



## APPENDIX C

### WRITTEN PROPOSAL FORMATS for the COMPREHENSIVE EXAM

#### CELL & MOLECULAR BIOLOGY PROGRAM

#### ALL PROPOSALS

Basic Format: 0.5-inch top, bottom, and sides margins; 11-point Arial font; no smaller than 9-point font in figure legends and tables.

**I. Title Page** (1 page); proposal title, student name, department affiliation

**II. Project Summary and Narrative** This is a succinct, “stand alone” description of the proposed work. This section should be informative to other persons working in the same or related fields, and understandable to a scientifically literate reader. State the application’s broad, long-term objectives, as well as the immediate objectives and Specific Aims. Include a brief description of the research design and methods for achieving the stated goals. The Project Summary may be up to 30 lines of text, and will be distributed to CMB faculty and students at the time the public seminar portion of the comprehensive exam is announced.

The **Narrative** is placed on the same page under a separate heading. This is a 2-3 sentence statement of how the research is relevant to public human, animal, or plant health.

**III. Specific Aims** (1 page). The Specific Aims page is a critical component of the grant that, in the ‘real world’, will often be the only page read by non-primary reviewers. This is a 1-page description of the proposal, and includes concise descriptions of the significance of the research proposed, the ‘gap in knowledge’ that the research will address, goals of the proposed research, the overall hypothesis to be tested, the Specific Aims, and the impact that the results of the proposed research will have on the field. References may be used in this section, but are not required. A suggested format is:

**Introductory paragraph.** Establish *relevance* of the work to the greater mission (e.g., human, animal health) of the work. Describe the *current knowledge*, then the “*gap*” in knowledge that prevents the field from moving forward. State why there is a *critical need* to close this gap in knowledge -- what the consequence of not filling this gap in knowledge will be.

**Second paragraph.** In this paragraph, convince the reader that you have the solution to the problem/critical need. First state your *long-term goal* as it relates to the larger mission, then state the *overall objective* of the work you are proposing. Next, state the *central hypothesis* that will be tested in your work. Here, you may also state why you are uniquely qualified to perform the research.

**Specific Aims paragraph.** Here, state 2-4 *Specific Aims* that will collectively fulfill the overall objective/test the central hypothesis. Under each aim, state the *working hypothesis* and an *approach*, which is a brief technical description of how the working hypotheses will be tested.

**Payoff paragraph.** This paragraph will inform the reader what the “return on investment” will be. State the *expected outcomes* and conclude with what *positive impact* the work will have, as it relates, again, to the larger mission of the work.

## Modified NIH-Style Format

**IV. Research Strategy.** 6 pages, including figures and figure legends, but not including references. The Research Strategy is subdivided into 2 sections:

**A. Significance.** Explain the importance of the problem or critical barrier to progress in the field that the project addresses. Describe the scientific premise for the proposed work, including the published research and preliminary data that are provide crucial support of your hypothesis. Explain how the work will improve scientific knowledge, technical capability, or clinical practice in the field.

**B. Approach.** In this section you should describe the research design and the procedures to be used to accomplish the specific aims of the project. Each aim should include:

*i. Aim and hypothesis.* Restate your aim as it appears in the Specific Aims page.

*ii. Rationale* Explain the rationale behind the hypothesis, including reference to the most relevant literature and/or preliminary data.

*iii. Research Design.* Explain the experimental design with which you will test your hypothesis. Define the experimental and control groups of the experiment.

*iv. Methods.* Explain what methods you will use for your experiment, with enough detail in less commonly used techniques to educate a reviewer not familiar with the technique. If needed, include preliminary data to demonstrate technical feasibility. It is not necessary to include an exhaustive description of commonly used techniques or solutions used.

*Data Analysis/Statistical Methods.* This section should include a power analysis and a description of the statistical tests that will be used to analyze data. It is important to show the reviewer that you have considered biological and technical variability, sufficient numbers of biological/technical replicates, and the appropriate type of statistical analysis.

*Expected Results and Interpretation.* Tell the reviewer what you expect to find, given your stated hypothesis. This section should include interpretation results if your hypothesis proves to be correct, as well as your interpretation if your experiments yield results contrary to your hypothesis.

*Potential Problems and Alternative Strategies.* Discuss potential difficulties of the proposed procedures or approaches, and what will be done if the proposed approaches do not work. This should include discussion of what will be done if technical difficulties are encountered, and alternative approaches that can be taken. Also, discuss the limitations of the technical approaches and/or experimental design, and what could be done to overcome these limitations. Finally, this section may include a discussion of experiments to be done in the event that your original hypothesis was incorrect.

**V. Literature Cited.** Include all references cited in the preceding sections using a standard format of journals relevant to the field. All references must be complete; include titles and all co-authors; conform to an acceptable journal format; and be listed in alphabetical order using the last name of the first author or listed by number in the order of citation. This section is not included in the 6 page limit of the Research Strategy. No page limit.

## Modified USDA-Style Format

**IV. Project Narrative.** 6 pages total, including figures and figure legends, but not including references. The Project Narrative is subdivided into 3 sections:

**A. Introduction.** The introduction should include a well-defined problem, a clear statement of the long-term goal(s), and supporting objectives of the proposed project. Summarize the body of knowledge or other past activities that substantiate the need for the proposed project. Describe ongoing or recently completed activities related to the proposed project including the work of key project personnel. Include preliminary data/information pertinent to the proposed work. All works cited should be referenced (see Bibliography & References Cited).

**B. Rationale and Significance**

- Concisely present the rationale behind the proposed project and how it will advance the current knowledge in the field;
- Clearly describe the specific relationship of the project's objectives to one of the Program Area Priorities. The [Program Area Priority\(ies\)](#) must be specifically identified; and
- Describe how the proposed curricular activities (predoctoral) will support educational goals and project activities.

**C. Approach**

Provide a concise description of the proposed project and the problem(s) to be addressed. Clearly describe the approaches to be used. Specifically, this section must include:

- A description of the project details proposed and the sequence in which the activities are to be performed;
- Methods to be used in carrying out the proposed project and feasibility of the methods (detail only if a new and unproven method is to be used; if employing commonly used methods provide information on the expertise available);
- Expected outcomes and outcome measures;
- Means by which results will be analyzed, assessed, or interpreted;
- How results or products will be used;
- Pitfalls that may be encountered, and possible alternatives;
- Limitations to proposed procedures;
- A full explanation of any materials, procedures, situations, or activities related to the project that may be hazardous to personnel, along with an outline or precautions to be exercised to avoid or mitigate the effects of such hazards;
- A timeline for attainment of objectives and for production of deliverables that include annual milestones with specific, measurable outcomes; and
- Establishment of a profile on an established professional social networking site to document career progress during and beyond the term of the proposal.

**V. Literature Cited.** All work cited in the text should be referenced in this section of the application. All references must be complete; include titles and all co-authors; conform to an acceptable journal format; and be listed in alphabetical order using the last name of the first author or listed by number in the order of citation. No page limit.