

Top 10 Things You Can Do To Write an Effective Grant Application

1. Contact the funding agency or NIH institute in advance of submission; develop a relationship with a scientific review administrator (SRA) and seek specific advice about your project.
2. Watch the 39-minute video stream *Inside the NIH Grant Review Process* (<http://cms.csr.nih.gov/ResourcesforApplicants/InsidetheNIHGrantReviewProcessVideo.htm>). Take the “Grant Application Basics” tutorial at <http://www.niaid.nih.gov/ncn/grants/basics/index.htm>
3. Review successful applications (and their project descriptions) to look for effective ways proposal writers have conveyed their ideas; adapt these strategies to fit the purpose and direction of your project. Carefully read them and the funding agency’s requests for applications (RFAs) to get a sense of the language used.
4. Develop relationships with collaborators and mentors who can advise you and serve as consultants on your project.
5. Write clearly. Use a consistent paragraph structure that puts a topic sentence at the start of each paragraph. Be sure that each individual sentence conveys a single main idea. Format sentences so that the new or more important information appears in the second half of the sentence, which is the natural position of emphasis.
6. Use logical subheadings and a numbering system that ties together different sections so that the reviewer can skip around the application. Use bold *only* for subheadings or for very important topic sentences at the start of paragraphs.
7. Use figures, images, and tables to convey not only your preliminary results but the background and your thinking and approach. In figure legends, include statements that emphasize the benefits or significance of the figure to your proposal.
8. Make it visually appealing: use line spaces between paragraphs; set margins to 0.8 inch or 0.9 inch, and not 0.5 inch. Keep paragraphs manageable—four or more paragraphs per page is ideal. Provide ample “white space” and avoid dense blocks of text and awkward text wrapping.
9. Employ the feature–benefit model: “sell” the idea by stressing the benefits of each feature of your proposal. Include a “significance” paragraph at the end of each major section. Stress how the project addresses the mission of the funding agency or specific institute of the NIH and to the Public Health Service (“to improve the health of Americans”).
10. Get feedback early and often in the process. Have both experts and “intelligent non-experts” review the proposal to provide edits and suggestions about how to improve the both the science and the clarity of the message.

Paul Casella
Office of Faculty Affairs and Development
University of Iowa Carver College of Medicine
paul-casella@uiowa.edu

WRITING GRANT PROPOSALS

paul-casella@uiowa.edu

In a typical year, the Center for Scientific Review at the NIH receives between 55 and 75 thousand grant applications. Only the top 20 to 30 percent receive support.

To be successful, your application must possess three characteristics

- Excellent science
- Flawless packaging
- A clear emphasis on the benefits of each feature of the proposal and how the project as a whole serves the priorities of the institute

Excellent Science contains three elements:

- A basic idea that is novel, significant, and based on sound, logical principles
- An experimental approach that is technically feasible
- A study design that is adequate to achieve an answer that is as unambiguous as the state of the art permits (adequate number of experiments, suitable planning for controls, and a workload that is appropriate to both the dollars and the time frame)

Flawless packaging means

- Following all the format guidelines
- That the proposal is clear, concise, well organized, and that it facilitates the reader's understanding and "intellectual skimming" of the application

How the project serves the priorities of the institute need to be emphasized

- In the Project Description (Instructions begin: "State the application's broad, long-term objectives and specific aims, making reference to the health-relatedness of the project.")
- In the introduction paragraph in Section A: Specific Aims
- In Section B: Background and Significance
- Wherever possible and appropriate in Sections C and D

"Selling" your proposal: the "feature-benefit" model

For each feature, or point you make in your proposal, be sure to identify the benefit (the importance, the significance, the relevance, the value) of that feature to the successful completion of that project. This is the extent to which you can "sell" your proposal; you make every effort to identify and highlight the reasons that support your ability to complete the project successfully.

For example:

In C: Preliminary Studies: "Preliminary Study 2 gave us the experience we need to perform this type of assay with this type of cell line. Similar assays will be necessary to complete Experiment D.2 (see page 19).

In D: Experimental Plan: "We plan to take this approach because it will allow us to..."

Important steps to take before submitting your proposal

- Review excellent “Grant Application Basics” tutorial at <http://www.niaid.nih.gov/ncn/grants/basics/index.htm>
- Publish articles in peer-reviewed journals that you can use in C: Preliminary Studies
- Search the institute’s website via nih.gov to learn about the institute’s priorities and other issues, including how to “speak the language” of the field
- Write to the institute with the aim of developing a correspondence with a Scientific Research Administrator in your specific area
- Review successful proposals to look for effective ways proposal writers have conveyed their ideas; adapt these strategies to fit the purpose and direction of your project
- Develop relationships with collaborators and mentors who can advise you and serve as consultants on your project
- Construct a timeline to manage the proposal writing process, complete with time set aside for informal peer review and revision. Dedicate a specific time per day to work on the project.

