Grants 101 Part II: Training and Career Development Awards

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DOM Fellows Course – Surviving and Thriving in the Research Years

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Thanks to Sheila Lukehart, PhD for sharing her slides and wisdom on this topic.
I. Grants 101 Part I: Introduction to Research Administration
   Monica Fawthrop

II. Training & Career Development Awards
   Ellen Schur

III. NIH Structure & Behind the Scenes at Study Section
    Tom Hawn
Training and Career Development Awards

- Purpose of a career development award
- Selecting a career development award
  - Where to get information
- Components of an NIH K application
- Tips on writing a great application
Purpose of a Career Development Award

For you
- Mentorship
- Research support
- Training
- Track record of funding

For sponsor/NIH
- Develop and shape the scientific workforce
- For foundations and NIH Institutes, promote scientists devoted to their area of emphasis
- Target support to specific stages of career development
- Target support to improve representation in the scientific workforce
Example of a Career Development Award (K award)

- Mentored Career Development Award
  - Early career
  - Postdoc or junior faculty
  - Examples: K08, K23, K01
- Require 75% protected time for research and training
- 3-5 years duration
- Salary support ($50-100K per year)
- Modest funds for research
- Mentor(s) required (but not paid by the grant)
Tips on writing a great application

This grant is about you
Selecting a career development award

**Eligibility**
- MD or clinical degree vs. PhD
- Years since doctorate
- Person from underrepresented background
- Citizenship

**Research**
- Patient-oriented or basic
- Clinical trial or not
- Specialized – e.g., engineering

**Institute**
- Topic of your research
- Mechanisms offered
- Funding levels
Selecting a career development award: Eligibility

- **US citizen, permanent resident**
  - K08 MD, DVM, DDS, other Clinical Doctorate
  - K23
  - K01
  - K22 MD or PhD
  - K25

- **US Citizen/PR or Non-citizen**
  - K99/R00 Pathway to Independence: MD or PhD
  - Many foundations do not have citizenship requirements
Selecting a career development award: Research

K08: Mentored Clinical Scientist Research Career Development Award

- Laboratory focused research
- May use human samples

K23: Mentored Patient-Oriented Research Career Development Award

- Patient oriented research
  - Clinical trial not allowed
  - Clinical trial required
  - Independent basic experimental studies with humans required

Eligibility: MD, DVM, DDS, other Clinical Doctorate
Selecting a career development award: Research

K01: Mentored Research Scientist Development Award
- Basic or clinical
- Institute-specific purposes

K25: Mentored Quantitative Research Career Development Award
- Quantitative science or engineering degree moving to health-related topics/biomedical research

Eligibility: PhD or MD, DVM, DDS, other Clinical Doctorate
Selecting a career development award: Institute

- Some institutes don’t offer all grant mechanisms
- Some institutes have special mechanisms or requirements
  - NIAID: K99/R00 Physician/Scientist MD only
  - NHLBI: K01 Mentored Career Development Award to Promote Faculty Diversity in Biomedical Research
- Pay lines vary
  - Optimize your chance of success if possible
Selecting a career development award: Transition to independence awards

**K99/R00 NIH Pathway to Independence Award**
- Postdoc *move* to Assistant Professor
- No more than 4 years of postdoctoral research* experience at the time of submission (or resubmission)
- Has mentored postdoc phase K99 (1-2 years)
- Independent Asst. Prof. phase R00 (up to 3 years)
- *Non-citizens eligible*

**K22 Career Transition Award**
- Mentored phase (postdocs eligible)
- Followed by independent research phase
- NIAID, NCI only
Tips on writing a great application

This grant is about you

Match you, your research, and your mentor to the mechanism and institute
Where to get more information

https://researchtraining.nih.gov/programs/career-development
Training and Career Development Awards

- Purpose of a career development award
- Selecting a career development award
  - Where to get information
- Components of an NIH K application
- Tips on writing a great application
This is the most important slide of my talk

- How you present your science matters, too
- Use formal language—no slang or jargon
- Use correct grammar and punctuation
- No typos!
- Pay attention to required fonts, margins, page limits

Put your best foot forward
Tips on writing a great application

This grant is about you

Match you, your research, and your mentor to the mechanism and institute

Inspire confidence in your potential with a well-presented proposal
Boring—and causes tired eyes...
Visual Appeal

