Research, Funding and Grantsmanship:
Fellowship to Assistant Professor
- Postdoctoral Training Program
in Cardiovascular Disease -

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Jaime S. Rubin, Ph.D.
jsr9@columbia.edu, 342-3184
Dept. of Medicine
College of Physicians and Surgeons
Columbia University
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, AHRQ, HRSA
    - Voluntary Health Organizations, Professional Societies, Foundations, Industry, Other

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

Adapted from NIH (DRG) - Peer Review of NIH Research Grants Applications
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- **Planning & Organizing a Research Proposal**
Not All Funding Opportunities Are the Same

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

- **Different funding**
  - Stipend/Salary
  - 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
- Institutional Clinical & Translational Science Award (CTSA)
- Loan Repayment Program
- Administrative supplements
- Program Projects
- Cooperative agreements
- Subcontracts
- Contracts
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
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)
Timeline of NIH Funding for Junior Investigators

Medical School
- T35 Training Grant
- Summer Research between 1st and 2nd Years

Internship/Residency
- Year-long "Enhancement" Research Program

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

Instructor/Assistant Professor
- Career Transition Award
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.
  - Must hold an M.D., D.D.S., D.V.M., Pharm.D., or equivalent clinical 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

- NIH Pathway to Independence Award (K99/R00)
  - 1-2 years as a mentored K award for post-docs
    - Total/year: =$90,000 (salary and research expenses)
    - 75% effort
  - 3 years as an research support award for independent investigators
    - Total/year:=$249,000 (salary and research expenses)
    - Must have an independent research position
  - Fund 150-200 awards per year
Career Transition Awards

- American Heart Association (National) Fellow-to-Faculty Transition Award
  - Provides funding for the crucial period of a physician-scientist’s career development which spans the completion of research training through the early years of the first faculty/staff position.
  - Training stage (1-3 yrs, $65,000 per year) and the first years of the first faculty/staff appointment ($132,000 per year), for a maximum of five years of support.
  - Citizenship: U.S. citizen/ Permanent resident/ Pending permanent resident, Visas (e.g. H1-B, O-1)
Timeline of NIH Funding for Junior Investigators

- T35 Training Grant Summer Research between 1st and 2nd Years
- Individual Post-doc Fellowship or Institutional Post-doc Training Grant slot
- Year-long “Enhancement” Research Program
- Career Transition Award
- Individual Mentored K Career Development Award
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
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 Awards (K01)

- **NHLBI:**
  - Diversity

- **NHLBI:**
  - (a) Epidemiological Research
  - (b) Biostatistics Research
  - (c) Comparative Effectiveness Research
Research Career Development Awards

Number of Awards vs Fiscal Year and Funding:

- **Number of Awards**
  - 1998: 2,000
  - 1999: 2,500
  - 2000: 3,000
  - 2001: 3,500
  - 2002: 4,000
  - 2003: 4,500
  - 2004: 5,000
  - 2005: 5,500
  - 2006: 6,000
  - 2007: 6,500
  - 2008: 7,000
  - 2009: 7,500
  - 2010: 8,000

- **Funding**
  - 1998: $100,000,000
  - 1999: $200,000,000
  - 2000: $300,000,000
  - 2001: $400,000,000
  - 2002: $500,000,000
  - 2003: $600,000,000
  - 2004: $700,000,000
  - 2005: $800,000,000

**Sources:**
# NHLBI: K23 awards - Success Rates

<table>
<thead>
<tr>
<th>IC</th>
<th>Fiscal Year</th>
<th>Topic</th>
<th>Mechanism</th>
<th>Activity</th>
<th>Type</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHLBI</td>
<td>2012</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>21%</td>
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<tr>
<td>NHLBI</td>
<td>2012</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>86%</td>
</tr>
<tr>
<td>NHLBI</td>
<td>2012</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>18%</td>
</tr>
<tr>
<td>NHLBI</td>
<td>2011</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>39%</td>
</tr>
<tr>
<td>NHLBI</td>
<td>2011</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>89%</td>
</tr>
<tr>
<td>NHLBI</td>
<td>2011</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>44%</td>
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<tr>
<td>NHLBI</td>
<td>2010</td>
<td>Applications - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>90%</td>
</tr>
<tr>
<td>NHLBI</td>
<td>2010</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>28%</td>
</tr>
<tr>
<td>NHLBI</td>
<td>2010</td>
<td>Success Rate</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>42%</td>
</tr>
<tr>
<td>NHLBI</td>
<td>2009</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>46%</td>
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<tr>
<td>NHLBI</td>
<td>2008</td>
<td>Awards - Number</td>
<td>Research Grants - Career Awards</td>
<td>K23</td>
<td>New</td>
<td>36%</td>
</tr>
</tbody>
</table>

