

MRRF
Wayne State University

Part IV MR Operator Training

Exam

NAME: _____ DATE: _____

DEPARTMENT: _____

MRI Operator's Exam

1. Mr. Jones is feeling a little claustrophobic during his exam and would like his wife to sit with him during his MRI exam. Mrs. Jones had a pacemaker implanted five years ago therefore it is permissible to allow her into the room now as long as she stays at least 10 feet from the front of the magnet.

- a. True
- b. False

2. For subject safety purposes, which of the following items are contraindicated for an MRI scan.

- a. orthodontic braces.
- b. orthopedic screws in the ankle placed 6 months ago
- c. aneurysm clips
- d. pacer wires (no pacemaker) left in the chest after open heart surgery 3 years ago.
- e. c & d only
- f. all of the above

3. You walk into the scan room and find a maintenance employee pinned to the magnet by a floor buffer. He is unresponsive but has a weak pulse. You immediately...

- a. Throw cold water on him.
- b. Use smelling salts to try to rouse him.
- c. Call his supervisor and tell him that the maintenance employee is sleeping on the job.
- d. Call for help then attempt to free the employee. If unsuccessful, press the quench button to eliminate the magnetic field

4. While scanning a subject for a heart study, he suddenly complains of a stinging, burning sensation at the location of one of the electrodes placed on his chest for cardiac gating. You....

- a. Tell him to remain quiet until the sequence has finished.
- b. Turn the radio up louder so you can't hear his complaint.
- c. Tell him the stinging will subside in a few hours.
- d. Immediately remove him from the magnet and inspect the area of the leads for loose or crossed wires.

5. When positioning the ECG monitoring cable on a subject for a heart study, it is OK to run the cable across the subject's body to plug it into the connector box.

- a. True
- b. False

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6. You have just positioned a subject inside of the magnet for a knee scan when she suddenly remembers she had a brain aneurysm repaired ten years ago. You...

- a. Rapidly pull the table out of the scanner, immediately lower it, and rush her out of the room as fast as possible.
- b. Continue with the exam because you are not scanning her head.
- c. Call 117
- d. Very slowly pull the table out of the scanner and then have the subject slowly slide onto a stretcher so that you can slowly cross her through the magnetic field lines and out of the room.

7. Which of the following is the current FDA recommendations regarding specific absorption rates for the Siemen's 1.5T MR scanner?

Are these current and applicable to both machines?

- a. Not to exceed 1.5 W/kg(whole body)
- b. Not to exceed 3.2 W/kg(head imaging)
- c. Not to exceed 8 W/kg in any single gram of tissue
- d. Not to exceed an increase of 1°C core temperature or 38°C in the head, 39°C in the trunk, and 40°C in the extremities.
- e. all of the above.

8. If a subject is unresponsive when you try to communicate with him in between scanning sequences, you should...

- a. Continue with the scan and assume that he is sleeping.
- b. Call 117.
- c. Defibrillate him.
- d. Pull him out of the scanner or at the very least go into the room to see if he is O.K.

9. To avoid the confusion that may be caused by the scenario in the previous question, it is a good idea to use the pulse oximeter on everyone that is placed into the magnet.

- a. True
- b. False

10. Your subject has informed you that he has worked as a metal grinder for ten years but he has never had any metal shavings fly into his eyes.

- a. Proceed with the scan since he has never gotten any metallic foreign bodies in his eyes.
- b. Do not proceed with the scan and at the discretion of the Principle Investigator, send the subject for x-rays of his orbital area to rule out possible metallic foreign bodies.

11. Your subject has informed you that she had a metal sliver enter her eye 10 years ago but that the doctor got it all out. You...

- a. Proceed with the scan since the metal sliver was removed.
- b. Do not proceed with the scan and at the discretion of the Principle Investigator, send the subject for x-rays of the orbital area to rule out possible metallic foreign body.

12. While performing a brain MR on a twenty-four year old woman, she begins to complain of some stinging around her eyelids. Upon examining her you find out that she has permanent tattoo eyeliner. You...

- a. terminate the exam, apply cold compresses to her eyes, and seek the proper medical attention.
- b. apply ice-cold compresses to her eyes to lower the temperature in the area and then continue with the scan if she feels up to it.
- c. tell the subject to shut her eyes and the pain will go away.

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13. Your subject has had a heart attack while undergoing an MR exam. You ...

- a. dial 117, call a Code Blue and immediately bring the crash cart into the magnet room to begin resuscitation measures.
- b. dial 117, call a Code Blue and bring the subject out of the magnet room on a stretcher to begin resuscitation measures.
- c. call 911 and wait for the paramedics to arrive.
- d. call 117, and go and get the crash cart.

14. The red table stop buttons on both sides of the table are used to...

- a. stop the table from moving.
- b. set off an alarm that tells you the patient is moving around on the table during the scan.
- c. release the table for manual removal of the patient during emergencies.
- d. quench the magnet.

