



FORMING A NEURAL NETWORK:

National Institute of Neurological Disorders
and Stroke Diversity Research Education
(R25) Grantee Meeting

April 11 – 12, 2016
Doubletree by Hilton Hotel Bethesda
Ballroom B



National Institute of
Neurological Disorders
and Stroke

Table of Contents

Welcome Letter and Meeting Goals.....	1
Agenda.....	2
Speakers and Moderator Bios.....	5
Session 1: Creating Sustainable Mentoring Networks in Neuroscience Panel.....	9
Sessions 2-4: Addressing & Enhancing Neuroscience Diversity across Career Stages....	10
References.....	15
Breakout Sessions.....	18
R25 Programs.....	20
Poster List.....	33
Participants.....	35

Welcome and Meeting Goals



It is my pleasure to welcome you to “Forming Neural Networks: NINDS Diversity Research Education (R25) Grantee Meeting.” As one of 27 Institutes and Centers making up the National Institutes of Health (NIH), the National Institute of Neurological Disorders and Stroke (NINDS) has played a central role in supporting neuroscience research for more than 60 years. Our mission is to seek fundamental knowledge about the brain and nervous system and to use that knowledge to reduce the burden of neurological diseases borne by every age group, by every segment of society, and by people all over the world. To help accomplish this mission, our portfolio must include research training and career development programs to increase basic, translational, and clinical neuroscience expertise and ensure a vibrant, talented, and diverse workforce.

The goals of this meeting are 1) to establish a network and build alliances between individuals who are actively engaged in addressing issues surrounding workforce diversity across the neuroscience research career pipeline; 2) identify opportunities and share successful approaches for more effective recruitment, training, and retention of diverse individuals in the neuroscience workforce; 3) foster dialog and collaborations around intervention strategies to support diverse trainees at critical transition points along the career path; 4) provide suggestions to NINDS on how our programs can more effectively promote a diverse neuroscience workforce.

Currently, there are 25 R25 grant awards that address interventions across career stages, from high school to junior faculty, and are helping to prepare the next generation of diverse neuroscience researchers. With your help, we at NINDS are making strides and are confident that through collective dedication, we can strengthen our efforts and further improve our workforce diversity outcomes.

We hope that you will enjoy this important meeting and take full advantage of the many opportunities to interact with colleagues, share experiences, and participate in stimulating discussions. I apologize for the schedule conflict that prevents me from joining you. I have total confidence in Dr. Michelle Jones-London and will be sure to follow up with her upon my return.

*Best wishes,
Walter*

Walter J. Koroshetz, MD
Director
National Institute of Neurological Disorders and Stroke
National Institutes of Health

Agenda

Monday, April 11, 2016

- 7:00 – 8:00 am **Breakfast, Registration and Preview Posters**
Ballroom B Foyer
- 8:00 – 8:15 am **Welcome and Opening Remarks**
Michelle Jones-London, PhD
NINDS, Director of Diversity Training and Workforce Development
- 8:15 – 8:45 am **How is NIH Leadership Addressing Diversity in the Scientific Workforce?**
Hannah A. Valantine, MD
NIH, Chief Officer for Scientific Workforce Diversity
- 8:45 – 9:00 am **Q&A**
- 9:00 – 9:45 am **What Matters in Research Mentoring: Research Self-Efficacy and Cultural Responsiveness in Trainees' Success**
Angela Byars-Winston, PhD
University of Wisconsin School of Medicine and Public Health
- 9:45 – 10:00 am **Q&A**
- 10:00 – 10:15 am *Break*
- 10:15 – 11:05 am **Session 1: Creating Sustainable Mentoring Networks in Neuroscience Panel**
Moderator: Rae Nishi, PhD – *Marine Biological Laboratory*
- Neuroscience Scholars Program (NSP) at Society for Neuroscience
Julio Ramirez, PhD – *Davidson College*
Gina Poe, PhD – *University of Michigan Medical School*
 - Mentoring Institute for Neuroscience Diversity Scholars (MINDS)
Gonzalo Torres, PhD – *University of Florida*
Michael Zigmond, PhD – *University of Pittsburgh*
 - Broadening the Representation of Academic Investigators in Neuroscience (BRAINS)
Sheri Mizumori, PhD; Joyce Yen, PhD; and Claire Horner-Devine, PhD – *University of Washington*
- 11:05 – 11:45 am Break-Out Groups and Reports
- 11:45 – 1:00 pm **Networking Lunch across Career Stages**

- 1:00 – 4:00 pm **Addressing and Enhancing Neuroscience Diversity across Career Stages**
 Panels led by current program leaders with career stage expertise who can discuss i) gaps/needs and challenges, ii) opportunities, iii) recommendations, and iv) priorities. *Each session followed by open discussion with all attendees.*
- Moderator:** Stephen J. Korn, PhD – *NINDS, Director, Office of Training, Career Development and Workforce Diversity*
- 1:00 pm **Session 2- Recruitment:** Summer Programs for High School and Undergraduate Students
 Marlys H. Witte, MD – *University of Arizona*
 Michael McKernan – *The Jackson Laboratory*
 Robert Meisel, PhD – *University of Minnesota*
- 2:00 pm **Session 3 - Transition and Training:** Programs to Promote Transition to Graduate School
 Regina Miranda, PhD – *Hunter College, CUNY*
 Kyle Frantz, PhD – *Georgia State University*
 Carol Milligan, PhD – *Wake Forest University*
- 3:00 pm **Session 4- Retention:** Programs to Maintain Engagement of Graduate to Junior Faculty in the Neuroscience Workforce
 Farah Lubin, PhD – *University of Alabama*
 Girardin Jean-Louis, PhD – *New York University School of Medicine*
 Peter R. MacLeish, PhD – *Morehouse School of Medicine*
- 4:00 – 5:30 pm **Poster Session and Program Networking**
 Session A (4:00 -4:45) & B (4:45 – 5:30)
 Wisdom Room

Tuesday, April 12, 2016

- 7:00 – 8:00 am **Breakfast**
 Ballroom B Foyer
- 8:00 – 8:30 am **Opening Remarks and Goals for Today's Session**
 Michelle Jones-London, PhD
NINDS, Director of Diversity Training and Workforce Development
- 8:30 – 10:00 am **Group Breakout Session and Development of Follow-up Action Items**
Participants in their selected groups will identify tangible next steps for developing and integrating new concepts and interventions into current and future NINDS diversity training programs.

- 1) **Fixing Gap Junctions:** How can we influence graduate admissions and affect institutional buy-in?
Moderator: Sherilynn J. Black, PhD – *Duke University*
Balance Room

- 2) **Increasing Action Potential:** How do we address non-research factors that impact diverse trainees while leveraging attributes like resiliency?
Moderator: Anna Han, PhD – *NIH, Chief Office of Scientific Workforce Diversity*
Wisdom Room

- 3) **Wire Together, Fire Together:** How can we use our programs to facilitate transition of trainees across career stages?
Moderator: Alison Hall, PhD – *NIGMS, Division of Training, Workforce Development, and Diversity*
Insight Room

10:00 – 10:15 am *Break*

10:15 – 11:30 am **Reconvene and Report on Breakout Session Discussions**
Ballroom B

11:30 – 12:00 pm **Next Steps and ADJOURN**
Michelle Jones-London, PhD

Speakers and Moderators



Hannah Valantine, MD

Hannah Valantine received her M.B.B.S. degree (Bachelor of Medicine, Bachelor of Surgery; the United Kingdom's equivalent to an M.D.) from St. George's Hospital, London University in 1978. After that, she moved to the University of Hong Kong Medical School for specialty training in elective surgery before returning to the U.K. She was awarded a diploma of membership by the Royal College of Physicians (M.R.C.P.) in 1981. In addition, she completed postgraduate training and numerous fellowships, serving as senior house officer in Cardiology at Brompton Hospital and Registrar in Cardiology and General Medicine at Hammersmith Hospital. In 1985, Dr. Valantine moved to the United States for postdoctoral training in cardiology at Stanford University, and in 1988, she received a Doctor of Science (DSc), Medicine, from London University. Dr. Valantine became a Clinical Assistant Professor in the Cardiology Division at Stanford and rose through the academic ranks to become a full Professor of

Medicine in the Division of Cardiovascular Medicine and Director of Heart Transplantation Research. She came to the NHLBI in 2014 to continue her research while also serving as the first NIH Chief Officer of Scientific Workforce Diversity. Dr. Valantine has received numerous awards throughout her career including a Best Doctor in America honor in 2002. She has authored more than 160 primary research articles and reviews and previously served on the editorial boards of the journals *Graft* and *Ethnicity & Disease*. Dr. Valantine is a member of the American College of Cardiology, the American Society of Transplant Physicians, and the American Heart Association, and past President of the American Heart Association Western States Affiliate.



Angela Byars-Winston, PhD

Angela Byars-Winston is an Associate Professor of General Internal Medicine and Director of Research and Evaluation, Center for Women's Health Research at the University of Wisconsin-Madison. Dr. Byars-Winston is a vocational psychologist and nationally-recognized expert on cultural influences on academic and career development, especially for racial and ethnic minorities and women in the sciences, engineering, and medicine. Her work has focused on testing the validity of theoretical models to explain and predict academic and career outcomes using social cognitive theoretical approaches. Dr. Byars-Winston completed her bachelor's (dual major in Psychology and Spanish) and master's (Counselor Education) degrees at San Diego State University and PhD in Counseling Psychology at Arizona State University. Dr. Byars-Winston is a Fellow of the American Psychological Association, received an Outstanding Woman of Color Award

from UW-Madison in 2014, was designated as a Centennial Scholar by the UW School of Medicine and Public Health, and received a Champion of Change Award from the White House in 2011. Her well-supported research program has been funded by the National Institutes of Health (NIH) and the Alfred P. Sloan Foundation. She is currently co-leading a four-year, \$1.4 million NIH grant to assess how mentors and mentees define cultural diversity awareness and how important this awareness is to the mentoring relationship. She is also part of a national team that has been awarded a five-year, \$19 million grant from NIH to establish a national research mentoring network (NRMN). Dr. Byars-Winston serves on a federal panel, the Board of Higher Education and Workforce (BHEW) of the National Academy of Sciences, that advises federal lawmakers, policy-makers, and academic and industry leaders on recommendations to inform action and set strong public policy on issues in higher education and the workforce. She is currently appointed as a Visiting Professor at the University of Pretoria, GIBS campus in Johannesburg, South Africa. In 2015, *In Business* magazine selected Dr. Byars-Winston as one of the 25 most influential people in Madison, Wisconsin and *BRAVA* magazine designated her as one of 30 Women To Watch.



Rae Nishi, PhD

Rae Nishi is the Director of the Division of Education and the Burroughs Wellcome Fund Director of Education at the MBL. She has a BS in biological sciences with honors and distinction from Stanford University; a PhD in biology from the University of California, San Diego, and did her postdoctoral training in the department of neurobiology at Harvard Medical School. Her research, which was continuously funded by NIH grants for over 30 years, was in developmental neurobiology and neurodegenerative disease. She has a strong track record in training: 11 predoctoral trainees have earned PhDs in her lab and she has trained over 30 undergraduates. For the past 8 years she served as the founding director of the university-wide Neuroscience Graduate Program as well as the Director of the Neuroscience,

Behavior, and Health Transdisciplinary Research Initiative at the University of Vermont. Prior to the University of Vermont, where she was from 2001-2016, she rose through the faculty ranks at the Oregon Health and Science University in Portland, OR from 1986-2001. She moved to Woods Hole to assume her current role in January, 2016.



Sherilynn Black, PhD

Dr. Sherilynn Black is an Assistant Professor of the Practice in Medical Education in the Duke University School of Medicine. She completed her undergraduate degree in Psychology (Biology minor) as a Morehead-Cain Scholar at the University of North Carolina at Chapel Hill and graduated with Highest Honors. She then completed her doctoral studies in the Department of Neurobiology at Duke University and completed additional studies in the School of Education at the University of North Carolina at Chapel Hill. Her current research focuses on identifying the common variables associated with successful STEM student-development interventions in higher education, and in creating computational models that are predictive of the success of higher education intervention programs. Dr. Black currently serves as the founding Director of the Office of Biomedical Graduate Diversity for the Duke University School of Medicine. Her office works to bring talented underrepresented graduate students to Duke and to enrich their experiences over the course of their doctoral studies through a

series of professional development opportunities, academic enrichment programs, mentoring programs, and cohort-formation activities. Dr. Black is also a co-Principal Investigator of the Duke Initiative for Maximizing Student Development (IMSD) program referred to as the Duke Biosciences Collaborative for Research Engagement (BioCoRE). Duke BioCoRE provides extensive mentoring and scientific engagement opportunities for talented and diverse undergraduate and graduate students in the biomedical and behavioral sciences. Dr. Black also serves in a number of additional roles in the Duke community, including serving as a member of the a President's Council on Black Affairs, the co-Advisor for the Duke Chapter of the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), a faculty advisor for the Duke Bridges to the Doctorate Program, and as a faculty affiliate for the Duke Center for Science Education. Dr. Black is deeply engaged in promoting STEM diversity efforts on a national level. She currently serves the international membership of the Society for Neuroscience as a faculty stakeholder in the Neuroscience Scholars Program and as a member of the Professional Development Committee, and she is also an appointed member of the AAMC Group on Graduate Research, Education, and Training (GREAT). She also works with the National Institutes of Health to lead national workshops on diversity initiatives in the basic sciences. Dr. Black continues to form institutional partnerships across the nation to build programmatic and institutional collaborations directed towards increasing diversity in the biomedical and basic sciences.



Anna Han, PhD

Dr. Anna Han is a senior behavioral scientist and a policy advisor at NIH's Office of the Director, Scientific Workforce Diversity and her work focuses on evidence-based approaches and interventions to enhance the diversity and social inclusion of the scientific workforce. Before joining NIH, she was an Associate Professor of Psychology at St. Mary's College of Maryland, where she taught social psychology, experimental methods, and statistics.

She received her Ph.D. from The Ohio State University, and her research areas include attitude and behavior change, stereotyping and prejudice, implicit/explicit biases, and implicit self-control. She has published numerous peer reviewed journal articles on these topics, especially in the domains of implicit biases, and has served on numerous grant reviews and as an expert panelist on these topics.



Alison Hall, PhD

Dr. Alison Hall is deputy director of the Division of Training, Workforce Development, and Diversity, which supports the Institute's research training, career development and diversity-building activities through a number of programs at the undergraduate, graduate, postdoctoral and faculty levels. She joined NIGMS following two decades at Case Western Reserve University School of Medicine with neuroscience research supported by grants from NIH, other federal agencies and additional funding organizations. There, as professor in the department of neurosciences and associate dean of graduate education, she trained numerous graduate, undergraduate and postdoctoral fellows, and participated in federal review panels for training and research. As a graduate dean, she was instrumental in developing a relational database for following students through careers, and in institutional T32 preparation and implementation, as well as directing several research education programs.



