

ACD High-Risk, High-Reward Working Group Update

Council of Councils
January 25, 2019



National Institutes of Health
Office of Strategic Coordination - The Common Fund

High-Risk, High-Reward Research Program



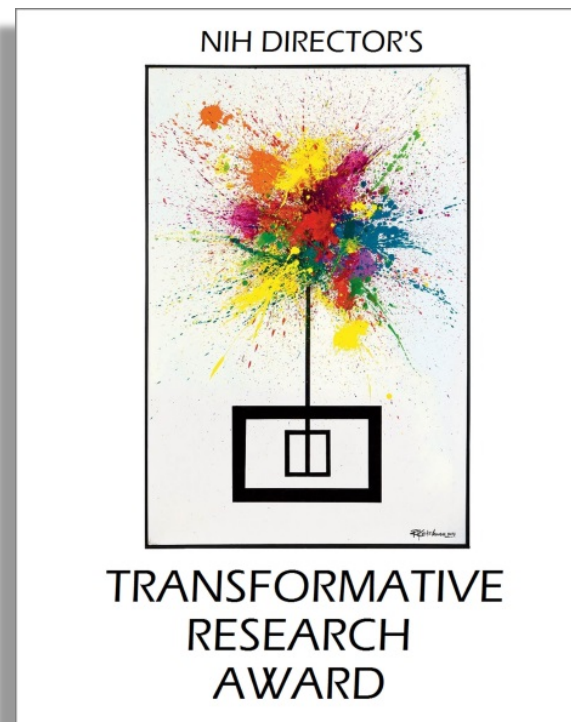
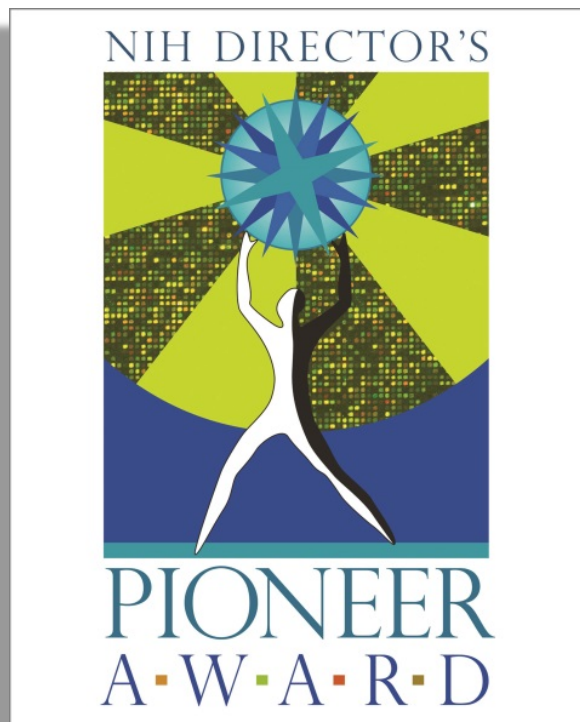
The Common Fund

- Investigator-initiated scientific goals
- Enable investigators to launch a potentially transformative project without preliminary data
 - *Risk involved is mitigated by emphasizing past accomplishments during review and by allowing changes of course during the funding period*
- Individual awards are 5 years
- Piloting novel application and review processes

High-Risk, High-Reward Research Program



The Common Fund



Supporting exceptionally creative scientists pursuing highly innovative research with the potential for broad impact

