OPTIMIZING NIH

We are pleased to convey this document, Optimizing NIH, which presents comment and recommendations that we commend to three government entities, the White House (and its Department of Health and Human Services, administrative home of NIH), Congress (which authorizes and funds NIH), and the National Institutes of Health (NIH) itself. Our goal is to promote adoption of changes in policy and practice that would further enhance NIH, the world's premier biomedical research and health agency.

This report was created by an ad hoc Working Group, convened by the Coalition for the Life Sciences. The Group includes not only two members with prior experience as Director of NIH, but also many researchers with distinguished research achievements (three are Nobel Laureates) underwritten substantially by NIH grants and training mechanisms. Each member brings deep insight borne of years, typically decades, of service as volunteers to enable and advance NIH activities and governance, and as leaders of research institutions or policy/advocacy organizations. Collectively, the group deeply values NIH's leadership and accomplishments, while also recognizing that large bureaucracies and longstanding policies can benefit from fresh insights.

While the seven recommendations in this report are not intended to be inclusive, addressing them would be broadly impactful. Some would require infusion of new funding, and we describe the substantial benefits that such investments would deliver. Other recommendations are actionable without substantial new costs; indeed, some could reduce costs, while markedly enhancing NIH's capacity for discovery, workforce development, and improvement in public health and wellbeing.

Our Working Group stands ready to respond to questions, provide further rationale for our recommendations or implementation details, or engage in work required to render the recommendations actionable.
Thank you for your attention and consideration.

On behalf of the Working Group,

Keith R. Yamamoto
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Executive Summary

United States investment in scientific research has been a critical driver of the nation's economic prosperity. The **National Institutes of Health** (NIH) is envied and emulated across the world for its unique approach to supporting fundamental discoveries that lead to transformational improvements in health. The significance of U.S. primacy in the global competition for innovation cannot be overstated, but that primacy is at risk. This report lays out seven recommendations for optimizing NIH that, if implemented, would ensure continued U.S. competitiveness.

Talented U.S. biomedical scientists submit far more highly promising research proposals than the current NIH budget can support. The changes recommended here will advance even more bold and innovative proposals, while supporting a more creative and effective workforce, and a more efficient allocation of resources. Not all of these changes require additional funding–indeed, some will save money. However, increased appropriations to NIH are essential if we are to drive the most impactful research, capitalize on recent discoveries to understand mechanisms of disease, design treatments and preventive strategies, and maintain U.S. leadership in science and medicine.

We must invest more, and do so in new and creative ways.

Overview

To unleash the creativity of the research community

Recommendation 1
Reinvent merit review

Pilot a two-stage review process in which the first phase requires only a one-page application focused on the creativity and potential impact of the proposal and not include the applicant's name and institution. The second phase would then evaluate a full application, shortened to tighten attention on the significance and promise of the proposed ideas. These changes will maximize identification of the most innovative research ideas with the greatest potential for broad impact.

Recommendation 2
Develop and apply data science and artificial intelligence technologies across all of NIH

Invest in data science and artificial intelligence across all NIH Institutes and Centers. This cross-NIH emphasis will unlock researchers' ability to discover patterns and correlations across biological systems from molecules to populations, revealing mechanisms of disease, facilitating design and development of treatments, predicting individual probabilities of contracting disease, and contributing to potential cures.

Recommendation 3
Incentivize research that crosses Institute/Center boundaries

Expand the Director's Common Fund to establish and support research opportunities that cross Institute and Center boundaries. Each of the Institutes and Centers of the NIH will be more efficient and effective with this mechanism to incentivize cooperation and collaboration among them.

To attract, empower, and sustain a world class workforce

Recommendation 4

Ensure a high-quality training and mentoring experience for all graduate students

Shift funding for graduate students progressively to training grants, which set high standards for mentoring and performance. Seek to make training grant support broadly available to students at institutions receiving NIH research funds.

Recommendation 5

Establish new career paths

Establish new career paths for PhD- or MD-trained scientists to strengthen expertise and mentoring in individual laboratories, research programs, and institutional facilities. As research has become increasingly collaborative and advanced technologies ever more essential, a critical need for new career experts has emerged.