Michelle Jones-London, PhD

Dr. Michelle D. Jones-London serves as Director of Diversity Training and Workforce Development. In this position, she plays a critical role in guiding the Institute's diversity efforts and chairs the NINDS Diversity Working Group. Dr. Jones-London joined NINDS as a Program Director in July, 2006. Dr. Jones-London earned her Ph.D. in Neuroscience from the Department of Neuroscience and Anatomy at Pennsylvania State University College of Medicine. She then received postdoctoral training as a research fellow at University of Pennsylvania in the Department of Psychiatry. Dr. Jones-London came to the NIH in July 2004 as an Emerging Leader Fellow; she performed duties across the Department of Health and Human Services including the

Center for Scientific Review, FDA Office of Women's Health Science Program, and the Immediate Office of the Secretary, Intergovernmental/Tribal Affairs Office. Dr. Jones-London directs the diversity training and workforce development programs at NINDS which include Diversity and Re-Entry Supplements, Predoctoral Fellowships to Promote Diversity in Health-Related Research (F31), Career Development Awards to Promote Diversity (K01 and K22) and Diversity Research Education Grants (R25) (including the Neuroscience Scholars Program with SfN). She also provides oversight for the Institute's diversity outreach initiatives at several other national scientific conferences. Her trans-NIH efforts include oversight for the NIH Blueprint ENDURE. Her research interests have focused on understanding monoaminergic neurotransmitter regulation and mechanisms of behavioral psychopharmacology in animal models of disorders such as ADHD, Tourette Syndrome, and depression.



Stephen J. Korn, PhD

Dr. Korn came to NINDS as Director of the Office of Training, Career Development and Workforce Diversity in January, 2006. He received his Ph.D. in Pharmacology from the University of North Carolina- Chapel Hill, and received postdoctoral training at NIH (as a PRAT Fellow of NIGMS) and at the Roche Institute of Molecular Biology (with financial support from NRSA postdoctoral fellowships). He then spent 15 years on the faculty of the University of Connecticut at Storrs, where he was a Full Professor. His area of scientific specialty is the molecular basis of ion channel gating and permeation, but he has also conducted electrophysiological and imaging research on calcium and pH transport/buffering, and synaptic transmission in the hippocampal slice.

Special thank you to Dr. Edgardo Falcon-Morales (NINDS, Health Program Specialist) and Dr. Lauren Ullrich (AAAS Science & Technology Policy Fellow) for their contributions in helping to organize this meeting.



Also Monica Flemming (NINDS), Michaela Mueller and Valentine Neira (Palladian Partners) for their logistical support.

Sessions 1- 4: Logistics and Background Literature

Session 1 - Creating Sustainable Mentoring Networks in Neuroscience Panel

Moderator: Rae Nishi, PhD

Structure of session:

- | | |
|-----------------|--|
| 10:15 – 10:25am | Introduction of the session’s Goals & Panelists by Dr. Nishi |
| 10:25 – 10:35am | Neuroscience Scholars Program (NSP) at Society for Neuroscience |
| 10:35 – 10:45am | Mentoring Institute for Neuroscience Diversity Scholars (MINDS) |
| 10:45 – 10:55am | Broadening the Representation of Academic Investigators in Neuroscience (BRAINS) |
| 10:55 – 11:05am | Clarifying Questions (General questions about the 3 programs that were presented) |
| 11:05 – 11:25am | Breakout groups for deeper discussion about neuroscience mentoring network gaps and challenges (see below) |
| 11:25 – 11:45am | Report out top ideas from each group |

Topics for deeper discussion:

- a. **Challenges:** What are the challenges that programs are having in promoting mentorship and networking for their trainees? What do mentors and trainees need most with respect to resources and tools to support program goals?

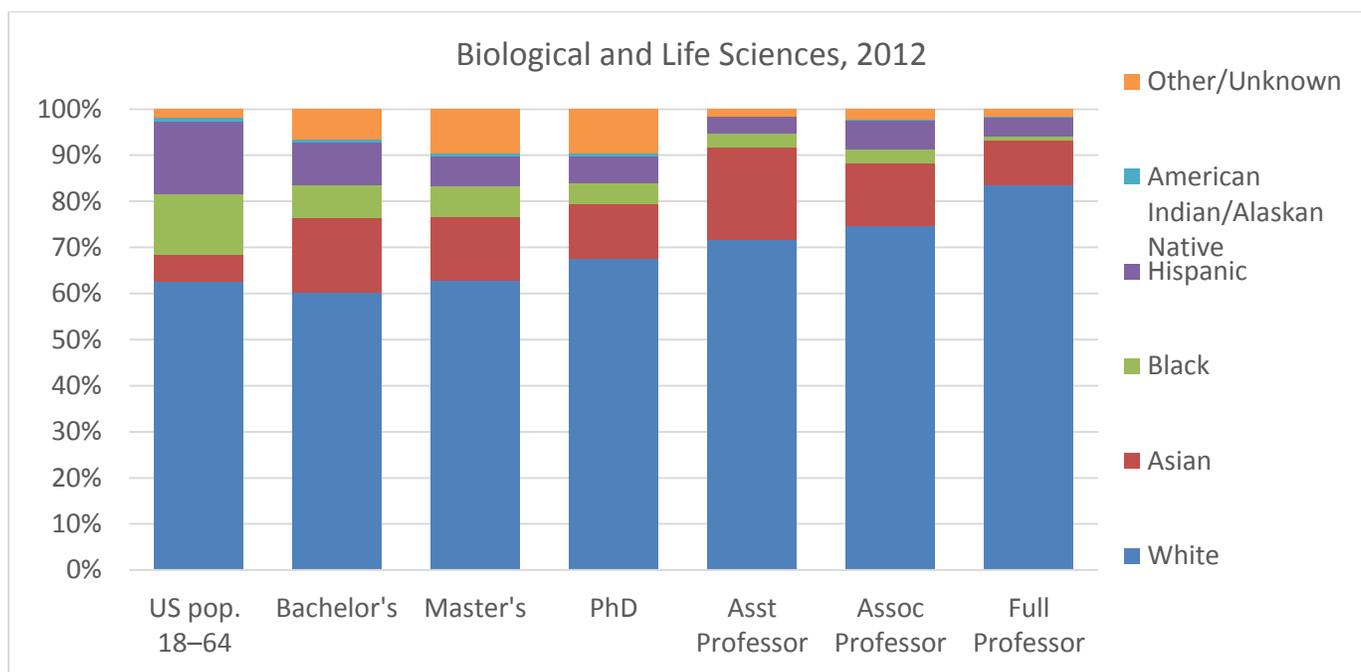
- b. **Opportunities:** How do we as a neuroscience network facilitate seamless transitions across the neuroscience career pipeline? Is there interest in development of an information clearing house (including funding opportunities, career development information, specific diversity programs and resources, grant writing tutorials, job postings, webinars, etc.) specific for neuroscience and diverse trainees? Who could/should sponsor the website or diversity neuroscience hub (university, federal, society, etc.)?

- c. **Collaboration:** How could your organization create or tap into sustainable mentoring networks? How should our organizations collaborate to expand and support sustainable mentoring networks? How do we leverage the impact of the current diversity training programs to inform institutions/senior faculty on how to create a more inclusive recruiting and work environment that could lower some of the barriers for underrepresented applicants and increase retention once hired?

Sessions 2-4: Addressing & Enhancing Neuroscience Diversity across Career Stages

Session 2 - Recruitment: Summer Programs for High School and Undergraduate Students

In biological and life sciences, blacks, Hispanics, American Indians, Alaskan Natives, and Pacific Islanders are progressively more underrepresented at each point on the academic ladder, as displayed in the chart below (National Science Foundation, 2015).



These disparities are disheartening in light of the fact that underrepresented minority (URM) students are as likely as whites to intend to major in science as a freshman, but are less likely to ultimately graduate college with a degree in science (National Science Foundation, 2015). Thus, programs encouraging URM high school and undergraduate students to pursue a research career have great potential to expand the “pipeline” from which future science faculty will develop.

Indeed, a large body of literature points to the effectiveness of early intervention programs. A [recent evaluation](#) of the outcomes of 9,000 Maximizing Access to Research Careers Undergraduate Student Training in Academic Research (MARC U-STAR) program participants found that they were four times more likely to receive a PhD (Hall et al., 2016), while recipients of [NIGMS diversity supplements](#) were twice as likely to receive a PhD as biology baccalaureates in general (Hall et al., 2015b). An analysis of NINDS diversity supplementees found similar results (Jones-London, 2016). One particularly rigorous (and currently ongoing) example is *TheScienceStudy*, a prospective, national, longitudinal study of undergraduate training programs (Estrada-Hollenbeck et al., 2011; Merolla and Serpe, 2013; Schultz et al., 2011). The study is unique in that it compares participating students to controls matched on entry on 11 variables (including gender, race/ethnicity, GPA, major, and intention to pursue a scientific research career), thus addressing the critique that participating students might be more likely to persist in science due to pre-existing factors. They found that students who participated in the program were more likely to persist in their intentions to pursue a scientific research career than nonfunded students who engaged in research—who, in turn, showed more interest in science than did matched students without any research experience.

The literature also points to several ways that undergraduate research programs may influence students and increase their intention to persist in a science career. Common factors include increases in self-efficacy (a student’s

belief in his/her ability to succeed in science); increases in scientific knowledge and technical skills; developing an identity as a scientist; relationships with others involved in scientific pursuits; and understanding of the path to a scientific career and what that entails (Eagan et al., 2013; Merolla and Serpe, 2013; Ong et al., 2011; Russell et al., 2007). Programs that explicitly foster these kinds of development (e.g. by asking students to reflect on experiences or overtly teaching scientific values and ethics) may “speed up enculturation and strengthen guidance” (Linn et al., 2015). There is also evidence that mentoring relationships can be critical to success, but “just *having* a mentor is not sufficient,” the mentoring must be of high quality (Linn et al., 2015; Schultz et al., 2011).

In addition, several studies have shown that the longer the research experience, the more effective it is at increasing persistence in STEM; this might be expected due to the enculturation process students must undergo in order to begin thinking of themselves as scientists (Adedokun et al., 2014; Carter et al., 2009; Fechheimer et al., 2011; Gazley et al., 2014; Thiry et al., 2012). Longitudinal studies suggest that novice researchers first show gains in confidence, self-efficacy, and lab skills; only with time do students develop a “more sophisticated understanding of the process of scientific research” and “patience and perseverance in the face of setbacks or failures” (Estrada-Hollenbeck et al., 2011; Thiry et al., 2012).

A challenge faced by both high school/undergraduate research programs and graduate admissions is identification of students with potential talent who may not display conventional measures of achievement (GPA, SAT, GRE). Indeed, GRE scores have been shown to be poorly predictive of success in graduate school beyond first year grades and to be reflective of “certain demographic characteristics of test-takers—such as family socioeconomic status—that are unrelated to their intellectual capacity or academic preparation” (Miller and Stassun, 2014). NIH and NSF have recognized this and removed GRE and MCAT score reporting from the NSF Graduate Research Fellowship Program; F30/31; and T32 applications. One suggested alternative predictor of success is to look for “evidence of ability to overcome the tribulations of becoming a PhD-level scientist,” also known as “grit” (Miller and Stassun, 2014; Powell, 2013). While these may not be easy assessments to make, broadening the pool of URM students beyond those with already-documented ability is critical to increasing the number of URM scientists.

A recent comprehensive review, “[Undergraduate research experiences: Impacts and opportunities](#)” summarizes much of the research on undergraduate research experiences and provides recommendations for improving programs and the research done on them (Linn et al., 2015).

Discussion Questions

- How do programs identify and develop students with as-yet unrealized talent?
- What qualities besides research skills are developed in your students: identity as a scientist, self-actualization, community building, etc.? How can programs intentionally foster these developments?
- What are the biggest challenges for your program? For your students? For your faculty?
- What do students identify as the most influential part of your program?
- How do you ensure that mentoring in your program is consistent and effective?

Session 3 - Transition and Training: Persistence as a Graduate Student and Postdoctoral Researcher

As stated by McGee et al., “Students start PhD programs with a wide range of acquired academic and scientific skills. The skills of students coming from less advantaged backgrounds often are not as fully developed at the start of the PhD. Thus, they will be at higher risk of failing to thrive during the rapid transition of the first two years of the PhD” (McGee et al., 2012). Accordingly, programs such as the Bridges to the Doctorate or the Post-baccalaureate Research Education Program (PREP) have become popular and useful for students that do not feel prepared to tackle the challenges of grad school. A [recent analysis](#) of PREP participant outcomes found that 65% matriculate into a PhD program and around 63% complete the degree (Hall et al., 2015a).

As students enter graduate school, they face a challenging educational experience. URM students face additional or heightened obstacles, including academic and cultural isolation; discrimination, whether perceived or actual; financial stress; consequences of unsuccessful mentoring experiences; long training periods; and a sense of lack of achievability; among others. Trainee persistence in the face of these obstacles is shaped by internal decisions as well as by external factors (Skaalvik and Skaalvik, 2002). This is shown in a survey by the Council of Graduate Schools in which graduate students rated financial support as most influential on their ability to complete their PhD, followed by mentoring/advising, family non-financial support, and social environmental/peer group support (Sowell, Bell, Kirby, & Naftel, 2009). Internal factors, such as acculturation, self-efficacy, and development of an identity as a scientist have also been shown to be a major contributor to persistence in STEM fields (Summers and Hrabowski, 2006; Chemers et al., 2011; Estrada et al., 2011 Adams, 1992; Meyers and Turner, 2000; Anthony and Taylor, 2004).

At present, a number of programs are pursuing theory-driven measures based on several social science theories that could provide the data needed for evidence-based interventions (Tull et al., 2012; Thakore et al., 2014). Social science theories can be used to understand the social and cultural factors that impact young scientists and help explain the lack of improvement in diversity. Some of these are Identity Formation, Social Cognitive Career Theory (SCCT), Cultural Capital Theory, and Communities of Practice (CoP). Identity Formation Theory works with how people view themselves and how they choose a path and create an identity for themselves, in this case as students and professionals, underscoring the importance of developing scientific identity.

