

NIH & NSF *Funding Advisor*

The monthly guide to preparing and submitting optimal grant applications

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NHC Offers Second Chance for Unfunded NIH Proposals

A new and little-known group may be a surprising source of funding if your grant is accepted but "unfunded" by the NIH.

The National Health Council (NHC), an advocacy group for people with chronic diseases and disabilities, may be able to help with its new website www.healthresearchfunding.org. The site brings together your unfunded NIH project and patient advocacy organizations (PAOs) that may provide preliminary funding to get your research started.

"In working with the NIH, we came up with the idea of building an online database where researchers, who've made research proposals to the NIH that are accepted, peer reviewed and scored, but unfunded, can upload abstracts of their research projects," says **Nancy Hughes**, assistant vice president of Communications and Marketing at NHC.

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Study Section Insider

The Scope of Your Research Plan: Find the Best Way Up the Mountain by Christopher Francklyn, PhD

Before you start writing any NIH grant application, you must map out your basic strategy. One core element of your overall approach is defining the scope of your project.

Climb the mountain

When considering your proposal's scope, think of your project as a mountain climbing expedition, and the grant as a plan for the climb. In this metaphor, reaching the summit stands for answering the principal research question driving your work. And like climbing a mountain, there may be multiple routes to the summit.

Your Specific Aims represent the potential routes to the summit, and collectively, they describe the project's scope. When choosing each route, consider what technical approaches you have immediate access to, and what additional ones potential collaborators might bring to the research.

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Put your research out there

The first step in finding a second chance for your research project is to create and publish a profile on the new site. This will link you with NHC member PAOs that can be the “bridge” between you and an NIH-funded project. The organization encourages you to upload the following — which you have already constructed as part of your NIH application — to take full advantage of the site’s search capabilities:

- abstract
- primary and potential research areas
- current and completed research
- professional affiliations
- bibliography.

The database includes funding opportunities offered by NHC’s 100-plus members, including the National Multiple Sclerosis Foundation and the March of Dimes. NHC plans to add pharmaceutical companies, along with other business and industry members, as it expands the program later this year.

You may be able to connect with an organization that will provide you funding to generate data. Armed with preliminary or expanded data, your new proposal or resubmission could score in NIH’s higher funding range.

For example, the National Marfan Foundation (NMF) is considering working with a PI who contacted them through NHC’s new site. “He was not previously using our research grant program,” says **Josephine Grima**, PhD, vice president of Research at NMF.

“Through healthresearchfunding.org, he found us and sent in some of his proposals for review.” Grima believes the contact will result in a grant award. This would enable the PI to continue his research and use that as a stepping stone toward an NIH-funded project.

Steps to take

There are several ways you can use the healthresearchfunding.org site:

- Search for funding sources by entering topic areas and/or keywords
- Subscribe to the site’s Auto Feed, which sends you alerts whenever possible funders’ updates include your search terms.

Although NHC’s site enables you to search for funding opportunities, the site also permits PAOs to search investigator profiles and abstracts. Organizations are using the site to find investigators whose research could impact their areas of interest.

For example, the Epilepsy Foundation is looking to provide seed funding to targeted specialty areas, such as pediatric neuropsychology, to add to its current research grants portfolio. “If we’re able to move ahead with that, the NHC website would be one of the sources where we could really look at the other investigators that are out there, besides the ones who are already in our network,” says **Karla Price**, MS, senior director of Programs and Research at the Epilepsy Foundation.

Don’t forget keywords

The NHC site allows you to enter keywords when creating your profile that are specific to the fields where you have conducted research — or are interested in. This is how PAOs will be able to locate you and your unfunded project.

Because of intellectual property concerns, PIs cannot search other investigators’ work published on the

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website. “Investigators need to be aware that they can disclose in their abstract as much or as little information as they want,” says Hughes. But you do not need to upload an entire abstract to access the funding database.

In most cases, applications submitted to an NHC member group will not be as lengthy as NIH applications. But funders likely will require you to submit many of the same documents.

For example, NMF will require a three-page project description along with letters of support, CVs, Institutional Review Board approvals (if necessary), and a budget and related justification.

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You may also have to predict whether you can reach the mountain in four to five years or if it will take 10. But this doesn’t mean that you should reject all research questions that might take 10 years to address definitively. Choosing a 10-year question is not necessarily a fatal flaw — *if* you can convince reviewers that the waypoint you hope to reach in 4-5 years will still pay scientific benefits to people outside your immediate scientific community. You may even win points for being realistic.

