

NRSA Comprehensive Exam Question, Spring 2016

Legalization of marijuana for medical and recreational purposes is an expanding public policy initiative that has come about for a number of reasons, chief among them is the failed “War on Drugs”. Δ 9-THC (the psychoactive chemical in the marijuana plant) has many medically beneficial actions but the potential adverse effects of recreational marijuana use remain controversial. A significant health concern is the potential for the development of cognitive impairments with long-term use, particularly when marijuana use begins during adolescence.

Develop an NRSA-style research proposal that will test the hypothesis that long-term marijuana use beginning in adolescence results in cognitive impairments in adulthood. Test your hypothesis in a rodent model using behavioral, neurochemical and neurophysiological approaches to determine if adolescent marijuana use leads to cognitive impairment and to determine the neurochemical and neurophysiological changes in brain function that are responsible for cognitive impairment. Your proposed studies should take advantage of modern neuroscience approaches, examples include but are not restricted to DREADD receptors, optogenetics, and/or transgenic animals.

Here are a few review articles to use as a starting point in developing your proposal.

1. An evidence based review of acute and long-term effects of cannabis use on executive cognitive functions. Crean RD, Crane NA, Mason BJ. *J Addict Med.* 2011. 5(1):1-8. PMID: 21321675.
2. Molecular Mechanisms of Cannabis Signaling in the Brain. Ronan PJ, Wongngamnit N, Beresford TP. *Prog Mol Biol Transl Sci.* 2016.137:123-47. PMID: 26810000

Additional Direction:

In writing your proposal, you can consult the tips provided by the NIH for writing proposals (http://grants.nih.gov/grants/writing_application.htm). For this exam you only need to consider specific aims, 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 order of 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 have 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.