

NIH Advancing Diversity Programs Conference Proceedings

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Introduction

In the last four decades, the number of students from underrepresented groups (URG) who receive PhDs in biomedical sciences has increased nearly tenfold. But these students still remain disproportionately underrepresented among graduate students, postdocs, and faculty members, indicating that individuals from URG are dropping out of the academic pipeline at critical points during their transition from undergraduate school to biomedical research careers.

Disturbed by these trends, experts have investigated the discrepancies in success rates between URG students and their majority peers. Among other data points, they have found that Black students are substantially less likely to receive grant support and funding from the National Institutes of Health (NIH), and more generally, that Blacks or African Americans, Hispanics or Latinos, American Indians or Alaska Natives, Native Hawaiians and other Pacific Islanders, and other groups including women and individuals with disabilities are significantly under-recruited and under-retained in the science workforce. Leaders at NIH therefore have concluded that recent efforts to diversify the biomedical workforce have not been sufficiently successful.

Based on recommendations made by the [2012 Advisory Committee to the Director \(ACD\) Working Group on Diversity in the Biomedical Research Workforce](#), NIH leadership convened an [Office of Scientific Workforce Diversity](#) – headed by Dr. Hannah Valentine since 2014 – and a permanent [ACD Working Group on Diversity](#). The working group's charge is to help the ACD to develop and recommend effective, innovative strategies to NIH that may help to enhance the diversity of the biomedical research workforce by increasing the participation of individuals who have been historically underrepresented in biomedical research. In the years since the Office of Scientific Workforce Diversity and the ACD Working Group on Diversity were established, NIH leaders, scientists, and researchers have collaborated to implement programs that enhance diversity and inclusivity in institutions across the nation. Preliminary data suggest that these programs have made progress towards improving recruitment and retention of scientists from URG. Despite these advances, leaders and experts recognize that significant gaps remain in the number of individuals from URG who obtain PhDs, MDs, or MD/PhDs in biomedical research, go on to postdoctoral research, are recruited as faculty members, and receive [Research Project Grants \(RPG\) and R01 grants](#) from NIH.

To address these disparities, NIH gathered a diverse group of scientists, researchers, and faculty members in the field of biomedical research to share their individual perspectives and unique expertise at a conference on Advancing Diversity Programs. Across five topic panels, conference participants presented data-driven perspectives on enhancing scientific workforce diversity. They

shared and learned about new program data and outcomes, best practices, and lived experiences and perspectives on diversity in biomedical research. Critically, the primary goal of the conference was to help obtain actionable input from these individual experts to inform NIH about potential next steps to take in the following decade.

NIH remains strongly committed to promoting diversity, inclusion, and excellence in biomedical research. Leaders intend to use recommendations from this conference to ensure that scientific workforce diversity remains a national priority. To assist in this effort, the NIH Office of Scientific Workforce Diversity has prepared this summary, which attempts to aggregate the key messages offered by individual contributors during each of the five panels that took place during conference.

Panel I: What are institutional perspectives and programs that help prepare students for the transition between undergraduate and graduate school?

The challenge

Although many students from URG express interest in pursuing biomedical degrees at the graduate level, many academic institutions may not adequately prepare them for the undergraduate-to-graduate pipeline. Data indicate that students from URG tend to enter programs with lower test scores and high school GPAs than their peers, while implicit—sometimes explicit—cultural biases may further discourage them from seeking graduate-level education. Fortunately, diversity-driven programming at the institutional and faculty levels can effectively neutralize these differences by the time students receive undergraduate degrees, positioning them for success as they seek MDs, PhDs, and faculty positions in the sciences.

Educators and program coordinators necessarily seek to understand the factors that encourage students from URG to pursue graduate education in biomedical fields. Further, they aim to ensure that graduate programs are equipped to support a diverse student body and faculty, promoting success for those students who are historically underrepresented in academia and science careers. In their ongoing work to promote diversity in higher education, programming experts have already identified perspectives and recommendations for facilitating URG students' transition from undergraduate to graduate school.

