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I. Completion of research MR studies at Lucas or departure from Stanford University

Attachments

Lucas Center Potential Abnormality/Incidental Finding SOP

Lucas Center Potential Abnormality/Incidental Finding Form
A. Lucas Center Magnet Suite & Magnet Room Access

Requirements to gain & maintain access to Lucas MRI scanners

Commitment of a MINIMUM of 6 months using or assisting at the MRI scanners.
Complete attendance at the Lucas Safety & Policy Review

Absence of 3 months or more from scanning or assisting with scans at Lucas Center:
Required to complete online Lucas Safety & Policy Review

One year after completing Lucas MR Safety & Policy Review, researchers are notified via email to take the annually required online training.
The online training is accessed under Quick Links at http://med.stanford.edu/lucasmri.html

B. Lucas Center MR Scanner Contacts

Anne Marie Sawyer, BS, RT(R)(MR), Cell 650.302.2846; Desk 650.725.9697
Kevin Epperson, RT(R)(MR), Cell 650.387.0194; Desk 650.724.9887
Karla Epperson, RT(ARMRIT), Cell 501.276.9448; Desk 650.725-7911
Gary Glover, PhD, Desk 650.723.7577; Cell 650.302.6902
Bob Herfkens, MD, Pager 13662; Cell 650.868.8479; Desk 650.723.4733

C. Scanning at the Lucas MR Scanners

Investigational Review Board (IRB) Approval

Scanning Human Subjects at Lucas Center

All scan subjects, volunteers & patients required to undergo ‘Informed Consent’ before scanning.
No human being is to be scanned without first being enrolled in a research study by undergoing the Informed Consent process.
This is required by Federal law; Stanford University acts as an accredited agent for the FDA

Consent form + HIPAA form

In a language the human subject can read
Scan subject/patient to read & sign (2 places)
Researcher conducting informed consent to sign (1 place)
Give copy to scan subject (Stanford University requirement)
Scan subjects should keep with medical records for future reference
Principal investigator keeps signed consent form in locked file with completed screening form

Scan Subject/Patient Issues

Researchers must discontinue scanning at the subject’s request (per informed consent)
Please report any unusual or distressful events to Lucas contact(s)
Includes seizures and/or loss of consciousness
Please report all complaints to Anne

Directions/Maps & Parking

Please provide contact names, phone numbers & maps to your scan subjects
Please provide more than one name & phone number
Maps included in handouts & at website http://med.stanford.edu/lucasmri/directions.html

Parking slips are located in magnet suites
Scan subject use only (not for researchers)
Use at 3 marked parking spaces on Welch Road Monday-Friday, 8am-5pm
Security Issues
Please follow Lucas policies regarding security issues
Valid Lucas card access required to enter Lucas building & magnet suites
Do not allow anyone to enter through locked doors without a valid Lucas access card
Please report any suspicious behavior immediately to:
   Stanford Security (650.723.7222)
   Stanford University Deputy (650.329.2413)
Lucas Center contacts

Entering the Magnet Suites
Courteous behavior is required at all times
Obtain permission to enter all magnet suites
Call from Lucas lobby to obtain approval to enter magnet suites before your scheduled scan time
Magnet suite phone numbers
   3T1: 498-5159, 723-2828
   3T2: 721-2270, 721-2284
   3T3: 723-8693, 723-8692, 498-4651
   7T: 724-7515
Obey signs posted for confidential or animal model studies being conducted.

Scanning Subjects & Patients
Human scan subjects must be ambulatory (ie. able to walk unassisted)
   No lifting of scan subjects
   If scan subject population cannot walk into magnet room & climb up onto table, please contact Anne for procedures to ensure safety for researchers and subjects/patients

Only outpatients are scanned at Lucas Center
   Lucas is not licensed by state to scan in-patients from any facility including Stanford Hospital

REQUIRES SPECIAL APPROVAL
Injection or administration of any drug NOT allowed by anyone at any time including PIs and/or MDs unless pre-approved by Stanford IRB and Lucas Safety Committee (Anne, Gary, Bob)
No sedatives, sedation or conscious sedation given or taken by scan subjects at Lucas Center unless:
   (1) approved by Stanford IRB and Lucas Safety Committee;
   (2) Anesthesiologist/MD and MR Technologist are present for the entire examination; and
   (3) physiologic monitoring is used (Heart rate, SpO2, and blood pressure).

