No. 25-1611

IN THE UNITED STATES COURT OF APPEALS
FOR THE FIRST CIRCUIT

AMERICAN PUBLIC HEALTH ASSOCIATION, *et al.*,

Plaintiffs-Appellees,

v.

NATIONAL INSTITUTES OF HEALTH, *et al.*,

Defendants-Appellants.

On Appeal from the United States District Court
for the District of Massachusetts

BRIEF OF AMICI CURIAE BIOLOGICAL AND BIOMEDICAL RESEARCH SOCIETIES IN SUPPORT OF PLAINTIFFS-APPELLEES' OPPOSITION TO MOTION FOR STAY PENDING APPEAL

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CORPORATE DISCLOSURE STATEMENT

None of the amici curiae has any parent corporation or any publicly held corporation that owns 10% or more of its stock.

/s/ *Megan Barbero*
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INTERESTS OF AMICI CURIAE[1]

Amici curiae are four nonprofit biological and biomedical societies (the "Societies") that support scholars pursuing cutting-edge research at America's leading scientific institutions:

- The American Society for Biochemistry and Molecular Biology (ASBMB) supports 11,000 researchers dedicated to advancing discovery in molecular science.
- The American Society for Cell Biology (ASCB) was founded in 1960 with the mission of cultivating a multidisciplinary scientific community focused on the cell, the basic unit of all life.
- The American Society for Microbiology (ASM) is one of the oldest and largest life science societies in the United States, supporting over 37,000 scientific researchers.
- The Federation of American Societies for Experimental Biology (FASEB), founded in 1912, is a federation of 22 societies representing more than 110,000 researchers.

Together, their members have pioneered breakthroughs that improve the lives of millions of Americans and power our nation's economy. And they have invested substantial resources in cultivating the next generation of science leaders, including by participating in the career development portion of the National Institutes of Health's (NIH) Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) grant program.

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[1] No counsel for any party authored this brief in whole or in part, and no party's counsel or party made a monetary contribution intended to fund the preparation or submission of this brief. No person other than amici curiae and their counsel made a monetary contribution to this brief's preparation or submission.

PRELIMINARY STATEMENT

In 2019, NIH introduced the MOSAIC program as a career catalyst for emerging leaders who are dedicated to expanding diversity and opportunity in science. In January 2025, the Administration issued executive orders aiming to eliminate "discriminatory . . . programs" featuring "race- and sex-based preferences" or "gender ideology" that it claims "diminish[] the importance of individual merit." Executive Order 14173 (2025). Soon thereafter, NIH purged billions of dollars in research grants—including the MOSAIC program. The district court correctly found that this purge violated the Administrative Procedure Act (APA). App.418-419.

The Societies support plaintiffs' arguments on likelihood of success on the merits but focus here on the equitable factors, which strongly weigh against a stay. In particular, the government's motion for a stay fundamentally misunderstands how additional delay will harm plaintiffs. This is not a case like *Department of Education v. California*, 145 S. Ct. 966, 969 (2025) (per curiam), where plaintiffs "have the financial wherewithal to keep their programs running." Because there is no viable alternative to NIH grants, a delay in reinstating these grants will stall research, causing lasting damage to scientific innovation. Important advances will be delayed or abandoned—endangering health, the economy, and American global leadership. And since emerging researchers rely on NIH grants to secure faculty positions, any delay in reinstating those grants will endanger their careers.

ARGUMENT

America's scientific enterprise is "an engine of research and innovation that has thrummed for decades," empowering our economy, strengthening national security, and ensuring our global preeminence.[2] To keep that engine running, Congress gave NIH an enduring, bipartisan mission: to cultivate "a world-class biomedical research workforce . . . that is diverse, creative, innovative, and productive."[3] NIH, in terminating billions of dollars in research grants, has violated its mandate and endangered American science and innovation. A delay in restoring these grants will cause harms that cannot be easily remediated.

