

# Grant Writing Tutorial

## Checklist for Success: Winning the Grant Writing Game

### 1. Before you begin:

- a. *Make sure your proposal is the right fit for the agency:* All funding agencies (federal, non-federal, and societal) have specific areas of interest and are most interested in supporting work that furthers their mission. The topics of interest are often clearly enunciated in program announcements or a “request for application” (i.e., RFA). If you are in doubt or wish to obtain further guidance to ensure your project is a good fit for the agency, speak with the program officer or the grant administrator. Speaking with this individual will ensure that your research idea and your research track are most likely to be of interest to that particular agency.
- b. *Line up senior colleagues to critically review your science:* A critical review of your science prior to submission is an important and sobering step in the grant-revision process. Before you start writing, speak with senior colleagues who may be experts in the content area or in the methods you plan to employ; and seek their guidance regarding your idea, solicit their input for a formal critique of the finished grant, and let them help you identify the weaknesses in your application and your science.

### 2. Writing the grant:

- a. *Allocate sufficient time to write:* If you rush the writing of your grant, the reviewers will quickly identify gaping holes in the science, the methods, the rationale, and the grantsmanship skills. A large National Institutes of Health (NIH) grant can take up to 120 hours (about 5 days) of dedicated writing to hone and revise. A smaller societal grant can take upwards of 3 to 4 months to complete if you include time for a critical review by senior colleagues and time to incorporate changes in a necessary revision. In general, overestimate the time you think you will need to write the grant and plan the timelines accordingly.
- b. *Read the instructions:* Follow pre-specified instructions *to the letter* regarding font, font size, margins, word counts, and page limits. Don’t include appendices if appendices are specifically prohibited. Pay attention to details regarding what is an allowable expense for a budget and what is not. Do not bend, modify, or get creative with the instructions. When in doubt, contact the program officer.
- c. *Write clearly and concisely:* Don’t assume that the reader knows your jargon, can follow the compelling rationale, or can breach the gaps in your logical links. Tell a story; take the reviewer by the hand and lead him/her to logical and natural conclusions regarding the compelling rationale to do your project, the innovation of your science, the clarity of your methods, and the necessity that your team (and yours alone) perform the work. Highlight the WOW factor while keeping abbreviations, acronyms, and jargon to a minimum if not entirely out of the proposal. The better you write, the more likely you are to get funded.
- d. *Consult weblinks for novice and expert grant writers:* Take the time to review the weblinks

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provided below to assist you in crafting your science. These weblinks offer you the “nitty-gritty” of how to write your abstract, specific aims, background, how to outline preliminary data, and methods sections. Additionally, pay attention to advice regarding how to avoid the common pitfalls of scientific writing, such as improper citation, plagiarism, and insufficient use of active verbs.

- <https://www.niaid.nih.gov/grants-contracts/draft-specific-aims>
- <https://www.niaid.nih.gov/grants-contracts/know-your-audience>
- <https://www.niaid.nih.gov/grants-contracts/create-biosketches>
- <https://www.niaid.nih.gov/grants-contracts/write-research-plan>
- <https://www.niaid.nih.gov/grants-contracts/highlight-preliminary-data-your-next-application>
- <https://public.csr.nih.gov/ForApplicants/PlanningAndWriting/SubmissionPitfalls>
- <https://grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/write-your-application.htm>
- <https://grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/write-your-application.htm#Important%20Writing%20Tips>
- <https://conductscience.com/common-errors-in-literature-citation-section-of-a-grant-application-how-to-correct-them/>

