UM Center for Brain Imaging Research (CBIR)

Center References

For grant applications and IRB protocols

NIH Resources Page Sample Language

For user's convenience, examples of languages that can be used for the resources pages of NIH applications are provided below. You are welcome to use or modify these languages to fit your grant application's needs.

MAJOR EQUIPMENT: The UM Center for Brain Imaging Research has a research-dedicated 3T Siemens TIM Trio MRI scanner with 12 and 32 channels head coils, and a 12-channel whole-body coil. The scanner is equipped with high-performance gradients, coils and fast data acquisition system for fast imaging. A mock scanner with identical-looking head coils is available.

The TMS Lab has a Magstim Bistim TMS system, a Magstim rapid[2] rTMS system, and a Brainsight brain navigation system (Rogue Institute)

The ERP Lab has a 64 channel Neuroscan system.

The Eye Movement Lab has an EyelinkII eyetracking system. Another MR-Eyetracker (Cambridge Research) is available for eyetracking inside the scanner

IMAGING AND NEUROPHYSIOLOGY RESOURCES: The UM Center for Brain Imaging Research is equipped with a 3 Tesla Siemens Trio a Tim scanner. The scanner is primarily used by faculty, scientists, and trainees from the Maryland Psychiatric Research Center (MPRC), University of Maryland Baltimore (UMB) School of Medicine, the University of Maryland Baltimore County (UMBC), and other research institutions in the area. The scanner is equipped with 12-channel and 32-channel head coils and a whole body coil, with modern neuroimaging suites for EPI, DTI, MRS, ASL capacities, with complete fMRI task presentation, MR compatible high resolution eye movement monitoring, and MR compatible physiological monitoring suites. The imaging center is a 1600 sqf stand-alone building adjacent to the Tawes Building of the MPRC, where the NRP and the First Episode Psychosis Clinic are located. The imaging center has a scanner room, server and equipment room, research participant waiting area, change area, and 4 additional offices. The imaging center is staffed by a full-time MR operator, a full-time MR physicist, and a full-time imaging center Manager. A mock scanner simulating the Siemens Trio is available for research participant training. It is equipped with automated bed, sound simulation, task presentation, and mock-ups of the Trio bore and the 32 channel head coil. The Neuroimaging Research Program (NRP) consists of about 25 staff including 6 faculty in different imaging research areas, 3-4 imaging post-doctoral fellows, 3 master level clinicians, 3 programmers and data managers, two administrative assistants, several project RAs, and a number of graduate and undergraduate students. The NRP has 4500sqft and about 20 separate offices, laboratories, plus multiple cubicle spaces. The NRP assumes overall responsibility for the operation of the UM Center for Brain Imaging Research. NRP faculty include a MR physicist and imaging faculty with expertise in fMRI, DTI, MRS, ASL, structural brain imaging, whole body imaging for adipose tissue and other areas, which serves as a resource for different aspects of imaging for all MPRC scientists and users from UMB, UMBC, and other research institutions in the area. NRP has established participant recruitment, clinical assessment, imaging data collection and preprocessing pipeline, supported by master level clinicians, research assistants, and programmers. Over 50 computers and work stations are available. A Dell R715 server cluster with 200 cores, 512GB RAM, 48TB storage capacity is dedicated for imaging data computation and storage. The NRP also has an ERP/EEG Lab with a 64-channel ERP system; a TMS Lab equipped with a bistim

TMS and an rTMS, three rooms for neuropsychological assessments. Two lab spaces for human PPI and eyetracking laboratories are also available. For fMRI task presentations, an Invivo ESys presentation system specifically designed for fMRI task presentation in the Siemens Trio scanner is available to provide seamless integration of behavioral tasks, clear and full-view presentation of tasks, and integration of scanner and behavioral tasks.

Electrophysiology ERP Lab: The lab located at NRP and is equipped with a 64 channel Neuroscan SynAmp^2/Stim^2 system, a sound attenuated chamber, and a Polhemus Fasttrack (Colchester, VT) for source reconstruction. It is fully equipped to perform electrophysiology biomarker and pharmacological challenge studies. The data recording environment is the state-of-the art. Neuroscan Stim2 and E-Prime are available for stimulus delivery. Staff includes Dr. Elliot Hong who direct the lab, Ms. Summerfield who has over 25 years of EEG/ERP data recording, data analysis, and ERP staff and student training experience, and several research assistant, post-doc, and graduate students. The ERP laboratory has specialized expertise in assessment auditory, visual, eye movement, and TMS related electrophysiological studies.

