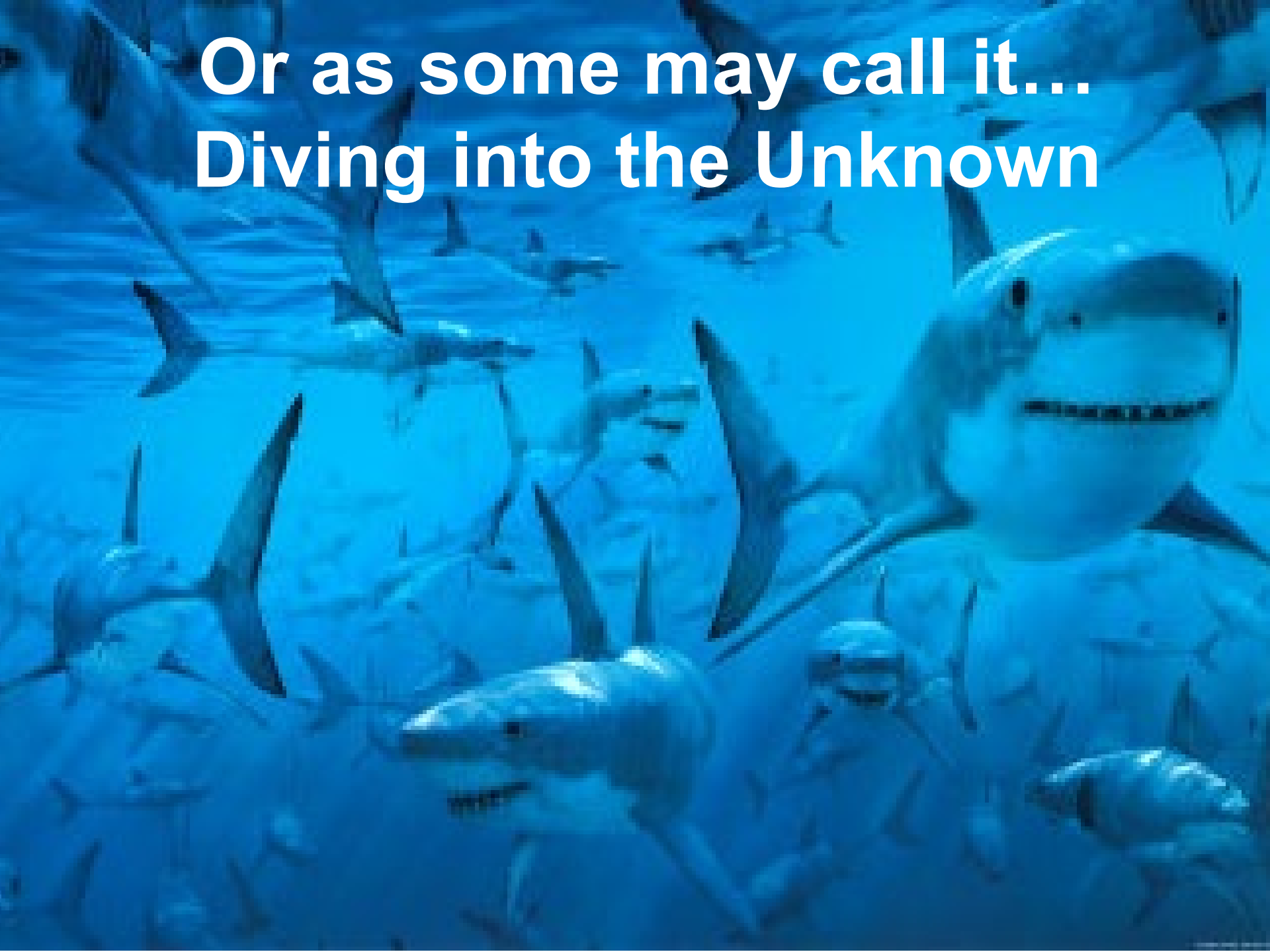
GRANT WRITING FOR SUCCESS

Michael A Sesma, Ph.D., NIGMS/NIH
Roger G Sorensen, Ph.D., NIDA/NIH

National Institutes of Health
Turning Discovery Into Health


Or as some may call it…
Diving into the Unknown

Grant Writing for Success

Writing the Application:

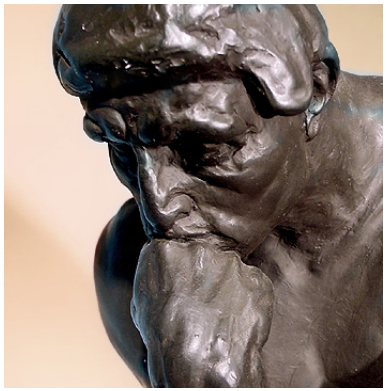
- Start Planning **EARLY**
- Develop your good idea
- Use the NIH webpage (www.nih.gov)
- Talk to your NIH Program Official(s)
- Provide a good presentation
- Align with review criteria
- Identify collaborators
- Seek advice and feedback from colleagues
- Funding & peer review

Grantsmanship Tips 101

START PLANNING YOUR APPLICATION **EARLY**

Application Development Strategy

Act (Plan)



