Research, Funding Opportunities, and Grantsmanship for Residents in the College of Dental Medicine

May 4, 2015

Jaime S. Rubin, Ph.D.
Director of Research Development
Dept. of Medicine
College of Physicians and Surgeons

Course: “Funding and Grantsmanship for Research and Career Development Activities”

http://grantscourse.columbia.edu/
Topics to be Discussed

- Selecting a Research Mentor/Group
- Selecting a Research Project
- Funding Agencies
  - Federal
    - National Institutes of Health, HRSA
    - New York State: Dept of Health
  - Voluntary Health Organizations, Professional Societies, Foundations, Industry
- Types of Awards
  - Research grants, K awards, Loan Repayment Program
- Finding Funding Opportunities
- Planning & Organizing a Research Proposal

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Selecting a Research Mentor/Group

What kind of research group do I want to join?

- Small, with the potential for significant interaction with the mentor
- Medium
- Large, with lots of other junior investigators (e.g. other students, post-docs, fellows) and lots of other projects
- Opportunity for senior mentor/junior mentor pairing
- Opportunity to get involved with many projects
- Opportunity to be focused on one main project, my project
- Opportunity to start a new project or new research area
- Opportunity to join ongoing project(s)
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Selecting a Research Project

What kind of research do you want to do?
What kind of research have you already done?
More of the same?
Try something different?
Multidisciplinary/Interdisciplinary?

- Basic science (lab-based)
- Translational
- Clinical
- Epidemiological
- Health Outcomes
- Patient Centered/Comparative Effectiveness
- Health Services
- Global Health

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What area of research?

- Must be in the same area as career plans
- Not very specific, good research experience most important at this stage
- Want to get experience outside my immediate area (preparing for multidisciplinary research)
Additional Issues

- Am I doing this full-time or at the same time as significant didactic/clinical responsibilities?
- Will I get to go to meetings and present my work?
- Will I be a co-author on a paper?
- Will I have the opportunity to be a first author on a paper?
- Will the IRB protocol be in place before I start?
- Will the IACUC protocol be in place before I start?
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Funding Agencies

- Be flexible
- Consider many possible sources of support
- Many different government agencies
  - Not only NIH
- Many different types of non-government agencies
  - Voluntary Health Organizations, Professional Societies, Foundations, Industry

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National Institutes of Health

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

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NIH FY14 Budget - $30,143M

- Grants and Contracts: $24,358
- Intramural: $3,396
- Other: $2,389

$ in millions

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Agency for Healthcare Research and Quality (AHRQ)

- Supports research designed to improve the quality, safety, efficiency, and effectiveness of health care.
  - Comparative Effectiveness
  - Prevention and Care Management
  - Value
  - Health Information Technology
  - Patient Safety
  - Innovations/Emerging Issues
U.S. Dept. of Health and Human Services

- Food and Drug Administration
- Centers for Medicare & Medicaid Services
- Centers for Disease Control and Prevention
- Substance Abuse and Mental Health Services Administration
- National Institutes of Health
- Health Resources and Services Administration
- Agency for Healthcare Research and Quality
- Agency for Toxic Substances and Disease Registry

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

Health Resources and Services Administration (HRSA)

**Mission:**

“To improve health and achieve health equity through access to quality services, a skilled health workforce and innovative programs.”

**Goals**

- Goal I: “Improve Access to Quality Care and Services”
- Goal II: “Strengthen the Health Workforce”
- Goal III: “Build Healthy Communities”
- Goal IV: “Improve Health Equity”

Health Resources & Services Administration

- **Bureau of Health Workforce**
  - “Addresses the nationwide shortage of primary health care providers through scholarship, loan and loan repayment programs that help underserved communities recruit and retain health professionals”

- **Bureau of Primary Health Care**
- **Healthcare Systems Bureau**
- **HIV/AIDS Bureau**
- **Maternal and Child Health Bureau**

HRSA: Bureau of Health Workforce

Scholarship, Loan and Loan Repayment Programs

- National Health Service Corps Loan Repayment Program
  - For primary care medical, dental, and mental and behavioral health clinicians

- National Health Service Corps Scholarship Program
  - For primary care medical and dental providers-in-training

- Faculty Loan Repayment Program
  - For health professions faculty from disadvantaged backgrounds

- Scholarship and Loan Programs
  - For health professions schools, which make scholarships and low-interest loans available to students with financial need

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HRSA: Bureau of Health Workforce

- **Health Professions Training Grants**
  - To “improve access to health care by helping health professions training programs address some of the most pressing needs across the U.S. health workforce.”
  - **Distribution** - Encouraging clinicians to practice in underserved areas and care for underserved people
  - **Diversity** - Increasing the number of racial and ethnic minority clinicians to mirror the U.S. population
  - **Development** - Preparing clinicians to meet the growing need for primary health care generally, and specifically primary health care for underserved populations, including the young, the old, people with disabilities, and other high-risk groups.

