President Trump attends a briefing at the NIH. Credit: Yuri Gripas/Abaca Press/Bloomberg via Getty Images

US biomedical and medical research under the Trump administration

As the US general election looms, feelings are more than mixed about science policy for biomedical and medical research under US President Donald Trump's administration.

Paul Webster

While far from being the best of times, these are not the worst. That is the verdict from numerous well-placed observers tracking US government support for biomedical research through the past four years, a period marked by White House science-budget-slashing efforts and often theatrical anti-scientific posturing.

"It could have been a lot worse," says Nobel laureate Harold Varmus, who led the US National Institutes of Health (NIH) from 1993 to 1999 and the National Cancer Institute from 2010 to 2015. "Although there have been a few peccadilloes along the way that have been troubling, on the whole, thanks to highly adaptive leadership and strong bipartisan support from Congress, the NIH has done quite well. And so have most of the other federally supported research entities."

Keith Yamamoto, vice chancellor for Science Policy and Strategy at the University of California at San Francisco and chair of the Coalition for the Life Sciences, a coalition of eight research societies, foundations, institutes and corporations, concurs with Varmus. "Throughout this administration the NIH has finally enjoyed long-awaited budget increases," he says. "That's really heartening. It's really been terrific."

Chol Pak, president of United for Medical Research, a group comprising 25 research institutions, corporations and patient and health advocacy groups, echoes this cheer.

"We estimate the NIH supports 476,000 jobs and about $81 billion in economic activities, and our mission is to get steady

Harold Varmus led the NIH from 1993 to 1999. Credit: Scott J. Ferrell/Congressional Quarterly/Getty Images

support for the NIH," Pak explains. "We're very pleased that Congress's support has been unwavering, and that due to COVID-19, Congress passed three supplemental budget bills that recognized the NIH's crucial role and allotted it an additional $3.6 billion."

Seen from a historical perspective, the NIH's success is all the more remarkable, says Naomi Oreskes, a science historian at Harvard University, because Trump is among the most anti-scientific presidents in recent history. "There's always been pressure on scientists," she notes, "but with this administration, it's become exponentially worse."

Not since the early Reagan years has the USA seen a president so intent on slashing biomedical research budgets, adds Matt Hourihan, a science budget analyst with the American Association for the Advancement of Science. "But there's a fairly solid case to say Trump has tried to cut funding even more deeply than Reagan did."

"It was Reagan who created the template for the White House questioning science that seemed to suggest the need for government interventions to remedy market failure, and for meddling in government reports," Oreskes notes. "That is the bigger, more damaging pattern with which we are living today."

Pak, Yamamoto and Varmus all praise strong bipartisan support from the US Congress for rejecting White House budget proposals four years in a row calling for deep cuts to the NIH and many more of the 24 federal agencies and entities that Yamamoto says have important roles in supporting biomedical research. These include, most notably, the National Science Foundation, the US Centers for Disease Control and Prevention, the US Food and Drug Administration, the Defense Advanced Research Projects Agency and the Department of Energy. "Some have done better than others, but by and large, Congress has been willing to say no to the cuts," says Yamamoto.

Budgets are not the whole story, Varmus and Yamamoto both hasten to add. There are also those "peccadilloes" that Varmus mentioned.

"Unfortunately, in at least one troubling episode, the NIH was forced by the White House to cease doing important research," says Varmus.

The project in question involved collaboration with researchers at the Wuhan Institute of Virology in China and EcoHealth Alliance in New York City to study how coronaviruses move from bats to people. The NIH canceled EcoHealth Alliance's grant in April 2020, days after Trump said that the USA would stop funding research at the Wuhan Institute of Virology. The NIH has now reinstated the grant while imposing conditions that remain highly problematic. "Fortunately there's been just this one episode of such direct interference," says Varmus.

The controversy over the NIH's support for EcoHealth Alliance's collaboration with the Wuhan Institute of Virology should not be seen in isolation, Varmus adds. "Visa restrictions, xenophobia, and antagonism, in particular, towards China," he laments, have created an unwelcoming atmosphere for talent from abroad.

"These things will impair our capacity to do research in any field, including biomedicine, for some time," Varmus warns. "Even the results of the pending election will not immediately reverse these effects unless energetic actions and forceful statements are made."