15. The red table stop buttons on both sides of the table must be in which position to release the table?

- a. pushed in.
- b. pulled out

16. During the middle of a measurement, you hear the subject attempting to speak to you but you cannot hear her clearly. You...

- a. Ignore her and continue the measurement.
- b. Stop the measurement and speak to her.
- c. Stop the measurement and yell at her for interrupting.
- d. Terminate the entire exam.

17. Your subject tells you she had surgery twenty years ago on her brain but she can't remember exactly what it was for. You...

- a. proceed with the scan because she seems credible.
- b. cancel the scan for today until further investigation into the matter can occur.
- c. tell the subject of the risks involved due to her lack of history and allow her to decide if she wants to have the MRI.
- d. proceed with the test only after having the subject sign a waiver that releases us from responsibility of injury because after all it's not our fault she can't remember her surgery.

18. Which of the following are contraindicated for an MRI exam?

- a. cardiac pacemaker
- b. Swan-Ganz catheter
- c. aneurysm clips
- d. all of the above

19. It is acceptable to loop an insulated surface coil cable around a subject's arm or leg to help keep the cable from getting caught in the table.

- a. True
- b. False

20. Cryogenics are...

- a. industrial strength cleaners.
- b. sedatives.
- c. liquefied gases used to cool a superconducting magnet and are deadly to breathe.
- d. sewer gases.

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21. A quench is...

- a. a relief of thirst for a hardworking researcher.
- b. a rain cloud that occurs inside of the magnet room due to overuse of the magnet by physicists.
- c. a rapid, usually undesired, release of the cryogens which causes a rapid decline of the magnetic field.
- d. the German word for magnet.

22. The first thing that you should do if a quench occurs is...

- a. call 117
- b. call the service engineers.
- c. immediately remove the subject from the scanner.
- d. call the EPA

23. If during a quench the cryogens do not vent out of the room properly a vacuum may form making it difficult to open the door to the magnet room to get the subject out. If you are unable to open the door, you should...

- a. sit and wait..
- b. use a blow torch to burn through the door.
- c. break the window between the control room and the magnet room.
- d. panic.

24. If your subject becomes short of breath while in the MR scanner you should immediately grab the oxygen tank off of the crash cart and administer oxygen.

- a. True
- b False

25. It is O.K. to let someone go into the magnet without emptying their pockets of metal objects if they are only going to be in there for less than a half hour.

- a. True
- b False

26. Which of the following objects are approved for entry into the MR scanner room.

- a. stethoscope
- b. hemostats
- c. employee I.D. badges
- d. small paper clips and coins
- e. none of the above

27. The system stop key will cut power to...

- a. all computer cabinets except for the gradient chiller cabinet.
- b. the lights.
- c. the fire alarms.
- d. the automatic sprinklers.

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28. If you get a message that the gradient chiller system is malfunctioning, you should immediately...

- a. continue to scan because the chiller is on automatic controls.
- b. run from the room screaming.
- c. stop scanning to avoid overheating the gradients.
- d. call 117.

29. If the subject sets off the patient alarm during the scan you should...

- a. page the MR research nurse/technologist
- b. tell the patient to be patient.
- c. communicate with the subject to check on their status.
- d. turn off the alarm and keep scanning.

30. Which of the following are contraindications for MRI?

- a. cochlear implants
- b. neurostimulators
- c. patient controlled anesthesia devices
- d. all of the above

31. Pregnant women should never be scanned in our research facility.

- a. True
- b. False

32. Pregnant research staff members are not permitted to enter the magnet room.

- a. True
- b. False

33. Which of the following is the correct method of investigating a metallic implant in a subject?

- a. Take the subject's word that their implant is non-ferrous.
- b. Call the surgeon responsible for placing the implant and get a detailed written operating room dictation explaining where the implant was placed, what it is, what it is made of, the manufacturer, and the model name and number.
- c. Ask the subject's family member.
- d. Call a physician referral service.

34. Any time a patient is scanned for research purposes, a medical doctor or other qualified medical personnel associated with the study must be present or in the near vicinity, and available at all times.

- a. True
- b. False

35. The MR compatible monitoring system that we have available to us is capable of measuring which of the following?

- a. ECG and heart rate
- b. Blood pressure
- c. Blood oxygen saturation
- d. all of the above

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36. It is O.K. to leave a subject lying on the table outside of the magnet bore while you leave the room.

- a. True
- b. False

37. All subjects undergoing an MRI should be given ear protection in the form of earplugs and/or the noise cancellation headphones.

- a. True
- b. False

38. Every person that enters the magnet room should have completed a screening questionnaire regarding metal in the body.

- a. True
- b. False

39. It is mandatory that research subjects remove all metal, metal jewelry, clothing with metal on it, and pocket contents before having an MRI scan.

- a. True
- b. False

40. Metallic objects in the body will produce an artifact on the images that looks like...

- a. a black signal void with bright edges.
- b. a green streak.
- c. a line through the image.
- d. pink swirls.