HRSA: Bureau of Health Workforce

 Graduate Medical Education

 Teaching Health Center Graduate Medical Education (GME) program is a $230 million, 5-year initiative created by the Affordable Care Act to increase the number of primary care residents and dentists trained in community-based settings.
Food and Drug Administration (FDA)

- Supports food safety, orphan drug development, and clinical training programs

Centers for Disease Control and Prevention (CDC)

- Supports programs to promote health and quality of life by preventing and controlling disease, injury, and disability
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Types of Awards

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

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

Research Projects

Research Project
(Traditional R01)

- To support a discrete, specified project related to the principal investigator's interests and competence. Most of the research that NIH supports is through this funding mechanism.

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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/year
- 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

Research Project Grants: Applications, Awards, and Success Rates
| R03 | **NIDCR Small Grant Program for New Investigators (R03)**  
|     | Support for scientists who are in the early stages of establishing an independent research career in oral, dental, and craniofacial research. Budgets for direct costs of up to $150,000 over a two-year period may be requested. See NIDCR's [Current Funding Opportunities](http://www.nidcr.nih.gov/GrantsAndFunding/Types_of_Grants_Awarded_by_NIDCR/FundingMechanisms/)
| R03 | **Small Research Grants**  
|     | Provide up to two years support for scientists in the following areas:
|     |  
|     | **NIDCR Small Research Grants for Oral Health Data Analysis and Statistical Methodology Development (R03)**
|     |  
|     | **NIDCR Small Research Grants for Data Analysis and Statistical Methodology applied to Genome wide Data (R03)**

### Funding Facts

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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.

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

- Funding level is Institute-specific
  - NIDCR: $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
This program is designed to facilitate a timely transition of outstanding dual degree dentist scientists from mentored, postdoctoral research positions to independent, tenure-track or equivalent faculty positions by providing support for two years of mentored training and three to five years of independent research.
Research Career Programs (K)

- Provides predominantly salary support
  - Specified salary levels
  - NIDCR
    - Salary: $75,000 plus fringe benefits per year
    - Research Support: $25,000 per year.

- Minimum effort (e.g. 75%) for Research and Career Development activities

- Up to 5 years

- US citizen/permanent resident

- May reduce effort to 50% in the last 2 years if the PI of an 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

Research Career Development Awards

![Bar chart](image)

- K01
- K08
- K23
- K25
- K99

Fiscal Year: 1997 to 2014

Number of Awards

# Research Career Development Awards:
## National Institute of Dental and Craniofacial Research, FY2014

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Agency for Healthcare Research and Quality

- **AHRQ K08**: Mentored Clinical Scientist Research Career Development Award Health Services Research
  - Safety and Quality
  - Effectiveness
  - Efficiency

- **AHRQ K08**: Patient-Centered Outcomes Research (PCOR) Mentored Clinical Investigator Award

- **AHRQ K01**: Patient-Centered Outcomes Research (PCOR) Mentored Research Scientist Development Award (K01)

Centers for Disease Control and Prevention

- **CDC K01**: Mentored Public Health Research Scientist Development Award
  - Basic, behavioral, and applied sciences
  - Health promotion
  - Disease prevention
  - Injury and disability prevention
  - Health protection from infectious, environmental and terrorist health threats

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)

- **Multi-Institute**: Women’s Health
- **Institute specific**
  - NIDCR: Temporomandibular Joint Disorders and Orofacial Pain
- **CTSA - Clinical and Translational Scientist Award**
NIH 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
- CUMC: TRANSFORM
  (Training and Nurturing Scientists for Research that is Multidisciplinary)
Institutional Clinical Research Curriculum Award (CRCA) (K30)

- Comprehensive courses in clinical research/
  “Patient-Oriented Research”
  - Biostatistics, epidemiology, study design,
    bioethics, legal and regulatory issues

- For the career development of clinical investigators

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Career Development (K) Support to Research Grant (R01)

K01/K08/K23 → R01
K12 → K23 → R01
K12 → K23 → R01
K01/K08/K23 → R01
K12 → R01

NIH RePORTER: Grants Database

Search Criteria:
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- State: New York
- Agency/Institute/Center: NIDCR,
- Project Number/Application ID: [Blank]
- Search in: Projects, Publications, News
- Limit Project search to: Project Title, Project Terms, Project Abstracts
- Limit Publication search to: Start Year 2013, End Year 2014

