Research, Funding Opportunities, and Grantsmanship for GI Fellows

March 22, 2017

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

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

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

- **Approaches for Competitive Applications**
  - Career Development and Research Proposals

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- **Approaches for Competitive Applications**
  - Career Development and Research Proposals
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: 4 - 5 years (R01) each competitive period
Types of Awards

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

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Timeline of Funding for Junior Investigators

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

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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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

Multidisciplinary Training in Translational Gastrointestinal and Liver Research [T. Wang]
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 (F32’s)
Applications, awards, and success rates
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 Diseases/ Liver Research Fund**
  - Advanced/Transplant Hepatology Fellowship
  - Clinical and Translation Research Award

- **American Cancer Society**
  - Postdoctoral Fellowships

- **American College of Gastroenterology**
  - Clinical Research Award
Post-doc: Individual Fellowship
- Voluntary Health Organizations, Foundations, Professional Societies -

- **American Liver Foundation**
  - Postdoctoral Research Fellowship Award

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

- **American Society of Clinical Oncology / Conquer Cancer Foundation**
  - Young Investigator Award

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

Timeline of Funding for Junior Investigators

- **T35 Training Grant Summer Research between 1st and 2nd Years**
- **Research Support**
- **Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot**

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

- **Year-long Enhancement Programs**
- **MD/PhD Fellowship or Institutional T32**
- **Career Transition Award**

NIH: 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.

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1-2 years as a mentored **K award** for “post-docs”

- Funding level is Institute-specific
  - NIDDK, NIA: $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

Career Transition Awards

BWF: Career Awards for Medical Scientists

- Supports physician-scientists to bridge advanced postdoctoral/fellowship training and the early years of faculty appointment
- Must hold an M.D., D.D.S., or D.V.M.
- 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

Timeline of Funding for Junior Investigators

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

Medical School

Research Support

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Instructor/Assistant Professor

Career Transition Award

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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
- 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
Cancer Prevention, Control, Behavioral, and Population Sciences Career Development Award (K07)

- NCI program
- Support individuals with health professional or science doctoral degrees who are not fully established investigators
<table>
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<tr>
<th>Fiscal Year</th>
<th>Activity Code</th>
<th>NIH Institute / Center</th>
<th>Number of Applications Reviewed</th>
<th>Number of Applications Awarded</th>
<th>Success Rate $^2$</th>
<th>Total Funding $^3$</th>
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<tr>
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<td>5</td>
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| 2016        | K23           | Activity Total         | 575                           | 207                           | 36.0%             | $35,665,755       |
Research Career Development/Scholar Programs

- **American Cancer Society**
  - Mentored Research Scholar Grant

- **American College of Gastroenterology**
  - Junior Faculty Development Grant

- **American Gastroenterological Association Research Foundation**
  - Research Scholar Awards

- **American Liver Foundation**
  - Liver Scholar Award

Research Career Development/Scholar Programs

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

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

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

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

Timeline of Funding for Junior Investigators

Medical School

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

Internship/Residency

- Research Support

Fellowship – Research Years

- Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot
- Institutional K12 Career Development Slot

Instructor/Assistant Professor

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

Mentored Clinical Scientist Development Program Award (K12)

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

CTSA Awards:
A Home for Clinical and Translational Science

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]
CU Irving Institute/CTSA Funding Programs

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

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

- **KL2 Program**: TRANSFORM KL2 Scholars Mentored Career Development program
- **Irving Scholars**: Florence and Herbert Irving Clinical Research Career Awards - $60,000/year for 3 years
- **Irving Institute/CTO Pilot Awards**: $50,000 awards for P&S junior faculty to conduct pilot studies leading to future independent funding
- **Imaging Core Pilot Awards**: Funding for junior investigators: magnetic resonance imaging (MRI), optical imaging, PET tomography, single photon emission computed tomography/computed tomography (SPECT/CT), and ultrasound
CU Irving Institute/CTSA Funding Programs

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

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

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

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

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

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

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

- **Patient-Oriented Research (POR) Master's of Science Program:** Two-year, 30-credit M-SPH degree program of comprehensive didactic training for conducting clinical and translational research.
Timeline of NIH Funding for Junior Investigators

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

Short term Training
Research Support
Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot
Institutional K12 Career Development Slot

