

Educational Instructions for new Employees - Superuser Agreement MRI-Lab Graz

1. Interaction of the static magnetic field

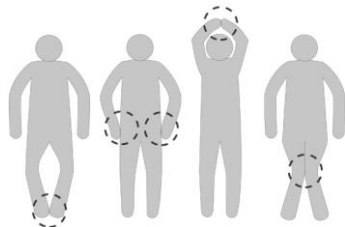
The very high static magnetic field of 3 Tesla is switched on permanently and this is independent of the operating hours. It is switched on 365 days a year and 24 hours a day, even if the scanner is shut down. The following interactions of the static magnetic field with ferromagnetic objects have to be considered:

- a. a huge torque on elongated ferromagnetic objects
- b. an action of force on ferromagnetic objects acting in the direction to the center of the magnet

This force can be very high even on very small objects and can in general not be handled. This force increases the nearer you are the magnet. At a certain point it increases abruptly to nearly the maximum.

2. Biologic interactions:

- a. Static magnetic field: Dizziness, sickness, a strange taste, visual sensations like flashlights are possible if you do quick movements near the magnet, but this is very unusual. Long term effects are not known.
- b. Gradient Fields: Peripheral nerve stimulations are possible
- c. RF-field: Some local heatings are possible, especially if the patient builds loops with its arms and legs. If a patient has conducting implants it can even lead to a local burning.



3. Access:

- a. All potentially dangerous devices have to be deposited latest in the room of the scanners console (mobile phones, watches, keys, jewelry, hair clips, bank cards, coins, paper-clips, pens, ...). **Important:** loose objects in the pockets
- b. Every time you enter the scanner-room perform a short self-check
- c. If you leave the console, even only for a short time, lock the door.
- d. Use inside the scanner-room only MR-certificated devices.
- e. Unauthorized persons are not allowed to enter the scanner-room (**in no case**), especially persons with heart pace maker, metallic implants, vessel-clips, ...

4. Emergency stop switches:

- a. Table emergency stop: Located at the interphone and the table, use if someone is pinched by the table.
- b. System emergency stop: The electrical power supply of the scanner is interrupted, use if someone gets into the electric circuit; **Warning:** The main magnetic field stays active!!!

- c. Magnet emergency stop: Use **only** if a person is endangered by the static magnetic field. In all other cases call Siemens service. **Warning:** It lasts approx. 30-60 sec. until the magnetic field is shut down.
5. Explain the meaning of information and prohibition signs and refer to the MR-proven fire extinguisher.
6. Switch On/Off:
 - a. Only shut down the system if the table is in home position and lowered a little bit.
 - b. Only shut down if no external coils are connected to the system.
 - c. Do not move the table; connect/disconnect any coils, etc. during shut down or booting of the system. Wait with all actions until the gradient test is completed (you can hear 3 times a loud "tok").
7. Phantom fluids:

In the case of phantom leakage, use medical gloves to remove phantom fluids (fluids can be injurious to health). If fluids are penetrating into the hardware shutdown the system and call Siemens service.

Measurements including persons:

8. Check the system before an investigation; perform a short visual check of the system and the used external coils. Do not continue the measurement if the case or a part of the isolation is broken or you can see blank conductors. Please call Siemens Service.
9. Make sure that every test person has filled the questionnaire for test persons (yellow folder) and additionally explain the dangers according to metallic implants, pacemakers or iron splints.
 - a. Every implant is an absolute criterion for exclusion, because the subject has no benefit of this scientific investigation. Peanuts like iron splints in the eye can be a big problem, please advise the subject to that.
 - b. If you need a measurement on an implant carrier, please talk to our radiology technologist for further support. Do not perform the investigation on your own.
 - c. In the case of small tattoos advise the subject that a local warming is possible and to pay attention to that. If the warming is too high interrupt the measurement.
 - d. Pregnancy is an absolute criterion for exclusion.
 - e. If a person fulfills any criterion for exclusion, make sure that he/she cannot enter the scanner room.
 - f. Advise any person to deposit all metallic and ferromagnetic devices outside the scanner room.
10. Patient support:
 - a. Make sure that the subject lies comfortably on the patient table, especially for long scan-times.
 - b. Make sure that the subject does not make any loops with its arms or legs. If necessary place isolating material in between.
11. Because of the high level of acoustic noise, make sure that the person wears proper fitting ear plugs. The Siemens headphone alone is not sufficient (only for communication), wear additional ear plugs.

12. Laser positioning device:

It is a laser of class II, make sure that the subject does not look directly into the beam, damages on the eye are possible. Make sure that the subject closes its eyes or if not possible cover the eyes properly.

13. Check the interphone to hold contact with the subject.

14. Make sure that the subject is able to use the emergency-ball and instruct the subject to it.

15. Do not use first level mode on subjects, if it is absolutely necessary talk to our radiology technologist.

16. If you use ECG-Trigger or other external devices, make sure that connector cables run out in a straight way and preferably in the middle of the bore. Make sure that the cables do not make any loops and isolate the cables with additional foam material from the subject.

17. Things to do in case of emergency:

a. Medical emergency:

- i. Interrupt measurement immediately
- ii. Get subject out of the scanner (if not possible automatically, unlock the patient table)
- iii. If possible take subject out of the scanner room.
- iv. Lock scanner room and start first aid.
- v. Call emergency rescue service (144 or 0144)
- vi. A medical emergency does not justify a Quench

b. Fire:

- i. Interrupt measurement immediately
- ii. Get subject out of the scanner
- iii. Evacuate subject and all other attendant people
- iv. Call fire brigade (122 or 0122)
- v. If possible extinguish the fire with the MR-compatible fire extinguisher
- vi. If extinction is not possible any more, quench the scanner (Attention: shut down of the magnetic field lasts at least 30-60 sec.)
- vii. Instruct fire brigade and advise them according the high magnetic field

c. Quench:

- i. Interrupt measurement immediately
- ii. Get subject out of the scanner room, danger of suffocation or freeze by leaking helium
- iii. Higher danger for fire, because of condensed oxygen
- iv. Call Siemens service

d. Magnetic emergency (ferromagnetic object is attracted to the scanner):

- i. If no person is in danger, **do not quench**, call Siemens service
- ii. If a person is in danger or is pinched by the object, quench the scanner using the magnet-emergency stop switch. **Attention:** Make sure that the attracted object is secured mechanically, that no additional harm can be done by falling off of the scanner.
- iii. **Attention:** shut down of the magnetic field lasts at least 30-60 sec.

e. Power break down:

- i. Get subject out of the scanner

- ii. Electric movement of the patient table does not work anymore. Unlock patient table and do it manually.
- iii. **Attention:** main magnetic field stays active

18. Absolute criterions for exclusion are (especially for scientific investigations):

- a. Pregnancy
- b. Metallic implants of any kind, excluded dental brace or retainer
- c. Active implants
- d. Heart pacemaker
- e. Metal splints
- f. Special clarification for high risk professional category like metalworkers
- g. Large-area tattoos
- h. Persons having fever or high temperature

19. Introduction for special MR-hardware components

Herewith I declare that I received an introduction according to the safety requirements for working self-dependent and on my own responsibility on and with the MR-scanner according to the above mentioned contents.

With my signature I declare that I was introduced according to the above mentioned contents. All of my questions were answered satisfactorily and I feel able to work on and with the MR-scanner on my own.

Name and Date of Birth

Date and Signature

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