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The NIH R01 Tool Kit

Science Careers Editors
United States
27 July 2007

Editor's note: In September 2001, Science's Next Wave published "[Getting an NIH R01](#)," which became the most frequently accessed Next Wave article for several years after. Since 2001, the National Institutes of Health has made many changes to its programs, including, notably, a transition to electronic applications. Meanwhile, we've continued to learn more about the process and how to make it work to your advantage. Science Careers (Science's Next Wave's successor) reworked the article in July 2007 to reflect the changes at NIH and our new insights. As noted in the original text, we will continue to update the article

periodically as conditions change.

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1. WHAT IS THIS DOCUMENT FOR?

If you're a scientist doing research that's directly related to human health, you need to know your way around the National Institutes of Health (NIH). Every young biomedical scientist seeks NIH grants; indeed, the first R01 is a milestone in every biomedical researcher's career.

Unlike most other guides, this one isn't static. In the coming months and years, we, the writers and editors of *Science Careers*, will incorporate changes in NIH procedures, new funding opportunities, and so on, and will keep it evolving as we learn more and get better advice from new sources. We'll keep refining it to reflect input from you and others.

So bookmark this page. Use it as your starting point whenever you start to prepare a new NIH research project grant (RPG), and check back when you have a draft in hand. This guide will be useful throughout the process of preparing and submitting grant applications.

NIH is the most important source of research funds for biomedical research, but don't forget that there are many other sources. *Science Careers*' [GrantsNet site](#) is the most complete, best maintained database of science research grants available anywhere. And it's *free*!

2. CAN GENERAL GUIDELINES HELP PARTICULAR APPLICATIONS?

In other words: Are guides like this a waste of time? Is there really anything helpful we can say? We've given this a lot of thought, and we're pretty sure the answer is yes. There are several reasons we think we can help. First of all, according to the experts, otherwise competent and qualified applicants often fail in their quest for NIH funding for one (or more) of a few common reasons. We can help you avoid those few pitfalls in preparing your application, greatly improving your chances of success. Many researchers know their science inside and out but don't take the time to learn about the intricacies of the proposal-reviewing process, so they end up making mistakes. Indeed, intricacies aside, many applicants lack even a basic notion of what proposal writing is all about, what a grant proposal ought to accomplish. The more time you get to spend on your science, the better, but succeeding in research requires more than just ingenuity and a deep knowledge of your field. We aim to make the process of learning about those other concerns--such as writing grant proposals--as short and painless as possible. If you're reading this, that's half the battle.

The second reason we think we can help you is that reviewers evaluate and compare applications based on a few common principles. Most reviewers have an outsider's perspective, and they are charged with comparing applications from disparate subfields. They know a lot of science and a lot about your field, but they're almost always working in a field that is closely related to--but not precisely the same as--yours. They are charged with evaluating your application relative to the "state of the science" and not directly to other applications, but it's impossible to do it without comparing. If you know what those principles are--the basis for comparison--you're a leg up on the competition. If we can help you understand how a typical reviewer goes about generalizing and comparing, we'll improve your odds of winning a prize.

Just remember your goal in writing is to instruct the reviewer on how to review your application. That's principle number one.

3. THERE ARE MANY DIFFERENT KINDS OF NIH RESEARCH SUPPORT

NIH provides many different kinds of intramural and extramural support, each specified by a three-character "activity code." The major kinds of support include research contracts (N-series), cooperative agreements (U-series), interagency agreements (Y-series), research projects and centers (P-series), research project grants (R-series), fellowships (F-series), training grants (T-series), and career development awards (K-series). There are many other kinds as well. A comprehensive list can be found in the NIH document [Activity Codes, Organization Codes, and Definitions Used in Extramural Programs](#) (PDF document). One odd one that's important for early-career scientists is the new K99/R00 award, which combined a training award with a research grant to bridge the transition from postdoc to faculty.

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4. THIS GUIDE IS MAINLY FOR R01S

Early-career academic scientists are most likely to be interested in research project grants, fellowships, and career-development awards. The latter two categories will be covered elsewhere; this article focuses only on R-series research grants. Much of the background information provided, as well as those basic principles, are relevant to any program that utilizes NIH's usual review process.

5. RPGS

A confusing bit of nomenclature: R-series grants (research project grants) aren't the only RPGs in town. Even

though RPG stands for "research project grant," NIH considers the U-series (cooperative agreements) and P-series (projects and centers) to be RPGs as well.

