Acknowledgments

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Survival Skills and Ethics Program
www.pitt.edu/~survival

Neuroscience Graduate Program

Cell & Molecular Biology Graduate Program
Types of NIH Grants

Objective
• training/career
  – fellowship
  – career award
• research

Form
• investigator-initiated
  – individual
  – Groups (multi-PI)
• “set-aside” grants
• contracts
 Availability of grants for biomedical research

Federal
- NIH
- NSF
- NASA
- NSF
- DOE
- DOD
- ...and others

Other
- foundations
- health voluntaries
- corporations
- private individuals

total
$100-300 billion/yr
So, why don’t people get funded?

• because it is too hard?

• already accomplished harder tasks
  – admitted to graduate school
  – completed PhD
  – obtained a job
So, why don’t people get funded?

- inadequate concept
- poor presentation
- poor understanding of process
- lack of persistence
Outline of the Workshop

I. Getting started
II. Scientific components of a good research grant
III. Writing style and content: how to get your message across
IV. Through the reviewers’ eyes
   – Drs. R. Parsons, M. Vizzard, C. Franklyn
Grantspersonship

1. establish frame of mind
2. develop concept
3. identify funding source
4. inform your institution
5. refine concept
6. stock the sections
7. outline, write, edit
8. get feedback & revise
9. get approvals
10. obtain assignment
11. submit application
12. provide add'l material
13. ensure receipt
14. await review
15. study report
16. respond to report

Think ahead and plan backwards

2-60d

0 d

2 m

>3 m
Phase I: Preparing

1. establish frame of mind
2. develop concept
3. identify funding source
4. inform your institution
5. refine concept
Establish frame of mind

• often: little enthusiasm
Establish frame of mind

• often: little enthusiasm
• better: a wonderful opportunity
Develop a Concept

• Fills a gap in knowledge
• Important
• Tests a hypothesis
• Short-term investment, long-term gain

That FITS
Identify Funding Source

- select institute
- communicate with program staff
- improve odds:
  - match objectives
Contact program staff

- Is concept relevant
- Current instructions
- Who reviews
- What are criteria
- Funding
  - Percentage
  - Level (amount, years)

- Characteristics
  - Strong proposals
  - Weak proposals

Pre-review possible
Inform Your Institution

• department chair
• office of research
• secretarial assistant
• fiscal assistant
• people to give feedback
Scientific Components of a Good Research Grant
Develop Concept

- review current literature
- talk with colleagues
- think hard
  - think harder
What makes a grant fundable

- Relevant and significant
- Focused
- Hypothesis testing
- Do-able
- Experiments and interpretation clear
- Goes somewhere
What constitutes a good experimental hypothesis?

• An educated GUESS
• Mechanistic, not descriptive or predictive
• Objective (not right versus wrong)
• Experiments testing the hypothesis fall out right away
My hypothesis is that growth factors are involved in tumorigenesis.

My hypothesis is that the cells will grow beyond confluency when I give them FGF.

My hypothesis is that astrocytomas fail to exert growth control because they overexpress FGF which acts in an autocrine fashion to stimulate mitosis.
My hypothesis is that astrocytomas fail to exert growth control because the FGF signaling pathway is constitutively activated.

- Develop an assay for uncontrolled growth
- Check for overexpression of FGF
- Test if FGF receptor is constitutively active
- Test for activation of FGF signaling pathway
- Inhibit FGF signaling to see if growth control is restored (e.g., transfect dominant negative receptor in to astrocytomas)
- Prevent FGF expression to restore growth control
Two Basic Models of Hypothesis Testing Grant Applications

• Primary hypothesis with aims that test predictions of the hypothesis
• A model which generates several hypotheses, each of which is an aim
How to Get Your Message Across
Writing the proposal

6. Stock the sections
7. Write and edit
8. Get feedback & revise
Stock the sections

- title and abstract
- budget & justification
- biographical sketch
- research plan
- subject welfare
- letters
- supplementary materials
Sections of a Fellowship Application

- title
- abstract
- biography
- training plan
- training environment
- research plan
- subject welfare
- letters
Research Plan

1. Specific Aims
2. Experimental Design
   - Experimental subjects
   - Bibliography
3. Background and Significance
   - Preliminary Data
Specific Aims

• Long term goal
• Key observation(s)
• System and model
• Question and Hypothesis
• List of aims with experimental approach
Background and Significance

• Relevance to objectives of the funding agency
• Previous work in the field
• Questions
• Where your proposal fits in
• How your proposal will advance knowledge in the field
Preliminary Data

• Preliminary (unpublished)
• Narrative can contain statements of published info (refer to reprints)
• Only that necessary to support proposal
  – Establishing foundation for hypothesis
  – Demonstration that technique is possible
Experimental Design

• Detail your aims
• Rationale
• Approach
• Interpretation
• Detailed techniques
Write

• begin with a full outline
• write initial draft without editing
• edit thoroughly

Edit
Some hints for effective writing

- Keep it simple
- Avoid jargon
- Be logical
- Write in paragraphs
- Explain everything
We have described three techniques that will be useful in identifying macromolecules involved in promoting survival and growth of neurons in cell culture.
Avoid Jargon

"(1) confused, unintelligible language; strange, outlandish or barbarous language; (2) technical terminology or characteristic idiom of a special activity or group; (3) obscure and often pretentious language marked by circumlocutions and long words"

• Accounted for by the fact
• With the possible exception of
• It may, however, be noted that

• Because
• Except
• But
• Now
The radio was not playing in our house and changing the fuse had no effect. Power to the neighborhood appeared to have been discontinued. Houses next to mine were dark. I also was surprised to note that the lights were out when I came home late that night. The light switch did not seem to work.

