Funding and Grantsmanship for Junior Investigators

Society of General Physiologists
69th Annual Meeting and Symposium

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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
  - Government
    - Federal: National Institutes of Health
  - Non-Government: Voluntary Health Organizations, Professional Societies, Foundations, Industry

- Types of Awards
  - Grants, Contracts, Cooperative agreements,
    - e.g. Research grants, fellowships, career development awards

- Funding Announcements

- Grant Review Processes: National Institutes of Health

- Identifying Funding

- Approaches for Competitive Applications

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- **Identifying Funding**

- **Approaches for Competitive Applications**

U.S. Dept. of Health and Human Services

Food and Drug Administration

Centers for Medicare & Medicaid Services

Centers for Disease Control and Prevention

Substance Abuse and Mental Health Services Administration

National Institutes of Health

Health Resources and Services Administration

Agency for Healthcare Research and Quality

Agency for Toxic Substances and Disease Registry

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

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A Typical NIH Institute/Center

- National Advisory Council
- Office of the Director
- Board of Scientific Counselors

Extramural
- Scientific Programs
  - Grants
  - Contracts

Intramural
- Laboratory Studies
- Clinical Studies

Adapted from: NIH (DRG) - Peer Review of NIH Research Grants Applications
Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
NIH FY14 Budget - $30,143M

- $24,358
- $2,389
- $3,396

$ in millions

Grants and Contracts
Intramural
Other

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NIH EXTRAMURAL & INTRAMURAL FUNDING: FY 2014 ENACTED

- Research Project Grants: $16,077,000,000 (53%)
- Research Mgmt & Support: $1,529,000,000 (5%)
- Intramural Research: $3,396,000,000 (11%)
- R&D Contracts: $2,990,000,000 (10%)
- Research Training: $753,000,000 (2%)
- Other Research Grants: $1,825,000,000 (6%)
- Research Centers: $2,713,000,000 (9%)
- All Other: $860,000,000 (3%)

Total: $31,877,000,000
## Summary of Trends in NIH Funding
**FY1995-FY2013**

<table>
<thead>
<tr>
<th></th>
<th>FY1995</th>
<th>FY2003</th>
<th>FY2013</th>
<th>% Change since 1995</th>
<th>% Change since 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIH Budget (in millions)</td>
<td>$11,300</td>
<td>$27,067</td>
<td>$29,151</td>
<td>158.0%</td>
<td>7.7%</td>
</tr>
<tr>
<td>NIH Budget (constant 1995 $ millions)</td>
<td>$11,300</td>
<td>$21,003</td>
<td>$16,309</td>
<td>44.3%</td>
<td>-22.4%</td>
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<tr>
<td>R01 Equivalent Funding ($ millions)</td>
<td>$4,718</td>
<td>$10,102</td>
<td>$10,175</td>
<td>115.7%</td>
<td>0.7%</td>
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<tr>
<td>Total # R01 Equivalent Grants</td>
<td>21,680</td>
<td>29,626</td>
<td>25,069</td>
<td>15.6%</td>
<td>-15.4%</td>
</tr>
<tr>
<td>R01 Equivalent Applications</td>
<td>22,542</td>
<td>24,634</td>
<td>28,044</td>
<td>24.4%</td>
<td>13.8%</td>
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<tr>
<td># of R01 Equivalent Awards</td>
<td>5,849</td>
<td>7,430</td>
<td>4,902</td>
<td>-16.2%</td>
<td>-34.0%</td>
</tr>
<tr>
<td>R01 Equivalent Success Rates</td>
<td>25.9%</td>
<td>30.2%</td>
<td>17.5%</td>
<td>-32.4%</td>
<td>-42.0%</td>
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</table>
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- Approaches for Competitive Applications
<table>
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<tr>
<th>Mechanism</th>
<th>NIH Role</th>
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</thead>
<tbody>
<tr>
<td>Grant</td>
<td>Patron (Assistance, encouragement)</td>
</tr>
<tr>
<td>Cooperative Agreement</td>
<td>Partner (Assistance but substantial program involvement)</td>
</tr>
<tr>
<td>Contract</td>
<td>Purchaser (Procurement)</td>
</tr>
</tbody>
</table>
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
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 vs. Comprehensive research costs

- **Different time frames**
  - Not renewable: e.g. 5 years (K’s), 3 years (F’s), 2 years (T’s)
  - Renewable: 4years-5years (R01) each competitive period
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Timeline of Funding for Junior Investigators

