NLM extramural program: frequently asked questions

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New and aspiring investigators often ask the same questions of experts as proposals are formulated, written, and submitted to the National Library of Medicine (NLM) for peer review. The NLM's Division of Extramural Programs (EP) provides support to medical libraries, academic medical centers, individuals, and industry through numerous types of grants and contracts. A complex set of processes and procedures is in place and is familiar to established and funded researchers, but to few others. A collection of frequently asked questions (FAQ) and their answers on these issues has been prepared by the Biomedical Library Review Committee (BLRC), a standing advisory group to the NLM that meets three times a year to review and score proposals. The BLRC and two experts on National Institutes of Health (NIH) grants and contracts compiled their advice in an electronic FAQ that has been edited and abridged as an introduction to NLM EP for investigators from medical library science, informatics, and biotechnology. The BLRC expects that if new investigators are able to avoid common mistakes and misconceptions, their proposals will improve in quality and they will be able to spend their time more effectively in proposal preparation.

GETTING STARTED

Purpose

This compilation of frequently asked questions and their answers (FAQ) provides information for new and aspiring investigators in medical informatics, medical libraries, and biotechnology information on how to get started with National Library of Medicine (NLM) extramural support programs and how to improve their chances of success. In addition, the NLM grants process is a good model for many other types of funding opportunities. Applicants for NLM Resource Grants should translate references to "research" to "project" context.

WHAT IS NLM AND HOW DOES IT RELATE TO NIH?

The National Library of Medicine, located on the southeast corner of the campus of the U.S. National Institutes of Health (NIH) in Bethesda, Maryland, is the world's largest library dealing with a single scientific and professional topic [1]. It cares for more

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The National Library of Medicine, Bethesda, Maryland

than 4.5 million holdings (including books, journals, reports, manuscripts, and audiovisual materials). NLM offers extensive online information services (dealing with clinical care, toxicology and environmental health, and basic biomedical research), has several active research and development components (including an extramural grants program), houses an extensive history of medicine collection, and provides several programs designed to improve the nation's medical library system.

WHAT RESEARCH DO NIH AND NLM SUPPORT?

There are many different mechanisms for applying for NIH funding [2]. Following is a list of those most relevant to the National Library of Medicine [3].

Research grants

Basic investigator-initiated research grants are the most common form of funding from NIH. Proposals require a budget, an administrative support section, a twenty-five-page research plan, human- and animal-use certifications, and letters from collaborators and consultants. (This is roughly the structure of proposals for all NIH funding mechanisms.) These basic research grants include R01 and R29.

R01. These are proposals for funding for health-related research and development projects that are two to five years in duration. There is no cap imposed on the budget, but most experienced investigators try to keep the annual budget below $200,000 in direct costs. NLM's research interests are medical informatics, biotechnology information, and health library information science.

R29. FIRST (First Independent Research Support and Transition) award applications are basic investigator-initiated research proposals by new faculty who (*a*) are within five years of beginning their academic careers and (*b*) have not previously been named as

principal investigators on a federal grant (with some exceptions). These applications must be for a five-year project period, require a minimum 50% time commitment, and have a budget cap of $350,000 in direct costs for the five years. The first two years are paid at the rate of no more than $75,000 per year, followed by an increase in allowable direct costs in the remaining three years to $100,000. In addition to the research plan of not more than twenty-five pages and the administrative sections required, as for R01s, R29 applications must be accompanied by four letters of recommendation, including one from a department chair. The review of these applications will take into account the fact that principal investigators (PIs) are not expected to have as extensive a track record as PIs on R01 proposals.

Resource grants

National Library of Medicine resource grants provide assistance for health sciences libraries in developing information services or activities by application of computer and telecommunications technology [4]. The resource grant program was redefined in 1989 to establish information access grants and information systems grants. This grant mechanism funds only direct costs.

