere
 - tesla
 - dipole
 - ohm
- ___ 13. The force between magnetic poles is proportional to the ____ of the magnetic pole strengths, divided by the ____ of the distance between them.
- square, sum
 - sum, square
 - square, product
 - product, square
- ___ 14. What type of material can be made magnetic when placed in an external magnetic field?
- diamagnetic
 - ferromagnetic
 - paramagnetic
 - nonmagnetic
- ___ 15. Like magnetic poles ____ and unlike magnetic poles ____.
- attract, attract
 - repel, repel
 - repel, attract
 - attract, repel

- ___ 16. The magnetic intensity of an electromagnet is greatly increased by the addition of a(n) ___ core.
- wood
 - iron
 - aluminum
 - copper
- ___ 17. A computerized imaging modality using a strong magnetic field and radiofrequency pulses to produce images in multiple planes is called:
- MRI.
 - mammography.
 - CT.
 - angiography.
- ___ 18. Radiofrequency coils are essential parts of the equipment used to perform:
- MRI.
 - SPECT.
 - Doppler sonography.
 - PET.
- ___ 19. The imaging modality that is most likely to cause patients to experience claustrophobia is:
- PET.
 - MRI.
 - SPECT.
 - CT.
- ___ 20. An example of a naturally occurring magnetic rock is
- | | |
|---------------|---------------|
| a. lodestone. | c. limestone. |
| b. soapstone. | d. peastone. |
- ___ 21. The north pole of one magnet will be
- attracted to the north pole of another magnet.
 - attracted to the south pole of the same magnet.
 - repelled by the north pole of another magnet.
 - repelled by the south pole of another magnet.
- ___ 22. Like magnet poles always
- repel each other.
 - attract each other.
 - cancel out each other's magnetic fields.
 - point toward the north pole.
- ___ 23. Magnetic fields are produced by
- | | |
|-----------------------|-------------------------|
| a. magnetic force. | c. gravitational force. |
| b. electric currents. | d. water currents. |
- ___ 24. In a magnetized substance, the domains
- are randomly distributed.
 - line up more uniformly in one direction.
 - cancel each other.
 - can never be reoriented.

- _____ 25. Which orientation characterizes the magnetic domains in an unmagnetized piece of iron?
- a. parallel to the magnetic axis
 - b. antiparallel to the magnetic axis
 - c. random
 - d. perpendicular to the magnetic axis

Intro to MRI Answer Section

MULTIPLE CHOICE

1. ANS: B PTS: 1 DIF: Level: Medium
REF: Volume 3, Page 343 OBJ: Category: None
TOP: Exam: None
2. ANS: C PTS: 1 DIF: Level: Easy REF: Volume 3, Page 343
OBJ: Category: None TOP: Exam: None
3. ANS: D PTS: 1 DIF: Level: Easy REF: Volume 3, Page 343
OBJ: Category: None TOP: Exam: None
4. ANS: C PTS: 1 DIF: Level: Medium
REF: Volume 3, Page 344 OBJ: Category: None
TOP: Exam: None
5. ANS: C PTS: 1 DIF: Level: Easy REF: Volume 3, Page 346
OBJ: Category: None TOP: Exam: None
6. ANS: A PTS: 1 DIF: Level: Easy REF: Volume 3, Page 351
OBJ: Category: None TOP: Exam: None
7. ANS: B PTS: 1 DIF: Level: Easy REF: Volume 3, Page 343
OBJ: Category: None TOP: Exam: None
8. ANS: B PTS: 1 DIF: Level: Easy REF: Volume 3, Page 352
OBJ: Category: None TOP: Exam: None
9. ANS: C PTS: 1 DIF: Level: Medium
REF: Volume 3, Page 365 OBJ: Category: None
TOP: Exam: None
10. ANS: B
The rotation of electrons on their axis is the property called electron spin.

PTS: 1 DIF: Easy REF: page 83 OBJ: Define the electron spin.
11. ANS: A
When a group of dipoles are aligned, they create a magnetic domain.

PTS: 1 DIF: Moderate REF: page 83 OBJ: Define the magnetic dipole.
12. ANS: B
The SI unit of magnetic field strength is the tesla or gauss.

PTS: 1 DIF: Easy REF: page 88
OBJ: Identify the SI unit for magnetic field strength.
13. ANS: D
The force between magnetic poles is proportional to the product of the magnetic pole strengths, divided by the square of the distance between them.

PTS: 1 DIF: Difficult REF: page 88
OBJ: Discuss the four laws of magnetism.
14. ANS: B
Ferromagnetic material can be made magnetic when placed in an external magnetic field.

PTS: 1 DIF: Moderate REF: page 85
OBJ: Recognize the properties of ferromagnetic materials.

15. ANS: C
Like magnetic poles repel and unlike magnetic poles attract.

PTS: 1 DIF: Easy REF: page 75
OBJ: Discuss the four laws of magnetism.

16. ANS: B
The magnetic intensity of an electromagnet is greatly increased by the addition of an iron core.

PTS: 1 DIF: Difficult REF: page 85
OBJ: Identify the interactions between matter and magnetic fields.

17. ANS: A
Rationale: The computerized imaging modality that uses a strong magnetic field and radiofrequency pulses to produce images in multiple planes is called magnetic resonance imaging (MRI).

PTS: 1 REF: p. 369

18. ANS: A
Rationale: Radiofrequency (RF) coils are essential components of a magnetic resonance imaging (MRI) system. They generate radiofrequency pulses electronically and are the cause of the loud, hammering sound that is typical of MRI scanners. The coils transmit pulses of RF energy to the patient's body and receive the RF signal emitted by the resonating tissue.

PTS: 1 REF: p. 369

19. ANS: B
Rationale: The imaging modality that is most likely to cause patients to experience claustrophobia is conventional MRI because the long, tubular gantry confines the patient in a very narrow space. The gantries of other imaging systems are more open and the patient is usually able to see outside the gantry.

PTS: 1 REF: p. 373

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|------------|--------|--------|-------------|
| 20. ANS: A | PTS: 1 | DIF: I | OBJ: 14-1.1 |
| 21. ANS: C | PTS: 1 | DIF: I | OBJ: 14-1.1 |
| 22. ANS: A | PTS: 1 | DIF: I | OBJ: 14-1.1 |
| 23. ANS: B | PTS: 1 | DIF: I | OBJ: 14-2.1 |
| 24. ANS: B | PTS: 1 | DIF: I | OBJ: 14-2.3 |
| 25. ANS: C | PTS: 1 | DIF: I | OBJ: 14-2.3 |