- Graduate School
- Post-doctoral Years
- Instructor/Assistant Professor

- Individual Fellowship Training Grant
- Mentor's Research Grant
- Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot

Timeline of Funding for Junior Investigators

Short term Training

Medical School

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

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Institutional Training Grant (NIH-T32)

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

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Pre-doc and Post-doc: Individual Fellowships

- Supports specific individual
- Stipend, health fees, tuition, travel
- NIH: F31 (Doctoral student), F30 (Dual Degree), and F32 (Post-doc)
- Review criteria:
  - Individual fellow
  - Mentor
  - Research project
  - Research training environment
Post-doc Fellowships (F31s)
Applications, awards, and success rates

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Post-doc Fellowships (F32s)
Applications, awards, and success rates

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Training Grants and Fellowships: Pre- and Post-Doctoral Positions
Improving graduate student and postdoctoral training

- A. Put individual development plans in place for all trainees
- B. Reduce the length of graduate training
- C. Provide F30 and F31 awards from all Institutes/Centers
- D. Increase postdoctoral stipends and consider policies on benefits
- E. Increase support for K99/R00 and shorten eligibility period
- F. Increase support for Early Independence Awards

http://acd.od.nih.gov/bwf.htm

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Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral Fellowship (Parent F31)

National Cancer Institute (NCI)
National Eye Institute (NEI)
National Heart, Lung, and Blood Institute (NHLBI)
National Human Genome Research Institute (NHGRI)
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 (NIDCD)
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 (NIEHS)
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)
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National Institutes of Health – F31

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Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
National Institutes of Health – F31

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

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Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral MD/PhD and Other Dual Doctoral Degree Fellows (Parent F30)

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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 Heart Association (Founders)
- Daland Fellowships in Clinical Investigation
- Helen Hay Whitney Foundation
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: $42,850-$56,400; Fringe Benefits: $1,000
  • Project support: $3,000

• Award Duration
  • 2 years (may apply for 2\textsuperscript{nd} 2-year award)

• Citizenship
  • U.S. citizen/ Permanent resident/ Pending P.R.
  • Visas (e.g. F1, H1-B, J-1, O-1)

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The Helen Hay Whitney Foundation

Postdoctoral Research Fellowships

• Supports early postdoctoral research training in all basic biomedical sciences

• Candidates who hold, or are in the final stages of obtaining PhD, MD, or equivalent - candidates who have no more than one year of postdoctoral research experience

• 3-year fellowships (<5% success rate)

• Stipend: $51,000-$53,000; Research Allowance: $1,500

• US and foreign citizens

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Types of Awards

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

Timeline of Funding for Junior Investigators

Graduate School
- Individual Fellowship Training Grant
- Mentor’s Research Grant

Post-doctoral Years
- Individual Post-doc Fellowship
- Institutional T32 Post-doc Training Grant slot
- Mentor’s Research Grant

Instructor/Assistant Professor
- Career Transition Awards
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.

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
<table>
<thead>
<tr>
<th>NHLBI</th>
<th>Year</th>
<th>Measure</th>
<th>Type of Grant</th>
<th>K99</th>
<th>Category</th>
<th>New</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td></td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K99</td>
<td>New</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K99</td>
<td>New</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K99</td>
<td>New</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K99</td>
<td>New</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K99</td>
<td>New</td>
<td>22%</td>
<td></td>
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<tr>
<td>2013</td>
<td></td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K99</td>
<td>New</td>
<td>25</td>
<td></td>
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<tr>
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<td></td>
<td>Awards - Number</td>
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<td>K99</td>
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<td>New</td>
<td>24.1%</td>
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<td>2014</td>
<td></td>
<td>Applications - Number</td>
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<td>K99</td>
<td>New</td>
<td>166</td>
<td></td>
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</table>
Timeline of Funding for Junior Investigators

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

Medical School

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

Internship/Residency

Fellowship – Research Years

Instructor/Assistant Professor

Career Transition Awards

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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

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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.
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- Career development awards
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- Program Projects
- Loan Repayment Program
- Administrative supplements
- Cooperative agreements
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- Subcontracts
- Contracts
Timeline of Funding for Junior Investigators

- **Medical School**
  - Short term Training
  - Medical School Internship/Residency

