

Strengthening a Neural Network

Pathways for Institutional Change Regarding Diversity and Inclusion R25/T32 Workshop Summary

April 29–30, 2019
Bethesda, Maryland

June 1, 2019



This meeting summary was prepared by Frances McFarland, PhD, Rose Li and Associates, Inc., under contract to Infinity Conference Group. The views expressed in this document reflect both individual and collective opinions of the meeting participants and not necessarily those of the sponsoring agency. Review of earlier versions of this meeting summary by the following individuals is gratefully acknowledged: Rose Li, Nancy Tuvevson.

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Acronym Definitions

AAAS	American Association for the Advancement of Science
AACU	American Colleges and Universities
AAMC	Association of American Medical Colleges
BRAIN	Brain Research through Advancing Innovative Neurotechnologies
BRIM	Bias Reduction in Internal Medicine
HHMI	Howard Hughes Medical Institute
IAT	Implicit Association Test
IE	HHMI Inclusive Excellence Program
MOSAIC	Maximizing Opportunities for Scientific and Academic Independent Careers
NIGMS	National Institute of General Medical Sciences
NIH	National Institutes of Health
NINDS	National Institute of Neurological Disorders and Stroke
NSP	Neuroscience Scholars Program
OPEN	NINDS Office of Programs to Enhance Neuroscience Workforce Diversity
PI	principal investigator
SEA Change	STEM Equity Achievement Change
SfN	Society for Neuroscience
STEMM	science, technology, engineering, mathematics, and medicine
UAB	University of Alabama at Birmingham
URM	underrepresented minority

Executive Summary

Introduction and Overview

On April 29–30, 2019, the National Institute of Neurological Disorders and Stroke (NINDS) of the National Institutes of Health (NIH) held a workshop during which R25 and T32 grantees discussed ways to promote institutional change to increase diversity and inclusion among neuroscience training programs. The workshop began with welcoming remarks from Walter Koroshetz, MD, NINDS Director, who emphasized the need for continued efforts to promote diversity and inclusion, especially at this extraordinary time for neuroscience research. Following these remarks, Michelle Jones-London, PhD, Chief of the Office to Enhance Neuroscience Workforce Diversity at NINDS, reviewed the workshop goals. The rest of the first day included a featured lecture from Molly Carnes, MD, on addressing implicit bias and three panels discussing strategies for institutional change, data-driven decision-making, and the roles of societies and associations in institutional change. Each panel consisted of presentations and discussion/brainstorming in small groups. The second day of the workshop focused on mentoring. This document summarizes Day 1 of the workshop and small group discussions by Group C. See Appendix 1 for the meeting agenda, and Appendix 2 for the participants list.

Key Themes and Highlights

General

- Diversity and inclusion programs should move away from a deficit model that assumes there is something inherently wrong with the individual and instead focus on improving systems. Helping students address individual gaps in knowledge can be seen as systemic change, because it ensures that all students have the knowledge required to navigate certain processes.
- The biomedical research workforce is a system, not a pipeline.
- Communities should be realistic about what diversity programs can do and the scale at which they can do it.
- NIH can use funding and policy to incentivize diverse representation.
- NINDS and NIH should consider additional initiatives targeting students in high school and lower grade levels to increase diversity. Potential approaches include:
 - Forming partnerships with organizations such as Upward Bound.
 - Visiting schools that are considered to be failing as a “talent scout” to identify promising students.
 - Having undergraduate students in training programs serve as peer mentors to students in high school training programs.

Implicit Bias: Breaking the Habit

- Sustainable institutional change requires buy-in from faculty and administrative leadership.

- Bias is more damaging and difficult to address when it is activated implicitly.
- A trivial amount of information can activate an entire stereotype that can influence decisions about recruitment, hiring, and promotion.

Strategies for Institutional Change

- To obtain faculty buy-in, institutions should employ a multifaceted approach that includes honest discussions, with the understanding that such discussions can be painful and difficult; sharing of data on the benefits of diversity and inclusion for all members in the institution; participation of leaders from well-represented groups in initiatives; and presentation of expected outcomes.
- Helping all students develop the skill sets needed for a successful research career in neuroscience is necessary but not enough. Attention should also be paid to how science is taught, particularly at the introductory level, and to areas, such as scientific curiosity or problem-solving, in which students from both well-represented and underrepresented groups are equally endowed.
- A database or digital community of initiatives promoting diversity and inclusion within institutions is needed.
- Establishing dean-level positions focused on diversity and inclusion and hiring dynamic individuals who use their experiences and relationships sends a powerful message to underrepresented groups and promotes diversity and inclusion in the institution. However, hiring these individuals should not be viewed as “checking a box.” Nor should these individuals be solely responsible for promoting diversity.
- Institutions can show a commitment to diversity simply by compiling a book or web page listing resources in the community surrounding an institution.
- Poor mentoring relationships are often cited as a reason why individuals leave biomedical research. This issue can be addressed by:
 - Emphasizing mentoring in applications for training grants.
 - Including skills such as mentoring in faculty assessments and promotion and tenure decisions.
 - Building in salary support for principal investigators (PIs) on R25s and T32s.
 - Holding other faculty members and department leaders, not just the mentor, accountable for poor mentoring.
- Evaluation should be built into diversity and inclusion initiatives to assess their effectiveness.

Making Data-Driven Decisions

- Evaluation of graduate programs relies on outcomes that occur more than a decade after students graduate. Proximal metrics are needed.
- Institutions should exercise caution in how they interpret data and focus on the “why” behind the numbers they see. For example, the success rate for black K99 applicants is half that of their white counterparts, and 60 percent of black K99 awardees convert to the R00 part of their award, compared with 80 percent of white awardees. Potential reasons this

disparity and for overall attrition among women and underrepresented minorities (URMs) include:

- Unwelcoming environments and misalignment of values.
- Observations of the stresses and challenges that current faculty and PIs face.
- Fear of being a “token.”
- A “grass is greener” mentality about other career paths.
- Lack of institutional support.
- Students and postdoctoral researchers should be allowed to explore their career options and understand that their training provides them with skills for success regardless of career choice.
- Diversity programs such as the Society for Neuroscience’s Neuroscience Scholars Program, diversity K99s, and the recent Maximizing Opportunities for Scientific and Academic Independent Careers program can have a “halo effect” by empowering others within the institution.

The Role of Societies and Associations in Institutional Change

- Societies and associations can increase their involvement in promoting diversity and inclusion by:
 - Coordinating among chapters of a large organization to disseminate best practices or collect data.
 - Asking large organizations, such as the Society for Neuroscience, Association of American Colleges and Universities, or Association of American Medical Colleges, to share boilerplate language with smaller societies for disseminating and advertising information.
 - Asking members to encourage colleagues from diverse backgrounds to become involved with their societies or associations early on.
 - Inviting individuals with diverse perspectives to their meetings.
 - Considering the extent to which units focused on women, URM groups, or education are positioned within their organizations.

Meeting Summary

Welcome

Walter Koroshetz, MD, Director, National Institute of Neurological Disorders and Stroke (NINDS)

This is a special time for neuroscience research. After years of flat budgets, the National Institutes of Health (NIH) has seen significant increases in its budgets. Most of the set-aside funds mandated by Congress have been allocated to neuroscience initiatives such as the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative and dedicated research in Alzheimer's disease and related dementias. Of the \$37 billion budgeted to NIH in fiscal year 2018, approximately \$8.2 billion was devoted to neuroscience research. Having exceeded the total dedicated to cancer research by \$1 billion, neuroscience now represents the largest area of science funding at NIH. This increase in funds is attracting more investigators into neuroscience.

Nonetheless, NINDS and NIH are looking toward the future and are focused on encouraging the best and brightest investigators to follow their passion in neuroscience, expanding the field, providing taxpayers with a return on investment, and fulfilling the promise of making a difference in neurological diseases. To fulfill these goals, NINDS and NIH aim to identify the best scientists from every segment of society and to make the field as fertile as possible not only to allow investigators to follow their passions, but also to foster the serendipitous discoveries that are critical to scientific advances. To that end, NIH is investing resources at increasingly earlier stages in career development, such that high school students considering careers in research are now receiving support to follow their interests.

However, challenges remain. Despite the amount of money dedicated to the BRAIN initiative, for example, less than 20 percent of investigators in the initiative are women. Transition points, for example from predoctoral student to postdoctoral fellow, are a concern, because it is at these points that many potential investigators are lost. The lack of a welcoming environment is one of the many reasons driving these individuals away from science. Thus, mentoring is an important mechanism for facilitating the transitions leading to successful research careers.

