NIH at the Crossroads: Strategies for the Future

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Director
National Institutes of Health
NIH Budget Facing a “Perfect Storm” in 2006

- Federal & Trade Deficits
- Defense and Homeland Security needs
- Katrina
- Pandemic flu
- Post- Doubling effects
- Physical Sciences focus
- Biomedical research inflation- 3 to 5%
Competition for funds from the NIH and other sponsors, intensifying year by year, now stands at an unprecedented level, and shows no sign of abating. Never before have so many established investigators faced so much uncertainty about their longevity as active scientists. Never before have so many novices faced so many disincentives to entering or continuing a research career.

Dr. William F. Raub, NIH Associate Director for Research and Training, strategy paper, 1982
What Is Really Happening?
3 Fundamental Drivers

- Large capacity building throughout U.S. research institutions and increase in number of new faculty
- Appropriations below inflation after 2003
  - Increases of 3% in ‘04, 2% in ‘05 and 0% in 06
  - Biomedical Inflation in 2004 was ~ 5%
- Budget cycling phenomenon
Investment in Research Facilities at U.S. Medical Schools

AAMC – Survey of Research Facility Investments (99 of 125 AAMC Member Schools)
* Data Based on AAMC Faculty Roster
New Grant Applications, Applicants and Success Rates

*During and After Doubling Period*

<table>
<thead>
<tr>
<th>Year</th>
<th>Applicants</th>
<th>Applications</th>
<th>Success Rate of Grants Funded</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td></td>
<td></td>
<td>10%</td>
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<tr>
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<td>15%</td>
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<td>30%</td>
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<td>35%</td>
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<tr>
<td>2004</td>
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<tr>
<td>2005</td>
<td>49,660</td>
<td>43,069</td>
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<tr>
<td>2006</td>
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<tr>
<td>2007</td>
<td>52,000</td>
<td>49,656</td>
<td></td>
</tr>
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</table>

Projected changes:
- +8,359
- +8,303
- +8,303
- +8,303
- +8,303
- +8,303
- +8,303
- +8,303
New Grant Applications, Applicants and Success Rates

During and After Doubling Period

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<th>Projected Apps</th>
<th>Applications</th>
<th>Applicants</th>
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<tr>
<td>2005</td>
<td>49,656</td>
<td>43,069</td>
<td>+5,334</td>
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<tr>
<td>2006</td>
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<td>+5,208</td>
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<tr>
<td>2007</td>
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</tbody>
</table>

- Success Rates
- Applications
- Applicants

% Success Rate of Grants Funded

Number of Applications/Applicants
Inflation Eroded Gains in NIH Funding

Real and Nominal NIH Funding Levels Since 2003

Nominal funding

Adjusted by BRDPI

7.3% loss in purchasing power since 2003

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Natural Funding</th>
<th>Adjusted by BRDPI</th>
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<tbody>
<tr>
<td>FY 2003</td>
<td>26.7</td>
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<td>FY 2004</td>
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<tr>
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<tr>
<td>FY 2006</td>
<td>28.2</td>
<td>24.8</td>
</tr>
<tr>
<td>FY 2007</td>
<td>28.2</td>
<td>24.8</td>
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</table>

% Change:
- NIH Nominal Funding: 5.5%
- Adjusted by BRDPI: -7.3%

Note: BRDPI is the Biomedical Research and Development Price Index
The Budget Cycling Phenomenon:

*What Funds are Available in any One Year?*

- **Budget Increase**
  - From current year to previous year
- **Uncommitted Funds**
  - From ending grants started 4-5 years ago
- **Committed Funds**
  - Continuing grants

NIH Appropriations
Billions of Dollars

NIH Congressional Appropriations

DOUBLING

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Appropriations</th>
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<tr>
<td>FY 1998</td>
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<td>FY 2006</td>
<td>$28.6</td>
</tr>
<tr>
<td>FY 2007</td>
<td>$28.6</td>
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</table>
The Bottom Line:
Demand for Grants “Took Off” Just as NIH Budget Was “Landing!”

