UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

AMERICAN PUBLIC HEALTH ASSOCIATION; IBIS REPRODUCTIVE HEALTH; INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE, AND AGRICULTURAL IMPLEMENT WORKERS (UAW); BRITTANY CHARLTON; KATIE EDWARDS; PETER LURIE; *and* NICOLE MAPHIS,

Plaintiffs,

- v. -

NATIONAL INSTITUTES OF HEALTH; JAY BHATTACHARYA, *in his official capacity as Director of the National Institutes of Health*; UNITED STATES DEPARTMENT OF HEALTH AND HUMAN SERVICES; *and* ROBERT F. KENNEDY, JR., *in his official capacity as Secretary of the United States Department of Health and Human Services*,

Defendants.

Case No. 25-10787

[PROPOSED] BRIEF OF AMICI CURIAE
BIOLOGICAL AND BIOMEDICAL RESEARCH SOCIETIES
IN SUPPORT OF PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION

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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.

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Page(s)

Cases

Constitutional Provisions

Statutes

Session Laws

Executive Orders

Other Authorities

INTERESTS OF AMICI CURIAE[1]

Amici curiae are led by 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. Their work has driven advancements in medicine, agriculture, and engineering.
- 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. ASCB consists of 6,000 leading researchers worldwide, including 32 Nobel laureates.
- 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. Its members support research to detect and diagnose infectious diseases.
- The Federation of American Societies for Experimental Biology (FASEB), founded in 1912, is a federation of 22 societies representing more than 110,000 researchers. Today, FASEB hosts multiple scientific conferences, publishes scientific journals, and provides its members with career resources.

Together, their members have pioneered scientific breakthroughs that improve the lives of millions of Americans and power our nation's economy.

All four Societies have invested substantial resources in cultivating the next generation of leaders in the life sciences. The Societies participate in the career development (UE5) portion of the National Institutes of Health's (NIH's) Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) grant program, supporting excellent researchers at key inflection points in their careers. NIH's unlawful termination of the MOSAIC program will upend the careers of those promising researchers, forestall American innovation, and stifle our nation's competitive edge. The Societies urge this Court to grant Plaintiffs' motion for preliminary injunction.

[1] Neither a party nor counsel to this lawsuit authored this brief in whole or in part, and no such counsel or party made a monetary contribution intended to fund the preparation or submission of this brief. No person other than the amici curiae or their counsel made a monetary contribution to this brief's preparation or submission.

In filing this brief, the Societies are joined by the following additional biomedical and biological research societies, each of which has a vested interest in supporting the next generation of American researchers and preserving our government's historic support for the sciences:

- The American Institute of Biological Sciences, an entity dedicated to promoting the use of biology to inform decision making for the benefit of science and society.
- The American Sociological Association, the national professional membership association for sociologists, including students, faculty, and practicing sociologists.
- The Association for Women in Science, an organization dedicated to advocating for equitable access to opportunities, resources, and mentorship for women in science, technology, engineering, and mathematics (STEM).
- The Ecological Society of America, the world's largest community of professional ecologists committed to advancing the understanding of ecological science.
- The Gerontological Society of America, the oldest and largest interdisciplinary organization devoted to research, education, and practice in the field of aging.
- The Infectious Diseases Society of America, a community of clinicians, scientists, and public health experts advancing the treatment and prevention of infectious diseases.
- The Society of Environmental Toxicology and Chemistry of North America, a society whose mission is to advance environmental science and management.

PRELIMINARY STATEMENT

Congress has long required the National Institutes of Health (NIH) to fund initiatives that promote diversity in the biomedical sciences. These Congressional directives reflect the fact that diversity in science is "essential for innovation, long-term economic growth[,] and global competitiveness."[2] In 2019, NIH introduced the Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) program as a career catalyst for emerging leaders who are dedicated to expanding diversity and opportunity in biology and biomedical science. MOSAIC is a competitive, merit-based grant—precisely the sort of program that pushes science forward and sharpens our nation's competitive edge in a changing world.

In January 2025, the Administration issued a series of 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); *see* Executive Orders 14151, 14168 (2025). Not long after, NIH summarily purged billions of dollars in research grants—including the MOSAIC program. For the reasons Plaintiffs discuss, that purge violates the Administrative Procedure Act (APA), the separation of powers, and multiple statutes requiring NIH to promote diversity in science. And as applied to MOSAIC, a merit-based initiative that does not favor applicants based on "race[] and sex" or "gender ideology," it is wholly arbitrary.

NIH's unlawful actions will imperil the careers of bright early-career researchers, causing lasting damage to scientific innovation in America and stalling a key engine of economic growth. Left unchecked, these acts will derail promising scientists during career transitions and jeopardize the education of students they employ. And important advances will be delayed or abandoned—endangering human health, American geopolitical leadership, and our nation's economy.

[2] Robert F. Smith, *Diversity in STEM: What It Is and Why it Is So Important* (last visited Apr. 23, 2025), https://tinyurl.com/34tjxeva.

