Research, Funding Opportunities, and Grantsmanship for “Post-doctoral Fellows in the Arteriosclerosis Research Program”

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Jaime S. Rubin, Ph.D.
Dept. of Medicine
College of Physicians and Surgeons
Columbia University

Course: “Funding and Grantsmanship for Research and Career Development Activities”
http://grantscourse.columbia.edu/
Topics to be Discussed

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

- Types of Awards
  - Fellowships (F’s), Training grants (T’s), Career Transition Awards, Research grants,

- Planning & Organizing a Research Proposal
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  - Fellowships (F’s), Training grants (T’s), Career Transition Awards, Research grants,

- **Planning & Organizing a Research Proposal**
Not All Funding Opportunities Are the Same

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

- Different funding
  - Stipend/Salary
  - Comprehensive research costs

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

- Individual fellowships
- Training grants
- Career transition awards
- Career development awards
- Research grants
- Institutional Clinical & Translational Science Award (CTSA)
- Loan Repayment Program
- Administrative supplements
- Program Projects
- Cooperative agreements
- Subcontracts
- Contracts
### 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>Training Grant</td>
<td>Individual Post-doc</td>
<td></td>
</tr>
<tr>
<td>Mentor’s Research</td>
<td>Fellowship or</td>
<td></td>
</tr>
<tr>
<td>Grant</td>
<td>Institutional Post-doc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training Grant slot</td>
<td></td>
</tr>
</tbody>
</table>
Timeline of Funding for Junior Investigators

<table>
<thead>
<tr>
<th>Medical School</th>
<th>Internship/Residency</th>
<th>Fellowship – Research Years</th>
<th>Instructor/Assistant Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T35 Training Grant</td>
<td>Individual Post-doc Fellowship or Institutional Post-doc Training Grant slot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer Research between 1st and 2nd Years</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Year-long “Enhancement” Research Program MD/PhD Program</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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
CUMC:

Post-doc Institutional Training Grants

- Postdoctoral Training in Arteriosclerosis Research [H. Ginsberg (Preventive Medicine)]
- Postdoctoral Training in Cardiovascular Disease [S. Marx (Cardiology)/ M. Hardy (Surgery)]
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
Post-doc: Individual Fellowships

Non-government, non-profit agencies
- Voluntary Health Organizations
- Professional Societies
- Private Foundations
American Heart Association
(Founders Affiliate)

Postdoctoral Fellowship Program

- Cardiovascular function and disease and stroke
- Clinical, basic science, bioengineering, biotechnology, and public health

Funding

- Stipend/Salary: $39,200-$54,100;
  Fringe Benefits: $1,000
- Award Duration: 2 years
American College of Cardiology Foundation/Merck

Research Fellowships in Cardiovascular Disease and Cardiometabolic Disorders

- No of awards: 4
- Funding: $70,000
- Award Duration: 1 year
- Research Focus: CVD and cardiometabolic disorders, pathophysiology, molecular genetics, metabolic abnormalities, hypertension, heart failure, hyperlipidemia, inflammatory mechanisms and new pathways for drug discovery.
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
- Awards: 20 3-year fellowships awarded annually
- Stipend: $49,000-$51,000; Research Allowance: $1,500
- US and foreign citizens
Timeline of Funding for Junior Investigators

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

- Training Grant
- Mentor’s Research Grant
- Individual Post-doc Fellowship or Institutional Post-doc Training Grant slot
- Career Transition Awards
Career Transition Award

- NIH: Pathway to Independence Award *(K99/R00)*
- No citizenship requirement
- At time of submission applicants must:
  - Have earned a terminal clinical or research doctorate;
  - Have no more than 4 years of research experience since completing the requirements of the doctoral degree
  - Have not been an independent principal investigator on NIH research grants, NIH career development awards, equivalent non-PHS peer-reviewed career development awards, or other peer reviewed NIH or non-NIH research grants over $100,000 direct costs per year intended for faculty members.
1-2 years as a mentored K award for post-docs

- Funding level is Institute-specific
  - **NHLBI, NIDDK, NIA, NICHD:** $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
Timeline of Funding for Junior Investigators

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

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

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

Instructor/Assistant Professor
- Transition Award
Career Transition Awards

- **BWF: Career Awards for Medical Scientists**
  - To support physician-scientists during the last years of a mentored postdoctoral/fellowship position and the beginning years of an independent faculty position.
  - 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 which 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
Research Career Programs (K)

- Minimum Effort: e.g. 75% (sometimes 50%)
  Research & Career development activities
- Predominantly salary support
- Up to 5 years
- US citizen/permanent resident
- Reduce effort to 50% in last 2 years if PI of NIH research grant
Mentored Clinical Scientist Development Award (K08)

- Support to develop outstanding independent clinician research scientists
- Basic and translational science
Mentored Patient-Oriented Research Career Development Award (K23)

- **Patient-oriented research:** Research conducted with human subjects (or on material of human origin) for which an investigator directly interacts with human subjects

- **Research areas:** (1) Mechanisms of human disease, (2) Therapeutic interventions, (3) Clinical trials, and (4) Development of new technologies
Mentored Research Scientist Development Award (K01)

Not all NIH Institutes participate in program. Participating Institutes may use for different purposes.