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NIH RePORTER: Grants Database

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<td>Genomic approaches to the pathobiology and classification of periodontitis</td>
<td>Papapanou, Panos N</td>
<td>Columbia University Health Sciences</td>
<td>2015</td>
<td>NIDCR</td>
<td>NIDCR</td>
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<td>5</td>
<td>R03</td>
<td>DE023820</td>
<td>02</td>
<td>Predictive value of microRNAs in the progression of oral leukoplasias</td>
<td>Philipone, Elizabeth</td>
<td>Columbia University Health Sciences</td>
<td>2015</td>
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<tr>
<td>2</td>
<td>R56</td>
<td>DE020097</td>
<td>06</td>
<td>Role of estrogen receptor alpha and beta in regulating mandibular condylar growth</td>
<td>Wadhwa, Sunil</td>
<td>Columbia University Health Sciences</td>
<td>2014</td>
<td>NIDCR</td>
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<td>5</td>
<td>R03</td>
<td>DE022797</td>
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<td>MicroRNA marker-based prognosis of oral cancer survival</td>
<td>Yoon, Angela Jiyeon</td>
<td>Columbia University Health Sciences</td>
<td>2014</td>
<td>NIDCR</td>
<td>NIDCR</td>
<td>$120,000</td>
</tr>
</tbody>
</table>
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

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NIH’s Extramural Loan Repayment Program

Extramural Programs

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

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NIH Extramural Loan Repayment Programs  FY 2012

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%)
<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>
</tr>
<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</td>
<td>9</td>
<td>$624,407</td>
<td>10</td>
</tr>
<tr>
<td>Disadvantaged Backgrounds</td>
<td></td>
<td></td>
<td></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>706</td>
<td>$42,629,607</td>
<td>848</td>
</tr>
</tbody>
</table>
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>Renewal</th>
<th></th>
<th>Total</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>
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<tr>
<td>Clinical Research</td>
<td>959</td>
<td>389</td>
<td>41%</td>
<td>726</td>
<td>493</td>
<td>68%</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>
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<tr>
<td>Health Disparities Research</td>
<td>338</td>
<td>122</td>
<td>36%</td>
<td>215</td>
<td>120</td>
<td>56%</td>
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<tr>
<td>Clinical Research for Individuals</td>
<td>23</td>
<td>9</td>
<td>39%</td>
<td>11</td>
<td>10</td>
<td>91%</td>
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<tr>
<td>from Disadvantaged Backgrounds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contraception and Infertility</td>
<td>48</td>
<td>18</td>
<td>38%</td>
<td>23</td>
<td>11</td>
<td>48%</td>
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<tr>
<td>Research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total</td>
<td>1,835</td>
<td>706</td>
<td>38%</td>
<td>1,265</td>
<td>848</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>3,100</td>
<td>1,554</td>
<td>50%</td>
<td></td>
<td></td>
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</tbody>
</table>
LRP: Clinical Research – New Applications -

[Bar chart showing new applications and awards for clinical research LRP from FY08 to FY13. The chart indicates a trend with increasing applications and awards over the years, with a peak in FY10, and stable numbers from FY11 to FY13.]
LRP: Clinical Research – Renewal Applications -

Renewal Applications for Clinical Research LRP

<table>
<thead>
<tr>
<th>Year</th>
<th>Applications</th>
<th>Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY08</td>
<td>710</td>
<td></td>
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<tr>
<td>FY09</td>
<td>675</td>
<td>502</td>
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<tr>
<td>FY10</td>
<td>648</td>
<td>469</td>
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<td>FY11</td>
<td>645</td>
<td>470</td>
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<tr>
<td>FY12</td>
<td>726</td>
<td>468</td>
</tr>
<tr>
<td>FY13</td>
<td>531</td>
<td>356</td>
</tr>
</tbody>
</table>

Source: NIH LRP
Data Accurate as of 03/31/14

Professional Societies

- **American Academy of Implant Dentistry**
  - Research Grant, Student Research Grant

- **American Academy of Pediatric Dentistry**
  - Resident Research Competition, Fellowships

- **American Academy of Periodontology**
  - Foundation Educational Awards

- **American Association for Dental Research**
  - Sjögren’s Syndrome Foundation Student Fellowship, Student Research Fellowships, William B. Clark Fellowship

American Association of Endodontists Foundation
- Research Grant, Educator Grants, Endodontic Educator Fellowship, Research Grant for Endodontic Residents

