Funding opportunities at NIH, the review process and thoughts related to achieving success

April 27, 2010
Dartmouth

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Director of Training and Career Development
NINDS, NIH
1. Preliminary Musings
2. Some Factual Stuff
3. Some Statistics
4. More Musings
As of November, 2008...

“It’s a great time to be a new investigator”
Now…

It’s still a great time to be a new investigator for almost all of you.
Opportunities to do science are fantastic

- Fellowship (F) success rates good (20-45%)
- Career Award (K) success rates excellent (~35-45%)
- K99/R00 was created (~20%)
- Higher paylines than for established investigators
  
  In FY07 - FY09, the NINDS payline = 
  ~20-30%tile compared with 9-12%tile for established investigators)

- Director’s New Innovator Award created
  - Up to $1.5M over 5 years
  - 125 awards made in 2007-2009
  - 27% success rate in 2009
In 2007…

New investigator designation
(no major NIH grants yet)

In 2008…

ESI (10 years since degree)
We’ll talk about jobs later
HAVE A LONG-RANGE PLAN

- Where are you going and how are you going to get there.
- Keep your eyes on the target and your progress.
- Be proactive.
What should you be thinking about when looking for a training environment?

- High quality science
- Significant science
- Exciting science
- Strong mentorship
- Great lab environment (people)
- Support of independence
- Institutional support for research
Find people who know what they’re talking about and get help

DO NOT listen to rumors

DO NOT pay attention to those who are chronically negative
Some Factual Stuff
National Institutes of Health

- 27 Institutes or Centers (ICs)
- Each IC has its own mission
- Each IC has its own budget
- Each IC has its own activities
- Each IC has its own ways of doing things
- Each IC has its own personality

When you’re planning to submit a grant, check with program directors from different institutes to determine their specific policies and interest in your science.
Funding Opportunities for Trainees

The Main Menu
Funding Opportunities

**Fellowships**
- F30 – NRSA for MD/PhDs (9 institutes)
- F31 – NRSA for MD/PHDs (NINDS)
- F31 – NRSA predoc. (8 institutes) (5 year max)
- F31 – NRSA predoc [diversity] (all institutes)
- F32 – NRSA postdoc. fellowship (3 year max)

**Institutional Training Grants**
- T32 – NRSA institutional training – pre & postdoc
- K12 – Mentored clinical scientist development award
Funding Opportunities

Mentored Career Development Awards

- K01 – generally for PHDs; IC-specific uses
- K07 – Academic Career Award (few ICs)
- K08, K23 – For clinicians doing basic or clinical research
- K25 - Quantitative research

Career Transition Awards

- K99/R00 - Pathway to Independence Award
- K22 – Transition Award; 5 ICs-all different
K01 Mentored Scientist Award

- NINDS: Diversity, Reentry
- NCI: Diversity
- NCRR: DVMs only
- NIAID: Epidemiology, modeling techniques, outcomes research
- NICHD: Population res., medical rehab. res., child abuse and neglect research
- NIDCD: Retooling, transition of junior and mid-level scientists in 1) translational, 2) clinical res.
- NIMH: Broad use
Funding Opportunities

Independent Career Development Awards

- **K02 – Research Scientist Development**
  - NINDS: Clinicians only before R01
  - Others: MD or PHD, Career Development after R01

- **K24 – Midcareer award in patient-oriented research**
Some Relevant Characteristics of Different Mechanisms
For all NRSA fellowships, and all K awards except K99/R00, applicants must be a U.S. citizen or permanent resident.
Predoc (F31): 1-5 years, primarily stipend
Postdoc (F32): 1-3 years, primarily stipend

ALL POSTDOCS should be applying

K awards: 3 – 5 years, provide salary, fringe, research costs and protected time (most require 75% effort devoted to research)

Details for all mechanisms vary by IC
K01/K08/K23/K25… (all Mentored)

- 75% effort required for most
- 50% effort required for neurosurgeons
- Up to 5 years protected time
- Up to $85,000 salary (NINDS)
- $50,000 research costs (NINDS)

