High-Risk High-Reward Research Demonstration Project

NIH Council of Councils

November 20, 2008

Faye C. Austin, Ph.D.
Consultant to the Director
Division of Program Coordination, Planning,
and Strategic Initiatives (DPCPSI)

NIH Reform Act 2006:
Demonstration Projects

- **Bridging the Sciences**:

  Grants for biomedical research at the interface between the biological, behavioral, and social sciences and the physical, chemical, mathematical, and computational sciences

- **High-Risk High-Reward (HRHR) Research**:

  Grants, contracts or "other transactions" for high-impact, cutting-edge research that fosters scientific creativity and increases fundamental biological understanding leading to the prevention, diagnosis, and treatment of diseases and disorders

Demonstration Projects: Implementation

- NIH Legislative Implementation Action Plans (LIAPs) completed June 21, 2007

- Two Demonstration Oversight Groups (DOGs) created, comprised of senior NIH officials, to review current NIH activities in each of these two areas and prepare recommendations for specific programs as needed beyond on-going activities

- Implementation Groups created to assist Oversight Groups

- If appropriate, demonstration project proposals may be nominated for consideration as a Roadmap Initiative

- **Obtain second-level review from Council of Councils prior to funding grants**

HRHR Demonstration Project:
Specific Goals of LIAP

- Define standards for evaluation and reporting

- Conduct a portfolio analysis to identify gaps and opportunities in supporting HRHR research

- Identify and develop potential initiatives as needed

- Seek to facilitate partnerships between public and private entities and coordinate when appropriate with the Foundation for the NIH

- Create a report to Congress by September 2009

HRHR Demonstration Oversight Group

Members

Griffin P. Rodgers, M.D. (co-Chair)
Director
National Institute of Diabetes and Digestive and Kidney Diseases

Stephen Katz, M.D., Ph.D.
Director
National Institute of Arthritis and Musculoskeletal and Skin Diseases

Lawrence Tabak, D.D.S, Ph.D.
Director
National Institute of Dental and Craniofacial Research

Nora D. Volkow, M.D.
Director
National Institute on Drug Abuse

Carl Roth, Ph.D., LL.M.
Associate Director for Scientific Program Operations
National Heart, Lung, and Blood Institute

Richard G. Wyatt, M.D.
Deputy Director
Office of Intramural Research

HRHR Demonstration Oversight Group

Members (continued)

Mark Rohrbaugh, PhD., J.D.
Director
Office of Technology Transfer
Office of Intramural Research
Office of the Director

Diane Frasier
Head of Contracting Activities
Acting Director
Office of Administration
Office of Acquisitions and
**   Logistics Management**
Office of the Director

Lynn Hudson, Ph.D.
Deputy Director
Office of Science Policy
Office of the Director

Walter Schaffer, Ph.D.
Senior Scientific Advisor
Office of Extramural Research
Office of the Director

Catherine Manzi, J.D.
Attorney Advisor
Office of the General Counsel
Office of the Director
Department of Health and
**   Human Services**

Facilitator
Faye C. Austin, Ph.D.
Special Assistant (contractor)
Division of Program Coordination,
**   Planning, and Strategic Initiatives**
**   (DPCPSI)**

HRHR Implementation Group

- Co-Chairs:
  - Carl Roth, Ph.D., LL.M.
  - Associate Director for Scientific Program Operations
  - National Heart, Lung and Blood Institute
  - David Armstrong, Ph.D.
  - Chief, Scientific Review Branch
  - National Institute of Mental Health

- Members representing:
  - 25 NIH ICs
  - NIH/OD Program Offices
  - OD, OER, OIR and DPCPSI

Facilitator:
Faye C. Austin, Ph.D.
Special Assistant (contractor), DPCPSI

HRHR Demonstration Project: Status of Specific Goals

➤ Define standards for evaluation and reporting:
  - ✓ Created HRHR definition
  - ✓ Defined questions to be answered
  - ✓ Developed strategy for data collection and analysis

- Conduct a portfolio analysis to identify gaps and opportunities in supporting HRHR research

- Identify and develop potential initiatives as needed

- Seek to facilitate partnerships between public and private entities and coordinate when appropriate with the Foundation for the NIH

- Create a report to Congress, due September 2009

Definition of HRHR Research

"research with an inherent high degree of uncertainty and the capability to produce a major impact on important problems in biomedical/behavioral research"

--- *created by HRHR Demonstration Oversight Group, for use in this Demonstration Project only*

HRHR Analysis: General Questions

1. How effective has the NIH been in supporting HRHR research?

2. Have the new Roadmap Programs been successful in promoting HRHR research?

3. Have other IC programs been used effectively to encourage/support HRHR research?

4. Are there gaps/opportunities that indicate the need for HRHR Research Demonstration Projects?

Strategy for HRHR Portfolio Analysis

1. **Establish "best-case" baseline** by analysis of HRHR grant applications from FOAs* that *specifically encouraged HRHR research* ("HRHR FOAs").

