Grantsmanship for Graduate Students and Postdoctoral Fellows - Individual Fellowships -

October 9, 2014

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Dept. of Medicine
College of Physicians and Surgeons
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Course: “Funding and Grantsmanship for Research and Career Development Activities”
http://grantscourse.columbia.edu/
Rescuing US biomedical research from its systemic flaws

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_Educating graduate students._ For the last several decades, the numbers of graduate students pursuing careers in biomedical science have grown unchecked because trainees are overwhelmingly supported on research grants (2). In contrast, the number of students who rely on training grants and individual fellowships has remained constant for a long time.

To give federal agencies more control over the number of trainees and the quality of their training, we propose moving gradually to a system in which graduate students are supported with training grants and fellowships and not with research grants. Fellowships have the virtue of providing peer review of the student applicants, and training programs set high standards for selection of students and for the education they receive.
Topics to be Discussed

- **Individual Fellowship Programs**
  - Federal
    - National Institutes of Health (F31 and F32)
    - National Science Foundation
  - Voluntary Health Organizations, Professional Societies, Foundations

- **Scoring and Review Criteria for Fellowship Applications**

- **Components of a Fellowship Application**

- **Approaches for a Competitive Application**

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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

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Not All Funding Opportunities Are the Same

- **Different mission statements**
  - Fellowships
  - 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: 5 years (K’s), 3 years (F’s), 2 years (T’s)
  - Renewable: 4 years - 5 years (R01) each competitive period
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### Timeline of Funding for Junior Investigators

<table>
<thead>
<tr>
<th>Graduate School</th>
<th>Post-doctoral Years</th>
<th>Instructor/Assistant Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Fellowship Training Grant</td>
<td>Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot</td>
<td></td>
</tr>
<tr>
<td>Mentor’s Research Grant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Timeline of 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

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

Medical Students: Year-long Enhancement Programs

- NIH
  - Medical Research Scholars Program
    - Mentored basic, clinical, or translational research
  - Fogarty International Center
    - Clinical Research Training Scholars Program
    - Fulbright-Fogarty Fellowships in Public Health
  - National Institute of Diabetes and Digestive and Kidney Diseases
    - Medical Student Research Training Program
  - National Institute of Environmental Health Sciences
    - Fellowships in Environmental Medicine for Medical Students
Medical Students: Year-long Enhancement Programs

- American Diabetes Association
  - Clinical Scholars Award
- American Heart Association
  - Medical Student Research Program
- CDC Foundation
  - Applied Epidemiology Fellowship
- Doris Duke Charitable Foundation
  - International/Global health
- Hughes (Howard) Medical Institute
  - Medical Research Fellows Program
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
Pre-doc and Post-doc: Individual Fellowship

- Supports specific individual
- Stipend, health fees, tuition, travel
- NIH: F31 and F32
- Review criteria:
  - Individual fellow
  - Mentor
  - Research project
  - Research environment
Post-doc Fellowships (F31s)
Applications, awards, and success rates
Post-doc Fellowships (F32s) Applications, awards, and success rates
Training Grants and Fellowships: Pre- and Post-Doctoral Positions
National Science Foundation: Graduate Research Fellowship Program

- Eligibility: Applicants in the early stages of their graduate study.
  - Usually, “applicants may have completed no more than 12 months of full-time graduate, post-baccalaureate and professional study by August 1” of year of application.

- Typically apply:
  - During the senior year of college;
  - After graduating from college and prior to entering graduate school;
  - During the first year of graduate school;
  - Prior to completing the fall term of the second year of graduate school.

