

PROGRAM CONTACT:
JONATHAN KING
(301) 402-4156
kingjo@nia.nih.gov

SUMMARY STATEMENT
(Privileged Communication)

Release Date: 11/08/2010
Revised Date: 11/09/2010

Application Number: 1 F32 AG039131-01A1

Samanez Larkin, Gregory R
Vanderbilt University
301 Wilson Hall
PMB 407817
Nashville, TN 37240-7817

Review Group: ZRG1 F02A-J (20)
Center for Scientific Review Special Emphasis Panel
Fellowships: Behavioral Neuroscience

Meeting Date: 11/01/2010

Council: JAN 2011

PCC: 2BCOGJK

Requested Start:

Dual IC(s): MH

Project Title: Imaging The Human Reward System across the Adult Life Span

Requested: 3 years

Sponsor: Zald, David H
Department: Psychology
Organization: VANDERBILT UNIVERSITY
City, State: NASHVILLE TENNESSEE

SRG Action: Impact/Priority Score: 19
Human Subjects: 30-Human subjects involved - Certified, no SRG concerns
Animal Subjects: 10-No live vertebrate animals involved for competing appl.
Gender: 1A-Both genders, scientifically acceptable
Minority: 1A-Minorities and non-minorities, scientifically acceptable
Children: 1A-Both Children and Adults, scientifically acceptable
Clinical Research - not NIH-defined Phase III Trial

1F32AG039131-01A1 Samanez Larkin, Gregory

RESUME AND SUMMARY OF DISCUSSION: This is an exceptional resubmission of a post-doctoral application which aims to characterize the neural changes underlying age-related changes in cognition, specifically those related to decision making and behavioral control, using fMRI and PET techniques. The applicant is stellar. He has 11 publications including some in high impact journals such as Nature Neuroscience and 20 abstracts. His dissertation won the 2010 American Psychological Association Dissertation Award for Adult Development and Aging. He was also recognized for his teaching ability while an undergraduate at Stanford University. The sponsor, Dr. David Zald, has an excellent publication record and an excellent record in training students. The resubmission includes a detailed and tailored training plan for the applicant that covers all aspects of scientific and professional training. Dr. Zald has adequate funding to support the proposed work. The research proposal is hypothesis-driven and well written. It will provide the applicant with a unique opportunity to combine cutting edge techniques in his research. A minor weakness noted was the lack of some methodological details. The broader environment at Vanderbilt University is outstanding and it is one of only a few places in the world that could offer this training experience in the use of both PET and fMRI.

DESCRIPTION (provided by applicant): Increases in human life expectancy over the twentieth century will continue to expand the proportion of older adults in the global population, magnifying the relative economic impact of their health-related and financial decisions. Thus, it is increasingly imperative to better characterize and understand age-related changes in reward processing and decision making across the adult life span. New in vivo brain imaging techniques using magnetic resonance imaging (MRI) and positron emission tomography (PET) now allow more precise measurement of the human reward system. Highly detailed visualization of structures across the brain is now possible using ultra high field strength 7-Tesla MRI scanners. The use of high-resolution protocols (i.e., slice prescriptions that selectively measure a subsection of the brain) at high field strength has the potential to both structurally and functionally dissociate individual nuclei in the reward system. Measurement of dopamine receptor availability in both striatal and extrastriatal (e.g., midbrain, frontal cortical) regions is now possible using the radioligand [18F]fallypride in PET imaging. These imaging techniques facilitate previously unavailable in-depth measurement across the brain. The main objective of this fellowship grant is to train the applicant in the use of novel methods for imaging the human reward system across the adult life span. Training will also include broadening the applicant's base of knowledge through directed reading, honing teaching and mentoring skills, and building laboratory and grant management skills to ensure productivity and success throughout the applicant's career. The specific aims are to train the applicant to (1) use high-resolution, ultra high field strength, (7-Tesla) MRI to examine structural and functional age-related changes in individual subregions of the midbrain across adulthood, (2) combine [18F]fallypride PET and functional MRI to characterize associations between dopamine receptor availability and aspects of reward processing and behavioral control in healthy adults, and (3) integrate structural (MRI) and functional (PET, fMRI) measures of neural integrity to investigate age-related changes in decision making from young adulthood to middle age. The goal of all aims is to precisely characterize the neural changes underlying age-related changes in cognition, specifically related to decision making and behavioral control. The fellowship will support the next stage of training on the applicant's path to becoming an independent psychological scientist in the cognitive neuroscience of aging. After completion of training, the applicant's goal is to combine these new methods to not only more precisely quantify age-related change in the human reward system but also to investigate the implications of these changes throughout the adult life span. The long-term goal of the applicant's career is to conduct basic scientific research that contributes directly to interventions aimed at easing the cognitive strain and improving emotional and economic health in the daily lives of aging adults.

