Grants 101

August 31, 2020

I. Training & Career Development Awards
   Sheila Lukehart

II. NIH Structure & Behind the Scenes at Study Section
   Tom Hawn

Slides Posted (A talk in Non-COVID19 years)

III. Introduction to Research Administration at the UW
   Monica Fawthrop
Outline

1. NIH Structure & Funding Facts

2. Behind the Scenes at a Study Section
1. NIH Structure & Funding
NIH History

Responses to Yellow Fever

1879
- Yellow fever destroyed the Mississippi Valley
- A $30,000 bid (RFA) from the US Army for Universities
- 1st peer-reviewed applications for research.

1887
- Marine Hospital Service established, NIH roots started
- Director Joseph Kinyoun

1930
- NIH officially named

Adapted from slide From Toni Scarpa, head NIH CSR
1. The only possible source for adequate support of our medical research is the taxing power of the federal government.

2. The federal government and politicians must assure complete freedom for individual scientists in developing and conducting their research work.

3. Reviews should be conducted by outside experts essentially without compensation.

4. Program management and review functions should be separated.
Dual Review System for Grant Applications

First Level of Review = CSR
Scientific Review Group (SRG)

Except Ks Reviewed within Institute rather than CSR

NIH owns review process

- The Scientific Review Officer, a federal employee, nominates the review panel, assigns applications and is responsible for the meeting

Study section owns the science review

Ownership of application:

- CSR from receipt to posting of Critiques
- Institute/Center after Critique posting
How do you perceive the world?
Department of Health and Human Services

Total Budget = $1216 Billion in 2019

NIH 54%

HRSA 11%

FDA 3%

CDC 8%

Other 24%

- Children's Entitlement Programs 2%
- TANF 1%
- Other Mandatory Programs 2.9%
- Medicaid 34%
- Medicare 52%
- Discretionary Programs 8%
FY 2020 NIH Budget -- $41.7 Billion

2003: $27.1 billion
2004: $28.0 (+3.1%)
2005: $28.6 (+2.2%)
2006: $28.6 (-0.2%)
2007: $29.2 (+2.1%)
2008: $29.2 (0%)
2009: $30.4 (+4.1%)
2010: $30.8 (+1.4%)
2011: $30.7 (-0.3%)
2012: $30.6 (-0.3%)
2013: $29.2 (-4.5%, sequestration)
2014: $30.1
2015: $30.3
2016: $32.3
2017: $34.1
2018: $37.0
2019: $39.1
2020: $41.7 (↑6.6%)

(note Trump proposed $34.4 (↓12%))
Not as Rosy with Inflation Adjustment
Funding Rate: applicants, any award in the year
Success Rate: A0+A1 applications combined
Award Rates: A0+A1 applications separated

*Excludes awards made with American Recovery and Reinvestment Act (ARRA) funds, and ARRA-solicited applications.
## The Good News: UW Has Flourished

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
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<th>STATE</th>
<th>AWARDS</th>
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Good news: F32 NRSA Success Rates Higher than R01

UW Experience:
Division of Pulm Crit Care
2006-16
21/38 funded (55%)
Good News: High Success Rates for K Career Awards

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<td>35%</td>
<td>31%</td>
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<td>35%</td>
<td>38%</td>
<td>36%</td>
<td>30%</td>
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<tr>
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<td>40%</td>
<td>39%</td>
<td>34%</td>
<td>36%</td>
<td>44%</td>
<td>47%</td>
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<td>34%</td>
<td>27%</td>
<td>33%</td>
<td>38%</td>
<td>44%</td>
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<td>23%</td>
<td>29%</td>
<td>25%</td>
<td>22%</td>
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<td>26.2</td>
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Scenario—Does it matter where I get reviewed?

You worked on viruses that cause lung cancer are ready to apply for a K08 or K23 grant.
Which K grant and institute do you apply to?

1. NCI
2. NIAID
3. NHLBI
4. NIDA

- NCI: Depends on their priorities, funding rates, & where your mentor is known.
- NIAID: Doesn’t match topic.
**Be Careful News: Heterogeneity in Success Rates**

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<td></td>
<td>18.1</td>
<td>20.5</td>
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</table>

Be aware of differences in institutional support for CDAs.

**Remember:**
K grants: Choose your institute (reviewed within Institute)
R grants: Choose Study Section (reviewed at CSR)

How do you perceive the world?

