Commentary

Toward an Anti-Racist Approach to Biomedical and Neuroscience Research

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Racism is a threat to public health. Race is a sociopolitical construct that has been used for generations to create disparities in educational access, housing conditions, exposure to environmental contaminants, and access to health care. Collectively, these disparities have a negative impact on the health of non-white Americans. The National Institutes of Health (NIH) funds biomedical research, including basic neuroscience research, aimed at understanding the mechanisms and consequences of health and disease in Americans. NIH has recently acknowledged its own structural racism, the disadvantage this perpetuates in the biomedical research enterprise, and has announced its commitment to eliminating these disparities. Here, we discuss different rates of disease in U.S. citizens from different racial backgrounds. We next describe ways in which the biomedical research enterprise (1) has contributed to health disparities and (2) can contribute to the solving this problem. Based on our own scientific expertise, we use neuroscience in general and mental health/addiction disorders more specifically as examples of a broader issue. The NIH, including its neuroscience-focused Institutes, and NIH-funded scientists, including neuroscientists, should prioritize research topics that reflect the health conditions that affect all Americans, not just white Americans.

"Racism isn't a product of race. Race is a product of racism."
—Dorothy Roberts

Introduction

The concept of biological race is a human invention, and its existence is racist (Roberts, 2012). It is important to emphasize that the concept of race is very real, but that it is a sociopolitical construct, created and reinforced for many reasons (including for social control), and it has led directly to race-based disparities in educational access, housing conditions, exposure to environmental contaminants, and access to health care (e.g., see Washington, 2008; Alexander, 2010; Roberts, 2012). Although biological race categories in the United States have continuously changed over the last 250 years, these categories have often been used by the U.S. government and other entities in ways that serve the interests of the white majority. For example, according to the Pew Research Center (2020), the race/ethnicity categories on the 1790 U.S. Census were "Free white males and females," "all other free persons," and "slaves," whereas the 2020 U.S. Census included nineteen race/ethnicity categories that are defined in some cases by country or region of origin (e.g., Korean), in others by cultural heritage and language (e.g., Hispanic, Latino, Spanish origin), and in others simply by skin color (e.g., white). Which of these classification schemes is "correct?" The answer to this question is, of course, whichever classification scheme best served its inventor (in this case the U.S. government) at any particular moment in time. Racism is not a uniquely American problem, but a global one. Here, we will focus on the biomedical research enterprise in the U.S., but this discussion is likely relevant for other parts of the world as well.

We acknowledge that this is a topic, unfortunately, that many scientists do not think about regularly. As such, there may be terms used in this commentary that are unfamiliar to some. One such term is the concept of "anti-racism," as used in the title of this commentary. To be clear, anti-racism goes far beyond "diversity and inclusion" efforts. In the words of Dr. Ibram X. Kendi, Founder and Director of the Center for Antiracist Research at Boston University and the author of *How to be an Antiracist* (Kendi, 2019a):

There is no such thing as a nonracist, but there is such a thing as an antiracist. Nonracists, historically, are people who defend policies that create racial inequity and express ideas of racial hierarchy. When those policies and ideas are challenged as racist, their response is, 'I'm not racist.' An antiracist is someone who deliberately is confessing the racist ideas that have been nurtured within them while trying to be better, trying to be different, and trying to support policies that create equity (Kendi, 2019b).

The American Medical Association recently acknowledged that racism is a significant threat to public health (American

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Medical Association, 2020); this most assuredly includes neurologic and mental health, areas of research emphasis for members of the Society for Neuroscience and readers of this journal. It is important to emphasize that poorer mental health outcomes in, for example, Black U.S. citizens is an issue of racism, not an issue of race (Williams 2018), and that this is also true for other racial/ethnic minorities and other countries (Wallace et al., 2016). Over the past year, the COVID-19 pandemic has further unmasked racial disparities in the prevalence and negative health impact of preexisting conditions in historically marginalized racial and ethnic groups (Bassett et al., 2020). The reasons for this are many, including structural racism that reduces access to quality health care for historically marginalized racial and ethnic groups, as well as centuries of betrayal of Black patients and research subjects that has eroded the faith of Black U.S. citizens in Western medicine (Washington, 2008). The most commonly known example is the decades-long Tuskegee syphilis experiment, in which life-saving treatment was withheld from mostly Black participants. Many other medical experiments have been inflicted on Black Americans in which harm to the participants has been disguised as treatment (e.g., radiation studies led by Eugene L. Saenger at Cincinnati General Hospital from 1960 to 1972) or in which such harms were not disguised at all (e.g., the mutilations inflicted by James Marion Sims, without anesthesia, in the 1800s).