Think

Write

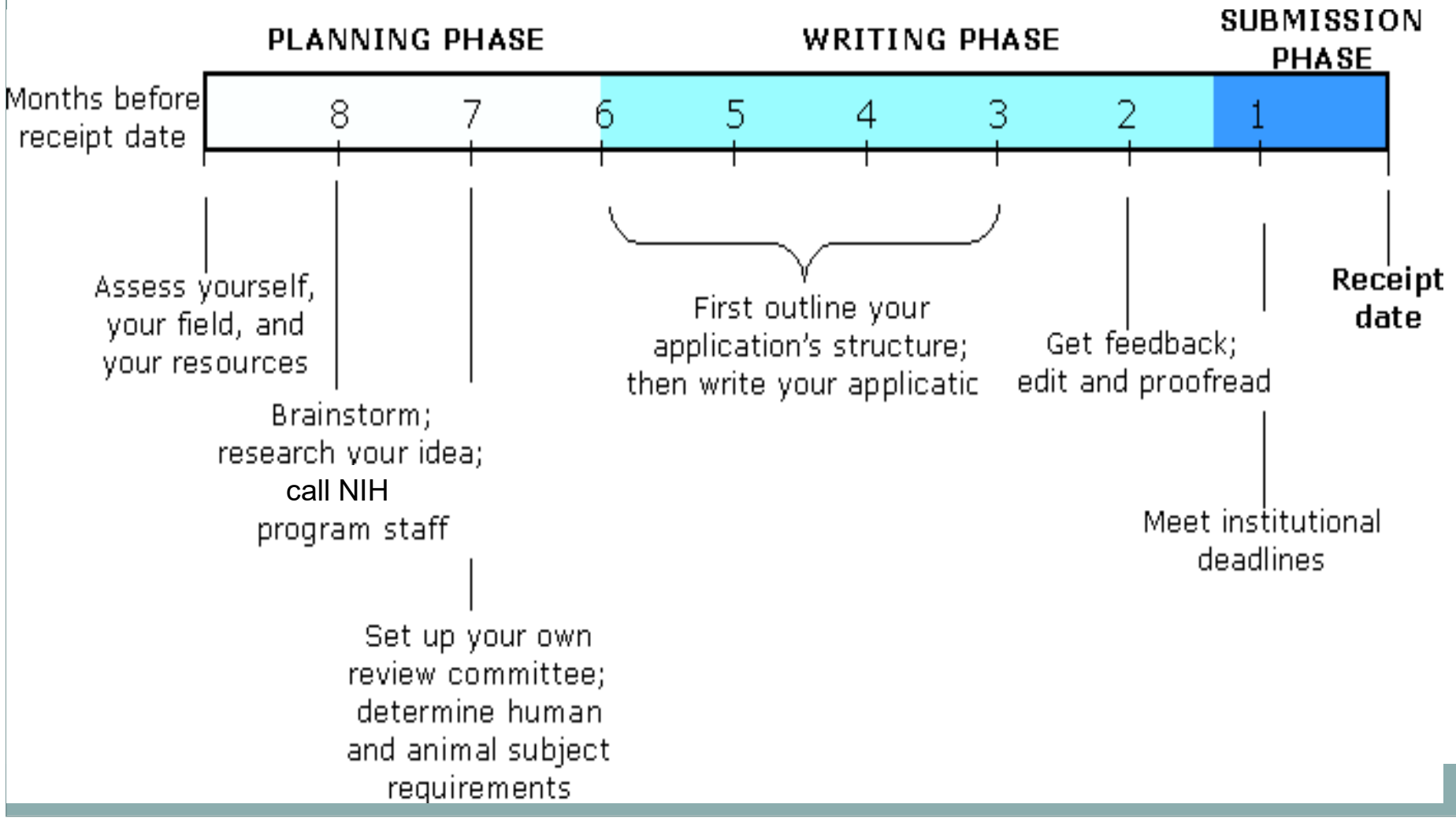
So WHY Plan?

You're more likely to get …

- A compelling scientific question
- Appropriate NIH Institute
- Appropriate review committee
- Adequate time to complete
  - *A major stress reducer!*

…a better grant application

Pre-Submission Planning Timeline



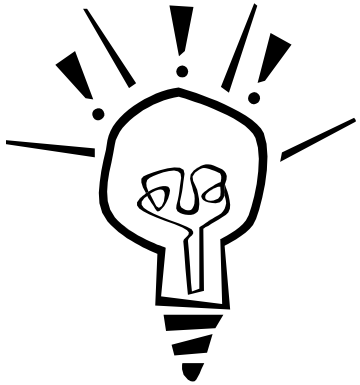
Grantsmanship Tips 101

DEVELOPING YOUR GOOD IDEA INTO:

- ***STRONG SCIENCE***
- ***A COMPETITIVE APPLICATION***

Getting out of the Deep and to the Top: Components of Successful Applications

- Strong Idea
- Strong Science
- Strong Application



Good Idea

- Does it address an important problem?
- Will scientific knowledge be advanced?
- Does it build upon or expand current knowledge?
- Is it feasible …
  - to implement?
  - to investigate?
  - in my hands/lab?

Grantsmanship Tips 101

FURTHER DEVELOPING YOUR GOOD IDEA

UNDERSTAND THE MISSION OF THE NIH

Understanding the Mission

- Mission of each NIH IC is based and defined in law
  - Authorizations (create/continue an agency – periodic)
  - Appropriations ($ for the agency – annual)
- ICs establish specific research emphases
  - Legislative mission
  - Current state of science
- *Use the Web to find out!*

www.nih.gov

NIH National Institutes of Health
Turning Discovery Into Health

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NIH
NEWS IN HEALTH

Get and stay healthy with this trusted monthly newsletter from NIH.

