Effective Specific Aims and a Persuasive Page 1

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Is this Science or Sales?

Both.

But not at the same time.

- Science is what you do with sponsorship => research
- Grant writing is getting sponsorship => business
- “All business is relationships” or “All business is personal”
  - Grant applications put you in partnership with reviewers
  - Enhance communication by speaking same language, help them to help you by demonstrating value of proposal in words they can use
Sell your ideas to reviewers, enlist them as your advocate in Study Section

- Offer something special (significance/importance to field)
- Make a good first impression (Specific Aims Page)
- Are prepared and knowledgeable (Background section)
- Have appropriate credentials (Biosketch)
- Provide supporting documentation (Pilot data, publications)
- Deliver a clear, understandable message (Approach)
- Have appropriate endorsements (Letters of Collaboration)
- Are persistent!
Specific Aims Page 1: Master Plan

- Reviews: Specific Aims plus Abstract used to identify reviewers, may be the only parts read before scoring
- Useful “concept sheet” for early feedback on ideas
- Includes project milestones, hypotheses tested, important aspects of plan *without* fine detail
  - Need to know information only
- Win or lose reviewers on this page
- Often the most difficult sections to write
  - Communicate *enthusiasm* for your Aims
Form and Flair of Specific Aims Page

- “Cultural norms” of disciplines, review groups
  - Placing hypothesis before aims, no hypotheses on Page 1, giving a short preview of the approach under each aim, using a figure on Page 1

- Everyone has a unique writing voice, and may use somewhat risky/nontraditional techniques
  - Launch into what the study will do, then give minimal background; use a composite case study to illustrate the human impact; present a puzzle or challenge

- Today we begin with form; flair can follow basics
Persuasive Specific Aims Page 1

1. Introductory Paragraph – *Definition of problem, critical need, proposed solution*

2. Proposed Solution – *Your objectives & rationale, “what why who” paragraph*

3. Specific Aims “paragraph” – *Steps to addressing critical need*

4. Significance – *Novelty, expectations & impact, “payoff” paragraph*

- Reviewer will form general conclusion by the end of the Specific Aims, confusion deadly to proposal
1. INTRODUCTORY PARAGRAPH

There is a significant problem; solving this problem is aligned with the mission of the funding agency/dissertation committee.
Introductory Paragraph

- Opening sentence must be interest-grabbing, establish relevance of proposal to human health
  - By supporting your proposal, reviewers will help NIH accomplish goals
- Statement of current knowledge will educate less expert members of the panel on what is known about the topic
- Identify the gap in knowledge holding back the field, what the application addresses, what MUST be solved
Focus of grant: Identify lymph node metastases in patients with resectable lung cancer

Example: *Lung cancer is the leading cause of cancer deaths among both men and women in the US.*

- States the obvious, non-focused, does not tell what grant is about
Example: *Failure to identify regional lymph node metastases in the 40,000 US patients/yr. with surgically resected lung cancer is associated with a 3-fold increase in recurrence and decreased overall survival.*

- Focused, adds information, identifies problem and relates to mission of agency
1. INTRODUCTORY PARAGRAPH

There is a significant problem; solving this problem is aligned with the mission of the funding agency/dissertation committee.

1st Paragraph Summary

✓ Introduce the project—Relate project to funding agency’s mission
✓ Educate the reviewer—Summarize important knowledge
✓ Identify the gap in knowledge or state critical need
✓ Identify the problem created by gap or need
2. RATIONALE: WHAT, WHY, WHO

You have a solution to the problem and can successfully address the identified critical need.
“What, Why, Who” Paragraph

- **Long term goal** projects continuum of research to pursue over multiple periods of support
  - “Big picture” of your research program
- **Next, objective of this application** defines what this project seeks to accomplish
  - Must link back to the *gap in knowledge*, emphasize *product* not process
- **Central hypothesis** links to *objective*, because objective will be accomplished by testing central hypothesis
- **Rationale** conveys *why* you want to conduct the proposed research, what will be possible after the study
Rationale and Objectives

- Relate purpose of this proposal to the critical need (and mission of the agency), urgency
- Identify well-defined end-points and a specific plan for accomplishing objectives
  - Careful: if objective is to test a hypothesis - you may not advance the field if your hypothesis is wrong
- Realistic objectives
  - “Cure cancer” vs. “Improve the staging and treatment of surgically respectable lung cancer”
Qualifications / Added Value of Team

- Important part of value proposition
  - Why you and colleagues are most qualified
  - Highlight unique qualifications of team, quality or quantity of prelim data, skills, technologies etc.

“...through the development of a novel ......, we now have the unique ability to ......”

“...by leveraging the eNQUIRENet we will collect...at the point of care in real time.”
2. RATIONALE: WHAT, WHY, WHO

You have a solution to the problem and can successfully address the identified critical need.