Funding is difficult, but ..
Success rates are higher than individual application rates
F/T awards have higher success rates than Rs
K awards have higher success rates than Rs
UW does much better than average
Part II: NIH Study Sections

Outline

1. Pre
2. During
3. Post

1946
The First NIH Study Section

An NIH Study Section Today
Study Sections

- Organized into IRGs (Integrative Review Groups)
- Headed by an SRO (Scientific Review Officer)
- 12-25 members
- 60-100+ applications per meeting
  - Study section scope
  - Roster of reviewers
- Study sections are advisory - they do not fund applications.
You are ready to apply for a grant and have many questions. Where do you get information? What do you apply for?

1. Study Section Chairperson  
2. Grants Management Specialist  
3. NIH Scientific Review Officer (SRO)  
4. NIH Program Officer (PO)
The SRO and the Program Officer

**Scientific Review Officer (SRO)**
- 240 SROs in CSR
- Legal Responsibility for Study Section Mtg
- Select Study Section Members
- Assign Applications
- Assisted by Grants Management Specialist

**Program Officer (PO)**
- Role before and after review
- Key “translator” of summary statements for investigator
- Responsible for programmatic, scientific, and/or technical aspects of a grant.
Solicit Advice Broadly ...

Mentor
Fellows
Post-docs
Colleagues
NIH

“Perhaps I'll enjoy sharing what's on your iPod, honey, when Hell freezes over.”
Review Process - Before the Meeting

- 4 months prior: Applications submitted
- 2 months prior: Applications assigned for review (~10 per person)
  3 reviewers for each application (R1, R2, R3)
- 1 week prior: Scores and critiques are uploaded
  Initial scores and critiques become available to all committee members
- Score revision phase
- 2-3 days prior: Applications are ranked in order of initial mean Impact Scores
- Lower 40-60% are not discussed (Impact Score of 4.5 – 5.0 and above)
  - Any “triaged” application can be resurrected at the meeting for discussion for any reason
  - Applicants receive the critiques and individual criteria scores
  - Impact Score is not given

90% of Grant Fates are Sealed Before the Meeting Begins
R Level Review Criteria

❖ Overall Impact: likelihood for the project to exert a sustained, powerful influence on the research field(s)

❖ Scored Review Criteria: Determination of scientific merit: Impact scores
  1. Significance
  2. Investigator(s)
  3. Innovation
  4. Approach
  5. Environment

❖ Additional Review Criteria: can impact scores
  1. Protection for human subjects (and inclusions)
  2. Sex as a Biological Variable
  3. Vertebrate animals
  4. Biohazards
  5. Resubmission, Renewal, Revision

❖ Additional Review Considerations: do not impact scores
  ➢ Select Agents
  ➢ Resource sharing plan: Data sharing, model organisms, & GWAS
  ➢ Budget
  ➢ Authentication of Key Resources

❖ Scoring scale of 1 – 9 (Best to worst)
  ⚠️ Budget: does not impact scores. Discussed after the final vote

Use these Words in Grant!

Don’t be Sloppy
<table>
<thead>
<tr>
<th>Scored Review Criteria: F vs K vs R</th>
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<tbody>
<tr>
<td><strong>Individual Training</strong> F-series Grants</td>
<td><strong>Career Development</strong> K-series Grants</td>
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<tr>
<td>- Overall Impact</td>
<td>- Overall Impact</td>
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<td><strong>Review Criteria</strong></td>
<td><strong>Review Criteria</strong></td>
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<tr>
<td>- Candidate</td>
<td>- Candidate</td>
</tr>
<tr>
<td>- Sponsor, Collaborators, Consultants</td>
<td>- Career development plan Career goals and objectives Plan to provide mentoring</td>
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<tr>
<td>- Research Training Plan</td>
<td>- Research Plan</td>
</tr>
<tr>
<td>- Training Potential</td>
<td>- Mentor(s), consultants, collaborators</td>
</tr>
<tr>
<td>- Institutional Environment &amp; Commitment to Training</td>
<td>- Environment &amp; Institutional commitment</td>
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# Criteria Scores

