

A Diverse Physician-Scientist Pipeline to Fight Structural Racism

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Translational research plays a pivotal role in leveraging good science to serve humanity. Structural racism and a lack of diversity severely limit our potential as scientists to exert a maximum impact. This moment calls for a renewed commitment to ridding science of racism and bias and promoting diversity, which makes us more effective at innovating and delivering therapeutics to the patients we serve.

Keywords. systemic racism; bias; physician scientist; disparities; science.

The events of recent months triggered by the death of George Floyd and the weeks of antiracism protests that followed have led to widespread support for the black lives matter movement and a much-needed awakening across institutions for the urgency to combat structural racism. These events collided with the unfolding tragedy of a disproportionate number of Black, Indigenous, and People of Color (BIPOC) dying in the ongoing coronavirus disease 2019 (COVID-19) pandemic. The term BIPOC, which has gained more traction lately, plays an important role in recognizing the unique relationship of Black African American people and Indigenous people to “whiteness” and how that influences how they experience racism and social determinants of health [1]. It recognizes the shared experiences of communities of color but at the same time provides much needed nuance that these communities are not homogenous and have unique histories and cultures that shape their lived experiences of racism.

As scientists and researchers, we can no longer ignore that racial bias, lack of diversity, and inequities exist in our own ranks. This is hurting scientific research and our ability to use good science to promote antiracism policies. We must do more to actively dismantle a system that, for too long, has not done enough to foster diversity and is set up to mostly represent a narrow range of ideas and perspectives. Such a system cannot achieve its full potential of conducting the type of research that represents and serves the full spectrum of society.

THE LEAKY PIPELINE FOR PHYSICIAN-SCIENTISTS DEMANDS DIVERSITY AND INCLUSION IN SCIENCE

For many years the physician-scientist pipeline has struggled with recruiting and retaining racial and ethnic minority candidates to its workforce. A 2017 report by the National Science Foundation (NSF) found that of 183 000 early career doctorate holders working in academic institutions, 78% were White and only 3.5% Black, 5.6% Hispanic, and 4.8% Other (American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and respondents who selected more than 1 race) [2]. This representation gap significantly widens ascending through academic rank [2] clearly indicating a failure of the system to retain a diversity of individuals and highlighting the need for major cultural change.

Starting at the level of initial admissions criteria into graduate and medical schools disproportionately disfavor applicants from minority backgrounds. BIPOC candidates often have to surmount challenges that are the direct result of centuries of inequality and systemic racism. These unique challenges are often not taken into consideration by the metrics [3] in place that determine what makes a “good candidate.” Beyond the admissions screen, existing curricula for schools can be based on old paradigms that fail to appropriately address diverse populations [4, 5]. This is compounded by inherent biases; a lack of support and inadequate mentorship faced by minority candidates creates a hostile environment where many may feel they do not belong and thus be less likely to thrive. For example, in a study of medical school performance evaluations, White applicants were more likely to be described using “standout” keywords such as “exceptional,” and “outstanding,” whereas Black applicants were more likely to be described as “competent” [3].

Explicit biases also exist and can contribute to differential treatment and discrimination against minority trainees. A good example of this is the natural hair discrimination frequently encountered by Black medical professionals and how

Received 3 August 2020; editorial decision 1 September 2020; published online 14 September 2020.

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Clinical Infectious Diseases® 2020;XX(X):1–5

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 DOI: 10.1093/cid/ciaa1387

it affects how they are perceived in their place of work. In a JAMA study that explored the experiences of minority residents in the workplace, the authors found that although developing their professional identities, minority residents felt aspects of their cultural identity were ignored at work [6]. “Residents experienced pressure to assimilate into the social culture specific to their institution, but their residency programs made little effort to integrate aspects of minority culture into the educational environment.” The failure to include minority cultures into the educational environment breeds a culture of “othering” and also limits the ability of all trainees to connect with and engage a diverse patient population. Furthermore, these biases are pervasive and have the potential to impact and amplify disparities in recruitment opportunities, salaries and promotions for BIPOC in science, medicine, and research.