When I arrived home late in the evening I was surprised to note that lights were out and that the light switch did not work. I then noticed that the radio was not playing. I changed the house fuse but this had no effect. Looking outside I saw for the first time that adjacent houses also were dark. Apparently power to our neighborhood had been discontinued.
Write in paragraphs

• 1 major idea per paragraph
• topic sentences
  – First sentence in the paragraph
  – Topic sentences flow logically
• use headers
Appearance

• Arial size $\geq$ 11 pt
• *occasionally* use special *fonts*
• let your text **BREATHE**
  – indent paragraphs
  – skip line between paragraphs
A. Background and Significance

The importance of training in "survival skills:" Success in science requires a solid background in a specific scientific discipline as well as extensive laboratory experience. However, for individuals to develop into accomplished professionals, they must acquire survival skills, that is, they must be able to communicate effectively, both orally and in writing, obtain employment and funding, manage stress and time, teach, and behave responsibly (1,2,3). This has always been the case and is becoming even more true as our doctoral and postdoctoral trainees need to be prepared for a variety of vocations (3, 4).

In addition to traditional jobs in academia, many of our trainees will ultimately find themselves doing research in industry, teaching in 4-year colleges, or serving in some administrative capacity. Others will combine their PhDs with professional degrees in medicine or law and become clinical researchers, patent lawyers, or become involved in the formulation of public policy. With many of these new vocations, extra-laboratory skills become even more essential (3).

Traditionally, higher education in the sciences has focused almost exclusively on the content of the scientific discipline and on research methodology. Indeed, individuals employed in research and related fields often complain that although their academic training provided them with a sound foundation in their
A. BACKGROUND AND SIGNIFICANCE

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In addition to traditional jobs in academia, many of our trainees will ultimately find themselves doing research in industry, teaching in 4-year colleges, or serving in some administrative capacity. Others will combine their PhDs with professional degrees in medicine or law and become clinical researchers, patent lawyers, or become involved in the formulation of public
Follow-up survey

Participants from our 1995, 1996, and 1997 trainer-of-trainers workshops were recently sent a survey to see what they had done to provide training in survival skills and ethics at their institution. (The 1995 workshop was made possible by an earlier grant.) Thus far, slightly more than half of all former participants have responded. Even if one assumes that none of the non-respondents did not implement any instruction at all (unlikely), the results of this survey still provide a clear indication of the impact of our program.

**Instruction implemented by participants:** The total number of hours of instruction in survival skills and ethics that was provided in 1997-98 by former participants was compared with the instruction offered in the year prior to their attendance (Figure 1). The number of students taught in new or preexisting (but expanded) courses increased by an average of 25 hr per year among the respondents.
Get Feedback

- establish mentors early
- provide clear instructions
- take *no* for an answer
- remind gently
- show appreciation
Revise

Take your feedback seriously!!
Behave responsibly throughout
Summary

• there is money available
• getting it takes
  – a good idea
  – a proper match
  – good grantspersonship
  – persistence
• it is hard work
• it is worth it!
Through the Reviewers’ Eyes
Features of outstanding grants

- Significance clear; focused; quality of question
- Clear preliminary data
- Easy to understand; don’t anger reviewer
- Cutting edge approaches; innovative; high impact
- Clinical relevance
- Answers questions that come up when reading
- Approaches clear and experiments meaningful
- Investigator & environment appropriate for work (track record important)
Fatal flaws

• Aims in series- accomplishing one or more depends on previous aim working
• Too ambitious
• Non-validated model or model cannot be used for proposed work
• Aims don’t answer question or hypothesis
Mistakes made by new investigators

- Not enough feedback
- Too ambitious (10-20 yrs of work for 4-5 yrs)
- Poor presentation
- Doing everything yourself - add consultants/advisors or collaborators to provide expertise
- Having postdoc advisor on grant - this questions your independence
- "Fishing expeditions" without prioritizing how they will deal with the information that they get
- "Fishing expeditions" - hypothesis mining not testing
- Lack of appropriate controls
Resources

- UVM Office of Sponsored Programs
- http://cms.csr.nih.gov/
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Age Distribution of NIH RPG Investigators: 2006

Average Age New R01 Investigator: 42.2

Sources: IMPAC II Current and History Files