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.[3] 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."[4] Ample data suggest that diversity is vital to that endeavor: Peer-reviewed studies have consistently linked diversity in science to productivity, excellence, and novel discoveries.[5] NIH, in terminating billions of dollars in research grants, has violated its mandate and endangered American science and innovation. Its actions must be enjoined.

I. NIH's termination of diversity-focused initiatives violates its statutory mandate to support diversity, which yields critical benefits for research, discovery, and innovation.

NIH's termination of diversity-focused initiatives violates clear Congressional mandates to fund them. The APA requires courts to set aside agency action that violates the law or exceeds statutory authority. 5 U.S.C. §§ 706(2)(A), (C). And the Constitution itself requires the Executive to faithfully execute congressional commands. U.S. Const. art. II § 3, cl. 5; *accord Clinton v. City of New York*, 524 U.S. 417, 438 (1998) ("There is no provision in the Constitution that authorizes the President to enact, to amend, or to repeal statutes."). An executive agency "may not decline to follow a statutory mandate" merely because it has "policy objections" to Congressional judgment.

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

[4] NIH, *Justification of Estimates for Appropriations Committees - Fiscal Year 2018*, Dep't of Health and Human Servs. 15 (last visited Apr. 23, 2025), https://tinyurl.com/3bnn2f6y.

[5] *E.g.*, Talia H. Swartz et al., *The Science and Value of Diversity: Closing the Gaps in Our Understanding of Inclusion and Diversity*, J. of Infectious Disease (Aug. 19, 2019), https://tinyurl.com/m2pz6avy; Cogent Infotech, *Diversity in STEM: How Does It Impact the US Economy?* (Jan. 30, 2024), https://tinyurl.com/5n88d8rv ("The likelihood of scientific success increases with more inclusion, promoting economic growth and competitiveness. America's global competitiveness depends on STEM education and employment.").

In re Aiken Cnty., 725 F.3d 255, 259 (D.C. Cir. 2013).

Congress required NIH to fund diversity-related research initiatives. *See* Pls.' Mem. Supp. PI Mot. 2-3 (discussing statutes). It did so because it recognized that diversity is critical to science. Science is all about solving complex problems. It requires brilliant minds to wield their curiosity, creativity, and drive to explore unknown facets of the natural world. Scientific research is driven by questions, not certainties, and breakthroughs occur by chance as often as by design. Increasing diversity in this process improves group decision-making, bringing different perspectives to the table to pursue novel inquiries and hasten discovery. Congress recognized as much when it made diversity a central facet of NIH's mission. NIH cannot forfeit this mandate merely because it now disagrees with Congress's judgment. Overwhelming evidence shows the value of diversity of thought, perspective, and demographics to the scientific endeavor.

1. *Homogeneity*. Science is a historically homogeneous profession. Today, the "entryways into STEM careers are unequally available to all members of our society, with the result that . . . the benefits of the scientific enterprise have disproportionately benefitted members of the upper echelons."[6] For example, only 6% of life science positions are held by Black researchers and 8% by Hispanics, far below these demographics' respective shares of the general population.[7] And women of all races and ethnicities face remarkable attrition as they climb the career ladder, with a 19.5% higher dropout rate from doctoral and postdoctoral programs.[8] Addressing these disparities has proven challenging given the length of a scientific education and the high rates of attrition among underrepresented minority researchers.

[6] Maureen Kearney et al., *Science Must Be for Everyone*, Sci. Am. (Aug. 16, 2021), https://tinyurl.com/548878dp.
[7] Univ. of Cal. at Berkeley, *The Scientific Community: Diversity Makes the Difference*, UnderstandingScience.org (last visited Apr. 24, 2025), https://tinyurl.com/mtskj532.
[8] Kearney, *supra* note 6.

2. *Blind Spots*. Homogeneity leaves blind spots in our knowledge.[9] Minority groups have varying susceptibility to diseases and therapies—but the conditions behind this divergence in outcomes remain understudied and poorly understood. For example, Black individuals develop sickle cell anemia at dramatically higher rates (93.4% of all cases) than Hispanic (4.8%) or White (1.8%) individuals, yet there are limited "studies on racial differences in sickle cell disease outcomes."[10] So too for debilitating conditions such as prostate cancer (1.7x more prevalent in Black men), asthma (5x more ER visits), and diabetes (1.4x more prevalent).[11] And among women, all manner of medical issues relating to reproductive and sexual health remain "vastly understudied and underfunded."[12] These pathologies contribute to significant disparities in health outcomes and collective trillions in healthcare costs.[13] Researchers from affected communities are more likely to study these conditions and advance the search for cures.[14]

3. *Innovation*. Researchers from underrepresented backgrounds also improve innovation by offering new perspectives that inform the scientific process. The result is better science. A 2020

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[9] *See, e.g.*, Minority Health and Health Disparities Research and Education Act of 2000, Pub. L. No. 106-525 (2000) (establishing the National Center on Minority Health and Health Disparities (NCMHD) to coordinate health disparities research at NIH); Patient Protection and Affordable Care Act, Pub. L. No. 111-148, § 10334 (2010) (establishing the Office of Minority Health to improve "the quality of health care minorities receive" and eliminate disparities).