Varmus also warns that an executive order on 22 September 2020 banning federal anti-racism and anti-sexism training programs "has the potential of limiting our ability to take advantage of a propitious moment for correcting deficiencies in equity, diversity, and inclusion in science. This should be reversed on the first day of a new administration."

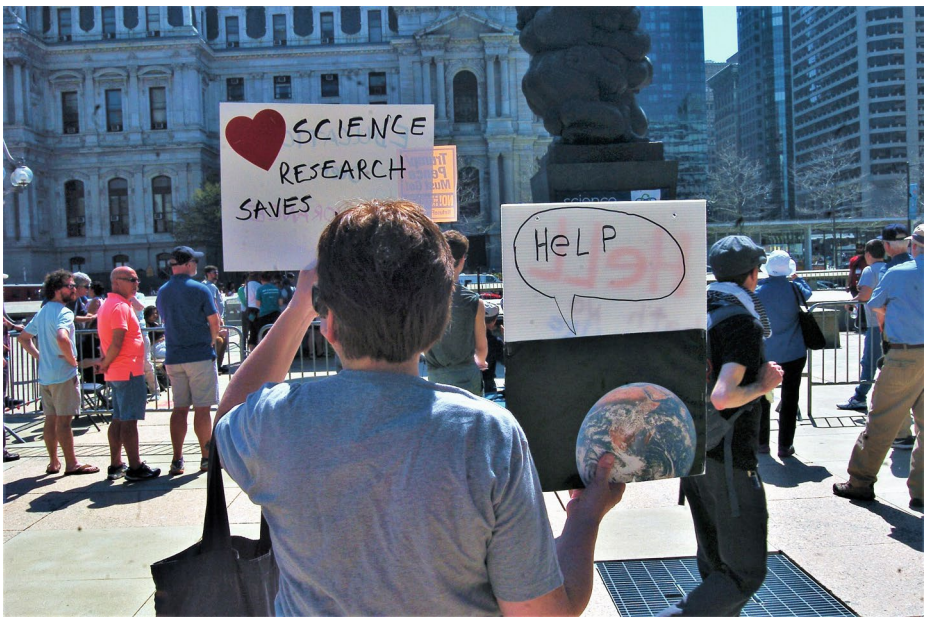
Erika Shugart, CEO and executive director of the American Society for Cell Biology, which represents over 7,000 cell biologists worldwide, says studies and polling commissioned by her society have documented widespread evidence of harm to US biomedical research programs stemming from the administration's immigration policies.

"The visa-granting process has gotten very slow. Many visa categories used by students have been capped. And many of those with visas are afraid to travel home for fear they won't be able to return," Shugart reports. "We're hearing really heartbreaking personal stories. Many students are giving up on the US, and going elsewhere."

Like Varmus and Yamamoto, Shugart expresses relief over Congress's consistent record of thwarting Trump's proposed budget cuts. But she warns that this may not last. All three branches of the US government — the executive, judicial and legislative — are now "in play" she notes, "and there's a concern that all three branches of government are increasingly controlled by an ideology that's anti empirical."

To bring that warning into focus, Shugart highlights ongoing efforts to impede fetal-tissue research at the NIH and elsewhere that she warns "appear to be politically motivated interferences in the peer review process."

Noting that a number of NIH grants involving fetal-tissue research were not funded recently despite being approved after peer review, Shugart points to the role of a



Protesters attend the March for Science on 14 April 2018. Credit: NurPhoto/Contributor

newly created NIH 'ethics advisory board' in stifling these grants. "This seems to be a repeat of what we saw in the past during the Bush years. But we're concerned it could be even worse."

With the election looming, and the COVID-19 pandemic propelling mud-slinging about science, the NIH declined an interview request, as did the National Science Foundation and other groups, including Research!America and the Union of Concerned Scientists.

"We've seen a huge effort to undermine public support for science in recent years," says Oreskes. "I can understand that's left many people afraid, and that the public are confused."

Adding to the doubts and confusion among scientists, adds Yamomoto, the shuttering of numerous research labs and initiatives during the pandemic has generated tremendous uncertainty. "Work in almost every area except COVID-19- and SARS-CoV-2-related research has been brought to a standstill."

