Hypothesis and Specific Aims

Randall Duncan
Biological Sciences

COBRE Grant Writing Workshop
January 11, 2012
How to get that first NIH grant

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<th>New Investigator</th>
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<th>Weak scientific background</th>
<th>No Preliminary data</th>
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General comments

• A good idea is critical, but not enough. Roughly 80% of proposals submitted to NIH are reasonably good ideas that will yield important knowledge.

• Excellent grant writers often claim they can get any reasonable idea funded.

• A poorly written grant will never be funded, even if it’s the best idea in the world.
General Comments

There is a simple secret to writing successful grants that all the best grant writers follow, . . .

but the vast majority of applicants do not.

It’s the 1st page of the grant:
The Specific Aims
There’s lots of excellent science out there.

What makes for an excellent grant?

• A compelling question
• Clarity of thought and expression
• A strong, testable hypothesis
• Logical steps (aims) to answer the question
• Rigorous experiments to answer the question
The Essential Parts of the Grant:

- Abstract
- Hypothesis / Specific Aims
- Significance / Innovation
- Research Design

This is the key
Hypothesis and specific aims: The first “make or break” point

- Defines the question to be answered
- The reviewer’s first major encounter with your ideas and thought processes
  - Experienced reviewers can assign an 85% accurate score just by reading this page
- Only page most panel member read (remember they all get a vote)
The 1st page should contain the essence of the entire proposal

Must address the following:

• What is the problem?
• Which aspect of this problem will you solve?
• How will you solve it?
• When you are done, what will we know and why is it important to solving the problem?
What is the problem?
- Definition of the problem and rationale

Which aspect of this problem will you solve?
Clear, unambiguous, testable hypotheses

How will you solve it?
- Specific Aims to include general methods

When you’re done, what will we know and why is it important to solving the problem
- Close the loop
Hypothesis and specific aims: The first “make or break” point

• First impressions count
  Failure here can “lose the reviewer”, regardless of the quality of your experiments!

• Good hypotheses and aims lead to good experiments
  Write your aims and hypotheses first!!!
Hypothesis and specific aims: The first “make or break” point

• Where do you start?
  - with a good idea. (chalk talks, colleagues)

• How do you know if your idea is good?
  – Why do we need to know this? (Scientifically important?)
  – Is it clinically relevant? – This is the NIH
Hypothesis and specific aims: The first “make or break” point

• Be brutally honest with yourself.
  “The first principle is that you must not fool yourself, and you’re the easiest person to fool.” Richard Feynman, Nobel Laureate

• Get other opinions.
  – Chalk talks/colleagues input
What is a good hypothesis?

- **Logical** - based on solid observations or experimental data
- **Testable**
- **Focused** (no fishing)
- **Informative** – interesting and new, not trivial or predictable
- **Simple** – “The number of entities used to explain phenomena should not be increased unnecessarily” (Occam’s Razor)

Translation: Offer the simplest explanation consistent with the data
Is a hypothesis always needed?

- No – Bioengineering/other technology
  Developmental type grants
  Clinical Trials
- But, all grants need well defined objectives
Specific Aims

- Describe the general research steps by which you will test your hypotheses.
- Each aim should logically follow the major hypotheses.
- Follow each aim with a brief description of the experimental design (2-3 sentences).
Do’s and Don’t’s

- Limit Specific Aims to one page – required.
- Formulate no more than four specific aims. Too many aims makes the grant overly ambitious.
- Draft and complete the SA page as the first task!!! Common mistake!
- Start early (6 months before deadline)
Do’s and Don’t’s

➤ Avoid “serial” or “contingent” aims.
   The aims shouldn’t be dependent on one another.
   If the first one fails, why give the grant.

➤ Too many aims.

➤ First words are important. Be active.
   “Determine, Define, Ascertain” good
   “Examine, describe, measure” not so good

➤ Vague goals/objectives
COBRE
Grant Writing Workshop
Significance and Innovation
Lynn Snyder-Mackler

Thanks to Wendy Sanders, M.A. Assistant Dean for Research Career Development U Maryland School of Medicine and the NIH OER
Overall Impact versus Significance

- Significance: Did you ask an important question
  - Overall Impact includes significance, but also assesses *feasibility, investigators and environment*
    - Do you have the right team to carry out this research?
    - Did you propose the best approach?

