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Commentary

Underrepresentation of Asian awardees of United States biomedical research prizes

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The lack of racial diversity among the winners of United States biomedical research prizes reflects a chronic problem of the underappreciation of certain groups of biomedical scientists. Asians continue to be severely underrepresented as awardees of United States biomedical research prizes, a trend that shows no obvious recent improvement.

Many private institutes, organizations, and scientific societies in the United States give out awards to honor biomedical researchers for their substantial scientific contributions (and, in some cases, their mentoring and service also) to highlight what is valued in science and to create role models. Ideally, the ethnicity of the awardees should reflect that of the researchers engaged in scientific advances. Biomedical research in the United States has benefited from researchers of diverse ethnic backgrounds including many who were attracted to come to the United States to pursue biomedical research so as to make substantial contributions. Recently, I came upon the very surprising realization that the awardees are overwhelmingly white (more than 90%). I wish to use this commentary to draw attention to this lack of racial diversity among the winners of United States biomedical research prizes in the hope that there will be remedies that facilitate fair recognition of the contribution of scientists of different ethnicities, thereby encouraging future broad ethnic representations.

I will focus on Asians, an ethnic group to which I belong. I was born in China and raised in Taiwan. I came to the United States in 1968 to attend graduate school and have stayed ever since. I am a naturalized United States citizen and have been on the faculty of the University of California San Francisco since 1979. I hope my firsthand experience of the unique challenges that Asian scientists face may be of some use in considering possible explanations and remedies for the lack of racial diversity highlighted in this commentary. Asians are considered "people of color." Unlike underrepresented minorities such as Blacks or Hispanics, Asians are not underrepresented in biomedical science. In fact, there has been a steady increase of Asian scientists, who now make up more than 20% of biomedical researchers in the United States. Even though many Asian biomedical scientists were born in the United States or are naturalized citizens, they are still made to feel like outsiders sometimes. I think it is fair to say that Asian scientists have been underappreciated, and yet I know of no specific mechanisms to promote Asian scientists. Combining the chronic underappreciation with the recent rise in anti-Asian sentiment since the start of the COVID-19 pandemic, it is increasingly challenging to be an Asian scientist in the United States. I hope this commentary concerning an aspect of underappreciation can help to raise awareness of the plight of Asian biomedical scientists in the United States.

Underrepresentation of Asian awardees of United States biomedical research prizes

In Table 1, I tabulated the statistics of some of the most notable biomedical research prizes in the United States. In most cases, the percentages for Asian recipients are in the single digits. Taken together, Asian scientists account for 6.8% of the awardees of all these prizes (57 out of 838). Besides a few of the Asian awardees who are from foreign countries (mostly from Japan), most of the Asian awardees are residents or citizens of the United States. How does this percentage compare to the racial composition of the United States biomedical workforce? According to the 2019 National Science Foundation Report on women, minorities, and persons with disabilities in science and engineering, Asians made up 31% of trainees (graduate students and postdocs), 21.3% of the faculty, and 12.3% of tenured or tenure-track faculty in academic biomedical science in the United States (National Science Foundation, 2019). The underrepresentation of Asian awardees continues the trend of a diminishing representation of Asians as they move up the career ladders.

Another, perhaps more suitable, estimate of the percentage of Asians among active contributors to biomedical science in the United States comes from the statistics regarding National Institutes of Health (NIH) R01 grants, the most widely used investigator-initiated research project grants supporting United States biomedical research. An analysis of 83,188 NIH R01 applications submitted between 2000 and 2006 revealed that Asian applicants accounted for 16.2% (13,481 out of 83,188) of the applications and 14.7% (3,430 out of 23,381) of the successful applications (Ginther et al., 2011). The percentage of Asian applicants has risen steadily in the past decades. In 2020, Asian applicants accounted for 25.9% (7,791 out of 30,061) of the applications and 23.8% (2,138 out of 8,990) of the successful applications (Collins et al., 2021). Thus, regardless which measure one uses as the percentage of Asian

Table 1. The percentage and the names of Asian awardees of some examples of notable United States biomedical research prizes