e. *Focus the component pieces of your grant:*

- i. **Title:** The TITLE of your project is important as it sets the first impression. It should be descriptive, specific, and appropriate, and should reflect the importance of the proposal.
- ii. **Abstract:** This particularly important “snapshot” of your proposal should state the overall objective of the research, succinctly articulate the specific aims, briefly describe the methods, and summarize the long-term goal of the research. It should provide a “stand-alone” description of the proposal and should be written so as to be understandable if read by a non-expert in your field. Though the primary reviewer will read your whole proposal, members of the grant review committee may only read the abstract before providing a score.
- iii. **Specific Aims:** Objectives or testable hypotheses that will be achieved within the timeframe of the grant are known as specific aims. Most grants contain no more than three (3) specific aims. Avoid vague language and link the specific aims to your clinical hypotheses. Consider adding an introductory statement for each specific aim that encapsulates your clinical hypotheses and the key elements of the background. Ensure that the specific aims are clear, concise, related to each other, and flow in a logical fashion. Avoid broad or over-ambitious specific aims that will clearly take longer to achieve than the grant term.
- iv. **Background Section:** Always begin with a clear statement of the clinical problem you are addressing and ensure you have compared, contrasted, and critiqued the science to date, citing original research instead of reviews. Demonstrate how your scientific

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approach will move the field forward, fill an important clinical or knowledge gap, or solve a novel problem. A useful technique is to logically lay out your section by asking the key questions the reviewer might pose and then answering them in that section of the background. Always end with a summarizing section that highlights the key points and re-establishes the need for you to complete your proposed science.

- v. **Preliminary Data Section:** Some grant applications require that you include a preliminary data section that highlights how your prior research results have laid the foundation for this new proposal. The type of work you cite in this section should speak to the logical development of your research agenda, the feasibility of what you propose and demonstrate expertise in the techniques/methods that you wish to employ. Wherever possible, summarize your prior work using data tables/charts and provide clear labels for graphic representations. It is always useful to add a summary statement that “wraps up the section” and addresses the key points highlighted.
- vi. **Methods Section:** This section describes exactly how you plan to conduct the research. It is also known as the “approach,” and describes the work to be done and details the tasks for performing that work. If you are not a methodologist, please obtain expert consultation with an epidemiologist, statistician, or experienced colleague in your proposed methods. These experts will ensure that the methods section is laid out in a logical and articulate fashion and will prevent you from demonstrating fundamental gaps in analysis or research design that may raise a red flag for the reviewer. A useful strategy is to first provide an overview of the experimental design and then relate the methods to each specific aim you previously proposed. Ensure you provide sufficient detail to demonstrate expertise but do not exceed the page limit. Anticipate the strengths and weaknesses of your methods and provide the reviewer with an explanation as to how you plan to minimize weaknesses and exploit strengths. Always include a clear and transparent statistical section and sample-size calculation. Finally, include a GANTT chart providing a timeline showing the project’s milestones are achievable within the time allocated by the grant award.
- vii. **Budget section:** A grant budget includes all the costs associated with carrying out the research objectives. In order to determine how much you will spend, you must know what activities will be done and for how many patients/subjects, the time points at which they will be provided, and by whom. A multi-year program will have a budget for each year of funding. It is important to contact the grants administrator at your institution early and work together to develop this budget and meet internal deadlines which may be weeks ahead of the submission deadline. Elements of a budget include:
  - Direct costs: Expenses directly related to the project in question. These can include salary (or effort) for personnel such as investigators, statisticians, and research assistants and the cost of conducting research activities (e.g., procedures, lab testing,

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- Indirect costs: These are provided by the funding agency as payments to institutions above the directly attributable costs of a specific research project in order to offset a portion of the costs associated with the infrastructure necessary to do the research work. They are typically a fixed percentage of the direct costs and may vary by institution. Check the grant announcement to confirm what costs the funding agency will support.
  - Equipment and materials: These are physical items needed to conduct the research (such as laptop computers, software, or laboratory equipment). Because these items are unique in nature, they get their own section in the budget proposal. Consider whether these are items which are already provided by your institution vs. costs the funding agency is willing to support.
  - Travel and other expenses: A grant may include the expenses for travel to a national conference to present the results or publication fees. Please note that the majority of ACG grants do NOT allow travel.
- viii. Letters of Support:** Include letters of support from people who will be making significant contributions to the project, explaining how they plan to support your work. For example, your division chief may include a letter stating that you will be given protected time to conduct the research, or a basic science collaborator may write a letter saying that they will be performing bench experiments using patient samples from your proposal.
- ix. Resources/Environment:** The purpose of this section is to describe the resources, facilities, and support available to the researcher. This includes clinic and office space, laboratories, equipment such as freezers, computers and software, and library resources. You should inquire with colleagues or mentors within your division or institution who may have a copy of this section from prior grant applications with details specific to your institution which can be modified and used for your proposal.
- f. Edit and revise: Allow sufficient time to “take a break” from the grant and then return to revise the proposal based on your internal reviews from senior colleagues. Ask an educated layperson to review your proposal to ensure that he/she, too, can understand the rationale, the importance of the science, and the clarity of the methods. Consider asking a medical writer to assist you in copy-editing. This task ensures the correct use of grammar, spelling, and syntax; avoids run-on sentences; prunes the jargon, and ensures the proposal has been written in an active voice.
- 3. Grantsmanship is the art of grant writing.** Find and study previous grant proposals that have been successful. Make the display pleasant and attractive. Polish your application extensively. Make the application well-focused, clear, well-organized, and accurate. Use figures or diagrams when appropriate to clarify or supplement the text. Assume that you are writing for a reviewer in a somewhat related field, rather than for an expert directly in your area.