SCTT breaks down the decisions people make as they progress along pathways and understand why they make such decisions by emphasizing the role of social cognitive variables – self-efficacy beliefs, outcome expectations, interests, and goals. Using SCCT, Cameron et al. found that acquisition and productivity of scientific communication skills – writing and speaking- predicted the biomedical trainee’s persistence to pursue a research career (Cameron et al., 2015). Accordingly, programs should design interventions where they can provide trainees with the tools necessary for them to develop a sense of self-efficacy, such as writing skills, career considerations, and individual development plans, among others.

Cultural Capital Theory involves the cultural resources a person has such as knowledge, skills, or behaviors that inform how they are supposed to act. In science, this can refer to abilities such as networking, bridging cultural expectations between science and home, interacting with professors and lab colleagues, among others. Good mentoring and coaching are crucial in nurturing the trainees’ cultural capital.

Finally, CoP details the socially constructed space where individuals with common goals and interests work together toward those goals. Training programs, including PhD programs, serve as CoPs for students and trainees. Programs that offer academic and personal/social support through professional development, knowledge and skill-building, and mentoring, have been shown to be effective in reducing isolation and increasing rate of degree completion (Summers and Hrabowski, 2006; Tull et al., 2012). Additionally, professional development activities provided by programs should also take into consideration success beyond degree completion and demonstrate increased attention in developing the trainee’s transferable skillsets in ways to make them attractive for employment in multiple careers to ensure a successful transition out of graduate school (Heflinger and Doykos, 2016). For example, a survey of PhD students at a Research One university found that even though students seem to feel prepared in scholarly activities, gaps were identified in areas such as grant writing, teaching, and leading research teams (Heflinger and Doykos, 2016).

A trainee’s ultimate career will depend on structural factors, such as availability of jobs, as well as career interests. Career interest is a dynamic process that is shaped by both didactic and vicarious learning experiences during college, graduate school, and postdoctoral training. Complicating this process is the fact that pursuit of both graduate and postdoctoral training is often independent of a clear career goal, and is instead driven by “love of science” (Gibbs and Griffin, 2013).

In general, both graduate students and postdocs report a decreased interest in faculty careers over time, with women and underrepresented minorities reporting a comparatively greater decrease than men and well-represented trainees (Fuhrmann et al., 2011; Gibbs et al., 2014, 2015; Sauermann and Roach, 2012). One study found that, in URM groups, lower interest in faculty careers as a postdoc was accompanied by lower feelings of intellectual and social belonging in graduate school (Gibbs et al., 2015). Women and URM postdocs also reported lower levels of self-efficacy even when accounting for research productivity (Gibbs et al., 2015). These feelings may be remediated by mentoring—a survey of graduate and postdoctoral trainee members of SACNAS (Society for the Advancement of Chicanos and Native Americans in Science) found strong effects of mentoring on self-efficacy, identity as a scientist, and commitment to a science career (Chemers et al., 2011).

A recent study found that, independent of objective performance measures, “the primary driver for pursuing a faculty career, across racial, ethnic, and gender backgrounds, was personal values...if a scientist felt [what] was important to him or her personally and professionally could be best achieved in an academic setting” (Gibbs and Griffin, 2013). Majority scientists focused on opportunities for academic freedom, while URM scientists expressed motivations related to externally-focused values such as mentoring students or researching health problems that affected their communities. Scientists that did not pursue faculty careers cited personal values as well as structural factors such as the academic job market, availability of grant funding, and work-life balance as driving them away from academia.

Discussion Questions

- What qualities besides research skills are developed in your students: identity as a scientist, self-actualization, community building, etc.? How can programs intentionally foster these developments?
- What are the biggest challenges for your program? For your students? For your faculty?
- What do students identify as the most influential part of your program?
- How do you ensure that mentoring in your program is consistent and effective?

Session 4 - Retention: Programs to Maintain Postdoctoral Fellows and Junior Faculty in the Neuroscience Workforce

Despite making up around 30% of the adult US population and 11% of PhD graduates in the biological and life sciences, underrepresented minorities (URMs) occupy only 8% of all associate and full professorships and only 6% of these positions at research-intensive institutions (National Science Foundation, 2015).

One key transition point in the journey to full professor is the postdoctoral fellowship. Unlike a graduate program, where trainees are integrated into a larger community and are required to complete a specific training program, postdocs are typically hired directly by a faculty member and milestones are less defined. Indeed, many academic institutions do not even know how many postdocs they employ, and estimates of the total number of biomedical postdocs in the US range from 37,000 to 68,000 (National Institutes of Health, 2012). It is estimated that biomedical PhDs spend an average length of 7.8 years (median length of 4 years) in postdoctoral positions (National Institutes of Health, 2012).

Surveys of postdocs have shown that those with more structure, administrative oversight, and formal training were more likely to be satisfied with their postdoc, rate their advisors highly, and be more productive (Davis, 2005; Scaffidi and Berman, 2011). Structured training programs for postdocs have also been shown to help prepare postdoctoral scholars for successful transition into academic positions (Derting et al., 2016; Rybarczyk et al., 2011). Participants in one such program, SPIRE, an NIGMS-funded IRACDA program, had similar rates of research productivity, higher number of courses taught, and students mentored, as well as higher rates of transition into academic positions (Rybarczyk et al., 2011).

Negative experiences—of isolation, tokenism, lack of support, questioning of competence—continue through the faculty careers of underrepresented minorities (Kachchaf et al., 2015; Kameny et al., 2014). Faculty of color

frequently report unequal treatment in the form of less support for their teaching and research and more difficulties in promotion and tenure (Hassouneh et al., 2014). Other barriers include: inadequate research infrastructure, training, and development; obstacles to development as independent researchers; institutional bias in NIH policies; lack of support for research topics/methods relevant to research with minority communities; and social, cultural, and environmental barriers (Shavers et al., 2005). Overcoming these barriers requires a multi-pronged approach. Key features of departments that have high numbers and retention of URM faculty include the use of human capital and social relationships (social networks, mentoring/role models) and buy-in from institutional leadership to strategically deploy institutional resources (recruitment/retention packages, and flexible work hours, etc.) (Peek et al., 2013).

As with postdocs, mentoring in particular plays a large role in career development of faculty. Faculty report that mentoring is important to personal development and career guidance as well as having an effect on research productivity, promotion, and retention (Sambunjak et al., 2006; Steele et al., 2013). Crucially, mentors can “provide education about the written and unwritten rules that govern the academic environment” (Beech et al., 2013). However, URM faculty are less likely to be aware of the significance of mentoring and report receiving less mentoring than well-represented scientists (Beech et al., 2013; Helm et al., 2000; Thomas, 2001; Palepu et al., 1998; Ramanan et al., 2002).

Structured mentoring programs can provide needed support to URM faculty. University of California, San Diego was able to increase the 4-year retention rate of URM junior faculty from 58% to 80% after implementing a structured mentoring program (Daley et al., 2006). A review of several mentoring programs found that best practices included a mix of personal and financial support: “one-on-one mentoring by an experienced investigator, group-based skill-building seminars, access to pilot grants, and support for conducting pilot studies” (Beech et al., 2013).

Formal mentoring programs can also increase the competency of the mentors, which is important considering 1) the success of a mentoring program depends heavily on the effectiveness of the individual relationships between mentor and mentee and 2) mentoring is usually learned by example and trial-and-error (Pfund et al., 2014). In particular, good mentoring relationships are “characterized by reciprocity, mutual respect, clear expectations, personal connection, and shared values” (Straus et al., 2013).

In addition to programs to benefit specific diverse individuals, a complementary approach focuses on institutional or structural transformation in the form of decreasing organizational barriers (e.g., changing recruitment, promotion, and tenure policies; conducting climate surveys) and providing greater work-life support (e.g., flexible career policies; dependent care support; Peek et al., 2013). On a more limited level, short (half-day) workshops for faculty focused on habit-changing interventions have also been shown to decrease gender biases over the short-term (months), even when only around 25% of a department participates (Carnes et al., 2012, 2015).

While research on postdoctoral and junior faculty retention is limited, the evidence suggests that both strong mentoring relationships and organizational transformation can be effective in increasing persistence of diverse individuals in academic careers.

Discussion Questions

- What qualities besides research skills are developed in your participants: identity as a scientist, self-actualization, community building, etc.? How can programs intentionally foster these developments?
- What are the biggest challenges for your program? For your participants?
- What do participants identify as the most influential part of your program?
- How do you ensure that mentoring in your program is consistent and effective?
- What are common and unique challenges for postdocs and faculty? What interventions have you found to be most effective in addressing these issues?

References

- Adams HG. Mentoring: An Essential Factor in the Doctoral Process for Minority Students. Notre Dame, IN: National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM); 1992.
- Adedokun, O.A., Parker, L.C., Childress, A., Burgess, W., Adams, R., Agnew, C.R., Leary, J., Knapp, D., Shields, C., Lelievre, S., et al. (2014). Effect of Time on Perceived Gains from an Undergraduate Research Program. *CBE-Life Sci. Educ.* 13, 139–148.
- Anthony JS, Taylor E. Theories and strategies of academic career socialization: improving paths to the professoriate for Black graduate students. In: Wulff DH, Austin AE, editors. *Paths to the Professoriate: Strategies for Enriching the Preparation of Future Faculty*. San Francisco, CA: Jossey-Bass; 2004. p. 92-113.
- Beech, B.M., Calles-Escandon, J., Hairston, K.G., Langdon, S.E., Latham-Sadler, B.A., and Bell, R.A. (2013). Mentoring Programs for Underrepresented Minority Faculty in Academic Medical Centers: A Systematic Review of the Literature. *Acad. Med. J. Assoc. Am. Med. Coll.* 88.
- Cameron, C., Young Lee, H., Anderson, C., Byars-Winston, A., Baldwin, C.D., and Chang, S. (2015). The Role of Scientific Communication Skills in Trainees' Intention to Pursue Biomedical Research Careers: A Social Cognitive Analysis. *CBE-Life Sci. Educ.* 14, 1-12.
- Carnes, M., Devine, P.G., Isaac, C., Manwell, L.B., Ford, C.E., Byars-Winston, A., Fine, E., and Sheridan, J.T. (2012). Promoting Institutional Change Through Bias Literacy. *J. Divers. High. Educ.* 5, 63–77.
- Carnes, M., Devine, P.G., Baier Manwell, L., Byars-Winston, A., Fine, E., Ford, C.E., Forscher, P., Isaac, C., Kaatz, A., Magua, W., et al. (2015). The Effect of an Intervention to Break the Gender Bias Habit for Faculty at One Institution: A Cluster Randomized, Controlled Trial. *Acad. Med.* 90, 221–230.
- Carter, F.D., Mandell, M., and Maton, K.I. (2009). The Influence of On-Campus, Academic Year Undergraduate Research on STEM Ph.D. Outcomes: Evidence From the Meyerhoff Scholarship Program. *Educ. Eval. Policy Anal.* 31, 441–462.
- Chemers, M.M., Zurbriggen, E.L., Syed, M., Goza, B.K., and Bearman, S. (2011). The Role of Efficacy and Identity in Science Career Commitment Among Underrepresented Minority Students. *J. Soc. Issues* 67, 469–491.
- Daley, S., Wingard, D.L., and Reznik, V. (2006). Improving the retention of underrepresented minority faculty in academic medicine. *J. Natl. Med. Assoc.* 98, 1435–1440.
- Davis, G. (2005). Doctors Without Orders: Highlights of the Sigma Xi Postdoc Survey. *Am. Sci.* 93, 1–13.
- Derting, T.L., Ebert-May, D., Henkel, T.P., Maher, J.M., Arnold, B., and Passmore, H.A. (2016). Assessing faculty professional development in STEM higher education: Sustainability of outcomes. *Sci. Adv.* 2, e1501422.
- Eagan, M.K., Hurtado, S., Chang, M.J., Garcia, G.A., Herrera, F.A., and Garibay, J.C. (2013). Making a Difference in Science Education The Impact of Undergraduate Research Programs. *Am. Educ. Res. J.* 50, 683–713.
- Estrada-Hollenbeck, M., Woodcock, A., Hernandez, P.R., and Schultz, P.W. (2011). Toward a Model of Social Influence that Explains Minority Student Integration into the Scientific Community. *J. Educ. Psychol.* 103, 206–222.
- Fechheimer, M., Webber, K., and Kleiber, P.B. (2011). How Well Do Undergraduate Research Programs Promote Engagement and Success of Students? *CBE-Life Sci. Educ.* 10, 156–163.
- Fuhrmann, C.N., Halme, D.G., O'Sullivan, P.S., and Lindstaedt, B. (2011). Improving Graduate Education to Support a Branching Career Pipeline: Recommendations Based on a Survey of Doctoral Students in the Basic Biomedical Sciences. *CBE Life Sci. Educ.* 10, 239–249.
- Gazley, J.L., Remich, R., Naffziger-Hirsch, M.E., Keller, J., Campbell, P.B., and McGee, R. (2014). Beyond Preparation: Identity, Cultural Capital, and Readiness for Graduate School in the Biomedical Sciences. *J. Res. Sci. Teach.* 51, 1021–1048.
- Gibbs K.D. and Griffin, K.A. (2013). What Do I Want to Be with My PhD? The Roles of Personal Values and Structural Dynamics in Shaping the Career Interests of Recent Biomedical Science PhD Graduates. *CBE Life Sci. Educ.* 12, 711-723.

