COMMENTARY

Government-Funded Health and Biomedical Research Is Irreplaceable

Victor J. Dzau, MD, National Academy of Medicine; and **Keith R. Yamamoto, PhD,** University of California, San Francisco

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ABSTRACT | *For eight decades, the federal government has invested in biomedical and clinical research that has transformed public health, fueled economic growth, undergirded national security, and established the United States as a global leader in science and innovation. Government support has been unique in its emphasis on basic knowledge discovery, its support of investigations that lack immediate promise of profitable product development, its underwriting of large-scale, long-term research endeavors, and its dedication to training future researchers. This public investment has produced a continuously evolving knowledge base and foundational breakthroughs that industry exploits to develop novel diagnostics and treatments. Moreover, transformative technologies emergent from biomedical research are addressing a wide range of societal challenges beyond health while contributing trillions to the US economy and boosting the national competitive advantage. Concerningly, however, recent policy changes, proposed agency reorganizations, and steep funding cuts threaten to derail this remarkable program of government support. A coherent strategy is urgently needed to sustain and coordinate the unrivaled strengths of government-funded research and ensure that its benefits reach all Americans.*

Introduction

The federal landscape for health and biomedical research is undergoing profound and unprecedented shifts. In recent months, sweeping policy changes and funding decisions have introduced widespread uncertainty and disruption—altering long-standing structures of support, challenging the incentives and capacities of research institutions, and prompting difficult questions about the future of scientific inquiry in the United States. These changes, including mass grant cancellations, proposed budget cuts, and agency reorganizations, threaten to reshape the research ecosystem in fundamental ways.

These developments raise a set of urgent questions: What is the value of government-funded scientific research to society, what are the consequences of pulling back that support, and could it be replaced by other resources? The authors seek here to answer these questions by examining the historical contributions, structural interdependencies, and public health and economic impacts of federally supported health and biomedical research—and by providing a foundation for informed dialogue in this time of upheaval.

The History of Federal Investment in Health and Biomedical Research

For the past 80 years, the federal government has built a vast program of health and biomedical research that has transformed the nation's health, prosperity, and security. This includes basic and clinical research, as well as studies to inform disease prevention, health systems innovation, and preparedness for emerging threats.

Currently, the National Institutes of Health (NIH) has the largest research budget of any agency within the Department of Health and Human Services (HHS)—approximately $47 billion in 2024

(Kaiser, 2024). Health and biomedical research also take place at the Centers for Disease Control and Prevention, the Food and Drug Administration, and other agencies within the Department of Health and Human Services, as well as the Department of Defense and the Department of Veterans Affairs.

It has not always been this way. Prior to World War II, most scientific research—health-related and otherwise—was funded by universities or philanthropies. During the war, however, the US government aggressively engaged scientists to lead and participate in massive efforts to bolster national defense and establish new capabilities. Within just a few years, remarkable breakthroughs emerged, including radar, synthetic rubber, penicillin, and the atomic bomb.

The return on government investment in science couldn't have been more obvious, and President Roosevelt wanted to sustain it. He commissioned a report from Vannevar Bush, Director of the Office of Scientific Research and Development, to evaluate the benefits of ongoing national support for scientific research. *Science, the Endless Frontier*, published in 1945, concluded that sustained investment in science, specifically basic research and training of the next generation of scientists, would be vital to postwar progress and prosperity in the United States (Bush, 1945).

What followed was the establishment of the National Science Foundation (NSF) and skyrocketing federal support for science, including biomedical and health research. Incredibly, by 1962, the NIH budget was 1,000 times what it had been in 1938 (El-Deiry, 2025). Over the past half-century, this investment has yielded enormous dividends for health and medicine (see *Box 1*).