Prize/award	Years of awards	Total number of awardees	Total number of Asian[a] awardees	Percent of awardees who are Asian (%)	Total number of awardees in the most recent 10 years	Total number of Asian awardees in the most recent 10 years	Percent of awardees who are Asian in the most recent 10 years (%)
Albert Lasker Basic Medical Research Award	1946 –2021	164	8[b]	4.9	20	1	5.0
Breakthrough Prize in Life Sciences	2013–2022	57	8[c]	14.0	57	8	14.0
Albany Medical and Biomedical Research	2001–2021	46	3[d]	6.5	24	2	8.3
Gruber Prize in Neuroscience	2004–2021	29	8[e]	27.6	17	4	23.5
Gruber Prize in Genetics	2001–2021	26	0	0	15	0	0
Louisa Gross Horwitz Prize	1967–2021	111	3[f]	2.7	23	0	0
Lewis S. Rosenstiel Award in Distinguished Work in Basic Medical Research	1971–2021	96	7[g]	7.3	14	1	7.1
Wiley Prize in Biomedical Sciences	2002–2020	42	4[h]	9.5	24	3	12.5
March of Dimes Prize in Developmental Biology	1986–2020	41	1[i]	2.4	13	0	0
Vilcek Prize in Biomedical Science	2006–2022	19	5[j]	26.3	12	4	33.3
E. B. Wilson Medal, American Society for Cell Biology	1981–2021	60	2[k]	3.3	13	0	0
Thomas Hunt Morgan Medal, Genetics Society of America	1981–2021	44	2[l]	4.5	11	0	0
Genetics Society of America Medal	1981–2021	42	0	0	10	0	0
Ralph Gerard Prize in Neuroscience, Society for Neuroscience	1978–2020	61	6[m]	9.8	13	1	7.7
Current Class II and Class IV Members of U.S. National Academy of Sciences	–	963	63	6.5	–	–	–

[a]Here, I use "Asian" as defined by NIH: "a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam."

[b]Choh H. Li (1962), Gobind Khorana (1968), Hidesaburo Hanafusa (1982), Susumu Tonegawa (1987), Yasutomi Nishizuka (1989), Yoshio Masui (1998), Shinya Yamanaka (2009), and Kazutoshi Mori (2014).

[c]Shinya Yamanaka (2013), Yoshinori Ohsumi (2017), Kazutoshi Mori (2018), Xiaowei Zhuang (2019), Zhijian "James" Chen (2019), Virginia Man-Yee Lee (2020), Yuk Ming Denise Lo (2021), and Shankar Balasubramanian (2022).

[d]Shinya Yamanaka (2011), Xiaoliang Xie (2015), and Feng Zhang (2017).

[e]Masakazu Konishi (2005), Masao Ito (2006), Shigetada Nakanishi (2007), Lily Jan (2012), Yuh Nung Jan (2012), Mu-Ming Poo (2016), and Joseph S. Takahashi (2019).

[f]Gobind Khorana (1968), Susumu Tonegawa (1982), and Robert Tjian (1999).

[g]Gordon H. Sato (1981), Shinya Inoue (1987), Robert Tjian (1994), Masakazu Konishi (2003), Roger Y. Tsien (2005), Shinya Yamanaka (2008), and Yoshinori Ohsumi (2015).

[h]Kazutoshi Mori (2005), Lily Jan (2011), Yuh Nung Jan (2011), and Yoshinori Ohsumi (2016).

[i]Shinya Yamanaka (2010).

[j]Inder Verma (2008), Lily Jan (2017), Yuh Nung Jan (2017), Xiaowei Zhuang (2020), and Vishwa M. Dixit (2022).

[k]Shinya Inoue (1992) and Roger Tsien (2008).

[l]Yasuji Ohshima (2001) and Masatoshi Nei (2006).

[m]Susumu Hagiwara (1984), Masakazu Konishi (2004), Nobuo Suga (2004), Lily Jan (2009), Yuh Nung Jan (2009), and Richard Tsien (2014).

contributors in biomedical research (be it as trainees, faculty, or principal investigators with NIH R01 grants), Asians are severely underrepresented as winners of biomedical research prizes.

