Dept. of Medicine
House Staff Residency Program:
“Funding and Grantsmanship
for Research and Career
Development Activities”
April 26, 2016

Jaime S. Rubin, Ph.D.
Dept. of Medicine
College of Physicians and Surgeons
Columbia University

Course: “Funding and Grantsmanship for Research and Career Development Activities”
http://grantscourse.columbia.edu/
Topics to be Discussed

- Funding Agencies
  - Federal
    - National Institutes of Health
  - Voluntary Health Organizations, Professional Societies, Foundations, Industry, Other

- Types of Awards
  - Fellowships (F’s), Training grants (T’s), Career Transition Awards, Research grants,

- Approaches for Competitive Applications
  - Planning & Organizing Research and Career Development Proposals
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- **Approaches for Competitive Applications**
  - Planning & Organizing Research and Career Development Proposals

Types of Awards

- Individual fellowships
- Training grants
- Career transition awards
- Career development awards
- Research grants
- Program Projects
- Loan Repayment Program
- Administrative supplements
- Cooperative agreements
- Institutional Clinical & Translational Science Award (CTSA)
- Subcontracts
- Contracts

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Not All Funding Opportunities Are the Same

- **Different mission statements**
  - Career development (K’s)/ Scholar awards
  - Research project (R’s)

- **Different funding**
  - Stipend/Salary
  - Pilot awards
  - Comprehensive research costs

- **Different time frames**
  - Not renewable: 5 years (K’s), 3 years (F’s), 2 years (T’s)
  - Renewable: 4 years-5 years (R01) each competitive period

Timeline of Funding for Junior Investigators

- Short term Training
- Research Support

- Medical School
- Internship/Residency
- Fellowship – Research Years
- Instructor/Assistant Professor

Year-long Enhancement Programs
MD/PhD Fellowship or Institutional T32

Residents - Research

- **American Medical Association Foundation**
  - Cardiovascular/pulmonary diseases and pancreatic cancer ($2,500)
  - Neoplastic diseases ($5,000)

- **American College of Gastroenterology / ACG Institute for Clinical Research & Education**
  - Clinical Research Awards: up to $35,000

- **Stony Wold-Herbert Fund**
  - Training Fellowships in the field of lung/respiratory diseases, including tuberculosis; Support for physicians entering the third postgraduate or late year of training
Residents – Research/Travel

- **Rheumatology Research Foundation**
  - Ephraim P. Engleman Endowed Resident Research Preceptorship/Resident Research Preceptorship Award ($15,000)
  - Medical and Pediatric Resident Research Award (to attend the annual meeting)

- **American Society of Hematology**
  - HONORS (Hematology Opportunities for the Next Generation of Research Scientists) - $5,000 stipend to conduct research and $1,000 each year for two years to attend the ASH annual meeting
Residents - Travel

American Heart Association:

Travel Stipends to Scientific Sessions

- Council on Arteriosclerosis, Thrombosis and Vascular Biology (ATVB)
- Council on Basic Cardiovascular Sciences (BCVS)
- Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation (3CPR)
- Council on Clinical Cardiology (CLCD)
- Council on Functional Genomics and Translational Biology (FGTB)
- Council on Peripheral Vascular Disease (PVD)
Timeline of Funding for Junior Investigators

- Medical School
- Internship/Residency
- Fellowship – Research Years
- Instructor/Assistant Professor

- Short term Training
- Research Support
- Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot

Year-long Enhancement Programs
- MD/PhD Fellowship or Institutional T32

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Post-doc:
Institutional Training Grant (NIH-T32)

- Post-docs selected by institution
- Research training in specific area
- Defined number of slots
- Stipend, health fees, tuition, travel

Do your fellowship programs of interest have a T32?