6. THERE ARE MANY DIFFERENT TYPES OF R-SERIES GRANTS

Here's a list of the most important types of R-series research grants:

- **R01** Research Project. Grant for a project performed by one or more named investigator(s) in an area of specific interest and competence.
- **R03** Small Grant. Time-limited and nonrenewable grant in a targeted area.
- **R13** Conference Grant (also U13).
- **R15** Academic Research Enhancement Award (AREA). For small-scale projects at institutions that don't get much NIH funding.
- **R21** Exploratory or Developmental Grant. Small, time-limited grant to explore new ideas in targeted areas.
- **R34** Clinical Trial Planning Grant Program. Supports the development of phase III clinical trials for pharmaceuticals.
- **R00** [Pathway to Independence Award](#) (also K99). Helps researchers obtain an R01 grant earlier in their careers. See [our article](#) about this program.

This is just a sampling; there are many more. If you're a real wonk, you can find a list of all activity codes and technical definitions on the [NIH Web site](#) (PDF document).

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7. NEW INVESTIGATOR GRANTS ARE NOW R01S

If you've never received an NIH grant before, you'll probably want a new investigator grant. In the past, early-career grants had separate designations--R23 and R29--but now they, too, are R01s. Just remember to indicate (by checking YES in item 1 of the form [PHS-398 Cover Page Supplement](#)--the link is to a Microsoft Word document) that you qualify for consideration as an early-career scientist. [If you're new to NIH, this gets a little confusing. Since NIH switched to electronic submission, applications are made using the SF424 (R&R) form. But this form incorporates elements of the old PHS-398 form that R01 applicants used before the switch to electronic submission.]

To qualify as a new investigator, you must not have previously received a regular NIH grant. Applicants who qualify for early-career status are evaluated using criteria that are young-scientist friendly. The bar isn't so much lowered as moved horizontally; the criteria are still stringent, they're just more appropriate for researchers who haven't had time to amass publications and a reputation. More emphasis is put on potential--and less on actual accomplishments--than for established researchers. Remember to take this difference into account when writing your proposal! More on this later.

8. APPLICATION DATES

New R01 applications are accepted three times a year: 5 February, 5 June, and 5 October. Deadlines at NIH used to be very simple--except for AIDS-related grants, most things were due on the same date. But no longer; since switching to electronic applications, the dates have been spread out to minimize strain on the servers at Grants.gov and NIH eRA Commons. (If you don't know what those things are, be patient. We'll get to that soon enough.) Competitive grant renewals ("competing continuations" in NIH-speak), supplemental grants, and revised applications (AKA "amendments") are due exactly 1 month later (on 5 March, 5 July, and 5 November). Note also that the schedule for all AIDS-related grants--including R01s--is different: Applications for new AIDS-related work are due on 7 January, 7 May, and 7 September. Deadlines for other types of grants are [available online](#).

Another factor--a [pilot program](#) to shorten the review cycle for new investigators--complicates the schedules further. If you're a new investigator participating in this pilot program aimed at shortening the review cycle--if you are you'll know it, it's hoped--your deadlines for resubmission are 20 March, 20 July, and 20 November. For other programs (and even for this one), consult NIH's master schedule to be sure you get your application in on time.

NIH [takes its submission deadlines seriously](#); get your application to NIH by the specified date by 5 p.m. local time of the applicant institution. If the deadline falls on a weekend or a holiday, it is automatically extended to the next business day. NIH does not grant extensions in advance and accepts late submissions only under extenuating circumstances (such as the floods following Hurricane Katrina). If an application is sent in late, NIH requires a cover letter explaining the delay and will evaluate the reasons on a case-by-case basis.

9. APPLICATION METHODS

As of February 2007, NIH accepts R01 and most other grant applications in electronic form only. Institutions need to register both with NIH's Electronic Research Administration Commons ([eRA Commons](#)) and the government's central grants portal, [Grants.gov](#). Even if an institution is registered with NIH and Grants.gov--your research administrators can tell you for sure--individual researchers still need to be registered with NIH, as principal investigators. PI registration is a one-time process; you only have to establish an account once. After that, you can

apply for NIH grants indefinitely (or until you change institutions) using that account. Registered PIs can also check on the status of their grant applications at eRA Commons.