Essentially, scope strictly defines the extent of science you hope to accomplish during the proposed award period. Fixing your application’s scale early is a critical aspect of grantsmanship because you have to strike the correct balance between proposing enough work to achieve significant impact — is the mountain high enough? — and not suggesting so much that reviewers think you overly ambitious — too many routes, or won’t get high enough to make a difference.

How broad should scope be?

Keep in mind also that your “expedition” has a fixed budget that will allow you to hire only a set number of “climbers.” This means you have to think carefully about the “routes” (the Specific Aims) for your personnel. Your scope should move the field forward (up the mountain) rather than sideways. If other researchers have made an interesting observation in your field in one organism, don’t assume that reviewers will be excited if you simply attempt to validate the same observation in a related species — particularly if the proposed work only takes your understanding to the same reported level of detail.

On the other hand, examining the same research question in a different species *could* be useful if that

Target a PAO

Select a PAO link on healthresearchfunding.org to land on a group’s home page. Then you can click on the “Request for Abstract” link for information regarding the group’s exact submission requirements.

Although NIH has already peer reviewed your project, the organization’s scientific review board will likely assess it as well. The length of time between submission of your application and award will vary by organization. At NMF, for instance, Grima indicates the process will take approximately four months. ■

system has unique features — better genetics, easier to screen phenotypes and easier biochemistry — that allow you to obtain more detailed data than the original system. Remember, reviewers are trying to uncover the new information’s perceived value. Will it provide novel insights that your competitors in the original system won’t arrive at tomorrow?

Scope should also provide depth to your research plan and insurance against any one approach’s failure.

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Consider These Scope Do’s and Don’ts

When considering your project’s scope, keep the following in mind:

- Before writing up your detailed research plan, **DO** spend time carefully deciding your research’s scope.
- **DO** carefully match scope with the project’s proposed costs and your technical capabilities.
- **DO** use scope to achieve depth, redundancy and flexibility in your research plan, so you can accommodate unexpected outcomes.
- **DON’T** try to fix your research plan’s scope until you’ve carefully defined your central research question.
- **DON’T** fall into the classic trap of proposing every experiment you can think of on the system.
- **DON’T** finish fixing the research plan’s scope until you’ve considered the proposed budget and your own technical limitations. ■

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Experienced reviewers know that — despite the most detailed plans — experiments don't always go as planned, and approaches fall short for unanticipated reasons. Thus, your proposal should include a built-in redundancy, and no single aim should depend on another's success. Reviewers typically spot — and frequently reject — this as a “linear” proposal where each aim represents a technical milestone that relies on a prior aim's success.

Instead, employ a “parallel” strategy where your individual aims represent individual climbers. Accordingly, if one goes spectacularly well, you may want to re-deploy the efforts of the others. Thus, in your proposal design, you should always “expect the unexpected,” and convince your readers that you've engineered your plan — while directed toward the summit — to be flexible and responsive to the results that you obtain.

Limitations on scope

NIH's National Institute of Allergy and Infectious Disease (NIAID) advises new and early-stage

investigators to keep their scopes fairly conservative. A key point NIAID repeatedly stresses is to avoid at all costs the dreaded “overly ambitious” reviewers' critique. The agency also writes, “Be innovative, but be wary,” and “As a new investigator, your goal should be significant incremental progress, not a ‘giant leap forward.’” This advice is somewhat problematic because reviewers usually use the term “incremental” in a pejorative context.

In my experience, there is no such thing as a totally risk-free, high impact, outstanding application. Rather, you should propose just enough risk — both in intellectual novelty and technical capability — to excite the reviewers, but not lose them regarding feasibility.

In addition, you should consider the principal limitations on scope, namely those imposed by resources and your technical background. With an annual \$250,000 grant, you likely will not be able to hire more than three or four full-time researchers.

Consequently, the resource limitation imposes a feasibility test on each aim. Can one full-time worker complete the work in a four- or five-year time period? If your plan is overly detailed with a long experimental sequence with numerous forks and contingencies, reviewers likely will score it as unrealistic. You're better off proposing fewer and better described model experiments, particularly ones for which you have technical precedent.

The other major limitation is your technical background. If you do not have expertise in a particular area, reviewers probably won't accept your research plan's appropriateness and feasibility. If you are a relatively new investigator, you may not have established an extensive track record in more than a few techniques, and reviewers may judge your proposal as suffering from an overly narrow focus.

The obvious solution, which experienced investigators employ universally, is to recruit one or more external collaborators with defined expertise in techniques outside the PI's field of strength. This is particularly important if experts in the field consider the additional approaches as the best way to attack the problem.