The Government-Academia-Industry Research Ecosystem

The federal government's commitment to knowledge discovery and research training created an obligation to support science on a national scale,

BOX 1 | Selected Impacts from Government-Funded Biomedical and Health Science

- **Sequencing the human genome,** enabling genetic testing for rare diseases and personalized treatments.
- **Developing vaccines** for polio, hepatitis B, HPV, and COVID-19.
- **Neurological discoveries** supporting the development of SSRIs (anti-depressants) and other mental health interventions.
- **Heart disease prevention** through a new understanding of the dangers of high blood pressure, cholesterol, and smoking, which contributed to a 56 percent decline in heart disease deaths between 1950 and 1996 [a].
- **HIV/AIDS treatment and prevention,** including antiretroviral therapy and pre-exposure prophylaxis, which have helped to reduce the death rate from AIDS worldwide by 54 percent since 2010 [b].
- **New treatments for breast, lung, prostate, and childhood cancers** as well as new immunotherapies.
- **Prevention of Sudden Infant Death Syndrome** through the "Back to Sleep" campaign.

NOTES: [a] CDC. 1999. Achievements in public health, 1900-1999: Decline in deaths from heart disease and stroke. *Morbidity and Mortality Weekly Report* 48(30):649-656. Available at: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm4830a1.htm (accessed July 14, 2025). [b] UNAIDS. 2025. *Fact Sheet 2025: Global HIV statistics*. Available at: https://www.unaids.org/sites/default/files/2025-07/2025_Global_HIV_Factsheet_en.pdf (accessed July 14, 2025).

thereby requiring extensive physical infrastructure, including laboratories, administrators, scientists, and trainees. Rather than building such infrastructure from the ground up, the great bulk of US investment in science and technology—and in biomedical and health research in particular—depended both then and now on a cost-sharing arrangement with America's universities and medical schools.

Under this cost-sharing approach, academic researchers and trainees compete for federal grants and contracts to carry out government research projects. These grants and contracts cover the so-called "direct" costs of research—in other words, the materials and personnel payments directly related to a particular project. However, in addition, they cover a limited portion of the research facility's "indirect" or "facilities and administration" (F&A) costs. These include expenses not solely attributable to individual projects but necessary for the overall research infrastructure (e.g., maintenance, operation, and depreciation of research buildings and instrumentation; administrative support of research activities; and assurance of compliance with federal regulations governing research). The government relies on a rigorous process of evaluation and negotiation with research institutions to determine the appropriate level of F&A cost reimbursement (AAU, 2025).

The cost-sharing arrangement allows the NIH, for example, to support research at approximately 2,500 academic institutions across the United States without needing to underwrite the full costs of F&A at any of them (NIH, 2025a). By contrast, taxpayers cover the full costs of research, equipment, property, facilities, personnel, and administration in the country's 17 federally owned National Laboratories.

Over many decades, cooperation between the federal government and academia has produced synergies in priority setting; in development of expertise, workforce, and infrastructure; and in achievement of transformative scientific advances. Together, the federal government, academia, and the National Laboratories drive the vast majority of basic research in the United States. Private industry then contributes in essential ways to this ecosystem by investing in applied research and development (R&D), innovating on academia/government-driven foundational discoveries and early-stage research to create products and technologies that benefit the public while driving economic growth. Incentivized by government resources, industry is increasingly joining with government and academia in public-private partnerships to advance the pace of translating new knowledge into new products.

Each sector within this ecosystem—government, academia, and industry—provides unique, though not exclusive, benefits: government sets national strategy and priorities; academia contributes comprehensive expertise and infrastructure that drives discovery; and industry brings focus to innovation, production, and commercialization. Additionally, philanthropy's investment in biomedical research, while comparatively modest, contributes significantly by focusing on high-risk innovation, support for underfunded areas, and building research infrastructure (Shekhtman, 2025).

Notably, recently proposed policy actions threaten to disrupt this established ecosystem by significantly reducing the federal government's investment in health and biomedical research. Since January 2025, thousands of research grants, reaching into the billions of dollars, have been canceled or paused (HealthDay, 2025). The federal government has also withheld all research funding from a growing number of major academic institutions under allegations of discriminatory policies, resulting in costly legal battles (Speri, 2025).