- Gibbs, K.D., McGready, J., Bennett, J.C., and Griffin, K. (2014). Biomedical Science Ph.D. Career Interest Patterns by Race/Ethnicity and Gender. *PLoS ONE* 9, e114736.
- Gibbs, K.D., McGready, J., and Griffin, K. (2015). Career Development among American Biomedical Postdocs. *CBE-Life Sci. Educ.* 14, ar44.
- Hall, A., Mann, J., and Bender, M. (2015a). Analysis of Scholar Outcomes for the NIGMS Postbaccalaureate Research Education Program. Available online: <https://www.nigms.nih.gov/News/reports/Documents/PREP-outcomes-report.pdf>
- Hall, A., Miklos, A., Micher, O., Oh, A., and Shoemaker, J. (2015b). NIGMS Analysis of Supplements to Enhance Diversity 1989-2006. Available online: <https://www.nigms.nih.gov/Research/mechanisms/Documents/DSPOutcomesReport5282015.pdf>
- Hall, A.K., Miklos, A., Oh, Austin, Gaillard, S.D. (2016). Educational Outcomes from the Maximizing Access to Research Careers Undergraduate Student Training in Academic Research (MARC U-STAR) Program. Available online: <https://www.nigms.nih.gov/News/reports/Documents/MARC-paper031416.pdf>
- Hassouneh, D., Lutz, K.F., Beckett, A.K., Junkins, E.P., and Horton, L.L. (2014). The experiences of underrepresented minority faculty in schools of medicine. *Med. Educ. Online* 19, 24768.
- Helfinger, C.A. and Doykos, B. (2016). Paving the Pathway: Exploring Student Perception of Professional Development Preparation in Doctoral Education. *Innov. High. Educ.* DOI 10.1007/s10755-016-9356-9
- Helm, E.G., Prieto, D.O., Parker, J.E., and Russell, M.C. (2000). Minority medical school faculty. *J. Natl. Med. Assoc.* 92, 411-414.
- Institute of Medicine. (2015). Developing a 21st century neuroscience workforce: Workshop summary. Washington, DC: The National Academies Press.
- Jones-London, M. (2016). NINDS Strategies to Enhance Diversity of Neuroscience Researchers. Presented at the National Advisory Neurological Disorders and Stroke (NANDS) Council Meeting - February 2016, Bethesda, Maryland. Retrieved from <https://videocast.nih.gov/summary.asp?Live=17842&bhcp=1>
- Kachchaf, R., Ko, L., Hodari, A., and Ong, M. (2015). Career-life balance for women of color: Experiences in science and engineering academia. *J. Divers. High. Educ.* 8, 175-191.
- Kameny, R.R., DeRosier, M.E., Taylor, L.C., McMillen, J.S., Knowles, M.M., and Pifer, K. (2014). Barriers to Career Success for Minority Researchers in the Behavioral Sciences. *J. Career Dev.* 41, 43-61.
- Linn, M.C., Palmer, E., Baranger, A., Gerard, E., and Stone, E. (2015). Undergraduate research experiences: Impacts and opportunities. *Science* 347, 1261757.
- McGee, R., Saran, S., and Krulwich, T.A. (2012). Diversity in the Biomedical Workforce: Developing Talent. *Mt Sinai J Med.* 79, 397-411.
- Merolla, D.M., and Serpe, R.T. (2013). STEM enrichment programs and graduate school matriculation: the role of science identity salience. *Soc. Psychol. Educ.* 16, 575-597.
- Miller, C., and Stassun, K. (2014). A test that fails. *Nature* 510, 303-304.
- Meyers SL, Turner C. Faculty of Color in Academe: Bittersweet Success. Upper Saddle River, NJ: Allyn & Bacon; 2000.
- National Institutes of Health (2012). Biomedical Research Workforce Working Group Report (National Institutes of Health).
- National Science Foundation (2015). Women, Minorities, and Persons with Disabilities in Science and Engineering: 2015 (Arlington, VA: National Science Foundation, National Center for Science and Engineering Statistics).
- Ong, M., Wright, C., Espinosa, L., and Orfield, G. (2011). Inside the Double Bind: A Synthesis of Empirical Research on Undergraduate and Graduate Women of Color in Science, Technology, Engineering, and Mathematics. *Harv. Educ. Rev.* 81, 172-209.
- Palepu, A., Friedman, R.H., Barnett, R.C., Carr, P.L., Ash, A.S., Szalacha, L., and Moskowitz, M.A. (1998). Junior faculty members' mentoring relationships and their professional development in U.S. medical schools. *Acad. Med. J. Assoc. Am. Med. Coll.* 73, 318-323.

- Peek, M.E., Kim, K.E., Johnson, J.K., and Vela, M.B. (2013). "URM candidates are encouraged to apply": a national study to identify effective strategies to enhance racial and ethnic faculty diversity in academic departments of medicine. *Acad. Med. J. Assoc. Am. Med. Coll.* 88, 405–412.
- Pfund, C., House, S.C., Asquith, P., Fleming, M.F., Buhr, K.A., Burnham, E.L., Eichenberger Gilmore, J.M., Huskins, W.C., McGee, R., Schurr, K., et al. (2014). Training mentors of clinical and translational research scholars: a randomized controlled trial. *Acad. Med. J. Assoc. Am. Med. Coll.* 89, 774–782.
- Powell, K. (2013). Higher education: On the lookout for true grit. *Nature* 504, 471–473.
- Ramanan, R.A., Phillips, R.S., Davis, R.B., Silen, W., and Reede, J.Y. (2002). Mentoring in medicine: keys to satisfaction. *Am. J. Med.* 112, 336–341.
- Russell, S.H., Hancock, M.P., and McCullough, J. (2007). Benefits of Undergraduate Research Experiences. *Science* 316, 548–549.
- Rybarczyk, B., Lerea, L., Lund, P.K., Whittington, D., and Dykstra, L. (2011). Postdoctoral Training Aligned with the Academic Professoriate. *BioScience* 61, 699–705.
- Sambunjak, D., Straus, S.E., and Marusić, A. (2006). Mentoring in academic medicine: a systematic review. *JAMA* 296, 1103–1115.
- Sauermann, H., and Roach, M. (2012). Science PhD Career Preferences: Levels, Changes, and Advisor Encouragement. *PLoS ONE* 7, e36307.
- Scaffidi, A.K., and Berman, J.E. (2011). A positive postdoctoral experience is related to quality supervision and career mentoring, collaborations, networking and a nurturing research environment. *High. Educ.* 62, 685–698.
- Schultz, P.W., Hernandez, P.R., Woodcock, A., Estrada, M., Chance, R.C., Aguilar, M., and Serpe, R.T. (2011). Patching the Pipeline Reducing Educational Disparities in the Sciences Through Minority Training Programs. *Educ. Eval. Policy Anal.* 33, 95–114.
- Shavers, V.L., Fagan, P., Lawrence, D., McCaskill-Stevens, W., McDonald, P., Browne, D., McLinden, D., Christian, M., and Trimble, E. (2005). Barriers to racial/ethnic minority application and competition for NIH research funding. *J. Natl. Med. Assoc.* 97, 1063–1077.
- Skaalvik E, Skaalvik S. Internal and external frames of reference for academic self-concept. *Educ Psychol* 2002;37:233-244.
- Steele, M.M., Fisman, S., and Davidson, B. (2013). Mentoring and role models in recruitment and retention: A study of junior medical faculty perceptions. *Med. Teach.* 35, e1130–e1138.
- Straus, S.E., Johnson, M.O., Marquez, C., and Feldman, M.D. (2013). Characteristics of Successful and Failed Mentoring Relationships: A Qualitative Study Across Two Academic Health Centers. *Acad. Med.* 88, 82–89.
- Summers MF, Hrabowski FA III. Diversity. Preparing minority scientists and engineers. *Science* 2006;311:1870-1871
- Thiry, H., Weston, T.J., Laursen, S.L., and Hunter, A.-B. (2012). The Benefits of Multi-Year Research Experiences: Differences in Novice and Experienced Students' Reported Gains from Undergraduate Research. *CBE Life Sci. Educ.* 11, 260–272.
- Thomas, D.A. (2001). The truth about mentoring minorities. *Race matters.* *Harv. Bus. Rev.* 79, 98–107, 168.
- Tull, R.G., Rutledge, J.C., Carter, F.D., and Warnick, J.E. (2012). PROMISE: Maryland's Alliance for Graduate Education and the Professoriate Enhances Recruitment and Retention of Underrepresented Minority Graduate Students. *Acad. med.* 82, 1562-1569.

Breakout Sessions

Group Breakout Session and Development of Follow-up Action Items

Participants in their selected groups will identify tangible next steps for developing and integrating new concepts and interventions into current and future NINDS diversity training programs.

8:30 – 8:40 am	Background: Self-Introduction of moderator
8:40 – 9:30 am	Brainstorming: Discuss questions below from individual perspectives
9:30 – 10:00 am	Prioritize the Final Report-Out: Develop generalizable lessons learned and/or recommendations around the topic to share with all meeting participants

Each group must identify a Scribe and a Reporter.

Balance Room

Fixing Gap Junctions: How can we influence graduate admissions and affect institutional buy-in?

Moderator/Facilitator: Sherilynn J. Black, PhD – *Duke University*

Successful interventions to change culture and thus promote diverse individuals career advancement must be both cross-cutting and institutionally individualized. (2014 Advancement of Women in Biomedical Careers Workshop)

- What are your University's strategies for creating a broad and inclusive search? Does your Institute have a way to raise awareness of the existence of unconscious bias and strategies to reduce its impact on graduate school admission or the search process?
- Is there consultation and resources on best practice strategies for identifying, recruiting and hiring qualified diverse talent from underrepresented groups? Are there incentives or disincentives for diversity recruitment by departments or chairs?
- How does your Institution coordinate multiple diversity efforts so they have a greater impact on all students, and on the institution as a whole?
- What are the top three issues in this area you believe the neuroscience community together could raise awareness about and take some collective action to address? How?
- What are some programmatic or possible NIH neuroscience initiatives or resources that would help create solutions for the problem?

Wisdom Room

Increasing Action Potential: How do we address non-research factors that impact diverse trainees while leveraging attributes like resiliency?

Moderator/Facilitator: Anna Han, PhD – *NIH, Chief Office of Scientific Workforce Diversity*

Defining effective research experiences and mentoring to enhance recruitment and persistence in biomedical careers is a central question to understanding and enhancing workforce diversity. It is also important for us to investigate scientifically the various persistent barriers that frustrate sustainable change in diversity outcomes. In particular, it is time to look more deeply at psychological and interpersonal factors that have significant impacts at the individual and institutional levels of biomedicine (Valantine and Collins, PNAS 2015).

- What are the non-research factors that are the obstacles for the advancement of diverse trainees in neuroscience? How do these factors change or sustain over the various career stages?
- How can successful strategies from this group be exported to the neuroscience community?

- What are the top three issues in this area you believe the neuroscience community together could raise awareness about and take some collective action to address? How?
- What are some programmatic or possible NIH neuroscience initiatives or resources that would help create solutions for the problem?

Insight Room

Wire Together, Fire Together: How can we use our programs to facilitate transition of trainees across career stages?

Moderator/Facilitator: Alison Hall, PhD – *NIGMS, Division of Training, Workforce Development, and Diversity*

Identification of the career stages (high school, college, graduate, postgraduate training, first job, tenure and promotion, first grant) at which diversity of the potential neuroscience workforce decreases can help guide effective programmatic development. The available studies suggest that there are barriers to diversity at each stage of career development. Even after academic appointment, minority faculty progress less rapidly and successfully to tenured status than do their non-minority colleagues (Fang et al, 2000; Chronicle of Higher Education Almanac, 2009; Nelson and Brammer, 2010; Liu and Alexander, 2010). Thus, the extant data demonstrate a continuing need for programs that foster diversity career success at each stage in the development of an academic research career (taken from NINDS Advisory Panel Report for Workforce Diversity, 2010).

- What successful strategies exist for the transition of diverse trainees? What obstacles do you face in implementing these at your school? At the stages below:
 - Entry into graduate degree programs
 - Transition from graduate degree to postdoctoral fellowships
 - Appointment from a postdoctoral position to the first independent scientific position
 - First Funding Award
- How do we create meaningful relationships, partnerships and faculty networks between Institutions that enroll substantial numbers of students from underrepresented groups at early career stages to later career research-intensive institutions to facilitate transitions up the career ladder?
- How do you engage and provide support for research advisors in their next role as career sponsors?
- What are the top three issues in this area you believe the neuroscience community together could raise awareness about and take some collective action to address? How?
- What are some programmatic or possible NIH neuroscience initiatives or resources that would help create solutions for the problem?

R25 Programs

Program: Bridge to the PhD in Neuroscience

PI(s): Atchison, William D

Home Institution: Michigan State University

Career Stage Target: Undergraduate

A five year program to Enhance Neuroscience Diversity through Undergraduate Research Experiences (ENDURE) will be developed at Michigan State University (MSU). Its goal is to increase the number of underrepresented minority (URM) Ph.D.s trained in neurosciences: specifically to facilitate their entry into high quality and highly competitive mainland Ph.D. or dual degree (M.D./Ph.D., D.O./Ph.D., D.V.M./Ph.D) programs with a neuroscience emphasis and enhance their likeliness of their success in the program. Central to this is the need to 1) identify talented students with potential for Ph.D studies in neuroscience; 2) introduce them to career opportunities in neuroscience; 3) provide research training and individual mentoring; 4) increase their competitiveness for graduate study; 5) and provide additional professional development activities. To do this a "bridge program" is proposed encompassing the last two years of undergraduate study. It entails established partnerships between MSU and 4 minority serving institutions (MSIs): two campuses in Puerto Rico in the University of Puerto Rico (UPR) system (UPR-Cayey and UPR-Arecibo), as well as two MSIs in the Southwest (Northern New Mexico College and St. Mary's University). To introduce students to neuroscience, a day-long workshop entitled, "What is Neuroscience?" will be held annually on each of the partnering campuses. Annual support will be provided for 8 summer students to work full-time at MSU on a 10-12 weeks research project in productive laboratories which are actively funded by extramural grants. To sustain student interest in neuroscience, a two semester videoconference journal club will be held at MSU and broadcast live to the 4 MSIs. It will be led by URM grad students in the neurosciences at MSU. Six URM students annually from the four MSIs will spend the Fall semester between their 3rd and 5th yrs at MSU taking 9 credits of classwork and continuing on an original, hypothesis-based research project. Included will be a seminar-type course stressing translational and interdisciplinary approaches to understanding the etiology of human disease. This course will entail significant practice in writing, as well as an integral journal club. Improvement of communication skills will involve both informal and more formalized settings (research presentations, participation in class, journal club participation and paper writing). Student progress in both course work and research will be closely monitored and externally evaluated. This program will increase the number of URM students entering Ph.D programs in Neuro-/Behavioral Science, by 1) increasing the student's awareness for research career opportunities in neuroscience, 2) improving their English language skills, 3) providing high quality mentored research experience during the undergraduate studies to 'springboard' the student into the Ph.D program, and 4) providing further didactic training in neuroscience principles, scientific writing and career enrichment activities. Through these combined activities, the student will become more confident in the application process, present a more competitive application and make valuable contacts (network) with researchers at MSU and elsewhere. **Funded by NIH Blueprint**

Program: Summer Research Experience in Neurobiology

PI(s): Burgess, Robert W

Home Institution: The Jackson Laboratory

Career Stage Target: High School and Undergraduate

The Jackson Laboratory (JAX) in Bar Harbor, Maine, proposes a summer research experience for six high school students and undergraduates to pursue basic research in neurobiology, under the mentorship of seven JAX scientists with NINDS grant funding. These experienced mentors are leading cutting-edge, collaborative research programs into neurodevelopment, neuromuscular diseases, and neurodegeneration. The 9-to-11 week residential internship will add a strong focus on neuroscience to the existing JAX Summer Student Program, an internationally recognized research opportunity for college and high school students that annually welcomes 30-40 participants. A weekly stipend, subsistence allotment and travel assistance provided to each intern enables economically disadvantaged students to forgo summer jobs and participate in this life-changing educational experience. The proposed program will offer an intense research internship in neurobiology with a focus on the laboratory mouse as an investigative tool to probe the basic mechanisms of human biology and disease. As a member of a sponsoring scientist's laboratory team, each student will design and conduct an independent, hypothesis-driven project using advanced analysis methods and tools and the outstanding genetic resources available at JAX. A strong emphasis will be placed on ethics education, including mandatory workshops on the ethical conduct of research and the humane treatment of lab animals. The JAX institutional commitment includes student access to intellectual and research resources such as on-campus courses and conferences, state-of-the-art instrumentation and bioinformatics databases, dedicated program direction by the

Education Office, and housing in a JAX-owned dormitory overseen by professional staff. The summer program--supported by institutional funds, private foundations, and federal grants--has well-established administrative procedures for recruitment and selection, mentor guidance, and program design, management, and evaluation. The participants will be chosen through a competitive, nationwide application process, and members of underrepresented groups will be strongly encouraged to apply and actively recruited through targeted outreach. JAX offers a stimulating environment in which motivated, talented students from diverse backgrounds can learn the fundamentals of scientific inquiry, contribute to real research progress, and make great strides in intellectual and personal growth that will guide them in career choices and lifelong learning.