Year-long “Enhancement” Programs

Career Transition Awards
Individual Mentored K Career Development Award

NIH Loan Repayment Program

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
NIH’s Extramural Loan Repayment Program

Extramural Programs

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

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<th>LRP</th>
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<td></td>
<td>Applications</td>
<td>Awards</td>
<td>Success Rate %</td>
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<td>Clinical Research</td>
<td>1,529</td>
<td>866</td>
<td>57</td>
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<tr>
<td>Pediatric Research</td>
<td>630</td>
<td>312</td>
<td>50</td>
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<tr>
<td>Health Disparities Research</td>
<td>486</td>
<td>125</td>
<td>26</td>
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<tr>
<td>Clinical Research for Individuals from Disadvantaged Backgrounds</td>
<td>50</td>
<td>25</td>
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<td>Contraception and Infertility Research</td>
<td>41</td>
<td>23</td>
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<td><strong>2,736</strong></td>
<td><strong>1,351</strong></td>
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<td>LRP</td>
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<tr>
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<td>$43,757,421</td>
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<td>Contraception and Infertility Research</td>
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<td><strong>Total</strong></td>
<td><strong>1,351</strong></td>
<td><strong>$69,368,686</strong></td>
<td><strong>$51,346</strong></td>
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</table>
6. NIH should expand Loan Repayment Programs and the amount of loans forgiven should be increased to more realistically reflect the debt burden of current trainees. This program should also be made available to all students pursuing biomedical physician-scientist researcher careers, regardless of particular research area or clinical specialty.
NIH Career Development Support to Independent Research Funding

- K08/K23 → Independent Grant
- K12 → Independent Grant
- K23 → Independent Grant

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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
  - “Specific Aims”
- “Comprehensive” funding
  - Salary of PI and research staff, supplies, animal costs, patient care costs, travel, publication costs
- Modular budgets up to $250,000/year
- Multi-year (4yrs – 5 yrs)
- 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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Research Project Grants: Applications, Awards, and Success Rates
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

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  - Federal
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  - Voluntary Health Organizations, Professional Societies, Foundations

- **Approaches for Competitive Applications**
  - Career Development and Research Proposals

Voluntary Health Organizations

- **American Cancer Society**
  - Mentored Training and Career Development Grants
    - Postdoctoral Fellowships
    - Mentored Research Scholar Grant
  - Research Grants for Independent Investigators
    - Research Scholar Grants
  - Health Professional Training Grants
  - Professors
    - Research Professor, Clinical Research Professor
  - New Initiatives and Requests for Applications

- **American Liver Foundation**
  - Postdoctoral Research Fellowship Award
  - Liver Scholar Award

- **Cancer Research Institute, Inc.**
  - Irvington Postdoctoral Fellowship
  - Clinic and Laboratory Integration Program (CLIP) Grants
  - Investigator Awards

- **Lustgarten Foundation (pancreatic cancer)**
  - Research Investigator Awards
Crohn’s & Colitis Foundation of America
- Student Research Awards (college/graduate/medical)
- Research Fellowship Awards
- Career Development Awards
- Senior Research Awards
- Scientific Conferences and Workshops

Damon Runyon Cancer Research Foundation
- Damon Runyon Fellowship Award
- Damon Runyon Clinical Investigator Award
- Damon Runyon Physician-Scientist Training Award
- Damon Runyon-Rachleff Innovation Award
Professional Societies

- **American College of Gastroenterology**
  - Junior Faculty Development Grants
  - Clinical Research Awards
  - “Smaller Programs” Clinical Research Award

- **American Association for the Study of Liver Diseases**
  - Pinnacle Research Award in Liver Diseases
  - Clinical and Translational Research Fellowship
  - Advanced/Transplant Hepatology Fellowship Program
  - Career Development Award in Liver Transplantation Clinical and Translational Research Awards

- **American Gastroenterological Association/AGA Research Foundation**
  - Student Awards
  - Career Development Awards
  - Young Investigator Awards
  - Established Investigator Awards
  - Travel Awards

- **American Society for Gastrointestinal Endoscopy/ASGE Foundation**
  - Research Awards
Private Foundations

