Career Development and Research Funding/Grantsmanship for Junior Investigators

- Department of Medicine -
Fellows Career Guidance Breakfast: Academic and Research Careers

December 5, 2016

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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, Industry, Other

- **Planning & Organizing a Research Proposal**
Topics to be Discussed

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- **Funding Agencies**
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- **Planning & Organizing a Research Proposal**
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
  - 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
- Program Projects
- Administrative supplements
- Cooperative agreements
- Institutional Clinical & Translational Science Award (CTSA)
- Subcontracts
- Contracts
- Loan Repayment Program
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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

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

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

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DoM NIH Training Grants

- Columbia University Training Program in **Lung Science** [J. Bhattacharyya (Pulmonary)]
- Training Program in **Endocrinology and Metabolism** [J. Bilezikian (Endocrinology)]
- Molecular **Oncology** Training Program
  [S. Emerson and G. Schwartz (Hematology and Oncology)]
- Precision Medicine Research in **Nephrology**
  [A. Gharavi and J. (Nephrology)]
- Postdoctoral Training in **Arteriosclerosis** Research
  [H. Ginsberg (Preventive Medicine)]
DoM NIH Training Grants

- Columbia Integrated Training Program in Infectious Disease Research
  [S. Hammer/F. Lowy (Infectious Diseases)]

- Postdoctoral Training in Cardiovascular Disease
  [S. Marx (Cardiology) - M. Hardy (Surgery)]

- Obesity Research Center Training Grant
  [F.X. Pi-Sunyer (Endocrinology/NYORC)]

- Primary Care Research Fellowship
  [S. Shea (General Medicine)]

- Multidisciplinary Training in Translational Gastrointestinal and Liver Research
  [T. Wang (GI)]
CUMC: NIH Institutional Training Grants

- Biomedical Informatics (G. Hripcsak)
Post-doc: Individual Fellowship

- Supports specific individual
- Stipend, health fees, tuition, travel
- NIH: F32

Review criteria:

- Individual fellow
- Mentor
- Research project
- Research environment
Post-doc Fellowships (F32s) Applications, awards, and success rates

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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 College of Cardiology/ACCF**
  - Merck Research Fellowships in Cardiovascular Disease and Cardiometabolic Disorders

Post-doc: Individual Fellowship

- Voluntary Health Organizations, Foundations, Professional Societies -

- **American College of Gastroenterology**
  - Clinical Research Award

- **American Heart Association (Founders Affiliate)**
  - Postdoctoral Fellowship

- **American Kidney Fund**
  - Clinical Scientist in Nephrology Fellowship
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
Post-doc: Individual Fellowship

- Voluntary Health Organizations, Foundations, Professional Societies -

- **American Society of Nephrology Foundation for Kidney Research**
  - Ben J. Lipps Research Fellowship

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

- **Endocrine Fellows Foundation**
  - Endocrine Research Grant
Post-doc: Individual Fellowship

- Voluntary Health Organizations, Foundations, Professional Societies -

- Flight Attendant Medical Research Institute
  - Young Clinical Scientist Award

- Francis Families Foundation
  - Parker B. Francis Fellowship

- Rheumatology Research Foundation
  - Scientist Development Grant

- Stony Wold - Herbert Fund
  - Fellowship

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Instructor/Assistant Professor
Career Transition Awards
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Career Transition Award

NIH: Pathway to Independence Award (K99/R00)

- No citizenship requirement
- Applicants must:
  - Have earned a clinical or research doctorate
  - Have no more than 4 years of research experience since completing the requirements of the doctoral degree
  - Have not been the principal investigator of an NIH research grant (e.g., R01, R03, R21), career development award (e.g., K01, K07, K08, K23, K25), other peer-reviewed NIH or non-NIH research grant over $100,000 direct costs per year, or have been a project leader on a sub-project of a program project (P01) or a center (P50) grant.

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1-2 years as a **mentored K award** for “post-docs”
- Funding level is Institute-specific
  - Salary (plus fringe benefits), 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
The purpose of the NIH Pathway to Independence Award (K99/R00) program is to increase and maintain a strong cohort of new and talented, NIH-supported, independent investigators. This program is designed to facilitate a timely transition of outstanding postdoctoral researchers with a research and/or clinical doctorate degree from mentored, postdoctoral research positions to independent, tenure-track or equivalent faculty positions. The program will provide independent NIH research support during this transition in order to help awardees to launch competitive, independent research careers.