ACD High-Risk, High-Reward Working Group



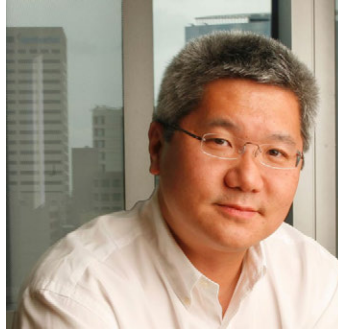
The Common Fund



Molly Carnes, M.D.
University of Wisconsin



John Carpten, Ph.D.
Keck School of Medicine,
USC



Brendan Lee, M.D.,
Ph.D. (Co-Chair)
Baylor College of Medicine



Amy Palin, Ph.D.
*Eunice Kennedy
Shriver* NICHD



Nicole Perry
Vanderbilt University



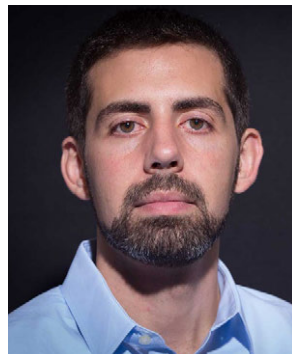
Griffin Rodgers, M.D.
NIDDK



Sandra Schmid, Ph.D.
UT Southwestern Medical
Center



Scout, Ph.D.
The Torvus Group



Jason Sheltzer, Ph.D.
CSHL



Lawrence Tabak,
D.D.S., Ph.D. (Co-Chair)
Office of the Director, NIH



Shirley Tilghman,
Ph.D.
Princeton University



Hannah Valentine, M.D.
OD Scientific Workforce
Diversity, NIH

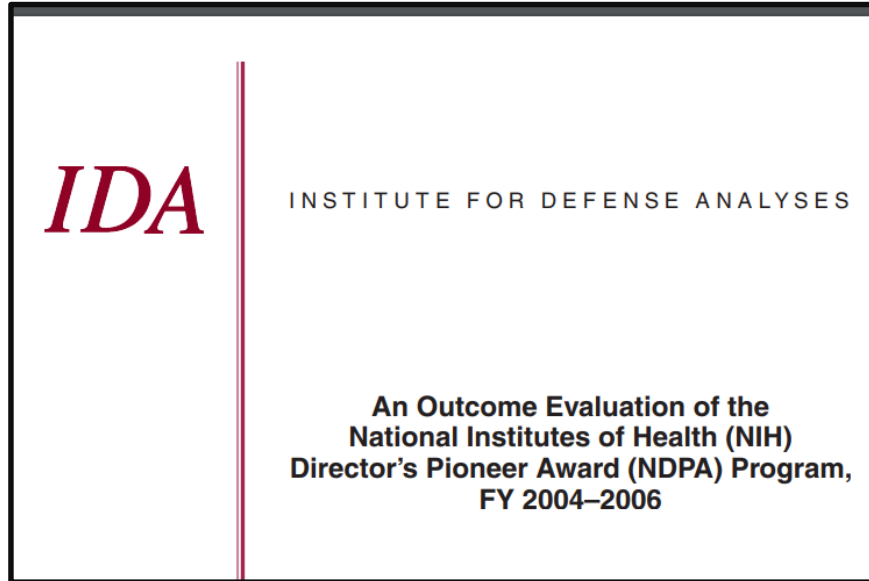
Working Group Charge



The Common Fund

1. Review effectiveness of NIH HRHR research programs
2. Analyze participation of women and other underrepresented groups in the applicant, finalist, and awardee pools of HRHR grants to identify possible causes for their underrepresentation
3. Examine institutional diversity and diversity of scientific topics in the applicant and awardee pools
4. Propose steps that NIH might take to enhance the diversity of applicants and awardees in HRHR programs, while supporting the best science

1. Effectiveness – Pioneer Evaluation



- Compared research outcomes of the 33 Pioneers in first 3 cohorts to similarly qualified R01 investigators, random R01 sets, and HHMI investigators
- Assessed scientific impact and innovation through bibliometrics and expert analysis
- Found Pioneer-funded research is
 - More impactful than similar and random R01s and about as impactful as HHMI
 - More innovative than similarly qualified R01 investigators' research and similar to HHMI

1. Effectiveness – New Innovator Evaluation

New Innovator Award Outcomes Evaluation Report by the Science & Technology Policy Institute

| Bibliometric indicator | NI Awardees compared with ESI R01 Awardees |
|---|---|
| Average Citations per Publication | NI awardees > ESI R01 |
| IPP (Journal impact factor) | NI awardees > ESI R01 |
| RCR (Relative Citation Ratio) | NI awardees > ESI R01 |
| SNIP (Journal Source-Normalized Impact per Paper) | NI awardees > ESI R01 |
| SJR (SciImago Journal Rank) | NI awardees > ESI R01 |
| H - Index | No statistically significant difference |
| Number of publications | ESI R01 awardees > NI awardees |
| Average annual publications | ESI R01 awardees > NI awardees |
| Time to first publication (Faster is greater) | ESI R01 awardees > NI awardees |