2. Do **retroactive "prospective" analysis** of reviewer comments in Summary Statements

   - Identify <u>initial potential</u> for high impact-- not subsequent impact
   - Determine if "risky" at inception-- without benefit of hindsight

3. Use "best-case" data to **develop a text mining tool** for analysis of "unsolicited" HRHR applications-- a true baseline.

   *FOA= Funding Opportunity Announcement; includes Requests for Applications (RFAs) and Program Announcements (PAs)

HRHR Demonstration Project: Status of Specific Goals

✓ Define standards for evaluation and reporting

➢ Conduct a portfolio analysis to identify gaps and opportunities in supporting HRHR research

▪ Identify and develop potential initiatives as needed

▪ Seek to facilitate partnerships between public and private entities and coordinate when appropriate with the Foundation for the NIH

▪ Create a report to Congress, due September 2009

Questions for HRHR Portfolio Analysis

1. *Do investigators really submit HRHR grant applications when encouraged by HRHR FOAs (RFAs and PAs)?*

2. *Do high-risk applications really fare worse in peer review?*

3. *How important is use of special review criteria and special peer review groups for review of HRHR applications?*

4. *Are there gaps/opportunities for HRHR funding that could be addressed?*

Funding Opportunity Announcements (FOAs)

Request for Applications (RFA)	Program Announcements (PA)
- One-time only - Special review criteria - Special review group - RFA orientation for reviewers - Set-aside of funds	- Open for 2 years (6 cycles) - Standard review criteria - Standing study section review - PA may be addressed - No set-aside of funds

Identification of HRHR Research

Definition:

"research with an inherent high degree of uncertainty and the capability to produce a major impact on important problems in biomedical/behavioral research"

HRHR definition has 2 independent components:

➤ First consideration must be "capability to produce <u>high reward/impact</u> *(…more than solid, incremental science)*

➤ <u>If</u> project is high reward/impact, then consider <u>level of risk</u>

--so we developed an <u>Electronic Spreadsheet</u> + <u>Decision Tree</u> to facilitate analysis of grant applications

Analysis of HRHR Grant Applications: Process

1. Developed list of applications for HRHR FOAs**, 2002-2007

2. HRHR status determined by Program staff from Summary Statements

3. Conducted various subset analyses to answer questions

4. Using identified HRHR Summary Statements to develop a text mining tool for identification of "unsolicited" HRHR applications

**FOA= Funding Opportunity Announcement; includes Requests for Applications (RFAs) and Program Announcements (PAs)

Is "Encouragement" for HRHR effective?

- HRHR FOAs* (specifically *encouraged* HRHR research) were modestly successful in soliciting HRHR applications

- HRHR projects were funded in higher proportion than were submitted.

- Not feasible to compare to "unsolicited" applications without capability for "text mining."

<u>Conclusion</u>:

1. Applicants do submit HRHR applications in response to HRHR FOAs and these applications are funded at a higher rate than non-HRHR applications.

* 79 IC FOAs;7828 applications peer reviewed; FY 2002-2007

How Successful are HRHR Applications?

- HRHR applications submitted to HRHR FOAs had a success rate almost 3-fold higher than for non-HRHR applications.

Conclusion:

1. HRHR applications were more successful, indicating that reviewers could accept risk when potential impact was high.

Are RFAs Better than PAs for HRHR Research?

- RFAs and PAs had similar % HRHR in applications and similar increase in % of HRHR in awards.

- PAs received over twice the number of applications as did RFAs, resulting in over twice the number of HRHR grants awarded.

Conclusions:

1. There is no apparent benefit of special review group, special review criteria or set-aside on award rate of HRHR applications.