Prospective candidates are encouraged to contact the relevant NIH staff for IC-specific programmatic and budgetary information: Table of IC-Specific Information, Requirements and Staff Contacts.
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.
Additional Information for Physician-Scientists

For the purposes of this program, physician-scientists include individuals with an MD, DO, DDS/DMD, DVM/VMD, or nurses with research doctoral degrees who devote the majority of their time to biomedical research. The K99/R00 is intended for those physician-scientists who already have substantial research training and are dedicated to initiating a strong, research-intensive career as physician-scientists. The K99/R00 program is designed to facilitate a timely transition of outstanding physician-scientists from mentored, research positions to independent, tenure-track or equivalent faculty positions, and to provide independent NIH research support during the transition. Individuals who need a longer period of mentored career development before they are prepared to begin the transition to research independence should consider the K08 or K23 program (see: K Kiosk).
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

Career Transition Awards

- **JDRF: Advanced Postdoctoral Fellowships**
  - Provides an opportunity to receive full-time research training and to assist awardees in transitioning from a fellowship to an independent (faculty-level) position
  - First degree (PhD, MD, DMD, DVM, or equivalent) received no more than 5 years before the fellowship
  - $90,000 per year for up to 3 years
  - **Transition Award**: Optional transition year in which awardees may request funding support for their first year as a faculty member (up to $110,000 for one year)

Timeline of NIH Funding for Junior Investigators

Medical School

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Career Transition Awards

Year-long Enhancement Programs
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Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot

Research Support

Fellowship – Research Years
**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
Research Career Development Awards

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<table>
<thead>
<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</th>
<th>Total Funding</th>
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<td>2015</td>
<td>K23</td>
<td>NCI</td>
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<td>NHLBI</td>
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Research Career Development/ Scholar Programs

- American College of Gastroenterology
  - Junior Faculty Development Grant
- American Gastroenterological Association Research Foundation
  - Research Scholar Awards
- American Liver Foundation
  - Liver Scholar Award
- American Heart Association
  - Scientist Development Grant

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Research Career Development/Scholar Programs

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

- **American Society of Nephrology/Foundation for Kidney Research**
  - Career Development Grants

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

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

Research Career Development/Scholar Programs

- Rheumatology Research Foundation
  - Scientist Development Grant

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

- American Society of Hematology
  - ASH-Harold Amos Medical Faculty Development Program

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Individual Post-doc Fellowship or Institutional T32 Post-doc Training Grant slot

Institutional K12 Career Development Slot

Career Transition Awards

Individual Mentored K Career Development Award

CTSA Awards: A Home for Clinical and Translational Science

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

- Support to an institution for the career development experiences of 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.

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Mentored Clinical Scientist Development Program Award (KL2)

- CTSA - Clinical and Translational Scientist Award
- CUMC TRANSFORM Scholars Mentored Career Development program
  [Training and Nurturing Scientists for Research that is Multidisciplinary]
CTSA Awards: A Home for Clinical and Translational Science

Source: Zerhouni (NIH) [9/06]

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Research-Oriented
Masters Degree Programs

- Comprehensive didactic training for conducting clinical and translational research
- “Patient-Oriented Research” (POR)
  - Two-year, 30-credit M-SPH degree
  - Biostatistics, epidemiology, study design, bioethics, legal and regulatory issues
- For the career development of clinical investigators

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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 opportunities to gain foundational knowledge and applied skills for advancing population health research.
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

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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)

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Timeline of NIH Funding for Junior Investigators

Medical School

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Internship/Residency

Research Support

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Fellowship – Research Years

Instructor/Assistant Professor

Institutional K12 Career Development Slot

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>
<th>New + Renewal</th>
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</table>
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, Industry, Other

- **Planning & Organizing a Research Proposal**
Approaches for Competitive Applications

- Identify Funding
- Prepare to Write 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
NIH's Research Grant

- Review Criteria -

- **Overall Impact Score – Research Grant**
  - “Likelihood for the project to exert a sustained, powerful influence on the research field(s) involved”

- **Core Review Criteria- Research Grant**
  - Significance
  - Investigators
  - Innovation
  - Approach
  - Environment

NIH's Career Development Grant - Review Criteria -

- **Overall Impact Score – Research Grant**
  - “Enhance the candidate’s potential for a productive, independent scientific research career”

- **Core Review Criteria - Research Grant**
  - Candidate
  - Career Development Plan/Career Goals & Objectives/
    Plan to Provide Mentoring
  - Research Plan
  - Mentor(s), Co-mentor(s), Consultant(s), Collaborator(s)
  - Environment and Institutional Commitment to the Candidate

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
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 Write 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

- 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 “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
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>
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<tr>
<td>Summary of Specific Aim 3</td>
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</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 Training Plan Section
3. Specific Aims
4. Research Strategy

Fellowship Applicant Section
2. Applicant's Background and Goals for Fellowship Training

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
Not everything that can be counted counts.
Not everything that counts can be counted.

Junior Faculty Career Development Application:

Research Training 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
Career Development/ Fellowship Proposals - Personal Statement

When describing a previous research experience:

- What was the hypothesis/scientific question?
- What were the findings and conclusions?
- Why was the study important?
- What were your role and responsibilities?
- What did you learn and accomplish?
  - “Intellectual aspects”
  - Do not focus on technical aspects

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Investigator

- Competent
- Enthusiastic
- Thorough
- Professional

Elements of a Good Proposal

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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
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
Bell Curve of Reviewer’s Grant Applications

Definitely do not fund

Great

Definitely fund

Fine

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

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Research Resources not Adequately Described

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Career Development/Research Training Plan not Comprehensive
Figure Caption Font too Small
All Components of the Application are as Strong as Possible
Good Luck!