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National Science Foundation: Graduate Research Fellowship Program

- **Fields of Study:** Chemistry, Computer and Information Science and Engineering (CISE), Engineering, Geosciences; Life Sciences; Materials Research; Mathematical Sciences; Physics and Astronomy; Psychology; Social Sciences; Stem Education and Learning Research

- **Funding:**
  - Stipend
  - Cost-of-education allowance

National Science Foundation: Graduate Research Fellowship Program

Application includes:

- Personal, Relevant Background and Future Goals Statement (3 pages)
- Graduate Research Plan Statement (2 pages)
- Education and Other Experience
- Graduate School Information
- Three Reference Letters
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)
- American Kidney Fund
- American Liver Foundation
- 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: $42,000-$55,300; Fringe Benefits: $1,000

Award Duration: 2 years

Citizenship

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

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American Assoc for the Study of Liver Diseases - Clinical and Translational Research Fellowship

• Support for an investigator from outside North America to perform clinical research in US in a liver-related area

• One one-year award of $75,000 will be funded

• MD or equivalent and/or a PhD

• MD within four years of completing residency or fellowship training, or, if a PhD, within four years of the receipt of the degree

• Student/trainee visa to the US
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

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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National Cancer Institute (NCI)
National Human Genome Research Institute (NHGRI)
National Institute on Aging (NIA)
National Institute on Alcohol Abuse and Alcoholism (NIAAA)
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 on Dental and Craniofacial Research (NIDCR)
National Institute on Drug Abuse (NIDA)
National Institute of Mental Health (NIMH)
National Institute of Neurological Disorders and Stroke (NINDS)
National Center for Complementary and Alternative Medicine (NCCAM) (See Notice NOT-AT-11-004 will no longer participate after May 7, 2012)
National Institutes of Health

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

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Ruth L. Kirschstein National Research Service Award (NRSA) Individual Postdoctoral Fellowship (Parent F32)
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- Scoring and Review Criteria for Fellowship Applications

- Components of a Fellowship Application

- Approaches for a Competitive Application
# 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>High Impact</td>
<td>1</td>
<td>Exceptional</td>
<td><strong>Strengths</strong></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>Moderate Impact</td>
<td>4</td>
<td>Very Good</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Satisfactory</td>
<td></td>
</tr>
<tr>
<td>Low Impact</td>
<td>7</td>
<td>Fair</td>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Marginal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Poor</td>
<td></td>
</tr>
<tr>
<td>Impact</td>
<td>Score</td>
<td>Descriptor</td>
<td>Additional Guidance on Strengths/Weaknesses</td>
</tr>
<tr>
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<td>---------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<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>
</tr>
<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>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Good</td>
<td>Strong but with at least one moderate weakness</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Satisfactory</td>
<td>Some strengths but also some moderate weaknesses</td>
</tr>
<tr>
<td>Low</td>
<td>7</td>
<td>Fair</td>
<td>Some strengths but with at least one major weakness</td>
</tr>
<tr>
<td></td>
<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>
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**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
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): Mean of reviewers’ Impact Scores x10
- 81 possible overall Impact Scores (10 – 90, whole numbers)

http://enhancing-peer-review.nih.gov/timelines.html
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Overall Impact/Merit

Write a paragraph summarizing the factors that informed your Overall Impact score.
Overall Impact/Merit Score

Reviewer’s assessment “that the fellowship will enhance the candidate's potential for, and commitment to, an independent scientific research career”

“Research project that is integrated with the training plan”

“Review will emphasize the applicant’s potential for an independent, scientific research career, the applicant’s need for the proposed training, and the degree to which the research project and training plan, the sponsor(s), and the environment will satisfy those needs.”

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Reviewers will consider each of the five review criteria below in the determination of scientific and technical merit, and give a separate score for each.

1. **Fellowship Applicant**
   - Strengths
   - Weaknesses

2. **Sponsors, Collaborators, and Consultants**
   - Strengths
   - Weaknesses

3. **Research Training Plan**
   - Strengths
   - Weaknesses
4. **Training Potential**

**Strengths**
- 

**Weaknesses**
- 

5. **Institutional Environment & Commitment to Training**

**Strengths**
- 

**Weaknesses**
- 

1. Fellowship Applicant

- “Are the applicant's academic record and research experience of high quality?
- Does the applicant have the potential to develop into an independent and productive researcher in biomedical, behavioral or clinical science?
- Does the applicant demonstrate commitment to a career as an independent researcher in the future?”
2. Sponsors, Collaborators, and Consultants

- “Are the sponsor(s’) research qualifications (including recent publications) and track record of mentoring individuals at a similar stage appropriate for the needs of the applicant?
- Is there evidence of a match between the research interests of the applicant and the sponsor(s)?
- Do the sponsor(s) demonstrate an understanding of the applicant’s training needs as well as the ability and commitment to assist in meeting these needs?”