[10] Akriti Pokhrel et al., *Racial and Ethnic Difference in Sickle Cell Disease Within the United States: From Demographics to Outcomes*, European J. of Haematology (May 2023), https://tinyurl.com/2k3n5v64.

[11] Ting Martin et al., *Racial and Ethnic Disparities in Use of Novel Hormonal Therapy Agents in Patients With Prostate Cancer*, JAMA Network Open (Dec. 1, 2023), https://tinyurl.com/4jb4mt5c; Editorial Staff, *The Unequal Burden of Asthma on the Black Community*, Am. Lung Ass'n (Feb. 28, 2024), https://tinyurl.com/54x6rmv6; Off. of Minority Health, *Diabetes and Black/African Americans*, U.S. Dep't of Health & Hum. Servs. (Feb. 13, 2025), https://tinyurl.com/5y8bu689.

[12] Eva De Clercq et al., *Rethinking Advanced Motherhood: A New Ethical Narrative*, SpringerNature (Sept. 3, 2023), https://tinyurl.com/2adnnzck.

[13] *See* NIH Press Team, *NIH-Funded Study Highlights the Financial Toll of Health Disparities in the United States*, NIH (May 16, 2023), https://tinyurl.com/25daw2e9; *see also* Pls.' Mem. Supp. PI Mot. 3 (discussing statutory requirements to fund research that reduces health disparities).

[14] *See* Swartz, *supra* note 5.

study published in the renowned scientific journal *PNAS* found that "[s]cholars from historically excluded backgrounds . . . produce more innovative research than their counterparts from overrepresented backgrounds."[15] Another leading study sponsored by the Stanford University School of Education analyzed the careers of 1.2 million researchers between 1977 and 2015, and found that "[m]inority and women researchers had more novel ideas, but these ideas were less likely to be adopted by the scientific mainstream."[16] It should be no surprise, then, that scientific institutions have concluded that "[i]mproving the participation of under-represented groups is not just fairer—it could produce better research."[17]

4. *Decision-Making*. Ample literature links diversity on scientific research teams to faster problem-solving, better decision-making, and more accurate results.[18] Individuals with different perspectives approach science in different ways—offering a rich tapestry of skills that helps teams "more easily and efficiently solve problems," understand and interpret data, and overcome barriers to success.[19] Indeed, "[o]verwhelming evidence suggests that teams that include different kinds of thinkers outperform homogeneous groups on complex tasks."[20] One recent study has found that "[a] socially-diverse group of problem solvers of regular ability" will "outperform a homogeneous group of high-ability."[21] And research produced by diverse teams accrues up to 10% more citations

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[15] Univ. of Cal. at Berkeley, *supra* note 7 (citing Bas Hofstra et al., *The Diversity-Innovation Paradox in Science*, PNAS (Apr. 28, 2020), https://tinyurl.com/32srbacx).

[16] Daniela Blei, *Science's Diversity Problem*, Stanf. Soc. Innov. Rev. (2000), https://tinyurl.com/4xh776cy.

[17] Nature, *Science Benefits from Diversity* (June 6, 2018), https://tinyurl.com/2696mbj6.

[18] *See, e.g.*, Swartz, *supra* note 5 (noting diverse teams result in "improved problem solving, increased innovation, and more-accurate predictions"); Berkeley, *supra* note 7.

[19] LabXchange RDEISE Team, *The Benefits of Increasing Diversity in STEM*, LabXchange (Aug. 22, 2024), https://tinyurl.com/jvye6ww7.

[20] Swartz, *supra* note 5.

[21] Avesta Rastan, *Why Science Needs Diversity*, Lifeology (June 23, 2020), https://tinyurl.com/5338kbmm (citing Lu Hong & Scott E. Page, *Groups of Diverse Problem Solvers Can Outperform Groups of High-Ability Problem Solvers*, PNAS (Nov. 8, 2004), https://tinyurl.com/mrydc552).

than homogeneous ones, indicating a high level of scientific impact.[22] "Being inclusive," in short, "gives research groups a competitive edge."[23]

5. *Experimental Design*. Different perspectives on a research team can also improve the accuracy and logistical efficacy of study plans. Homogeneous teams are more vulnerable to bias, and can miss crucial gaps in experimental design.[24] But diverse teams are more likely to proceed holistically, as researchers with new and varied viewpoints can round out a team's planning.[25] Diversity also helps overcome barriers to the generalization of treatments across populations.[26] Researchers from minority groups are better positioned to help teams study the effects of poor social determinants of health that affect their communities.[27] Scientists from populations known for treatment hesitancy are better equipped to facilitate public education and treatment adoption.[28] And minority investigators participating in clinical trials may be able to assist with patient accrual, retention, and compliance among communities with high dropout rates.[29]

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The Societies are deeply committed to supporting the best minds as they push forward the frontiers of biomedical research and discovery. Cutting grants that support diversity in science will imperil that vital aim and forfeit American leadership in innovation. Science is about solving

