Career Development and Research Funding/Grantsmanship for Junior Investigators

Dept. of Pediatrics: Fellowship Seminar Series

December 15, 2016

Jaime S. Rubin, Ph.D.
Vice Chair for Investigator Development
Dept. of Medicine
jsr9@columbia.edu
342-3184

Course: “Funding and Grantsmanship for Research and Career Development Activities”

http://grantscourse.columbia.edu/
Topics to be Discussed

- **Types of Awards**
  - Fellowships (F’s), Training grants (T’s), Career Development awards (K’s), Research grants (R’s), Loan Repayment Program

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

- **Planning & Organizing a Research Proposal**
Topics to be Discussed

- **Types of Awards**
  - Fellowships (F’s), Training grants (T’s), Career Development awards (K’s), Research grants (R’s), Loan Repayment Program

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

- **Planning & Organizing a Research Proposal**
National Institutes of Health

National Cancer Institute
National Eye Institute
National Heart, Lung, & Blood Institute
National Human Genome Research Inst
National Institute on Aging
National Inst of Alcohol Abuse & Alcoholism
National Inst of Allergy & Infectious Diseases
National Inst of Arthritis & Musculoskeletal & Skin Diseases
National Institute of Child Health & Human Development
National Inst on Deafness & other Communication Disorders
National Inst of Dental & Craniofacial Research
National Institute of Diabetes & Digestive & Kidney Diseases
National Institute on Drug Abuse
National Institute of Environmental Health Sciences
National Institute of General Medical Sciences
National Institute of Mental Health
National Inst of Neurological Dis and Stroke
National Institute of Nursing Research
National Library of Medicine
National Ctr for Complementary & Integrative Health
National Inst on Minority Health & Health Disparities
National Ctr Adv Translational Sciences
John E. Fogarty International Center
Office of the Director
Center for Scientific Review
Center for Information Technology
NIH Clinical Center

Adapted from: NIH (DRG) - Peer Review of NIH Research Grants Applications

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Agency for Healthcare Research and Quality (AHRQ)

“Mission is to produce evidence to make health care safer, higher quality, more accessible, equitable and affordable…”

Portfolios of Research

- Comparative Effectiveness
- Cross-Agency Communications
- Health Information Technology
- Innovations & Emerging Issues
- Patient Safety
- Prevention & Care Management
- Value
Centers for Disease Control and Prevention (CDC)

Supports programs to promote health and quality of life by preventing and controlling disease, injury, and disability

- Funds grants and cooperative agreements to support public health programs (national and international)
  - National Institute for Occupational Safety and Health
    - Mentored Research Scientist Development Award (K01)
    - Exploratory/Developmental Grant Program (R21)
    - Small Research Program (R03)

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Not All Funding Opportunities Are the Same

- **Different mission statements**
  - Fellowships (F’s), Training grants (T’s)
  - 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
Types of Awards

- Individual fellowships
- Training grants
- Career transition awards
- Career development awards
- Research grants
- Program Projects
- Administrative supplements

- Cooperative agreements
- Institutional Clinical & Translational Science Award (CTSA)
- Subcontracts
- Contracts
- Loan Repayment Program

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Types of Awards

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

- Individual fellowships
- Training grants
- Career transition awards
- Career development awards
- Research grants
- Program Projects
- Administrative supplements

- Cooperative agreements
- Institutional Clinical & Translational Science Award (CTSA)
- Subcontracts
- Contracts
- Loan Repayment Program

Timeline of NIH Funding for Junior Investigators

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

- **Internship/Residency**
  - Research Support

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

- **Instructor/Assistant Professor**

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

DoM NIH Training Grants

- Columbia University Training Program in **Lung Science** [J. Bhattacharya (Pulmonary)]
- Postdoctoral Training in **Cardiovascular Disease** [S. Marx (Cardiology) - M. Hardy (Surgery)]
- Training Grant in **Pediatric Endocrinology**, Diabetes and Metabolism [S. Oberfield (Endocrinology)]
- Training In **Pediatric Infectious Diseases** (Saiman, Lisa (Infectious Diseases))
- **Primary Care** Research Fellowship [S. Shea (General Medicine)]
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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Post-doc: Individual Fellowship