DELAY IN RESTORING NIH'S SCIENTIFIC GRANTS WILL IMPERIL THE CAREERS OF EMERGING LEADERS IN SCIENCE, IRREPARABLY HARM SCIENTIFIC RESEARCH IN THE UNITED STATES, AND DAMAGE THE AMERICAN ECONOMY

A stay pending appeal will imperil the careers of emerging leaders in science—including certain of amici's MOSAIC scholars, who are supported by grants the district court ordered reinstated. As the district court explained, "[e]ven a day's delay" jeopardizes "health research already bought and paid for by the Congress." App.363. And it throws into disarray a funding system carefully calibrated to support scientists at key career moments. If NIH's grant terminations

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[2] Alan Burdick, *Trump vs. Science*, New York Times (Apr. 25, 2025), https://tinyurl.com/6v6peawp.

[3] NIH, *Justification of Estimates for Appropriations Committees - Fiscal Year 2018*, Dep't of Health and Human Servs. 15 (last visited July 7, 2025), https://tinyurl.com/3bnn2f6y.

continue during this appeal, there will be no easy way to recover from the derailing of early-career researchers and shuttering of key research projects.[4]

Scientific Careers. A biomedical education requires arduous study. Nearly all academic positions, and many industry roles, require a doctoral degree (PhD).[5] PhDs are the pinnacle of scientific education, requiring graduate students to spend an average of 4 to 6 years developing research skills, working in a laboratory, publishing papers, and defending a thesis.[6] And that's not all. Scientists who wish to start their own labs must enroll in postdoctoral fellowships, spending 2 to 5 more years working in a new laboratory before having any chance at securing a faculty position.[7] Even promising scholars exhibit high attrition from this pipeline. Dropout rates for PhD programs range from 36% to 51%,[8] and over 40% of postdocs leave academia altogether.[9]

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[4] Rosalind Adams, *Trump Makes Sweeping HIV Research and Grant Cuts: 'Setting Us Back Decades'*, The Guardian (Mar. 31, 2025), https://tinyurl.com/4z3f2evx.

[5] Diego A. Reinero, *The Path to Professorship by the Numbers and Why Mentorship Matters*, SpringerNature Research Communities (Oct. 23, 2019), https://tinyurl.com/3s69tjtv; Univ. of Louisiana at Lafayette, *Careers That Require a PhD or Doctoral Degree* (Oct. 23, 2022), https://tinyurl.com/4z34k7nx.

[6] Educations.Com Team, *Study a PhD: A Guide to PhD Degrees* (Apr. 11, 2025), https://tinyurl.com/273uw6vj.

[7] Tracey Thomas, *Practical Paths for Promising Professors*, Science (Nov. 17, 2000), https://tinyurl.com/3e5amf6w; Courtney Chandler, *When Does a Postdoc End?*, ASBMBToday (Jan. 27, 2023), https://tinyurl.com/md5fztea.

[8] Sonia N. Young et al., *Factors Affecting PhD Student Success*, Int'l J. Exercise Sci. (Jan. 1, 2019), https://tinyurl.com/2hf4vbdk.

[9] Yueran Duan et al., *Postdoc Publications and Citations Link to Academic*

To counteract attrition and maintain a robust pipeline for American scientists, NIH has long offered "transition grants" to help researchers move from PhD and postdoctoral roles to independent faculty roles.[10] NIH offers these grants at each inflection point. First, the F99/K00 grant assists third- and fourth-year PhD students interested in postdoctoral roles with PhD funding (F99) and postdoctoral career funding (K00).[11] Second, the K99/R00 grant helps postdocs apply for independent faculty roles with postdoctoral funding (K99) and independent research support (R00).[12]

In 2019, NIH launched the MOSAIC program—a variant of the K99/R00 that supports early-career researchers committed to diversity in biomedical science.[13] This program includes a career development award for a sponsoring organization to offer mentorship, training, and networking for the applicant.[14] Each award recipient is assigned to one of those organizations for mentorship and career development.[15]

Retention and Faculty Success, PNAS (Jan. 21, 2025), https://tinyurl.com/34xysxyr.

[10] NIH, *Activity Codes* (last visited July 7, 2025), https://tinyurl.com/yn2mx9yw.