TMS Lab: The Lab has a Magstim Bistim TMS system, a Magstim rapid^2 rTMS system, and a Brainsight brain navigation system (Rogue Institute). All of the TMS systems are synchronized to a costumed 10-channel ERP Neuroscan SynAmp^2/Stim^2 system and behavioral computers for simultaneous TMS/ERP/behavioral experiments.

Eye Movement and Monitoring Equipments for ERP and MRI: An EyelinkII-based Eye Movement Lab (350sqf) with precise luminance control is located at the same space. The lab is equipped with a 64 channel Neuroscan SynAmp^2/Stim^2 system that is customized to couple with the Eyelink II system for simultaneous EEG/ERP and eye movement recording. Eye movement target information is directly recorded onto the EEG/ERP recordings. For monitoring eye movement inside the scanner, a MR-Eyetracker (Cambridge Research Systems Ltd) is available at the imaging center in MPRC, which is infrared based and has a fast acquisition rate of up to 500 Hz that allows accurate detection of saccades and smooth pursuits during fMRI experiments. A custom-built mounting system in combination with a bite bar allows efficient collection of high quality, high sampling rate eye movement data.

CLINICAL RESOURCES: The current census at the Maryland Psychiatric Research Center (MPRC) is about 180 outpatients with schizophrenia. Approximately 70 of these patients are part of the MPRC First Episode Clinic (FEC) under the NRP, occupied about 2500 sqf with about 12 offices. The rest of the patients are located at the Outpatient Research Program (ORP). The FEC sees patients who have had a recent but established onset of schizophrenia. For the patients that are treated in other MPRC clinics, our recruiter obtains a list of eligible patients and meets with patients to discuss the study. Patients are also referred by community mental health clinics and by private practice psychiatrists, when additional patients are needed for any particular study. We have consistently over-recruited using these resources for imaging, physiological, family, and clinical trial studies.

COMPUTER: Data storage uses a dual server system designated for storing all imaging and other laboratory data. Raw data are mirrored between the servers located in two separate buildings every night. Data are also backed up to DVDs and stored in a third building. All staff have their own computers. The program has programming expertise in Matlab, C++, Perl, TCL, Shell, and Java among the faculty and programmers. Primary imaging processing and statistical software include AFNI, SPM, FSL, Matlab, SPSS, and SAS.

OFFICE: Our program has excess of 20 offices (approximately 10X10 each) and laboratory spaces (ERP, TMS, mock scan behavioral testing, animal docking lab for scanner). The imaging center has 4 additional offices. The First Episode Clinic has 12 offices.

IRB Protocol and Consent Form Sample Language

For user's convenience, examples of language that can be used for IRB protocol and consent form on MRI risk and human subject protections are provided below. You are welcome to use or modify these samples. **REMEMBER** - The provided language is NOT "standard language", but is taken from existing IRB approved protocols involving MRI. These samples are provided here only as examples that the PI may choose to adopt or modify. The principal investigator is responsible for the planning, implementation, and compliance of human subject protection procedures in his or her protocol.

Language that could be used in the Exclusion Checklist

Woman who is pregnant (child-bearing potential but not on contraceptive and missing menstrual period; or by self report; or by positive urine pregnancy test before MRI)

For MRI, unable to undergo MRI scanning due to metallic devices or objects (cardiac pacemaker or neurostimulator, some artificial joints, metal pins, surgical clips or other implanted metal parts) or claustrophobic to the scanner

Language that could be used in the Consent Form

PROCEDURES section:

Training. You could be trained to do some tasks in a mock scan session. This training session will give you a chance to practice the tasks and allow you to become familiar with the MRI process.

MRI. Your head will be placed inside a special headset in the MRI machine. This machine uses a strong magnet and radio waves to take pictures of your brain. The MRI pictures will be used to see how your brain works while you perform the tasks. You will be inside the scanner for about xx hours. While you are doing the tasks, we may also measure your vital signs or other bodily functions. It is important that you keep your head still. We may use firm padding, headband, foam, bite bar (a mold of your teeth that you bite on to help keep your head in the same spot), and/or vacuum pillows to assist you to reduce head movement. You will be asked to perform several tasks divided into multiple sessions within these xx hours. Some of the times we will ask you to rest (but to keep awake). We will also ask you to perform tasks that test your memory, attention, emotion response, decision-making, task performance speed and accuracy. These tasks require you to pay full attention and to respond by pressing on a response pad. In one task you will try to win money. The amount that you win or lose will depend on your responses to target items shown on the screen. The amount of money won or lost on this task is not real. But, you will receive a performance payment based on the amount of money that you win during this task. Your eye movements can be measured using a special camera. Very small amounts of invisible (infra-red) light will shine into your eyes. You may also perform simple visual, auditory, and motor tasks.

