National Institutes of Health
High – Risk, High – Reward Research Programs

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Overview of NIH
Overview of the Common Fund HRHR Programs (focusing on the Pioneer Award)
Evaluation of the Pioneer Award
Some Lessons Learned
NIH is the steward of medical and behavioral research for the Nation. Its mission is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce the burdens of illness and disability.
Understanding the Dual Nature of NIH...

NIH performs research (Intramural Research)
~6,000 scientists
~11% of NIH budget

NIH supports institutions & people (Extramural Research)
- 90,000 applications
- 45,000 ongoing awards
- 3,000 institutions
- >300,000 scientists & research personnel
- ~83% of the NIH budget
Total NIH budget authority
FY 2012 enacted

- Research Project Grants: $16,489,000,000 (53%)
- Research Centres: $3,031,000,000 (10%)
- Other Research Grants: $1,833,000,000 (6%)
- Research Training: $778,000,000 (3%)
- R&D Contracts: $2,968,000,000 (10%)
- Intramural Research: $3,399,000,000 (11%)
- Research Mgmt & Support: $1,533,000,000 (5%)
- All Other: $821,000,000 (3%)
National Institutes of Health
(consists of 27 different Institutes and Centers)
The NIH Common Fund was enacted into law by Congress through the 2006 NIH Reform Act to support cross-cutting, trans-NIH programs.

The intent of NIH Common Fund is to provide a strategic and nimble approach to address key roadblocks in biomedical research that impede basic scientific discovery and its translation into improved human health. In addition, these programs capitalize on emerging opportunities to catalyze the rate of progress across multiple biomedical fields.
Common Fund Programs FY2011

Total annual budget ~$545M
Pioneer Award Initiative

• Started in 2004

• Any qualified investigator

• $500K DC/year for five years

• Individual scientists of exceptional creativity who propose pioneering and possibly transforming approaches to addressing major biomedical or behavioral challenges

• ~10 – 15 awards/year
Origins of the NIH Director’s Pioneer Awards

- Dr. Zerhouni becomes NIH Director in 2002
- Surveys biomedical research committee about research funding and NIH. In responses, sometimes **too conservative** nature of review is prominent theme.
- Because of the conservative nature, **opportunities for making leaps** in sciences are lost.
- Assembles trans-NIH “High-Risk Research Working Group”
- Dr. Zerhouni initiates Pioneer Award program, part of the NIH Roadmap.
- First awards made in 2004, awards made annually since then.
Fundamental characteristics of the Pioneer Award program

- Person-focused

- Allow unusual flexibility
  (Pioneer awardee may change direction of research)

- Provide generous resources
  ($500k direct costs per year for 5 years)
To implement the Pioneer Award program, wanted to make it very distinctive from the major NIH grant Program (R01):

Application format:

Review:

Program administration:
Pioneer Award Application format:

**R01:** 25 pages research strategy including detailed experimental plan and preliminary data

- **Pioneer:** 3-5 page essay
  - Scientific problem, significance, and pioneering approach
  - Evidence for innovativeness
  - How is research direction different from ongoing?
  - Why Pioneer Award mechanism?

**R01:** Biographical sketch limit 4 pages

- **Pioneer:** Biographical Sketch - 2 pages

**R01:** Budget, animal, human subject information – details required

- **Pioneer:** No detailed budget, other information brief

**R01:** letters of collaboration encouraged

- **Pioneer:** letters of collaboration not allowed
Components of Pioneer application not present for R01 application

- Most significant research accomplishment (one page max.)
- Statement of suitability of proposal for Pioneer research must be different from established research projects in the applicant’s laboratory
- Statement of commitment of at least 51% research effort to project
- Three letters of references

Pioneer application format designed to focus on person and scientific vision
Pioneer Award Review process:

**R01 review:**

- Review by a single panel
- Review by topic experts

Asked to consider: significance/impact, innovation, approach, investigator, and environment

Focus tends to be on approach and feasibility

**Pioneer review:**

- Review through 2 phase review (2 panels)
- Reviewers **not** assigned by specific topic expertise

Asked to consider: innovation/impact, investigator, and suitability for award

Involves in-person interviews
Overall Pioneer Review Process

- Phase I (electronic panel): Electronic review of all applications
  - Identify 25 for interview
    - Phase II (interview panel): Interview 25
      - Awardees chosen by DPCPSI Director in consultation with IC Directors
Pioneer Award Review – 1st phase

- No attempt to closely match reviewer expertise to proposal topic – 1 reviewer must be outside broad science area
- Use 3 Pioneer-specific review criteria
  - Proposal
  - Investigator
  - Suitability for Pioneer program
- Reviewers provide only scores and brief comments
- No discussion of applications/scores

Phase I (electronic panel)

Electronic review of all applications
Pioneer Award Review – 2nd phase

1. Identify 25 for interview
2. Interview 25

Guided by first review phase results, interview panel selects 25 applicants

25 applicants interviewed in person in Bethesda

Panel “bins” by consensus each applicant to one of three bins and provides individual scores
Reviewers for the Pioneer Award applications

- Unusually accomplished, leaders in the field
- History of themselves being very innovative
- Typically recipients of significant accolades (NAS, MERIT, HHMI)
- Most have been nominated as potential reviewers by NIH staff
- Try to ensure that diversity is represented
- Must be willing to go beyond their usual comfort zone in evaluating applications outside their areas of expertise
Pioneer Awards – Program Administration

- Pioneer project must represent at least 51% of the awardees research effort (first 3 years)