Use of MR contrast media (IV & oral)
   Please see Anne for policies & procedures including MD and MR Technologist present

Scans of human subjects are NEVER to be conducted for health issues not part of IRB-approved research studies.
Strictly prohibited:
   Scanning friends and/or family requesting MR examinations
   Scanning to investigate injuries or pain

Scans conducted at Lucas Center do not include image interpretation by radiologist or physician (unless study conducted by Radiology or for incidental findings).
MR images on a CD or DVD are **NEVER** to be given to scan subjects or volunteers for their physician or surgeon, or for personal use. One or two images printed from scanner may be given to the scan subject as a souvenir.

To prevent the spread of disease:
- Wash hands or use anti-bacterial sprayers, before positioning subject and immediately after positioning subject.
- Use gloves with bite-bars
- Use sanitary covers for auditory ear phones & ear muffs
- Wipe all positioning pads & sponges used with scan subject using antibacterial Sani-Cloths

**Scan subject preparation**
- Change out of street clothes into Lucas scrubs
- Remove all bras including sports bras
- Remove underwear that is not 100% cotton material
- Please use foot covers over socks & bare feet
- Please use denture cups for any removable dentures or dental implants

Use underpads (Underpads/chux = absorbent tissue on one side & plastic on the other):
- To prevent the spread of disease
- To prevent damage to equipment & sponge pads
- Use with these subjects and scans:
  - Children, Elderly, Confused
  - Animal models
  - Cadavers & tissues
  - Phantoms (fluid-filled bottles)
  - Meat, fruit, vegetables
- Table set up for children, elderly & compromised subjects includes overlapping underpads (chux) on table pad first then place sheet over.

Prior to scanning, check all equipment & accessories (you will be using) for damage including:
- (if damaged do **NOT** use – contact Anne immediately)
  - RF coils
  - Cables
  - Mirrors & projection screens
  - Physiologic monitoring
  - Eye tracker, EEG
  - Response boxes
  - Thermode
  - Etc.

First time use of equipment at the Lucas Center magnets requires training by the MR Technologists including:
- GE Equipment
  - ECG cable
  - Plethysmograph
  - Respiratory bellows
- Lucas ancillary equipment
  - EEG
  - GSR/EDA
  - Optoacoustics earphones
At end of exam, coil all cables neatly & hang on shroud (magnet covering) on hooks present
(Cables are very expensive and very fragile so please use gently)
Plethysmograph
Respiratory bellows
ECG cable
Squeeze ball
Response boxes

To prevent injuries as the scan subject moves in and out of the bore of the magnet, please instruct ALL scan subjects they are not to touch or rearrange any equipment at any time including:
  Mirror
  Projection screen
  RF coil
  Cables
  Respiratory bellows
  Monitoring devices

Mirrors & Projection Screens on RF coils
  1 - Closely watch mirrors & screens as scan subject is ADVANCED INTO magnet bore
     Keep a finger on 'Stop Table' button located on control panel on front of magnet
     Press 'Stop Table’ button to prevent injury or damage
  2 - Closely watch mirrors & screens as scan subject is MOVED OUT OF magnet bore
     Keep a finger on 'Stop Table' button located on control panel on front of magnet
     Press 'Stop Table’ button to prevent injury or damage

MR Scanner Operation
  Make prints of scan screens at MR scanner of your scan protocols including all scan parameters
  Bring prints of your scan parameters with you every time you scan
  (will be needed in the event of a software issue)

MR Image & Data Review
  Please check reconstructed images at MR scanner for:
    Subject motion
    Artifacts (if metal artifacts present in images, STOP scanning immediately)
    Potential abnormalities/Incidental Findings

Check all other data as soon as possible to identify:
  MR system problems
  Scan parameter problems
  Scan subject motion

Possible Abnormalities (Incidental Findings)
  Please review all images reconstructed at scanner & during your post-processing
  Please keep confidential from scan subject & family members
  Please contact Kevin or Anne -or- send email to Kevin with cc to Anne
  Please review Lucas abnormality (Incidental Findings) policy (attachment)
Scanning at the Lucas MRI scanners
At the completion of your scanning session, please clean up:
- Magnet room
- Control room
- All areas of the magnet suite used by you & your scan subjects
- Wipe all sponges and equipment used with Sani-Cloths