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[22] Swartz, *supra* note 5.
[23] Kendall Powell, *These Labs are Remarkably Diverse – Here's Why They're Winning at Science*, Nature (June 6, 2018), https://tinyurl.com/hd83uxxk.
[24] *See* Nat'l Acad. of Scis., *Why Diverse Representation in Clinical Research Matters and the Current State of Representation within the Clinical Research Ecosystem*, Nat'l Lib. of Med. (May 17, 2022), https://tinyurl.com/mryfhxwh.
[25] *See id.*; Katherine W. Phillips, *How Diversity Makes Us Smarter*, Sci. Am. (Oct. 1, 2014), https://tinyurl.com/mwbz2exk.
[26] Nat'l Acad. of Scis., *supra* note 24; Univ. of Cal. at S.F., *Diversity in Research Participation: Why It's Important*, U.C.S.F. Clinical & Translational Science Inst. (last visited Apr. 24, 2025), https://tinyurl.com/mr39dczj.
[27] Swartz, *supra* note 5.
[28] *See* Nat'l Acad. of Scis., *supra* note 24.
[29] *See id.*

complex problems, and progress in scientific endeavors demands creativity, curiosity, and drive. Maintaining a rich and vibrant collaboration in science, and bringing different perspectives and skillsets to the forefront of discovery, is paramount to maintaining America's competitive edge in our evolving world. As Congress—and NIH itself—have long understood, "[d]iversity enhances excellence and innovation."[30] It does not stifle them. NIH's decision to flout this mandate and abandon those virtues, reached abruptly and without good reason, is contrary to law.

II. The NIH directives terminating the MOSAIC grants are arbitrary and capricious because MOSAIC is a merit-based grant for emerging leaders in science.

NIH's termination of MOSAIC violates Congressional instructions to promote diversity in science—and is arbitrary and capricious on its own terms. *See* 5 U.S.C. § 706(2)(A). Agency action is arbitrary when the agency fails to consider an important aspect of the problem, or when "the evidence tells a story that does not match" the agency's explanation. *Dep't of Com. v. New York*, 588 U.S. 752, 784, 801 (2019); *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto Ins. Co.*, 463 U.S. 29, 43 (1983). NIH swept the MOSAIC program into its summary grant terminations. But MOSAIC is not a "discriminatory . . . program[]," designed to "diminish the importance of individual merit." Executive Order 14173 (2025); *see also* Executive Orders 14151, 14168 (2025). It is a merit-based funding pipeline for emerging leaders in biomedical science.

1. *Scientific Education*. A biomedical science education requires long and arduous study, particularly for first-generation graduate students and those who lack social or financial support. Nearly all academic positions, and many industry roles, require applicants to hold a doctoral degree (PhD).[31] PhDs are the pinnacle of scientific education and training, requiring graduate students to

[30] Swartz, *supra* note 5.

[31] *See* 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.

spend an average of 4 to 6 years developing foundational research skills, working in a laboratory, publishing papers, and exploring and defending a novel thesis of their own.[32] And that's not all. Scientists who wish to start their own labs as tenure-track faculty or independent research group leaders must continue their studies by enrolling in postdoctoral fellowships even after earning their PhDs.[33] Postdoctoral fellows (postdocs) hold their positions for an indefinite time, often spending 2 to 5 more years on average exploring experiments in a new laboratory setting before they have any chance at securing a faculty position.[34] It is no surprise, then, that even promising scholars exhibit high attrition during these career transitions. Dropout rates for PhD programs currently range from 36% to 51%,[35] and more than 40% of postdocs leave academia altogether.[36] Often, top talents leave academia because other career tracks are more lucrative or feasible—either due to accessibility, pay and benefits, or family obligations.[37]

To counteract attrition and maintain a robust pipeline for American scientists, the NIH has long offered "transition grants"—funding opportunities that are intended to help researchers move from dependent PhD and postdoctoral roles to independent faculty positions.[38] NIH offers these grants at each inflection point. First, the F99/K00 grant assists third- and fourth-year PhD students

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[32] *See* Educations.Com Team, *Study a PhD: A Guide to PhD Degrees* (Apr. 11, 2025), https://tinyurl.com/273uw6vj.
[33] Tracey Thomas, *Practical Paths for Promising Professors*, Science (Nov. 17, 2000), https://tinyurl.com/3e5amf6w.
[34] *See* Courtney Chandler, *When Does a Postdoc End?*, ASBMBToday (Jan. 27, 2023), https://tinyurl.com/md5fztea.
[35] *See* Sonia N. Young et al., *Factors Affecting PhD Student Success*, Int'l J. Exercise Sci. (Jan. 1, 2019), https://tinyurl.com/2hf4vbdk.
[36] *See* Yueran Duan et al., *Postdoc Publications and Citations Link to Academic Retention and Faculty Success*, PNAS (Jan. 21, 2025), https://tinyurl.com/34xysxyr.
[37] *See, e.g.*, Joe Riad, *A PhD Examined: Academia vs. Industry*, Medium (Oct. 13, 2024), https://tinyurl.com/422jf46d (explaining, by way of anecdote and analysis, one postdoc's decision to pursue industry roles over academia).
[38] *See* NIH, *Activity Codes* (last visited Apr. 25, 2025), https://tinyurl.com/yn2mx9yw (listing and describing the types and functions of NIH grants).