PUBLIC HEALTH RELEVANCE: This research training plan aims to use cutting edge neuroimaging technology to expand understanding of processes underlying decision making and behavioral control over the adult life span. This work has the potential to facilitate identification of markers for suboptimal decisions in older adults in order to inform the design of appropriate interventions. The long-term goal

of this line of research is to improve the financial and emotional health of older adults by improving decision making at the individual level.

CRITIQUE 1:

Fellowship Applicant: 1
Sponsors, Collaborators, and Consultants: 3
Research Training Plan: 2
Training Potential: 2
Institutional Environment & Commitment to Training: 2

Overall Impact/Merit:

The present proposal requests 3 years of support for the postdoctoral training of Dr. Gregory Samanez-Larkin at Vanderbilt University under the mentorship of Dr. David Zald. The proposed studies are designed to determine whether specific changes across the human reward system influence age-related alterations in cognition using state of the art imaging approaches and combining structural and neurochemical analysis. The applicant is outstanding and will receive excellent mentoring. Of minor concern is that background information on collaborators was not provided. The training plan is complete and the revised research plan adequately addresses previous concerns. Training will occur in an outstanding environment.

1. Fellowship Applicant:

Strengths

- Excellent academic performance.
- Received a number of honors as an undergraduate and graduate student, including being cited for top ten scientific advances by the National Institute on Aging for a first-author paper.
- Supported by predoctoral NRSA.
- Letters of recommendation were highly supportive. Ratings were all 1s.
- 11 publications including 5 as first author, including Nature Neuroscience and Journal of Neuroscience. One first-author manuscript under review and three manuscripts, including 2 first-author in preparation. One first-author review, 2 book chapters, including one first-author and 20 abstracts.
- Dissertation won the 2010 American Psychological Association Dissertation Award for Adult Development and Aging and the Dean of Research at Stanford nominated his dissertation for a Council of Graduate Schools/UMI Distinguished Dissertation Award for the Social Sciences.
- Received the Hastorf prize for undergraduate teaching at Stanford.
- Past research experience supports interest in a research career.

Weaknesses

2. Sponsors, Collaborators, and Consultants:

Strengths

- The primary sponsor, Dr. David Zald is an Associate Professor of Psychology, Psychiatry, & the Integrative Neuroscience Program at Vanderbilt University. He has a strong publication record and has expertise in neuroimaging.

- He has a strong training record, having trained 8 predoctoral and 6 postdoctoral fellows. Has also mentored 2 junior faculty who received K awards. Examples provided suggest previous trainees have continued on with successful academic research careers.
- Mentor is a co-PI on a training grant.
- Funding is in place to support candidate's research efforts until June 2012.

Weaknesses

- Additional collaborators are discussed, but biographical sketches demonstrating that they have the necessary expertise and training experience were not provided.

3. Research Training Plan:

Strengths

- The planned research will determine whether the volume of the substantia nigra and ventral tegmental area decreases with age, whether there are relationships between behavioral and neural measures using BOLD and binding potential and whether these relationships are altered by age.
- All studies combine measures of neural function and behavior.
- Some preliminary data are provided to support proposed studies.
- Studies are hypothesis driven, expected results are outlined and potential problems and alternative approaches are outlined.