- Voluntary Health Organizations, Foundations, Professional Societies -

- **American Heart Association (Founders Affiliate)**
  - Postdoctoral Fellowship

- **American Philosophical Society**
  - Daland Fellowships in Clinical Investigation

- **American Society of Clinical Oncology/Conquer Cancer Foundation**
  - Young Investigator Award
Post-doc: Individual Fellowship

- Voluntary Health Organizations, Foundations, Professional Societies -

- **American Society of Nephrology Foundation for Kidney Research**
  - Ben J. Lipps Research Fellowship

- **Damon Runyon Cancer Research Foundation**
  - Damon Runyon Fellowship Award

Timeline of NIH Funding for Junior Investigators

Short term Training

Medical School

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

Research Support

Internship/Residency

Career Transition Awards

Fellowship – Research Years

Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot

Instructor/Assistant Professor

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Pathway to Independence Award

- Career Transition 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.

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
1-2 years as a mentored **K** award for “post-docs”
- Funding level is Institute-specific
  - NHLBI: $75K for salary plus fringe benefits, $25K for 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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
The purpose of the NIH Pathway to Independence Award (K99/R00) program is to increase and maintain a strong cohort of new and talented, NIH-supported, independent investigators. This program is designed to facilitate a timely transition of outstanding postdoctoral researchers with a research and/or clinical doctorate degree from mentored, postdoctoral research positions to independent, tenure-track or equivalent faculty positions. The program will provide independent NIH research support during this transition in order to help awardees to launch competitive, independent research careers.

Prospective candidates are encouraged to contact the relevant NIH staff for IC-specific programmatic and budgetary information: Table of IC-Specific Information, Requirements and Staff Contacts.
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.
**Additional Information for Physician-Scientists**

For the purposes of this program, **physician-scientists** include individuals with an MD, DO, DDS/DMD, DVM/VMD, or nurses with research doctoral degrees who devote the majority of their time to biomedical research. The K99/R00 is intended for those physician-scientists who already have substantial research training and are dedicated to initiating a strong, research-intensive career as physician-scientists. The K99/R00 program is designed to facilitate a timely transition of outstanding physician-scientists from mentored, research positions to independent, tenure-track or equivalent faculty positions, and to provide independent NIH research support during the transition. **Individuals who need a longer period of mentored career development before they are prepared to begin the transition to research independence should consider the K08 or K23 program (see: K Kiosk).**
Additional Information for Physician-Scientists

For the purposes of this program, physician-scientists include individuals with an MD, DO, DDS/DMD, DVM/VMD, or nurses with research doctoral degrees who devote the majority of their time to biomedical research. The K99/R00 is intended for those physician-scientists who already have substantial research training and are dedicated to initiating a strong, research-intensive career as physician-scientists. The K99/R00 program is designed to facilitate a timely transition of outstanding physician-scientists from mentored, research positions to independent, tenure-track or equivalent faculty positions, and to provide independent NIH research support during the transition. Individuals who need a longer period of mentored career development before they are prepared to begin the transition to research independence should consider the K08 or K23 program (see: K Kiosk).
**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

Career Transition Awards

- **JDRF: Advanced Postdoctoral Fellowships**
  - Provides an opportunity to receive full-time research training and to assist awardees in transitioning from a fellowship to an independent (faculty-level) position
  - First degree (PhD, MD, DMD, DVM, or equivalent) received no more than 5 years before the fellowship
  - $90,000 per year for up to 3 years
  - **Transition Award:** Optional transition year in which awardees may request funding support for their first year as a faculty member (up to $110,000 for one year)

Timeline of NIH Funding for Junior Investigators

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

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

Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot
- Career Transition Awards
- Individual Mentored K Career Development Award

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Research Career Programs (K)

- Minimum Effort: e.g. 75% (sometimes 50%)
- Research & Career development activities
- Predominantly salary support
- Up to 5 years
- US citizen/permanent resident
- Reduce effort to 50% in last 2 years if PI of NIH research grant

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Mentored Clinical Scientist Development Award (K08)