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<th>Descriptor</th>
<th>Additional Guidance on Strengths/Weaknesses</th>
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<tr>
<td>1</td>
<td>Exceptional</td>
<td>Exceptionally strong with essentially no weaknesses</td>
</tr>
<tr>
<td>2</td>
<td>Outstanding</td>
<td>Extremely strong with negligible weaknesses</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Very strong with only some minor weaknesses</td>
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<tr>
<td>4</td>
<td>Very Good</td>
<td>Strong but with numerous minor weaknesses</td>
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<tr>
<td>5</td>
<td>Good</td>
<td>Strong but with at least one moderate weakness</td>
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<tr>
<td>6</td>
<td>Satisfactory</td>
<td>Some strengths but also some moderate weaknesses</td>
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<td>7</td>
<td>Fair</td>
<td>Some strengths but with at least one major weakness</td>
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<tr>
<td>8</td>
<td>Marginal</td>
<td>A few strengths and a few major weaknesses</td>
</tr>
<tr>
<td>9</td>
<td>Poor</td>
<td>Very few strengths and numerous major weaknesses</td>
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</table>

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
Scoring System

• Criterion Score
  • Whole numbers: 1-9
  • 1 (exceptional);
  • Given by reviewers but not discussed at study section
  • Provided in Summary Statement of all applications (discussed and not discussed)

• Overall Impact Score
  • Whole numbers (at first): 1-9
  • Not the mean of the criteria scores
  • Each review recommends a score
  • All committee members score within the range
  • Can vote outside the range, but must state that you are doing so

• Final Impact Score
  • Mean of all scores x 10
  • 10 – 90
  • Percentiled against similar applications across 3 meetings (not so for F’s and K’s)
  • Unknown to the committee (except the chair)

• Payline
  • Varies among institutes
  • [http://www.aecom.yu.edu/ogs/NIHInfo/paylines.htm](http://www.aecom.yu.edu/ogs/NIHInfo/paylines.htm)

Adjectives Used

1 Exceptional
2 Outstanding
3 Excellent
4 Very Good
5 Good
6 Satisfactory
7 Fair
8 Marginal
9 Poor
Study Section Scoring Range

CSR All 2014-01 Histogram

~5% of applications get a score of 10-20 and about 2% perform poorly.

Study sections often advised to “AVOID THREE” which leads to compression.

1. Shows recent scoring pattern of ~15,000 applications
2. Score is well spread over a range of ~10 - 69
Where and When Do Reviewers Review Grant Applications?

- At home
- On a plane (likely no internet)
- At the last minute - and thus a bunch in one sitting
- Hence, reviewers can be stressed, anxious, & not terribly sympathetic
- They may lose interest

Don’t let the reviewer become...

- Baffled,
- Bitter,
- or Bored

- Do not make the reviewer think!
- Do not make the reviewer read papers or go to the internet
- Do not tick off the reviewers!
### Pre-Meeting Rank Order

#### ~1 Week Prior

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#### ~3 days prior

**Read Other Reviews & Adjust Score**

- **D** Badness: Adjusted score to 2.33
- **F** Outlier Badness: Adjusted score to 2.67

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<th>R2</th>
<th>R3</th>
<th>Ave</th>
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The Review Process - at the Meeting

- Begin at 8 am EST (i.e., 5 am PST)
- Cramped room full of lap tops and several jet-lagged reviewers
- Review Grants in order - best to less best
- 15-20 min per application (shorter is best)
- Go to 6-7 pm
- Eat, sleep
- Repeat next day
What happens?

- Application is announced and conflicts identified
- Chair asks the 3 reviewers to state their scores
- Primary reviewer:
  Short description of proposal
  Discuss Overall Impact
  Discusses strengths and weaknesses using the scored criteria as a guide (but without stating criterion scores)
  - Reviewers 2 & 3: concur or discuss differences
  - Discussion opens to the committee
  - Additional Review Criteria: Animals, Human Subjects, Resubmission, Authentication of Resources
    - Reviewers restate their scores (e.g., 2-4-5, 3-3-3)
    - A range is established (e.g., 2-5, 3-3)
    - Chair asks if anyone plans to vote outside of the range
    - Committee posts scores online
    - Additional Review Considerations: Budget, Resource Sharing, Bioethics training
    - Repeat with the next application in order
### At the Meeting: Scoring

#### Pre-Discussion

<table>
<thead>
<tr>
<th>App</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>Ave</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Post-Discussion Possibilities

<table>
<thead>
<tr>
<th>App</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>Ave</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>A2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Discuss & Adjust Scores