Weaknesses

4. Training Potential:

Strengths

- Training will include learning new skills in fMRI and PET imaging, broadening knowledge base via selected readings, auditing of courses (Neuropharmacology, Advanced Statistics, Advanced Neuroanatomy and Brain Imaging Methods) and attendance and participation in seminars and colloquia, honing teaching and mentoring skills by leading workshops and co-mentoring undergraduates, building grant writing skills, developing grant management skills, networking via attendance at national meetings and preparing for the job market.
- The candidate will have biweekly one-on-one meetings with his mentor and will participate in weekly lab meetings.
- The co-mentor Dr. Samuel McClure will provide training in the use of computational models.
- Several additional collaborators are listed that will provide additional training in the use of high-resolution fMRI, computational modeling and PET imaging methods. The candidate will meet at least bimonthly with each of these collaborators either face to face or via video chat.
- In addition to video chats with collaborators located in California, the candidate will spend 2-3 weeks each summer on site at Stanford and the University of California Berkeley.

Weaknesses

5. Institutional Environment & Commitment to Training:

Strengths

- Rich, collaborative environment that provides expertise in the approaches necessary to complete the research program.

- Equipment necessary for completion of proposed studies is available.

Weaknesses

Protections for Human Subjects:

Acceptable Risks and Adequate Protections

- Risks are outlined and protections, including confidentiality, are described.

Data and Safety Monitoring Plan (Applicable for Clinical Trials Only):

Acceptable

- DSMP in place and independent monitor described.

Inclusion of Women, Minorities and Children:

G1A - Both Genders, Acceptable

M1A - Minority and Non-minority, Acceptable

C1A - Children and Adults, Acceptable

- Subjects under the age of 18 not included and this is scientifically acceptable.

Vertebrate Animals:

Not Applicable (No Vertebrate Animals)

Biohazards:

Not Applicable (No Biohazards)

Resubmission:

- Current proposal responsive to previous critiques. Proposed research is now hypothesis driven and integrated. Anticipated results are discussed.

Renewal:

Training in the Responsible Conduct of Research:

Acceptable

Comments on Format (Required):

- Online courses and informal discussions during lab meetings.

Comments on Subject Matter (Required):

- Data processing and presentation, recruitment and protection of research subjects, authorship and collaboration, peer review, conflict of interest, and research misconduct

Comments on Faculty Participation (Required):

- Mentor participates

Comments on Duration (Required):

- Length of lab meeting or until online course completed.

Comments on Frequency (Required):

- Courses annually, lab meeting discussions biweekly

Applications from Foreign Organizations:

Not Applicable

Select Agents:

Not Applicable (No Select Agents)

Resource Sharing Plans:

Not Applicable (No Relevant Resources)

Budget and Period of Support:

Recommend as Requested

Recommended budget modifications or possible overlap identified:

Additional Comments to Applicant:

CRITIQUE 2:

Fellowship Applicant: 1

Sponsors, Collaborators, and Consultants: 1

Research Training Plan: 3

Training Potential: 2

Institutional Environment & Commitment to Training: 1

Overall Impact/Merit:

This application is a resubmission for a 3 year postdoctoral fellowship at Vanderbilt University. The applicant is outstanding; the training program, the sponsors, collaborators, and environment are among the best in the country. The proposed investigation and training is aimed mainly at “expanding the applicant’s research toolbox by teaching him high-resolution and high-field strength fMRI, radioligand PET imaging, and the integration of structural and functional measures through hands-on experience”. This is one of the only places in the world where the applicant could acquire skills in both extrastriatal dopamine imaging and ultra-high field MRI. The general aim of the project is to identify how structural and functional changes in the human reward system associated with aging, affect cognition and decision making and behavioral control. The major difficulty with the previous submission was that the proposed research was more technical than hypothesis-driven. There was a failure to provide information about how the data would be reduced and analyzed, possible pit falls and alternatives, and, in general, a lack of specifics about the research plan. In addition, the training plan did not include teaching and professional development. In this recent submission most of these concerns were addressed, although some minor ones remain with the specifics of the proposed project.

1. Fellowship Applicant:

Strengths

- Outstanding applicant.