Program: NIH Neurotrauma Summer Research Experience Program

PI(s): Dietrich, W Dalton and Anderson, Kimberly D

Home Institution: University of Miami

Career Stage Target: Undergraduate

Undergraduate research experiences are essential to providing important skills and encouragement for students to pursue careers in the health related sciences. These opportunities are often very difficult for undergraduate students to obtain without adequate support from either external or internal funding sources within the University (particularly in the current economic climate), thus limiting not only their exposure but also their willingness to later pursue a scientific career. There is a need to recruit scientists into the field of Neurotrauma research as traumatic brain injury (TBI) and spinal cord injury (SCI) are significant causes of permanent paralysis in the United States. The current proposal seeks support for a competitive Neurotrauma-focused summer research program to be hosted by multi-disciplinary laboratories within The Miami Project to Cure Paralysis, a center of excellence for studying and developing therapeutic approaches for repair of central nervous system (CNS) injury caused by neurotrauma. The diverse foci of the research mentors who will participate in this program, from neuroprotection to cell replacement to regeneration to neurorehabilitation, will provide each student with a unique summer project to focus on related to a specific neurotraumatic condition, while advancing the aims of currently-funded parent programs and thus accelerating the pace of scientific advancement. The addition of a structured learning program involving faculty, graduate students, and post-doctoral fellows will serve to teach undergraduate students the processes involved in developing a project and experimentally testing a hypothesis using the standard scientific approach. Students involved in the proposed program will not only be exposed practically and theoretically to scientific research, but will also participate in cutting edge, NIH-funded projects that could have significant impact on the field of Neurotrauma and the US healthcare system. The measure of success of our proposed undergraduate research program will be by the attainment of either graduate or medical school positions by those students who participate in these activities within the listed host laboratories.

Program: Summer Research Experience in Translational Neuroscience and Neurological Surgery

PI(s): Ellenbogen, Richard G

Home Institution: University of Washington

Career Stage Target: High School and Undergraduate

The primary goal of our summer research program is to immerse a selected group of 6 high school students and 6 undergraduates in a translational environment of basic neuroscience, neural engineering, and neurological surgery. In the first 7 years of program operation, we have placed 75 high school and college undergraduate students from 49 different schools in the program. Students have participated in 17 different laboratories engaging a total of 22 faculty, attended over 80 separate Grand Rounds presentations, observed over 150 procedures by following 12 different surgeons, and had weekly student group presentations by 20 different faculty members. Several students (8) from our earlier classes have now been accepted into medical school or PhD neuroscience programs, and many of the high school students have gone on to neuroscience or premedical studies in college. Over 50% of our participants have been women and 15% have been from underrepresented groups. Participants in this program will be recruited by announcing our program through science departments at local high schools, community colleges, colleges and universities. Special efforts will be made to recruit individuals from underrepresented groups through different outreach programs including The Rainier Scholars, DO-IT, and Washington MESA. Coordinated recruitment through these programs will ensure that we will have participants from groups including individuals who are African Americans, Hispanic Latinos, Native Americans, children from families where there is no experience with college education and the opportunities that arise there from, disadvantaged (e.g. physical, sensory deprived, learning disorders), and have fostering experiences. Through their summer experiences participants will gain the self-assurance and confidence that will enable them to take advantage of educational opportunities, will have a better understanding of the scientific process, challenges of translating basic research to clinical application, will provide them with mentors that can become part of their continuing interest in their education and may lead to careers in science, engineering, and/or medicine.

Program: BP-ENDURE-Atlanta: Engaging Undergraduates in Neuroscience Research

PI(s): Frantz, Kyle J

Home Institution: Georgia State University

Career Stage Target: Undergraduate

Undergraduate students can be attracted to science by engaging in research. A summer experience as an apprentice in a scientist's laboratory or clinic may be effective in this regard, but short-term research may fail to provide the preparation necessary to progress into PhD programs in fields such as neuroscience. The BPENDURE-Atlanta project led by Georgia State University (GSU) in partnership with Agnes Scott College (ASC), Emory University, and Spelman College, will provide a two-year neuroscience research immersion and integration program for students from underrepresented groups. Program evaluation will test the hypothesis that in-depth research training, coupled with an intensive professional development workshop series, will positively affect participants' communication skills and confidence with research abilities, and will increase rates of matriculation into neuroscience PhD programs. Identification of a reliable approach to developing the skills and confidence necessary to progress into PhD programs will enable more students from various backgrounds to pursue their interests in science, and will ultimately increase diversity in the US scientific workforce. Specific Aim 1 is to engage undergraduates from underrepresented groups in research and training, using a two-year program for junior and senior undergraduates that includes five major components: 1) a research immersion in Atlanta's well-established BRAIN summer program; 2) a Research Assistantship in the first academic year; 3) a Travel Assistantship to conduct research at a partner T32 training program in the second summer; 4) a Capstone Research Assistantship during the second academic year; and 5) an intensive professional development workshop series. Specific Aim 2 is to test the hypothesis that this neuroscience research program will positively affect scientific communication skills and confidence with research abilities among undergraduates, thereby raising rates of matriculation into neuroscience PhD programs. By conducting hypothesis-driven science education research, this project will fill a gap in current knowledge about how best to encourage and prepare students to help address biomedical, behavioral, and clinical research needs, with a focus on students from underrepresented groups. By publishing results in peer-reviewed journals targeting different subpopulations in the scientific community, we will extend beyond the norm of many training programs in terms of contributing to best practices in science education. *Funded by NIH Blueprint*

Program: South Texas Advanced Research Training: Undergraduate Program (START-UP)

PI(s): Frazer, Alan and Morilak, David

Home Institution: University of Texas Health Science Center San Antonio

Career Stage Target: Undergraduate

The proportion of underrepresented minorities (URMs) earning doctorate degrees in the basic biomedical sciences has increased modestly over the past few decades. Our proposed Program, the South Texas Advanced Research Training Minority Undergraduate Program (START-M-UP) is a response to a Funding Opportunity Announcement from the Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences (BP-ENDURE). As such, the overall goal of our Program is to encourage and prepare junior and senior undergraduate URMs from the San Antonio and South Texas Region to enter doctoral programs in neuroscience, to complete them successfully, and become well-trained and competitive neuroscientists. To accomplish this, a comprehensive program is proposed for the URM students accepted into the program, involving extensive research experiences in the laboratories of successful neuroscientists, and opportunities to develop and improve their writing, speaking, and time management skills. Students will be recruited into START-M-UP from five partner institutions in San Antonio, namely Our Lady of the Lake University, St. Mary's University, Trinity University, University of the Incarnate Word, and the University of Texas, San Antonio. Collectively these schools have 24,527 undergraduates who are URMs (based on ethnicity), of whom 2,947 are Science Majors. Also, these schools have a high number of students from low income families, many of whom are the first in their families to attend college. Faculty contacts have been established at each school to assist us recruit suitable students into START-M-UP. Thirty-one training faculty have been identified (including three from UTSA), who are appropriate to mentor these students in their laboratories. The students will participate in laboratory research for an average of 12 hours per week during the two academic semesters, and 40 hours/week during a 10-week intensive summer research exposure. Students will also have an opportunity to work in one of seven major neuroscience programs at institutions outside of San Antonio during the summer. In addition to their laboratory research, the students will also attend seminars and journal clubs, research retreats, and have exposure to neuroscientists from other institutions. The students will all receive instruction on the responsible conduct of research. The Co-Directors of the Program are Drs. Alan Frazer and David Weiss, experienced scientists and administrators, who have run programs similar to START-M-UP previously. They will be members of an Executive Committee that will oversee all aspects of the Program. There is a formal evaluation plan for the Program, as well as an outcomes assessment process. Further, a plan is described to disseminate nationally all materials developed for the design and implementation of START-M-UP. *Funded by NIH Blueprint*

Program: Neuroscience Research Opportunities to Increase Diversity (NeuroID)

PI(s): Garcia-Arraras, Jose E and Maldonado-Vlaar, Carmen S

Home Institution: University of Puerto Rico – Rio Piedras

Career Stage Target: Undergraduate

The Neuroscience Research Opportunities to Increase Diversity (NeuroID) program from the University of Puerto Rico Rio Piedras Campus aims to increase the opportunities available for undergraduate students in the area of neurosciences. This proposal builds upon the experiences gathered during the current funding period to enhance and strengthen the mentoring and training activities of the NeuroID program, incorporating an emphasis in developing active-learning skills and strengthen emotional competence. NeuroID takes advantage of the strong neuroscience expertise among UPR investigators and fortifies the underlying neuroscience network that joins undergraduate students, island investigators and their collaborators in mainland institutions. The main goal of the NeuroID program is to increase diversity in the neurosciences by establishing a cohort of interested students that will receive academic and professional training in neuroscience-related research. The selected students will be Hispanics from different gender, race, social status and physical needs. The core of the program is a comprehensive research experience for undergraduate students based on a *research-with-purpose* training philosophy. The training program consists of three major components: (1) Research Experience - An intense research experience during the academic year and two research summer experiences: one at the UPR and the other in a laboratory at an institution in the mainland USA that have active T32 training grants in neuroscience and/or excellent track record in recruiting and training underrepresented minorities. (2) Academic training – an academic program based on active learning activities, seminars, workshops and selected courses to enhance their knowledge in neurobiology, quantitative biology and understanding of a research career. (3) Student development activities - Participants will enter a mentoring program that includes community outreach activities, writing in science, oral presentations and career counseling to enhance their professional capabilities. The proposed activities together with an established mentoring program with ethnic and race-representative members of the neuroscience community as role models will serve to increase the student competitiveness and enhance their interest in continuing a research career in neuroscience. The NeuroID program will extend the impact of other successful programs at the University of Puerto Rico, not only by focusing on the neuroscience field but also by greatly expanding the program to students from primarily-undergraduate institutions in the San Juan metropolitan areas, which increases the pool of available applicants as well as providing an inclusive and broader training program. **Funded by NIH Blueprint**

Program: A Neuroscience-Focused Undergraduate Research Program at an HBCU

PI(s): Harrington, Melissa A

Home Institution: Delaware State University

Career Stage Target: Undergraduate

Our R25 project focuses on recruiting undergraduates from underrepresented groups and integrating them into a vibrant community of neuroscience researchers. Students will conduct research with faculty who have active labs with external funding, and will also participate in academic, outreach and professional development activities sponsored by the Delaware Center for Neuroscience Research. Our project will target students from three Delaware institutions of higher education that serve large minority populations, allowing us to recruit a diverse group of students and maintain them as part of a supportive, research-focused community beyond the length of the 11-week summer program. The organizing center of our R25 project will be the Delaware Center for Neuroscience Research, an interdisciplinary, inter-institutional, virtual Center founded in 2012 with support from a grant from NIGMS. The Delaware Center for Neuroscience Research supports the ongoing research projects of 10 investigators at DSU by providing significant funds for their research and release time from teaching. Another 14 affiliated faculty at DSU, UD and Nemours take part in Center-sponsored meetings, retreats and symposia, professional development workshops. The undergraduate researchers in our R25 program will be a part of the Center for Neuroscience Research, carrying out research projects with affiliated faculty and participating in Center activities and professional development opportunities, including presenting at the annual Delaware Neuroscience Symposium and traveling to a national undergraduate research conference. As a Historically-Black University with an undergraduate enrollment that is approximately 78% African-American, DSU is well-positioned to provide a supportive environment for under-represented students. We will partner with Wesley College, a liberal arts college just 3 miles from DSU which has an undergraduate enrollment that is approximately 50% minority, and the two largest campuses of the Delaware Technical and Community College (DTCC), which combined have just over 16,000 students, 36% of which are underrepresented minorities. Focusing on students attending institutions within our small state allows us to keep our research scholars involved in the neuroscience-related events beyond the length of the summer program. By combining a high quality research experience with participation in a neuroscience-focused community and skill-building activities designed to help students think like a scientist, the DSU SN-R program will help build participants preparation and enthusiasm for graduating with a STEM BS degree and pursuing a doctorate in a STEM area.

