POLICY FORUM: SCIENCE POLICY

The NIH Budget in the "Postdoubling" Era

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Five years ago, the U.S. Congress agreed to double the budget of the National Institutes of Health, setting a goal to increase the agency's budget to $27.3 billion by 2003. This was an extraordinary commitment to accelerate NIH funding, which over the past four decades had doubled roughly every 10 years (*1*).

In October 2000, the authors began to meet unofficially to consider how the biomedical research enterprise, and the remarkable momentum generated in the doubling period, might best be sustained. We were driven by our conviction that crucial to maintaining America's remarkably successful biomedical research partnership between the federal government and academia was trust that the commitments would be sustained.

Balancing the Commitment Base

A central challenge for NIH has always been balancing current commitments, initiating new projects, and funding new investigators. More than 50% of NIH funding is expended in investigator-initiated research project grants (RPGs). The award of a new RPG carries a funding commitment that averages just over 4 years. The recent surge in appropriations has permitted NIH to fund record levels of new and total research projects, and thereby to accumulate a substantial commitment base. Management of that base makes the NIH exquisitely vulnerable to static funding levels. This was vividly illustrated in November 2000, when Congress considered freezing the NIH budget. NIH developed contingency plans that would have resulted in a 40% decline from the previous year in the number of competing RPGs (*2*, *3*). Fortunately, the freeze was not implemented.

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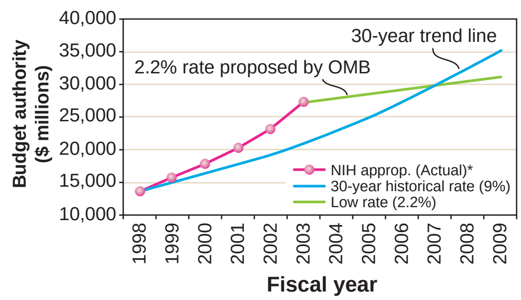

NIH appropriations compared with average rate from 1971 to 1998 (9%) and OMB-proposed low rate (2.2%) postdoubling. At the point of intersection of the curves in FY 2007, the net effect of the 5-year doubling investment on the magnitude of the biomedical research enterprise would be extinguished.

Previous disruptions in funding have had unfortunate consequences. In the late 1980s and early 1990s, the federal budget deficit, a recession, and administrative changes within the NIH caused oscillations in funding. Under pressure from Congress and others, NIH attempted to maintain the numbers of new awards artificially by spreading insufficient funds more widely; the agency routinely cut requested research budgets by more than 20%. These reductions were arbitrary and much deeper than those recommended by peer reviewers and institute councils (*4*). The Congress and Administration also increased disallowances on indirect cost recovery and placed caps on the recovery of salaries, direct administrative support, and tuition payments on training awards. The net effect was to destabilize established research teams, to create uncertainty in young people contemplating research careers, to stimulate investigators to slice research projects into smaller grant proposals, and to shift a larger share of funded research costs onto awardee institutions.

The current rapid expansion of NIH programs has stimulated similar concerns about the years to follow (*5*), causing one legislator to ask the acting NIH Director, "if we come to a ledge and we drop off—what's going to happen?" (*6*).

A Funding Model

The "doubling" budget increases of 14 to 16% annually will not recur in the near term. We began by negotiating a common set of principles for prioritizing and allocating resources. These principles were applied to a funding model that estimated various scenarios for budget growth in the 3 years after doubling. These scenarios included annual growth rates of 4, 6, 8, and 10%, and assumed an appropriation of $27.3 billion for NIH in FY 2003. The model tested how priorities conflicted under each budget scenario. It was not designed to identify a single solution, but to determine whether the principles could be applied to future funding scenarios in a manner that permitted the NIH flexibility in meeting its goals.

Principles for Prioritizing Resources

Preserve the integrity of the merit and peer-review processes. This requires that an appropriate success rate for funding relative to approval be maintained. "Appropriate" is widely accepted to lie between 30 and 40%. Lower success rates force reviewers to try to make overly fine discriminations among proposals, to divert the energy of applicants to repetitive proposal writing in an atmosphere of growing hopelessness, and to create a climate of disinclination to fund innovative proposals (*7*).