- Letters of recommendation all excellent and rankings are almost exclusively 1's.
- He is very productive and has, according to his referees, made major contributions to the field. He was awarded the Adult Development and Aging Dissertation Award from APA Division 20 in 2010 and his dissertation was nominated by Stanford University as the most outstanding dissertation in the Social Sciences.
- He lists 15 papers that are either published, in press, under review, or in preparation. Of those that have been published or in press (11) he is first author on 5. He lists 20 abstracts and three books chapters. He is first author on two. Lead author on an article published in Nature Neuroscience with his dissertation co-advisors, Dr. Carstensen and Dr. Knutson. This article was selected as one to the top 10 scientific advances of 2007 by the National Institute of Aging.
- Department of Psychology Teaching Award at Stanford. 2009-2010 received an NRSA pre-doctoral award and remained at Stanford to focus on research. Also received the 2010 Stanford Hastorf Prize for Teaching.

Weaknesses

2. Sponsors, Collaborators, and Consultants:

Strengths

- His sponsor Dr. Zald, has been at Vanderbilt since 2000. He is an Associate Professor of Psychology, Psychiatry, and Integrative Neuroscience Program. Since 1995 he has been conducting functional neuroimaging studies that use a combination of PET and fMRI to investigate the functioning of limbic and paralimbic regions, with particular emphasis on the amygdala, orbitofrontal cortex, and ventral striatal/mesolimbic dopamine system. The sponsor is an excellent match with the applicant.
- Dr. Zald is very productive. He lists 62 peer-reviewed publications. Grant support includes research grants and a training grant that I believe is used to support the applicant for one year.
- Dr. Zald has a collegial philosophy and believes in collaboration. Members of his research team with whom the applicant will collaborate are Drs. Gore (high resolution fMRI) and Kessler (PET imaging methods) at Vanderbilt and Drs. McClure (high resolution fMRI and computational modeling; Stanford) and Jaquist (PET imaging methods; Berkeley).
- There is no doubt that there is strong support for the applicant from the sponsor and collaborators. Dr. Zald will have no more than 2 other post-doctoral fellows at a time during the applicant's fellowship. It is expected that there will be only one other post-doctoral fellow during most of the applicant's fellowship. In addition, Dr. Zald expects 3-4 Ph.D. candidates during the applicant's fellowship period. He has had good experience sponsoring pre-doctoral, post-doctoral, and junior faculty with current K-awards.
- Dr. Zald will be the major sponsor. The applicant will spend some face-to-face time with the off campus collaborators for 2-3 weeks during the summer and also have meetings with them via videochat.

Weaknesses

3. Research Training Plan:

Strengths

- Training will focus on learning new research methods, mainly in imaging by combining innovative fMRI and PET techniques to study the extrastriatal DA system and aging cognition.
- Wants to key off of studies performed for dissertation as well as those performed by other investigators that were limited to standard resolution of whole brain fMRI and use more sensitive

measures obtainable with high resolution imaging that allow for visualization of very small brain structures (nuclei) of interest to the applicant. Vanderbilt is one of the few places where this work can be done. During the course of the proposed study, improvement of the methods will continue to be a goal.

- Cutting edge PET and MRI techniques. Allow more precise measurement of the human reward system.
- Unique opportunity for the applicant.
- Preliminary studies presented and published protocols noted lend feasibility to the proposed training plan.
- The major concerns of the previous review have been addressed

Weaknesses

- Details about the technical aspects of imaging are provided but there is a scarcity of information about the actual testing procedures. For example, during PET imaging, this reviewer had difficulty visualizing the testing procedure. What will the participant be doing during PET imaging? The applicant does note "Protocols for PET image acquisition and analysis are derived from a larger ongoing study and have been previously published".
- Study 1 with high resolution MR uses a separate group of participants than do studies 2 and 3. With the proposed differences in paradigms between study 1 and 2, the data provided by these studies are likely not comparable but will still answer the proposed questions. Would have been a more powerful design, if it were possible to use the participants for all three studies
- Fig. 6 - Not clear how one can get a p value for a correlation with one subject.