Faculty and leadership initiatives

Consensus indicates that diversity in academia hinges on systematic changes in attitudes, values, and norms that have traditionally excluded URG students and faculty from participating in higher-level education. Faculty and leadership represent a promising group in which to initiate these institution-level changes. Institutions benefit when leadership and faculty play a primary role in activities that support and promote diversity, including processes related to faculty buy-in, commitment, and messaging. Experts at these institutions also note that faculty and leadership should ideally exemplify the diversity they seek to foster among students, enabling them to effectively support and

mentor students from URG. For example, the University of Maryland, Baltimore County funds [programs for faculty diversity initiatives to improve recruitment, retention, and promotion of URG faculty](#), with a parallel goal of closing the equity gap for students seeking higher-level biomedical research degrees. And at UC Berkeley's [Biology Scholars Program](#), program experts recognize leadership diversity and commitment as a few of many components that drive institutional change. In general, institutions benefit from well-planned onboarding mechanisms to ensure that faculty and staff can easily adhere to and implement diversity initiatives and programs.

Partnerships

Other initiatives—such as Harvard University's [Graduate School of Arts & Sciences](#) and the University of Texas, El Paso's [BUILDiNg SCHOLARS program](#)—also foster external partnerships, enabling diverse faculty and student bodies to interact with other groups who work to promote minority representation at the institutional level.

This interdepartmental cooperation as well as cross-campus networks ensure that programs operate in an institutionalized context rather than in isolation. And more broadly, positive culture changes spread quickly and effectively when institutions communicate and collaborate with each other. Experts find that success at the institution level requires joint efforts from internal stakeholders (such as faculty and leadership) and external partners who demonstrate commitment to diversity initiatives.

Incentives

Critically, experts note that institutions typically require incentives to implement these programs and accountability mechanisms to sustain them. The Biology Scholars Program advocates a “carrot and stick” model—which uses promotion and tenure as faculty-level incentives—to encourage culture changes at the institution level. In discussion, other experts noted that incentivizing factors can be particularly useful for long-standing faculty members, who may be motivated to shift entrenched culture if rewards align with a value system and promote competition and research productivity.

External rewards and resources are also an effective way to hold leadership accountable for culture change. Specifically, funding and intervention from NIH is a powerful tool to help ensure that institutions allocate resources towards diverse programs and award funding to URG students, postdocs, and faculty, who currently receive a significantly smaller proportion of R01 and other grants compared to their peers. For example, in the last five years NIH has invested in two highly successful initiatives: 1) the [BUILD program](#), which pairs institutions to broaden the pool of students participating in biomedical research training and maximize opportunities for faculty/staff development, and 2) the [National Research Mentoring Network](#), which connects individuals with academic mentors across the country.

Mentorship

Beyond their function as an accountability mechanism, mentorship programs are a critical way to ensure that URG students receive integrated support throughout their careers, from undergraduate

to graduate school (and potentially to faculty positions). Many institutions fail to promote enthusiasm for science careers among URG students because their mentors do not fully exemplify or promote diverse interests. Funding for new mentorship initiatives—including mentor training, peer mentoring, and inter-institutional mentoring programs—widens the academic pipeline, ensuring that students from URG receive both the encouragement and support they need to pursue careers in biomedical research. For example, [the Mentor Advocate Partnership](#) at MIT reports that 80 percent of first-year undergraduates feel that their faculty/graduate mentors helped them make connections with other staff and professionals. Such mentorship programs may empower students from URG to break into institutional spaces from which they have been traditionally excluded.

Diversity training programs

To this end, experts support ongoing mentorship skills training programs for faculty and leadership. Some take an outcomes-based approach to the issue of culture change, suggesting that these programs should primarily seek to change faculty members' behavior rather than target their private ideologies. In general, training initiatives for faculty and leadership are critical for reversing the entrenched biases that systemically impact students from URG and for promoting institutional engagement with diversity-driven models. Mentoring and training courses are also valuable tools for students themselves, who should have access to these programs throughout their careers as postdocs and investigators (and someday as faculty members). Institutional culture benefits from this ground-up approach to change, which cultivates early interventions and aims to sustain them at all points of a student's education.