Program: BP-ENDURE St. Louis: A Neuroscience Pipeline

PI(s): Herzog, Erik

Home Institution: Washington University

Career Stage Target: Undergraduate

The BP-ENDURE program in St. Louis is intended for undergraduate students pursuing training in the neurosciences. The objective of the grant is to provide rigorous and critical training in neuroscience to a diverse cohort of students from three partner institutions (Washington University, the University of Missouri-St. Louis and Harris-Stowe State University). By providing support for 10 funded positions for summer research, this proposal will establish a Pipeline to graduate school. The Pipeline emphasizes sustained training in oral and written science communication, discovery science and outreach experience. Specifically, this proposal will support 10 early-stage trainees annually for up to three years each. Our Pipeline has long-standing commitments to cutting-edge research, to interdisciplinary education, and to providing modern career development. We seek to be a Program that responds to changes in the research environment by helping our students to pursue important and innovative problems and concepts, to adopt new techniques and to communicate effectively with their peers and the general public. The proposal will allow for the addition of three interactive and immersive courses that will appeal to teens and create a community of young scientists who can begin as early as the summer after their freshman year. The curriculum and research environments will remain broad and deep, combining expertise in molecular, cellular and systems-level approaches to the study of neural function and dysfunction. The Program will recruit and retain talented, diverse students through innovative and dedicated coordination with the University and partner schools and be evaluated formally by a Board of Directors and an external assessor. Major new initiatives aimed at accomplishing these goals include: 1) the establishment of a new network of research opportunities for undergraduates interested in the neurosciences, 2) the introduction of three interactive courses (The Teen Brain, Neuroscience Futures, and Skills for a Neuroscientist) to bolster neuroscience fundamentals and a sense of community among the students, 3) enhanced involvement of the undergraduates in the Society for Neuroscience Brain Bee as part of their training in science communication, and 4) refinement of a near peer-mentoring program that has graduate students working with undergraduates and undergraduates working with high school students. These initiatives will ensure our students remain at the forefront of developments in neuroscience research, teaching and outreach. *Funded by NIH Blueprint*

Program: Summer Research Experience for Undergraduates in Neuroscience

PI(s): Jackson, Meyer B

Home Institution: University of Wisconsin-Madison

Career Stage Target: Undergraduate

The Integrated Biological Sciences Summer Research Program (IBS-SRP) at the University of Wisconsin (UW) has an impressive record in providing authentic summer research experiences to undergraduates, most of whom are from groups underrepresented in the biological sciences research community. This application seeks support to expand this program by increasing the number of IBS-SRP students in UW neuroscience laboratories. The seven students supported by this grant will spend their summer in an outstanding neuroscience laboratory and conduct research under the supervision of scientists with experience in and commitment to the mentoring of undergraduates in research. The students will enter a highly structured program with weekly meetings and with many enrichment activities designed to help them connect their research with major concepts in the biological sciences. Additional enrichment activities provide students with guidance in preparing for graduate school and for developing the skills they will need as neuroscience researchers. This program will increase the diversity of neuroscience researchers and help students from diverse backgrounds in their preparation for careers in neuroscience.

Program: Congruent Mentorship to Reach Academic Diversity (COMRADE) in Neuroscience Research

PI(s): Jean-Louis, Girardin and Ogedegbe, Olugbenga

Home Institution: New York University School of Medicine

Career Stage Target: Postdoctoral

The training program 'Congruent Mentorship to Reach Academic Diversity (COMRADE) in Neuroscience Research' will offer an innovative, evidence-based mentored learning experience to URM neuroscientists. The focus on URM postdocs is guided by evidence that they experience inconsistencies in mentorship, suboptimal academic social support, insufficient time for research, and lack of role models during graduate training. As recommended by the NIH Office of Intramural Training & Education, mentees will participate in individualized exercises to improve career development and verbal/written communication skills; they will be mentored while implementing their Individual Development Plan. Training will begin with a 2-week didactic program (Summer I), followed by congruent mentorship, a mid-year meeting, monthly webinars, ending with a 1-

week, proposal-focused program (Summer II). Summer I comprises workshops on career and professional development, behavioral neuroscience methods, and grant writing. Summer II focuses on NIH mock study sections featuring peer proposal critiques and interactions with NINDS PO's. We will evaluate the program and track mentees' progress. Outcomes will include: 1) number of professional presentations and publications; 2) academic leadership positions; 3) academic career awards; and 4) federal and nonfederal grants. Mentees' characteristics (self-efficacy, intrinsic motivation, resilience, and social support) predicting academic success will be measured pre and post enrollment. The specific aims of the program are: 1) To select qualified URM postdocs with great potential to contribute to current knowledge of evidence-based neuroscience models utilized to reduce risk of stroke and related metabolic diseases; 2) To increase mentees' knowledge, skills, and motivation to pursue academic careers through intensive research training. This will be achieved via exposure to neuroscience research tools for risk reduction; instructions to enhance career development skills and development of successful grant applications; 3) To provide continuous congruent mentorship to mentees and to facilitate transition into independent investigators; and 4) To provide mentees with intensive individualized training and guidance in grant writing and to acquaint them with the NIH review process. This will enhance their capacity to compete successfully for funding at the national level. Mentees will participate in guided mock study section, receiving feedback on their proposals by experienced investigators and reviewing proposals of their peers. COMRADE will address a critical deficiency in the academic workforce by mentoring URM postdocs to pursue independent careers in behavioral neuroscience and health equity research. Successful completion of the program will establish a network of 24 well-trained URM neuroscientists, thus expanding capacity to reduce the burden of neurological diseases and improve health equity in disparity communities.

Program: Enhancing Neuroscience Diversity with the Tennessee State University-Neuroscience Education and Research Vanderbilt Experience (TSU-NERVE)

PI(s): Kelly, Kiesa G

Home Institution: Tennessee State University

Career Stage Target: Undergraduate

Tennessee State University (TSU)—a public, historically black university (HBCU)—proposes to launch TSU-NERVE (Neuroscience Education and Research Vanderbilt Experience) with partnership from Vanderbilt University, a major research university less than 3 miles away that supports over 70 faculty on two, T32 grants in neuroscience. TSU-NERVE will create quality research, didactic, and professional development opportunities during the junior and senior years for TSU undergraduate STEM students with interest in neuroscience. Research education will include three (3), paid, part-time research experiences in Vanderbilt neuroscience labs and a paid, full-time summer research experience at Vanderbilt or one of three other T32- funded neuroscience institutions with which a partnership has been formed (e.g., U. of Michigan). Didactics and professional development opportunities will include: free neuroscience courses, seminars, and retreats at Vanderbilt; a 6-part Workshop series on graduate school admissions that will involve directors of neuroscience doctoral programs from around the country; a 3 semester neuroscience research seminar course at TSU under the direction of an appropriate Co-PD neuroscientist; and individual mentoring and advising from said Co-PD. Carefully crafted admissions and retention plans will maximize TSU-NERVE completion and success. Program eligibility requires meeting a set of high academic standards, including a 3.5 minimum GPA and "B" or better completion of relevant foundational STEM coursework. Qualifying applications will be reviewed by the Co-PDs and Advisory Board, and up to 5 rising juniors will be admitted annually for the 2-year program. Support services to increase retention and Program completion include: 1) a paid Vanderbilt Teaching Assistant to tutor students in rigorous Vanderbilt neuroscience coursework, 2) paid Vanderbilt graduate student mentors who will work with each TSU-NERVE student in his/her academic year lab placements, 3) individual mentoring and advising from a Co-PD, including an evaluation of participant progress each semester, and 4) a Probation Plan to help remediate struggling students. In short, TSU-NERVE will: 1) recruit talented (primarily African American) STEM majors from TSU interested in neuroscience, 2) provide appropriate support and scaffolding for these students as they receive quality research and didactic experiences at major research institutions, and 3) advance students from underrepresented backgrounds into doctoral programs in neuroscience with well-crafted professional development activities—including direct contact with graduate program directors. **Funded by NIH Blueprint**

Program: UAB Neuroscience Roadmap Scholars Program

PI(s): McMahon, Lori and Lubin, Farah

Home Institution: University of Alabama at Birmingham

Career Stage Target: Graduate

Although the number of U.S. citizens from underrepresented minority (URM) groups earning doctoral degrees in science has increased over the past decade, URM's continue to represent a small proportion of the scientists in the United States. The University of Alabama at Birmingham (UAB) is uniquely positioned to support the training of diverse group of trainees. Evidence of this readiness is the significant (36%) undergraduate enrollment of URM students, predominantly African American, given our location in the Southeastern US. In addition, UAB is the home for several students with disabilities at the undergraduate and graduate levels (approximately 400). Importantly, there are several programs already in place, such as the Office of Equity and Diversity, the Comprehensive Neuroscience Center, and the focus on neuroscience in the School of Medicine Strategic Plan serve as a firm footing for the development of a program targeting diversity in neuroscience. The Comprehensive Neuroscience Center functions as the epicenter for the neurosciences on UAB campus and will be the home of the Neuroscience Roadmap Scholars Program. The CNC has a membership of approximately 365 members, with faculty from 11 basic science and clinical departments from 5 Schools. Since 2010, 89 new faculty have been recruited across several neuroscience-related departments and the number of students from diverse backgrounds applying to the Neuroscience Theme graduate program represents 27% of the domestic applicant pool in 2014. Our proposed *Neuroscience Roadmap Scholars Program* will target the obstacles impeding success with the goal of attracting an increased number of diversity trainees to neuroscience research and providing them with the necessary tools and skills early in their PhD careers which are essential to making this a life-long career choice. The specific "value added" components of the Neuroscience Roadmap Scholars Program include the annual southeast regional NEURAL (National Enhancement of UnderRepresented Academic Leaders) summer conference, interactions with Career Coaches (separate from the scholar's Research mentor), Peer-to peer mentoring and undergraduate mentees, and distinct extracurricular activities. As the UAB SOM and office of Diversity and Equity have focused on diversity in the neurosciences as an area for major investment with \$414,000 in stipend support and \$20 million towards strategic planning over the next five years, the future of the Neuroscience Roadmap Scholars Program is secure and it will benefit substantially from this investment with the addition of talented and qualified academic leaders. The result should be an increase in the number and quality of both applicants and matriculating students from a diverse background at UAB in neuroscience at the graduate level, with a positive impact at the undergraduate, postdoctoral and faculty levels as well.

Program: University of Minnesota Summer Research in Neuroscience

PI(s): Meisel, Robert and Ebner, Timothy

Home Institution: University of Minnesota

Career Stage Target: Undergraduate

Disorders of the nervous system are becoming more prevalent in our society, especially considering the growing number of people with neurological disorders as our population ages. To meet the challenge of developing new and effective therapies to treat these disorders, we need to consistently inspire intelligent and talented undergraduate students to enter careers in neuroscience research. This need is particularly acute among populations of students who are currently underrepresented in the field of neuroscience research. Published analyses have made it clear that making students aware of research fields early in their college careers, especially by involving them directly in the research process, is an extremely effective way of developing a student's interest in research as a future profession. For over 25 years, the University of Minnesota has recognized and met this challenge by offering summer residential research programs in biomedical sciences. This proposal is to fund a neuroscience component of these summer programs in which we will train 8 undergraduate students who have completed their freshman or sophomore years in college. We will recruit students nationally, focusing on students from groups that are underrepresented within the neuroscience research profession. We will provide them with a 10 week intensive research experience that will include professional mentoring (academic survival skills and preparation for graduate school) as well as workshops on research ethics. Our goals are to inspire a new generation of neuroscience researchers as well as to create a national mentoring pool who will accept that responsibility for future generations of students. In turn, we expect these individuals to become part of the research infrastructure dedicated to solving medical problems of nervous system dysfunction.

Program: Training in Health Disparity Research for a Diverse Neuroscience Workforce

PI(s): Milligan, Carol and Bell, Ronny

Home Institution: Wake forest University

Career Stage Target: Graduate (Master's Degree)

There are numerous reports that have identified disparities in presentation for care, severity and disability for stroke, Alzheimer's Disease, epilepsy and Parkinson's Disease. Nonetheless, the neurology discipline appears to lag behind other clinical specialties in terms of analyzing the causes, delivery of interventions and treatments across socioeconomic and ethnic groups that result in apparent poor outcomes in disadvantaged populations. In 2010, NINDS convened an external panel to review and provide recommendations to NINDS with respect to the priority, administration and oversight of health disparities research conducted by NINDS. Among the results of the review was the conclusion that there is no specific mechanism for training future health disparity researchers. There are several epidemiology programs throughout the country that focus on neuroepidemiology training, but essentially all programs require trainees to have advanced degrees, most often MDs. The goal of this program is to recruit undergraduate students from diverse backgrounds into a Master's Program in Neuroscience Clinical and Population Studies of Health Disparities at the Wake Forest School of Medicine. There are four unique resources at Wake Forest University that make it an ideal institution for the proposed program: 1) The Maya Angelou Center for Health Equity (MACHE), 2) experience through an established Master of Science in Clinical and Population Translational Sciences, 3) an established Neuroscience Graduate Program and 4) the Division of Public Health Sciences. Recruitment of students and collaboration with regional undergraduate institutions including HBCUs will be important for attaining our goal. The idea is to interest students a career choice and develop a love of neuroscience and understanding neurological disorders so that a proportion of these MS students will move onto PhD programs. The product of this program will be a solid foundation in neuroscience, epidemiology and biostatistics training and hands-on, practical research projects.

Program: BRAINS: Broadening the Representation of Academic Investigators in NeuroSciences

PI(s): Mizumori, Sheri J.Y.

Home Institution: University of Washington

Career Stage Target: Postdoctoral and Junior Faculty

In order to solve the most challenging public health issues, the scientific community needs creative and diverse scientific solutions. As innovation is enhanced when a diverse set of investigators examine a scientific problem, retention of highly skilled scientists from underrepresented groups is critical. Neuroscience assistant professors and postdoctoral scholars from diverse and underrepresented backgrounds, including racial and ethnic minorities, people with disabilities, and people from disadvantaged backgrounds, face three major challenges in their career development. First, comprehensive professional development at these career stages is often overlooked, leaving early career neuroscientists underserved and lacking skills critical for advancement to tenure. Second, people from underrepresented backgrounds are often at higher risk of leaving science due to inequitable access to peer networks, mentors, and advice on how to succeed in faculty careers. Third, they may lack role models for exposure to potential career paths. To fill these gaps, we propose to create BRAINS: Broadening the Representation of Academic Investigators in NeuroSciences, a national program to accelerate and improve the career advancement of neuroscience postdoctoral researchers and assistant professors from underrepresented groups. The BRAINS program creates unique, life-transforming experiences for 50 neuroscientists. BRAINS participants will become more dedicated to their scientific career, better able to direct their careers, and more likely to achieve success in academic neuroscience. The BRAINS program goal is to increase engagement and retention of academic early-career neuroscientists from underrepresented groups by reducing isolation; providing tips, tools, and skills development to prepare for tenure track success; and increasing career self-efficacy. This goal will be met via three synergistic BRAINS activities: A) National Symposia; B) facilitated Peer Mentoring Circles; and C) Invent Your Career teams. The synergism among all these components will: 1. Increase the diversity of neuroscience faculty by providing mentoring, training and skills to underrepresented postdoctoral scholars and assistant professors in the neurosciences so they have increased access to resources, feelings of preparedness, and sense of community and connectivity. 2. Reduce isolation of neuroscience postdoctoral scholars and assistant professors from underrepresented groups through the establishment of long-standing peer networks and informal mentoring relationships. 3. Increase career self-efficacy so postdoctoral scholars and assistant professors from underrepresented groups in the neurosciences will have more productive and satisfying careers.