4. Training Potential:

Strengths

- Excellent sponsor in Dr. Zald. The collaborators and sponsor are all relevant to the proposed training plan and are outstanding.
- Vanderbilt is one of a small number of institutions that provides trainees with access to both PET imaging and fMRI facilities. Also houses one of the few research-dedicated 7TfMRI scanners.
- Clear that sponsor and collaborators are fully committed to training this applicant.
- The sponsor has, in answer to the previous concerns, outlined an excellent training plan for the applicant – one of the most comprehensive I have seen: Includes details from course work, seminars, teaching and mentoring, grant writing and management skills, networking, and preparation for the job market.

Weaknesses

- Some concern about statement made by sponsor (P.23 of proposal): "... the questions that Dr. Samanez-Larkin wishes to ask fit nicely with this research program. In order to facilitate this work, we are committed to both provide Greg access to PET data that is arising in various PET projects at Vanderbilt (which includes older participants than my main series of PET studies), and to work with Greg to write internal and an R21 or R01 proposals to recruit additional participants from older populations." In the protocol proposed, the applicant will use 30 healthy young adults (18-50) who have been recruited to participate in an ongoing study in the Zald Lab. These subjects will be studied with 3TfMRI and PET. It appears that applicant will have to seek additional funding to test older subjects if enough are not available through the sponsor's research. Also, how old is "older"---- Fifty is not considered young, or is it?

5. Institutional Environment & Commitment to Training:

Strengths

- Excellent facilities and strong commitment to training.

Weaknesses

Protections for Human Subjects:

Acceptable Risks and Adequate Protections

- Very thorough and addressed previous concerns

Data and Safety Monitoring Plan (Applicable for Clinical Trials Only):

Not Applicable (No Clinical Trials)

Inclusion of Women, Minorities and Children:

G1A - Both Genders, Acceptable

M1A - Minority and Non-minority, Acceptable

- Priority will be given to Hispanic subjects if they volunteer. Minorities have participated in previous studies.

C1A - Children and Adults, Acceptable

Vertebrate Animals:

Not Applicable (No Vertebrate Animals)

Biohazards:

Acceptable

- Applicant and his sponsor have FDA approval for the use of fallypride, an investigational new drug. Adequate safety measures have been implemented -- study physician monitors participants for any adverse effects. Dr. Zald and colleagues have performed over 100 fallypride PET studies and have seen no laboratory abnormalities from administration of this radiopharmaceutical. Also, dose given during the study appears to be low.

Resubmission:

- This is a resubmission and the applicant has done a good job in addressing the major previous concerns.

Renewal:

Training in the Responsible Conduct of Research:

Acceptable

Comments on Format (Required):

- Seminar and formal course work as a graduate student. Online courses will be taken and applicant will maintain certification in Human Subject Research and HIPPA compliance. Also, discussions in sponsor's laboratory.

Comments on Subject Matter (Required):

- Procedures for assuring the welfare of subjects such as conflict of interest, adverse report handling, data handling, etc.

Comments on Faculty Participation (Required):

- Dr. Zald will participate.

Comments on Duration (Required):

- As a graduate student and at least bi-weekly in sponsor's laboratory.

Comments on Frequency (Required):

- At least bi-weekly and online coursework.

Applications from Foreign Organizations:

Not Applicable

Select Agents:

Not Applicable (No Select Agents)

Resource Sharing Plans:

Not Applicable (No Relevant Resources)

Budget and Period of Support:

Recommend as Requested

Recommended budget modifications or possible overlap identified:

Additional Comments to Applicant:

CRITIQUE 3:

Fellowship Applicant: 1

Sponsors, Collaborators, and Consultants: 1

Research Training Plan: 2

Training Potential: 1

Institutional Environment & Commitment to Training: 1

Overall Impact/Merit:

This is a revised application from a stellar candidate who has already shown his productivity, originality and promise. He ranks at the top of the chart in terms of number of publications at his stage and his publications include noteworthy high impact articles that display originality and set a new standard. He is proposing to work with Dr. Zald at Vanderbilt to gain experience in high field MRI and PET analysis of striatal and extrastriatal dopamine binding potential. This will enable him to address fundamental questions regarding the reward system in aging adults and to apply it to delineate the neurobiological underpinnings of age-related alteration in decision processes. This is a logical next step and will set him apart from other researchers in the aging field in his ability to simultaneously address problems through morphometry, fMRI, and receptor PET. The training plan is excellent, the resources superb.