41. If caught in the magnet room during a quench where should you place your body to avoid inhalation of the cryogenes?

- a. On top of the scan table.
- b. Perpendicular to the main magnetic field.
- c. As close to the floor as possible.
- d. Pressed up against the window between the scan room and the control room.

42. The simplest way to stop a measurement is to...

- a. click the left mouse on the stop button on the "change" or "position" menus of the scan console.
- b. quench the magnet.
- c. turn the key off.
- d. speak the word "stop" into the microphone.

43. Which of the following is the correct reason to shut the MRI system down (not the magnetic field).

- a. Building utilities are to be shut off.
- b. The scanner applications have locked up.
- c. No one is going to be using the system for several hours.
- d. all of the above.

44. When should the doors to the magnet rooms be shut?

- a. When measurements are running.
- b. Whenever the system is not in use.
- c. Whenever there is the potential that someone not associated with the study will wander into the room.
- d. all of the above

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45. If an acquaintance of yours asks you to take them into the magnet room to look at it, what do you do.

- a. Take them right in.
- b. Insist that they empty their pockets and then take them in.
- c. Tell them absolutely not, under any circumstances will you let them in.
- d. Screen them for metal in their body as if they were a patient and if they are cleared, have them remove all loose metal from hair, pockets, and clothing, and then take them in the room.

46. All subjects must complete a consent form before having an MRI scan in the research facility.

- a. True
- b. False

47. A volunteer had an MRI scan six months ago and they are now participating again. What documents do they need to complete?

- a. None, the ones they completed before are still good.
- b. Screening form only.
- c. Consent form only.
- d. Consent and screening forms.

48. Under normal circumstances when the MRI scan is not an emergency, subjects who have had non-ferrous metal e.g., orthopedic screws or plates, surgically implanted must wait how long before they can undergo an MRI scan?

- a. 2-6 weeks
- b. 5 years
- c. 1 year
- d. forever

49. Subjects who have metal devices which are not contraindicated for MRI i.e., heart valves, venous blood clot filters, surgically implanted, must wait how long before they can undergo an MRI scan?

- a. 2-6 weeks
- b. 5 years
- c. 1 year
- d. forever

50. After completing an experiment, you should...

- a. leave the room clean and tidy.
- b. leave the room as you found it.
- c. leave the phantoms on the floor.
- d. call the technologist to clean up the room.

51. Ferromagnetic objects are dangerous to take near the magnet because...

- a. they can become projectiles and harm the subject.
- b. they will burn the subject.
- c. they become very heavy.
- d. there are too many north poles and the subject gets dizzy.

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52. The leads for cardiac gating must be handled as follows.

- a. wound together and routed down the center of the magnet.
- b. run in parallel across the subject's chest.
- c. placed on the shin of the subject.
- d. coiled in a loop and placed across the subject's chest.
- e. none of the above.

53. Echo-planar imaging and other sequences can be quite loud. You should...

- a. tell the subject to grin and bear it.
- b. have the subject cup his hands over his ears.
- c. use ear plugs and/or ear phones to dampen the sound.
- d. have the subject sing during the scan to dampen the sound.

54. Consent forms must be signed by all subjects when non-FDA sequences are used.

- a. True
- b. False

55. While scanning a subject for a heart study, he suddenly complains of chest pain. You...

- a. tell him to remain quiet until the sequence is finished.
- b. ignore his complaints.
- c. immediately remove him from the scanner, get him out of the room, and call 117.
- d. give him a drink of water and put him back in the scanner to continue the exam.

56. All ferrous devices and devices containing motors or questionable ferrous parts should be secured when brought into the magnet room.

- a. True
- b. False

57. The five gauss line is...

- a. A pixel line in the matrix.
- b. The magnetic field line territory at which the magnetic field can become harmful.
- c. A catheter inserted into the femoral artery.
- d. A geometric theorem.

58. Where are the five gauss lines located in our MR research facility.

- a. At the RF window/screen between the control room and the magnet room for the 3T.
- b. At the orange tape on the floor between the console room wall and the 1.5T magnet.
- c. At the hallway entrance door of the console room for the 4.7T system.
- d. All of the above

59. When a subject is in the bore of the magnet it is O.K. for the researcher to leave the control room ...

- a. to check the weather outside.
- b. whenever he feels like it.
- c. when he wants to get himself a soda.
- d. if, and only if, he gets someone else to monitor the subject for him while he is gone.

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60. Potential subjects who have magnetically controlled artificial body parts or prostheses such as artificial limbs or eyes cannot undergo an MRI exam.

- a. True
- b. False

61. Assume you are using the head coil to image a patient and that the next patient will have a body scan. When the patient scanning is completed and you have taken the patient out of the room you should:

- a. pull the table out and carefully remove the head coil and put it away
- b. rip the expensive head coil out of its support with no regard for its expense because you have to get ready for the next patient or volunteer
- c. call the research tech for help
- d. slide the head coil to the other end of the patient table