[11] *Id.*; NIH, *Individual Predoctoral to Postdoctoral Fellow Transition Award (F99/K00)* (last visited July 7, 2025), https://tinyurl.com/5n7rfn7j.

[12] NIH, *Pathway to Independence Awards (K99/R00)* (Feb. 27, 2025), https://tinyurl.com/ynwsj3w6.

[13] ASM, *ASM MOSAIC Program* (last visited July 7, 2025), https://tinyurl.com/mrx6vxy3.

[14] Kenneth Gibbs et al., *New MOSAIC Funding Opportunities and Upcoming Webinar*, Nat'l Insts. of Gen. Med. Scis. (July 24, 2024), https://tinyurl.com/3up9c25t.

[15] NIH Off. of Extramural Rsch., Notice of Funding Opportunity, USA.gov

Participating societies, including amici, offer cohort-based learning and mentoring programs for their MOSAIC scholars.[16]

Transition grants are, by definition, time sensitive. Every day NIH fails to reinstate the grants at issue here, more researchers face shortfalls that could imperil their experiments and force them to change careers.

Researchers. "Scholars supported through the MOSAIC program represent emerging leaders in their respective scientific disciplines, each at critical junctures within their careers."[17] The program is already yielding results. "In just four fiscal years, the program supported 193 Scholars and five organizational hubs[.]"[18] And MOSAIC scholars have seen high faculty placement rates: Nearly all the scholars in ASBMB's 2021 and 2022 cohorts have faculty roles, and members of its 2023 and 2024 cohort have hit the faculty market early.[19]

(last visited July 7, 2025), https://tinyurl.com/6n6ee3sb (Expired).

[16] ASM, *supra* note 13; ASBMB, *ASBMB MOSAIC* (last visited July 7, 2025), https://tinyurl.com/mv9a6m6n; ASCB, *MOSAIC Program (AMP)* (last visited July 7, 2025), https://tinyurl.com/hhxr5dy7; FASEB, *FASEB MOSAIC* (last visited July 7, 2025), https://tinyurl.com/yndt3rhu.

[17] FASEB, *FASEB Disheartened by MOSAIC Program Termination* (Apr. 4, 2025), https://tinyurl.com/2wr93scz.

[18] *Id.*

[19] *See, e.g.*, NIH, *The Role of Nuclear Factor Erythroid 2-Related Factor 2 in Sarcopenic Obesity*, NIH Reporter (last visited July 7, 2025), https://tinyurl.com/e5ut29up; Univ. of Oregon Coll. Arts & Sci., *Faculty Directory* (last visited July 7, 2025), https://tinyurl.com/3pxv83ff.

The loss of a transition grant—even temporarily—is not just a loss of funds: It can derail a researcher's career. These grants support scientists as they achieve independence, transitioning from postdoctoral fellowships to coveted tenure-track faculty roles. Scientists who receive K99/R00 transition grants such as MOSAIC navigate that transition more successfully than those under other grant programs.[20] And investigators rely on NIH grants to run their labs. Emerging faculty use funding to attract and secure jobs with universities, to run their first experiments, and to hire young investigators.[21] Each day these grants are not reinstated, research is stalled; faculty and postdocs are laid off or furloughed; and students are stranded midway through their lengthy doctorate research programs.[22]

There is simply no replacement for the NIH grants. For researchers, "[f]inding a funding source large enough to fill the void" left by the termination of these grants "will be almost impossible."[23] Temporary relief offered by universities and funding by the private sector is insufficient, as "experts say industry and philanthropy are in

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[20] Nicole C. Woitowich et al., *Analysis of NIH K99/R00 Awards and the Career Progression of Awardees*, eLife (Jan. 19, 2024), https://tinyurl.com/mrys3skj.

[21] *See, e.g.*, Mathew Kiang, *Things to Consider Before Applying for a K99/R00*, MathewKiang.com (June 12, 2020), https://tinyurl.com/4jbcrtr7.