- Train in a new field
- Specific research areas
- Hiatus in research career
- Increase research workforce diversity
Mentored Research Scientist Development Awards (K01)

- **NHLBI:**
  - (a) Epidemiology
  - (b) Biostatistics
  - (c) Comparative effectiveness

- **NHLBI**
  - Underrepresented faculty

- **NHGRI**
  - (a) Genomics, proteomics, population genomics
  - (b) Ethical, legal and social issues (ELSI)

- **NIA:** Aging and Health Disparities Research

- **FIC:** International Research Scientist Development Award
Research Career Development Awards
Timeline of NIH Funding for Junior Investigators

- **T35 Training Grant Summer Research between 1st and 2nd Years**
- **Internship/Residency**
  - Year-long “Pull-out” Research Program
- **Fellowship – Research Years**
  - Individual Post-doc Fellowship or Institutional Post-doc Training Grant slot
- **Instructor/Assistant Professor**
  - Transition Award
  - Institutional K12 Career Development Slot
  - 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 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.
Mentored Clinical Scientist Development Program Award (K12)

- CTSA – Clinical and Translational Scientist Award

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

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

- American Heart Association
  - Scientist Development Grant
- Doris Duke Charitable Foundation
  - Clinical Scientist Development
NIH Career Development (K) Application

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

<table>
<thead>
<tr>
<th>Strengths</th>
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<table>
<thead>
<tr>
<th>Weaknesses</th>
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5. **Environment and Institutional Commitment to the Candidate**

<table>
<thead>
<tr>
<th>Strengths</th>
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</table>

<table>
<thead>
<tr>
<th>Weaknesses</th>
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<td>-</td>
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</tbody>
</table>
Overall Impact

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

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

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

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

- Review of didactic courses, clinical training, and research experiences to date
- New research skills/ knowledge required
- Identification of training modules required to fill gaps in knowledge in order to reach long term goals

- Mentors, Courses, Workshops and additional training, Conferences, Communication skills, Grant writing
### Mentors/Advisory Committee

- Collaborators and Consultants
  - Scientific area per mentor/committee member
  - Schedule of meetings

<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>
Environment and Institutional Commitment to the Candidate

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

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

Eligibility:
- U.S. citizen/Permanent residence
- Recipient of D.D.S, D.M.D., Ph.D., M.D., or other specified equivalent doctoral degree
NIH’s Extramural Loan Repayment Program

Extramural Programs

- Clinical Research
- Pediatric Research
- Health Disparities Research
- Clinical Researchers from Disadvantaged Backgrounds
- Contraception and Infertility Research
NIH Extramural Loan Repayment Programs  FY 2012

NIH received 3,100 applications
- 59 percent of the applications were from new applicants
- 50 percent of all applicants were awarded

<table>
<thead>
<tr>
<th>LRP</th>
<th>New</th>
<th></th>
<th></th>
<th>Renewal</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applications</td>
<td>Awards</td>
<td>Success Rate</td>
<td>Applications</td>
<td>Awards</td>
<td>Success Rate</td>
<td>Applications</td>
<td>Awards</td>
<td>Success Rate</td>
<td></td>
</tr>
<tr>
<td>Clinical Research</td>
<td>959</td>
<td>389</td>
<td>41%</td>
<td>726</td>
<td>493</td>
<td>68%</td>
<td>1,685</td>
<td>882</td>
<td>52%</td>
<td></td>
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<tr>
<td>Pediatric Research</td>
<td>467</td>
<td>168</td>
<td>36%</td>
<td>290</td>
<td>214</td>
<td>74%</td>
<td>757</td>
<td>382</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Health Disparities Research</td>
<td>338</td>
<td>122</td>
<td>36%</td>
<td>215</td>
<td>120</td>
<td>56%</td>
<td>553</td>
<td>242</td>
<td>44%</td>
<td></td>
</tr>
<tr>
<td>Clinical Research for Individuals from Disadvantaged Backgrounds</td>
<td>23</td>
<td>9</td>
<td>39%</td>
<td>11</td>
<td>10</td>
<td>91%</td>
<td>34</td>
<td>19</td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td>Contraception and Infertility Research</td>
<td>48</td>
<td>18</td>
<td>38%</td>
<td>23</td>
<td>11</td>
<td>48%</td>
<td>71</td>
<td>29</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,835</td>
<td>706</td>
<td>38%</td>
<td>1,265</td>
<td>848</td>
<td>67%</td>
<td>3,100</td>
<td>1,554</td>
<td>50%</td>
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</table>
### NIH Extramural Loan Repayment Programs FY 2012