- **Kenneth Rainin Foundation**
  - Inflammatory Bowel Disease (IBD)
    - Innovator Awards
    - Breakthrough Awards
    - Synergy Awards

- **Leona M. and Harry B. Helmsley Charitable Trust**
  - IBD and Crohn's Disease
Topics to be Discussed

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- **Funding Agencies**
  - Federal
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- **Approaches for Competitive Applications**
  - Career Development and Research Proposals
NIH Career Development (K) Application

- Model for other career development/scholar grant programs supported by voluntary health organizations, private foundations, and professional societies
Overall Impact

Write a paragraph summarizing the factors that informed your Overall Impact score.
### 1. Candidate

**Strengths**
- 

**Weaknesses**
- 

### 2. Career Development Plan/Career Goals & Objectives/Plan to Provide Mentoring

**Strengths**
- 

**Weaknesses**
- 

### 3. Research Plan

**Strengths**
- 

**Weaknesses**
-
4. **Mentor(s), Co-Mentor(s), Consultant(s), Collaborator(s)**

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<th>Weaknesses</th>
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5. **Environment and Institutional Commitment to the Candidate**

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</tr>
</tbody>
</table>
1 + 12 Pages Combined

- Candidate Information
  - Section 2

- Research Plan
  - 3. Specific Aims (1 page)
  - 4. Research Strategy
2. Candidate Information

- Candidate’s Background
- Career Goals and Objectives:
  Scientific Biography
- Career Development/ Training Activities During Award Period
Candidate’s Background

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

Career Goals and Objectives

- **Unique expertise/Scientific history**
  - Previous work
    - Consistent themes, or
    - Why research interests have changed direction
  - e.g. Joint appointments, Multidisciplinary

- **Skills that are lacking**
  - Identification of specific modules to address areas for growth, provides justification of award
  - Role of specific Mentor(s) and Advisory Committee member(s)
- **Justify award**
  - Fits into past and future research career

- **Short-term Career Goals**
  - Timeline for funded period

**Year 1:** Preliminary data

**Year 2:** Submit publications (possible journals),
  - Presentations at national meetings (examples),
  - Formulation of project to submit for R01 application

**Year 3-5:** By the end of the funded period, applicant will be an independent investigator near to R01 funding

Long-term Career Goals

Scientific goals
- Basic science, translational, clinical, epidemiologic, behavioral

Mentoring goals
- How mentoring has been important to you
- Previous/current mentoring responsibilities

Networking goals
- Multidisciplinary activities, grants, etc
Career Development/Training Activities During Award Period

- Review of didactic courses, 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
  - Rational for each of the modules

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
New Section on each Module

- Reason for module
- Specific Description of each “Mode of Learning”
  - Role of Mentors and Advisors
  - Specific courses, workshops, and other didactics
  - Details on research meetings

Module: Career skills

- Grantsmanship
- Becoming a mentor
- Laboratory management

Table: Career Development/ Training Activities During Award Period

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
<table>
<thead>
<tr>
<th>Module</th>
<th>Mentor(s)</th>
<th>Mode of learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific Area (1-3)</td>
<td>Specific names</td>
<td>Coursework (completed and new) 1-on-1 meetings (schedule? e.g. weekly) Guided readings Research meetings (schedule? e.g. weekly) Applied training Clinical experience</td>
</tr>
<tr>
<td>Career skills</td>
<td>All mentors</td>
<td>Improving communication skills Grant writing course Professional workshops/seminars Collaborations Abstracts and manuscripts Small grant application submission</td>
</tr>
<tr>
<td>Dissemination of Research Results</td>
<td></td>
<td>Supervising technical support personnel, organizing lab meetings, journal clubs</td>
</tr>
</tbody>
</table>
## Mentors/Advisory Committee
- 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>
</thead>
<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>
<tr>
<td>Name (Title)</td>
<td>Advisory Board Member</td>
<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>

Summary of coursework

- List previous relevant coursework
- Proposed coursework
  - Course number and description
  - Include courses on grant writing and responsible conduct of research
- Additional didactic activities
  - e.g. Those offered by professional societies, workshops, symposiums