Information access grant (G07). These are primarily directed to the libraries of small- to medium-size community hospitals with the need for short-term assistance to achieve better access to and delivery of health sciences information through up-to-date computer and telecommunication technology [5]. Each participating institution—either alone or as a consortium member—may receive up to $12,000 for one year of support.

Information systems grant (G08). This is intended to facilitate the utilization of health sciences information by establishing connectivity of system components, providing improvements to the infrastructure, or encompassing whole systems. The grant is not a research instrument and the project must be for an operational service activity with online access to NLM databases and provision for document delivery. Awards are for one to three years for $50,000 to $150,000 per year.

IAIMS (G08). IAIMS (Integrated Advanced Information Management Systems) grants are institution-wide computer networks that link and relate library systems with a variety of individual and institutional databases and information files, within and outside of the institution, for patient care, research, education, and administration. IAIMS grant support is available for (1) an institution-wide planning phase with funding up to $150,000 per year for one to two years and (2) an operation phase for IAIMS plans to be implemented with up to $500,000 per year for one to five years or $550,000 per year if an IAIMS apprenticeship is included.

Individual fellowships

Individual grants for predoctoral and postdoctoral students (F37) to acquire research experience in medical informatics (including biotechnology) are available. Fellowships are also available for individuals seeking experience in applying informatics (F38). These proposals require a research and mentoring plan, a statement about the applicant's career goals, and letters of recommendation.

Institutional training grants

Institutions may receive grants (T15) for training predoctoral and postdoctoral students in a specific research area. These grants may fund several positions each year. Trainees work with one or more members of a group of predesignated preceptors, as well as with other faculty in the training program. Currently, the NLM supports ten training grants for medical informatics.

Publication grants

NLM's Publication Grant Program provides selective short-term financial support for not-for-profit, biomedical scientific publications. Studies prepared or published under this NLM program include critical reviews or monographs on special areas of medical research and practice; research monographs on the history of medicine; writings on medical informatics, health information science and biotechnology; and, in certain cases, secondary literature tools and scientifically significant symposia. Because funds for publication support are limited, available resources in recent years have been used principally for history of medicine projects.

Conference grants

NIH has funds available to support conferences for the purpose of promoting the exchange and dissemination of information related to its program interests. Awards usually require the participation of several organizations, and provide funding for salaries, consultant services, equipment rental, travel, supplies, conference services, and publications.

NIH funding statistics

NIH has awarded between 6,000 and 7,000 new grants each year for the past ten years, spanning all NIH mechanisms. The proportion of grants funded overall

has decreased however, since the number of submissions and resubmissions has increased significantly over the years. In 1994, for example, NIH received more than 28,000 applications. In 1980, 25% of all R01s were resubmissions; in 1994, 33% were resubmissions.

Overall, NIH reports an award rate of about 25%. For R01s, however, the award rate is only about 10% to 15% in any review cycle, and is up to about 20% for R29s. Approximately 30% of all training grants are being awarded.

WHO IS ELIGIBLE TO SUBMIT AN NLM/NIH GRANT APPLICATION?

Public and private domestic non-profit institutions are eligible to apply. Most applicants are institutions devoted to some aspect of health sciences research, education, or practice, but any institution that can plausibly help to realize one or more of the goals of the request for applications (RFA) or program announcement (PA) is eligible. ("Health sciences" is defined as medicine, dentistry, nursing, public health, pharmacy, veterinary medicine, and other sciences related to health.) Members of a racial or ethnic minority group, women, and those with disabilities are encouraged to apply as PIs. Consortia of eligible institutions are encouraged to apply. Consortium applications must be submitted by a single lead institution; letters of agreement defining mutual responsibilities must be provided in the application and signed by authorized officials of each participating institution.

WHAT ARE THE FIRST STEPS IN PREPARING AN APPLICATION?

The eventual success of a proposal is highly dependent on your knowledge of where the funds are, the kind of research for which they are intended, and which investigator or group of investigators will be most competitive, and on your ability to craft a competitive proposal strategically [6].

