

**Safe Guide
Clinical Practice Coding
Magnetic Resonance Imaging (MRI)
Electroencephalography (EEG)**

Birkbeck/UCL Centre for Neuroimaging
26 Bedford Way

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The purpose of this document is to define a set of safety standards and safety procedures for conducting magnetic resonance imaging (MRI) experiments involving human subjects at the joint Birkbeck/UCL MRI Centre. The manual briefly describes the Centre's facilities, including the imaging modalities available.

A brief description of the principles of MR imaging is provided as background to the risks associated with MR experiments. Subsequent sections are organised into topics in line with requirements that must be implemented before an investigator begins work at the Centre.

The requirements to be met before scanning include:

1. Obtaining approved review of the study protocol from the Centre Directors after a scheduled project presentation;
2. Establishing a PI account and subject-screening documentation via the BUCNI website; and
3. Providing the Centre with an ethics code and approved Informed Consent form from the relevant ethics committee (typically UCL PALS or UCL Bioethics committee).

Pe e (a f 14 h Feb a 2022)

L e f Re b

Everyone in the magnet suite has the responsibility to ensure safety.

The Centre-Certified Operator running the console has the ultimate responsibility for enforcing safety standards.

No one may cross into the magnet room without approval from the Centre-Certified Operator.

Acce Fac e

scanning, head motion is restrained by padding inserted between the subject's head and the head RF coil or other similar support.

Definition (5-gauss)

Within the Avanto (1.5T) room, the 5-gauss line is marked around the magnet in red tape on the floor. In the Prisma scanner, the field extends around the entire exam room.

Tagged

()

Only individuals who have successfully gone through the Centre's training program may perform MR scanning. Centre Operator status is awarded following completion of BUCNI Operator Training. **Operator**
are designated as
Operator
trainees.

1.1 Operator trainees should have approximately 20 hours of hands on experience operating the scanner under the guidance of a BUCNI operator trainer. Operator trainers are the only people who can train new operators

b) Dealing with incidental findings

c) Possible emergency situations (eg metal in the scan room, medical emergencies, fi

responsible for safety around the scanner, although the scanner operator has ultimate responsibility (see Line of Responsibility, p.5).

There are minimum requirements regarding the number of BUCNI certified personnel in attendance under different circumstances, depending on the participant group and time of scanning:

	Monday - Friday 9:00-1800	Outside of hours
Head acc	1 certified operator	1 certified operator + 1 additional safety-trained person
Child (16 and adult head acc (>65))	1 certified operator + 1 additional safety-trained person	1 certified operator + 1 BUCNI-approved safety-trained person
Senior	1 certified operator + 1 additional safety-trained person	1 certified operator + 1 BUCNI-approved safety-trained person

Note that normal operating hours do not include Bank Holidays or other holidays where the University is not technically open. Scanning during holiday times, even when these occur between Mon-Fri, counts as outside of normal operating hours.

If there is any reason to question whether a person can be scanned, "they may NOT be scanned until the operator has written permission from the Director or Safety Officer (signature on Pre-Screen Form 1). "

Scanning sessions last approximately 0.5-2 hours. **Part of the
Centre, each bench becomes available every
weekend and for MRI (1.5T
3T).** If there are potential contraindications such as surgical screws, bolts, cardiac stents, orthopedic implants, joint replacements, intrauterine devices, and so on, and the participant is not a healthy young adult (e.g., easily substitutable), the research lead must send a completed MRI safety form to the Centre Director or BUCNI-director-appointed safety-trained evaluator. The participant **MUST NOT BE SCANNED** without written confirmation via a returned safety form that it is safe to do so.

The form is now online and sent directly to BUCNI:

https://uclpsych.eu.qualtrics.com/jfe/form/SV_38kG6VV1Xun9dxY

S b e c P c e

All records will be kept confidential. Following Centre specific format, a participant number will be recorded in the computer database for the scanner, along with a record of each of the pulse sequences used for the study. This record will be archived¹. No identifying information will be stored except the number provided by the PI. In this way the subject's anonymity is preserved while allowing the Centre to maintain records of the procedures used in each

- Subjects with whom no reliable communication can be maintained may not be scanned at the Centre.

As noted above, subjects must be screened for the presence of implanted or attached medical devices or other objects. For screening purposes approved forms have to be completed during recruitment into a study, and before a subject enters the magnet room. Subjects MUST be re-screened each time they are scanned.

Only a Centre Certified Operator should perform the screening prior to a study.

To permit an individual who screens positive for implanted or attached medical devices to enter the magnet room requires written permission from the Centre Director or the Safety Officer. They will require the name of the device, its manufacturer, and its part number, as well as a statement from the individual's GP. After the device is identified, documentation of its MR compatibility and safety is required. Please make sure to evaluate participants as far as advance as possible in that these decisions cannot be made on the fly.

De ce

Any non-BUCNI device (e.g., keypads, pulse-ox monitor, eye-tracker) must be approved in writing by the Director or the BUCNI MR physicist before it enters the magnet room.

Device approval must be documented on the MR Device Compatibility List (console room wall).

Special care will be given to positioning of any wires attached to the device. Wires should not touch the research subject. Wires should be kept straight and not contain loops.

E e g e c e

Including: fire, power failure, oxygen depletion, and accident.

The magnet room is equipped with oxygen monitoring. The control panel indicating the oxygen level within the room is on the wall of the control room. Should the oxygen level alarm sound then the magnet room must be evacuated immediately. Non-essential staff will also be evacuated from the entire suite. The doors to the corridor and the control room should be kept open to allow rapid restoration of oxygen levels. Two staff must remain on hand to maintain security of the area. These staff should reset the alarm when the panel shows that the oxygen level has returned to normal.

If a metal object traps a subject in or against the magnet bore and removal is not possible without quenching the magnet, press the Magnet Rundown System button on the RIGHT hand wall next to the control room window. The magnetic field will immediately drop to a level where metal objects can be removed. THIS IS A MEASURE OF LAST RESORT.

If possible, the magnet room should be empty of all personnel and participants before a quench takes place.

A quench is accompanied by a loud bang, causes the rapid loss of the magnetic field, and runs the risk of a helium leak

Any helium or nitrogen gas that might leak into the magnet room can displace oxygen. The Centre's magnet rooms are equipped with vents to provide proper disposal of cryogen vapours. However if the vents should fail, there is a risk of asphyxiation or frostbite. If the vents should fail during a quench, the operator MUST turn on ALL remaining working fans and open the doors to the

- Bomb threat: The Operator should immediately remove the participant from the bore of the magnet, lock the door of the scanner room, and await instructions from authorities.

See 'Lone Working'

L e W g

During normal working hours (9-6 Monday-Friday), it is possible (although not advisable) for a BUCNI Trained Operator to run participants without being accompanied by a second safety-trained person. However if there is only one operator, that person should contact a responsible person outside by prior agreement every hour. Failure to maintain contact will result in a call and/or visit from the named responsible person who must be aware of safety procedures within the unit and how to contact further assistance if necessary.

Lone working is fine when conducting administrative work and computing but not encouraged during scanning. In general, it is best to have at least two

S g a g e

All hazards are clearly signed, including magnetic risks, important devices (quench button), and areas of limited access.