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## Pearls and Pitfalls for Grant Applications to the American College of Gastroenterology

*(What the Research Committee looks for – and ways to get funded)*

The ACG Research Committee uses an NIH-style review process for scoring and funding grant applications. The committee is composed of a diverse group of individuals representing different specialty areas in gastroenterology, hepatology, and nutrition. Many or most of these committee members have been previously funded by the ACG and have benefited from its grants.

You should anticipate that your grant will be carefully reviewed by at least three individuals who have a specialty and research focus in the general area of your science but also recognize that all committee members will be reading the application. Therefore, it is essential that your application be interpretable and readable by a diverse group of scientists and clinicians; but rest assured that experts in your chosen field will offer translations of the critical areas if needed.

Here are some suggestions to improve your grant before you submit it. These are based on the combined comments of multiple experienced ACG grant reviewers:

- Ensure you are eligible for the award! Some submissions that are otherwise quite good come from individuals who are not eligible due to their status at the time of the award. Pay attention to this critical detail. In particular, if you are applying for a career development award, be sure that you are not too far along in your academic career and be sure that you are not currently in receipt of another career development award.
- Follow directions! Don't miss the DEADLINE- even by an hour (and note the time zone)! Make sure your name is on every page and your pages are numbered.
- Minimize the number and complexity of hypotheses. The grant review committee has a lot of work to do. It can be useful to put yourselves in the shoes of a reviewer who has, say, ten grants to read within a short amount of time. Grants with multiple, complex hypotheses start off on the wrong foot. It is preferable to have a few simple hypotheses. The best science is often obtained from the simplest yet most elegant research designs. Ask yourself: "If I had 15 seconds to explain what my grant was about, could I explain it clearly and easily?" There is beauty in simplicity. Simple is good.
- Be clear about your proposed study design. It helps the reviewer to know, up front and explicitly, what *kind* of study you are proposing. Is your study a randomized trial? A case-control study? A comparative cohort analysis? A retrospective database analysis? Often the study design is not at all clear and becomes evident only midway through the methods section. Help the reviewer by making things clear, concise, explicit, and simple.

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- Follow the suggested structure and include all portions of the grant in the recommended order. Remember that grant reviewers are used to reading grant sections in a specific order. Deviation from that order will lead to confusion, which will inevitably hurt your score.
- Your project question must have (a possible) answer that is worthwhile and relevant. You must consider: does it directly help patients, does it change clinical practice, does it save resources, does it optimize patient management? If the possible answer has an impact on one of these questions, you have a relevant question.
- Think of something that only your group and your center can offer.
- **Choose wisely your main variable.** The main endpoint is the one that most adequately answers your research question. If you want to know whether treatment A is better than treatment B, select a variable that proves it. The whole study falls apart if that variable is irrelevant and does not answer your question.
- Try to answer a question that will have broad significance in the field or is one that the unique population at your center can address. Answering a question that would not be otherwise answerable is a strength and will often lead to higher scores and funding.
- Design a win-win proposal. Ask questions with publishable results, no matter how your study turns out. Negative studies can be a good thing, too. Be clear about how a negative study may be important and useful; it helps the committee understand your thinking on this in advance because most studies are indeed (or at least should be) negative.
- Work with a statistician. Too often grant writers use statements such as "simple summative statistics will be performed" and do not demonstrate that the work for which they are seeking funding will be performed to demonstrate statistical significance. It is essential that the investment of ACG funds and the quality of the scientific research you propose are appropriate. Designing a study that may have interesting aims and answer an important question but is not going to measure statistical significance will result in major problems for grant reviewers.
- Make sure your study is powered adequately. You will require a statistician's help to consider the mathematical reality of designing a study that has sufficient subjects in its population to achieve statistical significance. Demonstrating an available population exists and is *recruitable* is essential. Some grant writers perform adequate power calculations but need to recruit half or more of all patients available (with the condition of interest) to perform the study at their institution. If you are not able to convince grant reviewers that you can recruit the population in question, significant concerns will surface, and your proposal will be a nonstarter.