Adhere to Scheduled Scan Time
- Please do NOT request additional time from researchers following you as it affects the magnet schedule and compromises studies being conducted by other labs
- Scanning MUST END with enough time to clean up the magnet room appropriately without affecting the lab whose researchers follow you on the schedule
- A minimum of 10 minutes must be included at the end of the scheduled scan time to allow for proper magnet room cleaning and organization.
- Please use cell phone for time reference (do NOT use wall clocks or scanner clock)

Exit Forms
- All human scan subjects complete Lucas ‘Exit Form’ at completion of MR scan
- Please leave completed Exit form in wall file in the control room of magnet suite

End of MR Examination
- Please escort ALL scan subjects to the lobby of the Lucas Center

MR Scanner Issues
- Call Lucas contact(s) for support
- Make entry at Scanner Reports website
  - Find under Quick Links at http://med.stanford.edu/lucasmri.html
  - Please include as much detail as possible

Lucas Center Computers
- Return to default orientation
- Do not load software (contact Anne first)
- Please do not use for email or checking random websites
- Dell PCs in magnet suites are used for temporary storage (maximum 2 weeks)
- iMacs in magnet suites are used for temporary storage (maximum 1 week)
- Ensure images & raw files (P files) saved before leaving the magnet suit
  - P files are deleted automatically when 12 hours old

D. MR Safety & Screening

MR Safety Rules
- Use every time you are in the MR environment
  1. Make no assumptions
  2. Trust no one
  3. Ask questions
  4. Screen 4 times
  5. Know your RF coils
  6. No loops (in cables or humans)
  7. Keep the magnet room door closed
  8. Remain vigilant; watchful & alert, especially to danger or something that is wrong
MR Safety Risks
Main MR risks are due to:
- Static main magnetic field ($B_0$)
- RF electromagnetic fields ($B_1$)
- Varying gradient magnetic fields ($G_{xyz}$)

Metal in a magnetic field can do one or more of the following:
1. Move (Translational attraction)
2. Turn (Torque)
3. Heat
4. Cause artifacts in images & data

MR Safety Precautions for Researchers
Dress code for RESEARCHERS working around magnets
(includes faculty, researchers, students, post-docs, research associates, etc.)
Remove all hairpins, barrettes, loose earrings, body piercing(s)
Remove all analog watches, hearing aids, credit cards
Remove all jackets with metal buttons
Check all metal closures & buttons on clothing to ensure they are securely fixed
Check hair extensions for metal attachments
Empty ALL pockets on shirts & pants of ALL items; stick hands inside of pockets to check
OK: eyeglasses, digital watches, belts, secured earrings & necklaces

Projectiles (Missiles)
Common projectiles ($B_0$) not to be taken into the magnet room at any time
- Paper clips & staples
- Hairpins
- Barrettes & hair accessories
- Jewelry (earrings)
- Coins (non-USA) Ferrous coins include Canadian, Euro, Chinese, etc.
- Keys
- Metal buttons & hook/eye
- Batteries
- Hearing aids
- Scissors
- Pocket knives
- Flashlight
- Cell phones
- Tools
- Notebooks
- Pens & pencils (Retractable pens and pencils have tiny springs which are very ferrous)
- Safety pins
- Stapled papers/magazines

Additional items cannot be taken into the magnet room
No stuffed toys from home
No pillows from home

Testing New Accessories and Equipment
Please do NOT test any new accessories or equipment for magnet safety
Please contact Anne for testing
Use of Handheld Magnets for Testing

- Neodymium magnet, 1200 Gauss (0.12T), www.mrimagnet.com
- Magmedix magnet, 22 lb., 1000 Gauss (0.10T)
  For equipment testing only
  Remember: these handheld magnets are not as strong as the Lucas magnets

New Accessories & Equipment

- All new accessories, equipment & RF coils must be approved by Anne before taken into the magnet room.
- All items will be safety tested for ferrous metal parts & the presence of electronic noise that would affect image data.

Items in Patient Prep Room Not Allowed in Magnet Room

- Anything with this sticker on it: ‘Not MR Safe’ is not to be taken into magnet room(s) at any time for any reason

Use of Rubbermaid Carts

- Rubbermaid carts may be taken into magnet room (casters are ferrous)
  - AFTER all shelves checked for metal items
  - AFTER all metal items removed from cart & shelves
  - Cart is kept a safe distance away from magnet (eg. length of patient table)

Retrieving Ferrous Projectiles or Missiles

- If a ferrous metal item is pulled into bore of magnet:
  - Do NOT ATTEMPT TO REMOVE IT no matter how small the item or object may be
  - GE service is required to remove item from magnet
  - Please contact Anne, Kevin, Karla or Gary immediately
- Ferrous items are to be removed by GE service ONLY in order:
  - To ensure minimal damage to the magnet, RF coil & enclosure (shroud)
  - To ensure injuries do not occur to you, other researchers or scan subject.