#### Funding
New and Renewal by Program

<table>
<thead>
<tr>
<th>LRP</th>
<th>New</th>
<th>Renewal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Awards</td>
<td>Funding</td>
<td>Awards</td>
</tr>
<tr>
<td>Pediatric Research</td>
<td>168</td>
<td>$11,560,880</td>
<td>214</td>
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<tr>
<td>Health Disparities Research</td>
<td>122</td>
<td>$6,108,530</td>
<td>120</td>
</tr>
<tr>
<td>Clinical Research for Individuals from Disadvantaged Backgrounds</td>
<td>9</td>
<td>$624,407</td>
<td>10</td>
</tr>
<tr>
<td>Contraception and Infertility Research</td>
<td>18</td>
<td>$996,637</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>706</strong></td>
<td><strong>$42,629,607</strong></td>
<td><strong>848</strong></td>
</tr>
</tbody>
</table>
Percent of Total Awards by LRP

- Clinical Research (57%)
- Pediatric Research (25%)
- Health Disparities Research (16%)
- Contraception and Infertility Research (2%)
- Clinical Research for Individuals from Disadvantaged Backgrounds (1%)
R01 Research Award

Independent Investigator

Funds research project
- Salaries of PI and other research personnel
- Supplies, reagents, etc
- Animal costs
- Patient care costs
- Core facilities
- Page charges for publications

Multi-Year (4yrs – 5yrs)
Renewable (e.g. original grant + 2 renewals = 15yrs)
R01 Research Grant

- Supports a discrete, specified project
- “Comprehensive” funding
- Modular budgets up to $250,000/year
- Multi-year
- Flexibility

- Most of the research that NIH supports is through this funding mechanism
Small Research Grants (R03)

- **Supports:**
  - Pilot or feasibility studies
  - Collection of preliminary data
  - Secondary analysis of existing data
  - Small, self-contained research projects
  - Development of new research technology

- **2 years of funding**

- **Budget:** $50,000 /year

- **Not renewable**
Exploratory/Developmental Grants (R21)

- Encourages new, exploratory, and developmental research
- Pilot and feasibility studies
- 2 years of funding
- Budget: $275,000 over two years
- Not renewable
Research Project Grants: Applications, Awards, and Success Rates

![Graph showing applications, awards, and success rates from 1995 to 2011. The graph illustrates an increasing trend in applications and awards with a fluctuating success rate.]
## Challenging Times for All Researchers

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

## Especially for Young Investigators

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

*RO1 Equivalents: RO1, R29, R37
Source: National Institutes of Health
“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)]
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
Age Distribution of NIH RPG Investigators: 1980

Average Age
New R01 Investigator: 37.2

Sources: IMPAC II Current and History Files
Age Distribution of NIH RPG Investigators: 2006

Percent of PIs

Age

PIs in 1980

Average Age
New R01 Investigator:
42.2

Sources: IMPAC II Current and History Files
Preliminary Projection of Age Distribution of NIH RPG Investigators: 2020

Sources: IMPAC II Current and History Files and Preliminary Demographic Projection Model
Early Stage Investigators

- No previous “significant NIH independent research award”
  - e.g. R01’s
  - Does not include: F’s, K’s, loan repayment program
- Within 10 years of terminal research degree/completion of medical residency
- Extensions permitted
  - Additional clinical training
  - Family responsibilities
## Early Stage Investigators: NHLBI

<table>
<thead>
<tr>
<th>Grant Program</th>
<th>Percentile</th>
<th>Priority Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R01</td>
<td>11.0</td>
<td></td>
<td>Research Project Grant</td>
</tr>
<tr>
<td>ESI</td>
<td>21.0*</td>
<td></td>
<td>Early Stage Investigators</td>
</tr>
</tbody>
</table>

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

FY13
R01-Equivalent grants, New (Type 1)
Success rates, by career stage of investigator
Topics to be Discussed

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

- **Types of Awards**
  - Fellowships (F’s), Training grants (T’s), Career Transition Awards, Research grants,

- **Planning & Organizing a Research Proposal**
When Preparing an Application:

- Read instructions
- Never assume that reviewers “will know what you mean”
- Refer to literature thoroughly and thoughtfully
- Explicitly state the rationale of the proposed investigation
- Discuss “challenges” and how these will be addressed
- Include well-designed tables and figures
- Present an organized, lucid write-up
Elements of a Good Proposal

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

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

Great

Definitely do not fund

Fine

Definitely fund

Great
Poor Statistics
Research Resources
not Adequately Described
Career Development Plan
not Comprehensive
Figure Caption Font too Small
All Components of the Application are as Strong as Possible
Common Problems with Grant Applications from New Investigators

- Overly ambitious
- Not independent of previous mentor’s research
- Fishing expedition
- Not hypothesis driven
- Descriptive, not mechanistic project
- Unfocussed
- No or insufficient preliminary data
- Unrealistic budget
- Methodologies beyond the expertise of investigator or research team
Good Luck!