General Writing Tips

- Prefer the active rather to the passive voice. For example, write "We will develop a cell line," not "A cell line will be developed."
- Keep related ideas and information together, e.g., put clauses and phrases as close as possible to - preferably right after the words they modify.
- Simplify and breakup long, involved sentences and paragraphs. In general, use short simple sentences; they are much easier on the reader. Your goal is communication, not literature.
- Edit out redundant words and phrases. Edit and proofread thoroughly. Look carefully for typographical and grammatical mistakes, omitted information, and errors in figures and tables. Sloppy work will definitely suffer in review. Reviewers feel that if the application is sloppy or disorganized, the applicant's research may be as well.

Writing an Application for a Research Project Grant

There are several components to a strong grant application. First, the subject must be creative, exciting, and worthy of funding. Then, the project must be developed through a rigorous, well-defined experimental plan. Finally, you must make sure that the information is presented in clear language and that your application follows the rules and guidelines detailed in the grant application kit of funding agency.

Eight Basic Questions Reviewers Ask

1. How high are the intellectual quality and merit of the study?
2. What is its potential impact?
3. How novel is the proposal? If not novel, to what extent does potential impact overcome this lack? Is the research likely to produce new data and concepts or confirm existing hypotheses?
4. Is the hypothesis valid and have you presented evidence supporting it?
5. Are the aims logical?
6. Are the procedures appropriate, adequate, and feasible for the research?
7. Are the investigators qualified? Have they shown competence, credentials, and experience?
8. Are the facilities adequate and the environment conducive to the research?

Developing the Hypothesis

- Most reviewers feel that a good grant application is driven by a strong hypothesis. The hypothesis is the foundation of your application. Make sure it's solid. It must be important to the field, and you must have a means of testing it.

- Provide a rationale for the hypothesis. Make sure it's based on current scientific literature. Consider alternative hypotheses. Your research plan will explain why you chose the one you selected.
- A good hypothesis should increase understanding of technological processes, protocols, mechanisms and/or solutions.
- Your proposal should be driven by one or more hypotheses, not by advances in technology (i.e., it should not be a method in search of a problem). Also, avoid proposing a "fishing expedition" that lacks solid scientific basis.
- State your hypothesis in both the specific aims section of the research plan and the abstract.

Developing Your Research Plan

A top-quality research plan is the most important factor determining your application's success in peer review. As with a scientific publication, developing your ideas is key.

Before proceeding into specific sections of the plan, here are some general tips:

- Your application should be based on a strong hypothesis.
- Be sure your project has a coherent direction.
- Keep the sections of the plan well-coordinated and clearly related to the central focus.
- Emphasize mechanism: A good grant application asks questions about technical mechanisms.
- Don't be overly ambitious - your plan should be based on a feasible timetable.
- Specific aims and experiments should relate directly to the hypothesis to be tested.

A. *Specific Aims*

- Your specific aims are the objectives of your research project, what you want to accomplish. The project aims should be driven by the hypothesis you set out to test. Make sure they are highly focused.
- Begin this section by stating the general purpose or major objectives of your research. Be sure all objectives relate directly to the hypothesis you are setting out to test. If you have more than one hypothesis, state specific aims for each one. Keep in mind your research methods will relate directly to the aims you have described.
- State alternatives to your hypothesis and explain why you chose the one (or more) you selected.
- Choose objectives that can be easily assessed by the review committee. Do not confuse specific aims with long-term goals.

B. Background and Significance

- Keep the statement of significance brief. State how your research is innovative, how your proposal looks at a topic from a fresh point of view or develops or improves technology.
- Show how the hypothesis and research will increase knowledge in the field. Relate them to the longer-term, big picture scientific objectives and to the betterment of society.
- Justify your proposal with background information about the research field that led to the research you are proposing. The literature section is very important because it shows reviewers you understand the field and have a balanced and adequate knowledge of it.
- Use this opportunity to reveal that you are aware of gaps or discrepancies in the field. Show familiarity with unpublished work, gained through personal contacts, as well.
- Identify the next logical stage of research beyond your current application.