- Open space
- Clear organization
- Use of Bold, CAPITALS, underlining, and outlining to define sections
- Theoretical models, diagrams, and figures
- Color or grayscale

Not too small
Components of K Applications

Major Sections
- Specific Aims
- Candidate Section
- Mentor’s statement, Co-Mentors
- Environment
- Institutional Commitment to Candidate
- Research Plan

Minor Sections
- Project Summary Abstract
- Project Narrative
- Human Subjects
- Vertebrate Animals
- Training in Responsible Conduct of Research (1 page)
- Authentication of Reagents
- Biohazards
- Select Agents
- Letters of Support (Collaborators)
- Budget
- Budget Justification
- Resource Sharing Plan
- Biosketches for You, Mentor, Co-mentors
- Letters of Reference (3-5 letters from people who know you)

Uh, that’s kind of a lot
# Components of K application

<table>
<thead>
<tr>
<th>Section</th>
<th>Pp</th>
<th>Purpose</th>
<th>Time</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Aim</td>
<td>1</td>
<td>What are they funding?</td>
<td>↑↑↑↑↑</td>
<td>Inspires; good first impression</td>
</tr>
<tr>
<td>Candidate</td>
<td>~4*</td>
<td>Who are they funding?</td>
<td>↑↑↑</td>
<td>Explains; logical extension of prior training; learning needs</td>
</tr>
<tr>
<td>Mentor’s statement</td>
<td>6</td>
<td>Who will be helping you?</td>
<td>↑↑↑↑</td>
<td>Mentor</td>
</tr>
<tr>
<td>Environment</td>
<td>1</td>
<td>Do you have resources?</td>
<td>↑</td>
<td>Expected; checks a box</td>
</tr>
<tr>
<td>Institutional commitment</td>
<td>1</td>
<td>Do you have support to become independent?</td>
<td>↑</td>
<td>Dept.</td>
</tr>
<tr>
<td>Research Plan</td>
<td>~8*</td>
<td>What science will you do... in the current research? in the future?</td>
<td>↑↑↑↑↑</td>
<td>Engages; interesting, rigorous science with potential for growth</td>
</tr>
</tbody>
</table>

* 12 pp limit combined
Specific Aims

- One page summary of the application
- An opportunity to tie the research proposed to your training plan and career trajectory
- Introduce your research plan
  - What is the hypothesis(es), and what data/literature support it?
  - What are the exciting new preliminary data that support your aims? Which data are YOURS?
  - What are you going to do?
  - What will your results mean for the field?
  - What will this project mean for your career?
Tips on writing a great application

This grant is about you

The Specific Aims page is the most critical page in the application

Match you, your research, and your mentor to the mechanism and institute

Inspire confidence in your potential with a well-presented proposal
Candidate Section

- Candidate’s Background
  - How did you get where you are?
  - Let the reviewers get to know you
  - Hint: establish your track record and commitment to a career in science

- Career Goals and Objectives
  - Where do you see yourself in 5 or 10 years?
  - Hint: “…independent investigator in the field of ________”

Who are they funding? (and why it makes sense to fund you to do this work)
Candidate Section

- Career Development/Training Activities
  - How will this award fill your training gaps?
  - How will this training be foundational for your anticipated future research?
  - What to include:
    - Didactic coursework
    - Technical training
    - Skills enhancement (e.g., grant writing)
    - Local and national conferences
Tips on writing a great application

This grant is about you

It’s OK to have weaknesses; address them in training section

The Specific Aims page is the most critical page in the application

Match you, your research, and your mentor to the mechanism and institute

Inspire confidence in your potential with a well-presented proposal
Mentor Statements (6 pages total)

- Mentor’s statement should include
  - Evidence of successful training history
  - Evidence of active productive research
  - Evidence of support for proposed research
  - Details about mentoring—e.g. frequency of meetings
  - Topic areas in which mentoring will occur
  - Plan for transitioning candidate to independence

- Co-Mentors’ statements should be specific about the expertise that they bring to the mentoring team

Who is helping you? (and why they are qualified to do so)

Should match your Candidate section
Environment & Institutional Commitment to the Candidate

- Description of Institutional Environment (1 page)
  - Intellectual environment
  - Facilities, resources

- Institutional Commitment to Candidate’s Research Career Development (1 page)
  - Is usually letter from Chair/Division Head
  - Guarantees >75% protected time for research training
  - Lab space, office, academic appointment

Do you have resources and support to become an independent investigator? (the answer should always be Yes)
The Science: Last, But Certainly Not Least!

