

Commentary

Fund Black scientists

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Our nationwide network of BME women faculty collectively argue that racial funding disparity by the National Institutes of Health (NIH) remains the most insidious barrier to success of Black faculty in our profession. We thus refocus attention on this critical barrier and suggest solutions on how it can be dismantled.

We are at a historic moment in time: a mainstream awakening to the pain that stems from racial injustice, with our scientific communities openly acknowledging that our practices promote racial inequity and disparity (Barber et al., 2020; Cell Editorial Team, 2020). To address racial injustice in our profession and society, we established a national network of 260+ women faculty in biomedical engineering from all academic ranks, including chairs, deans, and distinguished scientists, such as the few women of color elected into the National Academies. Over the past few months, we have exchanged >24,000 messages discussing racial inequities that pervade our profession. One issue keeps rising to the top throughout these discussions: our Black colleagues' grief about insufficient National Institutes of Health (NIH) funding for their research laboratories. These human experiences are backed by years of data.

The first study documenting racial disparity in NIH funding hit the field like a shockwave in 2011 (Ginther et al., 2011).

This study showed that award probability for Black principal investigators (PIs) in 2000–2006 was ~55% that of white PIs of similar academic achievement (Ginther et al., 2011). NIH scrambled to study potential reasons for this injustice (Barber et al., 2020; Erosheva et al., 2020). We, as scientists and engineers, wrote editorials and promised to do better. Yet, over a decade later, this gap persists (Barber et al., 2020; Dzirasa, 2020; Erosheva et al., 2020; Platt, 2020). In 2014–2016, Black applicants' award rates remained at ~55% of those for white PIs (Figure 1A) (Erosheva et al., 2020). While we continue to nitpick about reasons for this disparity, one fact remains widely agreed upon: the disparity is real.

Why does this matter? Promotion and tenure committees frequently use research grants, especially NIH R01-equivalent grants, to gauge a biomedical research program's long-term viability. Thus, the racial disparity in NIH R01 awarding leads to failed tenure cases for Black faculty (Cropsey et al., 2008; Fang

et al., 2000). Others burn out and exit the academy before reaching the tenure threshold (Cropsey et al., 2008). We thus ask our non-Black colleagues to consider being in our Black colleagues' shoes for a moment: imagine needing to spend *twice* the amount of time grant writing to achieve the same funding level as white PIs, while also performing substantially more service (Hare, 2018). This excessive burden no doubt leaves Black faculty less time to do research, publish papers, gain exposure, train and inspire diverse students, and attain the promotions and positions needed to achieve the highest levels of academic power (Dzirasa, 2020; Erosheva et al., 2020; Fang et al., 2000; Platt, 2020).

To add salt to this wound, we worry that NIH does not fully understand the critical deleterious impact of this disparity. For example, we applaud the NIH Common Fund FIRST program, which offers \$241 million to recruit new faculty committed to inclusive excellence. Yet, any new Black researcher recruited as a result of