Protections for Human Subjects:

Acceptable Risks and Adequate Protections

Data and Safety Monitoring Plan (Applicable for Clinical Trials Only):

Inclusion of Women, Minorities and Children:

G1A - Both Genders, Acceptable

M1A - Minority and Non-minority, Acceptable

C1A - Children and Adults, Acceptable

- Although applicant states that children are excluded they will be including 'children' 18-20 years of age.

Vertebrate Animals:

Not Applicable (No Vertebrate Animals)

Biohazards:

Not Applicable (No Biohazards)

Resubmission:

- Substantially improved.

Renewal:

Training in the Responsible Conduct of Research:

Acceptable

Applications from Foreign Organizations:

Not Applicable

Select Agents:

Not Applicable (No Select Agents)

Resource Sharing Plans:

Not Applicable (No Relevant Resources)

Budget and Period of Support:

Recommend as Requested

Recommended budget modifications or possible overlap identified:

Additional Comments to Applicant:

THE FOLLOWING RESUME SECTIONS WERE PREPARED BY THE SCIENTIFIC REVIEW OFFICER TO SUMMARIZE THE OUTCOME OF DISCUSSIONS OF THE REVIEW COMMITTEE ON THE FOLLOWING ISSUES:

PROTECTION OF HUMAN SUBJECTS (Resume): ACCEPTABLE

INCLUSION OF WOMEN PLAN (Resume): ACCEPTABLE

INCLUSION OF MINORITIES PLAN (Resume): ACCEPTABLE

INCLUSION OF CHILDREN PLAN (Resume): ACCEPTABLE

COMMITTEE BUDGET RECOMMENDATIONS: The budget was recommended as requested.

NIH has modified its policy regarding the receipt of resubmissions (amended applications). See Guide Notice NOT-OD-10-080 at <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-10-080.html>.

The impact/priority score is calculated after discussion of an application by averaging the overall scores (1-9) given by all voting reviewers on the committee and multiplying by 10. The criterion scores are submitted prior to the meeting by the individual reviewers assigned to an application, and are not discussed specifically at the review meeting or calculated into the overall impact score. For details on the review process, see http://grants.nih.gov/grants/peer_review_process.htm#scoring.

MEETING ROSTER

**Center for Scientific Review Special Emphasis Panel
CENTER FOR SCIENTIFIC REVIEW
Fellowships: Behavioral Neuroscience
ZRG1 F02A-J (20) L
November 01, 2010 - November 02, 2010**

CHAIRPERSON

FRENCH, JEFFREY A, PHD
PROFESSOR
DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF NEBRASKA AT OMAHA
OMAHA, NE 68182

GRAHN, RUTH E, PHD
ASSOCIATE PROFESSOR
DIRECTOR OF BEHAVIORAL NEUROSCIENCE PROGRAM
DEPARTMENT OF PSYCHOLOGY
CONNECTICUT COLLEGE
NEW LONDON, CT 06320

MEMBERS

BAUDRY, MICHEL , PHD
PROFESSOR
DEPARTMENT OF BIOLOGICAL SCIENCES
UNIVERSITY OF SOUTHERN CALIFORNIA
LOS ANGELES, CA 90089

JACKSON, DENISE , PHD
ASSOCIATE PROFESSOR AND DIRECTOR,
UNDERGRADUATE BEHAVIORAL NEUROSCIENCE
PROGRAM
DEPARTMENT OF PSYCHOLOGY
NORTHEASTERN UNIVERSITY
BOSTON, MA 02115

CHIRWA, SANIKA S, PHD
PROFESSOR
DEPARTMENT OF NEUROSCIENCE AND
PHARMACOLOGY
MEHARRY MEDICAL COLLEGE
NASHVILLE, TN 37208

MARK, GREGORY P, PHD
ASSOCIATE PROFESSOR
DEPARTMENT OF BEHAVIORAL NEUROSCIENCE
OREGON HEALTH AND SCIENCE UNIVERSITY
PORTLAND, OR 97239