- **Research Support**
  - Year-long Enhancement Programs
  - Graduate School Fellowship or Institutional T32

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

- **Career Transition Awards**
  - Individual Mentored K Career Development Award

Not All Funding Opportunities Are the Same

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

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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. NHLBI: $75K
- 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)

- Many Institutes: Big Data Science
- NHLBI, NINDS: Underrepresented faculty
- **NHLBI:**
  - (a) Epidemiology
  - (b) Biostatistics
  - (c) Comparative effectiveness

Mentored Research Scientist Development Awards (K01)

- **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/Scholar Programs

- American Heart Association
  - Scientist Development Grant
- Doris Duke Charitable Foundation
  - Clinical Scientist Development Grant
Career Development (K) Support to Independent Research Grant (R01)

K01/K08/K23

K12

K23

R01

K12

K23

R01

K01/K08/K23

R01

K12

R01

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Types of Awards

- Individual fellowships
- Training grants
- Career transition awards
- Career development awards
- Research grants
- Cooperative agreements
- Administrative supplements
- Contracts
- Institutional Clinical & Translational Science Award (CTSA)
- Loan Repayment Program
Not All Funding Opportunities Are the Same

- Different mission statements
  - Fellowships (F’s)/Training grants (T’s)
  - Career development (K’s)/Scholar awards
  - Research projects (R’s)

- Different funding
  - Stipend/Salary
  - Pilot awards vs. Comprehensive research costs

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

Research Project Grants: Applications, Awards, and Success Rates

[Graph showing trends in applications, awards, and success rates over fiscal years 1995 to 2014.]

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Types of Awards

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

- To promote **reentry** into biomedical and behavioral research careers
  - Individuals who have interrupted their research careers to care for children or parents or to attend to other family responsibilities
- To promote **diversity** in health-related research
  - Individuals from underrepresented racial and ethnic groups
  - Individuals with disabilities
  - Individuals from socially, culturally, economically, or educationally disadvantaged backgrounds that have inhibited their ability to pursue a career in health-related research

Instrumentation

National Institutes of Health

- **Shared Instrumentation Grant Program (S10)**
  - Major User group of ≥3 PI’s of active NIH research grants
  - NIH-funded projects: Minimum of 75% of the instrument time
  - Major User Group: Minimum of 35% of the total usage time
  - “Purchase or upgrade a single item of expensive, specialized, commercially available instrumentation or an integrated system”
  - $100,000 - $600,000
Instrumentation

National Institutes of Health

- High-End Instrumentation Grant Program (S10)
  - Major user group of ≥3 PI’s of active NIH research grants
  - NIH-funded projects: Minimum of 75% of the instrument time
  - Single piece of equipment
  - $750,000 - $2,000,000

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
NIH CTSA Awards: A Home for Clinical and Translational Science

Source: Zerhouni (NIH) [9/06]

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Topics to be Discussed

- Funding Agencies
  - Government
    - Federal: National Institutes of Health
  - Non-Government: Voluntary Health Organizations, Professional Societies, Foundations, Industry

- Types of Awards
  - Grants, Contracts, Cooperative agreements,
    - e.g. Research grants, fellowships, career development awards

- Funding Announcements

- Grant Review Processes: National Institutes of Health

- Identifying Funding

- Approaches for Competitive Applications

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Funding Announcements

- RFA
  - Targeted research
- Institute-Specific PA
  - Research in a stated area of scientific interest
- Parent PA
  - Investigator-initiated research in any area

narrow

broad

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Topics to be Discussed

- Funding Agencies
  - Government
    - Federal: National Institutes of Health
  - Non-Government: Voluntary Health Organizations, Professional Societies, Foundations, Industry

- Types of Awards
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- Funding Announcements