- Most common criticism in Overall Impact:
  - “Our enthusiasm about the overall impact of the proposal was diminished by concerns about feasibility . . .”
Significance (NIH Directions)

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, technologies, treatments, services or preventative interventions that drive this field will be changed if the proposed aims are achieved.
Significance

- Role of this subsection crucial
- 1st subsection of Strategy (1st impression)
- Significance will be read by all reviewers
Writing the significance section

- NIH doesn’t specify length; suggested length ¾ -1 page
- Begin: Identify research problem that you propose to address
  - Explain importance of resolving problem link to mission of NIH institute, include public health aspects
  - Briefly identify most important, relevant studies of other researchers – and identify important issues (questions) that have not yet been addressed
  - Specify how your study will differ from previous work; how it will contribute to scientific knowledge/clinical practice
  - Address anticipated impact of your research
    - on your field
    - on public health
Paragraph Structure

• Organization: Overview first, then details.
  • Overview: topic sentence, keep it short and simple.
  • Details: supporting sentences.
Writing about the Significance of Your Research Can Be Difficult . . .

I used to hate writing assignments, but now I enjoy them.

I realized that the purpose of writing is to inflate weak ideas, obscure poor reasoning, and inhibit clarity.

I'm so good there should be two of me.

vs
How to Write about Significance: Be Straightforward –and Current

• Does this study address an important problem? “This research question was identified as a major research focus (cite NIH program announcement or http://www.niams.nih.gov/About_Us/Mission_and_Purpose/long_range.asp) . . .”
• If the aims of the application are achieved, how will scientific knowledge be advanced?
  – “Our knowledge of . . . will be advanced by . . .”
• What will be the impact of these studies on the concepts or methods that drive this field?
• How will your studies speed advances, hasten translation?
• Keep in mind new NIH focus on public health: identify how your research will improve public health
  http://www.boneandjointburden.org/
Significance ≠ Illness

- Total knee arthroplasty (TKA) is one of the most common knee surgeries performed in the United States; 500,000 primary TKA procedures are performed each year with 97% of these procedures being performed in the management of knee osteoarthritis (OA) at a cost of $42,000.00 per patient. The prevalence of TKA is expected to increase to 3.4 million per year by 2030.
- Don’t argue that a particular illness is significant.
- **Significance**: What will you do to help cure the illness/lessen its consequences/prevent sequelae?
Just because it hasn’t been done doesn’t mean it needs to be done
Writing Significance

• The Significance subsection is where you begin to increase the level of detail that will extend and validate what was written in the Specific Aims section.

• Provide a critical analysis of the primary literature that describes the existence of a critical gap in knowledge.
  – This is where you include some of the material that used to be in the “Background” section, which substantiates and validates that there is an important problem.

• Explain why its continued existence represents an important problem that must be resolved.
Writing Significance

• Describe the positive impact your contribution will have.
  – How will your contribution enable subsequent thinking and research?
  – If applicable, call attention to decreased mortality/morbidity, improvements in the quality of life or medical outcomes, reduction in cost of medical care.
• Example: “Improved medication adherence through mail order pharmacy use has the potential to decrease CVD-related hospitalizations and deaths in diabetes patients. Through a full assessment of the risks and benefits of mail order pharmacy use, we can gain important knowledge on how to potentially improve and expand the use of mail order pharmacy services.”
Review Instructions on Significance

- Reviewers are instructed to “evaluate significance within context of a research field”
- Take home message:
  - include sufficient information about the field so that reviewers can make informed judgment
Critiques

- “Low impact” research
- “Incremental changes” – death knell for significance
- “Confirmatory research, duplicative”
Innovation (NIH Directions)

• Explain how the application challenges and seeks to shift current research or clinical practice paradigms.
• Describe any novel theoretical concepts, approaches or methodologies, instrumentation or intervention(s) to be developed or used, and any advantage over existing methodologies, instrumentation or intervention(s).
• Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation or interventions.
Think Broadly about Innovation

- A new specific aim, a new MECHANISTIC hypothesis
- A new combination of expertise (unusual multi-disciplinary team), leading to new perspective
- A new combination of 2 previously used methods
- A refinement of existing model, technology
  - If all previous studies on cartilage using an acute traumatic model, but you develop a model simulating chronic cartilage lesions that’s novel!
- Unique sample, opportunity provide the novelty
  - “The proposed study is distinctive in our ability to continue to test a cohort of individuals after ACLR and collect clinical, functional and biomechanical data in a longitudinal sample who are also at risk for the development of knee OA:
Make Sure Your Research Question is Unique

- Search NIH Research Portfolio Online Reporting Tool Expenditures and Results (RePORTER) database to see if anyone else has been funded to carry out similar research
How to Write about Innovation?
Be Straightforward!