Takeaways

Experts agree that culture change at the institutional level is the best way to prepare students from URG for the transition from undergraduate to graduate school. Committed leaders can champion meaningful changes to the norms, perceptions, and attitudes that may discourage and prevent URG students from pursuing graduate degrees in biomedical sciences.

Panel II: What are evidence-based practices for facilitating the transition from undergraduate to graduate school?

The challenge

After preparing students for the transition between undergraduate and graduate school, institutions should seek to implement best practices for guiding students through the academic pipeline. In the last two decades, institutions have made great strides in identifying replicable, scalable, and sustainable practices supported by a strong evidence base.

Faculty and leadership initiatives

Culture change remains a practical goal. Although training and professional development workshops can foster successful culture change at the faculty level, research from Syracuse University's [CHANCe Project](#) suggests that appeals to social justice do not effectively move many STEM faculty members

to action, and that many are unwilling to accept what they learn in anti-racism and implicit bias training workshops. As a result, program leaders should aim to motivate and engage faculty members by providing stipends and support from science education specialists, who are trained in strategies to encourage faculty to embrace inclusive pedagogies that do not necessarily require deep cultural awareness or competency. For example, specialists might train educators to open classroom dialogues about inclusivity, and they often aim to help faculty understand that all students have the capacity to grow into successful scientists.

Diversity training programs

Experts note that NIH has the capacity to encourage culture change by ensuring that all faculty at NIH-funded institutions receive diversity training and bias assessment as part of the onboarding process. URG students themselves can play an essential role in assessment and training procedures when institutions solicit their perspectives and narratives on inclusive classroom environments. Student anecdotes and performance analyses suggest that URG students perform particularly well in active learning classrooms, which break away from the standard lecture format to encourage students to analyze, synthesize, and evaluate information in a collaborative environment.

The student body

In fact, experts also identify the student body as a critical component of successful diversity initiatives. As well as diversifying faculty and leadership, best practices include a focus on selecting motivated, talented young people to form the next generation of URG students who go on to become biomedical researchers. Howard University's [MARC Program](#) prepares students to seek a science PhD by providing enhanced academic and professional development. The initiative aims to gather a high-quality student body by rigorously selecting for students who demonstrate the characteristics of successful investigators and active leaders—including passion, organization, self-motivation, self-advocacy, and willingness to learn.

Program evaluation

All three of the students who graduated from the HU-MARC Program in 2016 went on to receive PhDs in biomedical and behavioral sciences. Program evaluation strategies that track such progress and outcomes provide institutions with key insights about a program's impact, and directors can use these lessons learned to allocate resources, determine new priorities, and guide future best practices. Evaluations also inform necessary adjustments and demonstrate that a program effectively improves students' long-term outcomes. Currently, however, many agencies narrowly define successful outcomes such that clinician scientists are not valued as equally as PhDs. Some experts note that expanding positive outcomes to include MDs and PharmDs may dilute the focus on research-intensive biomedical careers, so program evaluators are advised to carefully broaden positive outcomes to include clinicians with significant research experience.

Centralized coordination

Program evaluators often find that centralized coordination models can streamline institutional efforts and may increase program effectiveness. The University of California, Davis centrally

coordinates its [Educational Enrichment and Outreach programs](#), with an early focus on stimulating interest and ensuring retention and a later focus on upper-level professional development and identity formation. The model coordinates a robust support network composed of mentors, peers, and leaders to provide each undergraduate student with the tools to move successfully towards graduate-level education programs. With an emphasis on student support and success, centralized coordination further enables institutions to achieve thriving communities of scholars and advocates who are empowered to share their resources and expertise. Although understaffing and sustainability represent significant challenges to this community support model, the coordinated structure effectively avoids duplication of effort, maintains program distinctness, and alleviates the burden associated with applying to multiple programs. Critically, the model drives sustainable culture change by providing a central overseeing force to mitigate bias across programs.