It is likely that racist disparities in health care are owed, in part, to disparities of investment in health-related research, including (1) racial disparities in federal research grants awarded to Black scientists (Taffe and Gilpin, 2021); (2) lower funding rates for topics of interest (e.g., disease prevention and intervention) to Black scientists (and by extension, Black citizens) (Hoppe et al., 2019); and (3) under-investment in research topics, and the institutes/centers that fund those topics, directly related to minority health and health disparities (Hoppe et al., 2019; Lauer et al., 2021). The Directors of the NIH Institutes/Centers with research portfolios aimed at investigating the biology of mental health, neurologic disorders and addiction (Gordon, 2021; Koob, 2021; Koroshetz, 2021; Volkow, 2021) recently issued statements of support for the acknowledgment by the NIH Director (Collins, 2021) that "individuals in the biomedical research enterprise... have endured disadvantages because of structural racism."

U.S. citizens from different racial backgrounds have different burdens of neurologic disease and mental health disorders

U.S. citizens from historically marginalized racial and ethnic groups have higher rates of predisposing factors for disease, and this fact has entered the public consciousness during the COVID-19 pandemic (Bassett et al., 2020). National statistics show that life expectancy, infant mortality rates, hypertension, and asthma rates are all highest in Black Americans, and also that obesity, diabetes, and kidney disease are all higher in Black and Hispanic Americans than in non-Hispanic white Americans, whereas white Americans exhibit higher rates of some other conditions, including specific types of pain (National Center for Health Statistics, 2017). Also, American Indians exhibit rates of all these conditions that differ in many cases from other subgroups or the general population. Chronic health conditions, such as those mentioned above are often comorbid with mental health and substance use disorders, and the presence of predisposing or comorbid factors in one domain of health often worsens disease outcomes in another (Harnett, 2020). Therefore, predisposing/comorbid factors should be considered in basic neuroscience research to increase the generalizability and translational value of basic neuroscience findings. More generally, prioritizing research topics that focus on conditions prevalent in historically underrepresented racial and ethnic groups will increase the positive impact of basic neuroscience research on the health of historically marginalized racial and ethnic groups.

There are many reasons for racial disparities in the rates of medical and psychiatric disorders. For example, Black Americans are more likely to live in the South (2010 U.S. Census), more likely to live in areas with lower socioeconomic status and higher exposure to environmental toxins, more likely to be incarcerated (Alexander, 2010), less likely to have medical insurance (Artiga et al., 2020), and more likely (historically and currently) to experience impediments in access to (quality) health care (Washington, 2008). This results in not only more exposure to health insults, but also less access to health care, including when it comes to mental health. For example, the percentage of people with substance abuse and mental health disorders that go untreated is much higher for Black Americans relative to the general population for all categories of disorders (Substance Abuse and Mental Health Services Administration, 2018). Licit and illicit drug use rates are higher in Americans with a mental health disorder, and the rates of addiction and mental health disorders, alone and in combination, differ according to race (Substance Abuse and Mental Health Services Administration, 2018). Furthermore, racism experienced by U.S. citizens belonging to historically marginalized racial and ethnic groups, as well as race-based differences in environmental exposure and health care access can affect the (neuro)biological contributors to disease in those groups (Harnett, 2020). It is critical to note that the prevalence rates of specific mental health and neurologic disorders can be lower (e.g., for alcohol use disorder, prescription opioid overdose and misuse, adolescent cigarette smoking) or higher (e.g., marijuana use, major depressive disorder) in Black Americans than they are in the general population (Substance Abuse and Mental Health Services Administration, 2018). This creates a scenario in which neuroscientists may be able to leverage racial differences (in rates of disease or neurobiological substrates that mediate disease) to identify neurobiological underpinnings of disorders and develop improved treatment strategies for all Americans.