NIH, along with the other major grant-awarding agencies, post their funding announcements at Grants.gov, and those announcements allow you to apply electronically directly from the announcement page. NIH has two main methods for electronic applications: online forms and system-to-system delivery. As of July 2007, NIH uses the PureEdge online forms specified by Grants.gov. While on the Grants.gov site, applicants click on a link to download the application form from the announcement, and the PureEdge software fills in a few fields with the announcement name and identifier. The applicant fills out the rest of the form offline and then uploads the completed form, with attachments.

The online form's feature of filling in the announcement name and number is more than just a convenience. It connects the application directly to the funding announcement, a strict NIH requirement. Even if submitting an unsolicited proposal, you must reference in the application what NIH calls the parent announcement for that funding program type (such as R01). NIH provides a list of [parent announcement numbers and links](#), including the announcement for the R01.



Why NIH switched to electronic applications. This photo, which also appeared in our 2001 article, shows the loading dock at NIH on the day of a grant-application deadline. Since the photo was taken, the number of applications NIH receives has more than doubled.

One problem with PureEdge, users say, is that it doesn't have good support for OS X and other non-Windows computing platforms. These applicants need to use a [work-around](#) to convert their data to a Windows format for electronic transmission. So in 2007, Grants.gov announced a new electronic form technology for grant applications, based on Adobe's Portable Document Format (PDF), to replace PureEdge. As of July 2007, however, Grants.gov planned to use the PureEdge forms into 2008, while it phased in the Adobe PDF technology.

Institutions with the right computing infrastructure can send applications directly from their own computers using [system-to-system](#) delivery, which avoids the need for PureEdge or Adobe forms. This alternative requires software development by the institution--and, usually, a high volume of applications to justify the cost. Another alternative is system-to-system delivery through a [third-party software or service](#).

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10. SF424 (R&R)

The official name of the federal-government-wide research grant application is *Standard Form 424, Application for Federal Assistance (Research and Related)*, abbreviated SF424 (R&R). NIH provides [detailed instructions](#) for filling out SF424 (R&R). In addition to the SF424 (R&R), NIH requires other NIH-specific information from the applicant. Be sure to *thoroughly* read and understand all of the forms and documents identified by the funding announcement. Just because a form is labeled "optional" in the SF424 (R&R) package doesn't mean it isn't required; it just means that some programs require it and others don't. Check with NIH well before the submission deadline if you aren't sure whether a form or document is required for the program you're applying to. In addition to the SF424 (R&R) and the NIH-specific forms, many applications require attachments. You will need to transmit these attachments in Adobe PDF format. NIH offers [guidelines](#) for preparing these attachments.

Science Careers articles from January 2007 describe the [electronic applications process](#) at NIH and Grants.gov in more detail, as well as the [efforts by several institutions](#) to prepare for NIH's electronic grant applications.

11. R01 TYPES

This isn't crucial information, but knowledge of the [main types](#) is useful for understanding some of NIH's online statistics.

- Type 1--A shiny new R01 application
- Type 2--A competing continuation (that is, renewal) application
- Type 3--An application for additional (supplemental) support
- Type 4--An application for additional support beyond that previously recommended
- Type 7--A change of grantee institution
- Type 9--A change of NIH awarding institute or division (that is, a competing continuation in a new institute)

If your grant application isn't funded in the first round and you revise and resubmit it, your resubmitted application will still be Type 1, but it will be classified as "amended."

12. WHO QUALIFIES?

If you are a biomedical scientist with a faculty position, you qualify to apply for an NIH research grant. Even if you don't have a faculty position, you may qualify--technically. You don't need to be a U.S. citizen or even working in the United States. All you need is the support of a qualified institution, the proper educational credentials, and a completed application. If you're not in a standard, tenure-track faculty position, "the support of a qualified institution" may be a stumbling block. If you're not in a tenure-track job, your institution (university or academic medical center) may or may not let you apply.

But even if you qualify, that doesn't mean you will be competitive. In order to receive an award, you have to have a strong record of accomplishment (or, for new investigators, demonstrated strong "research potential"). You have to prove to the reviewers that you can get the work done.

This last point doesn't only mean that you have to prove your general competence as a scientist; it also means you have to have a strong research plan that the reviewers are persuaded you can execute. Furthermore, it helps a great deal to have a long-term appointment and a reasonable workload (i.e., not too much teaching), because that provides evidence of institutional commitment: NIH doesn't want to see you lose your job or move on to another institution, leaving an NIH-funded research project unfinished. Although NIH is interested in career development, it isn't a public works program for research scientists. NIH is very serious about getting the work done, which means that it also helps to have experience running a lab and managing money, although these criteria are loosened for new investigators.