Post-doc: Individual Fellowship

- Supports specific individual
- Stipend, health fees, tuition, travel
- NIH: F32

Review criteria:
- Individual fellow
- Mentor
- Research project
- Research environment
Post-doc Fellowships (F32s)
Applications, awards, and success rates

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Training Grants and Fellowships: Pre- and Post-Doctoral Positions

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Post-doc: Individual Fellowships

Non-government, non-profit agencies

- Voluntary Health Organizations
- Professional Societies
- Private Foundations
Post-doc: Individual Fellowship
- Voluntary Health Organizations, Foundations, Professional Societies -

- American Association for the Study of Liver Disease
- American College of Cardiology Foundation/Merck
- American Heart Association (Founders)
- American Kidney Fund
- American Liver Foundation
- ASN Foundation for Kidney Research
- Conquer Cancer Foundation/American Society of Clinical Oncology
- Daland Fellowships in Clinical Investigation
- New York Academy of Medicine

American Heart Association (Founders Affiliate)

- Postdoctoral Fellowship Program
- Cardiovascular and stroke research
- Basic, clinical, and population research

Funding
- Stipend: $42,850-$56,400;
  Fringe Benefits: $1,000 (Health insurance)
- Project support: $3,000

Award Duration: 2 years

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Timeline of Funding for Junior Investigators

- Medical School
  - Short term Training
- Internship/Residency
  - Research Support
- Fellowship – Research Years
  - Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot
- Instructor/Assistant Professor
  - Year-long Enhancement Programs
  - MD/PhD Fellowship or Institutional T32
- Career Transition Awards

NIH: Pathway to Independence Award (K99/R00)

- No citizenship requirement
- Applicants must:
  - Have earned a clinical or research doctorate
  - Have no more than 4 years of research experience since completing the requirements of the doctoral degree
  - Have not been the principal investigator of an NIH research grant (e.g., R01, R03, R21), career development award (e.g., K01, K07, K08, K23, K25), other peer-reviewed NIH or non-NIH research grant over $100,000 direct costs per year, or have been a project leader on a sub-project of a program project (P01) or a center (P50) grant.
1-2 years as a mentored K award for “post-docs”
- Funding level is Institute-specific
  - Salary (plus fringe benefits), Research support (+ 8% I.C.)
  - 75% effort

3 years as a Research award for independent investigators
- Total/year:=$249,000 (salary and research expenses)
  - D.C. + institution’s I.C. rate
- Must have an independent research position
Research Career Development Awards

Physician-Scientist Workforce

5. NIH should establish a new physician-scientist-specific granting mechanism to facilitate the transition from training to independence. This program should be similar to the K99/R00 program whose funding currently goes almost exclusively to individuals holding a PhD degree. This new grant program could serve either as a replacement or transition from existing K Awards for physician scientists, and should provide a longer period of support, potentially lengthening the R00 phase to 5 years (with an interim staff review at year 3). This new grant series, as well as K and all other training awards, should rigorously enforce protected time of at least 75 percent effort and provide sufficient salary support to make that possible.
Notice of Reissuance of the NIH Pathway to Independence Award (Parent K99/R00)

Notice Number: NOT-OD-16-049

Key Dates
Release Date: January 8, 2016

Implementation
In response to the Physician Scientist Workforce Working Group recommendations, NIH is reissuing the K99/R00 FOA to provide additional information for physician-scientists who may wish to apply for this program. Specifically:

• **Section I. Funding Opportunity Description:** A separate section has been added under "Additional Information for Physician-Scientists" to further clarify features of K99/R00 program suited to physician scientists, and to provide guidance to applicants with respect to career stage and timing of the application.

• **Section III. Eligibility Information:** A separate section has been added under "Physician-Scientists in positions not designated as postdoctoral positions" to provide additional guidance on the differences between independence in clinical responsibilities and independence in research. In addition, more specific guidance is provided under "Level of Effort" and "Mentor(s)" sections.

• **Section VI. Award Administration Information:** Under the section "Transition to the Independent Phase" additional guidance is provided regarding institutional commitment to the awardee during the R00 phase of the award and beyond.