In February 2025, the NIH suddenly limited F&A reimbursements on its grants to a single rate of 15 percent of allowable direct costs (a steep drop from current policies, which typically result in negotiated rates in the 40–60 percent range) (AcademyHealth, 2025). While currently constrained under court order, this policy alone would drastically reduce federal support for biomedical research within academic facilities. Furthermore, the proposed NIH budget for 2026 requests a 43 percent reduction in the NIH's annual funds (Frank, 2025). Similar impacts on basic research are evident at the NSF—a key funder of foundational science that underpins biomedical and health advances—which has halted new funding awards, capped F&A reimbursements at 15 percent, and begun a major internal reorganization that has included mass staff layoffs, termination of its advisory committees, resignation of its director, and displacement from its headquarters building (Mervis, 2025). Although many changes at NIH, NSF, and other agencies are still uncertain or pending, their potential consequences are profound; moreover, much damage already has been inflicted.

The Unique Benefits of Government-Funded Research

In recent decades, industry has begun to significantly outpace the federal government in spending on scientific R&D and now represents about 78 percent of the total (NSB, 2024). This raises the question of whether cuts in federal research spending could or will be offset by industry investment. In this context, it is important to recognize that not all funding is created equal. That is, despite its relatively smaller investment footprint, government funding is unique in undergirding the science and technology enterprise in at least four distinctive ways.

First, the federal government supports the vast majority of the basic research that establishes our understanding of biological processes and determines their molecular mechanisms—in other words, this research describes in detail the "operating systems" of cells and organisms. Knowledge of how these processes and mechanisms can go wrong and cause disease reveals "targets" for therapeutics or technologies that can treat, cure, or prevent disease. In other words, government-funded knowledge discovery enables industry-funded innovation and development of diagnostics and treatments that improve health and save lives.

Second, the federal government funds scientific inquiries that are not seen as profitable targets for industry, such as research on rare diseases. Because these conditions affect small patient populations, private industry lacks the financial incentive to investigate them or seek therapies. In aggregate, however, rare diseases affect 25 to 30 million people in the United States alone (NIH, 2025b). Federal agencies like the NIH provide targeted support to researchers who investigate rare genetic mutations and disease mechanisms and infer therapeutic approaches. Such research has led to the identification of previously unknown disorders, improved diagnostic accuracy, and revealed treatments that may never have emerged through market-driven research. Moreover, it is not infrequent that the investigation of a rare disease has uncovered new information or employed a novel technology useful for deeper understanding or approaches to treating more common ailments.

Third, the federal government plays a unique role in enunciating national strategies and priorities for health and biomedical research and bringing academia, industry, and patient groups together around common goals. Through presidential initiatives like the Cancer Moonshot or the All of Us Research Program, the government defines key areas of focus, coordinates large-scale research efforts, and allocates funding to drive progress in pressing health challenges.

Finally, and very importantly, as part of its cost-sharing arrangement with academic institutions, the federal government pays a substantial portion of the cost of educating and training the next generation of science, technology, engineering, mathematics, and medicine (STEMM) professionals. This is the workforce the nation relies on to sustain and expand US R&D leadership, including in the health and biomedical sphere.

Economic Benefits

Government-funded biomedical research has often provided the springboard for staggeringly profitable and field-defining industry ventures. For example, five decades ago, NIH-funded basic research into an esoteric microbial process termed restriction and modification resulted in the creation of the world's first biotechnology company, Genentech (López González, 2025). The company sought to clone human genes with therapeutic potential into bacteria, enabling biomanufacturing—inexpensive production, at scale, of the gene products. Since then, basic research and biotechnology have empowered many private-sector endeavors, such as the nation's biopharmaceutical industry. For example, NIH-supported studies contributed to every one of the 210 new molecular entities approved by the FDA between 2010 and 2016, with basic research on biological molecules and processes being the focus for 95 percent of those investigations (Cleary et al., 2018).