Finally, even though non-U.S. applicants qualify (even foreign institutions can win NIH research grants), reviewers are asked to consider whether similar work is being done in the United States. If similar work is being done in the United States, your chances as a foreign investigator aren't as good. This is an extra hurdle that non-U.S. scientists must clear.

For non-U.S. researchers, especially if you're living in "developing" parts of the world, the best strategy is probably to find an NIH-funded--or fundable--U.S. partner. Several programs exist to facilitate international collaborations, including the [CIPRA](#) and [FIRCA](#) programs.

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13. WHEN SHOULD I START WRITING?

Yesterday. Better still, last year.

In all seriousness, it's never too soon to start writing your first R01 application. If you can find the time, start developing ideas as soon as you're comfortably settled in to your postdoc. That's right, I said postdoc. True, it's unlikely that you'll actually be able to submit your application while you're still a postdoc. That would require university sponsorship, and most universities won't sponsor a postdoc for independent funding. Even if they did, NIH is unlikely to fund it. Nevertheless, starting a grant proposal while you're still a postdoc has many advantages.

For one thing, you get an early start on thinking independently and developing your own ideas: *If this were MY lab, here's what I'd do differently.* For another, a well-developed, well-conceived R01 proposal in hand makes you look good to prospective employers. Submit it as supplemental material when you apply for faculty positions.

But the best reason for writing an R01 while still a postdoc is that you can submit it as soon as you accept the offer of a permanent job. If you get your first R01 application submitted that early, you'll have time to be rejected, revise, resubmit, get accepted, do the work, and win a competitive renewal--all before you stand for tenure.

But none of this matters to you if you already have a faculty post. In that case, you still want to get a good, early start on your application. You'll want to allow time for feedback from colleagues, and that takes time. The scientists you will ask to preview your application aren't going to work on your schedule.

14. THE CENTER FOR SCIENTIFIC REVIEW

NIH's grant-reviewing organization--the Center for Scientific Review (CSR)--is one of 24 NIH institutes. It's the first stop for any grant application; indeed, usually your grant application will be reviewed for scientific merit entirely within CSR, regardless of which institute ultimately funds (or decides not to fund) your research project. (A few, special programs are reviewed within the scientific institutes.) So you need to understand how CSR is organized.

CSR is divided into integrated review groups, which, in turn, are divided into study sections. Here's a [CSR organization chart](#) and the [study section roster](#).

You need to understand this because your cover letter will advise CSR on which study section to send your application to. Your request may not be honored--the process of routing applications to study sections is partly automated and based on key words--but you can at least anticipate which study section your application is likely to end up in. And it helps a great deal to know who will be evaluating your proposal.

Usually only two study section members write formal reviews of your proposal, and generally you won't know who they are. These reviews are made available to the whole panel in advance of the meeting. Then, during the meeting, one reviewer presents your application to the rest of the panel and provides a preliminary assessment.

Note that the above roster index includes links to study section membership rosters. Click on the acronym to see the roster; clicking on the study section name will take you to a detailed description of the study section's focus. Once you've got an idea which study section is most likely to consider your proposal, look at the membership rosters. See names you recognize? If you don't, look up their publications and see whether they're doing work that is similar to yours--or, more generally, if they're likely to appreciate the value of the work you're proposing. If you don't recognize any of the names, and their papers seem to be written in Martian, this might not be the correct study section. Ideally, none of this should be new to you. Very likely, your application will be considered by the same study section that evaluated the applications of your closest research mentor. It is hoped that you know some of the study-section members and they know--and respect--you and your work.

Studying the membership roster will also help you decide how to pitch your project--how technical to be and how general: If your study section is populated by people who are likely to know your science very well, you may want to discuss your work at a higher level of technical detail. Imagine that you are having a one-on-one conversation with them. What would you say? How would you present your work to that audience? But even if your study section includes experts in your field, don't forget to emphasize the big picture. You want to show that you know how to do your work, and you have to show that it's worth doing.

It's one of the oldest bits of writing advice around, a cliché: Know your audience. CSR is your audience; you aren't writing for some abstract group, you're writing for this core group. When you're writing an NIH grant proposal, you can actually get to know your audience pretty well. That's a huge advantage.