Agency for Healthcare Research and Quality (AHRQ)

- Mentored Clinical Scientist Development Awards (K08)
- Patient-Centered Outcomes Research (PCOR) Mentored Clinical Investigator Award (K08)
- Patient-Centered Outcomes Research (PCOR) Mentored Research Scientist Development Award (K01)
Timeline of NIH Funding for Junior Investigators

- Medical School
  - T35 Training Grant
    - Summer Research
      - between 1st and 2nd Years

- Internship/Residency
  - Year-long
    - “Enhancement” Research Program

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

- Instructor/Assistant Professor
  - Institutional K12 Career Development Slot
  - Individual Mentored K Career Development Award
  - Career Transition Award

Timeline of NIH Funding for Junior Investigators
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
CTSA Awards: A Home for Clinical and Translational Science

CTSA HOME

Clinical Research Ethics
Biomedical Informatics
Clinical Resources
Biostatistics
Regulatory Support
Trial Design

Advanced Degree-Granting Programs
Participant & Community Involvement

NIH
Industry
Other Institutions

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

■ CTSA - Clinical and Translational Scientist Award

■ TRANSFORM Scholars Mentored Career Development program
  [Training and Nurturing Scientists for Research that is Multidisciplinary]
Degree Program in Patient-Oriented Research [POR]

- Comprehensive courses in clinical research
  - Biostatistics, epidemiology, study designs, bioethics, legal and regulatory issues
- For the career development of clinical investigators
Research Career Development/Scholar Programs

- American Heart Association
  - Scientist Development Grant
- Doris Duke Charitable Foundation
  - Clinical Scientist Development
- Robert Wood Johnson Foundation
  - Harold Amos Medical Faculty Development Program
NIH Career Development (K) Application

- Model for other career development/scholar grant programs supported by voluntary health organizations, private foundations, and professional societies
<table>
<thead>
<tr>
<th>SCORED REVIEW CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Candidate</td>
</tr>
<tr>
<td>Strengths</td>
</tr>
<tr>
<td>•</td>
</tr>
<tr>
<td>Weaknesses</td>
</tr>
<tr>
<td>•</td>
</tr>
<tr>
<td>2. Career Development Plan/Career Goals &amp; Objectives/Plan to Provide Mentoring</td>
</tr>
<tr>
<td>Strengths</td>
</tr>
<tr>
<td>•</td>
</tr>
<tr>
<td>Weaknesses</td>
</tr>
<tr>
<td>•</td>
</tr>
<tr>
<td>3. Research Plan</td>
</tr>
<tr>
<td>Strengths</td>
</tr>
<tr>
<td>•</td>
</tr>
<tr>
<td>Weaknesses</td>
</tr>
<tr>
<td>•</td>
</tr>
</tbody>
</table>
4. **Mentor(s), Co-Mentor(s), Consultant(s), Collaborator(s)**

**Strengths**
- 

**Weaknesses**
- 

5. **Environment and Institutional Commitment to the Candidate**

**Strengths**
- 

**Weaknesses**
- 

OVERALL IMPACT

**Overall Impact** Write a paragraph summarizing the factors that informed your Overall Impact score.
The Candidate

- Candidate’s Background
- Career Goals and Objectives:
  - Scientific Biography
Candidate’s Background

- Personal background for this career path
- Other relevant training experiences
- Other research experiences
- Reasons for basic, clinical, translational, behavioral, multidisciplinary research, relevant publications
Career Goals and Objectives

- Unique expertise/Scientific history
- Skills that are lacking
- Short-term Career Goals
  - Timeline for funded period
- Long-term Career Goals
  - Scientific goals
  - Mentoring goals
  - Networking goals
Career Development/Training Activities During Award Period

- Review of didactic courses, clinical training, and research experiences to date
- New research skills/ knowledge required
- Identification of training modules required to fill gaps in knowledge in order to reach long term goals
- Mentors, Courses, Workshops and additional training, Conferences, Communication skills, Grant writing
## Mentors/Advisory Committee