Foundational discovery research supported by federal dollars is essential to the development of new drugs, vaccines, medical devices, digital health tools, and other health innovations. Start-ups and major corporations alike rely heavily on this federally funded "innovation pipeline." Without this basic research and the continuous flow of discovered knowledge from government to industry, the nation's biomedical sector would be hobbled—with far-reaching impacts on the nation's economic competitiveness.

Driven by an ever-expanding array of methods and tools emergent mainly from basic biomedical research, biotechnology is the driving force behind the bioeconomy, a burgeoning economic sector now generating over 5 percent of US GDP and boosting the national competitive advantage (World Bio Market Insights, 2025). Reports project the bioeconomy's global annual value to be worth 4 to 30 trillion dollars over the next two decades (Hodgson et al., 2022). Importantly, the untargeted aspect of basic research has facilitated the application of biomedical technologies to address not only matters of public health and well-being but also a broad range of societal challenges, including energy production and storage, environmental remediation and climate resilience, food and water security, and advanced manufacturing. In addition, the 2025 report from the bipartisan congressional National Security Commission on Emerging Biotechnology emphasized the importance of investments in biotechnology to ensure competitiveness and national security (NSCEB, 2025). Continued public investment is essential to ensure that the United States remains a global leader across all these strategically vital domains.

Clearly, in addition to invaluable payoffs for public health, government investment in biomedical and health research fuels innovation, creates high-paying jobs, and supports the emergence and expansion of entire industries. Public funding to NIH, for example, is itself a powerful engine both for economic growth and for the public good: every dollar appropriated to NIH generates $2.46 in economic activity while also reducing health care and insurance costs through earlier diagnosis and more effective treatments, and by preventing disease overall (NIH, 2025c).

Need for a National Health and Biomedical Research Strategy

While the US government does many things well in terms of its biomedical and health research program, it is far from perfect. A 2024 National Academy of Medicine report, *The State of the U.S. Biomedical and Health Research Enterprise: Strategies for Achieving a Healthier America*, emphasized that, despite the nation's significant contributions to science and health, the research enterprise faces challenges due to insufficient and fragmented funding, lack of coordination, and workforce issues (NAM, 2024). More responsible and effective stewardship of taxpayer investment requires the development of a cohesive national strategy to streamline funding mechanisms, enhance federal coordination, ensure that benefits reach everyone in America, and bolster the research workforce. *Unleashing American Potential*, a report from the Vision for American Science and Technology (VAST) task force, frames such a strategy (VAST, 2025).

Encouragingly, these priorities align with the vision laid out in President Donald Trump's letter to Michael Kratsios, director of the White House Office of Science and Technology Policy, which calls for strengthening US leadership in science and technology through better coordination of federal research efforts, modernization of research infrastructure, and workforce development (The White House, 2025). Building on that momentum, a more unified and strategic approach could ensure that investments in biomedical research are appropriately coordinated and focused and efficiently utilized, leading to sustained innovation and improved health outcomes for all Americans.

Conclusion

From curing diseases once thought untreatable to fueling entire industries, the US government's commitment to biomedical research and training has been irreplaceable—especially in areas where private investment is limited or absent. Yet, as the research ecosystem faces upheaval and uncertainty amid budget cuts and policy shifts, there is an urgent need for thoughtful, strategic stewardship and increased investment. By reaffirming its commitment to a coordinated, well-funded, and inclusive research enterprise, the federal government can ensure that US leadership in scientific discovery is sustained, continuing to improve lives, advance economic and national imperatives, and prepare the nation for future health and societal challenges.

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Author Information

Victor J. Dzau, MD, is President of the National Academy of Medicine. **Keith R. Yamamoto, PhD,** is Vice Chancellor for Science Policy and Strategy at the University of California, San Francisco.

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Correspondence

Questions or comments should be directed to Laura DeStefano at ldestefano@nas.edu.

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