Given that the Asian workforce in United States biomedical sciences has been growing over the past few decades, it is understandable that there were very few Asian winners during the early years of those prizes with a long history. The relevant question is whether there is an increase in Asian awardees in recent years to reflect the increase of Asian contributors. Indeed, the three prizes with the highest representation of Asian awardees all started relatively recently (after 2004): the Gruber Prize in Neuroscience (27.6%), Vilcek Prize (26.3%), and the Breakthrough Prize (14.0%). However, these are outliers. For all 8 prizes with a long history (35 years or longer), namely the Lasker Award, Horwitz Prize, Rosenstiel Prize, March of Dime Prize, E.B. Wilson Medal, Thomas Hunt Morgan Medal, Genetics Society of America Medal, and Gerard Prize, there are altogether only 3 Asians out of a total of 117 awardees, a measly 2.6%, in the past decade. This percentage is lower than the average record for these 8 prizes throughout several decades (4.7%; 29 Asians out of a total of 619 awardees), a discouraging trend. Dishearteningly, the percentage of female Asian awardees is a minuscule 0.8% (7 out of 838).

The underrepresentation of Asian awardees varies among different disciplines. For example, neuroscience awards are considerably more inclusive than genetics awards. While the Gruber Prize in Neuroscience has the highest representation of Asian awardees (27.6%), the Gruber Prize in Genetics has the lowest (0%). Moreover, out of 44 Thomas Hunt Morgan Medal winners, there are only 2 Asians, while the 42 winners of the Genetics Society of America Medal include not a single Asian (they are all white). It is ironic that the prizes in genetics have the worst record in racial inclusivity.

However, one needs only to look to the current trends in representation of women among scientific awards to see that progress is possible. Currently, women represent more than half of the trainees in biomedical sciences. Like Asian scientists, female scientists also have diminishing representation as they move up the career ladders (the so-called leaky pipeline phenomenon), and they are severely underrepresented as awardees of scientific awards (Meho, 2021). For the prizes considered here, only 129 of the 838 awardees are women (15.4%). Of those 8 prizes with a long history, 84 out of a total of 619 awardees are women (13.6%). Unlike the situation with Asian scientists, in the past decade, the percentage of female awardees of these 8 prizes has been substantially raised to 27.4% (32 out of a total of 117). This progress is likely due to increased awareness and efforts to correct the gender inequality.

What might be the cause for the underrepresentation of Asian awardees?

One possibility is that Asian scientists are not making their share of significant or groundbreaking contributions; perhaps they are doing more of the derivative type of research. I think this is unlikely to be the explanation. If one peruses any of the significant scientific journals or listens to scientific presentations at seminars or meetings, one gets the impression that Asians appear to be doing their share of cutting-edge science. This impression is supported by data on researcher citation in 2021 from Clarivate: of the 582 highly cited researchers in biology, biochemistry, molecular biology, genetics, neuroscience, and behavior, 84 are Asian (see web resources). This percentage (14.4%) is roughly comparable to the percentage of Asian recipients of NIH R01 grants (gradually rising from 14.7% to 23.9% over the past 2 decades), which I take as a reasonable estimate of the percentage of Asians as active contributors in United States biomedical science. As another measure of the group of scientists making significant contributions to American biomedical science, we can look at the population of Howard Hughes Medical Institute (HHMI) investigators (I have been one since 1984). With a track record of rigorous selections and renewal reviews of their investigators, HHMI values many of the same qualities that biomedical research prizes seek to honor. For example, HHMI expects their investigators to identify and pursue significant biological questions in a rigorous and deep manner and to drive their chosen research field into new areas of inquiry, being consistently at its forefront. Currently, out of the 267 HHMI investigators (https://www.hhmi.org/scientists), I can identity 45 who are Asian (16.9%). This percentage is comparable to Asian recipients of NIH R01 grants. Thus, based on the Asian representation of highly cited researchers as well as HHMI investigators, Asian scientists appear no less capable of doing significant or groundbreaking science.

Although scientific contribution is the primary criterion for the prizes in Table 1, other factors that may matter include the persona, visibility, communication skills, and polish, especially if the scientific contributions of the candidates are comparable. One likely contributing factor for the underrepresentation of Asian awardees is the relative invisibility of Asians in America. As noted in the *New York Times* article "The cost of being interchangeable Asian" by Brian Chen published on June 6, 2021, "At some top companies, Asian Americans are overrepresented in midlevel roles and underrepresented in leadership (Chen, 2021). The root of this workplace inequality could stem from the all-too-common experience of being confused for someone else." I can attest to this phenomenon from my own experience. This has happened to me many times, not only when I was a budding young scientist, but even as I am approaching Doctor Jubilaris. For instance, at an HHMI scientific meeting a few years ago, I was chatting with a fellow investigator. Soon, it became clear that he mistook me for Susumu Tonegawa. I was not surprised that people didn't recognize me, but I thought—surely—they would recognize Tonegawa, a Nobel Laureate and prominent researcher in immunology and neuroscience. For contrast, I doubt very much a neuroscientist would confuse someone else for Eric Kandel.

