Disclosure Information

A) Relationship with companies who manufacture products used in the treatment of the subjects under discussion
   Yes____  No ___X___  If "Yes," list company(ies) with the relationship(s) below.

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Manufacturer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Support</td>
<td></td>
</tr>
<tr>
<td>Speaker's Bureau</td>
<td></td>
</tr>
<tr>
<td>Consultant</td>
<td></td>
</tr>
<tr>
<td>Share Holder</td>
<td></td>
</tr>
<tr>
<td>Other Financial Support</td>
<td></td>
</tr>
<tr>
<td>Large Gift(s)</td>
<td></td>
</tr>
</tbody>
</table>

B) Relationships with any of the commercial supporters of this CME activity:  No

C) Discussion of unlabeled uses:  Yes _____  No_X___
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,

■ **Planning & Organizing a Research Proposal**
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,

- **Planning & Organizing a Research Proposal**
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,

- **Planning & Organizing a Research Proposal**

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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
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
Physician-Scientist Pathway

MEDICAL/DENTAL/NURSING/VETERINARIAN SCHOOL

T32 · T35 · F30 · F31

CLINICAL TRAINING,
FELLOWSHIP, RESIDENCY,
APPOINTMENTS

T32 · F32

LRP · K08 · K23 · K12/KL2 · K99/R00

JUNIOR FACULTY

INDEPENDENT INVESTIGATOR

SENIOR FACULTY

RPG · R01

INDUSTRY RESEARCH

- Mentoring
- Exposure
- Education

- Time
- Mentoring
- Debt
- Regulatory Requirements

OTHER ACADEMIC OR GOVERNMENT RESEARCH ROLES

- NIH Success rate
- Demands on time
- Institutional support

CLINICAL PRACTICE

PSW Workforce Working Group Report

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
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
Residents – Research/Travel

- Rheumatology Research Foundation
  - Ephraim P. Engleman Endowed Resident Research Preceptorship/Resident Research Preceptorship Award ($15,000 for salary, research expenses, travel)
  - Medical and Pediatric Resident Research Award ($750, plus $1,000 for travel to attend the 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)
# Timeline of Funding for Junior Investigators

<table>
<thead>
<tr>
<th>Medical School</th>
<th>Internship/Residency</th>
<th>Fellowship – Research Years</th>
<th>Instructor/Assistant Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term Training</td>
<td>Research Support</td>
<td>Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot</td>
<td>Year-long Enhancement Programs MD/PhD Fellowship or Institutional T32</td>
</tr>
</tbody>
</table>

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?

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
CUMC: Post-doc Institutional Training Grants

- Columbia University Training Program in Lung Science [J. Bhattacharya (Pulmonary)]
- Training Program in Endocrinology and Metabolism [J. Bilezikian (Endocrinology)]
- Postdoctoral Training in Arteriosclerosis Research [H. Ginsberg (Preventive Medicine)]
- Columbia Integrated Training Program in Infectious Disease Research [S. Hammer/F. Lowy (ID)]
CUMC:

Post-doc Institutional Training Grants

- Postdoctoral Training in Cardiovascular Disease [S. Marx (Cardiology)/ M. Hardy (Surgery)]
- Multidisciplinary Training in Translational Gastrointestinal and Liver Research [T. Wang (GI)]
- HRSA: NRSA for Primary Medical Care [S. Shea (Gen Med)]
- HRSA: Faculty Development in Primary Care [S. Shea (Gen Med)]

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

The graph shows the number of applications, awards, and success rates over fiscal years from 1998 to 2014. The success rate has generally decreased over time, with a notable dip around 2005. The number of applications and awards has fluctuated, with a peak around 2000 and a decline starting in 2005.
Training Grants and Fellowships: Pre- and Post-Doctoral Positions
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 function and disease and stroke
- Clinical, basic science, bioengineering, biotechnology, epidemiological, behavioral, community, and public health

Funding

- Stipend/Salary: $42,000-$55,300;
  Fringe Benefits: $1,000
- Award Duration: 2 years
Timeline of Funding for Junior Investigators

- Short term Training
  - Medical School
- Research Support
  - Internship/Residency
- 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

Awards
  - Career Transition Awards

Career Transition Award

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.

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, NIDDK, NIA, NICHD: $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

![Bar chart showing trends in research career development awards from 1997 to 2014. The chart includes different types of awards such as K01, K08, K23, K25, and K99.](chart.png)
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.
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

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 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

- Individual Mentored K Career Development Award

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
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
  - e.g. NIDDK: $90K, NCI: $100K
- US citizen/permanent resident.
- Can reduce effort to 50% in last 2 years if PI of NIH research grant
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
Mentored Research Scientist Development Awards (K01)

- Many Institutes: Big Data Science
- NCI, NHLBI, Underrepresented faculty
- NIAID:
  - (a) Epidemiology
  - (b) Modeling Techniques
  - (c) Outcomes Research
- NHLBI:
  - (a) Epidemiology
  - (b) Biostatistics
  - (c) Comparative effectiveness

Mentored Research Scientist Development Awards (K01)