- Schedule uninterrupted time to sit and think—days of time
- Read the latest papers in your field and well-written review articles
- What are the unknowns in the topic that you are studying?
- How do the ideas in your proposed research connect...
  - to each other?
  - to existing literature?
  - to your career goals?
- Follow your heart as well as your mind
Research Plan

- **Specific Aims**—1 page (not in 12-page limit)
- **Research Strategy**
  - Significance
  - Innovation
  - Approach

What science will you do? (and how it will help you in your career)
Significance (Background)

- Explain the importance of the problem
  - Clinical conundrum, scientific question, technical barrier
  - Hint: what excites you about this work?
- Assume you are not writing for an expert
- Identify gaps in knowledge; state how you will fill those gaps; tie to each Specific Aim
- Avoid selective citation of the literature
  - Hint: areas of controversy need more research!
Innovation

- What is new?
  - Hypotheses and ideas
  - Methods
  - Population
  - Technologies
  - Combining any of above: e.g., applying established methods in new population

- Keep it short and sweet!
Approach: Research Design and Methods

- Organize by Specific Aim*
  - Rationale and Hypothesis
  - Experimental Approach*
  - Expected Results & Interpretation
    - Statistical analysis, sample size
  - Potential Pitfalls and Alternative Approaches

- Other Important Sections
  - Future Directions – R01
  - Timeline – include grants

* For clinical studies, experimental approach might be the same for multiple aims; Organize by Aim for Expected Results and below
Kо8 review criteria for Research Plan

• Are the proposed research questions, design, and methodology of significant scientific and technical merit?
• Is the prior research that serves as the key support for the proposed project rigorous?
• Has the candidate included plans to address weaknesses in the rigor of prior research that serves as the key support for the proposed project?
• Has the candidate presented strategies to ensure a robust and unbiased approach, as appropriate for the work proposed?
• Has the candidate presented adequate plans to address relevant biological variables, such as sex, for studies in vertebrate animals or human subjects?

• Is the research plan relevant to the candidate's research career objectives?
• Is the research plan appropriate to the candidate's stage of research development and as a vehicle for developing the research skills described in the career development plan?
Tips on writing a great application

- **This grant is about you**
- **The Specific Aims page is the most critical page in the application**
- **Your research plan doesn’t have to change the world, but it should change you career**
- **Match you, your research, and your mentor to the mechanism and institute**
- **Inspire confidence in your potential with a well-presented proposal**

**Training program must be substantive**
### Components of K application

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<tr>
<td>Specific Aim</td>
<td>1</td>
<td>What are they funding?</td>
<td>↑↑↑↑↑</td>
<td>Isn’t this cool?</td>
</tr>
<tr>
<td>Candidate</td>
<td>~4*</td>
<td>Who are they funding?</td>
<td>↑↑↑</td>
<td>Aren’t I awesome?</td>
</tr>
<tr>
<td>Mentor’s statement</td>
<td>6</td>
<td>Who will be helping you?</td>
<td>↑↑↑↑↑</td>
<td>We got this!</td>
</tr>
<tr>
<td>Environment</td>
<td>1</td>
<td>Do you have resources?</td>
<td>↑↑</td>
<td>Can do!</td>
</tr>
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<td>Do you have support to become independent?</td>
<td>↑↑↑↑↑</td>
<td>We are all in.</td>
</tr>
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<td>Research Plan</td>
<td>~8*</td>
<td>What science will you do… in the current research?</td>
<td>↑↑↑↑↑</td>
<td>My science is real.</td>
</tr>
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* 12 pp limit combined
The iterative writing process

1. Write a section
2. Request feedback
3. Work on a different section
4. Revise based on feedback
5. Revisit completed sections
The Rewards!

- Start a rewarding career in science
- Discovery!
- Make a difference!
  - Help to understand, control, prevent, or cure a disease
  - Teach, develop, and train the next generation of outstanding scientists

http://www.nesc.nhs.uk/images/biomedical%20scientists.jpg
“A scientific theory isn't just a hunch or guess. It's more like a question that's been put through a lot of tests.”