- Pioneer Awardee allowed to change course of research direction, to follow most promising path as the science evolves

- Acknowledgment that not all projects will succeed

- Expectation that Pioneer Awardees will attend an annual symposium in which they present results and have opportunities to network and form collaborations
New Innovator Award Program

- Started in 2007 (in response to concerns that young investigators had difficulty in being funded)

- Must be Early Career Stage Investigator at time of award (<10 years from Ph.D./clinical residency with no significant NIH support as PI)

- Up to $300K DC/year for five years

- Highly innovative research ideas

- Investigators must have track record of exceptional creativity and have outstanding promise

- ~35 – 55 awards/year
**New Innovator Awards program implementation:**

- Very similar in spirit to the Pioneer Awards
- Focuses on the individual
- Limited to early career stage investigators
- Application is longer (10 page essay, preliminary data allowed but not required)
- Review criteria very similar
- Review process also has two phases but the second does not include interviews
- New Innovators encouraged to attend annual symposium with Pioneers
Transformative Research Award Program

• Started in 2009

• Arose from NIH Innovation workshop and Enhancing Peer Review process

• Individuals or teams with a project to overturn or create a fundamental paradigm

• Focus is more on the idea than the individual(s)

• “Outside-the-box” ideas

• Up to $25M TC/year for 5 years

• ~17 - 43 awards/year
Transformative Research Award Program - implementation

- Focuses more on the project than the individual(s)
- Encourage teams of investigators to apply
- Application was shorter than standard R01, but now uses standard format
- Application directs individuals to address program specific aspects, such as challenge, impact, innovation, suitability
- Review criteria well aligned with application format
- Review process uses “Editorial Board” model
  - Editorial Board screens all applications to identify most exciting subset (assignments not made on close topic expertise)
  - Most exciting subset sent forward for technical review by experts
  - Editorial Board uses technical review to discuss and score
Early Independence Award Program

• Started in 2011

• Started because of extraordinary length of time typically taken for an investigator to get first NIH R01 grant (~42 years old)

• Graduate students and clinicians within one year of degree or clinical residency who wish to “skip” the post-doc

• Talented young scientists who have the intellect, scientific creativity, drive and maturity to flourish independently without the need for traditional post-doctoral training

• Up to $250k DC/year for 5 years

• 10 awards/year
Early Independence Award Program - implementation

- Each institution is allowed to submit up to only 2 applications

- Uses standard R01 application packet, but with applicants focusing on program specific topics

Three letters of recommendation required

Review process is hybrid of Pioneer and Transformative processes
- Panel screen all applications to select most exciting
- Most exciting sent for technical review
- Panel selects ~25 of these for in-person interview

Expected to attend annual meeting

Site visit first year to awardees’ institutions
NIH has four different flavors of HRHR programs to meet different needs:

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<tr>
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<th>Transformative</th>
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How well have these worked? (The Billion $ Question)

- NIH has contracted for independent evaluations of all of these
- Completed evaluations are posted on the NIH website
- Most so far have been process evaluations
- Processes have been refined in response to evaluations
- Only the Pioneer has been in existence long enough to justify an outcomes evaluation
Summary of Pioneer Outcomes Evaluation:

Conducted by the Science and Technology Policy Institute (STPI)  
Bhavya Lal – Task Leader

Focused on first two “classes” of Pioneer Awardees (2004 and 2005)

Used a variety of data sources: applications and progress reports,  
literature survey, interviews of awardees, and eminent scientists  
familiar with areas of research
Summary of Outcome Evaluation Findings

- The Pioneer program funded a broad range of research projects that could be considered high risk in several different ways.

- Awardees stated they were able to undertake a variety of research activities under the NDPA funding that they wouldn’t have been able to do under traditional grants.

- About a third of the Pioneers deviated significantly in their research direction.

- The bibliometric analysis was inconclusive.

- Experts determined that the majority (19/21) of the Pioneers conducted pioneering research.
A majority of experts (51/62) moderately or strongly agreed that the work performed by the awardees was pioneering.

Although awardees felt their research could not have been funded through traditional mechanisms, experts were divided on whether the accomplished research could have been achieved using traditional mechanisms.

Most experts agreed that the research accomplished under the Pioneer program was pioneering.

Most experts agree that the Pioneer program is adding value to the NIH portfolio.
Comparison evaluation of Pioneers:

- To follow up on finding that “experts were divided on whether the accomplished research could have been achieved using traditional mechanisms”:

- NIH has commissioned STPI to perform a comparison evaluation to understand how effective the Pioneer award has been in supporting HRHR research

- Comparison groups include:
  - closely matched R01 awardees
  - unsuccessful interviewees
  - HHMI investigators
  - randomly selected cohorts of R01 awardees

- Results likely to be released in summer of 2012
Some Lessons Learned:

Have applicants focus on the vision, the possibilities

Have reviewers try to focus on asking what is the impact if this would work, rather why something might not work

Have reviewers in at least one phase not closely aligned with topic of application

Recruit reviewer who have the attributes being sought in the applicants

Try to be transparent – reviews, funding decisions, independent evaluations

Refine program in response to evaluations and other feedback

Allow flexibility in research

Do not emphasize preliminary data/feasibility

Try to have expectation that research projects will fail
Some Lessons learned – continued

Make sure PIs are committed to the project

Though the award emphasizes the person, it should be forward looking, not a recognition of past achievements, not allowing someone to sit on his/her “laurels”

Program publicity – broadly advertise FOA, make press releases, coordinate with universities to highlight awards and research findings
Thank you!