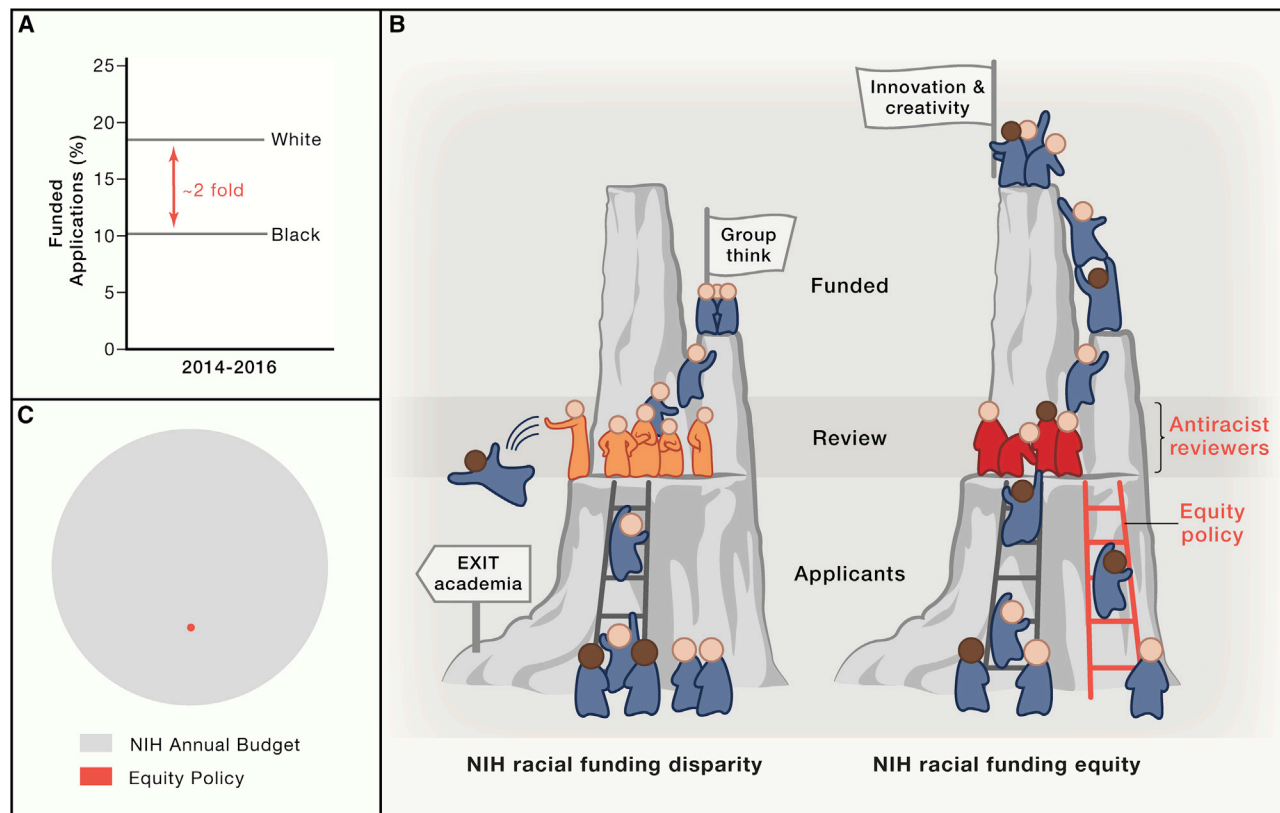


Figure 1. NIH R01 racial funding disparity

(A) For R01 applications from 2014 to 2016, the award rate was 10.2% for Black PIs and 18.5% for white PIs (Erosheva et al., 2020).

(B) Metaphoric illustration depicting current NIH funding procedures, which destroy innovation (left) versus those that incorporate a broad NIH equity policy (red ladder) and/or in which individual antiracist reviewers (red) advance applications of Black PIs, to create innovation (right).

(C) Circle areas proportionally represent the amount of funding in the NIH annual budget (gray, \$41.68 billion in 2020) versus that needed to achieve racial funding equity (red, \$32 million). Our ~\$32 million estimate is derived as follows: The NIH deputy director for extramural research reported 35,085 R01-equivalent applications were submitted in 2019 and average award size of funded applications was \$548,390. Of the awards submitted, previous studies have shown that ~2% of applicants were Black (Erosheva et al., 2020). 10.2% (Black) versus 18.5% (white) award rates (Erosheva et al., 2020) would yield 72 and 130 funded applications, respectively, which is a difference of only 58 funded applications. This R01-equivalent racial funding disparity amounts to ~2 applications per institute and ~\$32 million in research funding.

this program will be set up to fail if NIH doesn't aggressively work to eliminate racial funding disparity.

At least 10 editorials have been written about this NIH racial funding disparity (Dzirasa, 2020; Platt, 2020) with no sign of real effort from NIH or other entities to dismantle it. Meanwhile, our Black colleagues continue to be disenfranchised. We need radical solutions that produce racial funding equity *now*. Our hope is that this commentary refocuses attention on this critical issue. We also suggest solutions on how this barrier can be dismantled.

