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The Transformative Power of NIH Funding: Advancing Careers, Science, and Public Health

Bassel Almarie[1], Felipe Fregni[1*]

[1] Neuromodulation Center and Center for Clinical Research Learning, Spaulding Rehabilitation Hospital and Massachusetts General Hospital, Harvard Medical School, Boston, USA.

The National Institutes of Health (NIH) is a major contributor to biomedical and public health research and advances. As of October 2024, 174 NIH-funded scientists have been the sole or shared recipients of 104 Nobel Prizes (Nobel Laureates | National Institutes of Health (NIH), n.d.), underscoring its influence on major achievements that have reshaped global healthcare—from infectious diseases to cancer, genetics, and beyond—ultimately improving our daily lives and wellbeing.

But beyond healthcare, NIH funding has also been identified as a proxy contributor to economic growth, driving important yet often overlooked economic benefits across both private and public sectors (NIH Research Grants Yield Economic Windfall | Nature, n.d.). While 8.4% of NIH grants directly result in patents, an additional 30% contribute research that is later cited in commercial patents. In other words, the indirect influence of NIH-funded science on innovation is nearly three times greater than its direct contributions, making public science an important driver of economic and technological progress (The Applied Value of Public Investments in Biomedical Research | Science, n.d.). Previous analysis demonstrates the significance of NIH funding on the economy, showing that a $50 billion investment in NIH funding generates at least $85 billion in short-term economic output and between $107.5 billion and $157.5 billion in long-term returns for the bioscience industry (Chatterjee & DeVol, n.d.). Moreover, nearly all FDA-approved drugs in recent years—99.4%—owe their development, at least in part, to NIH funding (Galkina Cleary et al., 2023).

*Corresponding author: Fregni.Felipe@mgh.harvard.edu
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Public investment in science is often justified by economic returns, but its greater contributions lie beyond financial metrics. The NIH lays the groundwork for breakthroughs in foundational sciences, many of which are often overlooked by private-sector priorities. One such example is a trial led by author F.F., funded by the NIH (Grant No. R21NS131635), investigating the neural underpinnings of open-label placebos. Participants received inert treatments openly, allowing researchers to track behavioral changes and physiological responses. The trial also examined hidden placebo effects, aiming to identify specific neural signatures associated with different placebo conditions. These findings are particularly useful for understanding the concept of conditioning and expectations in treating neurological diseases.

This line of investigation demonstrates the NIH's critical role in supporting innovative scientific exploration into complex biological and psychological systems. While industry often focuses on translational studies with clear regulatory pathways, NIH support uncovers mechanistic insights that both advance health and inspire private-sector innovation. By enabling foundational discoveries to become therapeutic advances, the NIH addresses unmet medical needs.

Over the years, NIH funding has evolved in response to various challenges, with periods of high and low funding growth often influenced by inflation and policy decisions (Galkina Cleary et al., 2023). A steady increase in the budget has been observed over the years, however, fluctuations in the inflation rates have impacted the real values of these enacted budgets. For instance, with the inflation adjustment of the National Cancer Institute (NCI) budget using the Biomedical Research and Development Price Index (BRDPI) (NIH — Office of Budget —Price Indexes, n.d.), the NCI in 2023 can afford 13%—or $1.1 billion—less than it could twenty years ago (Bertagnolli, n.d.). Despite a modest 1.2% increase in the NIH's

BRDPI-adjusted budget relative to 2003 (Galkina Cleary et al., 2023), the number of Research Project Grant (RPG) awardees has grown by 13% from 36,187 in 2003 to 41,157 in 2023 (Mechanism Detail for Total NIH FY 2000 - FY 2023 (V).Pdf, n.d.) coupled with a recent rise in direct and indirect real costs (National Institutes of Health Research Project Grant Inflation 1998 to 2021 | eLife, n.d.), reflecting the mounting strain of an increasingly underfunded environment. This subtle imbalance—growing demand and cost, shrinking capacity—speaks to a broader challenge facing the future of biomedical research.

This decline of purchasing power and research budgets is particularly challenging for early-career researchers, who often depend on smaller, exploratory grants to establish their footing in academia. Over a period of twenty years, NIH funding supporting scientists under the age of 35 plummeted dramatically from 22% to just 3.8% (Kennedy, 2002). Many promising young scientists are now leaving the field, driven by a lack of resources and the daunting task of sustaining competitive research programs with insufficient funding (Carulli, 2013). The rise in publications of student-doctors is largely due to the necessity of securing residency matches, reflecting academic inflation (Elliott & Carmody, 2023). As a matter of fact, nearly one-third of researchers exit academia within five years of beginning their publishing careers, and two-thirds leave within two decades (Kwiek & Szymula, 2024). Retaining skilled scientists is essential to sustaining long-term innovation and strengthening the U.S's ability to respond to emerging scientific and public health challenges.

Beyond the challenges ahead, the nation is currently suffering from several severe epidemics and other crises. Opioid overdoses claim over 100,000 lives annually, maternal mortality rates are rising alarmingly, firearm-related violence continues to claim thousands of lives each year at rates far higher than in other developed nations, and emerging childhood obesity is accelerating the aging process (Degli Esposti et al., 2024; Etzel et al., 2022; On Gun Violence, the United States Is an Outlier | Institute for Health Metrics and Evaluation, n.d.). These crises disproportionately impact marginalized and low-income populations, worsening inequities in healthcare outcomes (Alsan & Yearby, 2024). Returning to a pre-Covid status quo does not signify recovery; if anything, sidelined healthcare crises now demand sustained attention to prevent deepening inequities and strain on public health systems. The NIH-supported research has been key in addressing these challenges. Yet without sustained engagement, these efforts risk stagnating.

Addressing these challenges requires not only domestic intervention but also global cooperation. The NIH-funded research and researchers contributed to global diplomatic efforts, influencing international relations. By swiftly coordinating global health responses with the US and its global health partners, transmission of risk to Americans was diminished through continuous efforts of entities like the Fogarty Center (Drain et al., 2017). Scaling back leadership roles in global health initiatives risks undoing progress in low-income regions, where infectious diseases like tuberculosis, increasingly resistant to treatment, continue to spread (Keshavjee & Farmer, 2012). The absence of containment measures and global engagement in combating such threats could reignite global health crises, undermining decades of progress.

The argument for balanced scientific public funding is not simply economic—it is deeply human. The research it supports directly touches the lives of millions, whether through therapies that extend life, vaccines that prevent disease, or interventions that strengthen healthcare systems and avert crises before they occur. Yet scientific discovery is an intricate and fragile ecosystem that requires consistent and meaningful support. A budget constraint today disrupts progress tomorrow, delaying life-saving treatments and diminishing the nation's capacity to respond to emerging crises.

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Conflicts of Interest

The authors declare no conflict of interest.

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