Takeaways

Best practices should ensure that culture change is sustained through ever-shifting leadership, faculty, and student cohorts. While training and professional development workshops can encourage faculty members to employ progressive pedagogy in their classrooms, longer-term change is necessary to ensure that URG students move smoothly along the pathway towards graduate-level education and beyond. Experts caution that intellectual exchange among institutions can entrench existing biases just as easily as it can promote inclusivity. Institutions can best sustain positive changes with ongoing visibility, support, and evaluation for initiatives that facilitate URG students' transition along the academic pipeline.

Panel III: What are the key components of successful postdoc and faculty-oriented programs?

The challenge

Despite the ongoing success of undergraduate-to-graduate school diversity programs, experts find that talented URG students still face challenges to continuing through the pipeline towards postdoc or faculty careers. Some hiring and onboarding practices operate under implicit biases that may discourage or prevent URG students with graduate-level degrees from pursuing postdoctoral research programs, funding opportunities, and faculty positions. Institutions that do not effectively diversify faculty may perpetuate biased academic environments that dissuade or exclude undergraduate URG students from seeking careers in biomedical research. Consequently, there remains a critical need for programs that empower URG scientists to secure faculty positions, awards, and funding.

Mentorship

Experts continue to emphasize mentoring as a means of systemic culture change. Data indicate that URG students and postdocs change career intentions as they spend time in the research environment, eventually losing enthusiasm for tenure-track academic positions after a postdoc. Fortunately, faculty mentors can act as role models to foster students' interest in academic

careers. To encourage effective mentorship, experts have designed culturally relevant, diversity-focused training platforms, such as the Mentoring Across Training Programs (ATP) initiative at the University of Alabama at Birmingham. The program mandatorily communicates mentoring competencies, culturally relevant mentoring strategies, and mental health resources to all UAB faculty who want to train a graduate or postdoc student, ensuring that faculty members are well equipped to guide URG students towards biomedical research careers.

Both students and faculty members benefit when training programs are rigorously evaluated. Program officers are encouraged to solicit faculty input about their training needs, while student satisfaction assessments can provide valuable insight about areas for intervention. For example, about one-third of students from underrepresented racial and ethnic groups and one-half of female students at Vanderbilt University report experiencing discrimination or harassment from their faculty mentors. Program directors at Vanderbilt have used these student accounts to inform mentorship interventions, which include ongoing initiatives to promote cultural awareness, inclusivity, and respectfulness among faculty mentors.

While program evaluation and training incentives can improve mentoring relationships, experts still encourage institution leadership to provide students with more than one mentor. Because a single mentor may be unable to meet a student's needs, multiple mentors enable students to seek alternative perspectives, discuss problems, and make informed decisions. Although mentors provide valuable career guidance, data from NIH indicate that students also benefit from relationships with sponsors, who act as advocates to help students apply for and receive postdoc or faculty positions.

Incentives

Tenure and promotion committees can also use these evaluation metrics to incentivize faculty engagement in non-compulsory training programs, ultimately promoting institutional culture change. Within an institutional context, these ongoing program evaluations can further drive culture change by defining which programs and institutions disproportionately receive awards. The NIH finds that women and particular racial and ethnic groups are underrepresented among NIH applicants and awardees. It is important to consider strategies which ensure that URG scientists are as likely as their peers to receive funding, salary support, and grants.

Grant award processes

Some experts advocate for funding inclusivity by calling for an amended grant award process. Currently, NIH funds only the top 20 to 25 percent of well received R01 grants, leaving many meritorious grant applications without sufficient support. Experts have proposed abandoning this quartile system in favor of a fractional award process that would allocate funds for the majority of grants received; for example, the top 2 percent of grants might receive 100 percent funding, while the top 26 to 40 percent might receive 40 percent funding. A restructured award mechanism could provide dollars to the research institutions which support postdocs and faculty from URG, whose R01 grant applications may not receive funding otherwise. Postdocs cite grant funding stress as the biggest inhibitor of moving towards faculty positions, so reformed R01 grant funding could reduce

the mental health burdens associated with the grant application process.