Evaluated outcomes of NI awardees in first 3 cohorts

- NI-funded research is more innovative, risky, and impactful than ESI R01 research
- Awards did not have significantly more positive or negative impact on the careers of its awardees than did ESI R01s (risk of research project did not put careers at risk)

1. Effectiveness – Clinical & Technological Impact

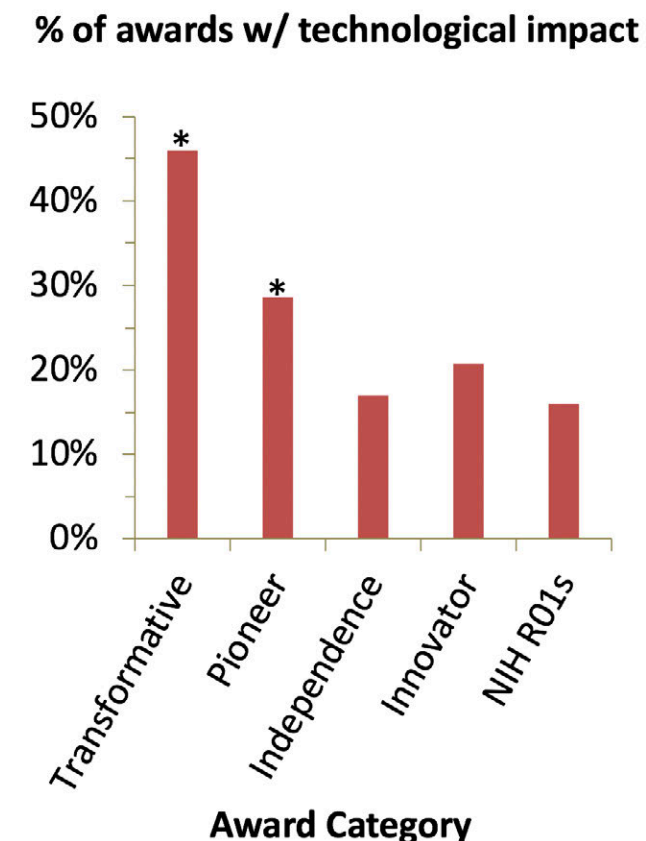
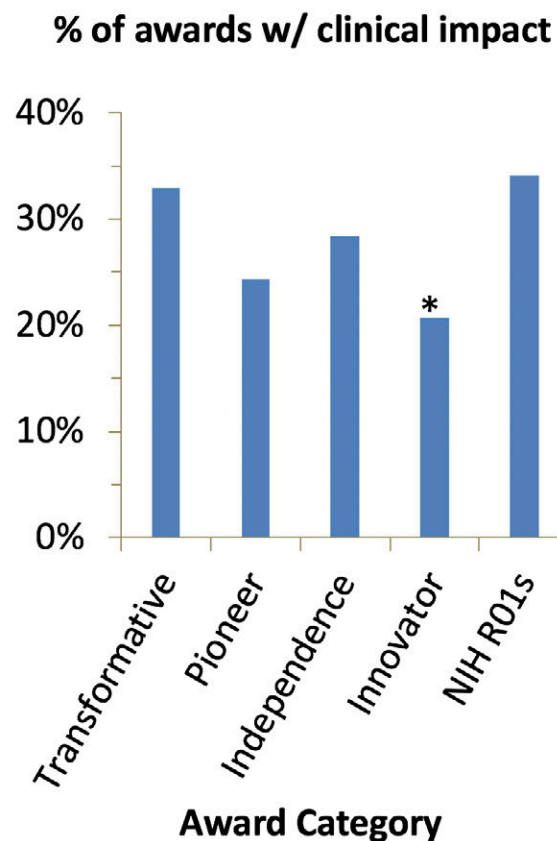


The Common Fund

Type 1 HRHR and NIH R01 awards, FY2011-FY2016

| Award Type | Number of awards | Awards with clinical impact | Awards with technological impact |
|----------------|------------------|-----------------------------|----------------------------------|
| Transformative | 76 | 25 (32.9%) | 35 (46.1%*) |
| Pioneer | 70 | 17 (24.3%) | 20 (28.6%*) |
| Independence | 88 | 25 (28.4%) | 15 (17.0%) |
| Innovator | 280 | 58 (20.7%*) | 58 (20.7%) |
| NIH R01s | 22,559 | 7708 (34.2%) | 3617 (16.0%) |

