

Research Tech Accreditation

MRI Safety QUIZ

Based on MRI safety course 1/05

Name: _____ **Date:** _____

Department: _____

Choose the single best answer for each question.

1. A “magnet quench” means:
 - a) An electrical fault causes the RF and gradient electronics to shut down.
 - b) The main magnet becomes resistive rather than superconductive, resulting in rapid heating of the magnet windings, boiling off of cryogenes, and loss of main magnetic field.
 - c) The magnet core melts down into a pool of molten metal which may break through the outer containment shield of the magnet.
 - d) Sudden inductive load of main magnet windings causes large drain on municipal power supply, resulting in loss of electrical service in the building or surrounding neighborhood.

2. The major risk of injury or harm due to magnet quench is:
 - a) Sudden heating of the magnet may cause burns to patients in the bore.
 - b) Boiling cryogenes create asphyxiating steam.
 - c) Electrocution by arcing of electricity across the main magnet windings.
 - d) Blinding flash of light.

3. In which of the following situations should you push the “Quench” button to cause a magnet quench:
 - a) Scan room fire.
 - b) A janitor has entered the room with a large floor buffing machine which is now stuck to the magnet. No one is hurt, but he can't pull the machine off the magnet.
 - c) A steel oxygen tank was brought into the scan room and has flown across the room and stuck to the magnet, pinning someone's arm in a painful crush.
 - d) All of the above.

4. After a magnet quench:
 - a) The superconducting magnet must be re-cooled with new cryogenes costing tens of thousands of dollars, and will likely be out of service for several days.
 - b) The magnet can be reset and back in service within a half hour.
 - c) The magnet is likely to be severely damaged and will need to be completely replaced.
 - d) A safety investigation must be carried out by the university's Human Subjects Committee.

5. The emergency shutdown button (on Siemens magnets) or main power switch on the power distribution unit (GE) should be used to immediately cut power to the scanner electrical system in each of the following situations **EXCEPT**:
- Scan room fire.
 - Sprinklers go off in scan room, but there is no fire.
 - Loud popping noises and smoke come from the scanner.
 - A patient in the scanner yells for help and becomes unresponsive.
6. Pressing the emergency shutdown button will:
- Immediately cut electrical power to all components of the MRI scanner except the main magnet.
 - Cut power to the entire system and cause magnet quench.
 - Cause immediate reboot of the scanner computer.
 - Activate explosive bolts and automatic patient ejection system.
7. At the end of an after-hours research scanning session, you should do all of the following **EXCEPT**:
- Place all removable coils back in their storage cabinets.
 - Power down the system via the system shutdown menu of the scanner computer interface.
 - Check cryogen levels and record in log book.
 - Lock scan room door.
8. All of the following statements about the main magnet of the MRI scanner are true **EXCEPT**:
- The magnetic field is extremely powerful.
 - Large metal objects like floor buffers and oxygen cylinders may be picked up by the field and fly toward the magnet bore at high speed.
 - The magnet is always on, all day and all night everyday including weekends and holidays.
 - The fringe field is confined to the magnet bore.
9. MRI fatalities have been associated with:
- Excessive exposure to the static main field.
 - Oxygen cylinder flying into magnet bore causing crush injury to patient.
 - Patient asphyxiation by cryogen gases.
 - Excessive deposition of RF power causing fatal patient heating.
10. Which of the following objects may be safely taken into the scan room:
- IV tubing.
 - Needle.
 - Handgun.
 - Stethoscope.

11. With regard to metal objects in the scan room:
 - a) No metallic objects are allowed in the scan room.
 - b) Metallic objects may be tested for ferromagnetism by the technologist with a hand-held magnet; if not ferromagnetic, they may be allowed in the scan room.
 - c) Small objects like hair pins may be attracted by the magnetic field but do not constitute a safety risk.
 - d) Most monitoring equipment used in the hospital is MRI compatible.

12. Patients with which of the following prosthetic devices may be safely scanned:
 - a) Total hip prosthesis.
 - b) Cardiac pacemaker.
 - c) Cochlear implant (inner ear prosthetic device).
 - d) None of the above.

13. The 5 gauss line:
 - a) Marks the limit of public access to the area surrounding the scanner.
 - b) Is usually about 100 yards from the magnet bore.
 - c) Marks the point at which the earth's magnetic field is equal in strength to the field created by the magnet.
 - d) May safely be crossed by visitors who have not filled out screening forms as long as they do not enter the scan room.

14. Which of the following is a likely consequence of forgetting to remove your wallet from your pocket before entering the scan room:
 - a) Because the ink on US currency is ferromagnetic, your wallet may become a projectile and fly into the magnet bore.
 - b) The magnetic stripes on your credit cards and ATM cards are erased.
 - c) Wallet heating may cause burns.
 - d) There will likely be no adverse consequence.

15. The following are all contraindications to having an MRI scan **EXCEPT**:
 - a) Lead bullet in the abdomen from prior gunshot wound.
 - b) Cardiac pacemaker.
 - c) Cerebral aneurysm clip of unknown type.
 - d) Swann-Ganz catheter with thermodilution tip.