- Support to develop outstanding independent clinician research scientists
- Basic and translational science

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
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
Mentored Research Scientist Development Awards (K01)

- **NICHD:**
  - (a) Medical Rehabilitation Research
  - (b) Child Abuse and Neglect
  - (c) Population Research

- **NCI, NHLBI, NINDS:** 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)
<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Activity Code</th>
<th>NIH Institute / Center</th>
<th>Number of Applications Reviewed</th>
<th>Number of Applications Awarded</th>
<th>Success Rate $^2$</th>
<th>Total Funding $^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>K23</td>
<td>NCI</td>
<td>22</td>
<td>3</td>
<td>13.6%</td>
<td>$509,190</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NHLBI</td>
<td>94</td>
<td>36</td>
<td>38.3%</td>
<td>$5,393,783</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIDCR</td>
<td>3</td>
<td>1</td>
<td>33.3%</td>
<td>$130,265</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIDDK</td>
<td>73</td>
<td>33</td>
<td>45.2%</td>
<td>$5,589,431</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NINDS</td>
<td>45</td>
<td>14</td>
<td>31.1%</td>
<td>$2,513,324</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIAID</td>
<td>32</td>
<td>11</td>
<td>34.4%</td>
<td>$1,941,510</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIGMS</td>
<td>16</td>
<td>7</td>
<td>43.8%</td>
<td>$1,293,518</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NICHD</td>
<td>73</td>
<td>13</td>
<td>17.8%</td>
<td>$1,670,141</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NEI</td>
<td>11</td>
<td>5</td>
<td>45.5%</td>
<td>$1,009,278</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIEHS</td>
<td>5</td>
<td>4</td>
<td>80.0%</td>
<td>$669,446</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIA</td>
<td>45</td>
<td>17</td>
<td>37.8%</td>
<td>$2,676,436</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIAMS</td>
<td>21</td>
<td>7</td>
<td>33.3%</td>
<td>$867,044</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIDCD</td>
<td>16</td>
<td>6</td>
<td>37.5%</td>
<td>$1,235,223</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIMH</td>
<td>70</td>
<td>27</td>
<td>38.6%</td>
<td>$4,591,885</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIDA</td>
<td>34</td>
<td>13</td>
<td>38.2%</td>
<td>$2,285,575</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIAAA</td>
<td>9</td>
<td>3</td>
<td>33.3%</td>
<td>$504,947</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NINR</td>
<td>12</td>
<td>2</td>
<td>16.7%</td>
<td>$266,325</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NIBIB</td>
<td>1</td>
<td>0</td>
<td>0.0%</td>
<td>$0</td>
</tr>
<tr>
<td>2015</td>
<td>K23</td>
<td>NCCIH****</td>
<td>7</td>
<td>4</td>
<td>57.1%</td>
<td>$554,834</td>
</tr>
</tbody>
</table>

**Activity Total**: 206

**Success Rate**: 35.0%

**Total Funding**: $33,702,155
- **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
- **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

- **American Heart Association**
  - Scientist Development Grant

- **American Society of Clinical Oncology - Conquer Cancer Foundation**
  - Career Development Award

- **Damon Runyon Cancer Research Foundation**
  - Clinical Investigator Award

- **Doris Duke Charitable Foundation**
  - Clinical Scientist Development Award

- **Robert Wood Johnson Foundation**
  - Harold Amos Medical Faculty Development Program

Timeline of NIH Funding for Junior Investigators

- **Short term Training**
  - Medical School
  - Internship/Residency
  - Fellowship – Research Years
  - Instructor/Assistant Professor

- **Research Support**
  - 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**

- **Career Transition Awards**

- **Individual Mentored K Career Development Award**

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)

- NIH-NICHD:
  - Pediatric Scientist
  - Child Health

- NIH-NIDDK
  - Diabetes Research for Pediatric Endocrinologists

- NIH-NCI: Clinical Oncology

- AHRQ:
  - Patient Centered Outcomes Research (PCOR)
CTSA Awards: A Home for Clinical and Translational Science

Source: Zerhouni (NIH) [9/06]
Mentored Clinical Scientist Development Program Award (K12/KL2)