interested in postdoctoral roles with 1 to 2 years of PhD funding (F99) and 4 years of postdoctoral career funding (K00).[39] Second, the K99/R00 grant helps postdocs apply for independent faculty roles with 1 to 2 years of postdoctoral funding (K99) and 3 years of independent research support (R00).[40] And those transition grants make new faculty more competitive for the grants necessary to launch their laboratories—such as discrete research grants (R01), small research awards (R03), developmental projects (R21), and more.[41]

2. *The MOSAIC Program*. In 2019, NIH launched the MOSAIC program—a variant of the K99/R00 that aims to support early-career researchers committed to increasing diversity in biomedical science.[42] NIH structured this program in a unique way: rather than seeking applicants from underrepresented minority groups, MOSAIC funds leading scholars "who have demonstrated meaningful contributions and proposed compelling future plans to promote broad participation in the biomedical research workforce."[43] This program is merit-based—selecting scholars based on the quality of their research and their dedication to broadening the field.[44] It identifies leaders in science and accelerates their careers.

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[39] *See id.*; NIH, *Individual Predoctoral to Postdoctoral Fellow Transition Award (F99/K00)* (last visited Apr. 25, 2025), https://tinyurl.com/5n7rfn7j ("The purpose of the [F99/K00 award] is to encourage and retain outstanding graduate students who have demonstrated potential and interest in pursuing careers as independent researchers.").

[40] NIH, *Pathway to Independence Awards (K99/R00)* (Feb. 27, 2025), https://tinyurl.com/ynwsj3w6 ("The NIH Pathway to Independence Award (K99/R00) is for promising postdoctoral scientists seeking to complete needed, mentored research career development.").

[41] *See* NIH, supra note 38.

[42] *See* ASM, *ASM MOSAIC Program* (last visited Apr. 24, 2025), https://tinyurl.com/mrx6vxy3 (explaining that the MOSAIC program facilitates the "[s]uccessful transition of early-career scientists from postdoctoral positions to tenure-track faculty positions at research-intensive institutions").

[43] La. Clinical & Translational Sci. Ctr., *NIH Webinar: MOSAIC K99 Program to Promote Faculty Diversity* (Aug. 29, 2024), https://tinyurl.com/3fm28xv6.

[44] As discussed in greater detail below, NIH's strategic plan emphasizes diversity in all its forms, including "thought, experience, and demographics." *See infra* notes 53–55 and accompanying text.

The MOSAIC program supplements the existing K99/R00 by offering additional career support and requiring a higher showing from applicants. The grant consists of two components:

- (1) a standard postdoctoral career transition award (K99/R00) providing 2 years of postdoc funding and 3 years of independent research support; and
- (2) a career development award (UE5) given to a sponsoring organization to offer mentorship, training, and networking for the applicant.[45]

Applicants are evaluated on equal terms to any other K99/R00 scholar. They must complete the same application requirements present in a standard K99/R00 grant—a career development plan; a research and mentorship team; and a research proposal detailing the applicant's plans for future postdoctoral and independent research.[46] However, to receive a MOSAIC grant, the applicant must also show that they have proactively worked to broaden participation in biomedical science, and that they have concrete future plans to continue.[47]

The UE5 is an "institutionally-focused research education cooperative agreement" that assigns scholars to one of several apolitical, nonprofit societies to provide unparalleled mentorship and career development.[48] Participating societies offer cohort-based learning and mentoring—giving scholars access to near-peer networks of support as they navigate the difficult transition from postdoc to independent lab leader. These opportunities are a game changer. ASM trains its MOSAIC scholars on successful mentoring, lab management, grant writing, and publishing.[49]

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[45] *See* 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.
[46] *See* NIH Off. of Extramural Rsch., *Notice of Funding Opportunity*, USA.gov (last visited Apr. 24, 2025), https://tinyurl.com/6n6ee3sb (Expired) (explaining MOSAIC application process and selection criteria).
[47] *See* La. Clinical & Translational Sci. Ctr., *supra* note 43.
[48] NIH Off. of Extramural Rsch., *supra* note 46 (explaining that UE5 "is designed to equip MOSAIC K99/R00 scholars with professional skills and provide them with the appropriate mentoring and professional networks to allow them to transition into . . . independent academic research careers").
[49] ASM, *supra* note 42.

FASEB offers workshops on foundational research skills, core competencies, and advocacy.[50] ASBMB embeds its MOSAIC scholars in long-standing, highly-successful programs—ranging from its grant-writing workshop to its early career reviewers program with its scientific journal.[51] And ASCB facilitates career transitions directly, offering "match-making visits for [MOSAIC] scholars" to interview with universities for faculty roles.[52] These opportunities are unrivaled career catalysts for early-career scientists, and find no parallel in standard NIH transition awards.