The Grants Information Office* at NIH can provide you with all the publications and application kits that you need to get started.

The appropriate form for almost all research applications is the Public Health Service document 398 (PHS-398). The most notable exception is the kit that is appropriate for training grants, PHS 416-1. The PHS-398 can be requested by leaving a telephone message at the Grants Information Office. As part of the instructions, the PHS-398 has incorporated a description of the review process, which will assist you in following the progress of your application through the system. Information Access and Information Systems Grants have special instructions obtained from NLM.

The most important thing to remember about finding funding for research is that it takes patience, perseverance, and lots of time. Successful investigators report that they spend between 100 and 200 person hours in preparing a research plan and writing applications. Taking into account the interruptions that are a regular part of any business day, multiply this figure by three and you have between three and four months. Add into this time frame some down time for reflection on your part so that you can come back to your writing tasks with a fresh outlook, time for your readers to review your ideas and your application drafts, and time for consultations with your collaborators. We now have a period of about six months, without taking into account the time you must spend on other professional duties. It is important for prospective applicants to consider the amount of time available to them after other commitments have been met, as well as their determination and ability to persevere.

There are three opportunities (cycles) per year to submit proposals to NIH. Deadlines for submission depend on the funding mechanism pursued, but regardless of which mechanism is used, they all begin at the Division of Research Grants (DRG) at NIH. At DRG, proposals are assigned two destinations: a study section (initial review group) and an institute.

Snap-outs, review sheets

The entire NIH process takes about nine months. Grant applications are reviewed by the study section approximately four months after receipt at DRG. Scores and percentile rankings are issued (in the form of "snap-outs") within two weeks of the review. The actual review summary sheets are released approximately six weeks thereafter. Final funding may require several more weeks or months.

WHAT IS NIH/NLM FUNDING THIS YEAR?

Asking the question in precisely this way is a sure way to display naïveté as to how NIH works. NIH funds good ideas of all kinds. The spectrum is so vast that scanning the titles of the grants in just one program area will provide an idea of the diversity of research that is funded from the NIH grant pool.

The question arises because many people in the research community erroneously believe that all research supported by NIH is funded in response to

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applications solicited by announcements of RFAs, requests for proposals (RFPs), and PAs. Although it is important to follow these announcements because RFAs and RFPs are made in order to distribute a reserve of funds and thus may increase the probability of your being funded, they are linked to only a small percentage of the total funded research.

WHERE DO I FIT IN?

You obviously already have ideas that you would like to pursue through a research activity. In order to develop those ideas into a workable project for which you can obtain outside support, your first activities should be to educate yourself about current research projects at your institution and to explore ideas about how you might fit into them. It is possible that there is an ongoing research activity that already has support and there is a niche where you could contribute [7]. This could be very valuable to you in your education in the grants process, as you could be a close observer and form ideas about how to proceed on your own.

HOW CAN I GET SEED MONEY?

It is a good idea to discuss research ideas with your supervisors and to involve them in the process as well. Often, research ideas require "seed money" (an amount from $2,000 to $50,000) to collect feasibility data, to conduct a pilot study, or to do preliminary calculations. Sometimes there are institutional funds set aside for this purpose. With your supervisor's help, you may be able to tap into them. Other sources for seed money include industrial partners who might benefit from a technological advance that you would develop, and other funding agencies such as the Whitaker Foundation and other sources that can be identified through your local institutional grants and contracts office.

When applying for seed money, beware of oversubscribed internal competitions

A university may set aside a very small pool of funds and allocate them through an internal proposal-and-review process that attracts far too many applicants for a small funding pool. Because you must economize your efforts, it is a good idea to find out how much money is available and how many applications are anticipated (e.g., from previous years' competitions). You may decide to apply for some, despite the odds, because it gives you practice with a short proposal before you pursue a more extensive project. Sometimes the dean's or department chair's operating budget is a more promising source of small amounts of seed funding, and the process of applying for such funding is less time consuming.