  - Grant Review Processes: National Institutes of Health

- Identifying Funding

- Approaches for Competitive Applications
# Application Due Dates

<table>
<thead>
<tr>
<th>Activity Codes</th>
<th>Program Description</th>
<th>Application Instructions</th>
<th>Cycle I Due Date</th>
<th>Cycle II Due Date</th>
<th>Cycle III Due Date</th>
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<tbody>
<tr>
<td>R01 new</td>
<td>Research Grants</td>
<td>SF424 (R&amp;R)</td>
<td>February 5</td>
<td>June 5</td>
<td>October 5</td>
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<tr>
<td>U01 new</td>
<td>Research Grants - Cooperative Agreements</td>
<td>SF424 (R&amp;R)</td>
<td>February 5</td>
<td>June 5</td>
<td>October 5</td>
</tr>
<tr>
<td>K series new</td>
<td>Research Career Development</td>
<td>SF424 (R&amp;R)</td>
<td>February 12</td>
<td>June 12</td>
<td>October 12</td>
</tr>
<tr>
<td>R03, R21, R33, R21/R33, R34, R36 new</td>
<td>Other Research Grants</td>
<td>SF424 (R&amp;R)</td>
<td>February 16</td>
<td>June 16</td>
<td>October 16</td>
</tr>
<tr>
<td>F Series Fellowships new, renewal, resubmission</td>
<td>Individual National Research Service Awards (Standard)</td>
<td>SF424 (R&amp;R)</td>
<td>April 8</td>
<td>August 8</td>
<td>December 8</td>
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<tr>
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<td>(see NRSA Training Page)</td>
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<tr>
<td>F31 Diversity Fellowships new, renewal, resubmission</td>
<td>Individual Predoctoral Fellowships (F31) to Promote Diversity in Health-Related Research</td>
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<td>August 13</td>
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<td>(see NRSA Training Page)</td>
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</tr>
</tbody>
</table>

All Activity Codes Cited Above new, renewal, resubmission, revision

AIDS and AIDS-Related Applications

NOTE: See Key Dates section of funding opportunity announcement to determine if AIDS dates apply.

Based on Activity Code

May 7

September 7

January 7

http://grants.nih.gov/grants/funding/submissionschedule.htm
## Application Due Dates

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<tr>
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</thead>
<tbody>
<tr>
<td>R01 renewal, resubmission, revision</td>
<td>Research Grants</td>
<td>SF424 (R&amp;R)</td>
<td>March 5</td>
<td>July 5</td>
<td>November 5</td>
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<tr>
<td>U01 renewal, resubmission, revision</td>
<td>Research Grants - Cooperative Agreements</td>
<td>SF424 (R&amp;R)</td>
<td>March 5</td>
<td>July 5</td>
<td>November 5</td>
</tr>
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</tbody>
</table>

[http://grants.nih.gov/grants/funding/submissionschedule.htm](http://grants.nih.gov/grants/funding/submissionschedule.htm)
## Review and Award Cycles

<table>
<thead>
<tr>
<th></th>
<th>Cycle I</th>
<th>Cycle II</th>
<th>Cycle III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scientific Merit Review</strong></td>
<td>June - July</td>
<td>October - November</td>
<td>February - March</td>
</tr>
<tr>
<td><strong>Advisory Council Round</strong></td>
<td>August or October *</td>
<td>January</td>
<td>May</td>
</tr>
<tr>
<td><strong>Earliest Project Start Date</strong></td>
<td>September or December *</td>
<td>April</td>
<td>July</td>
</tr>
</tbody>
</table>

[http://grants.nih.gov/grants/funding/submissionschedule.htm](http://grants.nih.gov/grants/funding/submissionschedule.htm)

NIH Referral and Review System
Regular Research Grant Applications

CSR
NIH: one round of applications
<table>
<thead>
<tr>
<th>CSR</th>
<th>Institutes</th>
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</thead>
<tbody>
<tr>
<td>• Research Grants (R01, R03)</td>
<td>• Multi-Project Grants (P01, P50, etc)</td>
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<tr>
<td>• Fellowships (F’s)</td>
<td>• Training Grants (T’s)</td>
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<tr>
<td>• Small Business</td>
<td>• Career Development (K’s)</td>
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<td>• Conference Grants (R13)</td>
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<td>• Research Grants in response to RFAs</td>
</tr>
<tr>
<td></td>
<td>• Contracts</td>
</tr>
</tbody>
</table>

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

Center for Scientific Review
- Integrated Review Groups (IRG's) -

- AIDS and Related Research
- Biobehavioral and Behavioral Processes
- Biological Chemistry and Macromolecular Biophysics
- Biology of Development and Aging
- Bioengineering Sciences and Technologies
- Brain Disorders and Clinical Neuroscience
- Cell Biology

- Cardiovascular and Respiratory Sciences
- Digestive, Kidney, and Urological Sciences
- Emerging Technologies and Training Neurosciences
- Endocrinology, Metabolism, Nutrition and Reproductive Sciences
- Genes, Genomes and Genetics
- Healthcare Delivery and Methodologies