Recommendation 6

Optimize funding opportunities for all career phases

Tune funding opportunity and award periods to specific career stages: scientists at the outset of their careers should be funded at elevated rates to permit efficient launch of their research programs; mid-career and established scientists who have been exceptionally successful should have options to apply for longer term support. These changes will also markedly reduce administrative demands on researchers, reviewers, universities, and the NIH.

Recommendation 7

Establish a career incubator in the Intramural Research Program

Identify, recruit, equip, and support a cohort of extraordinary PhDs with little or no postdoc experience to launch and manage bold and exciting independent projects for up to seven years in non-tenure track positions, after which they depart for extramural institutions. The NIH IRP, the largest biomedical research facility in the world, is an outstanding environment in which to foster early independence and jumpstart exciting contributions to science.

Introduction

The enormous power of the United States stems from its remarkable record of innovation.

Scientific innovation has been and continues to be the engine driving economic development and competitiveness, improving the health of the American people and enhancing national security. Our scientific competitiveness is the envy of the world. Other countries have attempted to duplicate the U.S. scientific enterprise, but none has created a system that rivals our robust research and innovation environment. The **National Institutes of Health** (NIH), the world's premier agency for supporting biomedical research, is key to our prominence in science and technology.

NIH-funded research has transformed our understanding of health and disease, created and now fuels the biotechnology industry, and trained a formidable biomedical workforce poised for new discoveries.

NIH-supported research has driven concrete and dramatic improvements in health in the U.S. and globally. Some treatment breakthroughs, such as curing sickle cell anemia through targeted genome editing and cell therapy were made possible by revolutionary NIH-funded advances, while others such as the steady decline in deaths from heart disease (60% over the past 40 years) and cancer (33% over 30 years) reflect the cumulative impact of a multitude of NIH-backed discoveries. NIH-funded research investigating the human papilloma virus, and the development of a vaccine targeting this insidious pathogen have virtually eliminated cervical cancer in women vaccinated during adolescence. NIH supported the development of remarkable new technology that enables special immune cells to find, bind, and specifically kill brain tumor cells. Indeed, there are hundreds of examples of how NIH-funded research is dramatically changing the U.S. health landscape.

Many groundbreaking medical advances have emerged from fundamental discovery ("basic") research, including studies of non-human "model" organisms. The study of seemingly obscure organisms has in fact been the backbone of 20th-and 21st-century biomedical advances. For example, the genetic effects of radiation were

We recommend seven changes in policy and investment that will ensure that NIH continues to lead in our ever more dynamic and competitive international health enterprise.

discovered in fruit flies, and our understanding of aging and age-related disorders (stroke, heart disease, and neurodegenerative disorders) was transformed by studies of a microscopic worm. Research investigating a chicken virus generated much of the knowledge needed to design treatments for AIDS, and analyses of bacterial immunity to viruses led to the discovery of gene editing, a powerful new tool in biotechnology and medicine. NIH's continued support of fundamental research remains key to enabling new discoveries that will tame chronic and infectious diseases, cognitive and neurodegenerative diseases such as Alzheimer's, enhance disease prevention and nutrition, and usher in an age of precision health care and nutrition. NIH-funded research is a major driver of economic development. The biotechnology sector, now generates over $500 billion/year. The competitive advantage of being "first to discover" helps to explain why the U.S. is estimated to account for 60% of the global biotechnology market. U.S. dominance of the pharmaceutical and medical devices markets is heavily dependent on NIH research. Fundamental discoveries made by NIH-funded scientists also drive innovation in non-health fields from agriculture to pollution remediation to materials science and chemistry.

Globally recognized U.S. dominance in biomedical research has attracted the brightest students from the U.S. and around the world to U.S. universities.

Globally recognized U.S. dominance in biomedical research has also attracted the brightest students from the U.S. and around the world to U.S. universities. Indeed, many foreign graduates stay in the U.S., expanding and enriching our research and biotechnology enterprise. Those who return home have been steeped in U.S. research practices and norms and remain connected with a network of U.S. collaborators.