NINDS, and particularly Dr. Michelle Jones-London, Chief of the Office of Programs to Enhance Neuroscience Workforce Diversity (OPEN), and Dr. Stephen Korn, Director of Training and Workforce Development, are working to address these challenges. NINDS offers several diversity programs, such as training programs and K99 awards for the BRAIN initiative, to bring individuals from various segments of society into neuroscience. NINDS is also inviting younger investigators and those from diverse backgrounds to participate on its advisory council and study sections, and NIH offers an award to encourage mentoring and acknowledges the best mentors. NIH training programs are also addressing challenges with time windows. For example, many postdoctoral researchers and early-stage investigators are starting families, and NIH training programs therefore offer extensions to accommodate these life changes. In addition, NIH has issued a request for information (NOT-RM-19-001) to solicit input on a

proposed Common Fund program that would promote a cohort hiring model at the faculty level to help institutions create routes of entry and advancement for talented individuals from diverse backgrounds.

Dr. Koroshetz thanked workshop participants for their ongoing work and for their participation in this workshop. He expressed the hope that the lessons learned at the workshop would help participants at their home institutions and further the shared mission of opening the field of neuroscience to more people.

Meeting Goals

Michelle Jones-London, PhD, Chief, OPEN, NINDS

This workshop was held to discuss issues on institutional change and transparency in pursuit of enhancing the diversity of the neuroscience workforce. It is a follow-up to two previous workshops: one in 2016 to identify successful approaches to recruit, train, and retain diverse individuals in the neuroscience workforce and a second in 2017 to discuss the issues, misconceptions, and barriers that currently exist in neuroscience graduate admissions programs with regard to diverse trainees. The 2019 goals are as follows:

- Build alliances between individuals who are actively engaged in addressing issues surrounding workforce diversity and individuals engaged in neuroscience training.
- Identify opportunities and share successful approaches for more effective institutional change.
- Foster dialogue around institutional approaches to interventions targeted at critical transition points along the career path, such as entry to and persistence in training programs (undergrad, grad, and postdoc) and hiring and retaining diverse faculty.
- Provide training to administrators of neuroscience R25 and T32 training programs on how to implement institutional change around diversity and inclusion at their institutions.
- Receive feedback on how NINDS programs and policies can catalyze institutional change around a diverse neuroscience workforce.

Dr. Jones-London emphasized that the workshop purpose was to help participants promote systemic change at their home institutions, rather than simply “check a box.” She therefore encouraged participants to share their thoughts and to be willing to respectfully disagree.

Discussion

One workshop participant noted the extremely low percentage of African American students admitted to an elite science high school in New York and questioned whether outreach efforts should target even younger students. Dr. Jones-London described a program she manages in which NINDS staff visit communities to talk with children. This program has been most successful by interacting with children through libraries. However, other NINDS efforts, such as inviting schools to send students to work with the BRAIN initiative, have not been successful.

Dr. Jones-London therefore invited workshop participants to describe other successful efforts in outreach to younger students.

Another participant discussed a brain science course that the College conducted in partnership with Upward Bound. As part of the summer Upward Bound program, this course matched graduate students with Upward Bound participants for 2 hours once a week to teach them about the brain and its importance in day-to-day life. The course has become one of the most popular courses at the summer Upward Bound program and has inspired several students to major in neuroscience once they enter college.

A workshop participant from the University of Arizona reported that their high school program has organized a biotechnology cluster by identifying talented students from high schools in low-income communities, some of which have been described as “failing.” Each summer, a cohort of these students attend a laboratory-based program at the University of Arizona medical school. One student had an abstract and poster accepted for, and received a travel award to attend, a meeting of the BRAIN initiative. The workshop participant thus suggested visiting schools in low-income districts as a “talent scout.” Dr. Koroshetz noted that the Director and Advisory Council for the BRAIN initiative is pushing NINDS to make similar efforts.

Another participant echoed this sentiment by noting the tremendous drive and need of the 400 to 500 students applying to the University’s R25 program each year. Talented students who attend schools that do not send many students to college feel unwelcome. However, efforts such as the R25 programs give them a place to shine. All participants from the R25 program continue to college, and 90 percent of them continue in the sciences. Another participant commented that their program, which recruits students from American Indian reservations, receives approximately 2,000 applications for 100 slots each year.

Another university has long had an outreach program for high school students and now has a similar program for undergraduate students. It aims to have undergraduate students in this program serve as peer mentors to high school students. Dr. Jones-London noted that some Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences programs use a similar approach, which benefits both the high school and the undergraduate student by creating a sense of research self-efficacy.

Another participant suggested incorporating the R15 mechanism, which provides supplements to support outreach to high schools and lower grades. A workshop participant described a collaboration with a primary school to build a curriculum that will expose students to neuroscience from the start, focusing on the brain, brain function, and behavior. The university is following the school longitudinally.

Featured Lecture: Breaking the Bias Habit

Molly Carnes, MD, Professor, Departments of Medicine, Psychiatry, and Industrial and Systems Engineering, Director, Center for Women's Health Research, and Co-Director, Women in Science & Engineering Leadership Institute, University of Wisconsin-Madison; Director, Women Veterans Health, William S. Middleton Memorial Veterans Hospital

A growing body of research shows that diverse groups are more productive, creative, innovative, and engaged in higher levels of clinical analysis. A review of more than 2 million scientific papers by researchers at Harvard found that papers written by more racially diverse groups of authors are more likely to be published in higher-impact journals and cited more significantly.¹ Another study found that white students who graduated from medical schools with more ethnically diverse student bodies believed that they were more competent to care for non-white patients.² Other studies have shown that increased diversity among faculty at U.S. medical schools creates a more diverse physician workforce and promotes health equity.

Despite the growing body of evidence and investments by NIH and others to promote workforce diversity, women and individuals from racial and ethnic minority groups remain underrepresented in science and medicine fields. Despite gender parity in MDs and biomedical PhDs for the past 10 years, women continue to be underrepresented among leadership positions in medicine and academic science. Likewise, individuals who identify as Asian are underrepresented among these leadership positions, and other racial and ethnic minorities are underrepresented at all career stages in medicine and academic science.

Intergroup bias is one reason for the continued disparity, but there are two types that must be considered. Explicit bias, which involves consciously endorsed personal beliefs, has decreased over the past 50 years. However, implicit bias, or unintentional cognitive biases, has not. Such bias, which is based on cultural stereotypes, strongly predicts an individual's behavior in some settings, even if that bias does not align with that individual's explicit, personal beliefs. Implicit bias is a habit of mind. Such habits are useful as automatic, implicit processes, but they also can lead to error and interfere with individuals' conscious intentions. Dr. Carnes demonstrated this by having workshop participants perform the Stroop color-naming task. When the color of the name matched the name itself, participants answered quickly. However, they answered more slowly when the color of the name did not match the name, because reading is a habit of mind and they wanted to focus on the word, rather than the color.

The same type of habit of mind that fails individuals on the Stroop task can fail them when they interact with others. A study by Donald Rubin, a linguist at the University of Georgia, recorded a graduate student reading a 450-word essay on a scientific topic. The student had a clear speaking voice and read standard American English. Different sections of Rubin's class were

¹ Richard B. Freeman, Wei Huang. Collaborating with People Like Me: Ethnic Coauthorship within the United States. In Sarah Turner and William Kerr, *US High-Skilled Immigration in the Global Economy*, pp. 289-318. National Bureau of Economic Research, 2015.

² Somnath Saha, Gretchen Guiton, Paul Wimmers. 2008. Student Body Racial and Ethnic Composition and Diversity-Related Outcomes in US Medical Schools. *JAMA* 300(10): 1135-1145.

assigned randomly to view a picture of a white woman or an Asian woman while listening to the recording. In the pictures, the women were the same age, wore the same dress and hairstyle, and adopted the same pose. However, students who viewed the picture of the Asian woman while they listened to the recording said that they heard more accented English.

Everyone knows common cultural stereotypes and are aware of them, even if they do not believe them. Several studies asked diverse groups to identify common stereotypes about men, women, and individuals from different racial/ethnic groups, even if they did not believe them. Words associated with men included “strong,” “decisive,” “competitive,” and “ambitious,” whereas words associated with women included “nurturing,” “emotional, supportive,” and “dependent.” Words associated with white people included “rich,” “intelligent,” “arrogant,” and “racist,” whereas words associated with black or Latino people included “uneducated,” “gangsters,” “unintelligent,” and “loud.” Another study found that 70 percent of individuals who took the Implicit Association Test (IAT) associated male names more quickly with science words and female names more quickly with liberal arts words. A study from the University of Wisconsin-Madison showed that greater than 70 percent of the faculty taking the IAT matched male names more quickly with leadership-associated words and female names more quickly with supporter-associated words. Yet, if asked about their conscious beliefs, these faculty would not agree with these associations.