2nd Paragraph Summary

- Overall project goal addresses identified gap in knowledge
- Presents central hypothesis (or statement of need)
- Explains rationale for pursuing the project
- Describes your qualifications and research environment
  - How you are better prepared than other equally qualified researchers
  - Identify relevant preliminary data; special training, expertise, experience; access to human and animal subject pools, to unique equipment and instrumentation, and to partnerships.
3. SPECIFIC AIMS PARAGRAPH

Outlines development of key steps to fulfill objectives and addresses a critical need.
Specific Aims: Headlines

- 2-4 brief aims that address the critical need
- Logical flow from aim to aim (tells your story)
- Avoid:
  - Aim dependency, e.g. Aim 1 requires development of an antibody and Aim 2 uses the antibody
  - Covering several related experimental questions
  - Descriptions of techniques in the headline
    - May briefly describe approach under headline
  - Non-committal aims…“determine whether”
Effective Specific Aims – Basic Science

- If possible test a hypothesis in the specific aim
  - Hypothesis driven, avoid making reviewer guess
  - Goal of the aim to understand mechanism – even if the experiments are largely descriptive

- Each aim is a paper, or is a significant part of a paper

- Specific Aims detailed but far reaching, not a list of experiments
Specific Aim - Example

- **AIM 1.** Establish safety, feasibility and accuracy of NIR fluorescence image-guided SLN dissection in patients with Stage I and II lung cancer.

- **AIM 2.** Compare detection of NIR fluorescence image-guided SLN identification and excision with conventional staging lymphadenectomy.

- **AIM 3.** Assess the predictive value of the detection of “occult” nodal metastatic disease on subsequent disease recurrence.
Specific Aims Examples

Okay Specific Aim: To test the hypothesis that neurons in the GluR1 knockout mouse will have delayed dendritic maturation.

Better Specific Aim: To test the hypothesis that GluR1 signaling is necessary for dendritic maturation. (or is sufficient)
Specific Aims: Do’s

- Write your aims early and stay open to change
- Massive parallelism, no first mentions in aims
- Keep to one page, “above the fold” effect
- Consider a figure that illustrates the story and interrelationships among aims
- Write to non-experts, as compared to the rest of the proposal (approach is to specialists)
Specific Aims: Don’ts

- Do not state a hypothesis that you cannot actually test with the proposed experiments.
- Avoid verbs viewed as “too descriptive” like correlate… describe… explore… investigate.
- Avoid vague words and jargon.
- Do not write aims that can be viewed as “a fishing expedition,” not essential to the problem at hand, not related to the overall hypothesis.
3. SPECIFIC AIMS PARAGRAPH

Outlines development of key steps to fulfill objectives and addresses the critical need.

3rd Paragraph Summary
Specific Aims in a bulleted or numbered list that:
✓ Correlates with your central hypothesis
✓ Supports your overall project goal
✓ Are conceptual rather than descriptive
✓ Flow in a logical sequence
✓ Define a clear purpose, working hypothesis or statement of need, and expected outcome
✓ Are related but not dependent on the success of another aim
4. SIGNIFICANCE, “PAYOFF”

Inform reviewers and funding agency of the return on investment and why this will be of value to society and the agency.
Payoff Paragraph

- Statement of innovation/novelty
- Advocacy—what makes your project better?
- Specific expectations to be fulfilled by proposal
- How outcomes will fill critical need—at least one per aim
- Positive impact of the findings from your proposal
- Relate to area and mission of opening sentence
- Include next study, *specific* future steps
4. SIGNIFICANCE, “PAYOFF”

Inform reviewers and funding agency of the return on investment and why this will be of value to society and the agency.

4th Paragraph Summary

✓ Identify project’s innovation, e.g., a unique approach or technology
✓ Delineate expected outcomes
✓ Validate central hypothesis, resolve gap in knowledge
✓ Summarize project’s significance
✓ Provides segue to Background and Impact
Workshop Assignment: 3 Rounds

- Gather in small groups 3-5 (fellow, faculty distributed).
- Exchange writing samples in group.
- Get worksheet for each writing sample.
- In *speed rounds*, use highlighters/pens to identify key pieces of a persuasive specific aims page.
- Make notes on the aims page itself or on the worksheet.
- When time is up, readers give feedback to writer.
- Keep sheet and flip over. Repeat exercise on Aims.
- Bonus round: answer last questions. Give to writer.
Workshop Assignment: Round 1

- **Definition of Problem / Critical Need**
  - Where were you educated, important knowledge summarized? *Circle*
  - Was the GAP defined? *Highlight*
  - What was the problem due to the gap? *Underline*

  - Central hypothesis or overall statement of need? *Circle*
  - Rationale? *Highlight*
  - Qualifications and research environment *Underline*

- **Significance – “Payoff” paragraph**
  - Expected outcome? Innovation/impact? *Underline*
Workshop Assignment: Round 2

- **Specific Aims:** Steps to addressing critical need
  - What is outcome of each aim? **Circle**
  - Jargon or technical language in aim? **Highlight**
  - Descriptive/noncommittal aims? **Underline**
  - Any first mentions? Aims that do not seem feasible? **Circle**
  - Aims related in meaningful way to overall goals? **Highlight**
  - Aim dependency (aim fails if a prior aim fails)? **Underline**
Workshop Assignment: Bonus Round

- What do you think the 6 key words will be?
- What could the title be (in 6 words or less)?
Describe the Experience

Thank you for participating! Keep at it, this is a skill just like any other!
References/Resources

- Yolanda Colson, MD, PhD, AATS Grantsmanship Workshop, 2009
  Kent Kester, USU School of Medicine, 2013
- Rita Balice-Gordon, PhD, How to Develop an NIH Grant
- All About Grants tutorial on developing R01 grant applications produced by the NIAID at the NIH
- Video tutorial to Morgan Giddings, PhD’s template and grant writing training
  [http://tinyurl.com/7lluvex](http://tinyurl.com/7lluvex)