• Note: NIH makes no recommendations re: length; suggested length ½ -¾ page

• Does your research incorporate a new perspective on your subject?
  – Does the proposed research employ novel concepts, approaches or methods? “The proposed research employs a novel method that we developed . . .”
  – Are the aims original and innovative? “These aims are original in that . . . While they build on . . ., they are designed to advance our understanding of . . .”
  – Does the project challenge existing paradigms or develop new methodologies or technologies?
Remember: Innovation is Necessary, But Not Justification for Research

- “This model has been tested in rabbits, mice, rats, drosophila, dogs, cats, chickens, zebrafish and hamsters, but no one has looked at it in a frog yet.”
But…

- “This model has been tested in rabbits, mice, rats, drosophila, dogs, cats, chickens, zebrafish and hamsters, but no one has looked at it in humans or better yet patients with the condition of interest.”

is a different story…
Too much “innovation”

- Be careful about arguing you’re “outside the mainstream”
- Need to balance innovation with:
  - Feasibility (preliminary data, scope of research)
  - Credibility (training, publications)
Writing Innovation

• Provide the context (with citations from the literature) so reviewers will be able to understand how your project is innovative.
  – For example, if you plan to assert that innovation stems from a new approach that you will take, you need to support that claim with discussion of previous approaches and why they were unsatisfactory.
  – This is another place where you include material that was previously in the “Background” section.
Writing Innovation

• Write a statement that begins with the phrase, “The proposed research is innovative because…..”
  – Complete this sentence by stating what objectively sets your project apart, such as a different approach you are taking or a different technology you have created, compared to past investigators.
  • Example: “The proposed research is innovative because it addresses the potential of a healthcare system-level factor – in this case, the provision of mail order pharmacy service – rather than patient-level or provider-level factors to improve patient adherence to medications.”
Writing Innovation

• Describe the *positive impact* that will result from your innovative approach.
  – Positive impact under **Significance** stems from concrete benefit that is relevant to NIH’s mission.
  – Positive impact under **Innovation** stems from advancement that would have been unlikely without substantive – **not incremental** – departure from the status quo.

  • Example: “Many researchers and policy makers have lamented that the field of medication adherence research is “stuck” with few good options for moving forward. Research that comprehensively assesses the impact of system-level interventions such as mail order pharmacies can significantly advance the field of structural interventions to improve patient health.”
Writing the Approach Section

Randall Duncan
Biological Sciences

COBRE Grant Writing Workshop
January 11, 2012
Getting Started

Read the directions!

http://grants.nih.gov/grants/forms.htm

Application for a
Public Health Service Grant

PHS 398
Reviewers are informed readers but not necessarily experts in your specific area (~20 reviewers).

- Funding agency personnel want to know health impact (e.g., NIH, OREF, NSF, NIST, AF, CDC, DOD, etc.).

- Keep in mind that you need to be very clear and need to emphasize health and science significance throughout.

- For NSF, include educational and underrepresented minorities.
SKELETAL BIOLOGY DEVELOPMENT AND DISEASE STUDY SECTION

Center For Scientific Review

(Terms end 6/30 of the designated year)

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---------------------
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PROFESSOR AND DIRECTOR
DIVISION OF PEDIATRIC SURGERY
DEPARTMENT OF SURGERY
UNIVERSITY OF ALBERTA
EDMONTON, AB T6G 2B7, CANADA

MEMBERS

---------------------
LEFEVBRE, VERONIQUE M, PHD, (11)
ASSOCIATE PROFESSOR
DEPARTMENT OF CELL BIOLOGY
LERNER RESEARCH INSTITUTE
ASSOCIATE PROFESSOR, DEPARTMENT OF MOLECULAR MEDICINE, CLEVELAND CLINIC LERNER COL. MEDICINE
CLEVELAND, OH 44195
Research Strategy

Problem: You only have 12 pages (less for an R21 or R03) – this includes Significance and Innovation

(c) Approach

If the project is in the early stages of development, describe any strategy to establish *feasibility*, and address the management of any high risk aspects of the proposed work.

Point out any *procedures, situations, or materials that may be hazardous* to personnel and precautions to be exercised (use of Select Agents should appear separately).
Research Strategy—Before you start....think!