FORMAT SUGGESTIONS FOR THE PHS-398

Font

- 11-pt Arial or Helvetica for text. Bold for headings.
- 10-pt Arial or Helvetica bold for figure legends

Margins

Most applicants will use 0.5-inch margins, the smallest allowed. Consider setting your margins closer to 1.0 inch for readability.

Paragraphs

- insert line spaces between the paragraphs (no indent with line spaces)
- use subheadings and a numbering system for as many paragraphs as is logical
- use Left Alignment, not Full Alignment

Images, figures and tables

You’ll want to make excellent use of these to make the reviewers’ work to understand your proposal as easy as possible. Graphics are not just for data anymore. Consider ways of graphically conveying your long-term objective and specific aims, and/or your hypotheses and methods. Use decision trees and flow charts for protocols. Show examples and pictures. Use color. Definitely include a timeline.

Be sure that your images are balanced on the page. Either use the entire width of the page or put them on the right margin.

NIH Has Five Review Criteria



When assessing the scientific and technical merit of an application, all NIH [review](#) committees use the same [criteria](#):

1. **Significance.** Does this study address an important problem? If the aims are achieved, how will scientific knowledge or clinical practice be advanced? What will be the effect of these studies on the concepts, methods, technologies, treatments, services, or preventions that drive this field?
2. **Approach.** Are the conceptual or clinical framework, design, methods, and analyses adequately developed, well integrated, well reasoned, and appropriate to the aims of the project? Does the applicant acknowledge potential problem areas and consider alternative tactics?
3. **Innovation.** Is the project original and innovative? For example: Does it challenge existing paradigms or clinical practice or address an innovative hypothesis or critical barrier to progress in the field? Does the project develop or use novel concepts, approaches, methods, tools, or technologies?
4. **Investigators.** 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)?
5. **Environment.** Does the scientific environment contribute to the probability of success? Do the studies benefit from unique features of the scientific environment or subject populations or use useful collaborative arrangements? Is there evidence of institutional support?

The criteria above reflect NIH's modifications as announced in its [October 12, 2004, Guide notice](#). They will be effective for all investigator-initiated research grant applications received by January 10, 2005. These include applications responding to program announcements, even if the PA was published before the Guide announcement. As always, reviewers will use the updated criteria as a basis for evaluating your application and assign one global score. If you're responding to a [request for applications](#) (RFA), check the RFA for special review criteria. Though [peer reviewers](#) don't score applications strictly by [review criteria](#), the criteria are gauges for assessing scientific and technical merit and feasibility. In writing your application, think of your goal as a quest to convince [peer reviewers](#) your proposal is important, your approach is logical and innovative, you have the resources to do the job, and you and your collaborators are qualified to accomplish the research.

Also keep in mind that, to a large extent, reviewers judge your application against their ideal outstanding application *in your field of science*. This is analogous to a dog show, where breeds are judged against their own standard for their breed, but different breeds do not compete with each other.

The super-organized proposal format for Section II (25 pages maximum)

A: Specific Aims (1/2–1 page) ***What do you intend to do?***

(one paragraph about broad, long-term objective that states the “health-relatedness” or the importance of the issue). The specific aims are

1. To determine...
2. To measure...
3. To classify...

B: Background and Significance (2–3 pages) ***Why is the work important?***

- B.1. Background
- B.2 Literature review
- B.3 Gaps to be filled
- B.4 Significance

C. Preliminary Results (6–8 pages) ***What have you already done?***

- C.1. Preliminary Results as they relate to Aim 1
- C.2. Preliminary Results as they relate to Aim 2
- C.3. Preliminary Results as they relate to Aim 3

D. Experimental Plan (13-15 pages) ***How are you going to do the work?***

- D.1. Experimental Plan for Aim 1
 - D.1.1 Design, Rationale, and Significance of Experimental Plan for Aim 1
 - D.1.2 Methods for Aim 1
 - D.1.2.1. Innovations
 - D.1.2.2. Limitations
 - D.1.2.3. Difficulties anticipated
 - D.1.2.4. Alternative approaches
 - D.1.2.5. Sequence
 - D.1.3. Analysis of data
 - D.1.4. Interpretation of anticipated results
- D.2. Experimental Plan for Aim 2
(and so on, as above)
- D.3. Experimental Plan for Aim 3
(and so on, as above)

SOME WISDOM from George Eaves

from Eaves G. Preparation of the research grant application: opportunities and pitfalls. *Grants Magazine* 1984.