Frequently, state agencies make small research grants. These are an excellent source of funding for a preliminary study leading to an NIH grant. Contact your institution's administration, particularly if it has a grants administration office, for information on how to explore the options in your state; or contact your state representative's office and ask for guidance and assistance in identifying a source of research funds.

WHERE DO I FIND COLLABORATORS?

If you are working completely on your own without the support of your institution or your department, the odds are against your succeeding. Today's research is frequently multidisciplinary, requiring a spectrum of disciplines and considerable resources. If you want to improve your chances of success in obtaining funding for your research, become part of a scientifically credible group at your institution and develop your own research project as part of the larger whole. You will still be in charge of your project, but as part of the larger picture, you will be seen as a good investment for the future.

WHAT FELLOWSHIP PROGRAMS ARE AVAILABLE, AND DO THEY APPLY TO ME?

Trainees appointed to the proposed training program must have the opportunity to carry out supervised research with the primary objective of extending their skills and knowledge in preparation for a research career. Prospective trainees must be U.S. citizens, noncitizen nationals, or permanent residents of the United States.

A postdoctoral student must have a Ph.D., M.D., Dr.P.H., Sc.D., D.N.Sc., or other doctoral degree, or an equivalent degree from any accredited domestic or foreign institution. Certification by an authorized official of the degree-granting institution that all requirements for the doctoral degree have been met is acceptable.

Predoctoral trainees must have received a baccalaureate degree and must be enrolled in a program leading to a Ph.D., Dr.P.H., or equivalent doctoral degree. Individuals working toward a medical, nursing, or dental degree who wish to interrupt their studies to engage in full-time research training for a year or more before completing their health professional degree are eligible for NRSA support with approval from NLM.

NLM recently began the Applied Informatics Fellowship Program, through which applicants can select a mentor who can offer an informatics study pro-

gram to be applied later in a health sciences environment. A doctorate is not required.

What are FIRST awards?

If you are a new investigator applying for the first time for an NIH grant, you qualify for a FIRST (First Independent Research Support and Transition) award. The purpose of FIRST awards is to provide a slightly easier track for new investigators starting their independent research programs. The eligibility rules are somewhat flexible; you are better qualified for this special grant category if you have not received a large grant from another federal source and are within approximately five years of receiving your advanced degree. If you are simultaneously applying for other NIH grants, do not be concerned about how your eligibility will be affected if you get another grant before the FIRST award. If, after the reviews, your proposal can be funded, it may be switched to a regular grant if other funding disqualifies you from receiving a FIRST award.

The priority scores for funding a FIRST award are not dramatically different than those for a regular grant award, but the reviewers are likely to give more weight to potential than to past achievement, and to be forgiving when minor shortcomings in the proposal can be attributed to inexperience. Thus, you may receive a better review score.

In addition to the standard research proposal, in a FIRST application you must supply (in sealed envelopes) four reference letters from prominent researchers who can attest to your abilities. Make sure that the people you approach for a reference letter have a high regard for your work and are familiar with its details. A vague or lukewarm letter from the superstar of the field is less valuable than a specific and enthusiastic letter from someone else (who should nevertheless be widely respected). It is advisable to obtain letters of reference from a variety of sources; try to get at least one from an institution other than your current place of work or doctoral study. If your work is cross-disciplinary, try to get letters from professionals in more than one discipline.

If you are qualified to apply for a FIRST award, you should consider it. The PI of a FIRST award, however, is required to spend at least 50% of his or her time on the research. The award is for five years and total direct costs cannot exceed $350,000 for the five-year period.

If you are not qualified to apply for a FIRST award, but have never received NIH funding, try to identify a mentor with whom you can begin. Someone who has been through the process, served on study sections, and dealt with the NIH administration can provide a wealth of information and support during those frustrating moments when you are not sure which way to proceed. If there is no one available to serve as a mentor, then at least make a beginning on faith. Program staff at NIH can assist you with some of the bureaucratic tangle, and if you have a grants office at your institution, it can offer a great deal of information and support.