2. PAs resulted in more HRHR grants funded than did RFAs.

3. ICs may have other programmatic reasons for use of RFAs.

HRHR FOA Portfolio Analysis (FY2002-2007): Summary of Findings

1. When specifically encouraged by HRHR FOAs, HRHR applications *are* submitted.

2. Success rate for HRHR applications is almost 3-fold higher than for non-HRHR applications.

3. No significant effect is seen for special review groups, special review criteria or set-aside of funds in this overall analysis.

4. HRHR PAs solicit and fund more applications than do HRHR RFAs, in same proportion to number of applications submitted.

5. **Main determinant for actual number of HRHR grants funded is number of HRHR applications submitted. *(Opportunity?)***

6. **When potential payoff is high and application clearly written, system is not risk-averse. *(Opportunity?)***

HRHR Demonstration Project: Status of Specific Goals

- ✓ Define standards for evaluation and reporting

- ✓ Conduct a portfolio analysis to identify gaps and opportunities in supporting HRHR research

- ➢ Identify and develop potential initiatives as needed

  - ✓ Reviewed current NIH HRHR programs, e.g., Pioneer Award, New Innovator Award, and IC programs

  - ✓ Developing recommendations for new/expanded programs and/or process improvements, as appropriate (e.g. Transformative-R01, expanded use of EUREKA)

- ▪ Seek to facilitate partnerships between public and private entities and coordinate when appropriate with the Foundation for the NIH

- ▪ Create a report to Congress, due September 2009

How Effective are Special Programs in Promoting HRHR Research?

1. Roadmap Programs

    - NIH Director's Pioneer Awards

    - NIH Director's New Innovator Awards

2. IC HRHR Programs

    - EUREKA: being expanded to 9 ICs in FY09

    - CEBRA (NIDA): award amounts very small

    - Quantum (NIBIB): number of awards very limited

3. How to measure success of HRHR Programs? (Success in *funding* HRHR research-- not *scientific* success)

Comparison of NIH HRHR & Transformative Grant Programs - FY 2008

	Pioneer *Started 2004*	New Innovator *Started 2007*	EUREKA *Started 2007*	Quantum *Started 2006*	CEBRA *Started 2001*	T-R01 *Planned 2009*
Grant Mechanism	DP1	DP2	R01	R01	R21	R01
Funding Source	CF/IC	CF/IC	IC (NIGMS, NINDS, NIMH, NIDA)	IC (NIBIB)	IC (NIDA)	CF/IC
Amount per award (direct cost)	$500 K for each of 5 yrs	$1.5 M to cover 5 years *	Up to $250K for each of 4 years (project limit - $800K)	Up to $700K for each of 3 yrs	$100K/yr for 2 yrs	Flexible
FY 2008 Budget for competitive awards (total cost)	$12.6 M (RM) +$0.2 M (ICs)	$61.8 M (RM) + $12.9M (ICs) *	$5 M (NIGMS) + $3 M (Other ICs)	RFA not issued in FY08	$2.5M	$25 M (2009)
# Awards Planned	16	31	24	RFA not issued in FY08	16	Flexible
Review - Type	1)Pre-Application X02 Electronic + 2) Interview by panel of scientists	1) Pre-Application X02 Electronic + 2) IAR or teleconference	Electronic + Internet Assisted Review (GM); Electronic + Face to Face (other ICs)	Face to Face	Electronic	Editorial Bd
Review - Locus	NIGMS on behalf of OD	NIGMS on behalf of OD	IC	IC	IC	CSR
PI Eligibility	All, but no Multi-PIs; domestic institutions only	Within 10 years of most recent doctoral degree; No R01 Equiv.; no multi-PI; domestic institutions only	All	All	All	All

23

HRHR Demonstration Project: Status of Specific Goals

✓ Define standards for evaluation and reporting

✓ Conduct a portfolio analysis to identify gaps and opportunities in supporting HRHR research

✓ Identify and develop potential initiatives as needed

■ Seek to facilitate partnerships between public and private entities and coordinate when appropriate with the Foundation for the NIH

■ Create a report to Congress, due September 2009

A TEAM EFFORT!

THANKS to:

- HRHR Demonstration Oversight Group (DOG) and Implementation Group (IG) co-chairs, members and other staff who worked on developing strategy and implemented the plan for data collection and analysis

- OER staff for data preparation

- IC Program staff for analysis of 7800 Summary Statements

- Additional IC staff who presented valuable information for discussion at monthly IG meetings

- NIDDK staff who prepared summaries of all DOG and IG meetings, and developed and maintained the secure SharePoint site