- Used differently by all institutes
- All Ks are 12 pages (plus various forms)
- Must be a US citizen or permanent resident
The K99/R00 Transition to Independence Award
● **What the K99/R00 was intended to do**
  Speed the transition to R01 and thus reduce the age of applicants getting 1st one

● **What the K99/R00 does**
  Facilitates the transition to a good academic position

● **Who gets the K99/R00**
  The most creative, scientifically sound, articulate postdocs (and physician-scientists*)
K99/R00

Must have less than 5 yrs. postdoc. res. experience

• 2 years K99 (mentored)
  • 75% effort required
  • $90,000 total cost, up to $50,000 salary
  • Exceptions related to salary (MD, other)

• 3 years R00 (independent)
  • must have tenure track or equivalent position
  • must get appropriate startup package
  • 75% effort on research required
  • $249,000 total cost
K99/R00

K99 phase (mentored)
• IC-specific salary differences
• IC-specific research expense differences
• IC-specific duration differences

R00 phase (independent)
• IC-specific duration differences
• Administrative review – undoubtedly
IC differences

In the program announcement, there’s a web table listing all of the IC-specific information.
K99 Fundamentals

- Open to U.S. and Non-U.S. Citizens
- Both phases must be done in the U.S.
- For NINDS, must do at least 1 full year in K99 phase – varies by IC
- Can submit amended application, but must be within 5 year rule
- Must be in mentored position to apply
For the K99, reviewers are looking for the Duck
Bottom line for K99 reviewers

- Am I impressed?
- Do I think this person’s great?
- Does this person do great research?
- Will this person do significant research?
- Is this person creative?
- Will this person be a leader in the field?
- Are the flaws in this grant so minor, and the person and ideas so good, that I can overlook the flaws?
- Will this person get a tenure-track job within 2 years?
Research Grants for Independent Scientists
The Main R-series Grants

Large Research Grant (R01)
- 4-5 years, $250,000 or more/yr

Exploratory Research Grant (R21)
- High Risk/High Reward
- Exploratory
- 2 years, $275,000 total

Small Grant (R03)
- 2 year max, $50,000/yr max
- Self-contained small project

Acad. Res. Enhancement Award (R15)
- primarily undergrad institutions
R-series Grants recommended for NI/ESI

Large Research Grant (R01)
- 4-5 years, $250,000 or more/yr

Exploratory Research Grant (R21)
- High Risk/High Reward
- Exploratory
- 2 years, $275,000 total

Small Grant (R03)
- 2 year max, $50,000/yr max
- Self-contained small project

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- primarily undergrad institutions
Other Funding for Independent Scientists

- R41…R44 (STTR/SBIR) – Supports collaboration between researchers and small business
- P-type (program projects and centers)
- U-type (cooperative agreements)
NIH isn’t the only game in town

- Other federal
- Private Foundations
- Do not disregard small grant opportunities
Application Preparation and Review
Applications are submitted electronically

They are submitted by your institution’s business office. But you are the one who loses if it’s incomplete or incorrect!

YOU HAVE TWO DAYS TO CHECK THE APPLICATION AFTER SUBMISSION. YOU SHOULD CHECK!
What happens when you submit an application?

Center for Scientific Review

Scientific Review Group/IC Review Branch

Program, NINDS

Advisory Council-NINDS

FUNDING DECISION

Institute Director
What is a study section (scientific review group)?
Your application is reviewed at study section by:

- Experts
- Non-experts
- People who are reading lots of grants
- People who want to be excited by science
- People who will be irritated by a sloppy application

Submit a high quality application!

Have people review your application critically WELL BEFORE submission
BEFORE study section

• 3 or more reviewers assigned to each application
• Reviewers read applications, post preliminary evaluations and scores

DURING study section

• Assigned reviewers describe strengths and weaknesses
• Some at table scan application during talks
• ALL reviewers discuss, give final score
Hypothesis-Driven Research vs Discovery Science
What is required for a good training grant application?

- Significant research question
- Clear hypotheses
- Clear tests of hypotheses
- Feasibility
- Excellent career development (training) plan
- Excellent mentoring
- Appropriate institutional support
- High quality publications (where appropriate)
- Plans to evaluate progress
Hypothesis-Driven vs. Discovery Science
The specific aims page is your hook

Make it as perfect as possible
Write clearly, coherently, logically

DO NOT BE BORING!