Career Transition Awards

- **BWF: Career Awards for Medical Scientists**
  - To support physician-scientists during the last years of a mentored postdoctoral/fellowship position and the beginning years of an independent faculty position.
  - Candidates must hold an M.D., D.D.S., or D.V.M. degree.
  - 75% effort to research-related activities
  - Funding: $700,000 over five years
    - Postdoctoral/Fellowship Portion: Years 1 and 2
      Annual Total: $95,000
    - Faculty Portion of the Award: Years 3-5
      Annual Total: $170,000

Career Transition Awards

- **American Heart Association (National)**
  Fellow-to-Faculty Transition Award

  - Provides funding for the “period of career development that spans the completion of research training through the early years of the first faculty/staff position”
  - **Training stage:** Maximum of $65,000 per year
  - **Faculty stage:** Maximum of $132,000 per year
  - Award Duration: 5 years

Timeline of Funding for Junior Investigators

**Short term Training**
- Year-long Enhancement Programs
- MD/PhD Fellowship or Institutional T32

**Medical School**

**Research Support**
- Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot

**Internship/Residency**

**Fellowship – Research Years**

**Instructor/Assistant Professor**

**Career Transition Awards**

**Individual Mentored K Career Development Award**

Research Career Programs (K)

- Provides predominantly salary support
- Minimum requirements for the amount of effort that must be devoted to research and career development (e.g. 75%, some exceptions to 50%)
- Up to 5 years
- Specified salary levels
- US citizen/permanent resident.
- Can reduce effort to 50% in last 2 years if PI of NIH research grant

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Mentored Clinical Scientist Development Award (K08)

- Support to develop outstanding independent clinician research scientists
- Basic and translational science
Mentored Patient-Oriented Research Career Development Award (K23)

- **Patient-oriented research:** Research conducted with human subjects (or on material of human origin) for which an investigator directly interacts with human subjects

- **Research areas:** (1) Mechanisms of human disease, (2) Therapeutic interventions, (3) Clinical trials, and (4) Development of new technologies
Mentored Research Scientist Development Award (K01)

Not all NIH Institutes participate in program. Participating Institutes may use for different purposes.

- Train in a new field
- Specific research areas
- Hiatus in research career
- Increase research workforce diversity

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Mentored Research Scientist
Development Awards (K01)

- **NCI, NHLBI:**
  - Underrepresented faculty

- **NIAID:**
  - (a) Epidemiology
  - (b) Modeling Techniques
  - (c) Outcomes Research

- **NLM:**
  - Biomedical Informatics
Mentored Research Scientist Development Awards (K01)

- **NHLBI:**
  - (a) Epidemiology
  - (b) Biostatistics
  - (c) Outcomes Research
  - (d) Implementation Research

- **NHGRI:**
  - (a) Genomics
  - (b) Ethical, legal and social issues (ELSI)

- **FIC:**
  - International Research Scientist Development Award (IRSDA)
### Mentored Career Development Award in Biomedical Big Data Science for Clinicians and Doctorally Prepared Scientists (K01)

| National Human Genome Research Institute (NHGRI) |
| National Cancer Institute (NCI) |
| National Eye Institute (NEI) |
| National Heart, Lung, and Blood Institute (NHLBI) |
| National Institute on Aging (NIA) |
| National Institute on Alcohol Abuse and Alcoholism (NIAAA) |
| National Institute of Allergy and Infectious Diseases (NIAID) |
| National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) |
| National Institute of Biomedical Imaging and Bioengineering (NIBIB) |
| Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) |
| National Institute on Deafness and Other Communication Disorders (NICCD) |
| National Institute of Dental and Craniofacial Research (NIDCR) |
| National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) |
| National Institute on Drug Abuse (NIDA) |
| National Institute of Environmental Health Sciences (NIEMS) |
| National Institute of General Medical Sciences (NIGMS) |
| National Institute of Mental Health (NIMH) |
| National Institute of Neurological Disorders and Stroke (NINDS) |
| National Institute of Nursing Research (NINR) |
| National Institute on Minority Health and Health Disparities (NIMHD) |
| National Library of Medicine (NLM) |
| National Center for Complementary and Alternative Medicine (NCCAM) |
| Office of Behavioral and Social Sciences Research (OBSSR) |
| Office of Strategic Coordination (Common Fund) |