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- Immunology
- Infectious Diseases and Microbiology
- Integrative, Functional, and Cognitive Neuroscience
- Interdisciplinary Molecular Sciences and Training
- Molecular, Cellular, and Developmental Neuroscience
- Musculoskeletal, Oral and Skin Sciences
- Oncology 1 – Basic Translational
- Oncology 2 – Translational Clinical
- Population Sciences and Epidemiology
- Risk, Prevention and Health Behavior
- Surgical Sciences, Biomedical Imaging, and Bioengineering
- Vascular and Hematology
Cardiovascular and Respiratory Sciences IRG

- Cardiac Contractility, Hypertrophy, and Failure [CCHF]
- Cardiovascular Differentiation and Development [CDD]
- Clinical and Integrative Cardiovascular Sciences [CICS]
- **Electrical Signaling, Ion Transport, and Arrhythmias** [ESTA]
- Lung Cellular, Molecular, And Immunobiology [LCMI]
- Lung Injury, Repair, and Remodeling [LIRR]
- Myocardial Ischemia and Metabolism [MIM]
- Respiratory Integrative Biology and Translational Research [RIBT]
- Physiology and Pathobiology of Cardiovascular and Respiratory Systems [F10A]

How to Direct a Grant Application to the Appropriate Study Section

- Review research areas of Integrated Review Group
- Review research areas of Study Section
- Review roster of Study Section members
  - Do not contact reviewers
- Review Study Section’s funded grants in NIH RePorter
- Discuss with colleagues in similar research area
- Request via Cover Letter in Application
Cardiovascular and Respiratory Sciences IRG [CVRS]

The Cardiovascular and Respiratory Sciences [CVRS] IRG will consider research applications that employ basic investigations, translational approaches and patient-oriented studies to focus on the development, physiology, and pathophysiology of the cardiac and pulmonary systems. Cardiac study sections are organized around themes of cardiac development, muscle contraction including cardiac hypertrophy and failure, cardiovascular electrophysiology and arrhythmias, myocardial ischemia and metabolism and include a study section devoted to clinical investigation. Respiratory study sections focus on inflammation and immune dysfunctions in the lung, lung injury, repair and remodeling, and the integrative biology and control mechanisms of the lung and its related organs and tissues. Investigators may employ a range of approaches that include genetics, genomics and proteomics, molecular, cell, and computational biology, biochemistry, biophysics and bioengineering, imaging, analyses of model organisms, and human studies.
Electrical Signaling, Ion Transport, and Arrhythmias Study Section [ESTA]

The Electrical Signaling, Ion Transport and Arrhythmias study section reviews both basic and clinical applications concerned with cardiac and vascular electrical and mechanical activity, excitation-contraction coupling, electrophysiological aspects of normal and abnormal cardiovascular function, arrhythmias and sudden death. Studies involve humans and animals, in vitro and in vivo systems, molecular, genetic, electrophysiological, biochemical, biophysical, bioengineering, and computational approaches. Emphasis is on ion transfer and transport mechanisms affecting cardiac rhythm disorders, impulse propagation, and cardiac and vascular smooth muscle contractility in hypertrophy, heart failure, ischemia, hypertension, congenital heart disease, and heart transplant.
ELECTRICAL SIGNALING, ION TRANSPORT, AND ARRHYTHMIAS STUDY SECTION
Center For Scientific Review
(Terms end 6/30 of the designated year)
ROSTER

CHAIRPERSON
------------------------
SANTANA, LUIS F., PHD, (17)
PROFESSOR AND CHAIR
DEPARTMENT OF PHYSIOLOGY AND MEMBRANE BIOLOGY
SCHOOL OF MEDICINE
UNIVERSITY OF CALIFORNIA, DAVIS
DAVIS, CA 95616

MEMBERS
---------
RESEARCHER AND ORGANIZATION

Principal Investigator (PI) / Project Leader:
(Last Name, First Name)

Organization:

Department:

Organization Type:

City:

State:

Country:

Congressional District:

DUNS Number:

TEXT SEARCH

Text Search (Logic):

Search in

Limit Project search to

Limit Publication search to

PROJECT DETAILS

Project Number/ Application ID:
Format: 5R01CA012345-04/ 8515397

Program Officer (PO):
(Last Name, First Name)

