General NIH Proposal Writing Guidelines

These guidelines are adapted from NIH Publication No. 93-3606, "Quick Guide for the Preparation of Grant Applications" and can be used to assist you in preparing your research proposal for your qualifying exam.

RESEARCH PLAN (Overview)

Organize the Research Strategy in the specified order and using the instructions provided below. Start each section with the appropriate section heading – Significance, Innovation, Approach. Cite published experimental details in the Research Strategy section and provide the full reference in the Bibliography and References Cited section

Recommended Length: The maximum length of the complete research proposal (not including the specific aims section) is 10-12 pages.

Content: The research plan should answer the following questions:

- What do you intend to do?
- Why is this worth doing? How is it innovative?
- What has already been done in general, and what have other researchers done in this field? Use appropriate references. What will this new work add to the field of knowledge?
- What have you (and your collaborators) done to establish the feasibility of what you are proposing to do?
- How will the research be accomplished? Who? What? When? Where? Why?

Suggestions

1. Make sure that all sections are internally consistent and that they dovetail with each other. Use a numbering system, and make sections easy to find. Lead the reviewers through your research plan.
2. Show knowledge of recent literature and explain how the proposed research will further what is already known.
3. Emphasize how some combination of a novel hypothesis; important preliminary data, a new experimental system and/or a new experimental approach will enable important progress to be made.

Specific Aims

Purpose: The purpose of the specific aims is to describe concisely and realistically what the proposed research is intended to accomplish.

Recommended Length: The recommended length of the specific aims is one page.

Content: State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Specific Aims are usually one page in length.

Suggestions:

1. Generally, the Specific Aims section should begin with a brief narrative describing the long-term goals of the project and the hypothesis guiding the research. This is followed by a numbered list of the Aims.
2. **State the hypothesis clearly**. Make sure it is understandable, testable and adequately supported by citations in the Background and by data in the Preliminary Results Sections. Be sure to explain how the results to be obtained will be used to test the hypothesis.
3. Show that the objectives are attainable within the stated time frame.
4. *Be as brief and specific as possible*. For clarity, each aim should consist of only one sentence. Use a brief paragraph under each aim if detail is needed. Most successful applications have 2-4 specific aims.
5. Don't be overly ambitious.
6. Be certain that all aims are related. Have someone read them for clarity and cohesiveness.
7. Focus on aims where you have good supporting preliminary data and scientific expertise.

Significance

Purpose: The purpose of the background and significance section is to state the problem to be investigated, the rationale for the proposed research, the current state of knowledge relevant to the proposal, and the potential contribution of this research to the problem(s) addressed.

- 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.

Suggestions

1. Make a compelling case for your proposed research project. Why is the topic important? Why are the specific research questions important? How are the researchers qualified to address these?
2. Establish familiarity with recent research findings. Avoid outdated research. Use citations not only as support for specific statements but also to establish familiarity with all of the relevant publications and points of view.
3. Make sure the citations are specifically related to the proposed research. Cite and paraphrase correctly and constructively.
4. Highlight why research findings are important beyond the confines of a specific project i.e., how can the results be applied to further research in this field or related areas.
5. Stress any innovations in experimental methods (e.g., new strategies, research methods used, interventions proposed).

Innovation

- 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 interventions to be developed or used, and any advantage over existing methodologies, instrumentation, or interventions.
- Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation, or interventions.

Approach

Purpose: The purpose of the research design and methods section is to describe how the research will be carried out. This section is crucial to how favorably an application is reviewed.

Content: The research design and methods section should include the following:

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Unless addressed separately in Item 15 (Resource Sharing Plan), include how the data will be collected, analyzed, and interpreted as well as any resource sharing plans as appropriate.
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
- 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.

Suggestions

Number the sections in this part of the application to correspond to the numbers of the Specific Aims.

1. Give sufficient detail. Do not assume that the reviewers will know how you intend to proceed.
2. Avoid excessive experimental detail by referring to publications that describe the methods to be employed. Publications cited should be by the applicants, if at all possible. Citing someone else's publication establishes that you know what method to use, but citing your own (or that of a collaborator) establishes that the applicant personnel are experienced with the necessary techniques.
3. If relevant, explain why one approach or method will be used in preference to others. This establishes that the alternatives were not simply overlooked. Give not only the "how" but the "why."
4. If employing a complex technology for the fast time, take extra care to demonstrate familiarity with the experimental details and potential pitfalls. Add a co-investigator or consultant experienced with the technology, if necessary.
5. Document proposed collaborations and offers of materials or reagents of restricted availability with letters from the individuals involved.

Preliminary Results/Progress Report

Purpose: The purpose of the preliminary results section is to describe prior work by the investigators relevant to the proposed project. ***Remember that you do NOT have to have substantial preliminary data to take your qualifying exam.***

Content: The preliminary results section should include the following:

- most importantly, a description of recent studies by the applicant investigators that establish the feasibility and importance of the proposed project

Suggestions

1. All Tables and Figures necessary for the presentation of preliminary results must be included in this section of the application.
2. Figures and Figure legends must be legible. There are specific limits on type size given in the application instructions, but beyond these rules, the critical factor is whether the data are legible and convincing to the reviewers.
3. Do not dwell on results already published. Summarize the critical findings in the text. Provide a PDF of a cited manuscript in the Appendix only if it is not published in a publicly accessible journal, or has been accepted but not yet published.

Bibliography & References Cited

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application.