COMMITTEE FOR PROTECTION OF HUMAN SUBJECTS (CPHS)
GUIDELINES ON MAGNETIC RESONANCE IMAGING (MRI) IN RESEARCH
Policies, Protocol Information, and Consent Form Language

A. CPHS Policies and Protocol Information

The following guidelines reflect standard procedures accepted by CPHS for UC Berkeley studies involving magnetic resonance imaging (MRI), functional MRI (fMRI), and magnetic resonance spectroscopy (MRS), as well as how such procedures should be described within the study protocol narrative. These guidelines apply to commercial, FDA-approved magnetic resonance instruments. Studies employing specialized, non-conventional instruments will be reviewed on a case-by-case basis by CPHS.

Screening: (*The protocol should reflect the following information (under "Screening," "Procedures," "Risks/Discomforts," etc. as applicable.*)

Because of the high magnetic field of the MRI scanner, individuals with pacemakers, cosmetics, or certain metallic implants in their bodies must be excluded. Each potential subject must fill out a questionnaire to identify these and other possible contraindications to MRI scanning. Also, because the MRI scanner attracts certain metals, precautions must be taken to remove metallic objects from the MRI room. As an additional measure of protection, a metal detector should be in place to screen subjects before entering the scanner.

Pregnancy Testing: It is the policy of the CPHS that for all studies involving MRI, fMRI, or MRS, women of childbearing potential must undergo pregnancy testing, and must be excluded from the study if the pregnancy test is positive. The Committee recommends that such potential subjects be asked to conduct a self-administered pregnancy test immediately prior to scanning, and adult women be instructed to exclude themselves from the study if the test is positive (i.e., indicates pregnancy). Post-menopausal female subjects and those who have not yet begun menstruating need not have a pregnancy test.

Pregnancy Testing with Minors: When a minor is to be screened for pregnancy (i.e., a female under the age of 18* who has had her first menstrual period), special provisions should be made and discussed in the protocol. In order to minimize the risk of placing subjects, parents, and investigators in a difficult situation as a result of an unexpected positive pregnancy test result, it should be explicitly stated during the recruitment process and in recruitment materials that pregnancy screening will be required. Investigators should consider in advance, and address in the protocol, how an "incidental finding" of pregnancy with a minor will be managed. Special care should be taken to protect the subject's privacy in such a situation; researchers should maintain this information as confidential and should not report the results directly to parents unless permitted or requested by the minor (e.g., they may inform the parents that the subject cannot be included in the study but should not specify the reason for exclusion). In addition, research staff should have a word in private with the minor before dispensing the pregnancy test, confirming that she is comfortable with it. To prevent any confusion regarding results, a member of the research staff should read and confirm the results of the pregnancy test.

Risks/Discomforts: The CPHS accepts current evidence suggesting that, in most cases, MRI is a minimal risk procedure. However, as above, the protocol should note under "Risks/Discomforts" that because the MRI scanner attracts certain metals, it could move metallic objects within the MRI room, which might harm a subject. It should also note that individuals with pacemakers, heart rhythm disturbances, permanent cosmetics, or certain metallic implants will be excluded, as will those with a history of claustrophobia.

This section of the protocol should also discuss that although MRI scanning itself is painless, subjects may experience discomfort. Some people become claustrophobic inside the magnet. Also, subjects may be bothered by the beeping and hammering sounds made when the scanner is collecting measurements, and/or experience peripheral stimulation, manifested as a gentle tap or sensation of mild electric shock. [Note: The latter should be explained in lay language in the consent form; see example below, under "Recommended Consent Form Language").

Measures to minimize risks/discomforts: The protocol should provide for and should indicate the following: (1) Screening procedures will be used to exclude any subjects who have metallic objects in their bodies, have a history of claustrophobia, or have other MRI contraindications. (2) Subjects will be informed that they may terminate the session whenever they feel discomfort for any reason. During MRI scanning, subjects will be able to communicate with the investigators via an intercom system, so that any anxiety or discomfort can be immediately addressed and scanning aborted if necessary. (3) Disposable earplugs or other ear protection will be provided to diminish the noise.

Currently unknown risks/discomforts: As a precautionary measure to guard against unknown risks to fetuses, pregnant women must be excluded from participation.