- CTSA - Clinical and Translational Scientist Award

- CU: TRANSFORM Scholars Mentored Career Development program
  [Training and Nurturing Scientists for Research that is Multidisciplinary]

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Research-Oriented Masters Degree Programs

- Comprehensive didactic training for conducting clinical and translational research

- “Patient-Oriented Research” (POR)
  - Two-year, 30-credit M-SPH degree
  - Biostatistics, epidemiology, study design, bioethics, legal and regulatory issues

- For the career development of clinical investigators

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
CU Irving Institute/CTSA Funding Programs

- **TRANSFORM TL1 Postdoctoral Precision Medicine Training Program:** Two-year mentored training program combining integrated didactic training, mentoring, and multidisciplinary research.

- **Precision Medicine Research Fellowship:** Two-year program to train physicians/researchers to use genomics and complex clinical data to improve clinical care and clinical outcomes by tailoring prevention, screening, and medical interventions based upon individual patient characteristics.
CU Irving Institute/CTSA Funding Programs

- **KL2 Program**: TRANSFORM KL2 Scholars Mentored Career Development program

- **Irving Scholars**: Florence and Herbert Irving Clinical Research Career Awards - $60,000/year for 3 years

- **Irving Institute/CTO Pilot Awards**: $50,000 awards for P&S junior faculty to conduct pilot studies leading to future independent funding

- **Imaging Core Pilot Awards**: Funding for junior investigators: magnetic resonance imaging (MRI), optical imaging, PET tomography, single photon emission computed tomography/computed tomography (SPECT/CT), and ultrasound
CU Irving Institute/CTSA Funding Programs

- **Collaborative and Multidisciplinary Pilot Research Awards (CaMPR):** Two-phase program that provides planning and start-up funding to newly-configured investigative teams to support the planning of novel, cross disciplinary projects.

- **CaMPR-BASIC Awards:** Two-phase program that provides funding to form a new collaborative team consisting of two principal investigators at the Assistant Professor level: one from a Basic Science department and one from a Clinical department.
CU Irving Institute/CTSA Funding Programs

- **Health Practice Research Pilot Awards:** For junior investigators to pursue an informatics-based project in an operational clinical setting (w/ the Dept of Biomedical Informatics)

- **Personalized Medicine Pilot Awards:** For research focused on approaches to tailor medical care (prevention, diagnosis, and/or treatment) to the individual patient. Studies may include the use of biomarkers, genomic data, aggregated clinical data, and/or patient reported data to develop personalized medical care.
CU Irving Institute/CTSA Training Programs

- **Reach for the First R01 Course:** Participants receive five free hours of biostatistical consulting, access to CTSA resources, two expert pre-reviews on an early draft of their R01 application, and bi-monthly, closely-monitored meetings to ensure structure and timeliness in completing the tasks required to successfully submit a first R01 application.
CUMC Research Training/Didactic Programs

- **Columbia Summer Research Institute (CSRI):** 5-week (10 credit) training program in research design and statistical analysis for patient oriented research.

- **Epidemiology and Population Health Summer Institute (EPIC):** Dept. of Epidemiology's series of week-long, non-credit courses provides opportunities to gain foundational knowledge and applied skills for advancing population health research.
Timeline of NIH Funding for Junior Investigators

- **Medical School**
  - Short term Training

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

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

- **Instructor/Assistant Professor**
  - Instructor/Assistant Professor
  - Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot

**Career Transition Awards**

**Individual Mentored K Career Development Award**

**NIH Loan Repayment Program**

NIH’s Extramural Loan Repayment Program

- 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

http://www.lrp.nih.gov/
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
NIH’s Extramural Loan Repayment Program

Extramural Programs

- Pediatric Research
- Clinical Research
- Health Disparities Research
- Clinical Researchers from Disadvantaged Backgrounds
- Contraception and Infertility Research