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1 2 3 4 5

IN THE NEWS

Shedding Light on Health
Research that helps people and their pets.
Posted on May 8, 2014

Targeting Attention
Insight into how the brain focuses attention on objects such as faces.
Posted on May 1, 2014

Pollen Grains
Understanding how pollen can cause allergies.
Posted on Apr 15, 2014

NIH at a Glance | Funding for Research | Labs at NIH | Training at NIH

NIH is the nation's medical research agency—supporting scientific studies that turn discovery into health.

Mission | Impact | Organization | Jobs at NIH | Visitor Information | FAQ

THE NIH DIRECTOR

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Look for the IC Website of Interest

NIH National Institutes of Health
Office of Extramural Research

GRANTS.NIH.GOV

Search

HOME | ABOUT GRANTS | FUNDING | FORMS & DEADLINES | GRANTS POLICY | eRA | NEWS & EVENTS | ABOUT OER

Grants & Funding

About Grants
- Grants Process Overview
- Grant Application Basics
- Types of Grant Programs
- How to Apply
- Peer Review Process
- Award Management
- Foreign Grants Information
- Funding Strategies

Electronic Grants
- Electronic Research Admin (eRA)
- eRA Commons
- Applying Electronically

Forms & Deadlines
- Forms & Applications
- Due Dates
- Submission Policies
- Submitting Your Application

Grants Policy
- Policy & Guidance
- Compliance & Oversight
- Research Involving Human Subjects
- Office of Laboratory Animal Welfare (OLAW)
- Peer Review Policies & Practices
- Intellectual Property
- Invention Reporting

FUNDING
Search NIH Guide for Grants and Contracts

Search

Funding Opportunities & Notices
Unsolicited Applications (Parent Announcements)
Advanced Search

- Recovery Act
- Research Training & Career Development
- Small Business (SBIR/STTR)
- Contract Opportunities
- NIH Loan Repayment Programs
- New and Early Stage Investigators
- Stem Cell Information
- NIH Common Fund
- OppNet (Behavioral & Social Sciences)

RePORT

RePORTER | AWARDS BY LOCATION | NIH DATA BOOK

Rock Talk

Follow @RockTalking

- A Look at Programs Targeting New Scientists
- Join Me and Many Other NIH Experts at the NIH Regional Seminar
- A Change in Our Resubmission Policy

Latest News and Events
- New NIH Resubmission Policy
- NIH Regional Seminar - Register by April 28 & Save!
- Application Submission News

More...

Social Media
Listservs & RSS
Workshops and Training

About OER
- OER and You
- OER Annual Reports
- OER Offices
- Contact Us

Global Resources
- Need Help?

Identifying NIH Initiatives

- Most NIH Institutes establish specific research Initiatives and Priorities
- Funding Opportunity Announcements (FOAs)
  - Must respond to a FOA via Grants.gov

NIH Guide for Grants and Contracts

- Official publication listing NIH funding opportunities and policy notices
  - Request for Applications (RFA)
  - Program Announcements (PA, PAR, PAS)
  - Request for Proposals (RFP)
  - Notices (NOT)
- Published daily, distributed weekly

NIH Guide for Grants and Contracts

http://grants.nih.gov/grants/guide/index.html

Identify NIH Funded Grants

- See what research projects the NIH or any Institute has funded
- Find potential collaborators for your Project

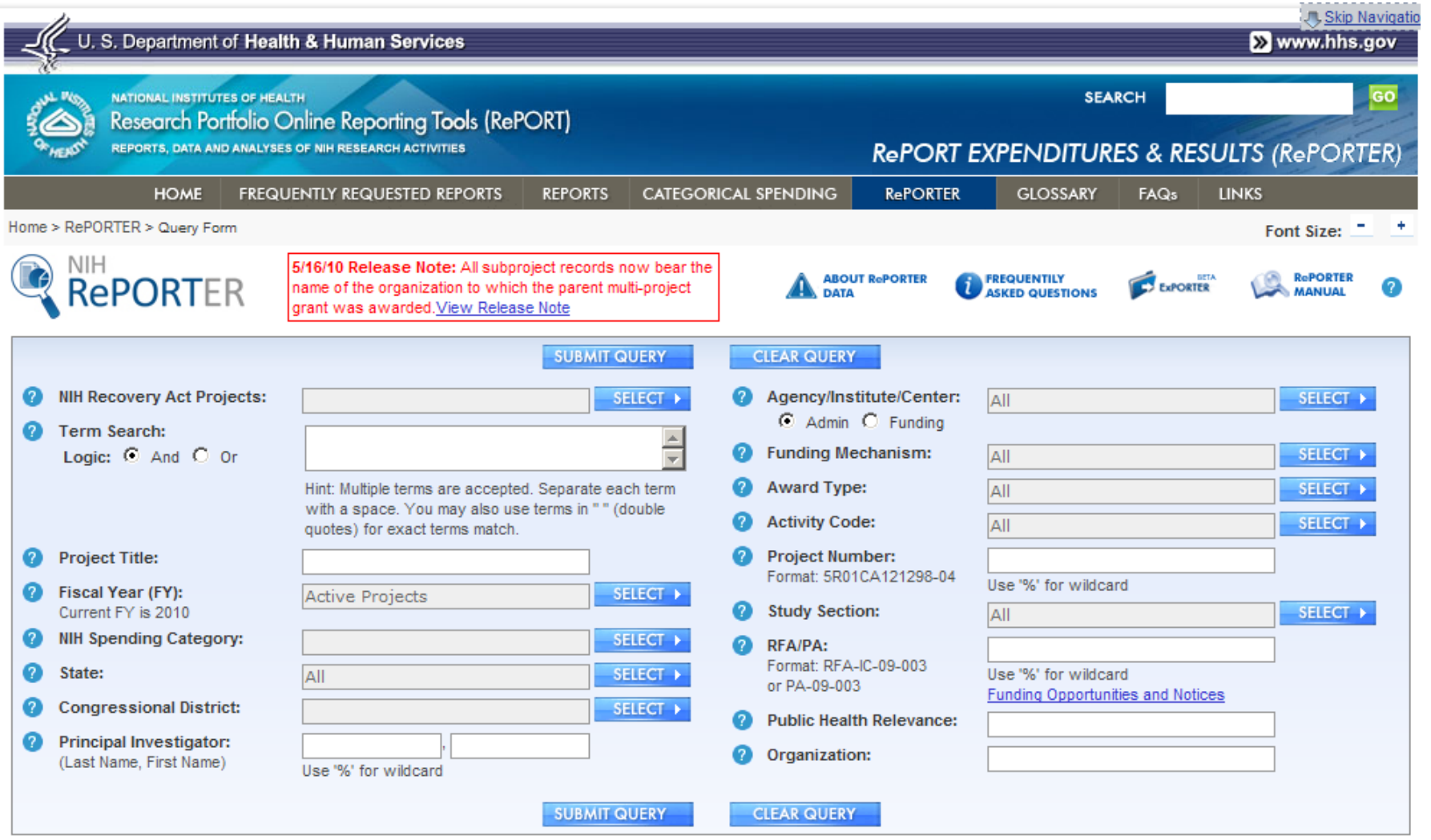
Research Portfolio Online Reporting Tool (RePORT)

