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Commentary

“America First” Will Destroy U.S. ScienceBrian D. Brown,^{1,3,*} Andrew M. Leader,^{1,3} Jan Vilcek,^{2,3} and Miriam Merad^{1,3,*}¹Precision Immunology Institute, Icahn School of Medicine at Mount Sinai, New York, New York 10029, USA²Department of Microbiology, NYU Grossman School of Medicine, NYU Langone Health, New York, New York 10016, USA³These authors contributed equally*Correspondence: brian.brown@mssm.edu (B.D.B.), miriam.merad@mssm.edu (M.M.)<https://doi.org/10.1016/j.cell.2020.09.025>

SUMMARY

The U.S. government has sought to restrict immigration under the “America First” doctrine. These policies severely harm American science by stripping it of talent and eliminating a major driver of its innovation engine. We urge scientists to work to reverse these policies and forcefully condemn anti-immigrant sentiments.

For as long as science has been practiced, bright minds have migrated to geographical centers that welcomed and fostered innovative thinkers. This has largely been America’s position for over a century and was codified in the Fulbright-Hays Act of 1961, which introduced the J-1 program that provides nonimmigrant visas for foreigners to conduct scientific research in the U.S. Unfortunately, the Trump administration has been trying to stymie the scientific openness that has benefited America for decades. Most recently, President Trump signed Proclamation 10052 suspending entry into the United States for H-1B, H-2B, L, and J visas. These visas are commonly issued to allow predoctoral, postdoctoral, and medical fellows to come to the U.S. to carry out biomedical research in academic labs and for more established foreign scientists, including faculty, to come to run research programs. These and other policies aimed at deterring and limiting immigration severely harm American science by stripping it of talent and thus eliminating a major driver of its innovation engine. We urge scientists across the nation to repudiate the ban and forcefully condemn anti-immigrant sentiments in the U.S., and in other countries, that are morally wrong and a threat to scientific progress.

The reason provided for Proclamation 10052 was economic—a response to the highest unemployment rate since the Great Depression. However, even prior to the pandemic, when unemployment was at historically low levels, the Trump administration had already been

increasing visa denials (NFAP, 2020), making it more difficult for foreign skilled workers to come to the U.S. Not only does the economic argument seem disingenuous, but from our experience as heads of U.S. labs, it seems unlikely the policy will result in a significant increase in American citizens employed in the scientific sector. Rather, we believe that many research positions, particularly in academia, will go unfilled, as they require applicants not only with MD or PhD degrees, but also expertise in very specialized areas of biology. Even during the Great Recession, when unemployment was high, the number of Americans applying to the positions that are commonly filled by J-1 visa holders was very low. This is likely because even during this period, unemployment for people with doctorate degrees was far below the national average (Milesi et al., 2014), and even in May 2020 when the national unemployment rate was 14.4%, the unemployment rate for those with a doctoral degree (from any field) was 3.2%, not far above the 2% average of the last 10 years for this group. Given that as many as 50% of the postdoctoral fellows in American labs are non-U.S. citizens, banning international scientists from coming to the U.S. will lead to many vacant research positions, thus removing a critical pillar upon which U.S. scientific research stands.

More importantly than just filling the workforce, foreign-born scientists are one of the major reasons for the outstanding success of American science. Due to the advanced training they bring, immigrant scientists generate

new patents at twice the rate of native-born college graduates (Hunt and Gauthier-Loiselle, 2010), and in the last two decades, immigrants, many of whom came to the U.S. as young adults, comprised 38% of the American Nobel Prize recipients in physics, chemistry, and physiology or medicine. The list of major medical contributions by immigrant scientists is long and includes Har Gobind Khorana, Nobel Laureate who discovered the triplet code and first synthesized oligonucleotides, Albert Sabin, who developed the oral polio vaccine, Elizabeth Stern, who uncovered the early events of cervical cancer which led to our current understanding and treatment of the disease, and other Nobel Laureates including Severo Ochoa, who made fundamental discoveries about the synthesis of RNA and its role as a blueprint for protein synthesis, and Baruj Benacerraf, who discovered the principles of immune self-recognition. Examples of more recent advances made by immigrants include the discovery of vascular endothelial growth factor (VEGF) and generation of the first anti-VEGF antibody, which led to the drug bevacizumab (Avastin), used to treat many different cancers and relied on by millions of elderly for the treatment of age-related macular degeneration (Ferrara, 2004); the development of the anti-parasitic drug Ivermectin, which treats, among other illnesses, river blindness (Campbell, 1991); the invention of second-generation chimeric antigen receptor (CAR) T cells that can provide long-lasting remissions of leukemias and lymphomas



Figure 1. Making America Less Great
Cartoon by Mats Carduner, MS.

(Maher et al., 2002); and the generation of a monoclonal antibody that became the basis of the anti-inflammatory drug infliximab (Remicade), widely used to treat rheumatoid arthritis, Crohn's disease, and other autoimmune disorders (Knight et al., 1993; Vilček and Feldmann, 2004).