As noted, scholars applying for MOSAIC grants must demonstrate that they are dedicated to expanding opportunities in the biomedical fields. But NIH's strategic plan emphasizes diversity in all its forms, including "thought, experience, and demographics."[53] Accordingly, the MOSAIC program does not contain one rigid definition of diversity or opportunity—permitting applicants to explain how they have expanded participation in STEM through their own initiative and drive.[54] Successful applicants have done everything "from mentoring young people to advocating for new departmental policies."[55] For example:

- A pancreatic cancer researcher won an ASCB MOSAIC award in 2023 for her innovative research on the pancreatic tumor microenvironment. She has expanded opportunities in STEM by founding a comic series introducing scientific concepts to children ages 8 and up.[56]

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[50] FASEB, *FASEB MOSAIC* (last visited Apr. 24, 2025), https://tinyurl.com/yndt3rhu.
[51] ASBMB, *ASBMB MOSAIC* (last visited Apr. 24, 2025), https://tinyurl.com/mv9a6m6n.
[52] ASCB, *MOSAIC Program (AMP)* (last visited Apr. 24, 2025), https://tinyurl.com/hhxr5dy7.
[53] Francis S. Collins, *NIH-Wide Strategic Plan, Fiscal Years 2021-2025*, at i (July 2021), https://tinyurl.com/bdydvfbf; *see also* NIH Off. of Extramural Rsch., *Updated Notice of NIH's Interest in Diversity*, USA.gov (last visited May 1, 2025), https://tinyurl.com/2jwurtey (Rescinded) (identifying a broad range of desirable diverse qualities, including socio-economic status, education level, disabilities, and race and ethnicity).
[54] ASCB Post Staff, *ASCB Responds to the NIH's Termination of the MOSAIC Program* (Apr. 3, 2025), https://tinyurl.com/y2azc6xn (MOSAIC "focused on scientific excellence, mentorship, and expanding opportunity").
[55] Laurel Oldach, *MOSAIC Changes the Landscape*, ASBMBToday (Feb. 2, 2023), https://tinyurl.com/23pyx4va.
[56] Emily Storz, *NIH MOSAIC Postdoctoral Career Transition Award to Promote Diversity*, Fox Chase Cancer Center, Template Health (Feb. 3, 2023), https://tinyurl.com/3mt394fu.

- An award-winning immunologist received an ASBMB MOSAIC grant in 2022 for his research into the use of CRISPR bacteria to fight viral infections. He has helped run a program to provide high school students in Montana valuable early-career research experience.[57]
- An RNA biologist won an ASBMB MOSAIC award in 2024 for studying the role of certain proteins in RNA degradation. Having grown up in rural Indiana, she helps K-12 students, underrepresented students, and low-income students participate in activities related to genetics.[58]
- An assistant professor of biochemistry in Purdue's School of Agriculture, earned a MOSAIC grant in 2021 for his research into RNA transcription and breast cancer. He expanded the field by founding First-Gen Scholars, a group for first-generation graduate students and postdocs of all backgrounds.[59]

These scholars, and almost 200 like them, were selected for their outstanding research record and their entrepreneurial commitment to the field. They are innovators and leaders. They belong at the forefront of discovery, and MOSAIC is designed to help them get there.

* * *

Nothing about this pipeline is "discriminatory." *Cf.* Executive Order 14151 (Jan. 20, 2025). It does not engage in "race- and sex-based preferences," *cf.* Executive Order 14173 (Jan. 21, 2025), or promote "gender ideology," *cf.* Executive Order 14168 (Jan. 20, 2025). Rather, "[a]ny postdoc can apply; the award is not limited by race or ethnicity."[60] Far from "diminish[ing] the importance of individual merit," Executive Order 14173 (2025), MOSAIC elevates the brightest in the field. It is precisely the sort of highly competitive, merit-based initiative that aligns with NIH's current priorities and long-term mission. Because the government's reasons for terminating MOSAIC do

[57] Meaghan MacDonald-Pool, *Montana State Postdoctoral Researcher Wins Prestigious MOSAIC Award*, Mont. State Univ. (July 25, 2022), https://tinyurl.com/4md7sf3k.
[58] Andrea Lius, *MOSAIC Scholar Loves to Share the Fun of Science*, ASBMBToday (Sept. 24, 2024), https://tinyurl.com/mwjjr477.
[59] Steve Koppes, *Path to NIH Early Career Award Began at Community College*, Purdue Univ. (Apr. 19, 2023), https://tinyurl.com/menver9c.
[60] Oldach, *supra* note 55; *see also* La. Clinical & Translational Sci. Ctr., *supra* note 43; NIH Off. of Extramural Rsch., *supra* note 46.

not align with the nature of the program, and the executive orders cited as the basis for termination do not apply, NIH's directives are arbitrary and must be set aside.

III. NIH's termination of scientific grants will imperil the careers of emerging leaders in science, irreparably harm scientific research in the United States, and damage the American economy.

If NIH's directives remain in effect, they will devastate the American research community and undermine our nation's economic growth. The damage to science in the United States will "set[] us back decades," shuttering key research projects and derailing early-career researchers.[61] This damage is being felt now, as NIH has already cut or suspended billions in federal funding for biomedical science.[62] The ensuing harms to researchers, the scientific community, and the nation's economy necessitate immediate injunctive relief. *See Rio Grande Cmty. Health Ctr., Inc. v. Rullan*, 397 F.3d 56, 75 (1st Cir. 2005) (defining irreparable harm as that which "cannot adequately be compensated . . . by a later-issued damages remedy").