Program: BP-ENDURE at Hunter and NYU
PI(s): Quinones-Jenab, Vanya and Miranda, Regina
Home Institution: Hunter College CUNY
Career Stage Target: Undergraduate

Diverse racial and ethnic groups, as well as individuals with disabilities and/or having socially, economically, or educationally disadvantaged backgrounds are underrepresented in neuroscience. Hunter College of the City University of New York (CUNY) and New York University (NYU) recognize that increasing the number of highly qualified neuroscientists from these underrepresented populations is integral to our future as academic and research institutions. Hunter College and NYU aim to increase the number of well-trained, diverse neuroscientists. BP-ENDURE at Hunter and NYU proposes to capitalize on and expand on the objectives and success of our first 5 years of BP-ENDURE funding, which has produced 15 program graduates in the program's first 4 years who have applied to and been offered admission to graduate school. Importantly, 100% of BP-ENDURE graduates from Hunter and NYU who have applied to doctoral programs were accepted. Some are at the best universities in the country, such as Harvard, Columbia, Johns Hopkins, UC Berkeley, Brown, and Yale. The overall goal of this application is to develop a neuroscience training program at Hunter that will encourage and prepare students from diverse backgrounds to enter into and succeed in neuroscience PhD programs. To achieve this goal, Hunter College has developed a research-educational partnership with four outstanding T32-awarded universities—New York University, Brown University, University of Michigan, and Vanderbilt University. This partnership will expose 12 BP-ENDURE-trainee students per year to a research-intensive curriculum and an environment of excellence and active research. Moreover, because of the diversity of the proposed mentors, students will be exposed to a broad spectrum of researchers, including basic neuroscientists interested in central nervous system (CNS) issues and applied neuroscientists from the areas of clinical, social, health, developmental, computational, and cognitive neuropsychology. During this funding period, four developmental activities are proposed: (1) To develop an outstanding group of undergraduate students with diverse backgrounds dedicated to neuroscience research; (2) To provide scientific skills and research experiences to our trainees through research placement with actively funded neuroscientists in three different university settings, so as to expose students to laboratories that differ in scale, hierarchically, stylistically, and geographically; (3) To develop academic development and curriculum enhancement activities rooted in the student's research activities; and (4) To maintain an effective Administrative Core to support our students' needs and development. Our measurable objectives during the requested funding period include: (1) attaining 85 to 90% acceptance of trainees to graduate school programs in neuroscience; (2) improving our students' quantitative skills and academic achievements, as well as their (3) scientific writing (of research and grants) and oral presentation skills. Outcome from evaluations of the Steering Committee, the external evaluator, and the Administrative Core will guide future modifications to our training initiatives. *Funded by NIH Blueprint*

Program: Next-Generation Neuroscience Scholars Program
PI(s): Ramirez, Julio J. and Poe, Gina
Home Institution: Society for Neuroscience
Career Stage Target: Graduate and Postdoctoral

Innovations and advances in neuroscience are greatly enhanced when the community of contributing scientists is diverse in perspectives, backgrounds, and experiences. Currently, however, racial/ethnic minorities and individuals with disabilities are not nearly as well represented within neuroscience compared to their representation in society at large. Underrepresented minorities (URM) who enter the scientific career pipeline, including neuroscience, appear to be exiting at higher rates than their non-URM peers due to significant cultural, societal, and financial pressures, as well as limited access to role models and community support. Now, as the nation becomes increasingly more diverse, an important and exciting opportunity exists to bring an even wider range of voices to bear on neuroscience research and address barriers that may be keeping these important scientist contributors from participating as fully as possible. Helping to fix the leaky neuroscience career pipeline has been the focus of the Neuroscience Scholars Program (NSP), a long-standing, far-reaching NINDS-supported effort of the Society for Neuroscience (SfN). NSP has served nearly 600 URM scholars since 1982 and is now poised to broaden its impact while preserving its core service model. Building on NSP's historic successes in meeting short- and long-term performance metrics, this new application will strengthen NSP's activities for a core group of participants, significantly expose many more URM researchers to relevant content and valuable networks, and facilitate sustained research engagement within the greater URM neuroscience community. SfN brings to this effort broad access to neuroscience disciplines, strong commitment to diversity, deep-rooted volunteer engagement from among leaders in the field, valuable in-kind resources, and proven experience in implementing high-impact programs. As such, SfN is uniquely positioned to lead NSP through this next innovative, expansive

phase with the affirmed goal of advancing careers and professional development of diverse neuroscience researchers. Evidence shows that former NSP participants have advanced in their neuroscience careers, overcoming challenges that could have led to an early exit from the scientific research career pipeline. SfN proposes to build on that strong foundation in the coming five years. Focusing particularly on graduate and postdoctoral neuroscience researchers from among racial/ethnic minorities and individuals with disabilities (collectively referred to as Underrepresented Neuroscience Researchers [UNRs]), NSP will achieve three specific aims: 1. Intensively guide and support more than 80 of the highest-achieving UNRs so they progress and thrive in their research careers through networking, mentoring, and career-advancement programming. Over five years, 12-15 of the highest-achieving UNRs will be selected annually to participate through the NSP "Intensive" Track as NSP Fellows. (Note: In addition to these new recruits, a cohort of 16 Scholars from the previous NSP funding cycle, currently in their first year, will complete their second year under the new Program). Fellows will receive formal mentoring, access to a comprehensive curriculum of professional and research-enhancement workshops and webinars, and special networking and financial-enrichment support. 2. Extensively engage 500 high-achieving UNRs to help them persist and succeed as neuroscientists through online professional enhancement programming and networking. Approximately 100 qualified NSP applicants will be formally invited annually to participate through the NSP "Extensive" Track as NSP Associates. Associates will receive special access to new and adapted webinars on neuroscience research and career-related topics, online diversity forums for discussion and learning, and a wealth of neuroscience community resources, as well as access to SfN's annual meeting networking events-when they choose to attend. 3. Motivate NSP alumni and diverse neuroscientists to stay engaged in neuroscience and garner long-term professional success by building community through online discussion and neuroscience career and community resources. NSP alumni, including former Fellows and Associates, as well as the broader community, will be actively encouraged to access archived webinars, take part in online discourse on diversity, and stay involved in online affinity networks.

Program: BRAiN: Building Research Achievement in Neuroscience

PI(s): Restrepo, Diego; Bland, Sondra; and Lyons, Barbara

Home Institution: University of Colorado Denver

Career Stage Target: Undergraduate

Building Research Achievement in Neuroscience (BRAiN): Student Training through Institutional Partnerships will bridge the neuroscience research participation gap by preparing in the Rocky Mountain and Southwest Region undergraduates nationally underrepresented in biomedical and behavioral sciences for successful entry to neuroscience Ph.D. programs. BRAiN unites preexisting formal research and education programs at diverse institutions: the BRIDGE program to advance Native American students to Baccalaureate of Science degree programs in biomedical sciences program and the Biomedical Research Support (MBRS) Research Initiative for Scientific Enhancement (RISE) programs at New Mexico State University (NMSU); and the undergraduate Brain and Behavior program of the Department of Psychology at the University of Colorado Denver downtown campus (UCD). Importantly in BRAiN these undergraduate programs collaborate thoroughly with the Neuroscience Graduate Program at the University of Colorado Denver in the Anschutz Medical Campus (NSP at UCAMC), home to a T32 Neuroscience Training Grant. Broad participation in the Ph.D. neuroscience/behavior pipeline will be enabled through pursuit of three specific aims: (1) Recruitment of 55 BRAiN Scholars from diverse demographic groups that are nationally underrepresented in biomedical and behavioral neuroscience research; (2) Development of the Neuroscience/Behavior research expertise and professional skills of BRAiN Scholars; (3) Retention of BRAiN Scholars in Neuroscience/Behavior research through enrollment in postgraduate programs. In the past funding period BRAiN has attained solid achievement. BRAiN will provide intensive training that combines mentored independent research with student development of a rich knowledge base in neuroscience core concepts and computational neurobiology using MATLAB through summer courses at UCAMC. Emphasis will be placed on enhancement of mentorship skills through activities such as the *Neuroscience Mentor Academy* where faculty will meet to discuss student training, program evaluation, and curriculum reform. Taken together, proposed activities will provide an integrated research and professional development experience across multiple sites that leverages 21st century resources for scientific investigation and is responsive to practical aspects of contemporary student life. **Funded by NIH Blueprint**

Program: Summer Research Experience in Neuroscience for Undergraduates

PI(s): Scott, Rod Craig

Home Institution: University of Vermont

Career Stage Target: Undergraduate

This is a program for undergraduate students in areas of neuroscience relevant to the mission of the National Institute for Neurological Disease and Stroke (NINDS): stroke, traumatic brain injury, neurodegenerative disease, pain, and epilepsy. We plan to provide, for six students a year, a ten week long hands-on research experience at the laboratory bench, together with opportunities to interact with and observe clinicians in order to foster a recognition of the relevance of neuroscience to human

health and a commitment to translational research. We have identified pairs of committed basic science and clinical faculty who will co-mentor these students. The mentors conduct research relevant to NINDS in an environment that is well suited for translational research: UVM's university-wide Neuroscience Graduate Program (NGP) has over fifty actively participating faculty members supported by research core facilities that facilitate molecular/cellular investigations (Dr. Sheryl White, PhD, director) and an advanced imaging core (Mr. Todd Clason, director) funded by an NIGMS Center of Biomedical Research Excellence (COBRE) grant. In addition, UVM is unusual in that the clinical facilities at Fletcher Allen Health Care (FAHC) are located adjacent to the undergraduate and medical campuses, which greatly facilitates the interaction of SRE students with their clinical mentors. We have extensive experience in providing a SRE program in basic neuroscience for the past ten years. We therefore have established expertise and the necessary infrastructure required for summer programs, including the recruitment and mentoring of students from under-represented minority backgrounds. The main goal of the current proposal is to secure funding for a highly diverse population of students interested in research related to neurological disease.

Program: Summer Program for Under Represented Students (SPURS)

PI(s): Siegelbaum, Steven A.

Home Institution: Columbia University

Career Stage Target: Undergraduate

Columbia University's *Summer Program for Underrepresented Students* (SPURS) program provides an intense undergraduate research experience on the campus of Columbia's College of Physicians & Surgeons for talented students from backgrounds that are traditionally underrepresented in the biology and chemistry fields. SPURS participants are accepted primarily from the City University of New York (CUNY) senior colleges, including Hunter, Brooklyn, Queens, and City Colleges. SPURS provides meaningful training in biomedical research, and enhances the likelihood that the students will achieve a career in science by pursuing an advanced degree (Ph.D.). To expand opportunities for minority undergraduate students to participate in high quality, focused and sustained research experiences in the neurosciences, Dr. Steven Siegelbaum (P.I.), Chair of the Department of Neuroscience at P&S, has joined forces with Dr. Andrew Marks, founder of Columbia University's SPURS program. Students selected for support through NIH's Summer Research Experience Programs solicitation (PAR-11-050, CFDA 93.853) will perform hands-on research for ten summer weeks under the mentorship of NINDS-supported Columbia University neuroscientists (currently 86 Columbia University faculty receive NINDS support). In addition to specific training in neuroscience, the students will receive in-depth training in research methodology including: (a) the design and analysis of experiments; (b) critical reading of the scientific literature through journal clubs and discussions of ethics in science; (c) the presentation of scientific results at laboratory meetings; (d) presentation of their research at poster sessions; (e) an oral presentation of their research to an audience of scientists; and (f) career counseling.

Program: Neurogenetics Undergraduate Summer Research Program

PI(s): Slaugenhaupt, Susan A.

Home Institution: Massachusetts General Hospital

Career Stage Target: Undergraduate

The Neurogenetics Undergraduate Summer Research program in the Center for Human Genetic Research at Massachusetts General Hospital was originally funded to create a unique, focused training program. We have formed an alliance with Eckerd College, a small undergraduate liberal arts college in St. Petersburg, Florida, to offer summer research opportunities to incoming junior and senior students. Eckerd College is a truly unique institution with a strong focus on the sciences, and our program provides the opportunity for students to get hands-on research experience in an environment that is not typically available. This program will offer the students an opportunity to work in NIH funded laboratories performing cutting-edge translational research in an exceptional environment. As funding becomes increasingly scarce, it is imperative that we continue to provide summer research opportunities to students who have never before worked in research laboratories. These experiences frequently change their career paths and provide them with an important foundation for continuing graduate education.

Program: Mentoring Institute for Neuroscience Diversity Scholars (MINDS)

PI(s): Torres, Gonzalo and Zigmond, Michael

Home Institution: University of Florida and University of Pittsburgh

Career Stage Target: Junior Faculty

Despite many years of discussion, research, and efforts to promote change, a great disparity remains between the presence of black, Hispanic, Native American, and other underrepresented minority (URM) faculty at US research universities and their representation in the American population. This reality is no less true in the neurosciences than in other disciplines. Moreover, URMs who do achieve faculty status appear to achieve traditional measures of success at a lower rate than do their majority counterparts. Although data on publications and funding rates appear to be lacking, there is a striking absence of URMs in visible positions of prominence as full professors or chairs at research universities and as symposia speakers, journal editors, or societal officers. We believe that these two problems are related – that if those URMs who are faculty become more successful in regard to those measures, this in turn will stimulate an influx of other URMs into faculty ranks. Our evaluation of available programs in the United States strongly indicates that there are limited opportunities to adequately assist early career URM faculty in overcoming these difficulties, and it is this problem that we seek to address through the establishment of a national Early Career Institute (ECI) to promote the advancement of junior faculty members in the neurosciences at research universities. Defining success for such faculty in terms of quality and quantity of manuscripts published and research grant proposals submitted, scored, and funded, we propose to establish an ECI based on the following hypothesis: The success of early career URM faculty members in neuroscience can be increased substantially by an intensive individualized educational program focused on (1) exposure to cutting edge research in basic neuroscience, (2) increased background on the neurobiology of disease, (3) instruction in professional skills and the responsible conduct of research (RCR), (4) development of an expanded network, and (5) frequent mentoring by established faculty. To test this hypothesis we wish to establish a national Early Career Institute (ECI) to advance the development of URM faculty. We will begin by identifying 10 URM faculty members in the neuroscience each year who are early in their career and have great promise for success. We will then develop individualized career development programs for each participant selected and together the participant and mentoring team will develop a career development plan. To facilitate that plan we will establish a one year educational program consisting of (a) workshops, (b) mentored attendance at professional scientific meetings, (c) assistance in the expansion of their network, and (d) a listserv to promote communication among the participants. The impact of our efforts will be carefully evaluated and the results disseminated at meetings and in published articles. We believe that this approach will have a significant impact on the success of early career URM faculty in the neurosciences and will also serve as a model for programs in many other areas of academia.