Another potential contributing factor may be the process of nomination and selection. Many of the awards solicit nominations from previous winners and senior scientists from elite organizations, such as members of the National Academy of Sciences (NAS). Many of the selection committee members also come from similar backgrounds. It is not surprising

that people tend to choose people they are familiar with (i.e., their ''club members''). This may lead to unintended bias, considering that Asians are not only underrepresented as previous winners but are also severely underrepresented among the current NAS regular members of biological sciences (class II) and biomedical sciences (class IV). Only 63 out of 963 (6.5%) are Asian. Perhaps one way to reduce the bias is to make the selection committee aware of the bias and modify the nomination process. It is interesting to note that election of new NAS members relies solely on nominations by current members whereas selection of HHMI investigators switched from nomination to application (self-nomination) a couple decades ago. The opening of the pool of candidates via self-nomination likely contributes to the greater representation of Asians as HHMI investigators (16.9%) versus NAS members (6.5%). Last year, to improve inclusivity, American Society for Cell Biology started allowing self-nomination for their awards. It will be interesting to see how this experiment turns out.

The lack of racial diversity among the winners of United States biomedical research prizes is even more pronounced for underrepresented minorities. As far as I can tell, in all the awards listed in Table 1, not a single winner is Black or African American. It is harder to determine the number of Hispanic or Latinx awardees from the information available. Nevertheless, it is safe to say that the number is very small. Unlike Asians, Blacks and Hispanics are severely underrepresented starting at the trainee level. Blacks and Hispanics make up an estimated 31.7% of the general population but only 14.7% of research trainees and 5.4% of biological sciences faculty (Meixiong and Golden, 2021). In 2020, they accounted for 7.5% of NIH R01 applicants (2,257 out of 30,061) and only 6.6% of the grant recipients (594 out of 8,990) (Collins et al., 2021). Obviously, as a first step of remedying the situation, it is important to remove the barriers for underrepresented minority scientists and to encourage and increase their representation in all ranks, both as junior and senior scientists.

Most scientists chose to become a scientist not because they were motivated to win awards. Why give out awards at all? There are certainly valid arguments against giving awards and reasons to question the selection process. For example, in the article ''We should ditch awards in science'' published in 2021, Bill Sullivan opined that ''conducting research to elucidate nature's mysteries is reward enough'' and that often awards place ''far too much credit on one or an individual who happened to be the last link in a chain of knowledge that stretches far back into the past of our collective enterprise'' (Sullivan, 2021). Furthermore, awards don't always go to the most deserving (Lawrence, 2012). Regardless how one views the scientific awards, I think the underrepresentation of Asians among awardees reflects the larger issue of the underappreciation of Asian people in the United States. It is ''a manifestation of the discriminatory 'bamboo ceiling' in academia, whereby Asians occupied correspondingly fewer positions of executive leadership compared with their representation among professional workforce'' (Meixiong and Golden, 2021).

Concluding remarks

Based on the sampling of a number of notable awards listed in Table 1, Asian biomedical scientists are much less likely to be recognized with the great majority of those honors. How to remedy such inequality? I have some suggestions. (1) Becoming aware of the bias/inequality is a good start. I doubt that conscious racism is the cause of the inequality. Whereas lack of awareness of the racial bias plus racial stereotyping could be contributing factors, ideas for remedies may emerge from open discussions prompted by awareness of an inequality. (2) Make effort to treat Asian scientists as individuals. For example, learn their names instead of referring to them as a Korean group, Chinese group, Japanese group, etc. (3) Re-examine the nomination/selection process to increase the diversity of candidate pools and to improve inclusivity. (4) In selecting awardees, be mindful of how to evaluate style versus substance. I think one good way to evaluate a scientist is to do a gedanken loss-of-function experiment a la Frank Capra's *It's a Wonderful Life*. Imagine if candidate X had chosen a different career instead of being a biomedical scientist; how might that impact the field?

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DECLARATION OF INTERESTS

The author declares no competing interests.

WEB RESOURCES

Clarivate list of 2021 highly cited researchers, https://recognition.webofscience.com/awards/highly-cited/2021/

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