Stereotypes persist even in the face of disconfirming data. A trivial piece of information can bring to mind the entire content of a stereotype and serve as a filter for all subsequent information. Thus, just knowing a stereotype can influence one’s interpretation of objective data, creating a stereotype advantage or disadvantage. Because implicit bias can drive behavior, even if it conflicts with personal beliefs, breaking this habit of mind requires more than good intentions. Breaking the habit requires awareness, motivation self-efficacy, positive outcome expectations, and deliberate practice.

Dr. Carnes presented a study in which she and her colleagues developed and tested a workshop to help faculty in science, technology, engineering, mathematics, and medicine (STEMM) departments combat implicit bias. The study randomly allocated 46 STEMM departments to the workshop and 46 to control. The workshop provided cognitive behavioral strategies to practice, such as intentional awareness and stereotype replacement, counter-stereotype imaging, individuating, perspective-taking, and increased opportunities for contact with individuals from other groups. The workshop also noted two strategies—stereotype suppression and too strong a belief in one’s personal objectivity—that do not work.

Dr. Carnes and her colleagues found that participating in the workshop did not change study participants’ performance on the IAT, as would be expected because stereotypes are affirmed daily. However, compared with those in the control group, participants in the experimental departments were more likely to be aware of their personal biases, motivated to engage in activities to reduce bias, confident that they could do so, and working to do so regularly. In addition, both male and female faculty members in the experimental departments were more likely to report that they fit in with their department, felt more valued and respected, and were

more comfortable discussing personal obligations with their colleagues. Dr. Carnes and her colleagues also found that departments that received the intervention showed more gender parity, a trend toward more non-white or URM members in the faculty, and significantly more retention of male faculty. Thus, promoting enduring and self-sustaining behavioral change among individual faculty members improved departmental climates and hiring outcomes.

Dr. Carnes closed her presentation by describing Bias Reduction in Internal Medicine (BRIM), an ongoing study to determine whether this strategy to motivate self-regulation of bias can work beyond one institution and beyond gender bias. BRIM is expected to be completed in 2022.

Discussion

In response to questions, Dr. Carnes noted that her research focused on faculty. However, other research is exploring implicit bias in medical education, and perspective-taking as an intervention has moved into medical schools. Dr. Carnes cited a collaboration between investigators at George Washington University and Howard University, who have found that medical students in the perspective-taking group believed that communication was better, that they would be better physicians, and that there was more trust. Dr. Carnes commented that institutional change cannot occur “from the bottom up.”

One workshop participant highlighted the finding that both women and men showed “anti-woman” bias and commented that internalization of stereotypes can lead to an unwillingness to assume certain roles, even with external encouragement. Dr. Carnes agreed that bias is more damaging when activated implicitly and easier to address when explicit.

Dr. Carnes described work examining letters of recommendation and student performance evaluations. This work found differences in the words used to describe men versus women. Likewise, at Yale University, a text analysis of deans’ evaluations of medical student performance found that “intelligent” was used more often to describe white students, whereas “competent” was used more often to describe black students. She reiterated that any trivial bit of information can activate an entire stereotype and that, if a dean evaluates a medical student and observes any behavior that reinforces a stereotype, that bias is reflected in the letter of recommendation.

A workshop participant asked how these data could be translated into institutional change in environments that do not allow such change. Dr. Carnes explained that her work has focused on faculty, whose behavioral changes can lead to institutional change. She acknowledged that additional interventions are even better to promote institutional change, but faculty must be involved to effect enduring change. She added that promoting institutional change with respect to bias requires data collection in a controlled, experimental environment and implementation of science approaches to facilitate the adoption of evidence-based practices. In addition, implementing and crystallizing such practices in a non-scientific manner does a disservice.

A workshop participant mentioned a paper from the 1980s that reported that male medical students had the worst attitudes toward women in academic leadership positions. This paper

mirrored other studies in other fields. Dr. Carnes responded that BRIM includes an intervention that encourages faculty to perceive variability, or to remind themselves that every group has subgroups. She noted that within that group of male medical students, some were likely offended by women in academic leadership, but others were not offended and still others championed women in those positions. She encouraged participants to interrupt when they hear group assumptions and note the variability within a group, because “the word that follows ‘group is’ will be a stereotype.” Studies have shown that consciously interrupting biased thoughts by perceiving variability can reduce bias.

Panel 1: Strategies for Institutional Change

Moderator: Letitia Weigand, PhD, NINDS

SEA Change

Beth Ruedi, PhD, American Association for the Advancement of Science

Despite some successful interventions over time, change has been slow with respect to the numbers of women and URM earning graduate degrees in STEMM fields. However, continued low numbers are a symptom of a larger issue. Many initiatives aimed at increasing diversity could be more successful if they were implemented in an organizational culture that embraced diversity. However, initiatives often focus on “fixing the individual” and therefore do not work in the long term. Increasing the likelihood of long-term, sustainable success therefore requires that initiatives promote systemic change by exploring the context for each institution and through voluntary participation, a declaration of commitment, and disaggregation of data within each analysis.

Athena SWAN, a program in the United Kingdom based on the Equality Charters process, has shown evidence of sustainable change, with improved visibility, self-confidence, and leadership skills among women in the STEMM fields. All staff in this program show positive differences in career satisfaction and development opportunities, and administrative and technical staff report a greater sense of belonging. The American Association for the Advancement of Science’s (AAAS) is therefore piloting a similar initiative, STEM Equity Achievement Change (SEA Change), in the United States. SEA Change includes three components. The SEA Change Institute is the technical arm and research repository, which provides evidence, trainings, and workshops. The community component is a digital platform in which stakeholders discuss best practices and barriers. The most visible component involves SEA Change awards.

The awards component encourages institutions to increase self-awareness and understanding, act based on that understanding, and reflect on their action after some time to determine whether it is working. The process, which includes collecting data, identifying gaps, and developing plans to close those gaps, looks not only at numbers, but also at policies, procedures, leadership, and institutional climate or culture. Thus, SEA Change encourages a holistic assessment to facilitate an environment that is more conducive to equity and inclusion. There are three award levels. Bronze awards encourage thorough self-assessments via qualitative and quantitative analyses, identification of key issues, and action plans to address

those issues. Silver awards build on the Bronze awards by having institutions demonstrate impact and expand their action plans. Gold awards build on Bronze and Silver awards by encouraging the institution to serve as a beacon in the sector and beyond.

At present, SEA Change focuses on faculty and administration and has issued three institutional awards. However, SEA Change promotes both trickle-down and trickle-up effects. Institutional awards promote change from the top down. Eventually, AAAS will offer departmental awards to facilitate change from the bottom up by focusing on faculty and students. AAAS has engaged disciplinary societies, and it is forming coalitions to confer the department-level awards.

Through these efforts, AAAS and SEA Change aim to promote shifts in cultural norms, encourage investment in institutions with a greater potential return on investment, and establish environments that are more conducive to true equity, diversity, and inclusion. It is the hope of AAAS that the encouragement of these behaviors will lead to better science.

ADVANCE-Northeastern University

Penny Beuning, PhD, Office of Faculty Development, Northeastern University

The National Science Foundation's ADVANCE program provides Institutional Transformation Grants to promote the inclusion and advancement of women and URM in academic science and engineering. Northeastern University has used this award to implement a multifaceted approach aimed at graduate students, postdoctoral researchers, and faculty.

One component of this approach is a series of Future Faculty Workshops. Attached to technology conferences held by the Northeastern College of Engineering, the 1-day Future Faculty Workshops help postdoctoral researchers and late-stage graduate students prepare competitive applications for faculty searches. For the first seven conferences, ADVANCE funding paid workshop participants' travel expenses. Of 167 participants across all seven workshops, 22 applied for faculty positions, 6 were interviewed, and 3 were hired. Since the ADVANCE grant has ended, Northeastern has secured additional support from a research corporation and the ADVANCE program to continue these workshops. The 2017 and 2018 workshops focused on women and URMs, respectively, in STEM fields. Based on these experiences, Northeastern University has learned that (1) the workshops should bring in faculty who serve on search committees, including those from other institutions; (2) more women participate in these workshops, although they are less likely to apply when the workshops target URMs; (3) small honoraria should be paid to offset additional service; and (4) graduate students and postdoctoral researchers need information and organized activities, even with excellent advisors.

Another component of Northeastern University's multifaceted approach is the Future Faculty Fellowship, a postdoctoral award supporting URM candidates across the university. The award provides \$50,000 plus benefits, along with \$5,000 for professional development, and structured mentoring for awardees. Of the eight individuals who received awards between 2013 and 2018, three were hired as tenure-track professors, two remained at Northeastern, and three moved to other institutions. Based on these experiences, Northeastern has learned that (1) faculty

must recruit postdoctoral researchers who are ready for faculty positions; (2) the program should select candidates who are beginning their second postdocs when two or more postdocs are the norm in a discipline; and (3) support from the department chair and dean is critical.