DO NOT BE SLOPPY!

DO NOT MAKE IT DIFFICULT FOR THE REVIEWERS!
You may not be funded on the first submission

You may not even get an IMPACT score!
DO NOT TAKE REJECTION PERSONALLY!

PERSIST!
Fix the problems

- Don’t get trapped by the new expedited review process for ESI / NI
- Know whether you should come back in quickly or take more time
- Get advice from your NIH Program Director if in doubt
Fix the problems

- You only get 2 shots
- Don’t think you should come back in quickly or succumb to pressure to come back in quickly
When you miss the funding range, respond to reviewer comments appropriately.
The review process has changed dramatically

- Length change; 25 → 12 + 1 pages
- Length change; 10 → 6 +1 pages
- Change in scoring system
- More structured review
- Change in review criteria
- A2 eliminated
- UN eliminated. Now ND
- New Investigators reviewed as group

http://www.nih.gov
Click on “Peer Review” – lower right corner
Changes in review were designed to place more focus on impact and less on details of approach or prelim. data.

But you’ll still need sufficient attention to details.
<table>
<thead>
<tr>
<th>Score</th>
<th>Descriptor</th>
<th>Additional Guidance on Strengths/Weaknesses</th>
</tr>
</thead>
<tbody>
<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>
</tr>
<tr>
<td>4</td>
<td>Very Good</td>
<td>Strong but with numerous minor weaknesses</td>
</tr>
<tr>
<td>5</td>
<td>Good</td>
<td>Strong but with at least one moderate weakness</td>
</tr>
<tr>
<td>6</td>
<td>Satisfactory</td>
<td>Some strengths but also some moderate weaknesses</td>
</tr>
<tr>
<td>7</td>
<td>Fair</td>
<td>Some strengths but with at least one major weakness</td>
</tr>
<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>
</tr>
</tbody>
</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
NIH Core Review Criteria for Fs

- Candidate
- Sponsors, Collaborators, Consultants
- Research Training Plan
- Training Potential
- Institutional Environment and Commitment to Training

HINT:
Significance, Mentors, Quality are buried in here and of huge importance
NIH Core Review Criteria for Ks

- Candidate
- Career Development Plan/Mentoring
- Research Plan
- Mentors
- Environment and Institutional Commitment
NIH Core Review Criteria for RPGs

• Significance
• Investigator(s)
• Innovation
• Approach
• Environment

• All criteria receive a score
• Application receives an overall IMPACT score that is NOT directly related to criterion scores
Significance is more important than ever

- The issue is not: ‘why this disease is important.’
- The issue is: ‘why this research is important’
- For clinical research grants, you must explain how your study will make a difference to patients
BUT

You also must demonstrate that you can do what you say you are going to do
IMPACT =
Significance
plus
Can you do it

This is ultimately what is being scored
Cannot emphasize this enough

- You must do important work

- You must do high quality work – reflected in journal quality, prelim. data and mentor reputation

- Pick your lab/institution based on the quality of the work AND the quality of the training AND whether you think you’ll be happy there –

Do your homework and interview the place
Where to find the latest information:

1. Go to www.nih.gov and click on the “Grants” tab

OR

2. do a Google search for “NIH peer review” or “enhancing peer review”
Some Statistics
## NIH-wide F Success Rates