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- Check if the unit of analysis is the same as the unit of observation. Typically, the unit of analysis and observation is the same. For example, in a clinical trial patients are tracked and observed; and outcomes are calculated based on patient-level data. But this is not always the case. For example, a study evaluating a physician educational intervention might measure patient outcomes, despite the intervention's target of physicians. This is acceptable, but the analysis plan should account for this; work with a statistician to think through these issues after you have applied the "unit- of-analysis litmus test."

Make sure your terminology is clear and consistent throughout the grant. Inconsistencies can occur when different portions of the grant are written by different individuals and/or when different terms are used interchangeably throughout the proposal. It also becomes important when using background work from other investigators that you clarify terms and use them consistently. For example, if you propose to study colorectal cancer ensure that "colorectal cancer" is consistently used in the different sections of the grant instead of switching to "colon cancer." Along these lines, it is also important to keep abbreviations consistent. Better yet, minimize abbreviations where you can; and rely only on standard, well-recognized abbreviations.

- Make sure your budget is appropriate and makes sense. A detailed breakdown of the expected costing and the corresponding justification must be provided. This should include both direct costs and indirect costs. We have all read grants and written grants for which an acknowledged maximum amount of funding was available, and the budget was adjusted to take advantage of this. However, questions arise when a grant is either underfunded, and it is not clear where the additional funding will be found to support the proposal, or potentially overfunded, when it appears that the investigator is "double dipping" or asking for amounts of money that are not consistent. Examples include two investigators from a similar institution who submit grant requests. One states that the cost for statistician services will be \$200 per hour, and the other budget from the other investigator states that the cost for statistical services will be \$50 per hour. Make sure that what you are asking for is legitimate. One submitted grant requested \$300 for a jump drive! Also, if your complex budget ends up totaling *exactly* the budget limit, the first instinct of the reviewer is to figure out how that happened – it tends to suggest that back-calculations may have occurred. The bottom line is to truthfully and justify all aspects of your budget truthfully and clearly.
- Proofread! And have many other people proofread your grant as well. Nothing torpedoes a grant faster than obvious spelling, formatting, or grammatical errors that annoy the reviewers. When you have finished proofreading, proofread again! The committee will notice all forms of errors. These include simple typos, and more egregious errors, such as missing sections and sentences cut-off mid mid-thought.
- If the intention is to collaborate with other partners in the same or different institutions, this

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should be clearly noted in the grant application. Multicenter or multidisciplinary studies are stronger candidates.

- Make sure that your letter writers and collaborators have read your grant and understand what you need. It is even more effective when they truly know what you are doing and can comment on the strengths of your proposal rather than just supporting you as an individual in their letters.
- Review your work team carefully. Reviewers consider how likely it is that a work benefiting from a grant will be executed properly, completed, and published. Consider that reviewers have no better way of knowing what work will lead to publication than by reviewing the history of the participating authors and the centers they practice. It is advisable to have excellent mentors with extensive academic history in the work area.
- Multicenter Proposals look more attractive for the reviewers. Sometimes, conducting research studies at a single center could result in difficulties obtaining the sample size, limit the generalizability of the results, and could avoid homogeneity of the study population.



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