Project Start Date: >=
Format: mm/dd/yyyy

Agency/Institute/Center:

NIH Spending Category:

Funding Mechanism:

Award Type:

Activity Code:

Study Section: Electrical Signaling, Ion Transpor

Standing CSR study sections only

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Initial Review Group or Study Section

Actions

- Discussed applications:
  - Receives Impact/Priority Scores
  - Receives Scores for individual core review criteria

- Not Discussed
  - Receives Scores for individual core review criteria

- Not Recommended for Further Consideration (NRFC)

- Other: e.g. Deferred
NIH's Review Criteria-1

**Overall Impact Score**

- Reflects project’s potential to exert a sustained, powerful influence on the research field(s) involved
  (using five core review criteria, and additional review criteria)

- An application does not need to be strong in all categories to be judged likely to have major scientific impact.
Core Review Criteria

A separate score is given for each for each.

(A) “Significance:

(1) Does the project address an important problem or a critical barrier to progress?

(2) If the aims of the application are achieved, how will scientific knowledge, technical capability, and/or clinical practice be advanced?

(3) What will be the effect of the successful completion of these studies on the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field?”
(B) "Investigators:

1. Are the investigators appropriately trained and well suited to carry out this work?
2. Do the Early Stage Investigators/New Investigators have appropriate experience and training?
3. Have the established investigators demonstrated an ongoing record of accomplishments that has advanced their field(s)?
4. If collaborative/multi-PI, do the investigators have complementary and integrated expertise?

Is their leadership approach, governance and, organizational structure appropriate for the project?
NIH's Review Criteria-4

(C) “Innovation:

(1) Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions?

(2) Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense?

(3) Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?
NIH's Review Criteria-5

(D) “Approach:

(1) Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the project?

(2) Are potential problems, alternative strategies, and benchmarks for success presented?

(3) If the project is in the early stages of development, will the strategy establish feasibility and will particularly risky aspects be managed?

(4) If appropriate, what are the plans for a) the protection of human subjects from research risks, and 2) the (exclusion) inclusion of minorities/both genders/children?
(E) “Environment:

(1) Will the scientific environment contribute to the probability of success?

(2) Are the institutional support, equipment, and other physical resources available adequate for the project proposed?

(3) Will the project benefit from unique features of the scientific environment, subject populations, or collaborative arrangements?
NIH's Review Criteria-7

Considered in determining merit, but not given scores

**Protections for Human Subjects:** Justification for involvement of human subjects and the proposed protections from research risk...

**Inclusion of Women, Minorities and Children:** Proposed plans for inclusion (or exclusion) of minorities and members of both genders, as well as the inclusion (or exclusion) of children...

Vertebrate Animals: Five points [specified in the grant application instructions] will be assessed

Requests for Applications (RFAs) May include additional elements, relating to the specific programmatic needs of the RFA

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NIH's Review Criteria-9

Addressed, but not given scores and not considered in overall impact score

**Budget and Period of Support:** Whether budget and requested period of support are fully justified and reasonable in relation to the proposed research

**Resource Sharing Plans:** Whether Resource Sharing Plans [1) Data Sharing Plan, 2) Sharing Model Organisms, and 3) Genome Wide Association Studies (GWAS)] are reasonable.

NIH’s Review of Research Grants

- Guidelines for Reviewers - R01 Research Grants

- Fill-able Templates
  - https://grants.nih.gov/grants/peer/critiques/rpg_critique_temp late.doc

- Review Criteria and Considerations
NIH's Evaluation System

9-point rating scale (1=exceptional; 9=poor)

<table>
<thead>
<tr>
<th>Impact</th>
<th>Score</th>
<th>Descriptor</th>
<th>Strengths/Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Impact</strong></td>
<td>1</td>
<td>Exceptional</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Outstanding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Excellent</td>
<td></td>
</tr>
<tr>
<td><strong>Moderate Impact</strong></td>
<td>4</td>
<td>Very Good</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>Good</td>
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<td></td>
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<tr>
<td><strong>Low Impact</strong></td>
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<td>Impact</td>
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<td>Additional Guidance on Strengths/Weaknesses</td>
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<td>----------------</td>
<td>-------------------------------------------------------------</td>
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<tr>
<td>High</td>
<td>1</td>
<td>Exceptional</td>
<td>Exceptionally strong with essentially no weaknesses</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Outstanding</td>
<td>Extremely strong with negligible weaknesses</td>
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<tr>
<td></td>
<td>3</td>
<td>Excellent</td>
<td>Very strong with only some minor weaknesses</td>
</tr>
<tr>
<td>Medium</td>
<td>4</td>
<td>Very Good</td>
<td>Strong but with numerous minor weaknesses</td>
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<td>5</td>
<td>Good</td>
<td>Strong but with at least one moderate weakness</td>
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<td>Fair</td>
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<td>8</td>
<td>Marginal</td>
<td>A few strengths and a few major weaknesses</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Poor</td>
<td>Very few strengths and numerous major weaknesses</td>
</tr>
</tbody>
</table>