Clinical and/or Teaching activities

- Be specific, mention hrs. per week, restate % of time dedicated to research

- Percentage of time for each activity

- Timetable
# Career Development Activities

<table>
<thead>
<tr>
<th>Career Development Activities</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mentorship</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentor (name) – frequency (e.g. weekly) of individual meetings, frequency of lab meetings, frequency and listing of specific journal clubs, seminars, and other recurring relevant programs</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Co-Mentor (name) – frequency (e.g. weekly) of individual meetings, frequency of lab meetings, frequency and listing of journal clubs, seminars, and other recurring relevant programs</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Advisory Group – frequency (e.g. quarterly) of meetings</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>
### Career Development Activities

<table>
<thead>
<tr>
<th><strong>Experimental Training</strong></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mentor</strong> (name) – Specific area of research and/or methodology</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td><strong>Co-Mentor</strong> (name) – Specific area of research and/or methodology</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Co-Investigator 1</strong> (name) – Specific area of research and/or methodology</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Co-Investigator 2</strong> (name) – Specific area of research and/or methodology</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Collaborator 1</strong> (name) – Specific area of research and/or methodology</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Collaborator 2</strong> (name) – Specific area of research and/or methodology</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

### CU Formal Coursework – P&S, M-SPH, GSAS, etc.

<table>
<thead>
<tr>
<th><strong>Course #1</strong>: Specific Course # / Formal Title</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Course #2</strong>: Specific Course # / Formal Title</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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<table>
<thead>
<tr>
<th><strong>Course #3</strong>: Specific Course # / Formal Title</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th><strong>G4010</strong>: Responsible Conduct of Research and Related Policy Issues</th>
<th>Year 1</th>
<th>Year 2</th>
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<table>
<thead>
<tr>
<th><strong>M9780</strong>: Funding for Research Activities</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Career Development Activities</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Workshops &amp; Additional Training Programs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cold Spring Harbor Course on......</td>
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<tr>
<td>Woods Hole Workshop on.....</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>American Association for.... Junior Investigators Training on.....</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTSA “K to R” Program</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IRB 101 Course</td>
<td></td>
<td></td>
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<td>X</td>
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<tr>
<td>NYAS Science Alliance Sessions on......</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td><strong>Scientific Conferences-Communication Skills (Oral / Poster Presentations)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Symposium of the NY Academy of....(annual)</td>
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<td>Congress of....... (annual)</td>
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<tr>
<td>American Association for........ (annual)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Society of...... (biannual)</td>
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</table>

<table>
<thead>
<tr>
<th>Career Development Activities</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mentoring Skills (responsibility shared with K mentors)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students (summer, undergraduate, medical)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Communication Skills (Written)</strong></td>
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<tr>
<td>Preparation of manuscripts for peer reviewed journals</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td><strong>Grant Writing</strong></td>
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<tr>
<td>CTSA pilot award for junior investigator (to supplement K award)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Center for...... award for new investigators</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>R01 preparation and submission (on research funded by K award)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
NIH Career Development Support to Independent Research Funding

K08/K23 → Independent Grant
K12 K23 → Independent Grant
K12 K23 → Independent Grant
K08/K23 → Independent Grant
K12 → Independent Grant

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Number of Scored Applications from First-time Investigators are Dropping

- 535 Applications
- 339 Applications

From Established Investigators
From First-time Investigators
# Challenging Times for All Researchers

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

# Especially for Young Investigators

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

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

http://www.brokenpipeline.org/brokenpipeline.pdf

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
Preliminary Projection of Age Distribution of NIH RPG Investigators: 2020

Sources: IMPAC II Current and History Files and Preliminary Demographic Projection Model
Figure 1. Average Age of Principal Investigators with MD, MD-PhD, or PhD at the time of First R01 Equivalent Award from NIH, Fiscal Years 1980 to 2011.
“Over the past three decades, we’ve seen profound shifts in the average age at which a principal investigator receives their first R01. During the period from 1980 to 2001, the average age increased nearly 0.3 years per year. Since that time, the average age at first R01 award has leveled off near 42 for PhDs. It is higher for researchers with an MD or an MD/PhD.” [Dr. Sally Rockey, NIH Deputy Director for Extramural Research (2/3/12)]
NIH R01 Principal Investigators: Age 36 and Younger / Age 66 and Older
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)
For FY 2016, NIDDK is establishing a nominal "payline" for new (Type 1) and renewal or competing continuation (Type 2) R01 applications of 13th percentile. Most unsolicited R01 applications will be funded at this payline.