http://report.nih.gov

- A searchable database of federally supported biomedical research
- Access reports, data, analyses, expenditures, results of NIH supported research activities

- Identify, analyze IC research portfolios, fundin patterns, funded investigators:
  - Identify areas with many or few funded projects
  - Identify NIH-funded investigators and their research
  - Identify potential mentors/collaborators

NIH RePORTer



http://projectreporter.nih.gov/reporter.cfm

Grantsmanship Tips 101

SEARCHING NIH WEB SITES IS A GOOD START *BUT FOLLOW UP WITH PERSONAL CONTACT*

- Contact NIH program staff *early*
- Ask what information would help them advise you about IC interest & "goodness of fit"
- Are there related FOAs?

Grantsmanship Tips 101

ARE YOU READY TO WRITE?

- **GRANT WRITING IS A LEARNED SKILL**
  - Writing grant applications, standard operating protocols and manuals of procedures that get approved are learned skills
  - Writing manuscripts that get published in peer reviewed journals is a learned skill

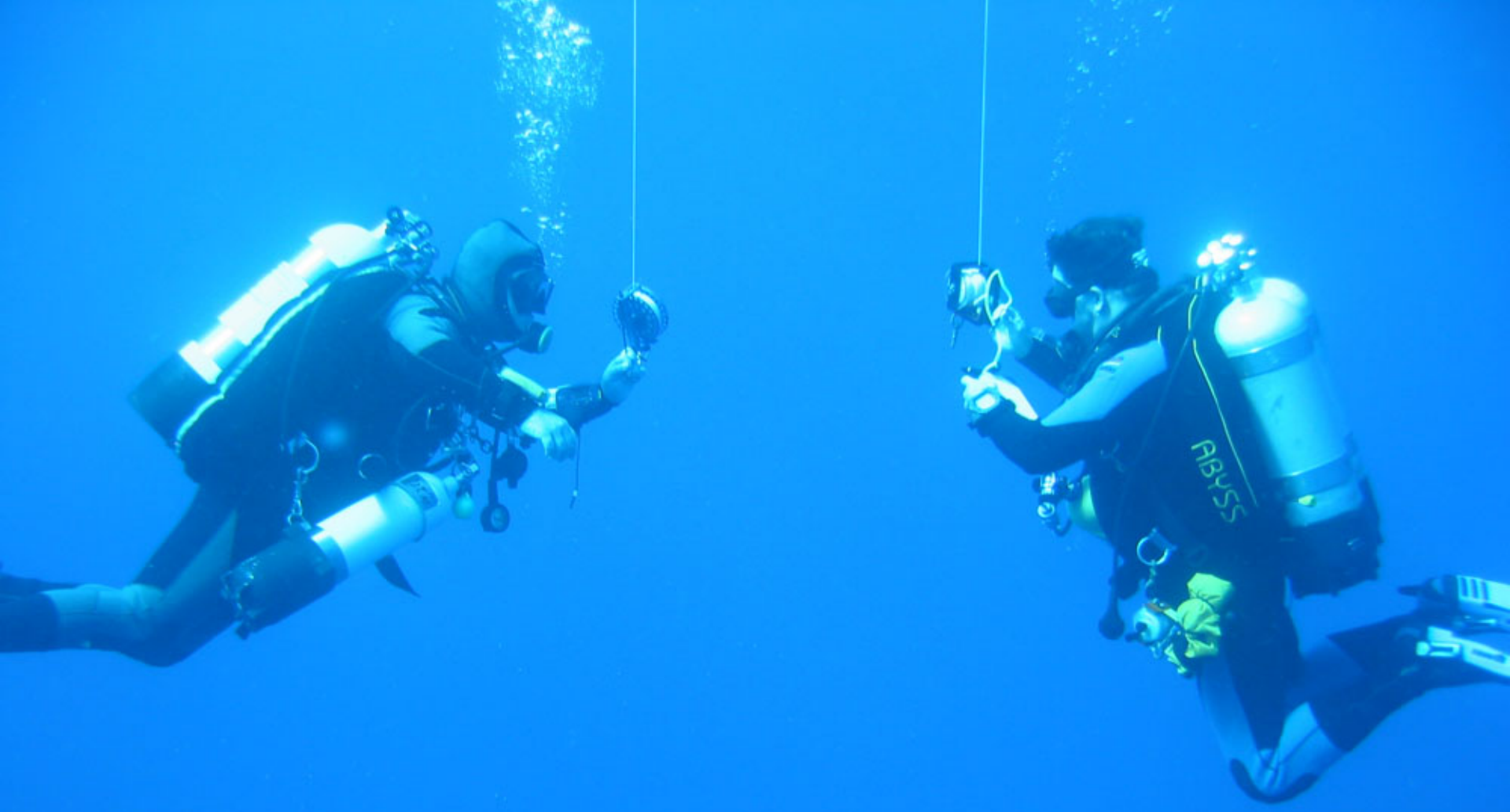
- **GRANTSMANSHIP IS A FULL TIME JOB**
  - Learn about the grant application process