RFA-HG-14-007
Research Career Development Awards

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<th>IC</th>
<th>Fiscal Year</th>
<th>Topic</th>
<th>Mechanism</th>
<th>Activity</th>
<th>Type</th>
<th>Status</th>
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<td>2011</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>89</td>
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<tr>
<td>NHLBI</td>
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<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>39</td>
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<td>Success Rate</td>
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<td>44%</td>
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<td>NHLBI</td>
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<td>Research Grants - Career Awards</td>
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<td>86</td>
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<td>NHLBI</td>
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<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>18</td>
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<td>NHLBI</td>
<td>2012</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
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<td>21%</td>
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<tr>
<td>NHLBI</td>
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<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
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<tr>
<td>NHLBI</td>
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<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>32</td>
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<td>NHLBI</td>
<td>2013</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
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<td>30%</td>
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<td>NHLBI</td>
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<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>77</td>
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<tr>
<td>NHLBI</td>
<td>2014</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>29</td>
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<tr>
<td>NHLBI</td>
<td>2014</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>37.66%</td>
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<tr>
<td>NHLBI</td>
<td>2015</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>36</td>
</tr>
</tbody>
</table>
Agency for Healthcare Research and Quality

- **AHRQ K08**: Mentored Clinical Scientist Research Career Development Award
  - Quality,
  - Safety,
  - Efficiency,
  - Effectiveness of health care

- **AHRQ K08**: Patient-Centered Outcomes Research (PCOR) Mentored Clinical Investigator Award

- **AHRQ K01**: Patient-Centered Outcomes Research (PCOR) Mentored Research Scientist Development Award

Centers for Disease Control and Prevention

- **CDC K01:**
  - National Institute for Occupational Safety and Health
    - Mentored Research Scientist Development Award
      - “career development experience in occupational health and safety research leading to research independence”
Research Career Development/ Scholar Programs

Non-government, non-profit agencies

- Voluntary Health Organizations
- Professional Societies
- Private Foundations

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Research Career Development/Scholar Programs

- AGA Research Foundation
  - Research Scholar Awards
- American Heart Association
  - Scientist Development Grant
- Robert Wood Johnson Foundation
  - Harold Amos Medical Faculty Development Program
- Damon Runyon Cancer Research Foundation
  - Clinical Investigator Award
- Doris Duke Charitable Foundation
  - Clinical Scientist Development Grant

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Mentored Clinical Scientist Development Program Award (K12)

- Support to an institution for career development experiences for clinicians leading to research independence.
- Institutions recruit and select candidates into their programs.
- Candidates must meet the same criteria as for the individual mentored clinical scientist development award.

Mentored Clinical Scientist Development Program Award (K12)

- **Multi-Institute:** Women’s Health
- **Institute specific**
  - NCI: Clinical oncology
  - NHLBI
    - Emergency Medicine
- **CTSA - Clinical and Translational Science Award**

NIH CTSA Awards: A Home for Clinical and Translational Science

Source: Zerhouni (NIH) [9/06]

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Research-Oriented Masters Degree Programs

- Comprehensive courses in clinical research/
  “Patient-Oriented Research”
  - Biostatistics, epidemiology, study design,
    bioethics, legal and regulatory issues

- For the career development of clinical investigators

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Timeline of Funding for Junior Investigators

- **Short term Training**
  - Medical School
- **Research Support**
  - Internship/Residency
- **Fellowship – Research Years**
  - Fellowship – Research Years
- **Instructor/Assistant Professor**
- **Career Transition Awards**
  - NIH Loan Repayment Program
  - Individual Mentored K Career Development Award
- **Year-long Enhancement Programs**
  - MD/PhD Fellowship or Institutional T32
- **Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot**
- **Institutional K12 Career Development Slot**