[22] Claudia Lopez Lloreda, *Exclusive: NIH Nixes Funds for Several Pre- and Postdoctoral Training Programs*, Transmitter (Apr. 8, 2025), https://tinyurl.com/3ekeasyc

[23] *Id.*; *see also* Sara Reardon et al., *U.S. Scientists' Lives and Careers Are Being Upended. Here are Five of Their Stories*, Science (May 2, 2025), https://tinyurl.com/2z2772hv.

no position to make up for the losses."[24] Experiments are being cut short, with "innumerable downstream effects on the rest of healthcare, . . . setting us back decades."[25]

Scientific Innovation. The American scientific community is the envy of the world, and NIH is its "crown jewel."[26] Since World War II, "the federal government has partnered with academic institutions, fueling discoveries that have transformed medicine and saved lives."[27] This partnership is irreplaceable—no good alternative exists for federal support for life science.[28] Between 2010 and 2019, NIH invested nearly $187 billion in pharmaceuticals, rivaling the contributions of the entire private pharmaceutical industry.[29]

If NIH's grants are not restored, critical advancements will be delayed or abandoned—compromising health and endangering lives. It is difficult to calculate

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[24] Kathryn Palmer, *Can Scientific Research Survive Without Federal Funding?*, Inside Higher Ed (May 12, 2025), https://tinyurl.com/yrdba44e.

[25] Adams, *supra* note 4; *see, e.g.*, Jocelyn Kaiser, *NIH Under Siege*, Science (Apr. 30, 2025), https://tinyurl.com/yha35aw2.

[26] Teddy Rosenbluth & Emily Anthes, *Long a 'Crown Jewel' of Government, NIH Is Now a Target*, N.Y. Times (Dec. 1, 2024), https://tinyurl.com/53y3xyd8.

[27] Jake Miller, *A Brief History of Federal Funding for Basic Science*, Harv. Med. (April 2025), https://tinyurl.com/3ptau7cd.

[28] *See id.*

[29] Ekaterina Galkina Cleary et al., *Comparison of Research Spending on New Drug Approvals by the National Institutes of Health vs the Pharmaceutical Industry*, JAMA Health F. (Apr. 28, 2023), https://tinyurl.com/46hntuzy; *New Study Shows NIH Investment in New Drug Approvals is Comparable to Investment by Pharmaceutical Industry*, Bentley Univ. (Apr. 28, 2023), https://tinyurl.com/33mty937.

precisely how damaging the loss of MOSAIC grants and other diversity-related funds will be. But that damage is already being felt. NIH grant freezes have halted projects fighting HIV/AIDS;[30] initiatives studying maternal mortality;[31] research on cancer, youth suicide, and bone health;[32] and programs dedicated to curing Alzheimer's.[33] These freezes yielded $1.4 billion in sunk research costs by the end of March 2025.[34] But the true, downstream harm caused by the loss of this research is incalculable. It will also be irreparable, as delays in the restoration of NIH grants can jeopardize experimental timelines, materials, and personnel.[35]

Economic Growth. Science funding is a key driver of the American economy and a remarkably efficient use of taxpayer funds. "NIH is the largest single public funder of biomedical and behavioral research in the world."[36] It is "an economic

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[30] Anil Oza, *NIH Cuts Halt 24-Year Program to Prevent HIV/AIDS in Adolescents and Young Adults*, STAT+ (Mar. 25, 2025), https://tinyurl.com/4xmufebw.

[31] Jason Mast, *Columbia Scientists Reel as Trump Administration Cancels Grants, Hitting Broad Suite of Research*, STAT+ (Mar. 11, 2025), https://tinyurl.com/4f9wv62s.

[32] Protect Our Care, *"It's A Bloodbath": Trump Administration Slashes Millions in NIH Funding for Maternal Health, HIV, and Other Research* (Mar. 26, 2025), https://tinyurl.com/bddzdr3u.

[33] Allison Parshall, *Lifesaving Alzheimer's Research Delayed by Trump Funding Cuts*, Sci. Am. (Apr. 18, 2025), https://tinyurl.com/4vdrrrww.

[34] Sara Reardon, *Are Terminations of NIH Grants Wasting Billions of Taxpayer Dollars?*, Science (Mar. 31, 2025), https://tinyurl.com/2s8urnua

[35] Erin Clancy, *Attempts to Slash NIH Funding Continue, Threatening the Future of Scientific Research*, Gen. Med. (Apr. 7, 2025), https://tinyurl.com/3vbswbez.