An adequate flow of funds into new and competing RPGs is needed for peer review to function, for attracting young people into research careers, and for NIH to be responsive to new research ideas. Accordingly, the model incorporated these concepts within its parameters: (i) The RPG success rate should not fall below 30%; (ii) funding should be maintained for competing RPGs at not less than 14% of the NIH budget; (iii) fluctuations in grant levels should be avoided.

Preservation of peer review also requires maintenance of adequate support for NIH research management and support (RMS) functions that have substantially increased in recent years.

Maintain new investigators. Because an influx of new investigators is essential, the number of NIH-supported training opportunities should be maintained and supported at realistic funding levels for stipends, tuition, and benefits. Stipends of first-year postdoctorate students should be increased to $45,000 annually, and for predoctoral trainees to $25,000, in agreement with the new policy objectives for NIH training grants (*8*). Transitional mechanisms like new career development ("K") awards for clinical researchers should be maintained, and loan repayment programs should be fully funded. New programs of start-up funding for senior postdoctoral fellows [like the NCI's Temin awards (*9*)] should be expanded.

NIH FUNDING INDICATORS UNDER TWO MODELED SCENARIOS

NIH growth scenario	8% Model		4% Model	
Fiscal year	2004	'06	2004	'06
Number of new and competing grants	10,600	11,100	9,950	9,450
Total number of grants	39,860	44,555	38,775	41,249
Average cost increase for noncompeting grants (%)	+4.2	+4.2	+2.5	+3.0
Research centers, other research (%)	+8	+7	+3	+3
Training (%)	+5	+5	+3	+3
Increase in total nos. of RPGs (%)	+5.7	+5.0	+4.2	+2.1
Success rate (%)	32	32	30	27

NIH funding indicators under two scenarios. A more detailed table is available (*14*).

Sustain commitments to continuing awards. Funding stability is essential for success of multiyear research projects, for stabilization of research teams, and for training and career development of new scientists. Average duration of the RPG award should not fall below 4 years. Funding for continuing awards should recognize that measures of inflation in biomedical research tend to exceed the Consumer Price Index by approximately 1.5% per year.

The average cost of awards has increased markedly during the doubling period (up more than 44% from 1998) (*10*), largely because of scientific advances and the introduction of new technologies. Arbitrary reductions in recommended funding of awards could have even more adverse effects on NIH research than in earlier years. If reductions from peer-recommended levels of funding are necessary, the cuts should not exceed 3 to 6%.

Preserve the capacity of awardee institutions. There is already significant cost-sharing, direct and indirect, on federally sponsored biomedical research, and the financial stresses on academic medical centers provide little capacity for further cost-sharing. Congress and NIH must recognize that reductions in approved budgets will reduce the scope of research accomplished.

Recognize new needs of contemporary biomedical science. Scientific progress is invariably accompanied by growing complexity and expense. New areas of research underscore modern biology's reliance on sophisticated instrumentation, information systems, animal models, specialized support facilities, and large teams of individuals with highly specialized skills. Translation of new basic research advancements to clinical research and improved patient care will require that a sophisticated research infrastructure, still embryonic, be integrated into health-care delivery systems. NIH budgets should continue to respond to scientific opportunity by providing adequate funding for the National Center for Research Resources and other NIH components that support major research resources.

Maintain a robust intramural NIH research program. The NIH intramural program is the organizing center of our nation's biomedical research enterprise. The last comprehensive review of this program occurred in 1994 in a different climate of science and funding policy (*11*). The scope and needs of the program would benefit from reexamination.

Lessons from the Model

Resource allocations can conform to these principles if overall funding is maintained at 8 to 9% annually, near the historical rate (*12*). Annual appropriations increases of less than 6% squeeze competing funding priorities and force retrogressive choices on NIH leadership. At risk would be new research support, maintenance of previous commitments, adequacy of support for equipment and shared resources, shrinkage of training opportunities, and other deleterious consequences.