NIH’s Extramural Loan Repayment Program

http://www.lrp.nih.gov/

- Up to $35,000/year towards educational loan debt
- Conduct qualified research activities for at least 50% of professional effort (or 20 hours per week) for 2 years
- Qualifying educational loan debt equals or exceeds 20% of the applicant's institutional base salary
NIH’s Extramural Loan Repayment Program

- May competitively apply for one-year renewal
- Repayments represent taxable income and are paid in addition to loan

Eligibility:
- U.S. citizen/Permanent residence
- Recipient of M.D., Ph.D., D.D.S. D.M.D., or other specified equivalent doctoral degree

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NIH’s Extramural Loan Repayment Program

Extramural Programs

- Clinical Research
- Pediatric Research
- Health Disparities Research
- Clinical Researchers from Disadvantaged Backgrounds
- Contraception and Infertility Research
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<th>LRP</th>
<th>New + Renewal</th>
<th></th>
<th>New</th>
<th></th>
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<tr>
<td></td>
<td>Applications</td>
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<td>Success Rate</td>
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<td>Success Rate</td>
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<td>Clinical Research</td>
<td>1,529</td>
<td>866</td>
<td>57%</td>
<td>874</td>
<td>400</td>
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<td>Pediatric Research</td>
<td>630</td>
<td>312</td>
<td>50%</td>
<td>404</td>
<td>157</td>
<td>39%</td>
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<td>Health Disparities Research</td>
<td>486</td>
<td>125</td>
<td>26%</td>
<td>303</td>
<td>55</td>
<td>18%</td>
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<tr>
<td>Clinical Research for Individuals from Disadvantaged Backgrounds</td>
<td>50</td>
<td>25</td>
<td>50%</td>
<td>32</td>
<td>11</td>
<td>34%</td>
<td>18</td>
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<tr>
<td>Contraception and Infertility Research</td>
<td>41</td>
<td>23</td>
<td>56%</td>
<td>28</td>
<td>12</td>
<td>43%</td>
<td>13</td>
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<td><strong>Total</strong></td>
<td><strong>2,736</strong></td>
<td><strong>1,351</strong></td>
<td><strong>49%</strong></td>
<td><strong>1,641</strong></td>
<td><strong>635</strong></td>
<td><strong>39%</strong></td>
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<td>LRP</td>
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<td>Clinical Research</td>
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<td>Health Disparities Research</td>
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<tr>
<td>Clinical Research for Individuals from Disadvantaged Backgrounds</td>
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<td>$1,517,710</td>
<td>$60,708</td>
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<tr>
<td>Contraception and Infertility Research</td>
<td>23</td>
<td>$977,528</td>
<td>$42,501</td>
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<td><strong>Total</strong></td>
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Career Development (K) Support to Research Grant (R01)

K01/K08/K23 → R01

K12 | K23 → R01

K12 | K23 → R01

K01/K08/K23 → R01

K12 → R01

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R01 Research Award

Independent Investigator

Funds research project
- Salaries of PI and other research personnel
- Supplies, reagents, etc
- Animal costs
- Patient care costs
- Core facilities
- Page charges for publications

Multi-Year (4yrs – 5yrs)

Renewable (e.g. original grant + 2 renewals = 15yrs)

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R01 Research Grant

- Supports a discrete, specified project (Specific Aims)
- "Comprehensive" funding
  - Salaries of PI and other research personnel (e.g. post-docs), Supplies, Animal costs, Core facilities, Patient care (research-related), Travel to conferences, Subcontracts to collaborating institutions
- Modular budgets up to $250,000/year
- Multi-year (4yrs – 5yrs)
- Renewable (e.g. original grant + 2 renewals = 15 years)
- Flexibility
- Most NIH-supported investigator-initiated research is through this funding mechanism

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## Challenging Times for All Researchers

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2007</th>
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<tbody>
<tr>
<td>Overall success rate for NIH RO1* Proposals</td>
<td>32%</td>
<td>24%</td>
</tr>
<tr>
<td>Success rate on first submission</td>
<td>29%</td>
<td>12%</td>
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## Especially for Young Investigators

