

Studies with rodents, non-human primates, and human subjects have demonstrated significant impact of gender difference on normal and abnormal cognitive aging. As an acknowledgement of these important gender differences, NIH recently requested that projects include both male and female subjects unless rationale is provide for focusing on a single gender (historically single genders were commonly utilized). Several factors that may influence cognition (depression, diabetes, stroke, hormones, etc.) are influenced by gender and may contribute to aging-related differences in cognition between males and females. This NRSA-type proposal should focus on modeling or studying the gender effects on one specific aspect of abnormal cognitive aging. You should take advantage of the available animal models of cognitive aging to develop a feasible approach.

The following reviews cover some of the relevant literatures, which may be useful to become familiar with the topic:

1. Li R and Singh M, Sex differences in cognitive impairment and Alzheimer's disease. *Front Neuroendocrinol.* 2014 Aug;35(3):385-403.
2. Jonasson, Z. (2005). Meta-analysis of sex differences in rodent models of learning and memory: a review of behavioral and biological data. *Neuroscience & Biobehavioral Reviews*, 28(8), 811-825.
3. Sherwin, B. B., & Henry, J. F. (2008). Brain aging modulates the neuroprotective effects of estrogen on selective aspects of cognition in women: a critical review. *Frontiers in neuroendocrinology*, 29(1), 88-113.

In writing your proposal, you can consult the tips provided by the NIH for writing proposals ([http://grants.nih.gov/grants/writing\\_application.htm](http://grants.nih.gov/grants/writing_application.htm)). For this exam you only need to consider **significance, innovation and approach**. Remember that the reviewers need to be convinced that you have a grasp of the topic and that you convey your research plan clearly. Even though the research may involve complex relationships you still need to express your ideas as simply as possible.

Your answer, not including references, should be no longer than 7 single-spaced printed pages using a font size of 11 points or larger. The first page should contain the **Specific Aims**; this will be an overview of the problem and your approach. Your research strategy should have the components listed below, with an emphasis on the approach, significance and innovation in that priority. In other words, the reviewers are more interested in how you would approach the problem than lots of “hand-waving” about significance and innovation.

## **Specific Aims**

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.

## Research Strategy

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.

### (a) Significance

- 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.

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

### (c) Approach

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