## Collaborators and Consultants

- Scientific area per mentor/committee member
- Schedule of meetings

### Career Development and Research Training

#### Mentors and Advisors

<table>
<thead>
<tr>
<th>Faculty Member</th>
<th>Role</th>
<th>Area of Expertise</th>
</tr>
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<tbody>
<tr>
<td>Name (Title)</td>
<td>Mentor</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Co-Mentor</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Advisory Board Member</td>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Advisory Board Member</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Collaborator</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Consultant</td>
<td></td>
</tr>
</tbody>
</table>
Environment and Institutional Commitment to the Candidate

- Description of Institutional Environment
- Institutional Commitment to the Candidate’s Research Career Development
NIH’s Extramural
Loan Repayment Program

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

Extramural Programs

- Clinical Research
- Health Disparities Research
- Clinical Researchers from Disadvantaged Backgrounds
- Pediatric Research
- Contraception and Infertility Research
LRP: Clinical Research
– New Applications –
LRP: Clinical Research
– Renewal Applications –

http://www.lrp.nih.gov/about_the_programs/clinical.aspx
HRSA
Loan Repayment Programs

- Health Resources and Services Administration/ Faculty Loan Repayment Program

- Health professions faculty from disadvantaged backgrounds agree to serve at a health professions college/university for 2 years. Federal government will pay up to $40,000 of the participant's student loans and provides funds to offset the tax burden.
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
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
R01-Equivalent grants: Applications, Awards, and Success Rates

[Bar chart showing applications, awards, and success rates over fiscal years 2004 to 2012.

Applications and awards increase over time, while success rate decreases.]
Exploratory/Developmental Grants (R21)

- Encourages new, exploratory, and developmental research
- Pilot and feasibility studies
- 2 years of funding
- Budget: $275,000 over two years
- Not renewable
Small Research Grants (R03)

- Supports:
  - 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: $50,000/year
- Not renewable
### 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
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
Early Stage Investigators

- No previous “significant NIH independent research award”
  - e.g. R01’s
  - Does not include: F’s, K’s, loan repayment program

- Within 10 years of terminal research degree/completion of medical residency

- Extensions permitted
  - Additional clinical training
  - Family responsibilities
## 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>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>
</tbody>
</table>

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

FY13

http://www.nhlbi.nih.gov/funding/policies/operguid.htm
R01-Equivalent grants, New (Type 1)
Success rates, by career stage of investigator
Topics to be Discussed

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- **Planning & Organizing a Research Proposal**
Voluntary Health Organizations

- American Heart Association
  - National
    - Collaborative Science Award
    - Mentored & Clinical Population Research Award
    - Fellow-to-Faculty Transition Award
    - Scientist Development Grant
  - Founders Affiliate
    - Grant-in-Aid
    - Mentored & Clinical Population Research Award
    - Scientist Development Grant
    - Postdoctoral Fellowship
    - Predoctoral Fellowship
    - Undergraduate Student Summer Fellowship Program
    - Medical Student Research Program
Professional Societies

- **American College of Cardiology (ACC)/ACCF**
  - Merck Research Fellowships in Cardiovascular Disease and Cardiometabolic Disorders
    - $70,000 salary support for one year of research
  - William F. Keating, Esq. Endowment Award
    - $70,000 salary support for one year of research
  - International Society for Cardiovascular Translational Research (ISCTR) Cardiovascular Translational Research Scholarship
    - $60,000 salary support for one year of research
  - Young Investigator Awards Competition
Private Foundations

- Doris Duke Charitable Foundation
  - Clinical Scientist Development
- Robert Wood Johnson Foundation
  - Harold Amos Medical Faculty Development Program
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- **Planning & Organizing a Research Proposal**
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
- Include well-designed tables and figures
- Present an organized, lucid write-up
Elements of a Good Proposal

- Feasible
- Relevant
- Unique
- Innovative
- Clear
- Brief
- Consistent
Anticipate Questions and Answer them before they are asked
Investigator

- Competent
- Enthusiastic
- Thorough
- Professional
NIH: one round of applications
Bell Curve of Reviewer’s Grant Applications

Definitely do not fund

Fine

Definitely fund

Great
Poor Statistics
Research Resources not Adequately Described
Career Development 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

- 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!