<table>
<thead>
<tr>
<th></th>
<th>Then 1990</th>
<th>Now 2007</th>
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<tbody>
<tr>
<td>Age at first Ro1* grant</td>
<td>39</td>
<td>43</td>
</tr>
<tr>
<td>% of Ro1s* that go to first-time investigators</td>
<td>29%</td>
<td>25%</td>
</tr>
</tbody>
</table>

*R01 Equivalents: RO1, R29, R37
Source: National Institutes of Health

Figure 1. Average Age of Principal Investigators with MD, MD-PhD, or PhD at the time of First R01 Equivalent Award from NIH, Fiscal Years 1980 to 2011
“Over the past three decades, we’ve seen profound shifts in the average age at which a principal investigator receives their first R01. During the period from 1980 to 2001, the average age increased nearly 0.3 years per year. Since that time, the average age at first R01 award has leveled off near 42 for PhDs. It is higher for researchers with an MD or an MD/PhD.” [Dr. Sally Rockey, NIH Deputy Director for Extramural Research (2/3/12)]
Age Distribution of NIH RPG Investigators: 1980

Average Age
New R01 Investigator: 37.2

Sources: IMPAC II Current and History Files
Age Distribution of NIH RPG Investigators: 2006

Sources: IMPAC II Current and History Files
Preliminary Projection of Age Distribution of NIH RPG Investigators: 2020

Sources: IMPAC II Current and History Files and Preliminary Demographic Projection Model

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NIH R01 Principal Investigators:
Age 36 and Younger / Age 66 and Older

http://nexus.od.nih.gov/all/rock-talk/

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Young, Brilliant and Underfunded

By ANDY HARRIS

We'll never know what medical breakthroughs were missed because young scientists were not provided with resources.

Comments

The New York Times

OCT. 2, 2014
A study for the National Bureau of Economic Research from 2005 examined the age at which over 2,000 Nobel Prize winners and other notable scientists in the 20th century came up with the idea that led to their breakthrough. Most were between 35 and 39. Yet the median age of first-time recipients of R01 grants, the most common and sought-after form of N.I.H. funding, is 42, while the median age of all recipients is 52. More people over 65 are funded with research grants than those under age 35.
Young scientists lead the way on fresh ideas

Analysis of millions of papers finds that junior biomedical researchers tend to work on more innovative topics than their senior colleagues do.

Young researchers are much more likely than older scientists to study exciting innovative topics, according to a text analysis of more than 20 million biomedical papers published over the past 70 years. More-senior researchers are more likely to publish in hot areas when they are supervising a younger scientist.

Young scientists go for fresh ideas.
Callaway E.

Age and the Trying Out of New Ideas
Mikko Packalen, Jay Bhattacharya
NBER Working Paper No. 20920

http://www.nature.com/news/young-scientists-lead-the-way-on-fresh-ideas-1.16934
http://www.nber.org/papers/w20920
HOT SPOT
Pairings of young first authors and mid-career last authors are the most likely to work on the hottest biomedical topics.

Share of publications trying out new ideas
- >23%
- 20–23%
- 17–20%
- <17%

Early Stage Investigator (ESI)

- Has **not** previously been awarded “significant NIH independent research award”
  - Includes R01’s, projects on P01
  - Does not include: R03’s, R21’s, F’s, K’s, loan repayment

- Within 10 years of terminal research degree/completion of medical residency
  - Extensions permitted (family care, additional clinical training)
# Early Stage Investigators: NHLBI

<table>
<thead>
<tr>
<th>Grant Program</th>
<th>Percentile</th>
<th>Priority Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R01</td>
<td>14</td>
<td></td>
<td>Research Project Grant</td>
</tr>
<tr>
<td>ESI</td>
<td>24*</td>
<td></td>
<td>Early Stage Investigators</td>
</tr>
</tbody>
</table>

*Summary Statement issues must be satisfactorily resolved on applications >19 percentile.