Yet another component involves the Strategies and Tactics for Recruiting to Improve Diversity and Excellence Workshops for Faculty Search Committees. These workshops educate faculty on the effects of implicit associations and biases throughout the hiring process. Most deans require participation in this workshop before faculty members can serve on search committees, and faculty must participate in the workshop every other year. After 5 years, Northeastern has changed the workshop format to a more interactive one that includes case studies and role play. New workshops are under development for department chairs. Based on these experiences, Northeastern has learned about the need to obtain buy-in and support from deans and to change the format over time and that faculty most value the discussions and interactive learning environment.

The Northeastern University ADVANCE Office also aims to foster a culture of mentoring. Activities in this area include mentor training, external mentors for tenure-track faculty, and the Mutual Mentoring Advancement Program.

Dr. Beuning concluded her presentation by noting that Northeastern University has not reached its goals but has made progress in changing the institutional culture. Faculty are generally open and participate in these initiatives when asked. Some departments now require that annual reports of activities address diversity and that tenure and promotion processes include diversity and inclusion statements. In addition, the ADVANCE Office has expanded.

Inclusive Excellence

David Asai, PhD, Howard Hughes Medical Institute

Like other organizations described in this session, the Howard Hughes Medical Institute (HHMI) is challenging institutions to create environments where all students can thrive. The Inclusive Excellence program (IE) provides 5-year grants to U.S. colleges and universities to make their environments more welcoming for students from community colleges and those from underrepresented groups. Dr. Asai emphasized four points:

- Most IE colleges and universities already have diversity and inclusion programs. Therefore, the IE grant must complement and synergize with those existing programs.
- Faculty buy-in is critical. At the end of the 5-year grant, more faculty at the institution should understand the need for diversity and inclusion.
- Assessing institutional and attitudinal change is difficult; thus, reflection is important. HHMI has developed a nine-question peer assessment to help grantees assess the environment on their campuses.
- Sharing is also important. IE therefore establishes implementation clusters, each containing four institutions, that meet online monthly and in person annually.

IE issued awards in 2017 and 2018 and created a learning community of 57 institutions across the United States. The competition for the third round of awards has begun. Applicants must demonstrate the commitment of faculty to inclusive excellence. In addition, applicants must choose and address one of three challenges: the content of introductory courses; assessments of teaching effectiveness and inclusiveness; or genuine partnerships between 2- and 4-year institutions.

The Gilliam Graduate Fellowship program supports PhD students from underrepresented groups, with an emphasis on advisor-student pairs. Applications are evaluated based on (1) the student's potential for success and leadership in science, as evidenced by the student's leadership statement, research plan, and letters of recommendation and (2) the environment as described by the nominating materials, the advisor's statement and mentoring plan, and diversity and inclusion allowances. All Gilliam advisors undergo approximately 30 hours of mentoring skills development, which includes monthly online activities and in-person workshops in April and September. Gilliam advisors have reported growth in cultural competencies, a strong likelihood that they will change mentoring practices, and behavioral changes in mentoring. Dr. Asai also noted that the level of commitment by Gilliam advisors has a strong impact on the students.

Discussion

Faculty members who would benefit the most from diversity and inclusion initiatives are most likely the ones who do not participate. One workshop participant asked for ideas on obtaining faculty buy-in and expressed concern that requiring participation in such initiatives could reinforce internal stereotypes and worsen a situation. Dr. Beuning suggested a multifaceted approach that includes sharing data on the impact of such initiatives and emphasizing the benefit of institutional change for all members, not just those from underrepresented groups. She emphasized the need for open discussions and cautioned that such discussions can be difficult, painful, and uncomfortable. Dr. Beuning acknowledged that some faculty members at Northeastern University have declined to participate in ADVANCE initiatives, although this occurs rarely. Dr. Ruedi acknowledged that obtaining faculty buy-in can be tricky, but she also noted the importance of in-grouping and of leaders from well-represented groups participating in these initiatives. She added that individuals who initially refuse to participate in diversity and inclusion initiatives begin to feel like outsiders as the institutional environment changes.

A workshop participant questioned whether institutions discussed expected outcomes when obtaining faculty buy-in. Dr. Beuning noted that the Northeastern University administration looked at data regarding issues of satisfaction and dissatisfaction and have expressed a deep commitment to diversity and inclusion initiatives. She also noted that ADVANCE conducted several focus groups and adjusted its initiatives based on the outcomes from those groups. Dr. Asai added that initiatives could obtain buy-in from faculty and the administration by noting the benefits, such as better faculty hires and improved quality of laboratory publications as mentoring improves.

Another workshop participant asked for clarity on the theme of “not changing the individual.” The participant noted that school is about growth and that all students are different people when they leave graduate school than when they entered their programs. The participant also noted that some students enter STEMM programs without skills that students from other groups were taught at a younger age. He shared that his institution helps students address gaps in knowledge, such as how to write a curriculum vitae, to arm them for success. Dr. Ruedi clarified that diversity and inclusion initiatives should not operate from a deficit model or assume that there is something inherently wrong with the individuals they are trying to include. She added that helping students address gaps in their knowledge can be seen as a systemic change, because it ensures that all students have the same knowledge so that they know how to navigate certain processes. Another workshop participant also noted the importance of institutional climate, and she suggested that institutions that have historically served minority populations often provide environments to help these students succeed.

Dr. Asai pointed to data showing that URMs are overrepresented among students who want to enter STEMM fields but leave these fields at a substantially higher rate than their counterparts from well-represented groups, even when their backgrounds are the same. Although Dr. Asai agreed that all students should develop a certain skill set to succeed in STEMM fields, he noted that focusing on those skill sets is not enough. The data suggest that institutions must also assess how they teach science, particularly at the introductory level. As he noted in an essay published in *Nature*, increasing diversity is as much personal and emotional as it is skills driven. In line with that discussion, another workshop participant questioned whether it would be better to focus on areas, such as scientific curiosity, where students from well-represented and underrepresented groups are equally endowed, rather than focus on the deficits of students from underrepresented groups. She and Dr. Ruedi agreed that the current way STEMM is taught at the undergraduate level often kills curiosity. Dr. Beuning added that institutions could encourage underrepresented groups by reframing their experiences. For example, someone from a low socioeconomic background learns early on how to solve problems. Thus, a recruiter could point out that science involves something that individual already does.

One workshop participant noted that most of the existing IE awards are concentrated on the East and West coasts and asked about geographical bias. Dr. Asai acknowledged the uneven distribution and suggested that it arose partly from an uneven distribution of schools in the applicant pools. However, he emphasized that HHMI aims not to select the “perfect” schools, but to create a learning community and bring in new schools as others leave.

In response to questions about databases of existing initiatives, Dr. Ruedi noted that SEA Change is encouraging its awardees to talk about their initiatives and working to align with the Alliance of Public and Land-Grant Universities. SEA Change also aims to identify and learn from institutions that are already serving their communities well. Dr. Ruedi noted that Understanding Interventions has a database, but that these interventions do not necessarily focus on institutional change. She noted that creating a digital community of initiatives would be difficult and requires dedicated individuals.

In response to questions about promotion, Dr. Beuning noted that subsequent Future Faculty Workshops would be advertised as “increasing diversity,” rather than targeting specific populations. She also cited buy-in from potential allies and bystander training as ways to encourage participation in ADVANCE initiatives. She also addressed questions about sustainability, noting that several individuals who had participated in mentoring workshops participated again and continued their discussions during those workshops. However, she acknowledged that more effort is needed on sustainability.

Panel 2: Making Data-Driven Decisions

Moderator: Lauren Ullrich, PhD, NINDS

Career Trajectories: Using NIH Grant Data to Understand the Job Paths of Biomedical Researchers

Chris Pickett, PhD, Rescuing Biomedical Research

Approximately 80 percent of new PhDs move on to a postdoctoral researcher position. Of these, 60 percent want a faculty position, but only 10 percent obtain one. The ability to obtain a faculty position depends partly on publications and funding. Postdoctoral researchers often say that they must have a K99 award before they can enter the job market, and this perception influences their behavior. However, the evidence does not appear to justify this perception. Among individuals receiving their first R01 grants, the proportion of those who previously received F or K awards has increased from 25 percent in 2000 to 35 percent in 2018. Approximately 80 percent of F awards are National Research Service Awards, and K awards include both mentored awards (K01, K08, K23) and the K99 Pathway to Independence awards.