- **NIDDK**: Advanced postdoctoral and/or newly independent research scientists

- **NHGRI**
  - (a) Genomics, proteomics, population genomics
  - (b) Ethical, legal and social issues (ELSI)

- **NIA**: Aging and Health Disparities Research

- **FIC**: International Research Scientist Development Award (IRSDA)

Research Career Development Awards

![Graph showing the number of awards over fiscal years 1997 to 2014 for different types of awards: K01, K08, K23, K25, and K99.]
<table>
<thead>
<tr>
<th>IC</th>
<th>Fiscal Year</th>
<th>Topic</th>
<th>Mechanism</th>
<th>Activity</th>
<th>Type</th>
<th>Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCI</td>
<td>2009</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>9</td>
</tr>
<tr>
<td>NCI</td>
<td>2010</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>5</td>
</tr>
<tr>
<td>NCI</td>
<td>2010</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>39</td>
</tr>
<tr>
<td>NCI</td>
<td>2010</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>13%</td>
</tr>
<tr>
<td>NCI</td>
<td>2011</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>27%</td>
</tr>
<tr>
<td>NCI</td>
<td>2011</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>45</td>
</tr>
<tr>
<td>NCI</td>
<td>2011</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>12</td>
</tr>
<tr>
<td>NCI</td>
<td>2012</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>17%</td>
</tr>
<tr>
<td>NCI</td>
<td>2012</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>24</td>
</tr>
<tr>
<td>NCI</td>
<td>2012</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>4</td>
</tr>
<tr>
<td>NCI</td>
<td>2013</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>7</td>
</tr>
<tr>
<td>NCI</td>
<td>2013</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>34</td>
</tr>
<tr>
<td>NCI</td>
<td>2013</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>21%</td>
</tr>
<tr>
<td>NCI</td>
<td>2014</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>5</td>
</tr>
<tr>
<td>NCI</td>
<td>2014</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>17.86%</td>
</tr>
<tr>
<td>NCI</td>
<td>2014</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>28</td>
</tr>
</tbody>
</table>
Agency for Healthcare Research and Quality

- **AHRQ K08:** Mentored Clinical Scientist Research Career Development Award Health Services Research
  - Safety and Quality
  - Effectiveness
  - Efficiency

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

- **AHRQ K01:** Patient-Centered Outcomes Research (PCOR) Mentored Research Scientist Development Award (K01)
Centers for Disease Control and Prevention

- **CDC K01**: Mentored Public Health Research Scientist Development Award
  - Basic, behavioral, and applied sciences
  - Health promotion
  - Disease prevention
  - Injury and disability prevention
  - Health protection from infectious, environmental and terrorist health threats

Research Career Development/Scholar Programs

Non-government, non-profit agencies

- Voluntary Health Organizations
- Professional Societies
- Private Foundations

Research Career Development/Scholar Programs

- AGA Research Foundation
  - Research Scholar Awards

- American Heart Association
  - Scientist Development Grant

- Doris Duke Charitable Foundation
  - Clinical Scientist Development Grant
Research Career Development/Scholar Programs

- **American Cancer Society**
  - Mentored Research Scholar Grant
- **American Society of Clinical Oncology/Conquer Cancer Foundation**
  - Career Development Award
- **Damon Runyon Cancer Research Foundation**
  - Clinical Investigator Award
- **Susan G. Komen**
  - Career Catalyst Research Grants

Timeline of Funding for Junior Investigators

1. Short term Training
   - Medical School

2. Research Support
   - Internship/Residency

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

4. Career Transition Awards
   - Year-long Enhancement Programs
     - MD/PhD Fellowship or Institutional T32
   - Individual Mentored K Career Development Award

5. Instructor/Assistant Professor
   - Institutional K12 Career Development Slot
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.

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Mentored Clinical Scientist Development Program Award (K12)

- **Multi-Institute**: Women’s Health
- **Institute specific**
  - NCI: Clinical oncology
  - NHLBI
    - Clinical hematology/Transfusion medicine
    - Emergency Medicine
- **CTSA - Clinical and Translational Science Award**
NIH CTSA Awards: A Home for Clinical and Translational Science

Clinical Research Ethics
Biomedical Informatics
Clinical Resources
Biostatistics
Regulatory Support
Trial Design
Advanced Degree-Granting Programs
Participant & Community Involvement
CTSA HOME

NIH
Industry
Other Institutions

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

- CTSA – Clinical and Translational Science Award

- CUMC: TRANSFORM (Training and Nurturing Scientists for Research that is Multidisciplinary)

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Institutional Clinical Research Curriculum Award (CRCA) (K30)

- Comprehensive courses in clinical research/
  “Patient-Oriented Research”
  - 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
Timeline of Funding for Junior Investigators

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

- Internship/Residency
  - Research Support
    - Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot

- Fellowship – Research Years
  - Instructor/Assistant Professor
    - Institutional K12 Career Development Slot

- Career Transition Awards
  - NIH Loan Repayment Program
  - Individual Mentored K Career Development Award

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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
NIH’s Extramural Loan Repayment Program

Extramural Programs

- Clinical Research
- Pediatric Research
- Health Disparities Research
- Clinical Researchers from Disadvantaged Backgrounds
- Contraception and Infertility Research
Percent of Total Awards by LRP