One other thing you need to consider when preparing NIH applications: You can apply in response to a specific program announcement (PA) or request for applications (RFA), or you can choose not to. It's exciting to see that NIH is seeking to fund research like yours, so you might be tempted to run out and apply under a particular RFA. But that might not improve your odds. Not every RFA is well funded, and some get lots of applications. So you'll have to decide whether your odds will be better within an RFA, or whether your application is likely to fare better among the general pool of applications. On average, funding rates for RFAs are lower, but it varies from one competition to the next. To search the complete list of all RFAs and PAs, see the [NIH Guide](#).

15. NIH ORGANIZATION

Your proposal will be reviewed by a study section, but it will be funded by a home institute (i.e., the National Cancer Institute if your project is cancer-based, or the National Institute of Allergy and Infectious Diseases if it's about AIDS). An institute committee will make the ultimate funding decision, based on budgets, the scores your application got from the study-section reviewers, and the institute's scientific priorities. This is the second tier of NIH's lauded two-tier system. Just as you can (and should) recommend a study section, you can (and should) also recommend an institute in your cover letter to fund your application; these requests usually are honored. Furthermore, it's a good idea to suggest a second institute. It's not uncommon for an institute to stretch to fund a proposal that's on the edge, and one of the best ways to do this is to team up with another institute. This [list of institutes](#) has links to the home pages of the various centers and institutes that make up NIH.

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16. DO NOT LET COMPETITORS BE YOUR REVIEWERS

If your competitors are doing the same sort of work you're doing, make sure they don't end up reviewing your proposal. Include in your cover letter a request that particular competitors not be named as reviewers.

17. WHAT NIH TELLS REVIEWERS

There are loads of resources out there to help you write successful NIH proposals. We encourage you to read and compare all of them--if you have the time. We'll provide a list of some of the best resources momentarily. But the goal of this article is to save you time by bringing together all the best advice.

Here's the most important document you can read--required reading. It's short. Read it now.

- [Guide for Assigned Reviewers' Preliminary Comments on Research Grant Applications \(R01\) \(PDF\)](#)

These are the instructions given to reviewers of R01s. It's a carefully written document that doesn't require much explication. Study it and tape it to the wall above your desk. This document specifies the criteria that reviewers **must** use in evaluating research grant applications. These are, consequently, the criteria you **must** use in writing your application. Note in particular the five criteria listed: significance, approach, innovation, investigator, and environment. Your goal in writing an application is to convince reviewers that your project is important, your approach makes sense, your approach is innovative, you (and your collaborators) are qualified to do the work, and your institution provides an environment that is conducive to getting the work done--that it doesn't make unreasonable demands on your time and that it provides the infrastructure you need to succeed.

You will notice an additional criterion in this document: the "Multiple PD/PI Leadership Plan." NIH only recently started allowing grant proposals to be submitted in the names of more than one PI. If you're doing this, read this section carefully (like the others) and make sure your proposal is strong in this area.

Just how important are these criteria? How closely are these instructions followed? Pretty closely, we hear. After all, these aren't merely suggestions; they form an outline. They dictate the form that R01 reviews are to take--one paragraph for each criterion listed--so they're pretty hard for reviewers to ignore.

18. THE MOST IMPORTANT ADVICE YOU WILL RECEIVE

Write a draft of the application and then write your own evaluation using the reviewers' guidelines, one paragraph for each of the five criteria. Be honest. How does your proposed research compare--specifically, in each area--to work in your field that you respect and admire ... to the "state of the science"? Does your application make the best possible case for the significance, approach, degree of innovation, qualifications (or potential) of the investigator, and the strength of your institution's support? Does the work you hope to do, in an honest, objective evaluation, measure up to the work that the best (NIH-funded) scientists in your field are doing? If the work you propose falls short, is the problem with the science or with the presentation?

If the problem is with the presentation, it's easy to brush up the prose. Get some help (more on this momentarily). If the problem is with the substance, you need to solve it. Think of a different approach, another way of doing things. Either way, you can't expect to win your first R01 until you fix those problems.

Once you feel that your application meets the standard for each of those five criteria, send it on to a mentor, or one or more close colleagues. It's a good idea to send it to two different colleagues, one who is an expert in your field (an insider) and one who is from a related field who can provide the outsider's perspective. Circulating your proposal widely carries a small risk that someone will steal your ideas. But it has the considerable advantages that:

1. It will make your proposal stronger.
2. It can help to build a consensus within your network of colleagues that the work you propose must be done, and that you are the best person for the job.