Less visible, but no less important, NIH has established global standards for research conduct, integrity and communication. Its National Library of Medicine has made the published literature and shared resources like DNA sequence databases available to the world's research community. NIH has also led major initiatives, such as the Human Genome Project, Precision Medicine, and the BRAIN Initiative, that empower discovery across all of biology, as well as other science and technology sectors.

While NIH's accomplishments have been impressive, its continued global leadership is at risk. In 2000, U.S. research spending was eight-fold greater than China's. By 2017, China's spending was nearly equal to that of the U.S., having grown at almost double the pace of U.S. spending over that interval. The U.S. share of world R&D expenditure fell from 38% in 2000 to 25% in 2017, while that of East and Southeast Asia, including China, India, Japan and South Korea rose from 25% to 41%. China surpassed the United States in 2007 as the world's largest producer of doctoral degrees in natural sciences and engineering (excluding social and behavioral sciences) and has remained in the lead ever since. Perhaps reflecting the relatively flat federal spending on NIH research, fewer foreign recipients of U.S. graduate degrees are remaining in the U.S. after graduation and the U.S. is attracting a declining share of foreign students seeking degrees in science and technology.

The significance of U.S. primacy in the global competition for innovation cannot be overstated. Here we recommend seven changes in policy and investment that will ensure that NIH continues to lead in our ever more dynamic and competitive international health enterprise. The first three recommendations seek to better recognize and support especially creative and impactful NIH research. The remaining four recommendations address the necessity to build, empower and maintain the strongest biomedical workforce. In some cases, increased funding is justified to meet an urgent need to realize dramatic returns, but notably, some of our recommendations would be budget neutral or even reduce costs, while leading to greater impact. Whatever the budgetary implications, each of our recommendations will require an investment of political will to overcome inertia and adversity to risk, empowering relevant stakeholders to pilot and implement bold new approaches.

Unleashing the creativity of the research community

Reinvent merit review

NIH is entrusted with evaluating the merit of research grant applications that depends on the judgment of "study sections" - committees of peer scientists - from narrowly defined disciplinary areas who volunteer their services. Although this approach successfully identifies strong proposals for funding and is envied throughout the world, the application and review processes have become increasingly complex and inefficient, while the number of worthy applications far exceeds allocated funding. As a result, study sections are favoring safe, incremental research proposals from established researchers at prestigious institutions over bold and innovative new ideas. The higher funding rate afforded more cautious proposals makes researchers less likely to propose their best and boldest ideas.

To create incentives for more strongly advancing novel ideas through NIH's merit review system, we recommend the following revisions:

a. Pilot a two-phase application process. Phase I would require a single page synopsis of Abstract and Specific Aims, lacking direct or indirect identifiers of the investigator or their host institution. Approximately ~50% of applications would advance past this phase. Applications reaching Phase II, would be reviewed as full proposals, including identifiers and other details. Applicants would have the option to submit both phases for review in a single review cycle, or to submit only Phase I, preparing Phase II for the subsequent cycle. Other funders using this two-phase review process report that it identifies and supports unconventional ideas with potential for breaking new ground, and is more likely to recognize such ideas irrespective of the reputation or institutional affiliation of the applicant. NIH should design a pilot program to assess the impact of these changes on how proposals are ranked and on the quality of the review experience for applicants and reviewers.

b. Revise the Research Strategy section of all standard research project award (R01) proposals to be shorter (from 12 to 6 pages), and focused on significance (What would be the impact on the field if the work is successful?) and innovation (Is the idea a new one? Does the idea challenge prevailing paradigms or exploit novel approaches or technologies?). Eliminating detailed description of methods and preliminary results will greatly streamline these applications, and squarely focus on creativity and potential impact.

c. Populate merit review study sections with generalists, who can recognize highly original ideas that would be impactful if successful. Potential for failure should not automatically lead to rejection of a proposal, nor should past failure bias against future funding – these are commonly accepted principles in the technology sector.

d. Eliminate those ad hoc reviewers who are currently recruited as full participants in study section meetings solely for their expertise in specific experimental technologies. Instead, seek brief email commentary from two such outside experts, not on the grant application overall, but rather on whether the methodology proposed is appropriate and will accomplish the stated goal. The study section can then adequately assess the impact, innovation and methodological approach of the full proposal. This change will improve efficiency and elevate the overall quality of the review process.