THE DIRECT IMPACT OF UNDERREPRESENTATION ON SCIENCE AND MEDICINE

There is overwhelming evidence that science and medicine greatly benefit from diversity. Representation invigorates and expands the scope of scientific inquiry to include research questions that focus on traditionally underrepresented groups. Underrepresentation and lack of diversity feeds existing biases that directly impact the choice of research questions, the interpretation of results, and the engagement of minority populations in medical/scientific research studies [7].

Science and medicine have a long-standing history of racism. A somber example of how biomedical research has exploited existing racial inequalities for its own advancement is the HeLa cell line. Thousands of biomedical research papers have been published in the fields of cancer biology, cell biology, virology, and so forth, using cells stolen from Henrietta Lacks, a Black woman who died from an aggressive form of cervical cancer [8]. Almost 60 years after her death, Black women are still underrepresented in clinical trials for new treatments [9] and have disproportionately higher rates of death from breast [10] and cervical cancer [11] compared to White counterparts. Marion Sims, often celebrated as the “father of modern gynecology,” developed his famous technique for repairing vesicovaginal fistulas, a severe complication of childbirth, by perfecting his surgical technique operating on enslaved Black women without anesthesia [12]. Today BIPOC women are 2–3 times as likely to die from a pregnancy-related cause than White women [13]. By every measure, healthcare outcomes in Native American people continue to lag behind those of other racial and ethnic groups in the United States [14]. This is the direct consequence of centuries of unfair treatment, racism, and neglect. In the 1960s and 1970s Native American women were subjected to sterilizations by the Indian Health Service (IHS), in many instances without informed consent [15]. The investigation of 4 IHS sites found that at least 3406 indigenous women were sterilized through

this program between 1973 and 1976. This practice had a profound impact on Native American birth rates and also psychological and social consequences that persist to this day.

The legacy of betrayal at the hands of science means BIPOC often benefit the least from scientific discoveries made on a background of their oppression and exploitation. This has led to a vicious circle in which minority groups are more wary of participating in research fearing that they will be “experimented on” as has been the case in the past. The most cited example of this was the Tuskegee Study in which 600 Black men were enrolled in a study to evaluate the natural history of syphilis. They did not receive informed consent and did not receive proper treatment to cure their illness, although it had become widely available. The study participants were offered medical care and meals, which took advantage of their economic vulnerability [16]. This atrocity has caused generations to mistrust the biomedical community and further drives health disparities as individuals are less likely to heed advice of medical professionals or put themselves in a vulnerable position as a study participant.

As researchers, especially in the field of infectious diseases, we have a big role to play in breaking the cycle and restoring trust in equitable because that is free of racial bias and works to serve all of humanity. Lack of diversity in perspectives and values impact the researcher’s approach to problem solving and choice of methods. This has direct consequences on how we approach research participants from diverse backgrounds and adds much needed context on how research findings are interpreted. At this moment we are facing the global pandemic of COVID-19, which has shed light on stark racial inequalities in our society. BIPOC are overrepresented in the numbers of patients who have been infected and have died from COVID-19. The ramifications of historical mistreatment and racism are reflected in the ongoing challenges to recruit representative numbers of BIPOC participants into COVID-19 treatment and vaccination studies.

As infectious disease physicians with a leading role in clinical trials for treatments and vaccines, the onus is on us to ensure adequate representation of racial minorities in these studies.

In order to do this, we must recognize that even as objective scientists, we are all susceptible to prejudice and often fail to acknowledge our own racial biases, even when they directly affect our research [7]. Mistrust of the healthcare system by BIPOC communities can be exacerbated by a lack of minority investigators. Ensuring that there is diversity in the research workforce is a pivotal first step toward regaining some of that trust. Besides being the morally and ethically right thing to do, expanding diversity and restoring equity in the scientific work force has a direct impact on the financial bottom line for institutions. A 2017 analysis by McKinsey showed that institutions that are in the top quartile for gender and racial diversity on executive teams outperformed on profitability by 27% and also had superior value on creativity [17]. Our efforts to strengthen the pipeline and build a more diverse

workforce are long term and will take several years to yield dividends. In the short term improving BIPOC community involvement and using culturally competent staff can increase enrollment in target populations. Using targeted recruitment approaches to cater to specific cultural characteristics and literacy levels may also enhance minority participation.