The value of experienced collaborators is at least threefold:

1. strengthen the research plan
2. add credibility to the investigator team
3. justify a larger budget.



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Before going this route, new PIs should understand that a larger team means more administrative responsibilities and potentially delicate negotiations regarding leadership, authorship and control over the project's strategic direction.

Dr. Francklyn is a veteran reviewer for NSF and NIH and served as an NIH study section chair. He is a professor at the University of Vermont, where his scientific expertise is in protein synthesis and RNA-protein interactions. He is also assistant editor of the Journal of Biological Chemistry, and is a member of the Editorial Advisory Board of NIH & NSF Funding Advisor monthly newsletter. ■

R01 or R21? Choose the Appropriate Grant Type

You know *what* you want to do and *how* you want to do it. Now you have to decide *which* grant type will offer your research the best funding opportunity.

NIH's R01 and R21 grant mechanisms offer funding for different situations. How to choose between them?

What is different

The R01 is NIH's standard independent research grant designed to provide support for a "specified," "circumscribed" project for which you generally need preliminary data. You can request up to five years, and depending upon your budget type, up to \$500,000 per year in support. (If you request more than \$500,000, you will need the Program Officer's permission to apply.) The R01's Research Strategy is 12 pages in length.

In comparison, the R21 is an exploratory/developmental funding mechanism, and your proposed research should have a "Wow!" factor — meaning it could lead to a research breakthrough or new methodology. The R21 is a one- to two-year grant, and preliminary data is not required. Applicants can request up to \$275,000 for the two years combined, and the Research Strategy should be no more than six pages long.

Choose R21 for "exploratory" work

"I pursue an R21 when I have a new or, to use the NIH term, 'exploratory' idea for which I still need time and funds to further the development and initial testing," says **Kenzie Cameron**, PhD, research assistant professor in the Departments of Medicine and Preventive Medicine at Northwestern University. She is studying health messaging design and has received both R01 and R21 awards.

For example, Cameron wanted to develop three sets of written messages related to the flu and flu shot for a study. "We wanted significant patient input on these messages, and the R21 was the perfect mechanism."

The project was funded because Cameron was able to:

- demonstrate a solid plan
- provide the expertise needed to accomplish what was proposed, and
- justify the costs needed to reach the goal.

For example, Cameron and her team had previously created messages about an influenza vaccination and other preventive healthcare services. "What we sought in the R21 was the opportunity to develop and test print messages related to influenza and influenza vaccination using communication theory as a base," she says. She justified the costs by demonstrating that she required funding to pay for participants, visual design services, and development and layout of the written messages.

Cameron strongly advises you to prevent your R21 from looking like a mentored award. For example, if a senior faculty member is on the grant for 5 percent, and you're budgeted for 25 percent, she says that's fine. But if you're on for 15 percent and the senior faculty is at 10 percent, reviewers may ask who is really completing the study, she says.

By comparison, Cameron says she pursues an R01 when she wants to test an intervention for which she already has some pilot or preliminary data.

The rule is NIH does not *require* preliminary data for an R21. But it's nice to have, according to **Dorothy Lewis**, PhD, professor of Internal Medicine at the University of Texas Health Science Center. "Reviewers are human beings, and they like to see some evidence that what you propose is going to work. The best evidence of that is usually preliminary data."

For example, Cameron submitted some *related* preliminary data for her R21 messaging proposal.

Having the related preliminary data helps the reviewer recognize the research's trajectory by demonstrating the following:

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- what has already been done
- how the grant proposal will build upon the preliminary research.

At the same time, preliminary data is required for the R01. Lewis recommends you have at least one piece of data to support each aim that you propose. “It’s better to have less data and explain it, than cram the proposal full of data and leave off the explanation,” she says.

Tip: If you already have a lot of data and apply for an R21, reviewers may say, “This isn’t exploratory.” In that case, you may not have a choice other than the R01.

Length may decide for you

The amount of time you need to accomplish your research project will play a key role in determining which grant is the best fit. For example, if you need three years of recruitment for your project, then applying for an R21 doesn’t make sense.

Cameron warns against trying to compact your project. “You don’t want to try to fit a larger R01-type project into an R21 because it will be terribly frustrating. You won’t be able to do everything that you want to do, or you think you need to do, for the project,” she says.

Cameron does not recommend proposing anything less than a three-year R01. “The one potential exception might be related to the amount of funding you need to do the project,” she says. “Although \$275,000 in direct costs is a lot of money (R21 cap), it might not be sufficient, depending on what you are doing.”