Mental health and support networks

Other mental health resources and other faculty-oriented support systems can mitigate graduate students' perceptions that academic careers are unsustainably demanding. Prospective faculty members can navigate onboarding negotiations more successfully when they receive educational resources about typical startup packages, and in general they thrive when they can engage with community spaces within institutions and nationally. For URG students, postdocs, and faculty members, national cohorts can provide valuable support systems when their own institutions fail to provide inclusive spaces.

Takeaways

Experts encourage program coordinators to remain wary of one-size-fits-all strategies and to consider that best practices may vary by institution, program, department, and individual. In general, however, postdocs and faculty members thrive when institutions provide them with the resources, support, and networks that empower them to guide themselves and others towards success.

Panel IV: What are the perspectives of early-stage faculty?

The challenge

First-hand accounts from a panel of early-stage faculty members confirm that URG postdocs experience significant barriers to hiring and retention in academic positions, and experts rely on these lived experiences to design programs and initiatives that address the needs of URG faculty. Among other perspectives, experts are interested to know the factors that have facilitated or prevented URGs' transition into faculty positions; the valuable programs and resources that have supported them in their careers; and the issues they have experienced as early-career faculty members.

Diversifying faculty relies in part on expanding the pool of individuals from URG who receive graduate-level degrees and pursue postdoctoral research. Although talent is equally distributed across groups, systemic barriers prevent many individuals from URGs from having the same opportunities as their peers. One panelist who self-identified as a formerly incarcerated individual highlighted the legal system as a significant barrier. The U.S. incarcerates more people than any other country, and less than 4% of formally incarcerated individuals have some form of post-secondary education, compared to about 35% of the general public. Considering that 1 in 3 African American/Black males can expect to be incarcerated in their lifetime, it is essential that interventions for enhancing scientific workforce diversity target this large talent pool and that institutions consider other systemic barriers impacting the pursuit of higher education among individuals from URG.

Increasing the number of PhDs received by individuals from URG is a necessary but insufficient approach for enhancing scientific workforce diversity, as it only affects faculty diversity to the extent that these scientists enter the job market as candidates (and are [successfully hired and retained](#)). In fact, although the number of URG students who receive PhDs has increased nine-fold in the last three decades, the corresponding number of assistant professors has only increased three-fold. This disparity suggests that URG students—even those who have already received a graduate-level degree—remain disproportionately affected by systemic issues, institutional climates, and entrenched biases that discourage or prevent them from attaining faculty careers.

Mental health and support networks

The early-stage faculty panelists highlighted that their stress is exacerbated by the burdens of microaggressions and the perceived responsibility of representing underrepresented groups. Some expressed additional frustrations related to tokenism—the tendency of non-minority faculty members to perceive that their minority colleagues were recruited only to increase staff diversity, rather than for their professional merit. URG faculty members may feel othered by their peers and excluded from faculty support systems, intensifying the existing pressures associated with sustaining an academic career.

Psychosocial literature suggests that social supports are critical for faculty success and mental wellbeing. As a result, experts recognize the importance of encouraging institutions to create more opportunities for postdocs and staff—particularly URG faculty, who may experience additional isolation—to build their social and professional networks. One professor at the University of Pennsylvania explained that his success was facilitated by extensive networking supports, including two NIH-funded initiatives: the [IRACDA Program](#) and the [BRAINS Initiative Fellows](#). He cited these cohort experiences as invaluable resources during his application for faculty positions.

Mentorship

The early-stage faculty members emphasized that mentors are an essential component of these networks. Many celebrate mentorship as a valuable support system and encourage their mentors to express their own barriers, failures, and successes rather than project an unrealistic image about the challenges associated with academic careers. A majority of students who participated in the [Academic Pathways Fellowship](#) at Vanderbilt University report that their formally assigned mentors significantly facilitated their transition towards faculty positions. However, URG postdocs may experience challenges to accessing mentorship in informal spaces (such as happy hour) because many faculty members struggle to interact with individuals from different backgrounds. Diversity-focused mentorship training programs can ensure that institutions promote inclusivity and belongingness for prospective and current URG faculty members.