To ascertain how institutions recruit faculty and shepherd them to R01s, Dr. Pickett has divided institutions into quartiles based on their total number of first-time R01s, then looked at the distribution of previous training awards among these quartiles. He found that F32s are distributed evenly across quartiles, but that mentored K awards are overrepresented among the first two quartiles and K99s are overrepresented among the first three. Institutions in the first quartile appeared to prefer candidates with K01s, whereas those in the second and third quartiles appeared to prefer candidates with K99s. Faculty who trained at first-quartile institutions went on to receive R01s at those institutions, whereas faculty who received R01s at second- and third-quartile institutions were hired externally.

Dr. Pickett also noted evidence of institutional or systemic biases. His data showed that the success rate for black K99 applicants was half that of their white counterparts. Eighty percent of white K99 awardees converted to the R00 part of their awards, whereas only 60 percent of black awardees did so.

Questions for further study include the effects of T32 training grants on these data, the dynamics of retaining faculty versus hiring externally, how K awards factor into early laboratory funding, and the strategies early-stage faculty use to fund their laboratories. More study is also needed to determine how well other grant mechanisms support scientists from

underrepresented groups and approaches that small groups of institutions can take to diversify the research enterprise.

Coalition for Next Generation Life Science: Commitment to Data Transparency

Elizabeth Watkins, PhD, University of California, San Francisco

The Coalition for Next Generation Life Science, which consists of 44 member institutions, is committed to data transparency. Coalition members commit to collecting and publishing data on PhD admission and matriculation rates; time to degree or program completion; demographics of doctoral and postdoctoral scholars by gender, URM status, and citizenship status; time in postdoctoral research positions; and career outcomes. Reporting these data supports meaningful career exploration and placement support, increases and improves recruitment and retention to diversify the life sciences workforce, can improve mentorship at the doctoral and postdoctoral levels, and can provide a snapshot of campus programs.

The Coalition has faced some challenges in data transparency. Data by URM status are difficult to present because sample sizes are too small. In addition, the development of common data standards is difficult. Whereas time to degree, URM status, and immigration status are easy to define, other metrics have proven more challenging. For example, time in a postdoctoral research position has been difficult, because some institutions have not defined who counts as a postdoc and therefore do not know how many they have. Likewise, tracking career outcomes has been difficult because of multiple parallel efforts to develop a career taxonomy. The Coalition brought several organizations together to establish a career taxonomy based on tiers of information, including sector and career type. These tiers are expected to change as jobs change.

Dr. Watkins showed examples of data published by various member institutions. She also discussed an article she and her colleagues posted on BioRxiv, “Where Do Our Graduates Go? A Toolkit for Career Outcomes Data Collection for Biomedical PhD Students and Postdoctoral Scholars.” This article describes the steps needed to implement a data collection project, as well as lessons learned.

Biomedical Workforce Development and Diversity: From Data to Policy

Kenneth Gibbs, Jr., PhD, National Institute of General Medical Sciences

As noted by Valentine and colleagues in 2016, white, Asian, and non-resident individuals continue to be well represented in the life sciences, whereas black, Hispanic/Latino, American Indian, and Alaska Native individuals continue to be underrepresented, and the proportion of men from well-represented groups grows larger at each successive stage of an academic faculty career. The evidence suggests that these trends will not change as demographics change in the United States. Although the pool of PhD-trained scientists from URM groups is growing, a disconnect exists between the labor pool and faculty hiring because of disparate career interests and institutional and systemic factors. Thus, increasing the talent pool or the number

of assistant professor positions can only affect faculty diversity to the extent that scientists from underrepresented groups are hired and retained.

To address this need, the National Institute of General Medical Sciences (NIGMS) has issued an institutional predoctoral training grant funding opportunity to equip graduate students with the technical, operational, and professional skills required for careers in biomedical research. Trainees are expected to be rigorous scientists who can work in teams, communicate their science, and have the knowledge, professional skills, and experiences to transition into those careers. The funding opportunity will support training environments that focus on all trainees and enhance diversity, and applicants are expected to describe how they will provide information about career outcomes for the overall landscape in biomedical research.

Another funding opportunity, the Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) program, aims to facilitate the transition of postdoctoral researchers into independent faculty careers at research-intensive institutions. Through a cooperative agreement, NIGMS and scientific societies will support 15 K99/R00 awardees a year to enhance diversity. Each cohort of K99/R00 awardees will be assigned to a scientific society, which will provide strengths-based individual development plans, courses for skills development, scientific and professional networks, additional mentors, and meetings with appropriate leaders.

Dr. Gibbs closed his presentation by emphasizing that the biomedical research workforce is a system, not a pipeline. He also offered a thought experiment suggesting that if two-thirds of institutions in the Association of American Medical Colleges (AAMC) hired and retained one URM faculty member per year for 6 years, the assistant professor pool would show parity in one tenure cycle.

Discussion

Workshop participants noted that graduate program evaluation can be challenging because the relevant outcomes, such as faculty positions, tenure positions, and time to first R01, occur more than a decade after graduate students leave. The participants therefore asked about more proximal metrics that graduate students can evaluate. Dr. Watkins suggested the first research position as one metric. Dr. Pickett suggested that graduate students look at trends.

Dr. Pickett reported that some NIH-wide data suggest that 20 percent of black graduate students obtain faculty positions. However, he cautioned that this statistic is based only on publicly available data. Dr. Steve Korn noted that NINDS data on K99 awardees who have transitioned to the R00 part of their awards suggest that these researchers choose faculty positions based on the quality of life. He also cautioned against the perception that new and early-stage researchers need more grants to obtain faculty positions. For example, NINDS data indicate that the number of F32 awardees who obtain faculty position has not changed and that approximately 15 percent of early-stage investigators who receive R01s had K99 awards. Dr. Korn cautioned against inaccurate conclusions. He therefore suggested that institutions focus

more on why they see the numbers that they see, for example why graduate students and researchers make the career choices they make.

Most discussion focused on the reasons students and postdoctoral researchers choose to leave academia. Dr. Gibbs indicated that most people enter graduate school because they like science, but few know what they can or want to do after graduate school. He also cited biases and “various -isms,” misalignment of values, and issues of family care as factors in an individual’s decision not to pursue an academic research career. A workshop participant noted that some students shy away from research careers after observing the stresses and challenges that faculty and principal investigators (PIs) face. A black female workshop participant who chose a non-faculty career path added that she did not see any black women in the faculty at her institution and worried that she would be trying to train students at the same time that she was “training” other faculty to work with a black female colleague. Another workshop participant mentioned a meeting of black female alumni who agreed that academia was unattractive because of the stress associated with grants, politics, and infighting, among other factors. Another workshop participant added that many individuals from URM groups are afraid of becoming a token or targeted. One workshop participant questioned whether institutions steer graduates to non-research careers when they might be most competitive and effective in research, or whether the opportunities outside of academia are better than the ones inside it. Another participant noted a “grass is greener” mentality and commented that his institution tries to show students what life is like in other career paths.

The Coalition for Next Generation Life Science has tried to be flexible in building its career taxonomy, with the expectation that new job categories will be added by description and roll up into larger categories such as sector or science- and not-science related. The Coalition also accommodates differences in types of faculty. Dr. Watkins suggested that students and postdocs should be able to explore all options and understand that their training provides them with skills for success regardless of their career choice. Another workshop participant commented that his institution is working to change the culture so that students have time for career exploration. Data have shown that doing so shortens the time to degree and that many students pursue careers in academic research careers following such exploration. Another workshop participant echoed this sentiment, noting that students’ values can change. He commented that 40 percent of the University’s graduate students go on to academic careers, but that these students differ from the 40 percent who enter graduate school expressing an interest in academic careers.

Panelists also agreed that NIH initiatives can contribute to institutional change, but the responsibility to change institutional culture rests with current faculty and administrations. Dr. Watkins challenged full professors to support their URM colleagues and to create a culture of inclusivity by speaking out against mistreatment and negative comments. Dr. Gibbs added that private correction of public harms does not help the individual who was harmed. He noted that institutions currently swing between zero tolerance and license, and he called for creative solutions to address these harms. A workshop participant commented that the university tries to help students and postdocs navigate systemic and institutional barriers that could derail

their interest in academic research careers. It also talks with faculty about stereotype threat, imposter syndrome, and cross-cultural communication. Another workshop participant noted that her university empowers its students by describing what it is like to be an assistant professor and by being honest with them about them being a token. Another workshop participant suggested that institutions hire in clusters or pairs.

Dr. Jones-London noted that national R25 programs— such as the Society for Neuroscience’s (SfN) Neuroscience Scholars Program (NSP), which are like MOSAIC—emphasize self-efficacy by reminding students that they have the talent to be junior faculty and by providing postdoctoral funding. She suggested that such programs could create a “halo effect” for other diversity programs.

