MRI SCANNING EFFECTS, HAZARDS & GENERAL SAFETY GUIDELINES

PURPOSE

- To ensure the safety of patients undergoing MRI examinations.
- To ensure that patients are aware of the risks associated with the MRI scanner.
- To ensure the proper attire for patients undergoing MRI examinations to minimize the risk of thermal burns.
- To ensure the safety of personnel and visitors while in the vicinity of the MRI scanner.

GENERAL COMMENTS

- MR imaging is contraindicated in patients with certain metallic and/or electronic implants due to the risk of implant malfunction, movement/torque and/or heating related to the static magnetic field, gradient magnetic fields and radiofrequency (RF) fields.
- There is a risk of injury to patients and personnel if there is inadvertent introduction of ferromagnetic materials in proximity to the MRI scanner due to the projectile effect.
- The magnetic and radiofrequency fields pose risks to decompensated cardiac patients, febrile patients and patients with impaired perspiration.
- There is a possible risk to fetuses and infants placed within the MR magnetic field for which data establishing safety of MR imaging are insufficient at this time.
- There is a risk of asphyxiation related to quenching of the superconducting magnet if gases are not properly vented to the outside environment.
- Warning signs and the establishment of security zones are recommended to minimize the risk of patient and personnel injury.
- Data are collected on patients with ferromagnetic materials that inadvertently enter the MRI scanner resulting in patient injury or burns. ERS incident reports are used as documentation for data collection.

DEFINITIONS

- <u>MR safe</u> implants/materials are those that are composed of nonmetallic, nonmagnetic and nonconductive components that post no known hazards in any MR imaging environment.
- <u>MR conditional</u> implants are those that have been demonstrated to pose no known hazards when imaged under specified conditions including static magnetic field strength, spatial gradient, time rate of change of the magnetic field, RF fields and specific absorption rate (SAR).
- <u>MR unsafe</u> implants are those that are known to pose hazards in all MR environments.
- <u>MR nonconditional</u> implants are those that have not received a designation of MR safe, MR conditional or MR unsafe or those implants in which any component is nonconditional.

- <u>Passive</u> implants are those that do not have electronic components (surgical clips, vascular stents, cardiac valves, orthopedic fixation hardware, etc).
- <u>Active</u> implants are those that have electronic components (pacemakers, defibrillators, cardiac event recorders, deep brain / spinal / peripheral nerve stimulators, cochlear implants, etc).

PATIENT PREPARATION PRIOR TO MR IMAGING

- Completion and/or re-verification of the patient's MR safety sheet (MI-0614A) or EMR safety form must be performed by the MR technologist prior to the patient entering zones 3 or 4 of the MR environment.
- Lockers are provided for patient clothing and other belongings.
- All patients must wear approved clothing (hospital gown or scrubs) and approved slipper socks. Undergarments and underwear must also be removed. Some fabrics contain small metal fibers which can cause thermal burns.
- All patients must also remove jewelry and other accessories.
- All patients will be provided ear plugs or headsets to reduce the risk of ear damage due to acoustic noise generated during the examination.
- All patients will be given the emergency ball with instructions to squeeze if any abnormal sensations occur or if the patient needs assistance during the examination.
- The MR technologist will visually and verbally monitor the patient throughout the exam.

MRI DEPARTMENT ZONES

- The MRI technologist will control access to areas around the magnet that exhibit magnetic fields in excess of established safety guidelines.
- Restricted areas include the MRI scan room, MRI control room, computer room and all other adjacent areas.
- The MRI environment is divided into zones:
  - Zone 1 - This includes all areas that are freely accessible to the general public. This area is outside the MRI department itself and is the area through which patients, health care professionals and ancillary staff access the MRI department.
  - Zone 2 - This is the area where MRI screening takes place. This is where patients are typically greeted but are not free to move about without the supervision of MRI personnel.
  - Zone 3 - This is the area where only previously screened patients and personnel may enter. This area is close to the magnetic field and may cause serious injury if ferromagnetic objects are brought in proximity. Access to this area is strictly restricted controlled by MRI personnel.

- Zone 4 - This area is the MRI scan room itself. This room should be designated with signage indicated, "The Magnet is Always On." The magnetic field is never off and is always able to pull ferromagnetic objects in.
- The MRI scan room door will be locked when an MRI technologist is not in the immediate area.
- When the MRI scan room door is closed, a yellow caution ribbon must be pulled across the scan room door frame.
- After normal hours, the MRI control room and MRI scan room doors will be locked. The MRI scan room door will also be blocked with a yellow caution ribbon across the door and signage indicating "DO NOT ENTER."
- After normal hours, prior arrangements must be made with the MRI department team leader or Medical Imaging manager to obtain entry into the MRI control room or MRI scan room
  - Only the MRI technologist, a member of Medical Imaging management or Trimedx personnel can unlock the door to the MRI scan room.
  - If prior arrangements have been approved, all personnel entering the MRI scan room must be screened prior to entering.
  - All tools or items to be brought into the MRI scan room must be approved by the MRI technologist, Medical Imaging management or Trimedx personnel.
  - The MRI technologist, Medical Imaging management or Trimedx personnel must remain onsite to secure the MRI scan room door.