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
<table>
<thead>
<tr>
<th>LRP</th>
<th>New + Renewal</th>
<th>New</th>
<th>Renewal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applications</td>
<td>Awards</td>
<td>Success Rate</td>
</tr>
<tr>
<td>Clinical Research</td>
<td>1,529</td>
<td>866</td>
<td>57%</td>
</tr>
<tr>
<td>Pediatric Research</td>
<td>630</td>
<td>312</td>
<td>50%</td>
</tr>
<tr>
<td>Health Disparities Research</td>
<td>466</td>
<td>125</td>
<td>26%</td>
</tr>
<tr>
<td>Clinical Research for Individuals from Disadvantaged</td>
<td>50</td>
<td>25</td>
<td>50%</td>
</tr>
<tr>
<td>Backgrounds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contraception and Infertility Research</td>
<td>41</td>
<td>23</td>
<td>56%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>1,351</strong></td>
<td><strong>49%</strong></td>
</tr>
<tr>
<td>LRP</td>
<td>Awards</td>
<td>Funding</td>
<td>Mean Award</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>--------</td>
<td>-----------------</td>
<td>------------</td>
</tr>
<tr>
<td>Clinical Research</td>
<td>866</td>
<td>$43,757,421</td>
<td>$50,528</td>
</tr>
<tr>
<td>Pediatric Research</td>
<td>312</td>
<td>$16,891,639</td>
<td>$54,140</td>
</tr>
<tr>
<td>Health Disparities Research</td>
<td>125</td>
<td>$6,224,388</td>
<td>$49,795</td>
</tr>
<tr>
<td>Clinical Research for Individuals from Disadvantaged Backgrounds</td>
<td>25</td>
<td>$1,517,710</td>
<td>$60,708</td>
</tr>
<tr>
<td>Contraception and Infertility Research</td>
<td>23</td>
<td>$977,528</td>
<td>$42,501</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,351</strong></td>
<td><strong>$69,368,686</strong></td>
<td><strong>$51,346</strong></td>
</tr>
</tbody>
</table>
NIH Career Development Support to Independent Research Funding

K08/K23 ➡ Independent Grant
K12 | K23 ➡ Independent Grant
K12 | K23 ➡ Independent Grant
K08/K23 ➡ Independent Grant
K12 ➡ Independent Grant

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Independent Investigator

**R01 Research Award**

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)

Research Grant (NIH R01)

- Supports a discrete, specified project
  - Specific Aims
- “Comprehensive” funding
- Modular budgets up to $250,000/year
- Multi-year
- Flexibility
- Most NIH-supported investigator-initiated research is through this funding mechanism
Research Grant (NIH R01)

- Funds research project
  - Salaries of PI and other research personnel
  - Supplies, reagents, etc
  - Animal costs
  - Patient care costs
  - Core facilities
  - Travel to national meetings

- Multi-Year (4yrs – 5yrs)

- Renewable
  - e.g. original grant + 2 renewals = 15yrs
Small Research Grants (R03)

- Supports, e.g.:
  - Pilot or feasibility studies;
  - Collection of preliminary data
  - Secondary analysis of existing data
  - Small, self-contained research projects
  - Development of new research technology

- 2 years of funding
- Budget: Direct costs up to $50,000/yr
- Not renewable
- Some Institutes only accepts applications in response to their specific funding opportunity announcements

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Exploratory/ Developmental Grants (R21)

- Encourages new, exploratory and developmental research projects by providing support for the early stages of project development. Sometimes used for pilot and feasibility studies.
- 2 years of funding
- Budget: $275,000 (D.C.) over two years
- Investigator-initiated R21 studies not funded by all Institutes
## Challenging Times for All Researchers

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2007</th>
</tr>
</thead>
<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>
</tr>
</tbody>
</table>

## Especially for Young Investigators

<table>
<thead>
<tr>
<th></th>
<th>Then 1990</th>
<th>Now 2007</th>
</tr>
</thead>
<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

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

Average Age
New R01 Investigator: 42.2

Sources: IMPAC II Current and History Files

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Preliminary Projection of Age Distribution of NIH RPG Investigators: 2020

Sources: IMPAC II Current and History Files and Preliminary Demographic Projection Model
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)]
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 RO1 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: e.g. NHLBI

- Separate R01 payline for Early Stage Investigators:
  - 5 percentile points above the regular R01 payline
- Applications that are > 5 but ≤ 10 percentile points above the regular R01 payline
  - May undergo expedited administrative review
## 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**