Systemic racism in the biomedical research enterprise contributes to health disparities

Doctors from historically marginalized racial and ethnic groups are more likely to focus on the health of historically marginalized populations; for example, a higher percentage of medical school matriculants from historically marginalized racial and ethnic groups in the United States say they will practice medicine in underserved areas relative to white matriculants (Association of American Medical Colleges, 2019). Likewise, scientists from racial and ethnic groups that are underrepresented in the sciences are more likely to focus on biomedical research topics that are relevant for historically marginalized racial and ethnic populations. For example, ~15% of applications received by the National Institute on Minority Health and Health Disparities (NIMHD) are submitted by African-American/Black Principal Investigators (PIs), a percentage that is threefold higher than that for any other Institute or Center at NIH (Lauer et al., 2021). This fact is perhaps not surprising, but it is problematic because NIMHD has the second lowest funding rate of all Institutes/Centers at NIH and receives only 0.8% of the overall NIH allocation (National Institutes of Health, 2021). These data suggest that African-American/Black PIs are more likely to propose research that focuses on minority health issues, and that these topics are less

likely to be funded. The fact that African-American/Black PIs only constitute 2%-3% of applicants for NIH funding likely compounds the lack of attention to biomedical research topics relevant to historically marginalized groups.

This raises some key questions about NIH funding priorities as it relates to topics of minority health and health disparities:

- Disease rates differ among individuals from different racial backgrounds, and some NIH research grants propose to focus on those topics and/or understand those disparities. In these cases, what dictates which NIH grant applications are diverted from "parent" institutes/centers with higher funding rates (e.g., NIMH for mental health-focused grants, and NIDA/NIAAA for addiction-focused grants) to NIMHD, which has lower funding rates and a tiny fraction of the annual NIH appropriation?
- The percentage of NIMHD applications with Black PIs is more than threefold higher than the percentage of Black PI-led grant applications for any other IC. Why are their applications being assigned in this way?
- Because NIMHD receives a small portion of the overall NIH allocation and has the second-lowest funding rate of all NIH institutes/centers, grant applications diverted to NIMHD are less likely to be funded. In those scenarios, how often are those applications selected for funding by the relevant topic-related "parent" institute/center?

Within NIH research funding, the data show that, among historically marginalized racial and ethnic groups within the United States, Black scientists and Black-preferred research topics are especially at a disadvantage. For example, Black-preferred topics are funded at consistently lower rates than are other topics (Hoppe et al., 2019) and this is due, in part, to "programmatic priority," as reflected in the discretionary funding decisions made within a given Institute/Center (including those that fund mental health and addiction basic neuroscience). A follow-up report revealed that Black-preferred Institutes/Centers are also funded at lower rates and concluded that racial disparities in federal research grant funding are likely because of "their assignment to Institutes/Centers with lower funding rates" (Lauer et al., 2021). The report attributes these disparities to "differential funding ecologies among NIH institutes/centers," but does not appear to recognize that an "ecology" of disadvantage for specific racial groups, built into the operation of the system, is the very definition of systemic racism. In addition to the fact that Black-preferred topics are funded at lower rates, Black scientists are underrepresented at all levels of the scientific enterprise (Stevens et al., 2021). Since Black scientists are less likely to receive NIH research grants (regardless of topic), they are less likely be selected to serve on the review panels that advise Institutes/Centers on which research is of the highest priority to be funded; these two factors are intertwined to create a feedforward loop of continued disparity of NIH grant funding (Ginther et al., 2011; Hoppe et al., 2019; Taffe and Gilpin, 2021).

Collectively, these factors combine to create a situation in which health research topics proposed by Black scientists, and more importantly health topics that disproportionately affect Black U.S. citizens (who are taxpayers that fund the NIH), are underrepresented in the federal research grant portfolio. This includes topics of mental health and neurologic disease. A small amount of data have been recently shared with the scientific community by the directors of specific neuroscience institutes: specifically, at the 2020 American College of Neuropsychopharmacology meeting, NIMH Director Dr. Joshua Gordon orally reported to meeting attendees that NIMH grant funding rates were very similar to the overall NIH numbers (white PIs = 20%, Black PIs = 11%, Hispanic PIs = 16%, Asian PIs = 17%); and at the 2021 Research Society for Alcoholism meeting, NIAAA Director Dr. George Koob orally reported to meeting attendees that NIAAA grant funding rates were also very similar to the overall NIH numbers (white PIs = 21%, Black PIs = 12%, Hispanic PIs = 19%, Asian PIs = 17%). We are not aware of these figures having been reported for NIDA or NINDS, although NIDA did report that 2.4% of funded research grants were awarded to Black PIs, similar to the overall NIH numbers (Ginther et al., 2011; Hoppe et al., 2019). Overall, these data from specific neuroscience-focused NIH Institutes suggest that (1) what is true for the biomedical enterprise as a whole is also true for the basic neuroscience fields that conduct research on mental health and addiction topics; and (2) there is a need for higher transparency and availability of data describing which grants and PIs are, and are not, being funded (Taffe and Gilpin, 2021).