Principles of Success

- **Understand the agency mission**
  - ***Every IC is different!***
- **Understand the peer review process**
- **Secure collaborators (mentors) to complement your expertise and experience**
  - **Don't compete … *collaborate!***
- **Learn and practice the skills of writing applications for grant funds**

Remember … Before you start

- Talk to Program Staff at appropriate IC
- Read instructions for application form
  - *SF 424 R & R*
- Are you a New or Early Stage Investigator?
  - http://grants.nih.gov/grants/new_investigators/index.htm
- Know your audience
  - Which Integrated Review Group (IRG) is most likely to get your application?
- *Propose research about which you are passionate and totally committed to doing*



Diving Deeper into Good Grantsmanship

Grantsmanship Tips 101

GOOD IDEAS,

PRESENTED CLEARLY,

IS PARAMOUNT

3 Simple Steps

Presentation Matters

3 Simple Steps

- Read the application instructions carefully
- Read the application instructions carefully
- Don’t forget …

  … *read the application instructions carefully*

Develop a Strong Research Plan

Presentation Matters

Specific Aims

- Grab the reader immediately
- State long-term objectives AND expected impact
- Explicitly state hypotheses and research question

Develop a Strong Research Plan

Presentation Matters

Preliminary Studies/Progress Report

- How previous work -- by you, your team, and others -- leads to this study
- Demonstrate your experience, competence and likelihood of continued success
- Must flow logically from literature review and major themes of the problem area

Develop a Strong Research Plan

Presentation Matters

Approach

- Does your plan flow logically from the literature review and prior studies?
- How will each hypothesis be tested?
- Do your measures capture the variables needed to test hypotheses?
- Why did you choose those measures?
- Methods and analyses must match

Develop a Strong Research Plan

Presentation Matters

Approach

- For clinical studies be explicit and thorough in discussing
  - intervention or system to be studied
  - target population
  - inclusion and exclusion criteria
  - independent and dependent variables
  - all measures and instruments
  - power analyses

Develop a Strong Research Plan

Presentation Matters

Common Miscues:

Failure to …

- Document why the problem is important
- Distinguish empirical findings from speculation
- Critically analyze key themes in literature
- Consider alternative perspectives
- Read, understand, and cite the crucial studies

Grantsmanship Tips 101

ALIGN YOUR APPLICATION WITH THE REVIEW CRITERIA TO MAXIMIZE IMPACT:

- Significance
- Investigator
- Innovation
- Approach
- Environment

Align with Review Criteria

1. **Overall Impact**
2. **5 Core Review Criteria:**
   - Significance
   - Investigator
   - Innovation
   - Approach
   - Environment

http://grants.nih.gov/grants/guide/notice-files/NOT-OD-09-025.html
http://grants.nih.gov/grants/guide/notice-files/NOT-OD-09-024.html

Review Criteria for Career Development Awards

- Candidate
- Career Development Plan Goals and Objectives
- Research Plan
- Mentor(s), Co-mentor(s), Consultants, Collaborators
- Environment & Institutional Commitment to Candidate

Review Criteria compared:
http://grants.nih.gov/grants/peer/guidelines_general/Review_Criteria_at_a_glance.pdf

Final Priority Score

OVERALL IMPACT

The likelihood for the project to exert a sustained, powerful influence on the research field(s) involved:

- in consideration of the following five core review criteria, and
- additional review criteria (as applicable for the project proposed)

Address this on your Specific Aims page!

Align with Review Criteria

Scored Criteria	Application
Significance	Research Strategy a. Significance
Investigator(s)	Biosketch - Personal Statement Letters of Support
Innovation	Research Strategy b. Innovation
Approach	Research Strategy c. Approach
Environment	Facilities & Other Resources

Core Review Criterion #1

SIGNIFICANCE

- Does this study address an important problem?
- If the aims are achieved, how will scientific knowledge be advanced?
- What will be the effect on concepts or methods that drive this field?

Core Review Criterion #2

INVESTIGATOR

- Are the investigators appropriately trained and well suited to carry out this work?
- Is the work proposed appropriate to the experience level of the principal investigator and other researchers?
- Does the investigative team bring complementary and integrated expertise to the project (if applicable)?