Program: Summer Research Experience in Biological and Computational Sciences

PI(s): Vance, Jeffery M.

Home Institution: University of Miami

Career Stage Target: High School

This Summer Research Program builds upon the success of the JJ Vance Memorial Summer Internship in Biological and Computational Sciences at the John P. Hussman Institute for Human Genomics (HIHG). Part of HIHG's mission is to train the next generation of researchers. For this reason, it has hosted for the last five years the JJ Vance Memorial Summer Internship in Biological and Computational Sciences (JJ Vance internship), a program that has offered rising seniors from Miami-area high schools a unique opportunity to be directly involved in scientific research. The program has been highly successful, and this year has received applications from 62 applicants representing 30 different high schools in Miami-Dade and Broward Counties for only eight positions. Last year, we had 56 students from 24 high schools apply to the program, a steady growth from our start of six applicants in 2009. Since its inception at the HIHG, we have had a total of 201 applicants from 53 different high schools. Of the 38 selected interns during this time, 24% were white non-Hispanic, 26% were Hispanic/Latino, 29% were African-American, 16% were Asian and 5% were other ethnicities. Currently, STEM majors represent 80% of the ex-intern's college major fields of study. Thus, the JJ Vance Internship is reaching a large group of individuals and filling a great need in the highly diverse Miami community. We have established this internship from ground zero in the Miami area. Its rising trajectory of applicants over the years show that it is an established program in the community and that has been obviously successful as it has grown and schools keep sending new students back to apply. We also now have data on successful outcomes, and active mentoring years after the students' summer internship occurred. Given this success and the program's potential, we can no longer run the program trying to accrue year-to-year funding from foundations. We need stability in order to serve the community better, increase the number of students that we can enroll in the program for the program's continued growth. This grant, if funded, would provide us with that stability to continue our highly successful program into the future, and increase the number of participants.

Program: High School Student NeuroResearch Program (HSNRP)

PI(s): Witte, Marlys Hearst and Porreca, Frank

Home Institution: University of Arizona

Career Stage Target: High School

The University of Arizona (UA) High School Student NeuroResearch Program (HSNRP) will introduce, train, and nurture a growing cadre of diverse talented Arizona high school students including under-represented minorities in basic, translational, and clinical research on the normal and abnormal nervous system, neurological disorders, and stroke as well as encourage pursuit of advanced research experiences and health/ science-related careers. We will leverage the strong infrastructure, effective recruitment strategies, high level of student/faculty mentor participation, esprit-de-corps, and outstanding trainee productivity of our long-standing federally funded multidisciplinary/multispecialty disadvantaged high school student and medical student summer research programs to develop the training model for this new specialized NeuroResearch (NR) program. Twelve to 14 full-time summer high school trainees annually for the next 5 years will be offered an expanding menu of closely mentored NeuroResearch(NR) experiences; 2-4 will be reappointed as undergraduates for advanced NR. These will be integrated into an innovative inquiry-based Summer Institute on Medical Ignorance (SIMI) interweaving biomedical Knowns and Unknowns (“what we know we don’t know, don’t know we don’t know, and think we know but don’t”) with featured NR topics and sustained by periodic enrichment activities year round. SIMI emphasizes “translating translation” and includes a high school level brief Introduction to Pathobiology, topical seminars, laboratory/leadership/multimedia skill workshops, clinical correlations, social networking, and career advising. A unique Virtual Clinical Research Center/Questionnaire forms a centerpiece for training and national/international networking. Within basic and clinical departments and specialized Centers of Excellence and overseen by an energetic HSNRP Leadership Team and Advisory Committee, high school student research will encompass cross-cutting themes and *in vivo*, *in vitro*, *in situ*, *in silico*, and modeling approaches to neurobiology/disorders including Parkinson, Alzheimer, Niemann-Pick C diseases, ALS, epilepsy, HIV encephalopathy, head trauma, hydrocephalus, muscular dystrophy, pain/ addiction pharmacology, molecular psychiatry, cognition, brain development, senescence, mental retardation, blood-brain barrier/neuroprotection, neuroimaging, neuro-genomics/proteomics, neuroengineering, deep brain stimulation, brain cancer, cerebrovascular disease, stroke, and rehabilitation. Based on our ~25-year track record and established access to large diverse pools of disadvantaged Arizona students reflected in 474 SIMItrained high school students followed to date with many in basic/clinical NeuroResearch, we expect HSNRP to: cultivate an expanding network of diverse researchers, physicians and other health professionals; contribute to the NeuroResearch pipeline and enterprise; and improve “neurohealth” literacy through community engagement. Ongoing short-term and long-term evaluation including surveys, database registry and career portfolios will document efficacy of the training model and promote networking.

Poster Sessions (April, 11th, 2016 - Wisdom Room)

Session A (4:00- 4:45 pm)

1. A New MS Program in Health Disparities in Neuroscience Related Disorders as a Means to Increase Diversity in the Neuroscience Workforce
Carol Milligan, PhD and Ronny A. Bell, PhD – Wake Forest University
2. Summer Program in Neuroscience, Ethics & Survival (SPINES)
Keith Trujillo, PhD – California State University San Marcos
3. High School Student NeuroResearch Program (HSNRP)
Marlys H. Witte, MD – University of Arizona
4. BRAINS: Broadening the Representation of Academic Investigators in NeuroScience
Sheri Mizumori, PhD, Joyce Yen, PhD, and Claire Horner-Devine, PhD – University of Washington
5. TSU-NERVE: Diversifying the Neuroscience Workforce at a Historically Black University
Kiesya Kelly, PhD – Tennessee State University
6. The BP-ENDURE St. Louis Neuroscience Pipeline: A Unique Program Based on Proven Interventions
Rochelle D. Smith, MS and Erik Herzog, PhD – Washington University School of Medicine
7. UAB Neuroscience Roadmap Scholars Program
Lori McMahon, PhD and Farah Lubin, PhD – University of Alabama at Birmingham
8. NIH Neurotrauma Summer Research Experience Program
Kim Anderson, PhD and W. Dalton Dietrich, PhD – University of Miami
9. The SPURS Program
Monica P. Goldklang, MD, Jeanine M. D'Armiento, MD PhD, and Steven A. Siegelbaum, PhD – Columbia University

Session B (4:45 – 5:30 pm)

10. BP-ENDURE Atlanta: Engaging Undergraduates in Neuroscience Research
Kyle J. Frantz, PhD – Georgia State University

11. The Neuroscience Scholars Program (NSP)
Cynthia Cheatham – Society for Neuroscience, Julio Ramirez, PhD – Davidson College, and Gina Poe, PhD – University of Michigan

12. Life Science Summer Undergraduate Research Program (LSSURP) at the University of Minnesota
Robert L Meisel, PhD and Paul G Mermelstein, PhD – University of Minnesota School of Medicine

13. Exposing underrepresented populations to STEM careers through mentored high school research experience
Jeffery M Vance, MD PhD and Margaret Pericak-Vance, PhD – University of Miami

14. MINDS: Mentoring Institute for Neuroscience Diversity Scholars
Gonzalo E. Torres, PhD – University of Florida and Michael J. Zigmond, PhD – University of Pittsburgh

15. Building Research Achievement in Neuroscience (BRAiN): A university partnership for broadening participation in neuroscience in the Rocky Mountain and Rio Grande regions
Sondra Bland, PhD – University of Colorado Denver

16. Summer Research Program in Neurobiology
Michael McKernan and Robert W, Burgess, PhD – The Jackson Laboratory

17. Congruent Mentorship to Reach Academic Diversity (COMRADE) in Neuroscience Research
Girardin Jean-Louis, PhD and Olugbenga G. Ogedegbe, MD – New York University

18. Best practices and achievements of the Neuroscience undergraduate training Program to Increase Diversity (NeuroID) at the University of Puerto Rico-Rio Piedras
Carmen S. Maldonado-Vlaar, PhD and Jose E. Garcia Arraras, PhD – University of Puerto Rico-Rio Piedras

Participants List

Kim Anderson, Ph.D.

Research Associate Professor
University of Miami Miller School of Medicine
kanderson3@med.miami.edu

Jennifer Alexander

Training Coordinator
New York University School of Medicine
Jennifer.Alexander@nyumc.org

Chiye Aoki, Ph.D.

Professor
New York University
ca3@nyu.edu

Irene Avila, Ph.D.

Special Assistant to the Chief Officer for Scientific
Workforce Diversity
National Institutes of Health, Office of the Director
avilai@od.nih.gov

Ronny Bell, Ph.D.

Director
Wake Forest School of Medicine
rbell@wakehealth.edu

Laurel Belton, M.A.

Administrative Assistant
New York University School of Medicine
laurel.belton@nyumc.org

Sherilynn Black, Ph.D.

Director
Duke University School of Medicine
sherilynn.black@duke.edu

Sondra Bland, Ph.D.

Assistant Professor
University of Colorado Denver
sondra.bland@ucdenver.edu

Karen Brakke, Ph.D.

Associate Professor
Spelman College
kbrakke@spelman.edu

Angela Byars-Winston, Ph.D.

Associate Professor
University of Wisconsin School of Medicine and Public
Health
ambwinst@medicine.wisc.edu

Cynthia Cheatham, M.A.

Professional Development Manager
Society for Neuroscience
ccheatham@sfn.org

Jeanine D'Armiento, M.D., Ph.D.

Associate Professor
Columbia University Medical Center
jmd12@columbia.edu

Richard Ellenbogen, M.D.

Professor and Chair
University of Washington School of Medicine
rge@uw.edu

Edgardo Falcon, Ph.D.

Health Program Specialist
NINDS
edgardo.falcon@nih.gov

Kyle Frantz, Ph.D.

Professor
Georgia State University Neuroscience Institute
kfrantz@gsu.edu

Monica Goldklang, M.D.

Assistant Professor
Columbia University Medical Center
mpg2124@cumc.columbia.edu

Jeannette Gordon

Grants Management Officer
NINDS
jg82s@nih.gov

Anna Han, Ph.D.

Scientific Program Analyst
COSWD, NIH
anna.han@nih.gov

Alison Hall, Ph.D.

Deputy Director
NIGMS
alison.hall@nih.gov

Melissa Harrington, Ph.D.

Professor
Delaware State University
mharrington@desu.edu

Participants List

Erik Herzog, Ph.D.

Professor
Washington University in St. Louis
herzog@wustl.edu

Michael Holsey

Graduate Student
Columbia University Medical Center
mh2766@cumc.columbia.edu

Claire Horner-Devine, Ph.D.

Director of Diversity and Leadership Development
University of Washington College of the Environment
mchd@uw.edu

Girardin Jean-Louis, Ph.D.

Professor
New York University School of Medicine
girardin.jean-louis@nyumc.org

Michelle Jones-London, Ph.D.

Director of Diversity Training and Workforce
Development
NINDS
jonesmiche@ninds.nih.gov

Kiesa Kelly, Ph.D.

Chair
Tennessee State University
kkelly5@tnstate.edu

Stephen Korn, Ph.D.

Director, Office of Training, Career Development, and
Workforce Diversity
NINDS
korns@ninds.nih.gov

Farah Lubin, Ph.D.

Associate Professor
University of Alabama at Birmingham School of
Medicine
flubin@uab.edu

Peter MacLeish, Ph.D.

Chair and Professor
Morehouse School of Medicine
pmacleish@msm.edu

Carmen Maldonado-Vlaar, Ph.D.

Professor
University of Puerto Rico, Río Piedras
csmaldonado.upr@gmail.com

Michael McKernan

Program Director of STEM and Undergraduate
Education
Jackson Laboratory
michael.mckernan@jax.org

Lori McMahon, Ph.D.

Professor
University of Alabama at Birmingham School of
Medicine
mcmahon@uab.edu

Robert Meisel, Ph.D.

Professor
University of Minnesota
meisel@umn.edu

Paul Mermelstein, Ph.D.

Professor
University of Minnesota
pmerm@umn.edu

Carol Milligan, Ph.D.

Professor
Wake Forest School of Medicine
milligan@wakehealth.edu

Regina Miranda, Ph.D.

Professor
Hunter College, City University of New York
regina.miranda@hunter.cuny.edu

Sheri Mizumori, Ph.D.

Professor and Chair
University of Washington
mizumori@uw.edu

Rae Nishi, Ph.D.

Director
Marine Biological Laboratory
rnishi@mbl.edu

Bruce Ovbiagele, M.D., M.Sc., M.A.S.

Professor and Chair
Medical University of South Carolina
adamsjan@musc.edu

Participants List

Margaret Pericak-Vance, Ph.D.

Director of the John P. Hussman Institute for Human Genomics
University of Miami Miller School of Medicine
mpericak@med.miami.edu

Gina Poe, Ph.D.

Assistant Professor
University of Michigan Medical School
ginapoe@umich.edu

James Pridgeon, M.H.A.

Senior Lecturer and Summer Program Administrator
University of Washington School of Medicine
pridgeon@uw.edu

Julio Ramirez, Ph.D.

Chair and R. Stuart Dickson Professor
Davidson College
juramirez@davidson.edu

Eduardo Rosa-Molinar, Ph.D.

Senior Scientist and Director, Microscopy Analytical Imaging Resources Laboratory
The University of Kansas
erm@ku.edu

Rochelle Smith, M.S.

Assistant Provost and Director of Diversity, Summer Programs, and Community Outreach
Washington University School of Medicine
rsmith@wustl.edu

Gonzalo Torres, Ph.D.

Associate Professor
University of Florida College of Medicine
gonzalotorres@ufl.edu

Keith Trujillo, Ph.D.

Professor and Director
California State University San Marcos
keith@csusm.edu

Lauren Ullrich, Ph.D.

AAAS Science & Technology Policy Fellow
NINDS
lauren.ullrich@nih.gov

Hannah Valantine, M.D.

Chief Officer for Scientific Workforce Diversity
National Institutes of Health
valantine@mail.nih.gov

Jeffery Vance, M.D., Ph.D.

Professor
University of Miami
jvance@med.miami.edu

Irving Vega, Ph.D.

Associate Professor
Michigan State University
irving.vega@hc.msu.edu

Tish Weigand, Ph.D.

Program Manager
NINDS
letitia.weigand@nih.gov

Marlys Witte, M.D.

Professor
University of Arizona College of Medicine
grace@surgery.arizona.edu

Joyce Yen, Ph.D.

Director
University of Washington
joyceyen@uw.edu

Michael Zigmund, Ph.D.

Professor
University of Pittsburgh Medical Center
zigmond@pitt.edu

Freddy Zizi, M.B.A.

Director of Research Training Initiatives
New York University School of Medicine
ferdinand.zizi@nyumc.org