Maintain Restricted Access to MR Scanner Rooms

- No visitors or tours in magnet rooms at any time for any reason
- All others require approval from Anne AND completion of Visitor Screening forms
- Contact Anne for ALL tours, classes, videos or pictures for TV, web casts, presentations, papers, journals, magazines, etc.
- Maintenance personnel are screened by Kevin, Karla, Anne or John Mendoza (Lucas Building Manager)

MR Pre-Procedural Screening

- Lucas Center scans NOT clinically-ordered MR exams
- Human subjects are “volunteers” enrolled in research studies
- No formal image interpretation conducted by a board-certified radiologist
- Lucas screening procedures do NOT include ‘Benefits vs. Risks’ assessment as do clinical counterparts such as hospitals & clinics
- Previous MR scan does not mean the scan subject will be allowed to be scanned at the Lucas Center
Please screen 4 times for each scan subject

1 - Telephone or email screening
   
2 - Scan subject completes printed screening form on day the of the scan and researcher
   reviews completed form with the scan subject/patient
   
   **Must use forms provided by Lucas at the Lucas Center – do not copy forms at any time**

3 - Visual & verbal screening at the dressing room
4 - Visual & verbal screening at magnet room door BEFORE entering magnet room

Telephone pre-screening includes the following instructions to ALL scan subjects:

- No makeup, no lipstick, no eye shadow, etc.
- No wet hair; no hair products or treatments, hairspray, etc.
- No hair extensions, wigs, toupees, etc.
- No hair pins or barrettes (all subjects must run fingers through hair)
- Please leave all hair accessories, jewelry and body piercing at home

MR Screening Form

Use current Lucas Center screening forms (Revision “16_0927”)

Completed ON-SITE at Lucas Center on the day of the subject's scan

Scan subjects & volunteers complete a screening form each & every time they are
scanned at Lucas Center

**Must use forms provided by Lucas at the Lucas Center – do not copy forms at any time**

Screening form is completed in its entirety including ‘patient identifiers’ such as Name,
Birthdate, Gender, Height, Weight, Address, primary care physician, and medical
history to ensure accuracy, patient safety and in the event of a loss of consciousness
and other event requiring 9-911 to be called

After scan subject/patient completes screening form, individual who is to take the scan
subject/patient in the magnet room, is to verbally review the completed form with the
scan subject/patient to ensure accuracy in reporting current physical conditions; that
person then PRINTS their name at bottom of screening form in field provided **before**
the scan subject/patient is taken into the magnet room.

Completed & signed screening form is attached to signed Consent form

All signed forms kept in a locked file with Principal Investigator

Please stress importance of MR screening form to scan subjects.

Please remind scan subjects that accuracy in completion of screening form is crucial to
their safety

**Approval for MR Safety & Screening Questions**

For all MR safety & screening questions concerning any implant, device or condition:
Contact **ONLY** Anne or Bob.

**ONLY** Anne or Bob can approve human subjects to undergo MR scans at Lucas Center
    - or - for a researcher, patient spouse or parent, to enter magnet room

Cannot reach either Anne or Bob?
   Do **NOT** take the scan subject into magnet room

Do **NOT** put scan subject/patient in MR scanner nor scan him/her
**Previous Surgeries**

If a scan subject has had previous surgery on any part of their body or brain, please contact Anne or Bob before taking the scan subject into the magnet room.

If a scan subject tells you the device that was implanted during their surgery is made from plastic, you are required to contact Anne or Bob before taking the scan subject into the magnet room.

There are no exceptions to this policy.