[36] NIH, *Direct Economic Contributions* (Dec. 30, 2024),

powerhouse, creating jobs[,] fueling economic activity," and "driving innovation that supports America's global leadership."[37] NIH grants produce $2.56 in economic output for every $1 of federal input.[38] In FY 2024 alone, NIH's $36.94 billion in grant awards generated $94.58 billion in economic activity nationwide.[39] And NIH funding supports 407,782 research positions and a biomedical industry with 7 million jobs nationwide.[40] These investments supercharge the American economy, "generat[ing] billions of dollars in wages, taxes, and increas[ing] the national GDP."[41]

Any delay in reinstating NIH research grants—even for a period of months—will stall that engine of economic growth, creating a void our rivals are eager to fill. Over the past 20 years, China "has narrowed the U.S. global lead," increasing its contribution to global research and development from 5% to 22%, while America's

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https://tinyurl.com/4cnuavan.

[37] United for Med. Rsch., *NIH's Role in Sustaining the U.S. Economy* at 2 (Mar. 2025), https://tinyurl.com/4rwur8d7.

[38] *Id.*

[39] *Id.*

[40] *Id.*; NIH, *Spurring Economic Growth* (Jan. 17, 2025), https://tinyurl.com/bdcv4688.

[41] Science Coalition, *American-Made Innovation: Sparking Economic Growth* (2025), https://tinyurl.com/2ve3rx28.

has declined from 37% to 27%.[42] Already, China has begun to outpace us on key metrics of scientific progress.[43]

NIH's grant terminations are already accelerating this trend, causing a drain on American talent and leading researchers to seek careers overseas.[44] Institutions in the European Union and China have stepped up hiring and research investments.[45] The inverse is also true. Career transition grants like MOSAIC were a key incentive for foreign researchers to move to America and invest in our institutions.[46] But following NIH's termination of these grants, "applications to US institutions from researchers in Europe dropped by 41%."[47] If these trends continue, they cannot be easily reversed.

* * *

[42] Sci. & Techn. Action Comm., *China is a Determined and Formidable Competitor with the U.S. in Science & Technology* at 1 (last visited July 7, 2025), https://tinyurl.com/bdhst4h6.

[43] *Id.*; *see also* Rebecca Mandt et al., *Federal R&D Funding: The Bedrock of National Innovation*, MIT Sci. Pol'y Rev. (Aug. 20, 2020), https://tinyurl.com/2s4brtye.

[44] Laurie Udesky & Jack Leeming, *Exclusive: A Nature Analysis Signals the Beginnings of a US Science Brain Drain*, Nature (Apr. 22, 2025), https://tinyurl.com/3r6j8t95; Catherine Offord, *Overseas Universities See Opportunity in U.S. 'Brain Drain'*, Science Insider (Mar. 17, 2025), https://tinyurl.com/yew5dacj.

[45] *See* Offord, *supra* note 44; Udesky & Leeming, *supra* note 44.

[46] *See* Offord, *supra* note 44.

[47] Udesky & Leeming, *supra* note 44.

NIH's termination of scientific grants will jeopardize the careers of leading researchers and stall critical research. Its actions have already begun to degrade American leadership in science and technology. A stay pending appeal will impose long-lasting and irreparable harms.

CONCLUSION

This Court should grant deny the government's motion for a stay pending appeal.

Dated: July 8, 2025

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CERTIFICATE OF COMPLIANCE

This brief complies with this Court's type-volume limitations because it contains 2,591 words.

This brief also complies with the typeface and type-style requirements of Federal Rule of Appellate Procedure 32(a)(5)-(6) because it was prepared using Word for Microsoft 365 in Times New Roman 14-point font, a proportionally spaced typeface.

Dated: July 8, 2025

/s/ *Megan Barbero*
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CERTIFICATE OF SERVICE

I certify that the foregoing brief will be served on all counsel of record through the court's CM/ECF system.

Dated: July 8, 2025

/s/ *Megan Barbero*
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