Ask yourself: What is the length of the project? If it is a shorter term project that is novel and exploratory — and you don’t have much preliminary data — then the R21 is likely your best bet.

Writing a grant takes a lot of time. Don’t make the mistake of thinking the R21 will be easier to write because it has fewer pages than the R01. Having only six pages for the R21 project description creates a challenge. “In those six pages there has to be an amazing, clear description, but you have lost room to delve into the detail you want to,” says Cameron.

Tip: Give yourself plenty of time. NIH indicates it may take three months or longer to write a ready-to-go R01 or R21 application.

Budgets weigh on decision

When establishing your budget, NIH states you should count 60 to 80 percent of your total request toward salaries. If you’re applying for the R21, you’ll have up to \$275,000 to work with. “If most people do \$150,000 in the first year and \$125,000 in the second year, that’s not much money. So you can’t have a huge scope,” says Lewis.

For example, if you think your study needs four different aims, but you are over your budget, you may consider reducing the number of aims or applying for a shorter R01.

In comparison, the R01 budget is more flexible, and the money is spread out over a longer period of time. You can request up to \$250,000 a year if you choose a modular budget. “What that means is, you don’t have to have individual justification for budget items,” says Lewis. ■

4 Tips for Your First Discussion With a Program Officer

Your department chair advises you to talk with NIH and NSF Program Officers (POs). Before you pick up the phone, make sure you’re prepared to speak with the person who could become one of your research project’s biggest advocates.

Too often, a PI fails to do his or her homework before the initial conversation with a PO, says **Bruce M. Kramer**, PhD, senior advisor at NSF’s Division of Civil, Mechanical and Manufacturing Innovation. “I’m always surprised at how many times somebody will call up and they don’t know what any of the programs are.”

Here are five ways to get the most out of your first conversation with a PO.

1. Learn the agency

The more familiar you become with funding announcement types and funding award mechanisms, the more valuable your conversation with the PO will be. In addition, understanding the program areas, offices and directorates relevant to your research interests is important. You should be able to engage the PO in a discussion of your proposal and how it relates to NSF or NIH program interests.

Example: Knowing the roles of those involved in your grant process will prevent wasting valuable time. “A lot of people will just grab the phone and leave it

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to us to explain the difference between the roles of a Scientific Review Officer and a PO,” says **Matthew Fenton**, PhD, chief at NIAID’s Asthma, Allergy and Inflammation branch.

Tip: You can learn about these differences, programs and early stages by reviewing your funding sources websites:

- Find a full list of NIH’s 27 institutes and centers at www.nih.gov/about/almanac/organization/index.htm.
- Locate a high-level overview of NSF that includes policies and procedures, funding opportunities, and a guide designed to help potential new awardees at www.nsf.gov/bfa/dias/index.jsp.

When speaking with your PO, being able to convey your excitement for your project will go a long way. Fenton advises pointing out your project’s novelty and how it differs from all other projects in the same research area.

He also says you should detail how your proposal has significant impact. “Explain how it will move the field forward, change or make new paradigms, or lead to findings that will have broad utility in other research areas,” Fenton says.



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“When you can explain it to us on the phone, then that’s a good sign that you’re going to be able to explain the same kind of thing in your application,” says Fenton.

2. Prepare an agenda

Before you call your PO, generate a list of talking points or an outline of what you want to discuss. It should also include a list of questions.

For example, you should ask your PO if your proposal will be competitive based on your funder’s priorities. Also, inquire about what is generating reviewers’ excitement in your research area.

“Another question should be whether your proposal is sufficiently developed to be competitive,” says Fenton, adding, “Does the data support the central hypothesis and each of the specific aims?” Even a question like, “I’ve been told POs can help me in the grant process, I don’t know how, but I want to learn,” is a legitimate topic and question, he notes.

Tip: Know the extent to which a PO can assist you. Ask your colleagues how their POs helped them through the grant process. For example, a PO will aid in determining whether the funding mechanism is appropriate for your research project, and help you decide if you’re ready to submit your application.

3. Review a highly successful application

Your PO may want to know if you have reviewed a ready-to-go application.

For instance, “many new faculty never get a chance to look at a colleague’s application, especially one that has scored in the top 5th percentile,” says Fenton. In fact, he adds, PIs frequently submit their applications without seeing a funded R01 or other type of grant application.