C. Preliminary Studies/Progress Report

By providing preliminary data, this extremely important section helps build reviewers' confidence that you can handle the technologies, understand the methods, and interpret results.

- Preliminary data should support the hypothesis to be tested and the feasibility of the project.
- Explain how the preliminary results are valid and how early studies will be expanded in scope or size.
- Make sure you interpret results critically. Showing alternative meanings indicates that you've thought the problem through and will be able to meet future challenges.
- Preliminary data may consist of your own publications, publications of others, unpublished data from your own laboratory or from others, or some combination of these.
- Include manuscripts submitted for publication. Make sure it's clear which data are yours and which others reported.

D. Approach

- State why you chose your approach(es) as opposed to others.
- If you are choosing a nonstandard approach, explain why it is more advantageous than a conventional one. Ask yourself whether the innovative procedures are feasible and within your competence.
- Call attention to potential difficulties you may encounter with each approach. Reviewers will be aware of possible problems; convince them you can handle such circumstances. Propose alternatives that would circumvent potential limitations.
- Consider the limitations of each approach and how it may affect your results and the data generated.
- Spell it out in detail. While you may assume reviewers are experts in the field and familiar with current methodology, they will not make the same assumption about you. It is not sufficient to state, "We will grow a variety of viruses in cells using standard in vitro tissue culture techniques." Reviewers want to know which viruses, cells, and techniques;

the rationale for using the particular system; and exactly how the techniques will be used. Details show you understand and can handle the research.

Make sure any proposed model systems are appropriate to address the research questions and are highly relevant to the medical problem being modeled.

E. Evaluation

- Develop a methodology for evaluating the project:

    1. Describe how you will ensure that you are meeting the goals, objectives, outputs, and outcomes of the project
    2. Identify the strategies, milestones, and tools that you will use to track and measure progress towards achieving the outputs and outcomes of the project
    3. Describe how monitoring will be used to strengthen the project

F. Timeline

- Develop a realistic timeline:

    1. Demonstrate that you can complete the project within the funding period
    2. List the sequence and time frames of all tasks you will undertake to meet the goals of the project (on a schedule that covers the entire grant period)

Problems and Concerns Commonly Cited by Reviewers

Below is a list of the most common reasons cited by reviewers for an application's lack of success:

- Lack of significance to the scientific issue being addressed.
- Lack of original or new ideas.
- Proposal of an unrealistically large amount of work (i.e., an over ambitious research plan).
- Scientific rationale not valid.
- Project too diffuse or superficial or lacks focus.
- Proposed project a fishing expedition lacking solid scientific basis (i.e., no basic scientific question being addressed).
- Studies based on a shaky hypothesis or on shaky data, or alternative hypotheses not considered.
- Proposed experiments simply descriptive and do not test a specific hypothesis.
- The proposal is technology driven rather than hypothesis driven (i.e., a method in search of a problem).

- Rationale for experiments not provided (why important, or how relevant to the hypothesis).
- Direction or sense of priority not clearly defined, i.e., the experiments do not follow from one another, and lack a clear starting or finishing point.
- Lack of alternative methodological approaches in case the primary approach does not work out.
- Insufficient methodological detail to convince reviewers the investigator knows what he or she is doing (no recognition of potential problems and pitfalls).
- Most experiments depend on success of an initial proposed experiment (so all remaining experiments may be worthless if the first is not successful).
- The proposed model system is not appropriate to address the proposed questions.
- The proposed experiments do not include all relevant controls.
- Proposal innovative but lacking enough preliminary data.
- Preliminary data do not support the feasibility of the project or the hypothesis.
- Investigator does not have experience (i.e., publications or appropriate preliminary data) with the proposed techniques or has not recruited a collaborator who does.
- The proposal lacks critical literature references causing reviewers to think that the applicant either does not know the literature or has purposely neglected critical published material.
- Not clear which data were obtained by the investigator and which others have reported.

The Basic Components of a Proposal (Table of contents)

There are eight basic components to creating a solid proposal package
1. The proposal summary
2. Introduction of project and organization
3. The problem statement (or needs assessment)
4. Project objectives
5. Project methods or design
6. Project evaluation
7. Future work
8. The project budget.