There is an urgent need to break down the barriers imposed by segregated care. Segregation, a word not frequently used in healthcare, is an important contributing factor to health disparity. The environment largely determines the quality of schools an individual is able to attend, directly impacts on their economic prospects, the quality of care they can access, and ultimately their health outcomes. Strategies that aim to integrate schools, end housing discrimination, and eliminate poverty in BIPOC communities are important in restoring the trust of these communities in the healthcare system. This is an integral part of improving healthcare outcomes in marginalized groups. A recent important study in PNAS showed that Black newborns die more frequently, regardless of who is treating them, compared to their White counterparts. Remarkably, when Black physicians care for them, the death rate is 39–58% lower than when White doctors provide care [18]. These results highlight the urgent need to diversify the medical workforce and emphasize how racial bias contributes to health inequity. Increasing enrollment and emphasis on greater recruitment of BIPOC in relevant areas of healthcare can have immediate and significant impact.

How can diversifying medicine and science lead to better outcomes for all? Here are concrete actionable points to create sustainable solutions.











Diversity fosters a greater capacity for excellence. Team science is becoming increasingly more prevalent as multidisciplinary approaches are required to solve complex problems. We rely on teams that bring together different backgrounds, skill sets, perspectives, and life experiences. The greater diversity we bring to our teams, the richer our potential is for innovation. There is strong evidence that diverse groups publish more and are more highly cited [19]. Importantly, as the pandemic of health disparities drives a divide among communities, it is increasingly important that we work together to understand the root causes of these structural problems and develop multifaceted solutions. This cannot be done without individuals who have firsthand life experiences related to these disparities and a deep understanding of the nature of the issues.

Real change can only come from introspection of long-standing beliefs and practices and a systematic institutional soul-searching. Too many of our institutional efforts are performative, touting diversity efforts through illusion in images but not deeply examining the practices that disadvantage those who have traditionally not advanced through academic ranks. The approach to true inclusion and diversity requires a multitiered approach from the earliest times of recruitment through retention and support along the academic pipeline.

The start is trainee pipeline programs that advertise to and support individuals from diverse and underrepresented backgrounds to learn about graduate education in biomedicine [20, 21]. This includes high school and undergraduate summer programs, dissemination of media describing the career path, and showing examples of successful BIPOC physician scientists. Standardized testing can bias toward those who have the resources to afford preparatory courses. A more holistic review should consider the totality of the applicant including academics, research experience, potential as a physician scientist, and the challenges that individual has overcome. Admissions criteria should be transparent and advertised, and ranges of scores for accepted or matriculated applicants should be publicized to dispel the myth that all individuals must have metrics at or near the middle [22]. All those participating in the admissions process must be educated about how bias impacts their decisions. Annual training mitigates inevitable biases and opens conversations during admissions committee meetings; these are critical to creating systems of mutual accountability. Conversations about race are challenging, and the only way to further this mission is through learning and introspection in an environment that is open and free from blame. Allowing admissions officers to give and receive feedback on their practices will help ensure continued progress.

During the course of training, a strong antiracism curriculum is critical. Our health systems are built on antiquated models of segregated care that offer a different standard to those of lower socioeconomic status [23]. The implications of this have ravaged our country during the COVID-19 pandemic in which BIPOC continue to be disproportionately impacted. A cross-academic initiative to examine how structural racism is baked into medical education will help inform practices that need to be challenged and improve the care of all communities for the future.