**Scan Subject Preparation for MR Examination**

3T1, 3T2, 3T3:  
Recommended for BRAIN scans > change out of street clothing into Lucas scrubs  
Required for BODY scans > change out of street clothing into Lucas scrubs  
Includes all scans of anatomy below brain Including neck, shoulder & chest

7T: Required for All scans – All anatomy – NO exceptions  
Required to change out of street clothing into Lucas scrubs

**Street Clothing Dangers**

Beware of hidden dangers in street clothes (will result in patient burns)  
- Metal buttons  
- Metal hooks and eyes  
- Metal threads  
- Metal in underwear  
- Antimicrobial solutions (will result in fiber burns)

Before scanning the scan subject or volunteer is to remove:  
- all jewelry & hair accessories  
- eyeglasses  
- contact lenses (if concerned about artifacts & eye motion)  
- all clothing with metal buttons or fibers, or special material treatment (eg. antimicrobial)  
- all items from all pockets  
- all bras (brassieres) including exercise  
- their shoes (use foot covers)

Scan subjects (male & female) must run fingers through hair before entering magnet room

All personal items belonging to ALL scan subjects to be secured in patient locker

Before you (the researcher) enter the magnet room:  
- Visually & physically screen YOURSELF & hands are placed INSIDE of all pockets  
- Visually screen your CO-WORKERS  
- Visually & verbally screen your SCAN SUBJECT

**Maintain a Closed MR Scanner Room Door**

Keep magnet room door closed at all times.  
Unless it is being ‘closely’ monitored by someone standing in it to prevent access by inappropriate individuals.
Monitor Individuals in the MR Suite
Please monitor all individuals present in MR suite including:
- Spouse of patient
- Parents of patient
- Family members of patient

Only individuals allowed to enter the MR Scanner room include:
- Researchers completed Lucas MR safety & policy course
- Scan subject (after completion & review of Lucas screening form)
- One spouse/parent to accompany scan subject (after completion & review of screening form)

E. RF Electromagnetic Fields (B₁)

Risks of B₁
Heating of metal or device, associated components, and/or surrounding tissues
Heating occurs due to:
1. Exposure (close proximity) to transmit RF coil or focus in area (antenna effect)
2. Currents induced in conductive devices
   - Cable forms loop with itself
   - Cable forms loop with other cable
   - Cable forms loop with human body
   - Human body forms a loop with itself
3. Cable or human touches magnet bore wall
4. Inappropriate use of a RF coil
5. Use of equipment not ‘MR safe’

To prevent injuries (burns) to scan subjects & damage to equipment, researchers must know:
- Operation of the RF coil(s)
- Safe utilization of RF coil(s)
- Correct coil selection in MR scanner software
- Thorough pre-procedure screening & change out of street clothes

First Time Use of RF Coils & all other equipment (ECG, Plethysmograph, EEG, eye trackers, etc.)
All first-time use of any RF coil & equipment at all Lucas Center magnets requires the training & approval from either Kevin, Karla, Anne or Gary.
There are no exceptions to this policy.

Communication with the Scan Subject / Patient
- Provide instruction before the exam
- Explain use of the squeeze ball
- Researcher verbally checks in with subject at end of each scan AND immediately before each scan
- Researcher maintains CONSTANT visual contact with scan subject

Operation of RF Coils
- Receive-only RF coils utilize Body Coil to transmit RF (located within shroud covering of magnet)
- Using the RF Body Coil as transmit RF coil, transmission of RF occurs along the entire length of Body Coil, not only in the area of the receiving RF coil.
- Any cables or human body located within area of transmitting RF coil are at risk for burns if a loop is present (due to induced currents) or if arms or cables are touching magnet bore wall.
Presence & Positioning of Cables with Magnet Bore

Loops of cables cannot be present inside the bore of the MR scanner
This includes U-shaped loops, S-shaped loops and crossing of cables
Cables must be routed out of the magnet bore directly out from the patient without loops &
without touching patient or magnet bore wall

Use of Sponge Pads to Separate & Insulate

Sponge pads are required to separate & insulate with ¼ inch (0.635 cm) of air GUARANTEED
Absolute requirement to scan human subjects
Sponge pads are REQUIRED between arms & magnet bore walls, and to provide insulation
and separation for:
Physiologic Monitoring
Response Boxes
EEG (electroencephalography)
Eye Trackers

If you cannot guarantee insulation of ¼ inch of air between body and body wall, DO NOT SCAN.

Potential for Induced Electrical Currents in Cables

Presence of metal, conductors, loops of cable, and the human body increase the risk for induced
electrical currents.
Induced electrical currents result in excessive heating which causes patient burns & equipment
damage
This includes product ECG cables and RF coil cables
To prevent, pad the arms & any other anatomy that touches the bore walls & ceiling of the
magnet.