Panel 3: The Role of Societies and Associations in Institutional Change

Moderator: Marguerite Matthews, PhD, NINDS

Society for Neuroscience

Rae Nishi, PhD, Chair, Professional Development Committee, Society for Neuroscience; Marine Biological Laboratory

Kevin Jones, PhD, Chair, Neuroscience Scholars Program Subcommittee, Society for Neuroscience; University of Michigan

SfN is the largest organization of scientists and physicians devoted to understanding the brain and nervous system. Its membership includes individuals from every career stage, beginning with the undergraduate level, and about 40 percent of its membership is international. SfN also has more than 100 Institutional Program members, who are directors of undergraduate or graduate training programs and can facilitate their programs’ access to Society resources. One such resource, Neuronline, is the Society’s home for learning and discussion. It provides information across several content areas, including career paths, diversity and inclusion, outreach, advocacy, professional and program development, and scientific research and training. Resources on diversity and inclusion include toolkits, webinars, conferences, and articles. Dr. Nishi highlighted the iWiN toolkits, which present best practices for avoiding gender bias. She also noted that the Career Development and Networking Subcommittee has started to create collections so that the content on Neuronline can be more easily searchable.

In the spring of 2018, SfN’s Professional Development Committee recommended revision of the Society’s diversity and inclusion strategy. The new strategy states that programming must ensure representation of all members and that SfN encourages membership and participation regardless of race, ethnicity, national origin, gender, gender identity, sexual orientation, economic status, disability, age, and religion. The strategy also emphasizes the creation of supportive institutional environments. In line with this revised strategy, SfN has restructured its subcommittees. They are now the Career Development and Networking subcommittee, NSP, and the Diversity and Inclusion Programs subcommittee, which oversees programs for women and URM groups.

NSP, which is funded currently by an R25 led by Dr. Ramirez and Dr. Gina Poe, of the University of California, Los Angeles, is a 2-year program that supports approximately 18 Fellows annually with a 2-year membership in SfN, travel awards to the annual SfN meeting, a mentoring team, access to Neuronline resources, and up to \$1,500 per year in enrichment funds. The Program also supports Associates with access to Neuronline, online affinity groups of NSP alumni and mentors, invitations to present in a Diversity Poster Session, and funds to travel to the annual SfN meeting. According to a recent evaluation of NSP, approximately 80 percent of NSP scholars remain in academic research; most receive one or more fellowships or grants during their time in the program; and most rated themselves highly in presentation skills, abstract preparation, presentation skill, and peer mentoring following their time in the program.

Dr. Jones noted mentoring as the strongest benefit of NSP. The Society pairs Fellows with leaders in neuroscience, based on their mutual interests, and members of the NSP Subcommittee contact Fellows periodically to see how they are doing. NSP has recently begun a biannual meeting with Fellows based in the Washington, DC, metro area, and it has established the Individual Fellow Support Network to help Fellows connect with their peers.

Dr. Jones also noted the Diversity Poster Session, which allows trainees to present their research. He announced that this year's NSP Summer Conference will be held July 11–12, 2019, in Washington, DC. The conference will focus on the theme of leadership, and it will provide additional opportunities for professional development and networking. The program is open to all F32 Fellows from the 2017–2019 and 2018–2020 cohorts, and up to 30 Associates and 15 alumni will be invited.

Dr. Jones closed his presentation by noting the ways that SfN can help to implement institutional change:

- Promote best practices in diversity and inclusion through toolkits and resources posted on Neuronline and through professional development workshops at the annual conference.
- Create virtual conferences for audiences at colleges and universities.
- Serve as a leader and role model in showcasing scientists from underrepresented groups at its annual conference.

That None Shall Perish: Association of American Colleges and Universities

Kelly Mack, PhD, Association of American Colleges and Universities

Dr. Mack noted that venture capitalists and philanthropists understand that the success of a company depends on the success of its leaders. Likewise, the success of transformative awards in diversity and inclusion depends largely on the PI. Creating institutional change requires PIs who confront resistance; are self-aware, emotionally intelligent, and capable of critical reflection; and understand the politics of change. These characteristics are necessary because these PIs become targets as agents of change. The Association of American Colleges and Universities (AACU) therefore focuses on the PI through Project Kaleidoscope, an initiative that integrates professional development in its awards to help PIs succeed.

Project Kaleidoscope offers several tools for professional development, including intensive, week-long training for STEMM faculty in leadership development. This training includes My Tenure Trek™, a diversity simulation that mimics the tenure process. Participants must earn 20 tenure bonds, and they move through stations representing search committees, department chairs, deans, and grants and publications, among other steps, and gain or lose tenure bonds. However, the participants move through the simulation as if they were someone else. Professional diversity simulators then help participants to process their experiences and confront triggers or unresolved issues. Dr. Mack reported that participants from majority identities left the simulation with wonder and disbelief at the microaggressions and implicit biases they had faced as a member of an underrepresented group, while those from underrepresented groups saw, for perhaps the first time, the systemic factors that influenced their experiences.

Promising Practices for Minority Faculty Development

Chantel Fuqua, PhD, Association of American Medical Colleges

The Association of American Medical Colleges (AAMC) represents all medical schools and academic health or medical centers across the United States and Canada. It also includes 80 academic and professional societies within academic medicine. Within the AAMC Diversity Policy and Programs Unit, the Organizational Capacity Building Portfolio focuses on cultivating capacity that addresses leadership recruitment and retention, professional development, and diversity issues at the institutional level. Its activities include the Tool for Assessing Cultural Competence Training (TACCT) to assess inclusive excellence at an institution and a Healthcare Executive Diversity and Inclusion Certificate Program, in which chief diversity officers from medical schools work on pilot projects at their institutions and receive mentorship, resources, and best practices from AAMC.

Dr. Fuqua described two faculty development programs focused on diversity. One, the Minority Faculty Leadership Development Seminar, encourages minority faculty to pursue leadership in academic medicine. The seminar teaches participants about the business side of academic medicine; discusses racism, microaggression, and stereotype threat in academic medicine; discusses grant writing and communication; and fosters collaboration and networking. Dr. Fuqua reported that an analysis of evaluation survey data suggest that faculty feel confident when they first leave the seminar but lose confidence approximately 3 months later. She also noted several themes arising from a preliminary thematic analysis of open responses about the effects of the seminar:

- Planning that includes goal setting and reviewing priorities.
- Initiating behaviors toward promotion.
- Increasing scholarly activity.
- Building networks.
- Enhancing communication skills.
- Focusing on mentoring relationships.

The second faculty development program is a Grant Writers Coaching Group for NIH Awards. In this group, individuals receive instruction on how to write their grants, for example how to express their ideas, keep the layperson in mind, and write their grants as a story. The group also provides one-on-one consultations with faculty, and participants work in small groups and cohorts over 1 year. In addition, participants receive career consultations in which faculty provide feedback on their readiness to submit a proposal and discuss long-term plans for career development. AAMC has started to evaluate this program.

Dr. Fuqua noted that AAMC is also implementing holistic faculty review in a pilot program across medical centers. This review considers a broad range of factors, including experiences, attributes, and academic metrics, when reviewing applicants for tenure. Evaluation data show that DDS programs have slightly surpassed MD programs in the use of holistic review and that holistic review has led to increased gender, racial, and ethnic diversity among classes. The holistic review framework, which acknowledges diversity as essential to institutional and educational excellence, has been published in *Academic Medicine*.

Discussion

The application period for Project Kaleidoscope opens in the fall, between mid-October and early November. Selection occurs in February or March, and the program is held in July. The program accommodates up to 8 early- to mid-career faculty. Dr. Mack noted that AACU plans to follow up with Project Kaleidoscope participants. However, anecdotal evidence from deans and chairs who have sent faculty to this Project suggest that participation is transformative. In addition, AACU is seeing participation from new deans, chairs, and PIs.

Workshop participants offered suggestions for increasing their societies' involvement with promoting diversity and inclusion. Dr. Jones commented that SfN has become increasingly active in advocacy, mentoring, and addressing gender bias and that SfN has implemented a workshop on minority recruitment. However, some SfN chapters are active, while others are not. One participant suggested coordinating among SfN chapters to disseminate best practices or collect data. Another workshop participant suggested that SfN, AAMC, and AACU share any boilerplate language with smaller societies to help them disseminate and advertise information. Yet another suggested that society members encourage colleagues at their institutions to become involved with societies early on, invite individuals with different perspectives to their meetings, or poll diverse individuals before holding a board meeting.