Adverse Event Management: The protocol should indicate the procedures in place for dealing with medical emergencies or incidents that might arise during the study. This procedure should include the following: 1) The physician in charge will be notified immediately, and the lead investigator, if not present, will also be notified. 2) In the case that the physician in charge cannot be reached, the Tang Center or other appropriate medical facility will be notified immediately. To prevent any confusion regarding this, the plan for managing such emergencies should be visibly posted in the facility.

"Incidental" Medical Findings: Since MRI scans are routinely employed in clinical practice, it is important that subjects not confuse a research scan with a clinical scan. Consent language (see below) should make clear that the research scan is not a clinical scan (i.e., it is not being done for clinical diagnosis or treatment), so the subject does not infer that the scan is meant to confirm or rule out a medical problem. On the other hand, participants should be informed of the possibility that an abnormality could be detected or suspected in the process of the research, the clinical significance of which may not be clear.

The protocol should include a plan for dealing with incidental findings, and participants should be fully informed as to what the policies and procedures for such incidental findings are. This plan should identify appropriate personnel or consultants who will report such findings to the participants and/or their physicians. If a physician is involved in the study, he/she would be an appropriate informant. In non-medical settings, the lead investigator or other responsible and qualified individual may be an appropriate person to serve in this role.

B. Recommended Consent Form Language

The following sample statements reflect commonly used language in UC Berkeley consent forms for studies involving fMRIs and should be adapted as necessary for other MRI techniques. All consent statements should accurately reflect the procedures stated in the protocol.

> **Procedures:** fMRI is an abbreviation for functional magnetic resonance imaging, a procedure that is described in more detail below. If you agree to participate, you will be asked to complete an MRI Contraindications Screening Sheet. This screening sheet contains questions that allow us to determine whether you can safely participate in this study.

Also, because the risks to a fetus are unknown, all women of child-bearing potential must have a pregnancy test immediately prior to each session. (Child-bearing potential means you have had your first menstrual period, and you have not yet reached menopause.) [*For adult women*:] You will be given an over-the-counter test that identifies pregnancy through a urine analysis. We will give you the test kit to administer by yourself, in private, in the bathroom. If the test is positive, you must notify the researcher that you cannot participate in the MRI scan.

[*For minors, modify this statement according to provisions made as above, e.g.,* We will give you a pregnancy test kit that indicates whether or not you are pregnant through urine analysis, which you use by yourself, in private, in the bathroom. One of our research staff members will talk with you about this test beforehand so you can ask any questions if you wish to. You should bring the kit back to the staff member when you are done so they can read and confirm the results of the pregnancy test. *We will not share these results with your parents unless you give us permission or ask us to do so*. If the test is positive (in other words, if it indicates that you are pregnant), at the end of all the screening procedures we will tell your parents that you cannot be included in the study, but not specify the reason.]

Following completion of the screening procedures, if you qualify, you will be asked to have an fMRI scan. The MRI scanner measures small changes in magnetic fields produced in your brain and generates images of the human brain. An fMRI is designed to detect small changes in blood flow associated with activity in various parts of the brain. You will be asked to lie down on a platform that can be slid into the center of the magnet. A plastic coil will be placed around your head and foam pads will be placed to limit head movement during the study. You will then be slid into the magnet and asked to lie still for approximately 60-90 minutes, during which time MRI images will be acquired. At different points during the scan, you will be asked to perform cognitive tasks [*provide description*]. You will be given a break from performing the tasks every 5-10 minutes. You can take breaks more frequently if you want.

Risks/Discomforts: While there are minimal risks from MRI as it is to be performed and MRI scanning is painless, participation may involve some discomfort. In particular, you may be bothered by the loud noise during the study that is due to beeping and hammering sounds made when the scanner is collecting measurements. Disposable earplugs will be provided to diminish the noise. Also, some people become claustrophobic while inside the scanner. (Individuals with a history of claustrophobia will be excluded from the study.) You may also experience stimulation of the nerves in your body, which feels like a gentle tap or sensation of mild electric shock.

We will be able to communicate with you during the session via an intercom system. If you feel uncomfortable in the scanner for any reason, please let us know and we will stop the experiment.