To ease the transition to the postdoubling environment, NIH should continue to increase infrastructure and training support and should attempt to reduce existing cost-sharing. Once doubling is finished, the pressure to share costs will increase. Thus, the level of annual growth for NIH, between 2.1 and 2.3% (*13*), included in the *President's Budget for FY 2004–07* is alarming and worse than any scenario we modeled (see figure, previous page, and table, this page); it would create wrenching choices for NIH and the research community.

New Realities

The Administration has proposed a FY 2003 budget of $27.3 billion for NIH, a 15.8% increase over the current year; if funded, this will complete the doubling goal. The budget allocates 53% of the increase to NIAID, primarily to counter bioterrorism, and to NCI. Most other NIH institutes and centers would receive budget raises between 8 and 9%, which means that they would be managing a postdoubling research portfolio next year. This is due to dramatic changes in the economy and national priorities.

The first change is the disappearance of the projected federal budget surplus and the return to deficit spending. The second, far more momentous, change occurred with the terrorist attacks on America. Forthcoming budgets must properly reflect expanded priorities for military readiness and national security. The president requested that $1.75 billion of the $27.3 billion requested for NIH be directed to biological defense, of which $1.08 billion is dedicated to basic and applied research. This may well generate new, broadly applicable innovations, as well as focus attention on such areas as emerging infectious diseases, vaccine development, and restoration of the nation's public health infrastructure. It also may inadvertently "crowd out" spending for research activities not directly related to biodefense.

Many policy-makers may feel that the federal government has done its part for NIH-funded research and that the agency can be allowed to coast, aside from its bioterrorism research, at static levels of funding. To the contrary, we emphasize that levels of growth below 6 to 8% will negate many of the advantages achieved by the doubling and will undo the benefits of this extraordinary and bold policy decision. They will also severely strain the relationship of trust between NIH and its awardees on which our nation's successes in biomedical research rest.

References and Notes

1. NIH Almanac—Appropriations; available at www.nih.gov/about/almanac/appropriations/index.htm.
2. *NIH Grants News* (Office of Extramural Research, National Institutes of Health, Bethesda, MD, November 2000); available at http://grants2.nih.gov/grants/newsarchive_2000.htm#20001120; accessed 8 March 2002.
3. S. Haley, *Washington Fax*, 30 November 2000.
4. Division of Research Grants, NIH, *Extramural Trends: Fiscal Years 1985–94* (NIH publ. no. 96-3506, National Institutes of Health, Bethesda, MD, October 1995).
5. D. Malakoff, *Science* **292**, 1992 (2001).
6. Hearing transcript, Senate Committee on Appropriations, Subcommitee on Labor, Health and Human Services, Education, and Related Agencies, 23 May 2001, p. 17
7. Association of American Medical Colleges, *Maximizing the Investment* (Association of American Medical Colleges, Washington, DC, 1998).
8. "NIH statement in response to addressing the nation's changing needs for biomedical and behavioral scientists," March 2001; available at http://grants.nih.gov/training/nas_report/NIHResponse.htm; accessed, 22 March 2002.
9. "The Howard Temin Award," Program Announcement PAR-00-66, National Cancer Institute, Bethesda, MD, 22 February 2002; available at http://grants2.nih.gov/grants/guide/pa-files/PAR-00-066.html.
10. *The FY 2003 President's Budget for HHS: The Budget in Brief* (Government Printing Office, Washington, DC, 2002), p. 44; available at www.hhs.gov/budget/docbudget.htm.
11. P. A. Marks, G. H. Cassell, *NIH Intramural Research Program, Report of the External Advisory Committee of the Director's Advisory Committee and Implementation Plan and Progress Report* (National Institutes of Health, Bethesda, MD, 1994).
12. Annualized rate of growth in NIH appropriations from 1971 to 1998, not adjusted for inflation.
13. *The President's Budget, FY 2003* [Office of Management and Budget, FY 2003 Analytical Perspectives (database), February 2002].
14. Supporting Online Material is available at www.sciencemag.org/cgi/content/full/296/5572/1401/DC1.