#### All Members Vote

<table>
<thead>
<tr>
<th>App</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>Ave</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>? 4 or 2</td>
</tr>
<tr>
<td>A2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

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Beware the LAW OF AVERAGES which is the norm
Vagaries of Peer Review

• Reviewers are humans; humans err
• Assigned reviewers have the most influence on scoring
• A passionate reviewer (pro or con) can influence the group
• Any committee member can vote outside of the “range”
• Final Impact Score is usually (~85% of the time) close to the initial impact score
  • Scores change >1 point on only 15% of grants
  • Rarely for ESI applications (less than 1%)

Good video of a mock Study Section
http://www.youtube.com/watch?v=fBDxI6i4dOA
Some Top Reasons Why Grants Don’t Get Funded

The Candidate
Poor training potential.
Poor productivity or applying too early
Uncertainty concerning future directions (where will it lead?).

The Mentor
Not qualified, poorly funded, and/or not productive

The Science
Lack of new or original ideas.
Diffuse, superficial, or unfocused research plan.
Lack of knowledge of published, relevant work.
Lack of preliminary data and/or experience with essential methodologies.
Questionable reasoning in experimental approach.
Absence of a sound hypothesis and clear scientific rationale.
Unrealistically large amount of work.
Bad fit with primary institute
Summary Points: Anticipating the Reviewer

Start early

Tend to the “small stuff” early

Provide mentoring committee & didactic plan

Provide compelling science (this is what reviewers enjoy!)

Make time for colleagues to review

Communicate clearly—summary figures, models, polished text
Ponder how you perceive

Reasons for Optimism
Science is satisfying
Science is important
UW does better than average
Career awards higher success

By Bohsky
Additional Information
NIH General Grant Information

The NIH has put together a series of podcasts in their “All About Grants” webpage (see link below). It looks like a fantastic resource, especially for early stage investigators.

General topics include:
Getting to know NIH and the Grants Process
Preparing a Successful Grant Application
Advice for New and Early Career Scientists
Submitting your Application
How NIH Grants are Reviewed
Life as an NIH Grantee (Post-Award Activities and Requirements)

http://grants.nih.gov/podcasts/All_About_Grants/index.htm
Website References

NIH

NRSA (T+F Grants):  http://grants.nih.gov/training/nrsa.htm

K Career Development Awards:
http://grants.nih.gov/training/careerdevelopmentawards.htm
Other Grant Sources To Consider

NIH Loan Repayment Program
For individuals with clinical doctorate degrees working in specified areas of biomedical science, predominantly patient-oriented research

Examples of Sources of Non-Federal Grants
American Heart Association
Infectious Diseases Society of America
Cystic Fibrosis Foundation
Parker B Francis Foundation
NIH Award Mechanisms
T & F Grants

Awards

• Institutional Awards: T32
  – Institution, not the individual, applies for the award
  – Not available at all schools, departments, divisions

Pre-Bac
  ➔ Pre-Bac Institutional Training Grant (T34)

GRADUATE/MEDICAL STUDENT
  ➔ Predoctoral Institutional Training Grant (T32)

  ➔ Predoctoral Individual NRSA (F31)
  ➔ Predoctoral Individual MD/PhD NRSA (F30)

  ➔ Postdoctoral Institutional Training Grant (T32)
  ➔ Postdoctoral Individual NRSA (F32)

  ➔ Mentored Research Scientist Development Award (K01)
  ➔ Mentored Clinical Scientist Development Award (K08)
  ➔ Mentored Patient-Oriented RCDA (K23)
  ➔ Mentored Quantitative RCDA (K25)

  ➔ Mentored Career Transition (K22, PhD Eligible)
  ➔ NIH Pathway to Independence (PI) Award (K99/R00)

POST DOCTORAL

EARLY

MIDDLE

SENIOR

Midcareer Investigator Award in Patient-Oriented Research (K24)
Summary Statement

- Face Page
- Summary of Discussion
- Description (abstract you wrote)
- Overall Impact and Scored Criteria
- Addition Review Criteria
  - Protection of Human Subjects
  - Inclusion of Women, Minorities, and Children
  - Vertebrate Animals
  - Biohazards
  - Resubmission
- Additional Review Considerations
  - Responsible Conduct of Research
  - Budget
  - Foreign Training
  - Resource Sharing Plan
- Additional Comments to the Applicant
  - Excess text in the wrong place
  - Advice for resubmission

Individual Critiques