Potential for Induced Electrical Currents in Human Scan Subject/Patient Loops

The potential exists for a scan subject to form a loop by touching another part of his/her body.
Instruct scan subjects not to clasp hands, cross ankles, place a hand against their forehead, etc.
during the scan.

Inappropriate & Unsafe Use of RF Coils

Please do NOT use cardiac array coil or abdominal array coil to wrap around a joint
Do NOT overlap cardiac array coil or abdominal array coils
Do NOT position one RF coil inside another
Do NOT leave unplugged RF coil on magnet table or in magnet bore during scanning
Please contact Kevin, Karla or Anne for assistance

Tattoos

Please warn scan subjects/patients with tattoos that the pigment in their tattoos may be
ferromagnetic which if in the area of the transmitting RF coil could result in a localized, short
term cutaneous reaction including skin reddening, irritation, pain and swelling which could
last one to three days.
Please contact Anne for any scan subjects with tattooed eyeliner planning to undergo an MR scan
of the brain at the Lucas Center.
F. Gradient Magnetic Fields (Gxyz)

Risks of Varying Gradient Magnetic Fields
Risks due to rapid switching of varying gradient magnetic fields determined by:
1 - Size (maximum amplitude)
2 - Speed (slew rate)

High speed systems
120-200 mT/m/msec (slew rate)
20-50 mT/m or 2-5 gauss/cm (amplitude)

Gradient magnetic fields larger at ends of magnet
Concerns:
Induce currents in conductive material or body (although power significantly less than RF)
Auditory effects ($>0.3$ Tesla)
Peripheral nerve stimulation ($\Delta B/\Delta t$)

Acoustic Noise
Hearing protection (earplugs or headphones) is required for everyone being scanned or present in MR scanner room during MR scan
No exceptions to this policy.
Earplugs must be 'NRR' rated.
If earplugs cannot be positioned correctly and other hearing protection cannot be employed, do NOT scan the subject
Please instruct your scan subject to notify you immediately during scanning:
If earplugs become loose or fall out
If noise of scanner becomes bothersome or irritating
Please refer to instructions posted in the magnet suites to assist in the proper placement of earplugs.
Audio delivery headphones do not require additional hearing protection (e.g. earplugs) with the exception of the ‘flat’ Optoacoustics earphones which do require earplugs
Earmuffs used on scan subjects in the bore of the magnet MUST be used with earplugs.

Peripheral Nerve Stimulation
Peripheral Nerve Stimulation is not life-threatening but can be uncomfortable or painful
To avoid Peripheral Nerve Stimulation in your scan subjects, select “Normal” under dB/dt
Please contact Kevin, Karla or Anne for assistance

G. Presence of Biomedical Implants & Devices

Screening of Biomedical Implants & Devices
Presence of biomedical device or implant, submit information to Anne or Bob
The presence of implants or devices is not dependent upon the age, apparent condition or health of the scan subject/patient
Implants can be located on the inside or on outside of the body
ALL scan subjects with implants and/or require approval from Anne or Bob BEFORE scan subject may be taken into magnet room and/or scanned.
This includes ALL DEVICES & IMPLANTS despite what the scan subject or their physician or surgeon tells him/her or you.
Contraindicated implants & devices for Lucas MR scans (examples, not an all-inclusive list)

- Pacemakers & implanted defibrillators
- Aneurysm clips
- Neurostimulator or Deep Brain Stimulator
- Insulin pump
- Acupuncture beads or needles
- Envoy Medical ‘Esteem’ Hearing Implant
- Vagal Nerve Stimulator (VNS)
- Pacemakers & implanted defibrillators
- Internal cardiac pacing wires
- Carotid artery vascular clamp
- Spinal or bone fusion stimulator
- Tissue expander
- Shanghai Ring IUDs
- Shrapnel, buckshot, bullets
- Electrodes on the brain
- Vagal Nerve Stimulator (VNS)
- Electrodes on the brain

Necessary Information for Decisions Concerning Biomedical Implants & Devices

Specific information must be supplied to Anne or Bob regarding device or implant:
- Name of manufacturer of device or implant
- Type, model #, serial #
- Material composition
- Date surgically placed
- Name of surgeon & hospital

Accurate documentation is required
- Patient cards provided to patient by manufacturer for implant or device
- Original package information from surgeon
- Contact manufacturer directly or visit their website
- Do NOT accept verbal reply

Body piercing & decorative implants are included in this category.