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2. Sponsors, Collaborators, and Consultants

- “Is there evidence of adequate research funds to support the applicant’s proposed research project and training for the duration of the fellowship?
- If a team of sponsors is proposed, is the team structure well justified for the mentored training plan, and are the roles of the individual members appropriate and clearly defined?
- Are the qualifications of any collaborator(s) and/or consultant(s), including their complementary expertise and previous experience in fostering the training of fellows, appropriate for the proposed project?”


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3. Research Training Plan

- “Is the proposed research plan of high scientific quality, and is it well integrated with the applicant's/proposed training plan?
- Is the research project consistent with the applicant's stage of research development?
- Is the proposed time frame feasible to accomplish the proposed research training?
- Based on the sponsor’s description of his/her active research program, is the applicant’s proposed research project sufficiently distinct from the sponsor’s funded research for the applicant’s career stage?”

4. Training Potential - Pre-docs (F31)

- “Do the proposed research project and training plan have the potential to provide the applicant with the requisite individualized and mentored experiences that will develop his/her knowledge and research and professional development skills?
- Does the training plan take advantage of the applicant’s strengths, and address gaps in needed skills?
- Does the training plan document a clear need for, and value of, the proposed training?
- Does the proposed research training have the potential to serve as a sound foundation that will facilitate the applicant’s transition to the next career stage and enhance the applicant’s ability to develop into an independent and productive research scientist?
4. Training Potential - Pre-docs (F32)

- “Do the proposed research project and training plan have the potential to provide the applicant with the requisite individualized and mentored experiences that will develop his/her knowledge and research and professional development skills?
- Does the training plan take advantage of the applicant’s strengths, and address gaps in needed skills?
- Does the training plan document a clear need for, and value of, the proposed training (for the applicant)?
- Does the proposed research training have the potential to serve as a sound foundation that will clearly lead the fellow to an independent and productive research career?”

5. Institutional Environment & Commitment to Training

- “Are the research facilities, resources (e.g. equipment, laboratory space, computer time, subject populations), and training opportunities (e.g. seminars, workshops, professional development opportunities) adequate and appropriate?

- Is the institutional environment for the applicant’s scientific development of high quality? Is there appropriate institutional commitment to fostering the applicant's mentored training toward his/her research career goals?”
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PHS Fellowship Supplemental Form

B. Research Training Plan

1. Introduction to Application
   (for RESUBMISSION applications only)
2. * Specific Aims
3. * Research Strategy
4. Progress Report Publication List
   (for RENEWAL applications only)

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B.2. Specific Aims (1 page)

- Goals of the proposed research
- Expected outcome(s)
- Impact of proposed research on your field(s)
- Specific objectives
  - Test of a stated hypothesis
  - Create a novel design
  - Solve a specific problem
  - Challenge an existing paradigm or clinical practice
  - Address a critical barrier
  - Develop new technology

B.2. Research Strategy (6 pages total)

■ (a) Significance

■ “Importance of the problem or critical barrier to progress in the field that the proposed project addresses”

■ “How the proposed project will improve scientific knowledge, technical capability, and/or clinical practice”

■ “How the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved”
B.2. Research Strategy (6 pages total)

- (b) Innovation - do not include
- (c) Approach
  - “Overall strategy, methodology, and analyses to be used”
  - “How the data will be collected, analyzed, and interpreted”
  - “Potential problems, alternative strategies, and benchmarks for success”
  - Strategies “to establish feasibility, and address the management of any high risk aspects”
  - Preliminary studies and results

C. Additional Information

7. * Goals for Fellowship Training and Career

8. * Activities Planned Under This Award

9. Doctoral Dissertation and Other Research Experience
C.7. Goals for Fellowship Training and Career (1 page)

- Overall career goals
- How the proposed research training will help the applicant reach these goals
- Identify specific “skills, theories, conceptual approaches, etc.” that will be acquired or expanded upon during the fellowship period
  - Didactics (e.g. statistics)
  - Technical Skills
  - Career Development Skills (e.g. presentations, writing)