**Minor Weakness:** An easily addressable weakness that does not substantially lessen impact  
**Moderate Weakness:** A weakness that lessens impact  
**Major Weakness:** A weakness that severely limits impact
Separate Scores for the 5 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 - ¼ page per criterion

<table>
<thead>
<tr>
<th>1. Significance</th>
<th>Please limit text to ¼ page</th>
</tr>
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<tbody>
<tr>
<td>Strengths</td>
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</table>

http://enhancing-peer-review.nih.gov/docs/ReviewerVideoslides030609_Modified.ppt
Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Impact Score

- Preliminary Impact Scores determine which applications discussed at study section
  - Impact Score given by each member of the study section

- Overall Impact Score (for discussed applications): Average of reviewers’ Impact Scores (rounded to one decimal place) \( \times 10 \)
  - 81 possible overall Impact Scores (10 – 90, whole numbers)
Calculating Percentile

<table>
<thead>
<tr>
<th>Rank</th>
<th>Impact Score</th>
<th>Percentile</th>
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<tbody>
<tr>
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<tr>
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<td>15</td>
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<tr>
<td>3</td>
<td>20</td>
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<tr>
<td>4</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
</tr>
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</table>
Percentile Value Calculation

- Relative rank for each priority score on a scale from 10 to 90.
- Follows NIH convention: Inverse relationship of priority score to scientific merit - lowest percentile value represents the highest scientific merit.
- Specifies the percent of applications with scores equal to or better than (lower impact score) the application.

\[ P = \frac{100}{N} \times (k^{1/2}) \]

- \( P \) = Percentile Value
- \( k \) = Numerical Rank of Impact Score
- \( N \) = Total number of applications
Calculating Percentile

80 applications*, 14 of which were not recommended for further consideration

<table>
<thead>
<tr>
<th>Rank</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>0.6</td>
</tr>
<tr>
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<td>15</td>
<td>1.9</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>3.1</td>
</tr>
<tr>
<td>4</td>
<td>21</td>
<td>4.4</td>
</tr>
</tbody>
</table>

//

80

Rank = 3

\[
P = \frac{100}{80} \times (3^{\frac{1}{2}}) = 3.1
\]

* Study section’s last three review cycles
Post Initial Review Group Actions

- Calculations of priority scores and percentile rankings
- Removal of applications from Council/Board consideration

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

- Concurrence with Study Section action
- Modification of Study Section action based on program or policy considerations
- Deferral for further review
What’s the problem?

Payline

Study Section A  Study Section B

Great application
Not great application

Courtesy of Dr. Jon Lorsch, NIGMS

CollinsF NIH Council of Councils 1-31-14
What’s the problem?

Great application
Not great application

Payline

Study Section A
Study Section B

Courtesy of Dr. Jon Lorsch, NIGMS
Number of Scored Applications from First-time Investigators are Dropping

+339 Applications
-535 Applications

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

http://enhancing-peer-review.nih.gov/meetings/Peer%20Review%20Implementation%20FINAL%20DRAFT%20update%20-
## 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>

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

http://www.brokenpipeline.org/brokenpipeline.pdf  
Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Age Distribution of NIH RPG Investigators: 1980

Average Age
New R01 Investigator: 37.2

Sources: IMPAC II Current and History Files

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Age Distribution of NIH RPG Investigators: 2006

Average Age
New R01 Investigator: 42.2

Sources: IMPAC II Current and History Files

http://enhancing-peer-review.nih.gov/meetings/Peer%20Review%20Implementation%20FINAL%20DRAFT%20update%20-
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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
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 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: 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>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**
  - Government
    - Federal: National Institutes of Health
  - Non-Government: Voluntary Health Organizations, Professional Societies, Foundations, Industry

- **Types of Awards**
  - Grants, Contracts, Cooperative agreements,
    - e.g. Research grants, fellowships, career development awards

- **Funding Announcements**

- **Grant Review Processes: National Institutes of Health**

- **Identifying Funding**

- **Approaches for Competitive Applications**

Total support for biomedical research in the U.S. in 2012 = $130.4 billion*.