Core Review Criterion #3

INNOVATION

- Does the project employ novel concepts, approaches or methods?
- Are the aims original and innovative?
- Does the project challenge existing paradigms or develop new methodologies or technologies?

Core Review Criterion #4

APPROACH

- Are the conceptual framework, design, methods, and analyses adequately developed, well-integrated, and appropriate to the aims of the project?
- Does the applicant acknowledge potential problem areas and consider alternatives?

Core Review Criterion #5

ENVIRONMENT

- Does the scientific environment in which the work will be done contribute to the probability of success?
- Do the proposed experiments take advantage of unique features of the scientific environment or employ useful collaborative arrangements?
- Is there evidence of institutional support?

Other Review Considerations

- Human subjects
- Animal care and use
- Select agents
- Model organism sharing plan
- Data sharing plan

The FOA will list the review criteria and any additional issues that reviewers will be asked to evaluate.

Grantsmanship Tips 101

IDENTIFY COLLABORATORS

- **COLLABORATE WITH OTHER INVESTIGATORS**
  - Fill gaps in your expertise and training
  - Add critical skills to your team
- **"TEAM SCIENCE" CAN BE POWERFUL**

Multiple Principal Investigators

- Single PI model does not always work well for multi-disciplinary, collaborative research
- Recognizes contributions of full team
- In place for most submissions to *Grants.gov*
- Implications for "New Investigator" status
- A complex issue – *Talk to NIH program staff if you are considering multiple PIs !*

grants.nih.gov/grants/multi_pi

Grantsmanship Tips 101

GET FEEDBACK

SHOW YOUR DRAFT APPLICATION TO A COLLEAGUE

SHOW YOUR DRAFT APPLICATION TO A COLLEAGUE… WHO DOES NOT ALREADY KNOW WHAT YOU INTEND TO DO

SHOW YOUR DRAFT APPLICATION TO A COLLEAGUE… WHO IS NOT YOUR BEST FRIEND

Grantsmanship Tips 101

YOUR DRAFT REVIEWERS NEED TO UNDERSTAND

- What you intend to do
- Why you believe it is important to do
- Exactly how you are going to do it

IF THEY DON'T GET IT, YOU MUST REVISE YOUR APPLICATION.

LEAVE ENOUGH TIME FOR REVISIONS

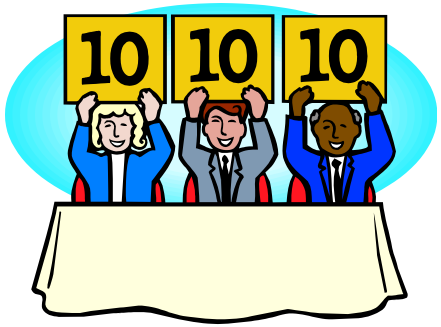
Grantsmanship Tips 101

PROVIDE A GOOD PRESENTATION

TO ACHIEVE A GOOD REVIEW

Keys to Good Presentation

- Be realistic … not overly ambitious
- Discuss potential problem areas and possible solutions
- Be explicit
  - Reviewers cannot read your mind!
  - Don’t expect reviewers to read between the lines
  - Don’t assume they know what you intend!

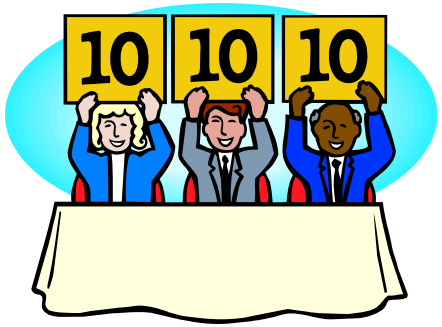


Good Review

Get to the right review group

- Title, abstract, specific aims all point to the main goals of your project
- Attach a cover letter for the Center for Scientific Review Division of Receipt and Referral
  - suggest IC and review group assignment*
  - outline areas of key expertise needed for appropriate review
  - do not name specific reviewers

* Consult with Program Official



Good Review

Understand the dynamics of peer review:

- Reviewers will review many applications
- Make your application easy to read and easy to understand
- The impact and significance should be clear throughout the application
- Convince them to be your advocate
  - *Get them on your side!*

Grantsmanship Tips 101

GUIDANCE FOR A COMPETITIVE GRANT APPLICATION

Hallmarks of an Outstanding Grant Application

- Strong significance to an important problem in public health: IMPACT is high
- High degree of novelty and innovation
- Strong track record by a well qualified applicant
- Clear rationale
- Relevant and supportive preliminary data
- Clear and focused approach that provides unambiguous results
- Careful attention to details
  - Spelling, punctuation, grammar, fonts, clarity of data, error bars, spelling, etc

How to assure that your application is competitive?

- Good ideas, well presented always win
- Think clearly
- Write clearly
- Be complete but not verbose
- Never lose sight of the significance
- Point to the impact
- Pay attention to details

Common Reasons Cited for a Weak Application

- Lack of or weak impact
- Significance not obvious or weak
- Too ambitious, lacking focus
- Unclear or flawed hypothesis or rationale
- Applicant track record weak or lacking appropriate expertise
- Feasibility unsupported
- Approach flawed
- Poor writing

Grantsmanship Tips 101

FUNDING DECISIONS

What Determines Which Applications Are Funded?