Specific aims

Aim 1
→ Hypothesis 1
→ Experiment 1
→ Result

Whoops Dead End

Aim 2
→ Hypothesis 2
→ Experiment 2
→ Result

Aim 3
→ Hypothesis 3
→ Experiment 3
→ Result

Aims should be sequential, but independent
Specific Aims

1. Ex-vivo analysis: QCT, HMM, QAR, IHC

2. Load

3. Mayer-Kuckuk
Experimental Design

Instability Rabbit Model of OA
Native, DJD ± modifications

Rabbit Knee
Disarticulate

Image Analysis
India ink, IFOP

Analyze Matrix
Biomechanics
Histochemistry
FT-IRIS
Cells

Compression
(k,Ha,Ei)

Analyze SZ,MZ,DZ
X-links
PG & Collagen
Content
Remove SZ,MZ,DZ
Methods and Analyses

**In Vitro Explants**

- Intact
- Degraded

**Functional Properties and Image Analysis**
(biological, biophysical, biochemical, biomechanical)

**Tissue Structural Analysis**
- Collagen orientation
- Cell shape
- Surface integrity
- PG loss/cleavage
- Collagen damage
- Cell viability
- Water content

**Cellular Function**
- mRNA Aggrecan
- mRNA Coll II
- mRNA ADAMTS
- mRNA MMPs
- mRNA IL-1

**Biomechanical Testing**
- Permeability
- Aggregate modulus
- Tensile modulus
- Poisson’s ratio

**FTIR Spectroscopy**
- Collagen orientation
- Cross links
- Collagen content
- PG content
- Collagen damage

**Data Analysis, Hypothesis Testing, Parameter Correlations, and Model Building**
So now that your ideas are clear in your mind, what do you put in the Approach section?

Preliminary Studies for New Applications

For new applications, include information on Preliminary Studies as part of the Approach section. Early Stage Investigators should include preliminary data and cite references.

However, for R01 applications, reviewers will be instructed to place less emphasis on the preliminary data in applications from Early Stage Investigators than on the preliminary data in applications from more established investigators.

Make sure that the graphs/photos/gels/etc. can be read by the reviewer!
Progress Report for Renewal and Revision Grants

For *renewal/revision applications*

- provide a Progress Report
- summarize specific aims of the previous grants and importance of the findings
- explain any significant changes, new directions and budget increases or reductions

*A list of publications should not be included here*. On separate page at end of grant.
What do you include in the Approach section.
Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project.

Explain how the data will be collected, analyzed, and interpreted as well as any resource sharing plans if appropriate.

Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
Research Strategy – What to include

- Describe any novel **concepts, approaches, tools, technologies and methods** and their advantage over existing ones.

- Include appropriate **statistical analysis** of the data and a **power analysis** for numbers.

- Provide a tentative sequence or **timetable** for the project’s Specific Aims.

- Discuss **potential difficulties and limitations** of the proposed procedures and **alternative approaches** to achieve the Specific Aims.
Remember who you’re writing to. Reviewers are basically volunteers – your job is to make it easy for them to understand your application.

- No one format fits all proposals
- Try to organize in logical (and readable) sequence
- Specific Aims => corresponding experiments
- Start with an outline
- Working Model
Research Strategy – Organization

Aim 1

Aim 2

Aim 3
For each Specific Aim clearly state

- Goals (objectives)
- Hypotheses (questions)
- Methods (details)
- Outcomes (metrics)
Research Strategy – Format

For Each Specific Aim

• Reiteration of Research Question
• Rationale
• Design and Approach
• Methods
• Anticipated Results, Analysis, Interpretation
• Difficulties, Limitations, and Alternative approaches

Can include a section on Detailed Methods common to more than one Specific Aim at end of Research Design and Methods *(Compendium of Methods)*
Directly and succinctly reiterate why you are doing this Specific Aim.

Remember, if you ask a question you can pose a hypothesis, and then you can answer the question (test the hypothesis).

Support your rationale with preliminary data.
For Each Specific Aim

• Reiteration of Research Question
• Rationale
• Design and Approach
• Methods
• Anticipated Results, Analysis, Interpretation
• Difficulties, Limitations, and Alternative approaches

Can include a section on Detailed Methods common to more than one Specific Aim at end of Research Design and Methods (Compendium of Methods)
Pose one hypothesis to address each question.

Describe experimental design to test each hypothesis and answer each question.

Describe the method(s) to perform each experiment, including number of tests and specimens per test.