Cultural context

The early-stage faculty also described the challenges of balancing work life with cultural contexts and obligations. For example, a Puerto Rican professor at the University of Arizona explained that her cultural ethic discourages adult children from putting their aging parents in a nursing home; as a

result, she was entirely responsible for the care of her elderly parents while also pursuing a faculty career in animal biomedical sciences. She discussed the critical need for institutions to consider cultural differences—such as family values, marriage, childbirth, and spousal hiring—that may impact URG postdocs’ retention and success as faculty members.

Cultural sensitivity training can help program directors, mentors, and other faculty members understand how to be empathetic to these situations, to avoid stereotypes, and to relate with URG faculty in informal environments.

Grants and funding

URG postdocs also experience financial barriers to success in academic careers. Two URG faculty members with lived experience report NIH funding during vulnerable life stages as a critical component of their ability to initiate and sustain faculty STEM positions. A professor at the University of Arizona explained that her financial circumstances almost ended her career in its early stages, but she was able to remain on the path to professorship after receiving supportive mentorship, a [diversity supplement](#), a postdoctoral advisor’s grant, and a [K99/R00 award](#). Other resources, such as the [Prison to Professionals \(P2P\) Program](#) and the [Burroughs Wellcome Fund](#), can also provide URG scholars with the funding they need to transition towards independent research and faculty positions. Additionally, URG investigators benefit from programs that train them to successfully compete as PD/PIs on applications for RPGs/R01s and other grants that are disproportionately awarded to institutions with majority PD/PIs.

Takeaways

Despite significant strides in the number of URG students who receive PhDs, many individuals from underrepresented racial and ethnic backgrounds remain underrepresented among faculty and among PD/PIs on successful R01 grant awards. Successful, inclusive initiatives include the perspectives of URG faculty members, whose lived experiences remain an invaluable and ongoing component of diversity programming.

Panel V: What makes a program scalable and sustainable?

The challenge

Experts recognize that leadership changes and unpredictable access to resources can easily stymie a program’s long-term growth and impact; as a result, they seek to ensure that successful diversity initiatives are designed with sustainability and scalability in mind. NIH and other organizations have ample capacity to bolster these small-scale, institution-level programs as they begin to establish self-supported, wide-reaching infrastructures.

Investment from NIH

To do so, experts urge NIH first to invest in workforce diversity programming. As a national entity, NIH can support country-wide scalability by allocating funds to diversity-oriented programs that

effectively promote inclusivity and institutional commitment. Partnerships with other organizations, including funders and universities, can further strengthen NIH as a champion of excellence in academic diversity. For example, NIH and the AAMC have collaborated to produce a successful [“Train the Trainer” workshop](#) to promote national sharing of best practices. And NIH’s [Broadening Experiences in Scientific Training \(BEST\) Program](#) has already expanded to 17 locations across 11 states, indicating the organization’s capacity to support programs on a national scale.

To scale up and to remain sustainable at this level, programs need long-term funding from NIH and other organizations. An expert from HHMI explained that the [Hanna Gray Fellows Program](#), which aims to increase diversity in the U.S. professoriate, attributes its success in part to its commitment to providing fellows with 8 to 12 years of funding. This self-sustaining resource flow establishes a sense of security, allows long-standing mentorship relationships, and facilitates networks among the larger HHMI community. Ideally, program developers should seek to promote these independent funding infrastructures so that communities and states can function without government resources in the event that leadership changes result in budget slashes. Experts also note that mentors should thoroughly prepare early-stage faculty members to approach these external funding challenges.

Diversity language

Direct funding is only one component of the effort to make diversity programs scalable and sustainable. Experts suggest that NIH can begin by using diversity language (especially in funding opportunity announcements) to emphasize that diversity contributes to excellence and strengthens the research enterprise. Regulatory leverage can serve as an important tool for promoting sustainable diversity programming. And institutions themselves can leverage sustainable workforce diversity by recognizing and incentivizing faculty who pursue career development grants.