That sort of thing has a way of filtering back to potential reviewers. Give your colleagues the NIH reviewer guidelines and ask them to review your proposal. Don't take their suggestions and opinions as gospel: Evaluate their comments critically, but don't be defensive. If you think they have merit, address them. Fix the problems.

An additional advantage to circulating your proposal widely: You can't be an expert in everything, but you can include expert analysis in your proposal that covers all the bases. Ideally, you've got a support network to which you can turn to advise you in some of the areas outside your specialty. It doesn't really matter whether all the ideas and insights in the proposal came out of your own head. If you've got friends and colleagues who are willing to advise you--and, reviewers can safely assume, to help you later on--that's an important asset. Make sure your proposal reflects it.

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19. A FUNDING PROPOSAL IS AN ARGUMENT

Never forget that your proposal is a work of persuasion and not a collection of disparate facts. It isn't merely a description of the work you want to do; you are making an argument that it needs to be done and that you are the right person to do it. Make a tight, focused, compelling argument.

20. THE BIG PICTURE

A related point: You need to include enough technical detail to be convincing, but your main objective should be to present the big picture. Focus on the significance of your research and what's novel about your approach. Include detail as needed to elucidate the novelty of your approach to the tricky parts.

21. INNOVATION

Criterion number three, innovation, is a relatively recent addition. It was added to the list as a result of concerns that NIH reviewing was too conservative and--hence--favored complacent senior scientists over more daring

younger ones. Innovation is currently a point of emphasis, but to what extent will depend on the particular reviewer; the consensus is still that NIH reviewers are too conservative. So emphasizing innovation carries risks. Innovation is valued if you can convince the reviewers that your approach will work. But more innovative approaches may be seen as risky; you may have a harder time convincing some that your approach is viable.

If your approach is particularly innovative, you may want to apply to a program that is designed to fund high-risk research, such as an R21 exploratory/developmental research grant. But read the instructions carefully to make sure you qualify. The work must really be new.

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22. ADVICE FOR NEW INVESTIGATORS

Reviewers of new-investigator R01s are given special instructions. You'll find them in the document "[Review of New Investigator R01s.](#)"

NIH charges reviewers with evaluating new-investigator applications differently than applications from established researchers. The instructions are fairly specific: "All applicants," writes NIH, "should be evaluated in a manner appropriate for the present stage in their careers." In particular, new investigator awards are evaluated more for feasibility; actual preliminary data are weighed less heavily. New investigators are expected to be less accomplished--fewer publications are expected--but they are charged with demonstrating their "training and research potential." This means that you probably should include more biographical information. New investigators have to sell themselves as well as the science. Established researchers can sit on their laurels, but most new investigators don't have enough laurels yet to sit on. Besides, laurels are pointy.

23. HIRE A WRITING CONSULTANT

If you're a lousy writer, use your start-up funds to hire a writing consultant. Look for someone who is generally familiar with your field, someone who has experience assisting successful proposal writers. You might need to be creative to find someone you trust. Try a trade journal. Writers for biomedical research publications (professional magazines, not scientific journals) often know quite a bit about biomedical science, ... and they can write, too. Contact two or three, and talk to them about your needs and the nature of the collaborative process you envision. Then, trust your instincts and make a choice. Be prepared to pay for talent--you get what you pay for.

Oh, and don't forget about your own institution's support staff, and your buddies in the English department.

24. SENDING IN YOUR APPLICATION

Once completed, the electronic R01 application is sent by the institution's authorized representative (often a research administrator) to Grants.gov, *not* NIH. One reason for this approach is security; Grants.gov authenticates the sender in order to prevent fraud or misrepresentation. Grants.gov also checks for errors in the form SF424 (R&R). Grants.gov logs and acknowledges the submission, and once the application passes Grants.gov's review, Grants.gov then sends it on to NIH.

At NIH, eRA Commons assembles the grant application into a single file that combines the data in the SF424 (R&R), entries in the NIH-specific components, and the PDF attachments. At this point, eRA Commons performs a second error check, this one dealing with NIH-specific requirements. The authorized representatives and PIs will receive e-mail notices from eRA Commons with error or warning messages--or indicating that the application has cleared error free. The eRA Commons system will return one or more notifications giving the status of the application and noting any discrepancies or omissions that the applicants need to fix. More details on the electronic submissions process are available from [Science Careers](#) and [NIH](#).