Use the diagrams/charts from the white board in the application.

Describe the statistical analyses to test the hypothesis – Can put this in a single section at the end of the grant – Compendium of Methods.
Experiments

- Can parameter be directly measured?
- Can theory help to design set-up?
- Can theoretical model provide physical measurements for analysis?
Describe techniques and equipment for measuring all variables

- Demonstrate that measurements will be accurate, precise, sensitive, specific
- State independent and dependent variables
- Use illustrations – Has to be interpretable
Theoretical Models

- Can be used to define or design an experiment
- Provides a parameter which can be calculated from experimental measurements
- Can be used for predictive purposes:
  - Cost Effective
  - Easier, less time consuming

- However, if you can perform an experiment to measure the parameter of interest, then a theoretical model probably is not necessary!
Emphasize what is new about your model or method

Point out advantages to using your proposed model or technique over other approaches

Never propose to develop or use a new model or method unless you can show it already works i.e., you already did it!

This is the “kiss of death”. Even if its in the literature, prove you can do it at least once.
Research Strategy – Format

For Each Specific Aim

• Reiteration of Research Question
• Rationale
• Design and Approach
• Methods
• Anticipated Results, Analysis, Interpretation
• Difficulties, Limitations, and Alternative approaches

Can include a section on Detailed Methods common to more than one Specific Aim at end of Research Design and Methods (Compendium of Methods)
Anticipated Results and Potential Pitfalls

- Provide an interpretation and outcome for each question based on the results of the analyses.
- Discuss limitations and possible problems specific to this question only (or do it at end).
- Address how you will alter your experiments in response to problems.
- If a negative result, explain how it does not affect the other Specific Aims.
Anticipated Results and Potential Pitfalls

Remember to discuss expected results and interpretation of analysis => outcomes

Close the Loop
There are three kinds of lies: lies, damned lies, and statistics.”

Benjamin Disraeli (1804-1881)

Use Statistics Correctly
Design Statistical Analyses to Test Hypotheses

Briefly describe
- Questions/Hypotheses
- Choice of specimens and number
- Choice of interventions, independent and dependent factors, and outcome assessments
- Specific statistical analysis to test hypothesis

However, best way to make sure that your statistical analyses are correct – Collaborate with a Statistician
Research Strategy – Timetable

Include timeline or timetable at end of Research Design and Methods

– Give enough detail for evaluation
– Make certain it is reasonable
Research Strategy – Summarize

- Close Research Design and Methods with an overall Summary about the significance of your studies and how the results will advance knowledge and/or patient care.
- Be enthusiastic
- Not more than one paragraph, the reviewers are tired of reading your grant application!
Summary

- Is the experimental design original and novel?
- Are the methods feasible and well developed?
- Are the hypotheses testable?
- If carried out successfully, will the research proposal answer the questions posed in the Specific Aims?
- Data will be analyzed correctly
- Enough subjects/specimens will be tested to lead to conclusive results
- Limitations are of minor concern only
- Study can be accomplished in requested time

Is your application clear, concise and easy to read!
COBRE
Grant Writing Workshop

Investigators and Environment
Lynn Snyder-Mackler
Application Alignment with Review Criteria: Major Examples

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<td>Investigator(s)</td>
<td>Biosketch</td>
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<td>Section 11. Equipment</td>
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• Are the PD/PIs, collaborators, and other researchers well suited to the project?

• If Early Stage Investigators or New Investigators, do they have appropriate experience and training?

• If established, have they demonstrated an ongoing record of accomplishments that have advanced their field(s)?

• If the project is collaborative or multi-PD/PI, do the investigators have complementary and integrated expertise; are their leadership approach, governance and organizational structure appropriate for the project*? (*Moved from Approach)
Investigators- evidence: Biographical Sketch

• Section A - Personal Statement

  – Briefly describe why your experience and qualifications make you particularly well-suited for your role (e.g. PD/PI, collaborator, mentor, etc.) in the project that is the subject of the application.

  Therefore, Biosketch WILL have to be revised for EVERY proposal submission depending on your role on the project.
• **Personal Statement:**
  - Why your experience and qualifications make YOU particularly well-suited for their roles in the project

• **Publications:**
  - Recommended: no more than 15---up to five of the *best*; up to five of the *most relevant* to the proposed research; up to five of the *most recent*

• If *Early Stage Investigators or New Investigators*, do they have appropriate experience and training?