One participant noted that most change comes about with personal interactions and questioned how that aspect can be factored into larger, more impersonal programs. Dr. Mack responded that faculty with experiences such as My Tenure Trek consider not only their own perspectives, but also the experiences of others, when they make decisions about policy. She acknowledged that an individual might not always make the right decision, but that he or she at least thinks more about the decision. With Project Kaleidoscope and My Tenure Trek, AACU aims to begin a lifelong process in which faculty consider those experiences as they work with colleagues and committees. Dr. Mack noted that AACU continues to emphasize advocacy and

works with other societies on similar interests. She added that all professional societies could consider the extent to which units focused on women, URM groups, or education in general are positioned within their organizations.

Small Group Discussions

At the end of each workshop panel, workshop participants broke into small groups for more in-depth discussion and to address specific questions from NINDS. This summary describes the discussions held by Small Group C, which was facilitated by Dr. Jones-London.

Panel 1 Discussion

Participating Panelist: Molly Carnes, MD, University of Wisconsin-Madison

What institutional programs and approaches have been successful in reducing isolation, increasing community building, and fostering career advancement for early-career faculty from diverse groups?

One workshop participant noted that his faculty group meets weekly. Although a social group, it discusses issues of faculty development and invites leadership to participate. He noted the progress that his institution has made in building this group and commented that the group presents an opportunity to facilitate mentoring. Another workshop participant commented that his university has hired an associate dean for diversity affairs. This dean has been so effective in outreach that he has mobilized medical and graduate students, in addition to the intended faculty. He noted that the dean's presence sends an important message about diversity and inclusion. Another workshop participant agreed, adding that students and postdoctoral researchers notice when departments recruit faculty from underrepresented groups.

In response to polling by Dr. Jones-London, most group members reported that their institutions have dean's-level positions focused on diversity and inclusion. Members from one university credited its provost for implementing several strategies, including involving graduate students and providing them with support to conduct their own programs. Likewise, another workshop participant credited the president of the college in transforming the institution with respect to diversity and inclusion. Group members from a medical school noted that its vice-president has increased the proportion of URM faculty from 10 percent to 30 percent because of his experience and expertise in relationship-building.

However, group members also described challenges in reducing isolation and building community. One workshop participant cautioned that dedicated leadership positions could be viewed as "checking a box" and solely responsible for addressing and promoting diversity. She added that individual women or members of URM groups face the same challenge. Her institution has addressed this issue by empowering its dean of diversity to train committee members on how to discuss these issues and by establishing departmental diversity liaisons who report back to this dean. Another workshop participant commented that her university has an associate dean for diversity and inclusion and a supportive campus climate, but that the surrounding community does not offer as much support. For example, she cited challenges

some students or faculty have in simply finding a barbershop. Suggestions from the group included a book or website that provides students and faculty with information about community resources. Dr. Jones-London described a resource that one school had developed to connect incoming faculty with other diverse professionals in the community.

The group also discussed the effectiveness of diversity and inclusion offices, because one group member observed that most diversity and inclusion initiatives are driven by PIs and faculty. Dr. Carnes commented that these offices are most helpful in coordinating resources, such as additional salaries, to support PIs on training grants. Dr. Jones-London added that, although PIs are required to be active researchers on NINDS training grants, individuals from the diversity office are often part of the team. A group member from NIGMS noted that some of its R25 programs do not require PIs to be active researchers.

Poor mentoring relationships often contribute to individuals' decisions not to continue in their fields. Thus, the group suggested that NIH require that faculty who want to add their students to training grants receive training in mentoring. NIGMS already has such mandates in place, and NIGMS T32 grants include a specific focus on mentoring and career development. NINDS requires that the PI at least attends a grantees workshop to discuss expectations about mentoring. The University of Wisconsin-Madison has developed a program, Entering Mentoring, in which one group of trainees trains the next group of mentors and therefore includes all faculty who want to mentor doctoral students. The program has been adopted at other institutions.

The group also agreed on the importance of including evaluation in diversity initiatives to determine their effectiveness. NIGMS training grant applications now include language on the evaluation of mentors. A workshop participant suggested that mentorship be built into faculty assessments and evaluations.

The institutional framework provides incentives that dictate the kinds of skills and knowledge perceived to have the maximum pay-off. How can this perception harm or help the efforts to increase workforce diversity?

The group agreed that, because NIH training grants incentivize only the science, evaluations of these grants miss other critical skills such as mentoring. Some members noted that serving as a PI on a T32 is a thankless job and suggested that these grants provide some salary support to those PIs. R25s provide some support, but the level of support does not match the level of effort from PIs. Committees focused on K awards have discussed the addition of incentives to recognize mentorship. Dr. Letitia Weigand also noted the remote possibility that applicants could obtain clearance and support for these types of costs.

Several institutions have incorporated mentoring and other service activities into their promotion and tenure tracks. One university emphasizes mentoring. A workshop participant noted that her college has two PIs on its R25 and reduces the teaching load for those PIs. She has been hired by a university to fill an endowed position that reduces the teaching load, provides salary support, and does not penalize her for mentoring activities. Another

department is piloting a system in which a faculty member's service earns points toward a bonus. Another School of Medicine conducts a holistic evaluation that includes mentorship and penalizes poor mentors.

Group members acknowledged that evaluating mentorship is challenging. Confidential mentee evaluations and students' or early-stage faculty advancement were cited as evaluation outcomes. However, group members noted that, in some cases, such as small laboratories, mentees' evaluations might not be confidential. Group members suggested third-party evaluation processes as one way to address this challenge. Group members also emphasized the need to hold other faculty members and department leadership—not just the mentor—accountable for poor mentoring.

Panel 2 Discussion

Participating Panelist: Chris Pickett, PhD, Rescuing Biomedical Research

This group expressed concern about the disparity between black and white K99 awardees who converted to the R00 part of their awards. Referring to institutions that interviewed only applicants with K99, one group member expressed concern that this situation, along with the disparity in the number of K99 awardees converting to R00, could establish a new system for discriminating against individuals from URM groups. Dr. Pickett cited data about the racial disparities in obtaining R01s and suggested that the K99 data were consistent with an existing system of bias.

Dr. Pickett did not have data to explain reasons for this disparity. Group members reiterated factors suggested during the wider panel discussions, such as unwelcoming environments or better opportunities elsewhere. One group member wondered whether black investigators are pushed to work on issues, such as certain diseases or health disparities, that are more relevant to the black community but not aligned with institutions' research directions. Dr. Jones-London noted that R00s are reviewed administratively and suggested a lack of institutional support as one reason that K99 awardees do not convert to R00s. She based this speculation on NINDS' experience with the K22 mechanism, which is similar to the R00 mechanism. Dr. Ashley Van't Veer, of the National Institute of Mental Health, suggested that some trainees face insufficient startup packages because they try to stay at their training institution, rather than conduct nationwide searches.

There was some debate about the importance of a K99 to success in obtaining a faculty appointment. One group member commented that institutions rely heavily on NIH support and therefore want their new hires to obtain funding. However, a group member from one NINDS group noted that only 52 percent of its early-stage investigators have K99s, and Dr. Weigand noted that the NINDS Data Interest Group found that only 18 percent of new hires had previous funding. NINDS awards approximately 13 K99s annually, and NIGMS awards 15 to 20. One workshop participant commented that he does not consider whether applicants have a K99. Another group member suggested that awards might depend on whether the institution is public or private; for example, her institution considers K99s because its budgets are getting

smaller. However, another workshop participant commented that his institution sets up its job searches so that the K99 is not a determining factor.

The group discussed the benefits of diversity K99s and other awards. One was the halo effect. A workshop participant noted that one individual's success empowers everyone around that individual. Another group member echoed that sentiment based on experience with NSP, noting that sharing information about a successful K award application generates substantial, powerful, transformative energy within the community. Group members also note that K awardees show more interest in mentoring within not only diversity programs, but also general training programs. Dr. Van't Veer added that K awardees build strong relationships with program officers at the Institute during the K99 phase, which helps them to connect with other opportunities at NIH. A workshop participant noted that such a relationship helped her build her confidence and negotiate her startup package. Another group member noted the number of foundations involved in K99 programs and commented that most if not all awardees from these programs have succeeded in getting a job, regardless of gender, race, or ethnicity.

The group noted the power of administrative review and suggested that NINDS and NIH review startup packages and offers, particularly for women and individuals from URM groups, and discuss with applicants how "normal" packages should look. Group members also suggested stratifying data by which institutions are forced to hire based on existing funding, although they disagreed on whether search committees would admit that.

Dr. Jones-London suggested that NINDS could help Dr. Pickett access the data needed to explore this disparity further. She also suggested that NIH could explore this internally. The group suggested a comparison of conversion rates among NIH Institutes and Centers.