Action for the National Institutes of Health

The NIH director and leadership must recognize that its previous approaches, most of which have focused on filling the

“pipeline” without simultaneously addressing our profession’s systemic racism, have failed. NIH must change course. We suggest the following:

Explicitly state that racism persists in the US research enterprise and that it must be expelled

Thousands of Black voices have long lamented the racism prevalent in this country. We refer readers to the thousands of reports, studies, and personal introspections written on this topic (Dzirasa, 2020; Erosheva et al., 2020; Henry et al., 2017; Platt, 2020). More recently, 10,234 of our faculty colleagues, including the authors here, signed a statement acknowledging the presence of systemic racism in academia (Barber et al., 2020). However, the silence from NIH on this topic remains deafening.

We ask: if racism is present in academia, how can it not be present in NIH grant review and research, which are performed by academics?

NIH must break its cycle of denial, which in the words of leading antiracism scholar Ibram X. Kendi, is “*the heartbeat of racism*.” NIH must acknowledge that racism exists in order to build the foundation of understanding needed to overcome it.

We urge NIH to release a public statement signed by the NIH director that:

- Acknowledges that racism persists in the US academic research enterprise and that it must be expelled.
- Describes metrics, a timeline, a plan for public progress updates, and funds committed for how NIH will

build and fund a scientific workforce that reflects the diversity of the US population. After all, *all* Americans pay the tax dollars that fund NIH. Inequitable distribution of these dollars is discrimination.

- Describes how NIH will invest in understanding the impact of racism in NIH grant review. For example, the NIH should study the cultural competency and unconscious bias harbored by its reviewers, differential review practices and funding disparity between NIH and the National Science Foundation (NSF), and why “matching criteria” (Erosheva et al., 2020) affect the funding disparity gap. These studies should be done in parallel with and not before immediate dismantling of racial funding disparity using approaches such as those below.

Institute policies to immediately achieve racial funding equity

Interestingly, solutions to similar funding disparities have been demonstrated elsewhere at NIH. The best example is the NIH Early Stage Investigator (ESI) Program policy, which funds additional R01 applications from early-stage investigators with scores above the funding pay-line. This program has successfully “leveled the playing field” by supporting early-career scientists at a success rate similar to established investigators. We call attention to the first line of background of the NIH ESI Policy website, which states: “Fostering the creative discoveries and innovative research ... requires NIH to take steps to promote the growth, stability, and diversity of the biomedical research workforce.”

We ask NIH: are race and ethnicity not considered diversity? In the words of our colleague Dr. Manu Platt:

“Be careful with responding, because one answer is racist and the other is not” (Platt, 2020).

NIH must institute an “equity” policy or program for Black investigators that eliminates racial funding disparity. We provide a metaphoric illustration for such a policy in Figure 1B. In addition to the ESI policy, procedural roadmaps for racial equity initiatives exist in other disciplines. Indeed, one similar pipeline already exists within NIH itself in the form of PAR-19-222,

which awards R21 grants for new investigators from diverse backgrounds. Unfortunately, an R21 program supported by only two institutes is set up for limited impact. We estimate that NIH would need to appropriate only ~0.07% of its annual budget to achieve racial R01-equivalent level funding equity across all career stages (Figure 1C).

We understand that such a policy or program may cause concern for some members of our scientific community. Indeed, the backlash from loud and privileged members of the majority is what has often enabled racism to persist (Henry et al., 2017). Should American institutions quake at such uproar? No.

Make diversity score-driving criteria, prioritize diverse teams for funding, and diversify review panels

Creativity and innovation blaze new paths to discovery and lay at the core of everything scientists value. We firmly support the first major goal of the NIH, as stated prominently on its Mission and Goals webpage: “To foster fundamental creative discoveries, innovative research strategies, and their applications”

Yet, NIH practices are discordant with this goal. Numerous studies have shown that diverse teams generate the most creative, innovative, and impactful solutions and science (Figure 1B; Freeman and Huang, 2014; Hofstra et al., 2020). Innovative progress strongly depends on the degree of our collective differences (Freeman and Huang, 2014; Hofstra et al., 2020).

We ask: why is “diversity of the investigator team” not a scorable criterion in NIH grant review and priority for funding?

Be careful with responding, because one answer is racist and the other is not (Platt, 2020).

To foster innovative strategies, diversity must be woven into the fabric of everything that NIH does. Diversity should not be viewed as a separate department, a separate institute, or a separate initiative. If NIH is truly committed to the most creative discoveries and innovative research strategies, diversity must be scorable and prioritized for funding, period.