Seven Fundamental Questions reviewers ask about an application

1. Are the aims logical?
2. Is the hypothesis valid?
3. Are the procedures feasible, adequate, and appropriate for the research proposed?
4. Is the research likely to produce new data or concepts or confirm existing hypotheses?
5. What is the significance and originality of the proposed study in its scientific field?
6. Are the principle investigator and the staff qualified to conduct the proposed work, as judged by their demonstrated competence, academic credentials, research experience, and productivity?
7. Are the facilities, equipment, and other resources adequate for the proposed work, and is the environment conducive to productive research?

Qualifications for Scholarship

According to Eaves, “the single most important requirement for a beginning investigator’s successful completion of a grant is a demonstration of outstanding qualifications.” These extend beyond the biographical sketch; they include the ability to

1. think clearly and logically
2. express logical thought clearly and cogently
3. discriminate between the significant and the inconsequential
4. display technical prowess
5. handle abstract thought
6. analyze data objectively and accurately
7. interpret results confidently and conservatively

EXERCISE: Project Description

Howard Butcher, Written Emotional Expression & Caregiver Burden Outcomes
Funded 2003

The purpose of this study is to evaluate the effect of structured written emotional expression (SWEE) in decreasing the emotional and physiological burdens in family caregivers of persons with Alzheimer disease and related disorders (ADRD). SWEE is an intervention postulated to facilitate the making of meaning and involves asking participants to write for a brief an account expressing their deepest thoughts and feelings about a stressful and traumatic experience. Negative consequences from the stress of ADRD caregiving are well documented in the research literature with family caregivers being more stressed, burdened, and depressed than non-caregivers. The specific aims of this study are to: 1) determine the effect of SWEE on finding meaning (Finding Meaning Through Caregiving Scale); 2) determine the mediating effects of finding meaning on caregiver burden (Burden Interview), depression (CES-D), self reported physical symptoms (Pennebaker Inventory of Limbic Languidness), and salivary cortisol measured QID over two days; and 3) determine the effect of SWEE on caregiver burden, depression, self-reported physical symptoms, and salivary cortisol. Caregivers will experience a total of three 20-minute writing sessions scheduled every other day. All outcome measures will be collected at pretest, 4th and 5th day post-test, and twice at one-month post intervention. The researchers hypothesize that caregivers experiencing SWEE will report higher provisional finding meaning and that higher provisional meaning is positively associated with lower caregiver burden, decreased depression, decreased self-reported physical symptoms, and decreased salivary cortisol dysregulation. Given the negative health outcomes in family ADRD caregivers, an easily administered and low cost intervention that has an impact on improving the health outcomes is both significant and timely.

List the purpose behind each of the sentences in this project description:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

EXAMPLES OF POSTED INFORMATION REGARDING THE MISSION OF INSTITUTES

1. NIAID Overview

Introduction

The National Institute of Allergy and Infectious Diseases (NIAID) conducts and supports basic and applied research to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases. For more than 50 years, NIAID research has led to new therapies, vaccines, diagnostic tests, and other technologies that have improved the health of millions of people in the United States and around the world.

Expanded NIAID Research Portfolio

The scope of the NIAID research portfolio has expanded considerably in recent years in response to new challenges such as:

- bioterrorism
- emerging and re-emerging infectious diseases including:
 - acquired immunodeficiency syndrome (AIDS)
 - severe acute respiratory syndrome (SARS)
 - West Nile virus
 - malaria
 - tuberculosis
- the increase in asthma prevalence among children in this country

2. National Institute of Biomedical Imaging and Bioengineering (NIBIB) -

The mission of the NIBIB is to "improve health by promoting fundamental discoveries, design and development, and translation and assessment of technological capabilities. The Institute coordinates with biomedical imaging and bioengineering programs of other agencies and NIH institutes to support imaging and engineering research with potential medical applications and facilitates the transfer of such technologies to medical applications."

3. Mission: National Institute on Aging (NIA)

NIA's mission is to improve the health and well-being of older Americans through research, and specifically, to:

- Support and conduct high-quality research on:
 - Aging processes
 - Age-related diseases
 - Special problems and needs of the aged
- Train and develop highly skilled research scientists from all population groups
- Develop and maintain state-of-the-art resources to accelerate research progress
- Disseminate information and communicate with the public and interested groups on health and research advances and on new directions for research.