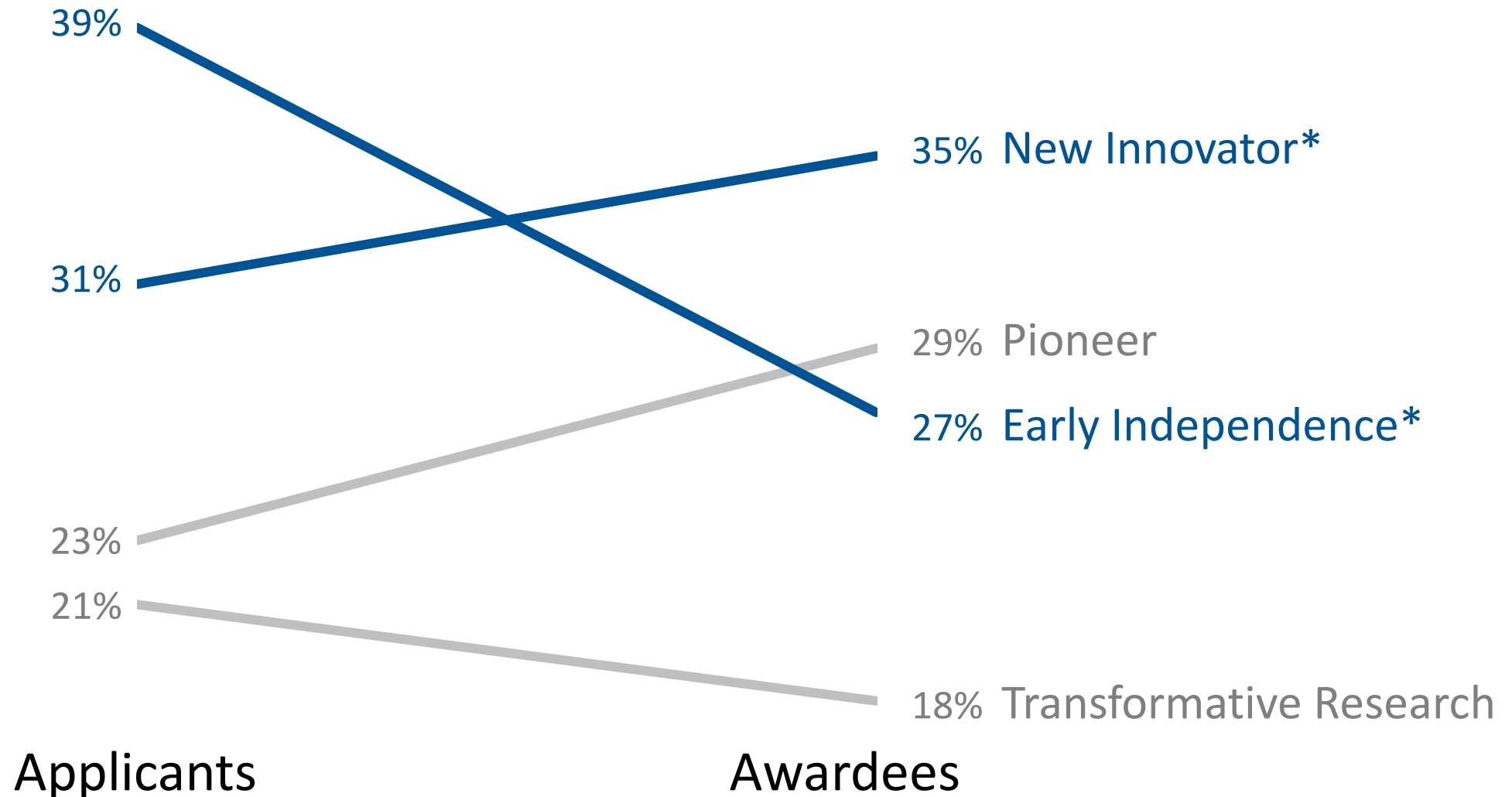
* Statistically significant difference relative to NIH R01s $p < 0.01$