- $41.1 billion
  Federal Government

- $17.8 billion
  Other

- $2.4 billion
  Foundations & Public Grantmaking Charities

- $69.2 billion
  Industry

*Source: Research!America
In 2012, **46 organizations** made **3,206 awards** to **2,579 investigators** totaling **$866 million** (36% of non-profit sector funding)

**Private foundations**
- Basic Discovery Research: 53%
- Mechanisms of Disease: 42%
- Prevention, Diagnosis, Treatment and Outcomes: 5%

**Public fundraising organizations**
- Basic Discovery Research: 32%
- Mechanisms of Disease: 13%
- Prevention, Diagnosis, Treatment and Outcomes: 55%
Award funding covers the broad spectrum of basic discovery and translational and clinical research.

- 61% Translational and Clinical Research
- 38% Basic Discovery Research
- 1% Other

Nearly half of the award dollars were for early career development and training, compared to about 5% of NIH grants.

- 51% Research
- 44% CD&T*
- 5% Other

*CD&T: Career Development and Training
Private Foundations

- Non-government, nonprofit organization with its own funds
- Usually from a single source (e.g. individual, family, corporation)
- Program(s) managed by its trustees and directors
- Established to maintain or aid educational, social, charitable, religious, or other activities serving the common welfare, primarily by making grants to other nonprofit organizations.
- Different types: Independent, Company-Sponsored, Operating, Community Foundation
Pharmaceutical/Biotech Companies

- Independent foundations

- Research agreements:
  - Companies support investigators for a specific research project
  - Agreement reviewed/negotiated by Columbia Technology Ventures (e.g. intellectual property protection)

- Clinical trials

- On going nationally competitive research awards/honorific awards

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Topics to be Discussed

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- Funding Announcements

- Grant Review Processes: National Institutes of Health

- Identifying Funding

- Approaches for Competitive Applications

How to Find Funding Opportunities

- Networking
- Speak to colleagues who are in a similar field
- Speak to colleagues who have been on governmental or private agency review panels
- Speak to colleagues who are on (advisory) boards of private agencies
- Acknowledgement section of publications, oral/poster presentations, press releases, etc.
Other Sources of Information

- Sponsor publications/website/social media which describe research/programmatic interests (e.g. newsletters, strategic plans, annual reports)

- Sponsor e-mail alert modules
  - NIH
    - “List of Lists”: https://list.nih.gov/
      - Able to save queries and have “ongoing” results e-mailed as funding alerts

- Funding Databases (government, private)
Topics to be Discussed

- Funding Agencies
  - Government
    - Federal: National Institutes of Health
  - Non-Government: Voluntary Health Organizations, Professional Societies, Foundations, Industry

- Types of Awards
  - Grants, Contracts, Cooperative agreements,
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- Funding Announcements

- Grant Review Processes: National Institutes of Health

- Identifying Funding

- Approaches for Competitive Applications

Approaches for Competitive Applications

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

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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
Prepare to Complete the Grant Application

- Speak with Program Officer
- Speak with colleagues who are/were awardees
- Review funded applications if possible
- Identify what will make the application more competitive (e.g. research arrangements)
- Strengthen “Preliminary Work/Data”
Research Arrangements

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

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Complete the Grant Application

- Review the application instructions
- Identify the different components
- Identify and delegate responsibilities for the different components
  - Technical/Scientific
  - Administrative – e.g. budget
  - Regulatory
  - Draft letters of collaboration/support
Complete the Grant Application

- Confirm page limits for each component
- Create a schedule for any required meetings
- Determine:
  - Shared computer drive/folders
  - Naming of files (dates?)
  - Track changes?
  - Font, margin, format of literature citation
- Set a firm time-line for each responsibility
  - Writing milestones
  - Absolute deadline date for final compilation

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
- 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
Elements of a Good Proposal

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

- Competent
- Enthusiastic
- Thorough
- Professional
Anticipate Questions and Answer them before they are asked
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
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
Good Luck!