The magnets in the MRI scanner are extremely powerful and will attract any metallic objects brought into the MRI room, so you must be careful to leave anything made of metal outside the room. People with pacemakers, heart rhythm disturbances, or certain metallic implants in their body cannot participate in this study. You will be screened for these conditions.

This study is part of a research protocol and is not intended to provide a comprehensive clinical MRI examination of the brain. However, if a potential abnormality is identified on your MRI scan, you will be notified and your scan will be forwarded to your family physician upon your request.

C. Determination of Risk/Review Level:

Studies that present no more than minimal risk to subjects may sometimes be reviewed by the expedited or exempt review process if they fit in one or more of the categories listed in the federal regulations. All

studies involving greater than minimal risk of harm or that do not otherwise qualify for exempt or expedited review require review by the convened Committee (full board review).

CPHS has determined MRI procedures to be *greater than minimal risk* whenever the device is employed for research purposes *if intravenous contrast, sedation, or drugs are also being used,* since the probability and magnitude of harm or discomfort anticipated in the research are greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests [45 CFR 46.102(i)].

MRI studies might also be deemed greater than minimal risk if the functional challenge/intervention or the physiological or psychological stimulation is such that the probability and magnitude of harm or discomfort anticipated in the research are greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

For studies involving normal, healthy subjects in which sedation, drugs, or contrast are not used, the study may be deemed to present no greater than minimal risk, as the probability and magnitude of harm or discomfort anticipated in the research are not greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

Some MRI studies involving children may be approved under 45 CFR 46.404, for "research not involving greater than minimal risk to the children." However, these studies are generally reviewed by the full committee initially, and may also go to full committee at the time of continuing review.

**Note*: Under California state law, minors are those under 18 years old; however, if the study is carried out in other states or countries, local law may prevail.

For further information regarding the above, please contact the Office for the Protection of Human Subjects (OPHS) at (510) 642-7461 or visit our website at: http://cphs.berkeley.edu.

MRI Contraindications Screening Sheet

Date: _____

Subject Name: _____ E-mail:_____
Subject ID _____ Phone: _____
DOB: _____ Address:_____
City, State, Zip: _____

Gender: M F

Do you have any metal in your body? _____
_____

1. Do you have any metal plates__, pins__, wires__, screws__, a joint replacement__, or anything that might have been inserted during an operation__? If yes, describe: _____
   _____
2. Do you have an artificial limb? Yes No If yes, is it removable? Yes No
3. Have you had heart or blood vessel surgery? Yes No If yes, do you have any of the following: pacemaker__, cerebral arteriogram__, stent__, or any metal implants related to the heart or blood vessel surgery__?
4. Have you ever worked with metals, e.g. metallurgy, metal shaving, welding, soldering, etc.? If yes, describe:_____
   Have you ever been injured as a result of metal work? Yes No
5. Have you ever been wounded by anything metal, e.g. a bullet, shrapnel, metal filing? If yes, describe: _____
6. Have you ever gotten a piece of metal in your eye? Yes No
7. Do you have hearing problems? Yes No If yes, do you have any of the following: Hearing aid__ (if yes, removable__ non-removable__), cochlear implant__, ear surgery_____?
8. Are you wearing any cosmetics today? Yes No
9. Do you have tattoos or permanent cosmetics (lipstick, lip liner, eye liner)? Yes No
10. Do you have any piercings? Yes No
11. Do you wear colored contacts? Yes No Do you also have non-colored contacts? Yes No
12. Do you have dental bridges or dental plates? Yes No If yes, are they removable? Yes No
13. Do you have metal dental caps? Yes No If yes, approximately how many? _____
14. Do you have any non-removable metal in your mouth besides fillings? Yes No If yes, describe: _____
15. Do you have fillings? Yes No If yes, how many? _____
16. Have you ever been told you can't have an MRI or fMRI for any reason? Yes No If yes, what was the reason?_____
    _____
17. Have you ever been claustrophobic or afraid of small spaces? If yes, describe:
    _____

Women only:

1. Are you pregnant? Yes No
2. Do you have an IUD? Yes No
3. Results of pregnancy test_____

Signature of person administering screening: _____