These recommendations will enable funding of more impactful ideas, while reducing the cost of review and the administrative burden on applicants, applicant institutions, NIH, and reviewers.

Notably, however impactful these policy changes may be, they alone will not address the stark reality that only a small fraction of approved applications is funded. Moreover, the budgets of those that are funded are commonly reduced to levels insufficient to support completion of the proposed study. Hence, even successfully funded investigators must commonly submit applications for funding in almost every grant cycle.

Therefore, a final, urgent element of this recommendation is to appropriate increased levels of funding for support of NIH research project grants, with a focus on fundamental discovery research, the bedrock of future innovation.

Develop and apply data science and AI technologies across all of NIH

In recent decades, biomedical research has become an increasingly quantitative endeavor. Advances in data science and machine learning technologies now hold promise to accelerate this process, speeding even further the pace of discovery, development and application. Some estimates suggest that the amount of data generated in just a few years could soon surpass that collected in all prior human history. Individual researchers struggle to remain atop the flood of results in their narrow field. Clearly, discovery is being slowed and opportunities are being missed simply because researchers cannot possibly know, much less assimilate and relate to their studies, anything close to the full array of relevant information. Machine learning will greatly accelerate scientific discoveries.

Machine learning (ML) technologies, including especially but not exclusively artificial intelligence (AI), offer powerful tools to aggregate, integrate, and perceive patterns across myriad data types, and predict structures, dynamics and interactions of molecules or populations, in applications that span every element of biomedical research, public health, and health care. AI technologies can increase efficiencies and reduce costs across the life cycle of drug development — target identification, molecular design and testing, clinical trials, manufacturing and post-marketing evaluation. AI tools can also dramatically facilitate basic, curiosity-driven research, on which subsequent development and health applications depend. For example, AI has predicted more than 200 million protein molecular structures that previously were painstakingly determined one-by-one by more costly and slower experimental procedures. The predicted structures, in turn, enable new proteins to be designed in silico to carry out specific functions. AI algorithms can surveille imaging data, e.g., X-rays, MRIs, CT scans, increasing the speed and accuracy of diagnostic and clinical decision-support. AI tools can integrate or fractionate population-level health data to identify or predict community health risks. Generative AI tools are being developed that create structured data from recorded doctor-patient interactions and components of patient electronic health records.

We urge NIH to take a central role in conceiving, developing and refining these tools, setting standards for their efficiency and efficacy, and making them broadly available and enabling in each of its domains.

In doing so, NIH should be mindful of two important considerations: First, in most cases, creation of best-in-class tools will require highly sophisticated computer science expertise and capacity. Thus, NIH should contribute their biomedical research and health expertise, and relevant data sets, to collaborations with computer scientists at DOE National Labs, National Institute of Standards and Technology (NIST), or DOD; joint projects might be developed with NSF Computational and Data-Enabled Science and Engineering in Mathematical and Statistical Sciences Program. Such collaborations would deliver great strategic and intellectual value to NIH; moreover, the budget implications would be relatively modest, as most necessary resources will be underwritten, with many already in place, in the computation-rich collaborating agencies.

Second, NIH must acknowledge and address evident risks and potential negative consequences inherent in these technologies (as considered in the White House Blueprint for an AI Bill of Rights, and in the Bipartisan House Task Force Report on Artificial Intelligence). Primary among these problems for NIH is that many or most data compilations involving human subjects or materials are not representative of national or regional population demographics. It will be essential to develop policies, technologies, and practices that eliminate such problems in future data sets and algorithms,

Incentivize research that crosses Institute boundaries

The National Institute (singular) of Health was founded in 1930. In 1937, Congress created the National Cancer Institute and located it on the new NIH campus in Bethesda – the first in what would become a steady stream of Congressionally-created institutes, typically promoted by patient advocacy organizations, leading in 1948 to the name change, National Institutes of Health. By 1960, there were ten Institutes and Centers (ICs); there are now 27.