- Scientific merit
- Program considerations
- Availability of funds

Remember how applications become grants

- Funding Decisions are based on:
  - scientific merit and impact
  - program considerations
  - available funds
- Funding Decisions are made by the Institute Director

Grantsmanship Tips 101

AFTER PEER REVIEW

After the Review

- Read the summary statement
- Reread the summary statement
- Contact your program officer and be prepared to discuss:
  - what the reviewers said about your application (after you have summary statement)
    - Scores and percentiles
    - the likelihood of funding
    - the prospects of a revised application
- Wait for the AWARD, or
- Listen to advice from Program Officer about options

If Not Funded, Try Again!

- You are in good company
- Know your options
- Get advice, Regroup
- Contact your Program Officer

Revise and Resubmit

- Properly Revised applications can receive fundable scores and subsequent $$
  - Score can inform degree of revision necessary
- Update Preliminary Results
- Maintain communications with Scientific Review Officer and Program Official

Notice NOT-OD-14-074: NIH and AHRQ Announce Updated Policy for Application Submission

Revising and Resubmitting

- Write A Clear Introduction Section
- Address All Criticisms Thoroughly
- Respond Constructively
- Acknowledge and Accept the Help of Reviewer Comments
- Don't Be Argumentative!
- Don't be Abrasive or Sarcastic!

Responding to reviewer comments

Q: What if you know that you are "Right" and the reviewers are "Wrong", is it appropriate to argue your position in your resubmission

A: NO!

Remember

- An application for funding is not about the facts of your completed research.
- It is about ideas and potential research
- DO NOT be Argumentative !
- DO NOT be Abrasive !
- DO NOT do longterm damage to yourself

Revise and Resubmit

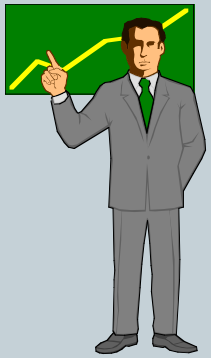
Prepare a REVISION COVER LETTER

- For Revisions, Indicate Review History
- Request Same Or Different Study Section
- Provide Justification for your request
- Don't be Argumentative ! Never!
- Don't be Abrasive ! Never!

"Simple can be harder than complex. You have to work hard to get your thinking clean to make it simple. But it's worth it in the end, because once you get there, you can move mountains."

Three Simple Rules to remember when planning, writing and submitting your application

#1



DO NOT write the application for yourself
Unless you are going to fund it yourself

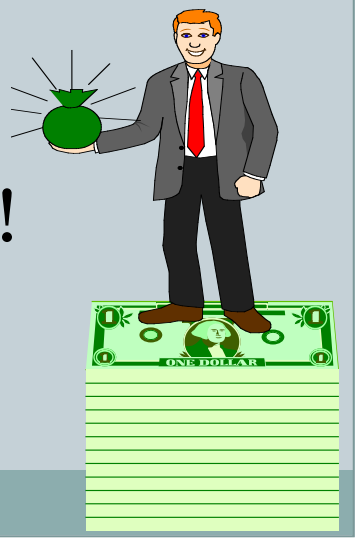
You MUST convince
the entire review committee
and the funding agency the proposed research will be of high impact and feasible

#2

Reviewers are never wrong,
Reviewers are never right:

they simply provide an assessment of material that you provided in your application

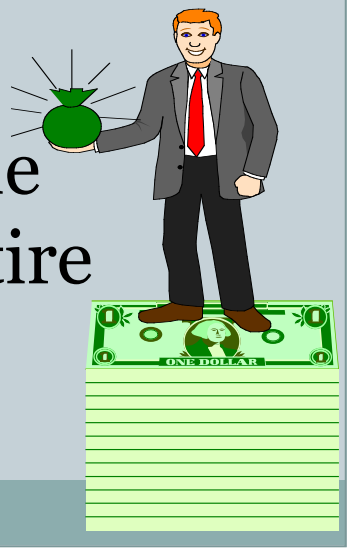
Don't Take the Criticism Personally!



#3

If you are revising the application the comments in the summary statement only list some of the weaknesses …. not all of the weaknesses.

When you revise your application use the time as an opportunity to improve the entire application.



Where Do I Get More Information?

NIH homepage: http://www.nih.gov/

Office of Extramural Research (OER): http://www.grants.nih.gov

CSR website: http://www.csr.nih.gov/

Grants Process & Data
Grant Application Basics
Grants Process Overview
Types of Grant Programs
How to Apply
Peer Review Process
Award Management
NIH Financial Operations
Award Information & Data

Electronic Grants
Electronic Research Admin (eRA Commons)
Applying Electronically

Global OER Resources
Glossary & Acronyms
Frequently Used Links
Frequent Questions

Grant Writing Tips Sheets

Many NIH Institutes put out guides and tip sheets on their Web sites. These guides can be useful resources. Here are just a few.

- All About Grants - Including Grant Application Basics, How to Plan a Grant Application and How to Write a Grant Application.
- Applying for an NHGRI Grant
- Choosing an Appropriate NIH Funding Instrument and Funding Mechanism (MS Word - 209 KB)
- NIH Grants Information CD (PDF - 51 KB)
- Peer Review Guidelines and Information
- Peer Review Meetings - Meeting dates, descriptions, rosters, guidelines, etc.
- Preparing Grant Applications
- Quick Guide for Grant Applications
- Quick Guide for the Preparation of Grant Applications (Complementary and Alternative Medicine)
- SBIR/STTR Policy and Grantsmanship Information
- Tips for New NIH Grant Applicants
- Writing a Grant

Note: For help accessing PDF, RTF, MS Word, Excel, PowerPoint or RealPlayer files, see Help Downloading Files.

grants1.nih.gov/grants/grant_tips.htm

Internet 100%

Additional Supporting Material

Examples

Reviewers' Concerns taken from Grant Applications and Summary Statements

Top 10 Common Reviewer Concerns

.....or How Not To Get DINGED!