How can the community of neuroscience help to address this problem?

The United States has a medical and scientific history that has focused on "white health and disease" (Washington, 2008). This has created a situation in which our choices of which health topics to investigate in basic neuroscience and other fields, and therefore our understanding and treatment of most health conditions, including mental and neurologic disorders, are systemically racist. More specifically, diagnosis strategies and therapeutic treatments may need to differ for white Americans and those of other racial backgrounds. Therefore, the prioritization of research topics by tax-supported federal funding agencies, such as the NIH (often described in Institute/Center Strategic Plans formally approved by their Advisory Councils), should reflect the health conditions that affect all Americans, not just white Americans. By expressing to NIH leaders the importance of this topic and by demanding data transparency and accountability for policy decisions, leaders and members of major scientific societies, such as the Society for Neuroscience, can help to eliminate racial disparities in biomedical research funding (Taffe and Gilpin, 2021).

What are some potential ways in which NIH can take an anti-racist approach to soliciting, reviewing and funding biomedical research in the neurosciences?

1. *Prioritize preclinical research on topics that are relevant for historically underrepresented racial and ethnic groups*: Above, we discuss systematic underfunding of scientists from racial and ethnic groups historically underrepresented in the sciences, de-prioritization of topics important to citizens from historically marginalized racial and ethnic groups, and small budgets and low grant funding rates for the NIH Institutes/Centers that are preferred by scientists from historically underrepresented racial and ethnic groups. Addressing these issues collectively will increase the amount of preclinical research being conducted to understand the biological underpinnings of disease relevant for historically marginalized racial and ethnic groups.
2. *Devote more of the NIH budget to the NIMHD:* The research interest areas listed prominently on the NIMHD website indicate clearly that this Institute/Center is focused on comorbidities, environmental and experiential contributors, and the integration of factors which influence health in minoritized populations across the scientific domains of most of the Institutes/Centers. Increasing the NIMHD

budget will not only address health disparities but also the scientific domains of the other Institutes/Centers.

3. *Include a health disparities section in NIH grant applications:* The inclusion of such a section in NIH grant applications would not require that all applications propose work that is relevant for health disparities, but it would force all scientists to think about the relevance of their work for different groups of U.S. citizens. Although it is likely that the decision to require such a section would be initially met with resistance, we feel it would eventually be viewed simply as part of the submission process, much as attention to "sex as a biological variable" has become.

In conclusion, we stand at a crossroads in the United States, in which our citizens and our institutions are experiencing a once-in-a-generation, substantive, and open discussion about the nature and lasting impact of systemic racism. The enterprise of publicly funded biomedical research is having this conversation in the domains of disparity of health care, disparity of research funding on topics critical to minoritized populations, and disparity of opportunity for scientists from groups traditionally underrepresented in academic research. Neuroscience research and mental/neurologic health concerns are very much a part of this conversation. The recent acknowledgment by NIH of structural racism and the accompanying action plan have been endorsed by the Directors of several key neuroscience and mental-health focused Institutes/Centers, such as NIDA, NIAAA, NIMH, and NINDS. This is a great first step, but rooting out structural racism in the neuroscience research enterprise will require the efforts and actions of all members of the U.S. public-funded neuroscience research enterprise, including those who participate in the Society for Neuroscience.

It is clear that individuals belonging to different sociopolitically defined groups exhibit disparities in the rates of medical conditions, including but not limited to neurologic and psychiatric disorders, and racism likely affects the (neuro)biological substrates that mediate those conditions. Prioritizing research that focuses on medical conditions, including but not limited to neurologic and psychiatric disorders, that differentially affect Americans from different racial backgrounds will increase the translational impact of basic biomedical and neuroscience research. It is important for neuroscientists (and scientists at large) to be aware of racial disparities in the conditions that we model and investigate in our work, to maximize the positive impact of our work on the health of all Americans.

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