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Number Reviewed</th>
<th>Number Awarded</th>
<th>Total cost awarded (x1000)</th>
<th>Success Rate²</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>3,920</td>
<td>1,281</td>
<td>$52,932</td>
<td>32.7%</td>
</tr>
<tr>
<td>2007</td>
<td>4,243</td>
<td>1,277</td>
<td>$52,349</td>
<td>30.1%</td>
</tr>
<tr>
<td>2006</td>
<td>4,407</td>
<td>1,267</td>
<td>$52,824</td>
<td>28.7%</td>
</tr>
<tr>
<td>2005</td>
<td>4,000</td>
<td>1,237</td>
<td>$51,086</td>
<td>30.9%</td>
</tr>
<tr>
<td>2004</td>
<td>3,618</td>
<td>1,272</td>
<td>$50,638</td>
<td>35.2%</td>
</tr>
<tr>
<td>2003</td>
<td>3,030</td>
<td>1,193</td>
<td>$47,455</td>
<td>39.4%</td>
</tr>
<tr>
<td>2002</td>
<td>2,369</td>
<td>1,050</td>
<td>$38,439</td>
<td>44.3%</td>
</tr>
<tr>
<td>2001</td>
<td>2,490</td>
<td>1,230</td>
<td>$41,729</td>
<td>49.4%</td>
</tr>
<tr>
<td>2000</td>
<td>2,584</td>
<td>1,219</td>
<td>$39,571</td>
<td>47.2%</td>
</tr>
<tr>
<td>1999</td>
<td>2,639</td>
<td>1,159</td>
<td>$37,895</td>
<td>44.6%</td>
</tr>
<tr>
<td>1998</td>
<td>2,839</td>
<td>1,159</td>
<td>$30,983</td>
<td>40.8%</td>
</tr>
<tr>
<td>1997</td>
<td>3,075</td>
<td>1,210</td>
<td>$32,297</td>
<td>39.3%</td>
</tr>
<tr>
<td>----</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>NIA</td>
<td>118</td>
<td>64</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>NIAAA</td>
<td>51</td>
<td>51</td>
<td>40</td>
<td>34</td>
</tr>
<tr>
<td>NIDA</td>
<td>96</td>
<td>133</td>
<td>120</td>
<td>101</td>
</tr>
<tr>
<td>NIDCD</td>
<td>72</td>
<td>96</td>
<td>91</td>
<td>74</td>
</tr>
<tr>
<td>NIMH</td>
<td>307</td>
<td>299</td>
<td>360</td>
<td>388</td>
</tr>
<tr>
<td>NINDS</td>
<td>390</td>
<td>398</td>
<td>423</td>
<td>366</td>
</tr>
</tbody>
</table>
In FY09, NINDS fellowship success rate = 23%
Increase in the number of Fellowship (F31, F32) applications, 2003 - 2007

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2003</th>
<th>% increase</th>
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<tbody>
<tr>
<td>NIAAA</td>
<td>72</td>
<td>46</td>
<td>56%</td>
</tr>
<tr>
<td>NIA</td>
<td>140</td>
<td>71</td>
<td>97%</td>
</tr>
<tr>
<td>NIDA</td>
<td>181</td>
<td>102</td>
<td>77%</td>
</tr>
<tr>
<td>NIDCD</td>
<td>147</td>
<td>93</td>
<td>58%</td>
</tr>
<tr>
<td>NIMH</td>
<td>455</td>
<td>403</td>
<td>13%</td>
</tr>
<tr>
<td>NINDS</td>
<td>644</td>
<td>364</td>
<td>77%</td>
</tr>
</tbody>
</table>
## K99/R00 NINDS

<table>
<thead>
<tr>
<th>Applications</th>
<th># Apps.</th>
<th>Awards</th>
<th>% Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2007</td>
<td>73</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>FY2008</td>
<td>85</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>FY2009</td>
<td>109</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>267</td>
<td>48</td>
<td>18</td>
</tr>
</tbody>
</table>

### Applicants

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MD</td>
<td>9</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>MD/PHD</td>
<td>14</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>PhD</td>
<td>192</td>
<td>42</td>
<td>22</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>48</td>
<td>22</td>
</tr>
</tbody>
</table>
K99/R00 results thus far for NINDS

31 of the first 36 awardees (through awards made 10/2008) have tenure-track positions