2. Women & Minorities – Statistical Significance of Average % Female Applicants to Awardees



The Common Fund

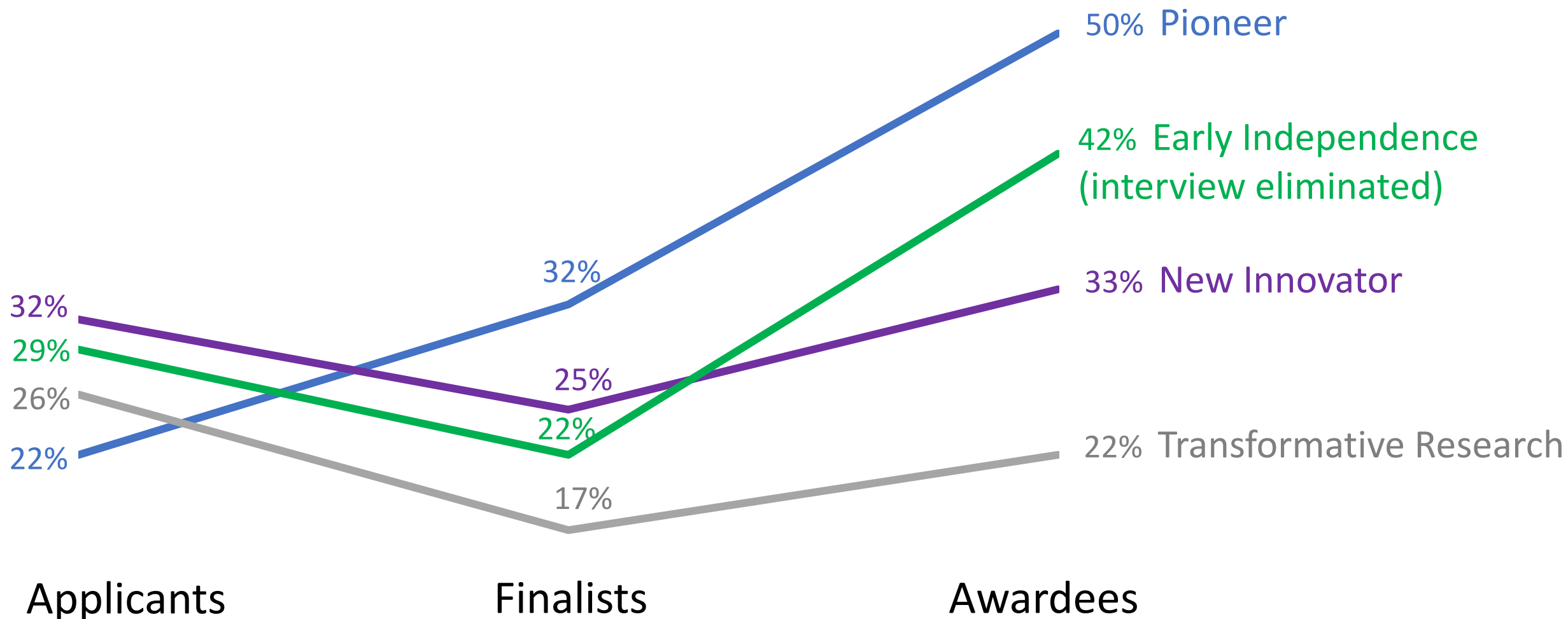


Note: Results are preliminary

2. Percentage of Females for FY 2018



The Common Fund



Note: Preliminary data

2. Women & Minorities



The Common Fund

- For Pioneers, New Innovators, and Transformative Research Awards, females and URMs are not being adversely affected by review process
 - For EIA, the numbers are very small; we need to continue to monitor
 - Across all awards, there is year-to year variation in percentage of applicants who choose not to identify their gender, ethnicity, and race
 - FY2019 EIA competition eliminated interview
- Issue and concern: number of women and URMs applying is extremely low

3. Institutional & Topic Diversity

HRHR applications and awards map to a narrow range of topics that vary widely in award rates

- For all HRHR programs combined, these 21 clusters (14.2% of the total of 148 clusters) account for over half of the applications
- The range of award rates for these clusters is 1.77% to 14.63%
 - Mean award rate = 6.83%
 - Median cluster award rate = 5.21%