- Clinical Research (57%)
- Pediatric Research (25%)
- Health Disparities Research (16%)
- Contraception and Infertility Research (2%)
- Clinical Research for Individuals from Disadvantaged Backgrounds (1%)
## NIH Extramural Loan Repayment Programs

### FY 2012

#### Funding
New and Renewal by Program

<table>
<thead>
<tr>
<th>LRP</th>
<th>New</th>
<th>Renewal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Awards</td>
<td>Funding</td>
<td>Awards</td>
</tr>
<tr>
<td>Pediatric Research</td>
<td>168</td>
<td>$11,560,880</td>
<td>214</td>
</tr>
<tr>
<td>Health Disparities Research</td>
<td>122</td>
<td>$6,108,530</td>
<td>120</td>
</tr>
<tr>
<td>Clinical Research for Individuals from Disadvantaged Backgrounds</td>
<td>9</td>
<td>$624,407</td>
<td>10</td>
</tr>
<tr>
<td>Contraception and Infertility Research</td>
<td>18</td>
<td>$996,637</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>706</td>
<td>$42,629,607</td>
<td>848</td>
</tr>
</tbody>
</table>

*Note: The table above shows the number of awards and the total funding for new and renewal grants for different programs under the NIH Extramural Loan Repayment Programs for FY 2012.*
NIH Extramural Loan Repayment Programs  FY 2012

NIH received 3,100 applications
- 59 percent of the applications were from new applicants
- 50 percent of all applicants were awarded

<table>
<thead>
<tr>
<th>LRP</th>
<th>New</th>
<th>Renewal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applications</td>
<td>Awards</td>
<td>Success Rate</td>
</tr>
<tr>
<td>Clinical Research</td>
<td>959</td>
<td>389</td>
<td>41%</td>
</tr>
<tr>
<td>Pediatric Research</td>
<td>467</td>
<td>168</td>
<td>36%</td>
</tr>
<tr>
<td>Health Disparities Research</td>
<td>338</td>
<td>122</td>
<td>36%</td>
</tr>
<tr>
<td>Clinical Research for Individuals</td>
<td>23</td>
<td>9</td>
<td>39%</td>
</tr>
<tr>
<td>from Disadvantaged Backgrounds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contraception and Infertility</td>
<td>48</td>
<td>18</td>
<td>38%</td>
</tr>
<tr>
<td>Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,835</td>
<td>706</td>
<td>38%</td>
</tr>
</tbody>
</table>
LRP: Clinical Research – New Applications -

New Applications for Clinical Research LRP

- Applications
- Awards

Source: NIH LRP
Data Accurate as of 03/31/14

http://www.lrp.nih.gov/about_the_programs/clinical.aspx
Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
LRP: Clinical Research – Renewal Applications -

Source: NIH LRP
Data Accurate as of 03/31/14

http://www.lrp.nih.gov/about_the_programs/clinical.aspx
Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Career Development (K) Support to Research Grant (R01)

K01/K08/K23 → R01
K12 → K23 → R01
K12 → K23 → R01
K01/K08/K23 → R01
K12 → R01

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
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)
R01 Research Grant

- Supports a discrete, specified project
- “Comprehensive” funding
- Modular budgets up to $250,000/year
- Multi-year
- Flexibility
- Most of the research that NIH supports is through this funding mechanism

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Research Project Grants: Applications, Awards, and Success Rates
## 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 R01* grant</td>
<td>39</td>
<td>43</td>
</tr>
<tr>
<td>% of R01s* that go to first-time investigators</td>
<td>29%</td>
<td>25%</td>
</tr>
</tbody>
</table>

*RO1 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

Average Age
New R01 Investigator: 42.2

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
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.

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
Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
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>RO1</td>
<td>11.0</td>
<td></td>
<td>Research Project Grant</td>
</tr>
<tr>
<td>ESI</td>
<td>21.0*</td>
<td></td>
<td>Early Stage Investigators</td>
</tr>
<tr>
<td>R21</td>
<td>11.0</td>
<td></td>
<td>Innovative Research Grants</td>
</tr>
</tbody>
</table>

*Summary Statement issues must be satisfactorily resolved on applications >16 percentile.

FY15

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,

- Planning & Organizing a Research Proposal
NIH: one round of applications
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

NIH's Review Criteria

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

- Core Review Criteria
  - Significance
  - Investigators
  - Innovation
  - Approach
  - Environment
Elements of a Good Proposal

- Feasible
- Relevant
- Unique
- Innovative
- Clear
- Brief
- Consistent
Research Arrangements

- Collaborations
- Subcontracts
- Multiple Principle Investigators
  - Now permitted by NIH
- Co-investigators
- Multidisciplinary/Interdisciplinary

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

- Competent
- Enthusiastic
- Thorough
- Professional

Anticipate Questions and Answer them before they are asked.
Bell Curve of Reviewer’s Grant Applications

Great

Definitely do not fund

Fine

Definitely fund

Great

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

not Comprehensive
Figure Caption Font too Small
All Components of the Application are as Strong as Possible
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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Good Luck!