Panel 3 Discussion

Participating Panelist: Kevin Jones, PhD, University of Michigan, Society for Neuroscience

Group participants noted that postdoctoral researchers are less engaged in SfN. Dr. Jones acknowledged that many postdoctoral researchers think about participation in NSP as a means to an end, rather than a year-long engagement. Although SfN attempts to address this issue by, for example, offering unlimited access to Neuronline as a benefit of membership, students and postdocs often take advantage of their institution's membership instead.

The group also asked about how previous NSP scholars have fared. Dr. Ramirez responded that he and Dr. Poe have collected data and produced mid-year and end-of-year reports for every cohort in their iteration of the program. Before they assumed responsibility, SfN collected data by contacting former scholars. A report on the first 30 years of the program is available. Dr. Ramirez noted that NSP is an effective program, based on outcome measures such as jobs, publications, and grants. Another workshop participant added anecdotal evidence that participation in the program increases confidence. Group members also noted the benefits of maintaining interactions with alumni. Dr. Jones commented that alumni engagement is especially powerful for new cohorts of scholars, who can see what alumni have achieved.

The group cautioned against unrealistic expectations about what a program such as NSP can achieve: for example, one R25 cannot solve the diversity issue for all of biomedicine when it can only accept a few talented individuals per year. Other group members commented that many women and individuals from URM groups are contacted multiple times by various programs. The group agreed on the need for careful consideration of what programs can accomplish and at what scale.

The group discussed the ways in which SfN pushes for diverse representation. Dr. Ramirez noted that Council discussions often focus on increasing the gender, racial/ethnic, and international representation of faculty, as well as of students, on SfN committees. He and Dr. Jones acknowledged the need for more diversity among all awards offered by SfN, and they invited group members to contact them with the names of potential nominees. Group members expressed the hope that SfN could set an example for promoting diverse representation.

Dr. Jones-London added that NIH can play a role in promoting diversity. Dr. Francis Collins, NIH Director, considers representation when deciding whether to accept an invitation to speak at an event. Dr. Jones-London noted that NIH can use funding to incentivize appropriate representation at the program level. Dr. Ramirez agreed that NIH funds present a powerful motivation for promoting diversity and mentoring. Another group member suggested that NIH set policies for training grants in general, rather than setting neuroscience-specific policies. Another suggested a policy requiring training grants for one high school or undergraduate student each summer, and another suggested that NIH stop aggregating data on Asian individuals with that on white individuals.

Appendix 1: Participant List

Maria Ali, University of Virginia
Richard Altschuler, PhD, University of Michigan
David Asai, PhD, Howard Hughes Medical Institute
Peggy Beuning, PhD, Northeastern University
Nicquet Blake, PhD, UT Health San Antonio
Dawn Bowers, PhD, University of Florida
Amanda Brown, PhD, Johns Hopkins University School of Medicine
Molly Carnes, MD, MS, University of Wisconsin-Madison
Moses Chao, New York University School of Medicine
Edwin Clayton, PhD, Princeton University
Michael Crair, PhD, Yale University
Theodore Cummins, PhD, Indiana University Purdue University Indianapolis
Cheryl Dreyfus, PhD, Rutgers-Robert Wood Johnson Medical School
Chris Dulla, PhD, Tufts University School of Medicine
Daniel Feldman, PhD, University of California, Berkeley
Michael Fox, PhD, Virginia Polytechnic Institute and State University
Chantel Fuqua, PhD, Association of American Medical Colleges
James Galligan, PhD, Michigan State University
Timothy Gentner, PhD, University of California, San Diego
Matthew Gentry, PhD, University of Kentucky College of Medicine
Arpita Ghosh, PhD, The University of Kansas
Annette Gray, PhD, New York University School of Medicine
Charles Greer, PhD, Yale University
Leslie Griffith, MD, PhD, Brandeis University
William Guido, PhD, University of Louisville
Melissa Harrington, PhD, Delaware State University
John Huguenard, PhD, Stanford University
Melissa Jaiman-Crus, BSc, Michigan State University
Diane Jaworski, PhD, University of Vermont College of Medicine
Girardin Jean-Louis, PhD, New York University Langone Health
Kevin Jones, PhD, University of Michigan
Diana José-Edwards, PhD, Washington University in St. Louis
Kiesa Kelly, PhD, Tennessee State University
Bjorn Knollman, MD, PhD, Vanderbilt University Medical Center
Benedict Koler, PhD, Duquesne University
Sarah Kucenas, PhD, University of Virginia
Daniel Lackland, PhD, Medical University of South Carolina
James Lauderdale, PhD, University of Georgia
Lakeisha Lewter, PhD, Duquesne University
Farah Lubin, PhD, University of Alabama at Birmingham
Christine MacDonald, PhD, University of Washington

Kelly Mack, PhD, Association of American Colleges and Universities
Jamie Maguire, PhD, Tufts University School of Medicine
Kathleen Maguire-Zeiss, PhD, Georgetown University
Carmen Maldonado, PhD, University of Puerto Rico-Rio Piedras
Michael McKernan, The Jackson Laboratory
Caleb McKinney, PhD, Georgetown University Medical Center
Robert Meisel, PhD, University of Minnesota
Carol Milligan, PhD, Wake Forest School of Medicine
Sheri Mizumori, PhD, University of Washington
Kelly Monk, PhD, Oregon Health and Science University
Christopher Moore, PhD, Brown University
Alicia Mosley Austin, PhD, University of Rhode Island
Janet Neisewander, PhD, Arizona State University
Rae Nishi, PhD, Marina Biological Laboratory
Gbenga Ogedegbe, MD, New York University Langone Health
Ava Onalaja, MPH, Society for Neuroscience
Suzanne Paradis, PhD, Brandeis University
Chris Pickett, PhD, Rescuing Biomedical Research
Gina Poe, PhD, University of California, Los Angeles
Julio Ramirez, PhD, Davidson College
A. David Redish, PhD, University of Minnesota
Kathleen Rodgers, PhD, University of Arizona
Beth Ruedi, PhD, American Association for the Advancement of Science
Sarah Sletten, PhD, University of North Dakota
Rochelle Smith, AA, BA, MS, Washington University
Alan Sved, PhD, University of Pittsburgh
Taralyn Tan, PhD, Harvard Medical School
Gonzalo Torres, PhD, University of Florida
Jeffery Vance, MD, PhD, University of Miami
Sukumar Vijayaraghavan, PhD, University of Colorado School of Medicine
Elizabeth Watkins, PhD, University of California, San Francisco
Mariann Weierich, PhD, Hunter College, City University of New York
Danny Winder, PhD, Vanderbilt University
Marlys Witte, MD, University of Arizona
Michael Zigmund, PhD, University of Pittsburgh
Ferdinand Zizi, MPH, New York University Langone Health

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Andrea Van't Veer, PhD

National Institute of General Medical Sciences

Edgardo Falcón, PhD
Kenneth Gibbs, Jr., PhD

National Institute on Alcohol Abuse and Alcoholism

Lynn Morin

NIH Office of the Director

Hannah Valentine, MD, PhD

Appendix 2: Workshop Agenda

Day One: April 29, 2019

- 8:00 am **Welcome**
Walter Koroshetz, MD
Director, National Institute of Neurological Disorders and Stroke (NINDS)
- 8:15 am **Meeting Goals**
Michelle Jones-London, PhD
Chief, Office of Programs to Enhance Neuroscience Workforce Diversity, NINDS
- 8:25 am **Featured Lecture**
Molly Carnes, MD
Professor, Departments of Medicine, Psychiatry, and Industrial & Systems Engineering, Director, Center for Women’s Health Research, and Co-Director, Women in Science & Engineering Leadership Institute, University of Wisconsin-Madison; , University of Wisconsin-Madison; Director, Women Veterans Health, William S. Middleton Memorial Veterans Hospital
- 9:05 am **Q & A Session**
- 9:25 am **BREAK**
- 9:45 am **Panel 1: Strategies for Institutional Change**
Moderator: Letisha Weigand, PhD, NINDS
Discussants: Beth Ruedi, PhD, SEA Change, American Association for the Advancement of Science
Penny Beuning, PhD, ADVANCE, Northeastern University
David Asai, PhD, Inclusive Excellence, HHMI
- 11:15 am **Discussion/Brainstorming in Small Groups**
- 12:00 pm **LUNCH BREAK**
- 1:00 pm **Panel 2: Making Data-Driven Decisions**
Moderator: Lauren Ullrich, PhD, NINDS
Discussants: Elizabeth Watkins, PhD, Coalition for Next Generation Life Science, University of California, San Francisco
Chris Pickett, PhD, Rescuing Biomedical Research
Kenneth Gibbs, Jr., PhD, Data-based Intervention Recommendations, National Institute of General Medical Sciences (NIGMS)