CUSHING, BRUCE S, PHD
PROFESSOR
DEPARTMENT OF BIOLOGY
UNIVERSITY OF AKRON
AKRON, OH 44325

PECHNICK, ROBERT NELSON, PHD
ASSOCIATE DIRECTOR, PSYCHIATRY RESEARCH
PSYCHIATRY AND BEHAVIORAL NEUROSCIENCES
PROGRAM
CEDARS-SINAI MEDICAL CENTER
LOS ANGELES, CA 90048

DUVAUCHELLE, CHRISTINE LEILANI, PHD
ASSOCIATE PROFESSOR
DIVISION OF PHARMACOLOGY AND TOXICOLOGY
UNIVERSITY OF TEXAS AT AUSTIN
AUSTIN, TX 78712

SHUCARD, DAVID W, PHD
PROFESSOR
DEPARTMENT OF NEUROLOGY, PEDIATRICS,
PSYCHOLOGY
STATE UNIVERSITY OF NEW YORK
AT BUFFALO SCHOOL OF MEDICINE
BUFFALO, NY 14203

DWORKIN, STEVEN I, PHD
PROFESSOR AND CHAIR
DEPARTMENT OF PSYCHOLOGY
WESTERN ILLINOIS UNIVERSITY
MACOMB, IL 61455

STACKMAN, ROBERT WILLIAM JR, PHD
ASSOCIATE PROFESSOR
DEPARTMENT OF PSYCHOLOGY
FLORIDA ATLANTIC UNIVERSITY
BOCA RATON, FL 33431

ECKEL, LISA A, PHD
ASSOCIATE PROFESSOR
DEPARTMENT OF PSYCHOLOGY
FLORIDA STATE UNIVERSITY
TALLAHASSEE, FL 32306

STEKETEE, JEFFERY D, PHD
PROFESSOR
DEPARTMENT OF PHARMACOLOGY
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER
MEMPHIS, TN 38163

FENTON, ANDRE ANTONIO, PHD
ASSOCIATE PROFESSOR
DEPARTMENT OF PHYSIOLOGY AND PHARMACOLOGY
NEW YORK UNIVERSITY
BROOKLYN, NY 11203

TEICHER, MARTIN H, MD, PHD
DIRECTOR, DEVELOPMENTAL BIOPSYCHIATRY
RESEARCH PROGRAM
DEPARTMENT OF PSYCHIATRY
HARVARD MEDICAL SCHOOL
MCLEAN HOSPITAL
BELMONT, MA 02478

GIVENS, BENNET S, PHD
ASSOCIATE PROFESSOR
DEPARTMENT OF PSYCHOLOGY
OHIO STATE UNIVERSITY
COLUMBUS, OH 43210

WALKER, ELLEN ANN, PHD
PROFESSOR
DEPARTMENT OF PHARMACEUTICAL SCIENCES
SCHOOL OF PHARMACY
TEMPLE UNIVERSITY
PHILADELPHIA, PA 19140

MAIL REVIEWER(S)

GARRAGHTY, PRESTON E., PHD
PROFESSOR
DEPARTMENT OF PSYCHOLOGICAL
AND BRAIN SCIENCES
INDIANA UNIVERSITY
BLOOMINGTON, IN 47405

LOCKERY, SHAWN R, PHD
ASSOCIATE PROFESSOR
DEPARTMENT OF BIOLOGY
INSTITUTE OF NEUROSCIENCE
UNIVERSITY OF OREGON
EUGENE, OR 97403

SCIENTIFIC REVIEW ADMINISTRATOR

KRAMER, KRISTIN , PHD
SCIENTIFIC REVIEW OFFICER
CENTER FOR SCIENTIFIC REVIEW
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MD 20892

GRANTS TECHNICAL ASSISTANT

FORD, BAYYINAH S
EXTRAMURAL SUPPORT ASSISTANT
CENTER FOR SCIENTIFIC REVIEW
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MD 20892

Consultants are required to absent themselves from the room during the review of any application if their presence would constitute or appear to constitute a conflict of interest.