Institutes focused on particular diseases, organs, or symptoms, as are current ICs, have considerable merit, but increased understanding of biology and disease has made clear that defects in a particular biological mechanism or pathway can cause distinct diseases that cross those categorical boundaries. For example, failure to produce a functional cellular structure called a primary cilium can result in disorders ranging from kidney, liver, lung or pancreas dysfunctions, retinal degeneration, loss of smell, various brain anomalies, polydactyly (extra fingers or toes), to infertility. Thus, a conceptual or technological breakthrough in an IC pursuing one of these defects could well benefit research or increase understanding in several others.

Siloing of research, researchers, and research findings into separate NIH ICs can be problematic, inspiring many proposals over several decades to reduce the number of institutes and categorize them more “rationally”. Indeed, one such proposal was put forth as part of a “Framework for Discussion” in June 2024 by the House Energy and Commerce Committee, which authorizes NIH. While the current institute structure involves a certain amount of inefficiency, reconfiguring the IC org chart risks simply creating a new set of silos that complicate or inhibit in different ways the capacity to recognize and react to emerging areas of potential cooperation and synergy.

As a more efficient and flexible alternative, we recommend a major expansion of the Common Fund, a mechanism enacted through the 2006 Congressional comprehensive reauthorization of NIH for up to 5% of the NIH budget, in which the NIH Director provides funding for emerging or under-explored scientific opportunities or knowledge gaps, to be pursued jointly by at least two ICs. Any two or more ICs would be encouraged to co-design funding opportunities that leverage resources and programs currently isolated within those ICs. By jump-starting successful “perforation of silos”, this program will motivate further inter-IC coordination and interaction. Such success could be extended in the future to interactions across agency boundaries, such as those needed in Recommendation 2 for development of ML/AI technologies for biomedical research and health. A substantial increase in the current Common Fund appropriation, from $672M in FY24 to $1B in FY25 and expanding in later years to the level authorized by Congress in 2006, while still elevating the IC appropriations, would have a significant impact by accelerating IC interactions and synergies.

Attracting, empowering, and sustaining a world-class workforce

Ensure a high-quality training & mentoring experience for all graduate students

Integral to NIH's mission is the imperative to train the biomedical research workforce of the future. The basic model for this process dates back to the 19th century: graduate students undertake research under the supervision of an established investigator, culminating in award of a PhD. In recent decades, it has become a de facto requirement for PhD recipients who seek a career in academic research to enter a postdoctoral phase of additional mentored research. The degree of independence given to the postdoc is highly trainee- and supervisor-dependent.

The process is long and involves a web of intersecting conflicts of interest and misaligned incentives. Investigators depend on graduate students and postdocs to advance their own research. Prioritizing the rapid completion of dissertation research and departure to a post-doc or other position runs counter to a very real interest in retaining individuals proficient in the techniques essential to the laboratory's success. Mentoring and encouraging the development of independence can take a back seat to striving for maximum productivity. In the worst cases, abusive supervisors can exploit the power they hold over the future careers of the trainees in their labs in coercive and damaging ways.

These problems are all exacerbated by a growing trend toward supporting biomedical trainees on individual investigator's research grants. The reasons for this trend are twofold: First, the training grant and fellowship programs are woefully underfunded, so they support only a small fraction of eligible trainees, and then commonly for only a year or two of training. Second, only U.S. citizens and permanent residents are eligible for support under these programs (with the exception of the K99/R00 transition-to-independence award), rendering nearly half of biomedical graduate students — and more than half of all postdocs — ineligible.

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Training grant programs are IC- and/or discipline-specific, so institutions must apply for multiple training grants, subject to multiple merit reviews and site visits. The administrative burden is such that the process favors large, established research institutions with the support infrastructures to navigate the extensive application and reporting requirements.

The consequences of the continuous increase in investigator grant-supported trainees are highly concerning; investigators are not held accountable for how, or even whether their trainees are mentored. While most investigators are committed to ensuring supportive, positive, and successful training experiences, the absence of reporting requirements makes it impossible to identify and hold accountable those who are not.