Tip: You will find four “lightly” annotated sample funded applications on NIAID’s Web site (<http://funding.niaid.nih.gov/researchfunding/grant/pages/appsamples.aspx#rpindex>). The notations indicate the parts of the application that discuss key points, such as the project’s significance, how it ties research to public health and shows potential to advance the scientific field.

4. What your PO will want to discuss

The more clearly you’ve defined your idea and objectives, the better the PO will be able to assist you.

For example, be prepared to expand on the following topics:

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- what you want to do
- the funding mechanisms you want to use
- why your proposal will be a “good fit” with the funding mechanism.

Tip: To make sure you’re ready, compose a brief, clear description of your central idea. Research and note the various funding mechanisms that are available and

suited to your project. Also, write a brief synopsis listing concrete examples of why your proposal meets the funding mechanism’s criteria.

“I say, do call, but have something interesting to talk about. Tell us about your new ideas. That’s what we want to talk about,” says Kramer. ■

Note: Look to a future issue for advice on how to find the appropriate PO for your research proposal in the first place.

NSF “EAGER” Program Encourages Investigators to Take Risks

If you’re ready to set the scientific world on fire with your radically different and transformative idea, you may want to look for funding through the EAGER award.

EARly-concept Grants for Exploratory Research (EAGER) is NSF’s mechanism to fund “high risk/high reward” projects that are *not* likely to make it through the regular peer review process.

“We’re looking for things that could potentially have a high chance of failure, but still have the potential for a payoff that is high,” says **Sam Scheiner**, PhD, program director in the Division of Environmental Biology at NSF. The agency has awarded 2,500 EAGERS over the last four years. There are no deadlines for EAGER submissions and awards are up to \$300,000.

Start with the PO

If you believe your idea may qualify for an EAGER, your first step will be to contact a Program Officer (PO) who knows the area where your idea will have the most impact.

For example, if your field of research is biology, specifically environmental biology and evolutionary processes, following this link, http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503421&org=DEB&from=home, will take you to the POs within that program. There you will find the POs’ names, email addresses and phone numbers.

The PO is the EAGER program’s sounding board and will help to determine if your idea is appropriate for consideration.

Harish Krishnaswamy, PhD, assistant professor in the Department of Electrical Engineering at Columbia University, received a 2009 EAGER for *Ultra-wideband mmWave Radar and Imaging Sensors Based on Compressive Sensing*.

A PO who shares your research interests will be the best judge of how new and exciting your idea is, Krishnaswamy says. “Typically, program managers at NSF (or any other agency) have their own research interests and are likely to fund exploratory projects that fall in that space.”

How do you convey your enthusiasm for your project to the PO? Krishnaswamy recommends using visual aides to illustrate and “sell” your idea. Send them a few slides depicting your idea’s broad strokes, and set up a phone call to discuss the idea in greater detail, he says. (See “4 Tips for Your First Discussion With a Program Officer” on page 30.)

Clearly outline your research

Once your idea passes the PO screening, you’ll be asked to submit a two- to four-page project description, and the PO will provide feedback. Unlike other proposals, with the EAGER, all of the feedback is given before the formal submission, Scheiner notes.

Richard Livingston, adjunct professor in the Department of Materials Science and Engineering at the University of Maryland, along with PI Amde Amde, of the Department of Civil and Environmental Engineering at the same institution, received the EAGER in 2009.

Livingston advises communicating clear and concise information in your proposal starting with the very first sentence. Start with a statement of the research objective. For example, “The Principal Investigator seeks funding to study X and Y to determine Z.”

“This helps the reviewer to keep track of the research’s overall direction while wading through all the technical details,” he says. This will force you to summarize the research in a single sentence, which in turn helps you tightly focus the scope of the work.

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Differentiate the proposed research clearly from other, similar sounding techniques or methods. “Most of the time, reviewers do not have an in-depth knowledge of a particular technology and may confuse it with others,” says Livingston.

For example, there are many different types of techniques used in a specific field of study. If your area of expertise uses a particular method, you have to specify how yours is different from another investigator’s or why it’s better.

Use EAGER process

An EAGER proposal only requires internal merit review, rather than peer review. But this stance is not meant to denigrate conventional peer review.

“I want to emphasize that the peer review is not necessarily risk averse, that the community recognizes the value of exploring unusual ideas, and that the standard peer review system does fund this kind of research,” says Scheiner.

Livingston found the internal EAGER review process to be refreshing. “It was reviewed by qualified reviewers within NSF who are knowledgeable about the research problem. Also, the turnaround for the review process was a rapid one.” You could have an EAGER award out the door within 30 days of the initial phone call, if the paperwork is submitted quickly, Scheiner says. ■

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