• If *Established*, have they demonstrated ongoing record of accomplishments that have advanced their field(s)?
Biographical Sketch

Section B  Positions and Honors

Section C  Publications (limit to 15 selected peer-reviewed publications).
  • Choose 15 based on most current, importance to field, and/or relevance to proposed research.
  • Be sure to include the PMCID # where applicable!

Section D  Research Support Ongoing and Completed
• Will the scientific environment in which the work will be done contribute to the probability of success?
• Are the institutional support, equipment and other physical resources available to the investigators adequate for the project proposed?
• Will the project benefit from unique features of the scientific environment, subject populations, or collaborative arrangements?
Facilities and Equipment

- Provide a description of how the scientific environment will contribute to the probability of success of the project.

- For Early Stage Investigators (ESIs), describe the institutional investment in the success of the investigator.
What to Look for in the Facilities and Equipment Section?

—Limited to those resources directly applicable to the proposed work:

• ESIs describe institutional investment, e.g., start-up funds and mentoring arrangements.
• For multiple sites, resources at each site should be described.
• Special facilities that handle biohazards, etc., included.
• Major items of equipment already available for the proposed studies listed under Equipment.
Facilities

- **Scientific Environment** – Describe how the scientific environment will contribute to the probability of success of the project, and unique features of the environment.
  - Discuss ways in which the proposed studies will benefit from unique features of the scientific environment or subject population or will employ useful collaborative arrangement.
Facilities Section

• Early Stage Investigators (ESIs) – will require the institutional investment in the success of the investigator.
  – e.g. classes, travel, training, collegial support, administrative support, and financial support.

• Definition of Early Stage Investigator (ESI): Within 10 years of completing their terminal research degree or within ten years of completing their medical residency.
• Special facilities that handle biohazards, etc., included.
• Major items of equipment already available for the proposed studies listed under Equipment.
Preparation by the Institution

- Are the Faculty, Business Office, Deans all supportive of faculty research & knowledgeable about the NIH application process?
- Know the guidelines, review criteria & flexible points
- Does the Institution provide and support an environment for faculty to succeed?
- Start up packages for equipment, supplies & students
- Credit for student involvement in research
- Do tenure decisions include credit for independent and/or collaborative research?
- Some projects require team work & more expertise
Preparation by the Investigator

• Is your expertise suitable for the project and approaches proposed?
• Are you asking the important, next questions in the field? Do you have the appropriate expertise?
• Does your research fit the NIH research goals?
• Have you generated preliminary data at your current institution with your students and other staff?
• Are your data supportive of your research proposal?
• Are your tools & reagents prepared & ready?
• Have you recruited and trained the necessary students and technicians?
• Are they enthusiastic and engaged?
• Are you?
Budget and Justification

Randall Duncan
Biological Sciences

COBRE Grant Writing Workshop
January 11, 2012
**Budgets: Submission**

NIH uses both modular and itemized budget formats

**Modular**
- $25,000 blocks
- Can use only if maximum requested is $250K/yr
- justification not needed except for personnel

*Even though you do not need to itemize for NIH, you should do this.*

**Itemized**
- use only in grants requesting more that $250K/yr.
- requires justification for each category of budgets.

*Each method has it’s merit, particularly if your work will require more $$.*
Budgets: Submission

It is essential that you think about your needs to do the experiments outlined – Experts on the panel that know the costs.

Don’t underestimate – sign that you don’t know what you’re doing.
Don’t “pad” your budget – (caveat!!)
**Budgets: Study Section**

The study section members evaluate the budget (after review of the scientific merit of the application) and can make suggestions to the council.

**Modular -**

The study section can recommend that the budget is adequate for the work proposed or that modules (1 or more) or years funded.

**Itemized**

Study section can recommend that the budget be approved or can cut years or specific items from the application.
Budgets: Council

Council meets 2-4 months after the study section. During this time, they will examine the payline to make a decision on funding.

They will cut your budget!! Modular budgets are typically cut at least one module and it’s not unusual to cut at least one year. Remember the caveat.
**Budgets: Justifications**

You need to justify personnel (including yourself) in modular grants.

- Role on project: PI, Co-PI, Co-investigator, etc.
- Time to be spent on grant (% time or academic/summer months)
- What that person will be doing on the grant.
- Can put in TBN, but need to tell the reviewers the time for that person and their duties on the grant.

Justification much more extensive for itemized. Each category – particularly equipment requests – needs to be justified.
Get with your budget officer/pre-award person early and put them in contact with the subcontracting institution.