Practical Research Advice: NIH Navigation and Grantsmanship

Robert Jeraj\textsuperscript{1} and Harald Paganetti\textsuperscript{2}

\textsuperscript{1}University of Wisconsin, Madison, WI
\textsuperscript{2}Massachusetts General Hospital, Harvard University, Boston, MA

rjeraj@wisc.edu, hpaganetti@partners.org
Outline

- Introduction
- NIH grant mechanisms
- Information and important websites
- NIH grant submission workflow
- NIH peer review process
- Review criteria, scoring
- How to write a successful grant
- Conclusions
Spectrum of medical physics

Development

INTERNAL FUNDING
- Clinical implementation
- Technology improvements

INDUSTRY FUNDING
- Translational research
- Cutting edge research

NIH FUNDING

Number of physicists

Time (yrs)

Now 1 2 5 10 20

Bortfeld and Jeraj 2011, Br J Rad 84: 485
Most popular NIH funding mechanisms

- **R01** – Research Projects
- **R21** – Exploratory/Developmental Awards
- **R41/R44** – Small Business Awards
- **K/F** – Training Awards
- **P01** – Research Program Project Awards
- **R&D Contracts** - NIH's direct involvement
Research awards

- **R01 Research Project Grant**
  - Support a discrete, specified, circumscribed project (3-5 years)
  - Institutional sponsorship assures the NIH that the institution will provide facilities necessary to conduct the research and will be accountable for the grant funds

- **R21 Exploratory/Developmental Grants**
  - Encourage the development of new research activities (2 years)
  - No pilot data required
Application types


  - **Program Announcements (PAs)**
    - Statement of new or ongoing NIH interest in a certain research area
  - **Requests for Applications (RFAs)**
    - Statement soliciting applications in a well-defined scientific area to accomplish specific program objectives
    - Set-aside of money
    - Might need Letter of Intent (LOI)
    - Might have special review panel
Writing a grant

- Register as a user of NIH eRA Commons: commons.era.nih.gov/commons/
- Check for RFAs and Pas: www.grants.gov
- Check for deadlines: grants.nih.gov/grants/funding/submissionschedule.htm
  - New R01 applications: Feb 5, Jun 5, Oct 5
  - R01 renewals: Mar 5, Jul 5, Nov 5
  - Deadlines for applications in response to RFAs and PAs may differ
- Consult your local (University/Hospital) grant office for specific instructions how to go through the submission process
Scientific Review Groups (SRGs)

- Each study section has 12-24 members who are primarily from academia (roster is public)
- Study sections (typically) convene face-to-face meetings
- As many as 60-100 applications are reviewed by each study section in one or two days
- Reviewers receive grants about 1 month in advance
Reviewer Assignments

- $\geq 3$ qualified reviewers ($2 + 1$)
- based on scientific content
- based on expertise of reviewer
- conflicts of interest
- reviewer workload

~ 8-12 as reviewer 1, 2, or 3
A PD/PI who has not yet competed successfully for a substantial, competing NIH research grant, e.g. R01

- The NIH will support applications from NIs at success rates comparable to those for new applications submitted by established investigators

- The NIH encourages NI and ESIs to apply for R01 grants when seeking first-time funding from NIH (initiative is limited to R01)
eRA Commons Post Review

- Priority Score
  - ✓ Three days after conclusion of SRG meeting
- Summary statement
  - ✓ 4 – 8 weeks after conclusion of SRG meeting

After the Review

- Consult Program Officer
- Consider resubmission (once!)
  - ✓ Consider critiques in summary statement
  - ✓ Address critiques in introduction and text
## Scoring system

<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
Review Criteria (individually scored)

- **Significance**: Does the study address an important problem? How will scientific knowledge be advanced?
- **Innovation**: Are there novel concepts or approaches? Are the aims original and innovative?
- **Approach**: Are design and methods well-developed and appropriate? Are problem areas addressed?
- **Investigator**: Is the investigator appropriately trained?
- **Environment**: Does the scientific environment contribute to the probability of success? Are there unique features of the scientific environment?

There is also an overall score (“overall impact”)

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MASSACHUSETTS GENERAL HOSPITAL CANCER CENTER

HARVARD MEDICAL SCHOOL
Outline

• Introduction to Application (if resubmission)
• Specific Aims
• Research Strategy
  Significance
  Innovation
  Approach
• Preliminary Studies/Progress Report (if renewal)
• References
Research Strategy

Approach

• Sections corresponding to the number of specific aims
• Describe specific methods to be employed
• Convince reviewers that this methodology will work
• Discuss the way in which the results will be analyzed and interpreted
• Discuss potential difficulties and limitations and how these will be overcome or mitigated
• State expected results