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25. IF YOU SCHMOOZE, YOU LOSE.

I once saw a presentation by a senior, very successful researcher--one with an impressive record of funding and accomplishment, one you may have heard of--called "Getting your first NIH grant." His talk was heavy on schmoozing. He emphasized the importance of personal contact. Contact your scientific research administrator, he suggested, before you even apply. Send that person a short list of objectives and ask for feedback. Is your work something he or she would be interested in funding? Then, the speaker argued, stay in contact throughout the process. Shepherd your application through.

Is this good advice?

NIH is eager to mentor young scientists, and most NIH officers are eager to help. If they didn't like the role of mentor and facilitator, they wouldn't be working at NIH. So you should definitely interact. Don't hesitate to call if you have a legitimate reason (see below for what qualifies as a legitimate reason).

But schmooze? Be careful. The key is not to be--or seem--cynical. Another worry is that you could be perceived as too dependent and lacking in original ideas.

One of the worst things that can happen to a young researcher is to be labeled as cynical. Young researchers

aren't supposed to be cynical; cynical is for old, established researchers. Young researchers are supposed to be bright-eyed, bushy-tailed, earnest, and serious. I'll make two points that I think will convince you that caution is warranted when it comes to schmoozing.

1. These folks see a lot of grant applications. Your phone call will likely not be the first they've received that day (unless you call before they've had their first cup of coffee--a very bad idea). These folks can smell a schmooze a mile a way, even through coffee fumes; they can tell if you're wasting their time. So don't call unless you have a good reason.

2. Section 1.4 of the [SR424 \(R&R\) grant application instructions](#) (the link is to a Microsoft Word document) includes explicit instructions for "interacting" with program officials. Nowhere do these guidelines say, "Don't contact NIH for any other reason"--indeed, the tone of the comments is solicitous; NIH encourages your interactions--but the fact that guidelines exist means that they should be followed. Here's what they say, in brief:

- First, you are encouraged to gather any additional information that might be available for the particular grant program you're applying for. You can probably find it on the Web site, but it's reasonable to contact a human being to make sure you have everything you need. Indeed, it's accepted, so you probably should.

- Second, you are encouraged to contact "relevant Institute or Center staff for advice in preparing an application and for information regarding programmatic areas of interest." Phone numbers to call are listed in the SR424 (R&R) instructions. Once again, do this. If you don't, you'll be at a disadvantage. It's a bit like visiting your professor's office when you had a question about the homework in college and grad school: You get to hear from the horse's mouth what he or she is driving at.

- Third, you are encouraged to let them know if your initial study-section assignment seems erroneous. Once again, the SR424 (R&R) instructions tell you whom to call.

- Fourth, once you've received your "summary statement," you are encouraged to contact "the appropriate Institute program official (noted on the Summary Statement) for an interpretation of the reviews and the disposition of the application."

Consider these your prime windows of opportunity to interact with NIH program officials. If you really need to call at another point in the process, do. But except in special circumstances, limit your contact with NIH to these times, and contact only appropriate personnel. Don't call just to chat or to ask about something that can easily be found on the Web site. It's disrespectful.

These are general suggestions; special circumstances may lead to different advice. For example, if you already have a warm, personal relationship with an NIH program officer, then your instincts are worth far more than these instructions--which are, after all, intended to be the best advice for the most people. If they don't apply to you, you're likely to know it. Follow your instincts--unless they aren't very good.

Your postdoc adviser and senior colleagues with an established record of research accomplishment (and NIH funding) can probably get away with schmoozing. Some NIH folks might even be honored to receive a phone call from a venerable scientist (well, that might be a bit of a stretch). Just remember that what works for the goose very possibly might not work for the gander (or vice versa). Unless you're venerable, play it safe. And speaking of geese and ganders:

Gender and race inevitably color these kinds of interactions. For better or for worse, social dynamics are different depending on the gender of the participants.

Indeed, much depends on particular, individual personalities. If you doubt your ability to pull off an effective schmooze, trust your instincts. If you are confident and your motives are pure, then call. But don't be cynical.

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26. WHAT IF YOUR PROPOSAL IS NOT FUNDED?

Well, most of them aren't. But many people react to this in exactly the wrong way.