To identify the most creative and innovative research, more diverse voices must be intentionally included on review panel teams. The deck is already stacked against incorporating diverse perspec-

tives and experiences into funding decisions, as minority Black faculty are ~6-fold underrepresented relative to the US population in academic medicine (Erosheva et al., 2020). We are thus prioritizing narrowly constructed, widely embraced paradigms, which most commonly lead fields astray, over creative and innovative work that illuminate new routes of research (Freeman and Huang, 2014; Hofstra et al., 2020).

The practice of prioritizing diverse teams already exists in many governmental entities, demonstrating that diversity is valued elsewhere and providing bureaucratic paths for implementation. For example, in awarding federally funded contracts, large companies bidding for jobs are encouraged to include partnership with a disadvantaged business enterprise (DBE) to remedy ongoing discrimination in federally assisted transportation contracting.

To make NIH’s policies and procedures consistent with its stated mission and goals, we recommend that:

- Diversity of the investigator team should be a score-driving criterion in NIH grant review. This includes race/ethnicity and other forms of diversity such as gender, sexual orientation, and disability.
- Diverse teams should be prioritized for funding. Until there is no NIH racial funding disparity, all applications from Black PIs must be discussed. These applications should be automatically slated for discussion, prior to the review meeting by an automated system or the scientific review officer (SRO).
- Program officers/program directors (POs/PDs) should be encouraged and empowered to reevaluate grants of Black PIs that score above the funding pay-line and bring these grants forward to council for funding. We calculate that an average of only ~2 additional R01 applications from Black PIs would need to be funded per institute to achieve racial equity (Figure 1C)!
- More Black PIs should be included on study sections. NIH should institute a minimum number of Black reviewers on each panel and publish a timeline over which this number will

represent the US population. We note that some, often in the majority, may voice that this may lead to an unmanageable burden on Black PIs. Yet, the “race tax” is most problematic for service that is not career enhancing. Service on an NIH panel is universally viewed as career enhancing and prestigious, and panel invitations can also be declined. The pool of Black reviewers available for each panel could also be increased if NIH adopted suggestions in the “Beyond 2020: A Vision and Pathway for NIH,” which recommends that narrowly defined organ- and disease-centric panels be replaced with panels that are broader in scope.

Train and empower NIH leadership, staff, and grant reviewers and recipients to recognize and stop racism

Dr. Martin Luther King, Jr. once said, “In the end, we will remember not the words of our enemies, but the silence of our friends.” The common act of “looking away” to avoid discomfort upholds racism (Henry et al., 2017). Silence is complicity. The continued persistence of a racial funding disparity suggests that the scientific workforce, including the NIH leadership, does not understand nor is adequately equipped to recognize and respond to this racism. To address this problem, which affects the health of millions of Americans, we suggest that NIH:

- Ensures that the scientific workforce, including NIH leadership, SROs and POs/PDs, study section chairs, NIH grant reviewers, and NIH grant recipients are trained and empowered to identify, respond to, and stop racism on review panels and elsewhere.
- Creates efficient mechanisms for reporting racist or biased conduct during and after review panels. This includes developing a standardized policy to remove reviewers with a history of offenses from the reviewer pool and publicizing policies, offenses reported, and NIH follow-up actions in annual reports.

- Includes an NIH “ambassador” trained in racism on all review panels. The ambassador would ensure compliance and consistency of “best practices” across study sections (e.g., fairly drawn discussion lines, equitable grant discussion ratios based on diversity metrics such as race/ethnicity and gender prior to panels, inclusion of Black faculty on panels). The ambassador would observe dialogs and intervene and mediate when racism or bias occurs. Reviewers should be enabled to communicate with the ambassador during and after each panel. Issues raised by ambassadors must be acted upon in the panel and later by NIH as above.
- Includes a module on recognizing racism and stopping its negative impact in the mandatory Responsible Conduct of Research (RCR) training.

Action for individual scientists, the private sector, and academia

While immediate and radical action by NIH is desperately needed, the collective actions by scientists and other entities have a vital role to play as well. We, the individuals and institutions that comprise our profession, are each ultimately responsible for the racism that permeates it.