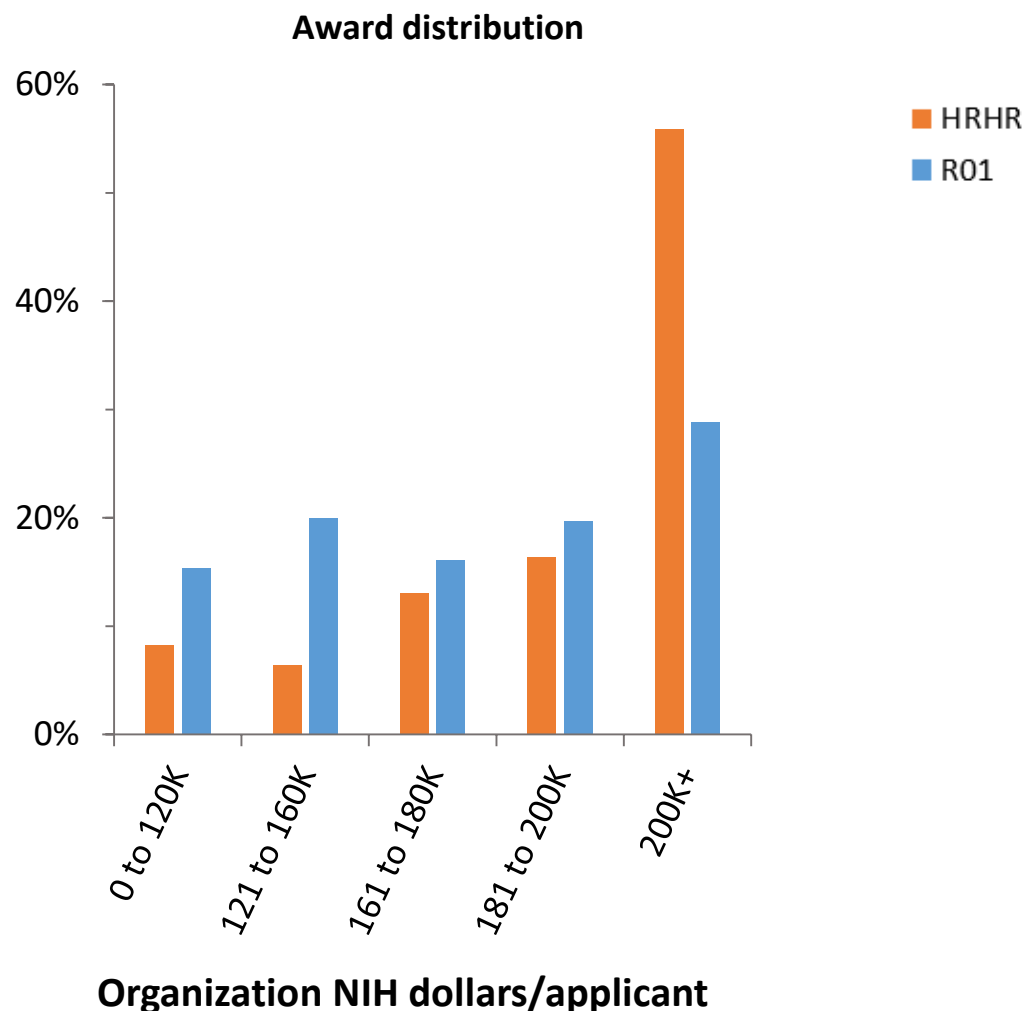
| | Topic | Awards | Appls | % of all awards | % of all apps | Award rate |
|---|----------------------------------|--------|-------|-----------------|---------------|------------|
| { | Model Organisms and Genetics | 24 | 164 | 4.67% | 2.18% | 14.63% |
| | Neuronal Circuits | 26 | 182 | 5.06% | 2.42% | 14.29% |
| | RNA Transcription | 12 | 100 | 2.33% | 1.33% | 12.00% |
| | Gene Regulation | 29 | 250 | 5.64% | 3.33% | 11.60% |
| | Antibiotic Resistance | 12 | 111 | 2.33% | 1.48% | 10.81% |
| | Protein Crystallography | 19 | 192 | 3.70% | 2.55% | 9.90% |
| | Gut Microbiome | 11 | 119 | 2.14% | 1.58% | 9.24% |
| | Systems Biology | 25 | 304 | 4.86% | 4.04% | 8.22% |
| | T-Cell Immunotherapy | 7 | 90 | 1.36% | 1.20% | 7.78% |
| | Tissue Scaffolding & Engineering | 17 | 229 | 2.92% | 3.05% | 7.42% |
| | Stem Cells | 15 | 229 | 3.31% | 3.05% | 6.55% |
| | High-throughput Screening | 20 | 306 | 3.89% | 4.07% | 6.54% |
| | Imaging Methodology | 15 | 240 | 2.92% | 3.19% | 6.25% |
| | Statistics and Modeling | 5 | 96 | 0.97% | 1.28% | 5.21% |
| | GWAS Studies | 14 | 270 | 2.72% | 3.59% | 5.19% |
| | Drug Discovery | 6 | 148 | 1.17% | 1.97% | 4.05% |
| | Software Development | 6 | 148 | 1.17% | 1.97% | 4.05% |
| | Brain Cancer | 6 | 185 | 1.17% | 2.46% | 3.24% |
| | Nanoparticle Drug Delivery | 5 | 178 | 0.97% | 2.37% | 2.81% |
| | Clinical Outcomes | 4 | 156 | 0.78% | 2.08% | 2.56% |
| | Clinical Practice | 2 | 113 | 0.39% | 1.50% | 1.77% |