If your proposal isn't funded, take advantage of that fourth window of communication opportunity: Once you've received your "summary statement," contact the "appropriate institute or program official for an interpretation of the reviews and the disposition of the application." Take careful notes. Get as much insight as you can into the reviewers' responses to your application. This isn't at all for cynical reasons--well, maybe just a little. You want to have the best information you can get for revising your application. (Yes, it's a foregone conclusion that you'll resubmit.) But it doesn't hurt to be perceived as serious and determined.

Then get to work rewriting the application. After all, the funding rate for "first amendments" (the first resubmission of a rejected application) is slightly higher than the funding rate for new proposals. The funding rate for second amendments (the second--and last--resubmission of a twice-rejected application) is higher still. You might say that having your proposal rejected gets you that much closer to getting a grant--if you handle rejection and use it to your advantage.

No matter how tempting it might be, don't dismiss the criticisms of your reviewers. Address them; take them seriously. True, the occasional reviewer will be clueless, but that really doesn't matter. Once your application has been reviewed, it has a paper trail that you have to deal with, like it or not. Even if the comments are dumb, address them. If a reviewer doubts that your approach will work, come up with an alternative approach that

definitely will. If a reviewer doesn't think your research is important enough to merit funding, change your justification--or beef it up. If after giving the reviewer's opinion a chance, you're convinced he's wrong about the importance of your research, even if your score doesn't improve all that much the next time around, you are more likely to be funded as an exception if the goals of your research are precisely aligned with the objectives of NIH.

In the paragraph above I wrote, "even if the comments are dumb, address them." I don't mean to suggest that you should check your dignity--and integrity--at the door. If a reviewer is wrong, then the reviewer is wrong. Always be polite and never seem defensive. But if your reviewer made a mistake that cost your application a fundable (or at least a higher) score, in your resubmission politely point out the mistake, then support your case with sound argument, preliminary results, or specific references to the literature, or some combination of these.

27. WHAT IS STREAMLINING, OR, WHAT IF YOUR PROPOSAL IS NOT SCORED?

NIH has a process called "streamlining" that is designed to reduce the workload of reviewers. About half of the proposals are dismissed after a preliminary reading, without being scored. But not being scored is not the kiss of death. Many applications that are initially streamlined are eventually funded. It isn't a lost cause.

28. OTHER RESOURCES

Here's a guide--with links--to some of the best NIH-grant-proposal-writing resources available (besides this one). Some are quite general, some are from particular institutes within NIH, and some are for the particular application form--SF424 (R&R)--that's used for R01s:

- [NIH Grantwriting Tip Sheets](#), from NIH's Office of Extramural research
- [All About Grants](#), a tutorial series from the National Institute of Allergy and Infectious Diseases
- Checklist from the [National Center for Complementary and Alternative Medicine](#)
- [Tips](#) from National Institute of General Medical Sciences
- Resources from the National Cancer Institute: [Preparing Grant Applications](#) and [Quick Guide for Grant Applications](#)
- [Writing a grant](#) for the National Institute of Diabetes and Digestive and Kidney Diseases

Science Careers resources

- Tools and Resources: [How to Get Funding](#)
- Vid Mohan-Ram on [writing an NIH grant application](#)
- How Not to Kill a Grant Application, in six parts:

[Part 1](#): Murder Most Foul

[Part 2](#): Abstract Killers

[Part 3](#): So What?

[Part 4](#): Lost at Sea

[Part 5](#): The Facts of the Case Thus Far

[Part 6](#): Developing Your Research Plan

- [How to Get a Slice of NIH's Billion-Dollar Funding Pie](#)
- [Grant Reviews, Part I: Introduction to the Review Process](#)
- [Grant Reviews, Part II: Evolution of the Review Process at NIH and NSF](#)
- [What You Need to Know About Electronic R01 Submissions](#)

- Science Careers offers occasional [seminars on grant writing](#). Check the Science Careers [workshop schedule](#) for a session near you.

Other media

-Video. Want to skip the book and wait for the film to come out? Too late. There's even a movie about writing NIH grant proposals: [Getting Funded: It Takes More Than Just a Good Idea](#), a two-tape set available (for a price) in VHS format, by Liane Reif-Lehrer. A less pricey (like, free) training course, [Understanding the Grant Process](#), is available on video from NIH's Center for Information Technology.

-Software. NIH publishes a list of certified [third-party service providers](#) that help organizations write, manage, and electronically transmit NIH grant applications.

-Seminars. NIH goes around the country giving [seminars on grant writing and management](#).

Comments, suggestions? Please send your feedback [to our editor](#).

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