The following changes would improve performance in this crucial domain:

a. Initiate annual progressive increases in funding for institutional training grants, predominantly for graduate students, toward a long-term goal of multiple years of support for a substantial fraction of eligible students. In the 23 IDeA (Institutional Development Award) states (those with historically low levels of NIH funding), indexing the funding of high-quality applications to the number of students in the program rather than the institution's level of NIH research funding would increase the rate at which training funding will move into those states. Institutions in other (non-IDeA) states would continue to compete for training grants based on training quality and career outcomes. Funding for this expansion of NIH training grant programs would be provided in part by savings from deletion of training funds from research grants. While this transition may need to be gradual, it should be intentional.

b. Make non-U.S. citizens eligible for training grant support. Currently, the K99/R00 transition to independence mechanism is the only NIH training mechanism available to non-U.S. citizens lacking permanent residence status. It has been highly successful in attracting and supporting brilliant non-U.S. citizen trainees who have elected to remain and work in the U.S. However, this mechanism is far from adequate given that non-U.S. citizens comprise nearly 50% of the NIH graduate student population. This critical cohort should be included in training grant funding.

c. Ensure that trainees understand how their work fits within the arc of science and society interactions, by including in training grant curricula articulation of the public context of science, and skills to communicate to the public and its elected representatives the immediate and potential future impact of their work.

d. Add specific mentoring responsibilities and require annual progress report updates for all research grants that provide trainee stipends. Reporting requirements should parallel those expected for training grant recipients, ensuring that all trainees' progress of all trainees is equally monitored. Success in mentoring and reasonable time-in-training should be included as criteria in evaluating future grant applications that continue to request funds to support trainees.

e. Reduce administrative burden on applicants, applicant institutions, and NIH by (i) bundling the current discipline-specific training grants into much broader categories (e.g., basic, clinical, population), thus reducing the multiplicity of training grant applications to be reviewed and administered; and (ii) making the training grant program NIH-wide, using a simplified common application format.

Establish new career paths

In the years since the expansion of federal support for fundamental research after World War II, the remarkable success of that commitment has facilitated a dramatic evolution in the scope and practices of research and training. That evolution warrants an NIH-academia shared effort to create and fund two new career paths for PhDs in biomedical research.

The need for one of these new career paths arises from a transition in recent decades of the role of the principal investigator from executing experiments proposed in a single R01 grant and guiding one or perhaps a pair of students, to managing a team of trainees, as well as multiple collaborations with other investigators, each with distinct backgrounds and expertise. These management responsibilities are time-consuming, but speed the pace of discovery.

The rationale for the second new career path reflects the fact that today's research typically involves highly sophisticated technology that cannot be accommodated in individual labs, and instead must be provided in shared technology facilities that efficiently serve large programs or whole institutions. The complex instrumentation must be overseen by dedicated scientist-technologists who develop the technology and often create new capabilities for it, while collaborating with and mentoring colleagues and trainees who seek to exploit the technology to advance their research.

Given these realities, we recommend that NIH create funding mechanisms to partially offset salary for two new academic career tracks, Scientific Director and [Research Technology] Director (where the specific technology would be named, e.g., Cryo-Electron Microscopy Director, Mass Spectrometry Director, etc.).

a. Scientific Directors would support individual laboratories or research programs, sharing with the faculty member(s) the planning and oversight of research projects, engaging in hands-on research of their own, and participating in day-to-day guidance and mentoring of trainees.

b. [Research Technology] Directors would oversee specialized technologies and facilities, mentoring and supervising researchers on the operation of the instruments, and using their deep expertise to adapt the instrumentation to fulfill specialized functions needed by research colleagues, virtually inventing new technologies.

These two career tracks would fill gaps and increase the capacity and efficiency of NIH-sponsored research, while establishing academic careers for talented scientists who are essential to the modern research enterprise. Academic institutions would cover part of the salaries for these new positions, as with the cost-sharing practices long-established for faculty salaries. Some new NIH funding would be required, but costs would be partially offset by the declining number of postdocs in academia.