To support a diverse pipeline of physician-scientist trainees, a network of diverse mentors is necessary. It is critical to have BIPOC in faculty positions and senior leadership roles to model and mentor the next generation. Leadership must take an interest in mentoring BIPOC through providing them with opportunities to build their career and allow them to express their expertise, as it relates to diversity and inclusion, but also to other areas in which they are subject experts. Faculty development through mentoring committees, peer review, and a community can help to ease the transitions for junior faculty. There are laudable initiatives within the infectious disease community actively working to retain historically underrepresented investigators. The Minority HIV Investigator Mentoring Program from the AIDS Clinical Trials Group (ACTG) has helped in retaining early career investigators in human immunodeficiency virus (HIV)/AIDS related research. More efforts such as this are needed [24].

Problems	Solutions
Low representation of BIPOC in academic workforce 	 Expand the pipeline through mentoring and outreach
Bias in selection and recruitment processes 	 Examine definitions of ideal candidacy and educate all those involved in the process
Academic advancement rewards those in traditional majority 	 Incentivize equity work across institutions and enlist allyship
Overrepresentation of BIPOC in pandemic disease prevalence 	 Health care reform to break down barriers imposed by segregated care
Underrepresentation of BIPOC in research studies and clinical trials 	 Increase enrollment and emphasis on greater representation of BIPOC in relevant areas

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Figure 1. Problems of structural racism and actionable solutions to increase diversity in the physician scientist workforce. Problems of structural racism and proposed solutions are outlined. Low representation of BIPOC in the academic workforce can be mitigated by expanding the pipeline of BIPOC in early training through mentoring and outreach efforts to increase exposure and support for BIPOC trainees. Bias in selection and recruitment processes can be mitigated by redefining excellence, clearly outlining eligibility criteria, valuing holistic review, and educating all those involved in the process. Academic advancement has rewarded those in the traditional majority through recognition with speaking opportunities, publications, grants, and awards; this can be mitigated by incentivizing equity work across institutions and enlisting allyship to advance BIPOC early in training through recognition. There is overrepresentation of BIPOC in pandemic disease as demonstrated by the high rates of COVID-19 in BIPOC populations; systemic healthcare reform is needed to ensure that these populations have access to care and are financially able to take advantage of health care services, most notably preventative care. Underrepresentation of BIPOC in research studies and clinical trials can be mitigated by greater presence of BIPOC physicians and scientists who can communicate with communities about the importance and relevance. Abbreviations: BIPOC, Black, Indigenous, People of Color; COVID-19, coronavirus disease 2019.

Support for family needs is also critical as physician scientists have to juggle multiple obligations including professional and family, while receiving a lower salary than they would in a full-time clinical position. Therefore, appropriate reimbursement for this important work is necessary to support and encourage this pathway. The issue of reimbursement is especially pertinent to the field of infectious diseases, which is among the least remunerated of the internal medicine subspecialties and has struggled in recent years to secure a robust pipeline of trainees. Participating in diversity and inclusion efforts at any institution should be remunerated as other efforts are through an incentivized structure so as not to disadvantage and rather to reward those who are particularly passionate about this subject. Salary parity is critical as well, as literature demonstrates that Black employees earn lower salaries than White men, and Black women earn lower salaries than everyone across the board [25, 26].

The time has come for us as a community to commit to a radical change. A global pandemic has served as the amplifying lens for the structural racism that has existed in our societies and gone unchecked for too long. The momentum of this moment should be the catalyst for us to fundamentally reset and commit to durable change. As physician scientists and infectious disease experts, we are in a unique position where our work interfaces with basic science, clinicians, trainees, and the populations we serve. Figure 1 describes 5 categories of problems and actionable solutions to expand our support of individuals through the

physician-scientist pipeline. The unique position of physician scientists comes with the responsibility to ensure that our workforce is diverse, inclusive, and free of bias and racism. Only then can we hope that the good science that we generate achieves its full potential of service to all. The importance of this cannot be overstated at a time when our field is taking center stage in fighting a global pandemic.

Note

Financial support. National Institute of Allergy and Infectious Diseases (NIAID) 1K08AI120806 to THS.

Potential conflicts of interest. The authors: No reported conflicts of interest. Both authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

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