While working on major discoveries, these and other foreign scientists contributed to building America as a scientific hub, educated generations of American scientists, and advised endless numbers of biotechnology and pharmaceutical companies. At least two of the drugs these foreign scientists generated, Avastin and Remicade, have been among the biggest blockbusters in medicine, with each generating over USD 5 billion per year in sales revenue. Thus, putting aside the specific scientific contributions, whose benefits can be shared by the

world, turning away a group of people that generates patents at a higher rate is bad economics.

In science like in sports, the competitiveness of scientific laboratories relies on their ability to attract the best talent, and like talented athletes, talented scientists will find other places to work if migrating to the U.S. is not an option. The best scientists will turn to more welcoming countries, and new scientific hubs will be built away from America. Already, news reports have been highlighting other countries' eagerness to recruit foreign scientists that find it more difficult to obtain visas from the U.S. (Warburton and Scherer, 2020). Science is global, and bright minds like to coalesce around vibrant, dynamic, and innovative—but also welcoming—scientific hubs. By reducing America's competitive ability to recruit talent, restricting immi-

gration and foreign exchanges will push away the best talent and diminish the strength of American science and innovation, an outcome that is obviously counterproductive to American interests (Figure 1).

Exemptions to the suspension of H-1B, L-1, and J visas allow for visas to be granted to new recruits dedicated to COVID-19 and other specific efforts. Unfortunately, targeted exclusions fail to appreciate that scientific discoveries often arise from areas of research that are not directly related to their original goal. Restricted immigration is in fact more likely to impair our efforts to contain COVID-19, and, potentially even more worrisome, it would put us at risk of being unprepared to thwart the next pandemic. Indeed, in December 2019, none of us were researching COVID, but now many of us,

including thousands of nonimmigrant visa holders, from many different areas of biomedical science, are dedicated to understanding all aspects of the disease and to developing better treatments. Foreign scientists from Mexico, Guatemala, Pakistan, India, Austria, England, Switzerland, France, Australia, and Singapore, who came here on the now-banned visas, have helped establish a widely used COVID antibody test, mapped the early spread of the virus in the U.S., and uncovered the innate immune response to SARS-CoV-2 (Amanat et al., 2020; Blanco-Melo et al., 2020; Gonzalez-Reiche et al., 2020; Del Valle et al., 2020), and one of the leading vaccine candidates for SARS-CoV-2 is being developed by a company, Moderna, which was cofounded by a foreign-born scientist. None of these immigrants were working on COVID-19 prior to the outbreak, but it was America's ability to recruit these diverse minds that enabled its swift response to the COVID pandemic. While we can appreciate the goal of increasing American employment, especially in the current circumstances, it is counterproductive and even dangerous for this to supersede the goals of biomedical research, which bring wide benefits to the country, not least of which can include helping to restore the economy through innovation and better public health.

Although scientists often abhor politics, we do not have the luxury of remaining silent. The scientific community needs to act to help reject the ill-conceived and politically charged policies that are threatening to destroy what we and our mentors before us have built for generations. Together, we need to push our institutions to go to court to fight Proclamation 10052 and other efforts to restrict nonimmigrant visas, as was recently done to challenge another executive order that would have barred many foreign-born students from attending American universities (Lorin, 2020). With our colleagues, we recently penned an open letter in opposition to the visa ban, which collected more than 3,000 signatures from trainees, faculty, chairs of departments, deans of prominent medical schools, CEOs of hospitals, and execu-

tives in the biotech and pharmaceutical industries. In addition to showing support for foreign-born scientists, these initiatives can inform policymakers backing for a cause and be used to support lawsuits against unjust or unlawful executive actions.

We also need to make non-scientists aware of the contributions of foreign scientists to medical research. The good news is that despite the anti-immigrant rhetoric of the Trump administration, American attitudes toward immigrants are overwhelmingly positive, with a Pew survey finding that 62% of Americans believe "immigrants strengthen the country because of their hard work and talents" (Jones, 2019). Nonetheless, there is a perception that the skilled visa programs are largely used by the tech sector, companies such as Google and Facebook, to hire foreign programmers and engineers. The general public may not fully appreciate that foreign talent, here on nonimmigrant visas, is a driving force behind many of the medical advances that are improving healthcare and will help us to overcome the COVID pandemic. So, the next time one meets someone who got their SARS-CoV-2 antibodies measured or is able to see better because of Avastin or walk better because of Remicade, inform them it was thanks to immigrants.

Perhaps most importantly, we need to mobilize the vote against governments with anti-immigration policies, especially since the nonimmigrant community does not have the ability to vote. As it happens, the current U.S. president is not only hostile to immigrants but also to science, so getting out the vote this year to change this hostility is even more important for U.S. science. We hope that others will join us in repudiating the current executive actions, and anti-immigrant nativism more generally both here and abroad, that are counterproductive to science and medicine and help us to work against these policies.

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WEB RESOURCES

Support for the innovation engine of American science: immigrants, <https://www.change.org/p/scientists-support-for-the-innovation-engine-of-american-science-immigrants>
Unemployment Rate, <https://fred.stlouisfed.org/categories/32447>
Vilcek Foundation, <https://vilcek.org/>
New Visa Policies Harm America's Interests, <https://cornhundred.github.io/biomed-scientist-against-visa-bans/>
List of largest selling pharmaceutical products, https://en.wikipedia.org/wiki/List_of_largest_selling_pharmaceutical_products

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