The nominal payline for R01 applications submitted by ESIs at the 18th percentile.

research workforce. In support of this, the nominal payline for first competitive renewal applications for R01 awards to researchers who were ESIs when they competed for the initial NIDDK Type 1 R01 award will be 15th percentile in FY 2016. Only one award per eligible

FY16


Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
R01-Equivalent grants, New (Type 1): Success rates, by career stage of investigator
Topics to be Discussed

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

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

- **Approaches for Competitive Applications**
  - Career Development and Research Proposals

Approaches for Competitive Applications

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

Identify Funding

- Identify appropriate funding agencies
  - Government
  - Non-government

- Identify appropriate funding mechanisms
  - Research
  - Training

- Create a calendar of application deadlines for identified funding programs
Approaches for Competitive Applications

- Identify Funding
- Prepare to Complete the Grant Application
- Complete the Grant Application
It’s not the will to win, but the will to prepare to win that makes the difference.

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

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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Research and Career Development Arrangements

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

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

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

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

- Review the application instructions
- Identify the different components
- Create a checklist
- Create an outline
  - Content, Length of section (*vis a vis* page limits)
- Identify and delegate responsibilities for the different components
  - Technical/Scientific
  - Administrative – e.g. budget
  - Regulatory
  - Draft letters of collaboration/support
Complete the Grant Application

- 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 (“the hypothesis of my study is…”)
- Discuss **limitations** and potential “challenges” and how these will be addressed (e.g., “alternate approaches”)
- Include well-designed **tables and figures**
- Present an **organized**, lucid write-up (use an **outline**)
- Ask colleagues to **review** and comment
Complete the Grant Application

- Read instructions
- Never assume that reviewers “will know what you mean”
- Refer to literature thoroughly and thoughtfully
- Explicitly state the rationale of the proposed investigation (“the hypothesis of my study is…”)
- Discuss limitations and potential “challenges” and how these will be addressed (e.g., “alternate approaches”)
- Include well-designed tables and figures
- Present an organized, lucid write-up (use an outline)
- Ask colleagues to review and comment
Include Well-Designed Tables and Figures

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

Tips:
- Bold label in text (e.g., Fig. 4) so it’s easier for reviewers to locate relevant text for individual Figure
- Try to have Figure and relevant text on the same page
## Timeline for Specific Aims and Benchmarks/Milestones of Research Progress

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

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

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

Candidate Section
2. Candidate Information and Goals for Career Development

Quote Investigator suggests crediting sociologist William Bruce Cameron
http://quoteinvestigator.com/2010/05/26/everything-counts-einstein/
Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Investigator

- Competent
- Enthusiastic
- Thorough
- Professional
Personal Statement/
Candidate’s Background

When describing a previous research experience:

- What was the hypothesis/scientific question?
- Why was the study important?
- What were the findings and conclusions?
- What were your role and responsibilities?
- What did you learn and accomplish?
  - “Intellectual aspects”
  - Do not focus on technical aspects
- Cite any resulting publications
- Describe any honors/awards and conference/workshop presentations

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Possible Problems Specific for Mentored Career Development Awards

**Mentor**

- Too many other responsibilities
  (e.g. administrative, clinical)
- Too many other mentees
  (e.g. students, post-docs)
- Not appropriate scientifically
- Too junior
- Limited experience as a mentor
- Limited funds to support proposed research

Possible Problems Specific for Mentored Career Development Awards

Institution

- Limited scientific/technical resources
- Limited career development opportunities
- Limited opportunities for career advancement
Elements of a Good Proposal

- Feasible
- Relevant
- Unique
- Innovative
- Clear
- Brief
- Consistent
Common Problems with Grant Applications from New Investigators

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

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Pink Sheet: Reviewers’ Comments

Center for Scientific Review
National Institutes of Health

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Bell Curve of Reviewer’s Grant Applications

- Definitely do not fund
- Definitely fund

Fine

Great

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Poor Statistics
Research Resources not Adequately Described
Career Development/Research Training Plan not Comprehensive

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Figure Caption Font too Small
All Components of the Application are as Strong as Possible
Good Luck!