1. *Individual Researchers*. "Scholars supported through the MOSAIC program represent emerging leaders in their respective scientific disciplines, each at critical junctures within their careers."[63] The program is already yielding results. "In just four fiscal years, the program supported 193 Scholars and five organizational hubs, well exceeding the original goal of 60 Scholars and three organizational hubs."[64] And MOSAIC scholars have seen high faculty placement rates: For example, nearly all the scholars in ASBMB's 2021 and 2022 cohorts have attained faculty roles, and members of its 2023 and 2024 cohort have hit the faculty market early.[65]

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[61] Rosalind Adams, *Trump Makes Sweeping HIV Research and Grant Cuts: 'Setting Us Back Decades'*, The Guardian (Mar. 31, 2025), https://tinyurl.com/4z3f2evx.
[62] Megan Molteni et al., *NIH Grants Plummeted $2.3 Billion in Trump's First Months, as Federal-Academia Partnership Crumbles*, STAT+ (Apr. 24, 2025), https://tinyurl.com/yefmxukm.
[63] FASEB, *FASEB Disheartened by MOSAIC Program Termination* (Apr. 4, 2025), https://tinyurl.com/2wr93scz.
[64] *Id.*
[65] *See, e.g.*, NIH, *The Role of Nuclear Factor Erythroid 2-Related Factor 2 in Sarcopenic Obesity*,

The loss of a transition grant is not just a loss of funds: It can derail a researcher's career. These grants support scientists as they achieve independence for the first time, transitioning from postdoctoral fellowships to coveted tenure-track faculty roles.[66] Scientists who receive K99/R00 transition grants such as MOSAIC navigate that transition more successfully than those under other grant programs.[67] And investigators who receive NIH grants rely on them to kickstart their careers. Emerging faculty use their funding to attract and secure jobs with universities, to run their labs' first experiments, and to hire young investigators pursuing PhDs and postdoctoral fellowships.[68] If this funding is lost, important research will be stalled; new faculty will be laid off or furloughed; and students will be stranded midway through their extensive doctorate research programs.[69] Injunctive relief is necessary to forestall these harms.

2. *Science and Discovery*. The American scientific community has been the envy of the world, and NIH is its "crown jewel."[70] Since World War II, "the federal government has partnered with academic institutions, fueling discoveries that have transformed medicine and saved lives."[71] This partnership is irreplaceable—no good alternative exists for federal funding of life science.[72]

NIH Reporter (last visited May 1, 2025), https://tinyurl.com/e5ut29up; Univ. of Oregon Coll. Arts & Sci., *Faculty Directory* (last visited May 1, 2025), https://tinyurl.com/3pxv83ff.

[66] *See* NIH, *supra* note 38 and accompanying text.

[67] 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 (observing that roughly 89% of K99 awardees receive R00 funding, "which indicates having obtained a faculty position").

[68] *See, e.g.*, Mathew Kiang, *Things to Consider Before Applying for a K99/R00*, MathewKiang.com (June 12, 2020), https://tinyurl.com/4jbcrtr7 ("Anecdotally, K99/R00's make candidates more appealing as new faculty hires while also providing protection and leverage during job negotiations.").

[69] *See* Claudia Lopez Lloreda, *Exclusive: NIH Nixes Funds for Several Pre- and Postdoctoral Training Programs*, Transmitter (Apr. 8, 2025), https://tinyurl.com/3ekeasyc ("Program directors and grantees are scrambling to continue supporting their students.").

[70] 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.

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

[72] *See id.*; *accord* Lloreda, *supra* note 69 ("Finding a funding source large enough to fill the void

Between 2010 and 2019, NIH invested nearly $187 billion in pharmaceuticals, an investment that rivals the contributions of the entire private pharmaceutical industry, supporting research that led to 354 of 356 new drugs approved in the last decade.[73] In 1988, NIH funding made possible the Human Genome Project, which has served as the genesis of a genomics-based industry that now generates more than $5.2 billion in federal revenue each year and supports 850,000 jobs.[74] Private industry lacks the incentive to fund the basic discovery efforts necessary to facilitate these projects; federal funding makes them possible.[75]

If NIH continues to terminate grants and shutter research projects, scientific and medical advancements will be delayed or abandoned—compromising health and endangering human lives. It is difficult to calculate precisely how damaging the loss of MOSAIC grants and other diversity-related funds will be. "Major advances in technology often are based on research whose eventual outcomes and applications could not have been predicted."[76] But the damage is already being felt. "NIH grants plummeted $2.3 billion in Trump's first months, as [the] federal-academia partnership crumbles."[77] NIH funding freezes have halted dozens of projects intended to combat HIV/AIDS;[78]

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of federal funding will be almost impossible.").

[73] 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 ("[A]t least half of the total investment in research and development required to bring a product to market comes from the U.S. government.").