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

- **Types of Awards**
  - Fellowships (F’s), Training grants (T’s), Career Development awards (K’s), Research grants (R’s), Loan Repayment Program

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

- **Planning & Organizing a Research Proposal**
Approaches for Competitive Applications

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

Overall Impact Score – Career Development

“Enhance the candidate’s potential for a productive, independent scientific research career”

Core Review Criteria – Career Development

Candidate
Career Development Plan/Career Goals & Objectives/Plan to Provide Mentoring
Research Plan
Mentor(s), Co-mentor(s), Consultant(s), Collaborator(s)
Environment and Institutional Commitment to the Candidate

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Overall Impact

Write a paragraph summarizing the factors that informed your Overall Impact score.
Separate Scores for the Individual Criteria

- All applications receive scores
  (even those not discussed at study section)
- Individually reported in summary statement
- Major strengths and weaknesses that influenced the overall impact/priority score - \( \frac{1}{4} \) page per criterion
<table>
<thead>
<tr>
<th>1. Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
</tr>
<tr>
<td>•</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td>•</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Career Development Plan/Career Goals &amp; Objectives/Plan to Provide Mentoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
</tr>
<tr>
<td>•</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td>•</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Research Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
</tr>
<tr>
<td>•</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td>•</td>
</tr>
</tbody>
</table>
4. Mentor(s), Co-Mentor(s), Consultant(s), Collaborator(s)

<table>
<thead>
<tr>
<th>Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

5. Environment and Institutional Commitment to the Candidate

<table>
<thead>
<tr>
<th>Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Research and Career Development Arrangements

- Multiple Principle Investigators (research awards)
- Multiple Mentors (mentored awards)
- Advisors (mentored awards)
- Co-investigators/Collaborations
- Subcontracts to other institutions
- Multidisciplinary/Interdisciplinary

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Prepare to Complete the Grant Application

- Identify and meet with Co-investigators, Collaborators, Consultants, Advisors
  - Identify roles and responsibilities
  - Administrative requirements
    (e.g. if other countries/institutions are involved)
- Identify necessary core facilities and other research resources
- Meet with research administrators
- Human subjects, lab animals, and any other regulatory issues?

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Approaches for Competitive Applications

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

- Review the application instructions
- Identify the different components
- Create a checklist
- Create an outline
  - Content, Length of section (*vis a vis* page limits)
- Identify and delegate responsibilities for the different components
  - Technical/Scientific
  - Administrative – e.g. budget
  - Regulatory
  - Draft letters of collaboration/support
Complete the Grant 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 (“the hypothesis of my study is…”)
- 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
Include Well-Designed Tables and Figures

- Include explanatory caption with the figure (not buried in text)
- Not overly complicated
- Informative, even if printed in black and white
- Easy for the reviewers to read

Tips:
- Bold label in text (e.g., Fig. 4) so it’s easier for reviewers to locate relevant text for individual Figure
- Try to have Figure and relevant text on the same page
# 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>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of Specific Aim 1a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 1b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 2a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 2b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Anticipate Questions and
Answer them before they are asked
Not everything that can be counted counts.
Not everything that counts can be counted.

Junior Faculty Career Development Application:

Research Training Plan Section
3. Specific Aims
4. Research Strategy

Candidate Section
2. Candidate Information and Goals for Career Development

Quote Investigator suggests crediting sociologist William Bruce Cameron
http://quoteinvestigator.com/2010/05/26/everything-counts-einstein/
Personal Statement

When describing a previous research experience:

- What was the hypothesis/scientific question?
- What were the findings and conclusions?
- Why was the study important?
- What were your role and responsibilities?
- What did you learn and accomplish?
  - “Intellectual aspects”
  - Do not focus on technical aspects
Investigator

- Competent
- Enthusiastic
- Thorough
- Professional
Elements of a Good Proposal

- Feasible
- Relevant
- Unique
- Innovative
- Clear
- Brief
- Consistent
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
NIH: one round of applications
Bell Curve of Reviewer’s Grant Applications

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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Figure Caption Font too Small
All Components of the Application are as Strong as Possible
Good Luck!