American College of Prosthodontists Education Foundation
- Innovator Grant, Research Fellowships in Prosthodontics

American Dental Association Foundation
- Dr. Ray Bowen Student Research Fellowship, Scholarships

American Dental Education Association
- Scholarships, Awards and Fellowships

American Dental Society of Anesthesiology
- Student Poster and Essay Contests

- **American Society for Nutrition**
  - Roland L. Weinsier Award for Excellence in Medical/Dental Nutrition Education

- **Hispanic Dental Association Foundation**
  - Grants and scholarship

- **International Association for Dental Research**
  - Distinguished Scientist Award, Research Award, Young Investigator Award, Fellowships, Travel Award

- **Oral and Maxillofacial Surgery Foundation**
  - Research Support Grants, Student Research Training Award

Topics to be Discussed

- Selecting a Research Mentor/Group
- Selecting a Research Project
- Funding Agencies
  - Federal
    - National Institutes of Health, HRSA
    - New York State: Dept of Health
  - Voluntary Health Organizations, Professional Societies, Foundations, Industry
- Types of Awards
  - Research grants, K awards, Loan Repayment Program
- Finding Funding Opportunities
- Planning & Organizing a Research Proposal
How to Find Funding Opportunities

- Networking
- Speak to colleagues who are in a similar field
- Speak to colleagues who have been on governmental or private agency review panels
- Speak to colleagues who are on (advisory) boards of private agencies
- Acknowledgement section of publications, oral/poster presentations, press releases, etc.
General Resources

- **Grants.gov**
  - Database and application system for Federal grants

- **FedBizOpps (Federal Business Opportunities)**
  - Single point-of-entry for Federal contracts

- **SPIN funding database**
  - [https://www.infoed.columbia.edu/](https://www.infoed.columbia.edu/)
  - e-mail alerts matching research area(s) of interest
National Institutes of Health

http://grantscourse.columbia.edu/nih.htm

Tips for Writing Grant Applications

http://grantscourse.columbia.edu/writing.htm
Other Sources of Information

- Sponsor publications which describe research interests (e.g. newsletters, strategic plans, annual reports)
- Sponsor e-mail alert modules
  - NIH
    - “List of Lists”: https://list.nih.gov/
      - Able to save queries and have “ongoing” results e-mailed as funding alerts
The Foundation Center

79 Fifth Avenue (at 16th St.)
New York, NY 10003-3076
Tel: (212) 620-4230

http://foundationcenter.org/
http://foundationcenter.org/newyork/
Library: Books, periodicals, and other print and electronic resources; Lending program, “Foundation Directory Online Professional”

Courses:
- Proposal Writing
- Proposal Budgeting
- Guide to Online Grantseeker Resources
- Grantseekers Basics

Hardcopy:
- The Foundation Directory
- Guide to Funding for International and Foreign Programs

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Digital Grant Guides

- Aging
- Foreign & International Programs
- Higher Education
- Hospitals & Health Organizations
- Mental Health, Addictions & Crisis Services

The Foundation Directory Online

- 120,000+ foundations and corporate donors
- 3 million+ grants
- Tax statements (990’s) showing previous awards
- Access via Columbia University

http://www.columbia.edu/cgi-bin/cul/resolve?clio3328966
SPIN (InfoEd)
Sponsored Programs Information Network

- Database of funding opportunities
- National and international government and private funding agencies
- Research grants, fellowships, career development, etc.
- Searchable via keywords (and other fields)
- E-mail alerts on targeted funding opportunities.

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https://www.infoed.columbia.edu/
Topics to be Discussed

- Selecting a Research Mentor/Group
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    - New York State: Dept of Health
  - Voluntary Health Organizations, Professional Societies, Foundations, Industry
- Types of Awards
  - Research grants, K awards, Loan Repayment Program
- Finding Funding Opportunities
- Planning & Organizing a Research Proposal
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's Review Criteria

- Overall Impact Score
  - Reflects project’s potential to exert a sustained, powerful influence on the field(s) involved

- Core Review Criteria
  - Significance
  - Investigators
  - Innovation
  - Approach
  - Environment
Elements of a Good Proposal

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

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Investigator

- Competent
- Enthusiastic
- Thorough
- Professional
Anticipate Questions and Answer them before they are asked
Research Arrangements

- Collaborations
- Subcontracts
- Multiple Principle Investigators
  - Now permitted by NIH
- Co-investigators
- Multidisciplinary/Interdisciplinary

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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 (e.g., alternate approaches)
- Include well-designed tables and figures
- Present an organized, lucid write-up
- Ask colleagues to review and comment
Good Luck!