- Post doubling “boom” in applications has led to demand/supply imbalance
- NIH managed well despite small increases in 2004 (2.9%) and 2005 (2%) but flat 2006 made it difficult to adjust
- ~80% of success rate drop is due to increased demand for grants
- ~20% of drop is due to increased costs of grant and inflation effects.
- Budget cycling effect will improve demand vs supply of grants in 2007
Common Misperceptions
Common Misperception: NIH is Over-Emphasizing Applied Research

<table>
<thead>
<tr>
<th>Year</th>
<th>Basic Research</th>
<th>Applied Research</th>
<th>Other</th>
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<tbody>
<tr>
<td>FY 1998</td>
<td>53.9%</td>
<td>40.5%</td>
<td>5.7%</td>
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<tr>
<td>FY 1999</td>
<td>55.2%</td>
<td>39.2%</td>
<td>5.5%</td>
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<tr>
<td>FY 2000</td>
<td>56.4%</td>
<td>38.4%</td>
<td>5.2%</td>
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<tr>
<td>FY 2001</td>
<td>56.6%</td>
<td>38.5%</td>
<td>4.8%</td>
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<tr>
<td>FY 2002</td>
<td>55.2%</td>
<td>39.8%</td>
<td>5.0%</td>
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<tr>
<td>FY 2003</td>
<td>52.1%</td>
<td>40.8%</td>
<td>7.0%</td>
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<tr>
<td>FY 2004</td>
<td>53.0%</td>
<td>43.5%</td>
<td>3.6%</td>
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<tr>
<td>FY 2005</td>
<td>55.2%</td>
<td>41.0%</td>
<td>3.7%</td>
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<tr>
<td>FY 2006</td>
<td>55.8%</td>
<td>41.0%</td>
<td>3.1%</td>
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<tr>
<td>FY 2007</td>
<td>56.1%</td>
<td>40.8%</td>
<td>3.1%</td>
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Common Misperception: NIH Shifting Towards Solicited Research with too many RFAs

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Unsolicited</th>
<th>Solicited</th>
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<tbody>
<tr>
<td>1994</td>
<td></td>
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<td>2004</td>
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<tr>
<td>2006</td>
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Percentage of Grants

- Unsolicited
- Solicited

Fiscal Year

- 1994
- 1996
- 1998
- 2000
- 2002
- 2004
- 2006

Graph showing the percentage of grants over fiscal years from 1994 to 2006, with a range from 0% to 100%.
Common Misperception: NIH Roadmap is Shifting Major Funds Away from Grant Pool

FY2005 Request = $28.757B

- Developed to increase synergy across NIH
- Not a single initiative but over 345 individual awards in FY 2005, 133 institutions, 33 states:
  - 40% basic
  - 40% translational
  - 20% high risk
The Question on Everyone’s Mind: 

What are MY chances of being funded?
Payline Is Not Funding Cut-off Line

>99% of grants under the payline are funded

Percent R01s Funded

Success Rate per application

Percentile Score
Success Rate **per Application** Understates Funding Rate **per Applicant**

Success Rate files as of May 3, 2006. Program srf_indiv_060103_rfm
Individuals are determined using the pi_profile_person_id in IMPAC II
Where Do We Go From Here?
NIH Must Develop Adaptive Strategies: Key Principles

- Protect core values and mission: *Discovery and New Knowledge*
- Protect the future: New Investigators
  - Pathway to Independence Program
  - Institutes and Centers efforts to assist new investigators
- Manage the key drivers
  - Supply/demand of grants
- Proactive communications
  - A unified message about value of NIH’s investment and need for sustainability
- Promote NIH’s vision for the future
Balanced National Biomedical Research Portfolio

NIH

Clinical Applications

Translational Research

Basic Research and Technology Development

Private Sector

Clinical Applications

Translational Research

Basic Research
Enhanced Support for New Investigators-
PATHWAY TO INDEPENDENCE AWARD

- Five years of support consisting of two phases
- Phase I provides 1-2 years of mentored support for advanced post doctoral fellows- 90k per year
- Phase II provides up to 3 years of independent RO1 equivalent research support- 250k per year
Central Themes in NIH Communications:
A Vision for the Future and Congressional Hearings
What is the return on the American people’s investment in the National Institutes of Health?