Individual scientists

Faculty colleagues, we respectfully suggest that it is time for us to acknowledge that we—*yes each of us, including many of the authors here*—have unintentionally contributed to racial inequity in our profession. As just one example of the insidious nature of systemic racism, many studies have shown that we judge CVs and resumes differently based on the name of the applicant alone with both racial and gender bias, even if these CVs are otherwise identical (Eaton et al., 2020; Henry et al., 2017). We ask: what might this suggest about our judgment of NIH biosketches and investigators? Comments by reviewers such as “this grant lacks detail, but this strong PI will figure it out” should thus be met with alarm bells. This example is just the beginning (Barber et al., 2020) (Eaton et al., 2020; Henry et al., 2017).

Scientific colleagues, let us each use our voices and actions to now overcome our profession’s racism and serve as anti-racist agents of change (Figure 1B). We must not wait for NIH to act. We suggest that each of us do the following:

- Score grants of Black faculty well (Platt, 2020).*
- Rescue grants of Black faculty to ensure they are discussed.*
- Consider diversity when scoring the investigator team and innovation.*
- Learn what racism is, especially topics such as “systemic racism,” “racism,” and “antiracism.”
- Call out and stop all racist statements in review panels and elsewhere. Do not let racist comments pass.
- Include Black faculty in scientific collaborations and write papers and grants with Black faculty.

*When we review, score, and/or rescue applications, our rationales must be based on the current “score driving” criteria (see <https://grants.nih.gov/grants/peer/critiques/rpg.htm>). Innovation is one of the score-driving criteria. As noted above, diverse teams generate more innovative work.

Private sector

While we continue to wait for NIH to act, we look to for-profit and nonprofit entities, such as foundations, professional societies, philanthropists, and non-government funders (e.g., Howard Hughes Medical Institute) to act. We highlight and thank Genentech for providing one example of innovative leadership by awarding \$500,000 to the corresponding authors’ institutes to create “Genentech Research Funding Awards,” which will be administered to Black faculty nationwide to help offset the NIH racial funding disparity. This program is the type of disruptive action that private entities can and should be taking. While a comprehensive analysis is beyond the scope of this commentary, we offer some suggestions for the private sector here, which should:

- Collectively mobilize and put pressure on the NIH to eliminate racial grant funding disparity.
- Create funding awards programs to help offset NIH racial funding

disparity. We estimate a total of ~\$32 million in funding annually is needed (Figure 1C).

- Prioritize investigator diversity and/or commitment to diversity when administering any type of scientific grant funding from the private sector. Anything less destroys creative synergy and diminishes innovation.

Academia

Many of our universities have responded to this historical moment with reflections and statements of solidarity. Yet, we have not seen the transformative organizational change needed to eliminate racism. Universities need to stop focusing only on the pipeline and do much deeper introspection. We must also identify and dismantle barriers and build inclusive support infrastructure for Black and other minoritized faculty to ensure their success. Indeed, academic hiring, promotion, and tenure policies enable racial funding disparity, by building and empowering the largely homogeneous academic faculty currently performing NIH grant review. Toward this end, we provide some recommendations for universities here:

- Make the mission, vision, and organizational changes needed to dismantle racism in academia. Ensure that our institutions' actions are consistent with their stated values.
- Revamp hiring and promotion and tenure (P&T) committee training in cultural competency, racism, and implicit bias. Ensure that hiring and P&T committees know and recalibrate (stated and unstated) expectations based on common dispar-

ities, such as NIH racial funding disparity and citation disparity. Remind committees that a singular bar for "excellence" is not consistent with diversity. Conversely, diversity *is* essential for innovation.

- Understand that when hiring Black faculty, we also need to create proactive and substantive funding mechanisms to provide these faculty with funding that achieves racial funding equity, including bridge funding to cover funding gaps.

We urge each of us—the NIH, every one of our scientific colleagues, industry partners, community partners, and universities—to add our voices and act now. It is time for us to stop extinguishing careers of exceptional scientists and instead demonstrate that we truly value innovation and creativity.

Fund Black Scientists.

Fund. Black. Scientists.

#fundblackscientists

WEB RESOURCES

NIH definitions of criteria and considerations for research project grant critiques, <https://grants.nih.gov/grants/peer/critiques/rpg.htm>

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