And while the pandemic is a "wakeup call for the need to underwrite the research needed to counter the next pandemic," Trump's calls for budget cuts are demoralizing. "There's not an alignment," he charges.

Trump, says Yamamoto, "is a science denier who belittles science, and that has a chilling effect on science itself. The effects of this are far reaching. These are the really corrosive effects of Trump."

Varmus, too, believes Trump's "contempt for science is pretty apparent. We've seen many efforts made to undermine science in regulatory functions and in public health." The impacts on biomedical research are profound, he argues. "In the end, if the public is suspicious of vaccines, for example, that impacts on research. I worry we're seeing a shift in public attitudes towards supporting science."

Eric Topol, director of the Scripps Research Translational Institute and a professor of molecular medicine at The Scripps Research Institute in La Jolla, California, which receives hundreds of millions of dollars in federal research support, agrees that biomedical research has faced "multiple threats" from the Trump administration. But Topol, whose research focuses in part on the potential for artificial intelligence (AI) to deliver benefits to medicine, does credit the Trump administration for making AI a centerpiece of its science policies.

The most recent White House science-policy statement, a budget memorandum for the heads of executive departments and agencies published by the Office of Science and Technology Policy and the Office of Management and Budget on 14 August 2020, outlines five research priorities for fiscal year 2022, to "ensure that America remains at the global forefront" of science and technology discovery and innovation.

The administration's science priorities include AI, quantum information sciences, advanced communication networks, biotechnology and advanced manufacturing and industries of the future, and "includes fulfilling President Trump's commitment to double non-defense AI and quantum information sciences funding by FY2022."

According to the administration, the "American Bioeconomy represents a convergence of science, infrastructure, innovation and technology, health, and national security that drive economic growth, promote health, and increase public benefit across the human, plant, and animal spectrums."

Due to "the unprecedented number of lives lost and resources consumed to combat COVID-19," the memorandum adds, "departments and agencies should prioritize evidence-based standards and research focus on R&D that enables forecasting and analyses from comprehensive collections of epidemiological, clinical, and genomic data capable of driving supply chain resilience and economic growth across sectors such as healthcare and pharmaceuticals, engineering biology, nanobiotechnology, agriculture and [industries of the future] including advanced manufacturing."

The administration's top science priority in achieving this, it says, is AI, with a special emphasis on AI and medicine: "The current pandemic highlights the importance of use-inspired AI research for healthcare, including AI for discovery of therapeutics and vaccines; Al-based search of publications and patents for scientific insights; and Al for improved imaging, diagnosis, and data analysis. Beyond healthcare, use-inspired AI research for scientific and engineering discovery across many domains can help the Nation address future crises."

Laudable as the administration's recognition of AI's potential role in medical research may be, says Topol, "I haven't seen any real federal government investments yet, even though there's such acute need. We can't just rely on the tech giants to lead research in this area, which cuts right across almost everything we do in biomedical research."

Melanie Mitchell, Davis Professor of Complexity at the Santa Fe Institute and professor of computer science at Portland State University, agrees with Topol that federal investments in AI remain modest, although AI initiatives by the Department of Energy and the Defense Advanced Research Projects Agency are gathering momentum, and a proposal with bipartisan support tabled by Senate Minority Leader Chuck Schumer (Democrat, New York) would vastly increase AI leadership and funding. A 20-year AI roadmap developed by the Computing Community Consortium Council and the Association for the Advancement of Artificial Intelligence is similarly ambitious, Mitchell notes. "Things

aren't happening yet in a big way," she acknowledges, "but this will likely unfold, for better or worse, over a span of ten years or so."

Topol strongly recommends that the federal government adopt a national strategy for AI in biomedicine. "The potential is just so vast," he argues, "we could have big national AI initiatives that bring together the Department of Defense, the NIH, the National Science Foundationand others. We need a trans-agency national plan that builds on the NIH's strengths as the world's leader in genomics. But so far the White House reports on it are simply vacuous. When you have big projects that this country gets behind, you know it. But we have no such plan in AI."

The Office of Science and Technology Policy did not respond to an interview request from Nature Medicine. ❐

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