H. Emergency Procedures

Minimum Number of Researchers Scanning Evenings & Weekends
Scanning evenings, nights & weekends, it is recommended a minimum 2 researchers are present to ensure safety in the event the scan subject experiences difficulties

Emergency Response Procedures
Scan subject loses consciousness or other (e.g., heart attack, stroke, shortness of breath, syncope)
REQUIRES 2 PEOPLE TO COMPLETE THIS PROCEDURE
Call 9-911 (response time = 3 minutes)
One person goes to lobby to receive paramedics at Lucas lobby & lead to magnet suite
A second person quickly moves scan subject/patient out of magnet room on magnet table
No emergent care performed in magnet room
Close & monitor the magnet room door to prevent entry by paramedics
Call contact(s) for assistance (Anne, Kevin, Karla, Gary)

Emergency Evacuation of Scan Subject/Patient from the MR Scanner
Using the cradle release and undocking of the MR scanner table
- Rotate handle backwards to release the cradle (top of the MR scanner table)
- Rotate handle backwards & pull 'cradle' (top of the table) out of magnet bore
- Step on Undock Pedal to release table from dock at MR Scanner
- If Undock Pedal fails to release table from magnet, pull RED HANDLE located on lower right side of the MR scanner.
Magnet Quench Procedures

Cryogens (liquid helium)
- Used in superconductive magnets
- Helium maintains temperature of -270°Celsius (4°Kelvin)
- Maintains electrical current due to zero resistance
- At room temperature, helium becomes a gas (1:700)

During a quench, the magnet expels cryogens (liquid helium) in form of gas
- Normally, cryogens exit building through exhaust pipe

3 situations in which a quench occurs:
1. Controlled (by service engineers)
2. Deliberate (in a life-or-death situation)
3. Spontaneous (earthquake)

Researchers may be responsible to deliberately activate a quench in a ‘life-or-death’ situation
- eg. individual pinned to magnet by large metal object and has life-threatening injuries
- Deliberate quench conducted ONLY in life threatening situation

Quench results in:
- Magnet downtime
- Financial loss
- Potential equipment damage
- Possible personal injury

Magnet Quench Devices Location & Operation
- 3T1, 3T2, 3T3 located just inside of the MR scanner room door on the wall
- 7T quench box located in the control room

Magnet may quench during an earthquake
- Listen >> loud noise (helium being expelled)
- Look >> damage to helium exhaust pipe
- Look >> gaseous helium forming cloud

If a helium cloud forms in MR scanner room during a quench:
- Turn on exhaust fans
- Quickly move scan subject out of magnet room
- If necessary, open doors to vent cloud outside
- See floor plans & pictures
- Closely monitor area in which helium cloud is located to prevent people from entering it.
- Call Lucas contact(s) (Anne, Gary, Kevin, Karla)

Switches for exhaust fans at 3T1, 3T2 & 3T3
- Two locations, in magnet room & outside

Switches for exhaust fans at 7T
- One location, in control room next to magnet room door
**Emergency Assembly Point (EAP)**
Located in grassy area south of the Lucas Center between the MSLS and Redwood buildings.

**Earthquake**
Procedures depend upon severity of quake
- Monitor magnet for quench & helium exhaust pipe for damage
- During the earthquake
  - Scan subject should remain in magnet
  - Researchers should stand in door way away from windows or under desk
- After the earthquake
  - Check MR scanner exhaust pipe for escape of helium gas (in the event of quench)
  - Remove scan subject from magnet room
  - CLOSE magnet room door
  - Proceed to Emergency Assembly Point

**Fire Alarm is Heard**
- Remove scan subject from magnet room
- CLOSE magnet room door
- Evacuate MR scanner suite
- Exit Lucas Center through closest door
- Go to Emergency Assembly Point
- Remain there until approval is given that it is safe to enter building

**Fire (observed in the MR scanner suite or near vicinity)**
- Remove scan subject from magnet room
- CLOSE magnet room door
- Activate the closest fire alarm
- Evacuate magnet suite
- Exit Lucas Center through closest door
- Go to Emergency Assembly Point
- Remain there until approval is given that it is safe to enter building

**I. Completion of research MR studies at Lucas or departure from Stanford University**
- Notify Anne to be removed from distribution lists
- Return your Lucas access card to Anne