What has the NIH budget doubling accomplished?

What is the NIH strategy for the future?
Coronary Heart Disease

- 63% decrease in mortality
- 10 million early deaths averted per year
- $2.6 trillion in economic return
- Industry, effective investments and prevention strategies
- New discoveries being developed with industry

Average investment per American

30-year investment per American: ~$110

Total

Year
Deaths per 100,000

~ 1,329,000 Projected Deaths
~ 555,000 Actual Deaths in 2000
Cancer

- For the first time in recorded history, annual cancer deaths in the United States have fallen.
- Improved effectiveness of early detection and screening.
- Doubling, new minimally invasive therapies for cancer multiplied.
- New drugs developed for cancer prevention.

Average investment per American: \(~$8.60\) per year

30-year investment per American: \(~$260\) Total

U.S. cancer deaths
In thousands

<table>
<thead>
<tr>
<th>Year</th>
<th>0</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
<th>600</th>
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SOURCE: National Center for Health Statistics
GRAPHIC: The Washington Post

Survivorship

<table>
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<tr>
<th>Year</th>
<th>1971</th>
<th>1986</th>
<th>1990</th>
<th>2003</th>
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<tbody>
<tr>
<td>Millions of People</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>9</td>
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</table>
New Discoveries Make it Possible to “Personalize” Cancer Treatment

Identified 16 informative genes

Test tumor samples for mutations in these genes

Impact:
70,000 breast cancer patients per year may not have to undergo chemotherapy

Predict which patients need chemotherapy
A World Without a Strong NIH

How would we face new threats?
Doubling the Budget Allowed NIH to Expand the Scope of its Mission

- **New Biodefense Mission**
  - Multiple countermeasures

- **New Vaccine Research Center**
  - Over 14 new vaccines

- **HHS Pandemic Flu Preparedness**
  - H5N1 Vaccines and Drugs

- **New fields of research:**
  - Genomics
  - Bioinformatics
  - Institute of Biomedical Imaging and Bioengineering
Human Genome Project and HapMap: The Foundation of a New Medical Era

- New powerful DNA sequencing technologies
- 2007 Genes, Environment, and Health Initiative
  - Identify roots of 10 most common diseases within 3 years
  - Devise new ways of monitoring personal environmental exposures
  - Guide new treatments
## Broadening the NIH Vision

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<tr>
<th>FY 2004</th>
<th>FY 2005</th>
<th>FY 2006</th>
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</thead>
<tbody>
<tr>
<td>NIH Roadmap for Medical Research</td>
<td>NIH Strategic Plan for Obesity Research</td>
<td>NIH Neuroscience Blueprint</td>
</tr>
<tr>
<td>- Involves entire NIH</td>
<td>- Involves 19 Institutes and Centers</td>
<td>- Involves 15 Institutes and Centers</td>
</tr>
</tbody>
</table>

*Image © Time magazine, June 2004*
Example of Interdisciplinary Research:
Deep Brain Stimulation Treatment for Parkinson’s Disease

Without “Brain Pacemaker” Stimulation
Example of Interdisciplinary Research:
*Deep Brain Stimulation Treatment for Parkinson’s Disease*

*With “Brain Pacemaker” Stimulation*
Example of Interdisciplinary Research:
Deep Brain Stimulation Treatment for Parkinson’s Disease
With Doubling, NIH Expands Funding Across U.S.

3,114 New Technologies Brought to Market

Funding to Develop Technologies Provided by Both US Government and Private Industry

4,543 New Companies Formed

2,671 Companies Still in Operation as of 12/2004
America Is Living Longer
And Healthier

- Improvements in:
  - Recovery from heart disease, stroke
  - Vision impairment
  - Osteoporosis
  - Bone and joint health
  - More effective classes of drugs for arthritis
  - Improvements in joint replacement technology

Since 1982, disability rate for elderly Americans declined by 30%

In past 30 years, American life expectancy increased by ~6 years
Facing the Rising Challenge

U.S. Health Expenditures per capita

$7100 per American in health care costs

$95 per American in NIH investment

The Future Paradigm:
Transform Medicine from Curative to Preemptive
NIH Transforming medicine and health through discovery