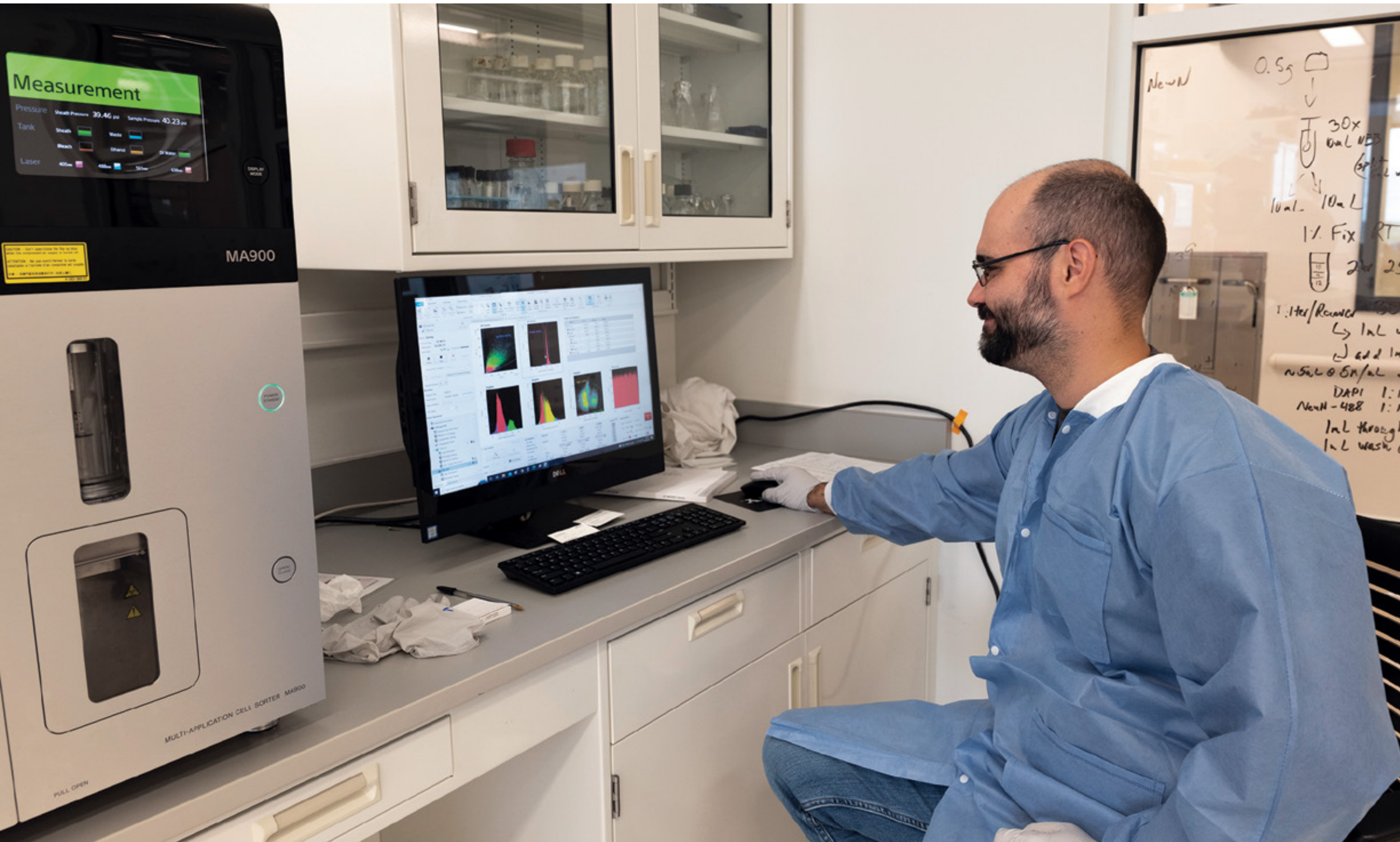
Optimize funding opportunities for all career phases