[Links to resources]
C.8. Activities Planned Under This Award (1 page)

- Specific fellowship activities (by year)
  - Research
  - Didactics
  - Teaching
- Estimate % of time devoted to each activity (each year should total 100%)
- Relate non-research activities to the proposed research training

C.9. Doctoral Dissertation and Other Research Experience (2 pages)

- In chronological order, summarize previous research and scientific experiences (not courses)
- Graduate students:
  - Preliminary description of doctoral thesis research
- Post-doctoral Fellows:
  - Describe previous scientific areas studied and findings
  - Specify which previous experiences were part of a doctoral thesis and which were part of a previous postdoctoral period

D. Sponsor(s) and Co-Sponsor(s)

* Sponsor(s) and Co-Sponsor(s) Information

D. Sponsor(s) and Co-Sponsor(s) (6 pages)

- **a. Research Support Available**
  - Table containing detailed information on all current and pending research and research training support available to the applicant

- **b. Sponsor's/Co-Sponsor’s Previous Fellows/Trainees**
  - Total number of predoctoral and postdoctoral fellows previously mentored. For representative five, provide information on current positions

D. Sponsor(s) and Co-Sponsor(s) (6 pages)

- c. Training Plan, Environment, Research Facilities
  - Fellow-specific research training plan (e.g. didactics, collaborations with other scientists)
  - Research environment (e.g. core facilities, equipment, research patient population)
  - Relationship of the Fellow’s research/career goals to the proposed research training plan and specific new skills and techniques to be acquired

D. Sponsor(s) and Co-Sponsor(s) (6 pages)

■ d. Number of Fellows/Trainees to be Supervised During the Fellowship
  ■ Number of pre- and postdoctoral fellows to be mentored

■ e. Applicant's Qualifications and Potential for a Research Career
  ■ Relate applicant’s academic record and previous research experiences to the proposed research training opportunity
  ■ Describe how the proposed research training plan, and your expertise as a mentor, will “assist in producing an independent researcher”

- Description of graduate program
  - Structure of program
  - Required milestones and timing
    - Number of courses
    - Teaching commitments
    - Qualifying exams, etc.
- Average time to degree over the past 10 years.
- Progress/Status of F31 applicant in relation to the program's timeline
- Frequency and methodology of formal monitoring and evaluation student's progress
- Provided by Director of Graduate Program or Department Chair (include name and title)
Letters of Reference

- Include a list of Referees in the Cover Letter
- 3-5 Letters of References are required
- Individuals who know you well and know you well from a research perspective
- Individuals who can provide “meaningful comments about your qualifications for a research career”
- Mentor(s) cannot be one of the confidential Letters of Reference (“letter” in main body of application)
Letters of Reference

- Helpful to include at least one referee who is not in your current department.

- Postdoctoral F32 applications: “References from graduate/medical school are preferred over those from undergraduate school.”

- Postdoctoral F32 applications: Explanation required if not including a letter from Ph.D. dissertation mentor
NIH Sites of Interest

- F31 Application Announcement
  [Link](http://grants.nih.gov/grants/guide/pa-files/PA-14-147.html)

- F32 Application Announcement
  [Link](http://grants.nih.gov/grants/guide/pa-files/PA-14-149.html)

- Fellowship Application Instructions
  [Link](http://grants.nih.gov/grants/funding/424/index.htm)

- Frequently Asked Questions
  [Link](http://grants.nih.gov/training/faq_fellowships.htm)

- Guidelines for Reviewers, Review Critique Fill-able Templates, and Review Criteria and Considerations
  [Link](http://grants.nih.gov/grants/peer/reviewer_guidelines.htm)

- Example of an F Application Critique
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- **Approaches for a Competitive Application**
NIH: one round of applications
When Preparing an Application:

- Read instructions
- Never assume that reviewers “will know what you mean”
- Refer to literature thoroughly and thoughtfully
- Explicitly state the rationale of the proposed investigation
- Include well-designed tables and figures
- Present an organized, lucid write-up

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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

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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

- 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

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Good Luck!