Admissions processes

Institutions can also scale up their programs by using targeted training to harness a large, capable talent pool with special emphasis on individuals involved in the legal system, college sports, or disadvantaged groups. Experts encourage institutions to monitor and revisit the review process if data indicate that individuals from URGs are poorly represented in application and award pools, ensuring that grants and recruitment are approached systematically and with an emphasis on the individual. In fact, some experts recommend abolishing standardized testing scores altogether in favor of holistic admission processes, which consider each applicant’s overall merit and potential to meaningfully contribute to the community.

After applicants are accepted, programs can nurture a strong cohort by highlighting role models from underrepresented groups, empowering students to take charge of their own academic careers, and setting a high standard for success. For example, a representative from the California State University, Los Angeles explained that the school’s [MORE Program](#) cultivates resilience and resourcefulness by encouraging minority students to strive for excellence rather than to close the

achievement gap. As a result, Cal State LA is the top baccalaureate origin institution of Hispanic science PhD recipients in the continental US, indicating that minority empowerment initiatives are a valuable tool for improving outcomes at the national scale.

Takeaways

Finally, experts agree that systems-level changes can form a strong foundation to support program sustainability and scalability. Although experts note that it is important to address disparities wherever possible, consensus concludes that new interventions to restructure the education system—beginning as early as elementary or secondary school—may enhance the academic pipeline *before* URG students reach college, reducing the challenges associated with implementing diversity overhauls during the relatively short transition period from undergraduate to graduate to postdoc to faculty careers.

Conclusion

Mounting evidence suggests that individuals from nationally underrepresented racial and ethnic groups are underrepresented in the science and research workforce. As they progress along the pipeline from undergraduate school to faculty and research positions, these URG students experience disproportionate barriers to success: they are less likely than their majority peers to receive the guidance, support, and funding they need to thrive at the graduate level and beyond.

After convening a conference to address these troubling trends, individual experts who participated in the panel presentations have provided a number of actionable recommendations aimed to increase retention and success of URG students in graduate programs, postdoc careers, and faculty positions:

Goal	Recommendations
Facilitate the transition between undergraduate and graduate school	<ul style="list-style-type: none"> • Promote ongoing culture change at the institutional level by incentivizing leadership, faculty, and stakeholder buy-in and commitment • Integrate mentoring and training processes across the investigator’s career • Design bias and sensitivity training programs for NIH-funded researchers and institutions • Implement rigorous review processes to select and identify the most talented, motivated students • Evaluate program progress and success over time, if necessary, amending definitions of successful outcomes • Consider implementing centralized coordination models • Take advantage of work published in the last 40 years to prevent duplication of effort

<p>Enhance postdoc and faculty-oriented programs</p>	<ul style="list-style-type: none"> • Incorporate and systematically assess recurring mentor training programs for faculty members • Increase availability of mentors and sponsors to meet student needs • Incentivize faculty and leadership to consider and remain sensitive to cultural context • Address mental health, stress, and microaggressions by fostering community cohort spaces and networks, institutionally and nationally • Evaluate program success, with attention to faculty and student input • Implement cluster/cohort hiring models • Secure faculty success by educating early-stage faculty members about typical startup packages, preparing investigators to compete for grants, and amending the R01 grant award process
<p>Ensure program sustainability and scalability</p>	<ul style="list-style-type: none"> • Increase NIH investment in workforce diversity programming with an emphasis on lasting, sustainable funding • Develop programs with independent infrastructures to reduce long-term reliance on government funding • Include diversity language in funding opportunity announcements • Promote partnerships between NIH, other organizations, funders, and universities • Amend admissions and review processes to harness large talent pool • Recognize and incentivize faculty who pursue career development grants • Involve and align stakeholders • Restructure education systems, as early as elementary school

NIH strives to remain a champion of national scientific diversity. With continued partnerships and input from other institutions across the nation, leaders at NIH hope to use these recommendations to catalyze actionable plans, policies, and best practices to advance diversity in the biomedical research workforce.