3. Institutional & Topic Diversity – HRHR Awarding Descriptive Analysis



The Common Fund

Organizations with higher amount of NIH dollars per applicant receive more HRHR awards



4. Recommendations – Outcomes



The Common Fund

The working group agrees there is value in having HRHR programs and that the awards have greater influence on certain scientific areas as compared to traditional R01s.

- Overall successful program, expand if possible
- Formally evaluate the Early Independence Award & Transformative Research Award (in progress)

4. Recommendations – Outreach



The Common Fund

The HRHR working group recognizes that encouraging women and underrepresented minorities to apply for HRHR awards is of critical importance to increase their representation among the awardees.

- Initiate a special HRHR program that requires a collaboration between an under-resourced institution and resourced institution and addresses diversity in the broadest sense
- Build a career development portal that centralizes all NIH training grants and efforts (<https://researchtraining.nih.gov/>)
- NIH should host workshops where institutions can send 1-2 students to learn about all training opportunities (NIH Regional Seminars)

4. Recommendations – Outreach



The Common Fund

- Provide on the HRHR website prototype example grants similar to the template examples available for R01s
- Certain HRHR application features can be applied to other NIH grants to enhance broader success of underserved groups
 - New Innovator features should be applied to a special award type for Early Stage Investigators (ESIs)

4. Recommendations – Bias



The Common Fund

There appears to be bias in the topics that are awarded under HRHR programs. Clinical studies tend to be underrepresented, as do other behavioral, psychological, and sociological topics.

- Special track or separate HRHR program for clinical outcomes; separate review track
- In FOAs for all the HRHR awards, reiterate that all topics are welcome; underrepresented topics can be emphasized
- Continue to ensure reviewer expertise in topics underrepresented in award topic maps and matching of reviewer expertise to applications

4. Recommendations – Bias



The Common Fund

Over half of HRHR awardees come from top-tier research institutions.

Options:

- Elevate institutional diversity as a program priority
- Cap the number of applications each institution can submit
- Cap the number of institutions each institution can submit, but factor in size of institutions and scale the permissible number of submissions accordingly

4. Recommendations – Bias



The Common Fund

Average representation of females and underrepresented minorities in the applicant pool is reflected in the awardee pool, but there is fluctuation from year to year and the numbers in many cases are small. The group agrees potential for unconscious bias should be mitigated.

- Reviewer education or training
- For the Pioneer and Early Independence awards, move approach review to first phase and keep only biosketch for the final review

4. Recommendations – Harassment



The Common Fund

- Require HRHR grantee organizations to provide assurances that they have effective, fair, and up-to-date policies to preserve a harassment-free environment
- If HRHR grantee institutions become aware of harassment findings related to HRHR grantees, they should alert and work with NIH to arbitrate the situation

Council's thoughts, recommendations, or input?

- ACD will make final recommendations in June