**FY16**

http://www.nhlbi.nih.gov/research/funding/general/current-operating-guidelines

R01-Equivalent grants, New (Type 1)
Success rates, by career stage of investigator
Topics to be Discussed

- **Funding Agencies**
  - Federal
    - National Institutes of Health
  - Voluntary Health Organizations, Professional Societies, Foundations, Industry, Other

- **Types of Awards**
  - Fellowships (F’s), Training grants (T’s), Career Transition Awards, Research grants,

- **Approaches for Competitive Applications**
  - Planning & Organizing Research and Career Development Proposals

Jaime S. Rubin, Ph.D. - [http://grantscourse.columbia.edu](http://grantscourse.columbia.edu)
Approaches for Competitive Applications

- Identify Funding
- Prepare to Write the Grant Application
- Complete the Grant Application
Identify Funding

- Identify appropriate funding agencies
  - Government
  - Non-government
- Identify appropriate funding mechanisms
  - Research
  - Training
- Create a calendar of application deadlines for identified funding programs
It’s not the will to win, but the will to prepare to win that makes the difference.

Bear Bryant, University of Alabama
Prepare to Complete the Grant Application

- Speak with Agency Program Officer
- Speak with colleagues who are/were awardees
- Review funded applications if possible
- Review agency’s review criteria
- Identify what will make the application more competitive
  - Research and/or career development arrangements
  - Access to core facilities/research resources
- Strengthen “Preliminary Work/ Pilot Data”
- Who will write confidential letters of reference?
NIH's Review Criteria

- **Overall Impact Score – Research Grant**
  - Reflects project’s potential to exert a sustained, powerful influence on the field(s) involved

- **Core Review Criteria - Research Grant**
  - Significance
  - Investigators
  - Innovation
  - Approach
  - Environment

Multiple Principle Investigators (research awards)
  - Now permitted by NIH

Multiple Mentors (mentored awards)

Advisors (mentored awards)

Co-investigators/Collaborations

Subcontracts to other institutions

Multidisciplinary/Interdisciplinary

Complete the Grant Application

- Review the application instructions
- Identify the different components
- Create a checklist
- Identify and delegate responsibilities for the different components
  - Technical/Scientific
  - Administrative – e.g. budget
  - Regulatory
  - Draft letters of collaboration/support
When Preparing an Application:

- Read instructions
- Never assume that reviewers “will know what you mean”
- Refer to literature thoroughly and thoughtfully
- Explicitly state the rationale of the proposed investigation
- Discuss “challenges” and how these will be addressed (e.g., alternate approaches)
- Include well-designed tables and figures
- Present an organized, lucid write-up
- Ask colleagues to review and comment
## Timeline for Specific Aims and Benchmarks/Milestones of Research Progress

<table>
<thead>
<tr>
<th>Benchmarks/ Milestones</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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<tbody>
<tr>
<td>Summary of Specific Aim 1a</td>
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<tr>
<td>Summary of Specific Aim 3b</td>
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</table>

Anticipate Questions
and
Answer them before
they are asked
Elements of a Good Proposal

- Feasible
- Relevant
- Unique
- Innovative
- Clear
- Brief
- Consistent
Investigator

- Competent
- Enthusiastic
- Thorough
- Professional
Common Problems with Grant Applications from New Investigators

- Does not address/follow funding agency’s mission, specific instructions, budget limits, etc.
- Overly ambitious
- Not independent of previous mentor’s research
- Fishing expedition
- Not hypothesis driven
- Descriptive, not mechanistic project
- Unfocussed
- No or insufficient preliminary data
- Unrealistic budget
- Methodologies beyond the expertise of investigator or research team
Center for Scientific Review
National Institutes of Health
NIH: one round of applications

http://www3.cancer.gov/admin/gab/02gpb/nci_grants_bk.pdf

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Bell Curve of Reviewer’s Grant Applications

Definitely do not fund

Fine

Definitely fund

Great

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Poor Statistics
Research Resources not Adequately Described

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Career Development/Research Training Plan
not Comprehensive
Figure Caption Font too Small
All Components of the Application are as Strong as Possible
Good Luck!