[74] *See* Kara Flynn, *New Report Indicates Annual Economic Impact of Human Genetics/Genomics Grew Over $200 Billion Since 2010, Outlines New Areas of Promising Application*, Am. Soc'y of Hum. Genetics (May 19, 2021), https://tinyurl.com/324cw9km.

[75] Lloreda, *supra* note 69.

[76] Nat'l Acad. of Scis., *Allocating Federal Funds for Science and Technology*, Nat'l Lib. of Med. (1995), https://tinyurl.com/msbbs277 ("[W]ork on atomic clocks led to the concept and development of [GPS] . . . ; work on the microwave spectrum of ammonia enabled the development of lasers; and studies of magnetic moments and nuclear spin were the basis for the development of magnetic resonance imaging and dramatic new forms of medical diagnosis.").

[77] Molteni et al., *supra* note 62.

[78] Anil Oza, *NIH Cuts Halt 24-Year Program to Prevent HIV/AIDS in Adolescents and Young*

initiatives researching maternal mortality;[79] research on cancer, youth suicide, and bone health;[80] and programs within the National Institute on Aging dedicated to finding a cure for Alzheimer's.[81] The harm caused by the loss of this research is incalculable.

3. *Economic Growth*. Science funding has been 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."[82] It is "an economic powerhouse, creating jobs and fueling economic activity in communities across the country," and "driving innovation that supports America's global leadership."[83] NIH grants now produce $2.56 in economic output for every $1 of federal input.[84] In FY 2024 alone, NIH's $36.94 billion in awards to researchers in the United States generated $94.58 billion in economic activity nationwide.[85] And NIH funding supports 407,782 research positions and a biomedical industry with 7 million jobs nationwide.[86] These investments supercharge the American economy, "generat[ing] billions of dollars in wages, taxes, and increas[ing] the national GDP," a core indicator of economic health.[87] Indeed,

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Adults, STAT+ (Mar. 25, 2025), https://tinyurl.com/4xmufebw.

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

[80] 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.

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

[82] NIH, *Direct Economic Contributions* (Dec. 30, 2024), https://tinyurl.com/4cnuavan ("Each year, NIH awards over 60,000 grants that directly support more than 300,000 researchers at more than 2,500 different institutions.").

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

[84] *Id.*

[85] *Id.*

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

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

"[d]iscoveries arising from NIH-funded research provide a foundation for the U.S. biomedical industry, which contributes over $69 billion to the U.S. GDP each year."[88]

Pulling federal funding for scientific research will stall that engine of economic growth, creating a void that our geopolitical rivals are already eager to fill. Over the past 20 years, China "has narrowed the U.S. global lead," raising its contribution to global research and development from 5% to 22%, while America's has declined from 37% to 27%.[89] In fact, China has begun to outpace us on key metrics of scientific progress—including high-impact papers, contributions to *Nature* publications, and the total number of STEM PhDs matriculating each year.[90] A study published by the Massachusetts Institute for Technology recognizes that "America's position as the world's uncontested technology and innovation powerhouse has been steadily slipping."[91] Our government must expand its support for the sciences if it wishes to "maintain our historic preeminence in science and technology."[92]

NIH's termination of grants is already accelerating this trend, causing a drain on American talent and leading promising researchers to seek careers overseas.[93] As *Nature* observed in a recent study, "US scientists submitted more than 32% more applications for jobs abroad between January and March 2025 than during the same period in 2024," with overall searches for foreign jobs increasing by 35%.[94] In response to this realignment in interests, institutions in the European Union

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[88] NIH, *supra* note 86.
[89] Sci. & Techn. Action Comm., *China is a Determined and Formidable Competitor with the U.S. in Science & Technology* at 1 (last visited Apr. 24, 2025), https://tinyurl.com/bdhst4h6.
[90] *Id.*
[91] 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.
[92] Sci. & Techn. Action Comm., *supra* note 89.
[93] 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.
[94] Udesky & Leeming, *supra* note 93.

and China have begun accelerating their hiring and research investments.[95] The inverse is also true. Career transition grants such as MOSAIC, and other K99 initiatives, were a key incentive for researchers from foreign countries to move to the United States and invest in our institutions.[96] But following NIH's termination of these scientific grants, "applications to US institutions from researchers in Europe dropped by 41%."[97] America will no longer be the land of innovation and opportunity if this trend continues.

* * *

NIH's summary termination of scientific grants has been disastrous for American science. It has jeopardized the careers of leading researchers and stalled critical research into widespread and debilitating conditions. Its actions have begun to degrade American leadership in science and technology, stalling out an unmatched engine of geopolitical and economic primacy. Terminating MOSAIC and other grants aimed at diversifying science will close talent pipelines when we need them most. An injunction is urgently necessary to avoid these long-lasting harms.

CONCLUSION

This Court should grant plaintiffs' motion for preliminary injunction.

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[95] *See* Offord, *supra* note 93; Udesky & Leeming, *supra* note 93.
[96] *See* Offord, *supra* note 93.
[97] Udesky & Leeming, *supra* note 93.

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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: May 2, 2025

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