Others are interviewing heavily now
# NIH-wide Career Awards, 2008

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number Reviewed</th>
<th>Number Awarded</th>
<th>Success Rate*</th>
<th>Total Cost Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>K01</td>
<td>443</td>
<td>172</td>
<td>39%</td>
<td>26,926,629</td>
</tr>
<tr>
<td>K02</td>
<td>72</td>
<td>27</td>
<td>38%</td>
<td>3,398,620</td>
</tr>
<tr>
<td>K07</td>
<td>84</td>
<td>29</td>
<td>35%</td>
<td>3,805,123</td>
</tr>
<tr>
<td>K08</td>
<td>509</td>
<td>222</td>
<td>44%</td>
<td>30,178,636</td>
</tr>
<tr>
<td>K12</td>
<td>36</td>
<td>19</td>
<td>53%</td>
<td>11,846,194</td>
</tr>
<tr>
<td>K22</td>
<td>115</td>
<td>26</td>
<td>23%</td>
<td>4,066,411</td>
</tr>
<tr>
<td>K23</td>
<td>574</td>
<td>216</td>
<td>38%</td>
<td>31,635,924</td>
</tr>
<tr>
<td>K24</td>
<td>97</td>
<td>49</td>
<td>51%</td>
<td>7,776,530</td>
</tr>
<tr>
<td>K25</td>
<td>50</td>
<td>24</td>
<td>48%</td>
<td>3,072,154</td>
</tr>
<tr>
<td>K99</td>
<td>795</td>
<td>180</td>
<td>23%</td>
<td>17,195,013</td>
</tr>
</tbody>
</table>
### NIH-wide RPG Success Rates

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>P01</td>
<td>34%</td>
<td>27%</td>
<td>22%</td>
</tr>
<tr>
<td>New</td>
<td>R01</td>
<td>19%</td>
<td>19%</td>
<td>16%</td>
</tr>
<tr>
<td>New</td>
<td>R03</td>
<td>22%</td>
<td>24%</td>
<td>19%</td>
</tr>
<tr>
<td>New</td>
<td>R15</td>
<td>26%</td>
<td>24%</td>
<td>24%</td>
</tr>
<tr>
<td>New</td>
<td>R21</td>
<td>17%</td>
<td>16%</td>
<td>15%</td>
</tr>
<tr>
<td>Cont</td>
<td>P01</td>
<td>41%</td>
<td>47%</td>
<td>43%</td>
</tr>
<tr>
<td>Cont</td>
<td>R01</td>
<td>35%</td>
<td>36%</td>
<td>34%</td>
</tr>
<tr>
<td>Cont</td>
<td>R15</td>
<td>46%</td>
<td>49%</td>
<td>42%</td>
</tr>
</tbody>
</table>
Keep in mind, success rates are underestimates because of how they’re calculated.

Applicant success rate is higher!
Miscellaneous Musings

(forgive me, some of this is preachy but my experience tells me it needs to be said)
A research career is a blast…

But you have to be good
(you’ll hear this more than once!)
Evaluate yourself honestly
(not what you wish, but what is)
Are you publishing in the best journals?
Do you have good first author papers?
If not, why not?
If not, when are you planning to start?

Realize, high quality publications are the key to the kingdom – and some good ones must be first author
When you look around you, are you one of the best predocs or postdocs you know? If not, do you want to be? What do you want?

When you read your grant, do you think the leader in your field would be impressed?

- If not, keep writing.
- You must get rid of your ego and be honest with regard to your writing
- You must get help (from your mentor)
You are ultimately the person responsible for your success

You must have some first author papers in good journals

Interviews and lab/institution situations are two way streets – you must get what you need to succeed

If you are in a bad situation, get out
You must find your passion -

This is not an easy job – never was

And there’s a lot of frustration and rejection

But if you find your passion, there’s no better job
The little secret nobody says but everybody knows (ssshh!)

Biggest factors in success:
• Fire in the Belly
• Important Project
• Good Mentoring
• Strong Institutional Support
Remember to

HAVE FUN
&
HAVE A LIFE

(those who don’t choose not to!)
Sorry, I’m not quite done

You are not ENTITLED to an independent research position – you need to position yourself to get one

Stay positive, optimistic and keep moving forward

Jobs are bad all over right now – just hang in there
OK, let’s talk jobs

1. There are jobs now
2. There will be more in the future
3. You need to expand your thinking about what job you want
4. You don’t want the job you “should” want, you want the job that’s best for you
Don’t be negative – it’s completely pointless
If you have questions:

Email or Call

Program Director - questions related to science

Training Director (e.g. me at NINDS) - for questions related to mechanisms, application preparation, etc.

Who you need to speak with will vary by institute