RISK section (Can be used in both the consent form and the protocol Risk sections):

MRI: The risks of having an MRI are minimal. The process itself is painless. There will be no x-rays or radioactivity in the MRI. However, subjects will be exposed to a high magnetic field. The magnetic field and radio waves used for MRI scans are considered too weak to do any damage to the body. There is no evidence that any harmful or adverse effects can be expected. Nothing can be proven to be absolutely safe, but the Food and Drug Administration has set guidelines for exposure to MRI studies that we follow. There are potential side effects known from the MRI scans. One is mild backache from lying still for up to two hours. Subjects may experience claustrophobia. We may give subjects mock scan training so that they could find out whether they can tolerate the MRI environment. The MRI machine makes loud banging noises. Subjects will be given earplugs that will lessen the sound to prevent damage to hearing. Subjects may still experience some temporary problems hearing soft sounds after the exam. Some of these risks can be associated with the mock scan training.

Metal Implants: The MRI machine contains a strong magnet. If you have certain metal in or on your body, the magnet may move it. That could be painful and/or harmful. Metal implants may also cause burns from the radio frequency energy used in the exams. If there are metal objects on or in your body that cannot be removed you need to tell us. These include bone pins, braces, and artificial joints. If you have any of these items, you may be excluded from the study. If a subject has a skull plate, surgical metal clips in the brain, inner-ear implants, metal within the eye, cardiac pacemaker, neurostimulator or deep brain stimulation device, he/she cannot be in this study. You need to inform the investigator if you have ever worked in a place where metal objects may have entered your body (for example, welding, metal drilling, etc). We will give you a metal screening questionnaire that will allow us to make sure that this procedure is safe for you.

Pregnancy Risks: MRI has never been shown to harm a fetus or a pregnant woman. However, it has not been proven to be safe at any stage of pregnancy. You should not participate if you are pregnant or are likely to be pregnant. If you are not certain, we can provide a urine pregnancy test. If the test is positive, or uncertain, you may not be in the study. You should know that a negative pregnancy test does not rule out very early pregnancy. If you think you might have become pregnant in the last two weeks, you need to tell us.

Monitoring: The electrodes used to monitor your heart may cause some minor skin irritation. Also, the adhesive may pull out some hair when it is removed. We may have to shave a patch of your chest hair to help place the electrodes. The razor may cause some minor skin scrapes. If tape generally gives you a rash, you should tell us.

PAYMENT section:

You will be paid $XX per hour for your participation in any interviews and testing. You will be paid $XXX for completing a MRI scan.

Languages that could be used in the Protocol

PROCEDURE section:
Inside the MRI scanner subjects will be asked to hold still for about xx hours. Tests will include structural and resting MRI and several passive and active cognitive tasks. In some tasks the subject will be asked to simply rest, or to use a response pad. The specific tasks will include

structural images for gray and white matter, resting scan, tasks that measure responses to craving and smoking-related cues, inhibition and reward functions, eye movement, motion perception and prediction, attention/working memory, response to emotionally related pictures, learning and reversal learning tasks, finger tapping, and/or simple auditory and visual stimulus tasks. Subjects are asked to pay attention to auditory and visual stimuli while holding a response pad. They are trained and then perform the tasks by responding, remembering, or recalling certain items and ignoring the other items. These tasks are programmed auditory and visual stimuli using computers. Data are recorded in digital forms. Each test lasts a few minutes to about half an hour; they are repetitive but with breaks between tasks to reduce subject fatigue. Each subject will perform only a subset of these tasks. Behavioral response, eye movement, basic physiological measures including breath, blood pressure, pulse, skin conductance can be recorded during the tasks.

PROCEDURE section:
Same as in the Consent Form

PAYMENT section:

Subjects will be paid $XX per hour for participation by check. This includes any research-related tasks. In addition, subject will receive a $XXX payment for completing each scan that requires then to hold very still for about 2 hours inside the scanner and perform a number of tasks.