1

There is not a

CLEAR HYPOTHESIS, or

WELL DEFINED GOALS

- Provide a focused hypothesis, objectives
- Describe the importance and relevance of your problem
- Be clear on how your project will move the field forward

2

The specific aims do NOT TEST the Hypothesis, or the specific aims DEPEND on results from previous aims

- The best proposals are those with independent specific aims that address your hypothesis using different approaches

3

The proposal is NOT MECHANISTIC, or NOT SCIENTIFICALLY RELEVANT

- Do not propose correlative studies, propose strong associations
- Do not propose general observations, propose specific manipulations

4

This application is not APPROPRIATE for the GRANT MECHANISM

- A R21 is NOT a R01
- A Career Development Award (K) is NOT a Research Project Grant (R)

5

The proposal is
OVERLY AMBITIOUS

- Set realistic goals for the budget and project period you propose

6

PRELIMINARY DATA is lacking

- Include preliminary data for all aims
- Use preliminary data to show knowledge of methods and data analyses
- But DO propose more than just confirming preliminary results

7

I’m not sure that the Investigator can do the PROPOSED EXPERIMENTS

- Don’t propose what you can’t do
- Include Collaborators and Consultants on your project
- Describe the value of datasets and experimental models

8

The background section is MISSING KEY publications and experimental findings

- Thoroughly describe the literature, especially controversies, *but….*
  - Support your views and ideas
  - Be sure you have found key references

9

Experimental details, alternative approaches, or interpretation of data are INADEQUATELY DESCRIBED

- Don’t assume the reviewers know the methods
- Provide other experimental directions you might use should you encounter problems
- Show the reviewers that you have thought about your research plan

10

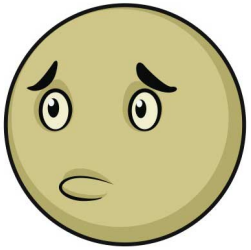
The Proposal is NOT RELEVANT to the MISSION of the Institute

- Make your application FIT the Mission of a particular Institute
- Don’t FORCE your application on an Inappropriate Institute

Additional Supporting Material

Examples

BAD & GOOD GRANTS



BAD GRANT

Grant Example

Hypothesis: The goals of this proposal are to identify microRNAs (miRNAs) and elucidate gene networks that regulate limb regeneration. These studies will (1) identify miRNAs that contribute to the regulation of regenerative capacity; (2) identify miRNA-target mRNA pairs involved in limb regeneration; and (3) test selected microRNAs for their ability to promote regeneration.

Purpose: Elucidation of microRNA-dependent regulation during amphibian regeneration should identify key molecular components and regulatory steps that could potentially permit the therapeutic activation of regenerative processes in mammals.

Grant Example

- **SA #1:** Identification of microRNAs expressed in intact, regenerating, and non-regenerating limbs.
- **SA #2:** Characterization of miRNA-mRNA regulatory interactions
- **SA #3:** Functional analysis of selected miRNAs in limb regeneration

Grant Example

Reviewer Comments:

- Unfocused screen for potential miRNAs that participate in limb regeneration.
- The functional characterization is less focused and thus more uncertain in outcome. The potential unique assay offers a tantalizing opportunity, but it would be stronger if a more comprehensive analysis of all candidates were proposed.
- The functional analysis is diffuse and overly ambitious. There is a major concern that the results will not lead forward to a more mechanistic understanding of limb regeneration.

Grant Example

Reviewer Comments:

- Study in cells is very promising but extrapolation to limbs and tissues may be technically challenging.
- Need discussion of controls/quantitative effects of method on normal regeneration.
- The method of incorporating agents into *specific tissues is a very new method*. None of the PIs have used this method previously; preliminary experiments would strengthen the feasibility of this approach.
- The PI is new to the regeneration field and has no funding or publication history in this area

GOOD GRANT

Grant Example

Hypothesis: *Chronic drug* exposure upregulates the expression of *Factor X*, which triggers and sustains the exocytotic trafficking and surface expression of functional *Receptor A*

Purpose: To investigate the molecular mechanisms for *Factor X*-induced *Receptor A* trafficking

Grant Example

- **SA #1:** Determine the signaling pathways mediating *Factor X*-induced R*eceptor A* trafficking
- **SA #2:** Determine *Factor X* involvement in *drug*-induced *Receptor A* trafficking
- **SA #3:** Determine the synaptic sites of *Receptor A* trafficking and *Receptor A-B* interactions
- **SA #4:** Determine the behavioral significance of emergent *Receptor A* and behavioral *Receptor A-B* interactions

Grant Example

Reviewer Comments:

1. Strengths are numerous and include novel and innovative hypotheses, sound experimental design using multidisciplinary approaches, a highly qualified investigator and research team, and a high likelihood of meaningful findings

2. Strengths include the significance of the central hypothesis, the well-designed experimental plan, supportive preliminary data ….

3. ..the rationale for the studies are clearly delineated, appropriate controls are in place, scope of the studies is appropriate, and there is … complete discussion of possible limitations of some approaches and how findings will be interpreted

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