The mission of the NIH is best served by a biomedical workforce composed of a balance of early-stage, mid-career and senior investigators, in other words, a smooth and well-functioning pipeline. The NIH depends primarily on the R01 grant as a "one-size-fits-all" mechanism focused strongly on single investigator projects despite the strong scientific value now demonstrated by team-based, transdisciplinary research. While NIH has established programs to facilitate funding of early career scientists, the R01 mechanism continues to set an unacceptably high barrier to entry, delaying the launch of research careers. At the same time, some talented mid-career investigators, in whom the enterprise has made a significant investment, are so discouraged by low funding rates that they are leaving the scientific workforce. To optimize the retention and productivity of researchers at every career stage, the NIH should adopt funding paylines and periods tuned to different career stages.

a. Early-stage: Because so few grants can be funded under current budget constraints, many first-time R01 applicants spend two or more years at the beginning of their careers in applying and re-applying for support for research that could be significant and productive, but that they cannot begin without first securing funding. The NIH should pilot a program to fund a substantially greater proportion, e.g., >30%, for an initial three to five-year term R01 application, allowing the work to get underway, so that investigators can demonstrate their skills and the promise of their ideas in time to apply successfully for renewal.

b. Mid-career, established, and senior investigators: To address the next stage problem, NIH should offer an option for mid-career investigators to apply for funding for an extended term, 7 years, and for well-established investigators, 10 years. These would be short-form applications that emphasize their record of creativity and productivity, coupled with a brief research plan. Finally, for senior investigators approaching the end of active investigation, NIH could pilot a 3-year non-renewable award to support testing a new idea or approach that if successful, would open a new area of investigation for others to pursue.

These new funding terms would give researchers who have demonstrated productivity and creativity the freedom to pursue bold ideas instead of continuously preparing grant applications, while reducing administrative burden for investigators and reviewers, their institutions and the NIH. The elevated payline for first-time R01 applications would require only a modest increase in funds, whereas the other changes should save some administrative costs.



Reinvent the intramural program as a model career incubator

In 1940, NIH's new campus in Bethesda, MD included onsite research laboratories, but beginning in 1944, with authorization of NIH grants to universities and medical schools, the extramural research program became the primary focus of NIH, with 83% of the NIH budget now designated for extramural research. The intramural research program (IRP), however, has also grown and prospered. It is now the world's largest biomedical research institution, with more than 1,200 principal investigators and 4,000 postdoctoral fellows and a budget representing ~11% of the total NIH appropriation.

Recommendation 7

While the research carried out in the intramural program is of high quality, and includes some historically exceptional discoveries and contributions, we consider here whether the large capital expenditure that underwrites the IRP could contribute to progress in biomedical science in a way that is distinct from the extramural program.

One way to make the IRP more distinctive would be to develop it into a career incubator for extraordinary PhD scientists with no (or very little) postdoctoral experience. In such a program, versions of which have been developed on a small scale at several universities and research institutes in the U.S. and elsewhere (e.g., the European Molecular Biology Laboratory, Heidelberg), freshly minted PhDs would be nominated by their PhD advisors as having the intellect, skills, and drive to initiate and manage an exceptionally original and potentially impactful research program. Selected candidates would be provided an equipped lab, salary and research funding for up to seven years, after which they would depart for an extramural research position facilitated by a 3-year transition grant, making these candidates extremely attractive to extramural institutions, while encouraging intramural turnover. Such an incubator program would enable these exceptional individuals the opportunity to launch their research careers immediately, without the time and expense of postdoctoral training and research grant preparation, arguably at a career stage characterized by peak energy and creativity. The incubator will also place the IRP at the leading edge of emerging fields.

Experience with similar programs has shown that even small cohorts of such “Independent Fellows” gain stimulation and inspiration from associating with each other, and that their research programs and their very presence are exciting and energizing for the host institution. In turn, of course, they would learn, and be inspired and actively mentored, by the cadre of outstanding established scientists in the IRP.

A pilot for this program within the IRP might recruit a cohort of 100 Independent Fellows over the course of three years. If estimated costs for an independent fellow are approximately four-fold that for an IRP postdoc, the pilot could be fully paid for by a parallel 10% attrition-driven reduction over three years in the size of the IRP postdoc population.

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