Above all, do the best job possible in writing your grant application. The reviewers and NIH staff cannot develop your research ideas for you—that is your job. They *do* know that many good ideas are not funded because they were presented poorly in the application. Being able to avoid such problems will advance your goals.

WHAT ARE THE BARRIERS AND OBSTACLES TO FINDING SUPPORT FOR MY RESEARCH?

The reasons for failure to receive funding that are most frequently given to NLM are:

- "The study section (peer review) does not support research in my area of interest." This is a self-fulfilling prophecy; if you never apply for funds, you will never receive them. Grantsmanship can be used to make your research more exciting and palatable to study sections.
- "I never know what you are funding, and it is hard to get information." What "NLM is funding" due to a special solicitation is generally less than 3% of the total grant pool. This fraction of NIH-initiated research is a very small piece of a very large pie. Investigator-initiated or unsolicited grant applications make up 95% to 97% of the research funds. Grants are funded on the basis of good ideas. If your ideas are well presented, amply documented, and have scientific merit, your application will be eligible for a fundable score. This score will determine the decision regarding funding, whether your research falls in the category of what you think "NLM is funding" or not.
- "The reviewers will not understand my research and they will just reject it out of hand." Again, this is a self-fulfilling prophecy. If you do not try to make them understand what your research is about, they will not understand. There is no substitute for a good idea, but it is your job to make it understandable and make it sound exciting to another scientist.
- "I am too busy to write an application; my clinical (or administrative or other) duties are too demanding." Granted, the time required for writing the first application is enormous. You need to negotiate with your supervisor and your administration to arrive at some way of getting more time to do the background research and even the pilot studies that need to be incorporated into the first application. Try to convince your administration that the ad-

ditional funds and prestige that a funded grant will bring to your institution far outweigh the disadvantage of having to spare you from the clinic, or of hiring someone to help while you are working on your application. If that does not work and you have the energy for it, you can use your personal time to develop a first proposal. Once you get a funded grant, however, it is almost a certainty that you will be able to demand more for yourself in your institution. Getting a funded grant is one of the best ways to get the attention of your administration. According to a recent survey, 29% responded that finding outside support for research is essential to getting promoted. If your institution does not seem to be impressed that you got a funded grant, look for someplace else that will be. Having a funded NIH grant is a powerful feather in your cap when you are job hunting.

THE GRANTS PROCESS AT NIH/NLM

What happens to my application?

The Division of Research Grants (DRG) at NIH processes approximately 20,000 applications [8]. Although not all applications arrive at the same time, since the deadlines for different types of applications have been staggered throughout the calendar year, it is still an immense amount of paper to be managed at any one time. Once your application arrives at the DRG it is forwarded by the referral officer to the appropriate Study Section. Most of the applications that deal with medical libraries, informatics, or biotechnology are forwarded to the Biomedical Library Review Committee (BLRC), the standing study section of the National Library of Medicine. (See the appendix for a list of the BLRC members). Simultaneously, a copy is sent to the appropriate scientific program (in our case, the NLM Division of Extramural Programs) and assigned a program officer.

The scientific review administrator (SRA) of the study section determines whether there is adequate scientific expertise on the standing study section to review your application. If there is not, there are several options available to the SRA. First, your application may be forwarded to another standing study section that has the necessary expertise to review the kind of work that you propose. For example, NLM frequently reviews applications proposing research in knowledge-based systems, expert systems, or medical informatics, even though they involve body systems or applications outside NLM program areas. In addition, sometimes a grant application comes to NLM that is outside its funding priorities. If, for example, it has received a good score in NLM peer review and fits into the mission of the National Cancer Institute (NCI), the grant can be transferred to an NCI Program Office and funded as an NCI grant.

The SRAs perform another important function: they select the reviewers who serve on the study sections. They solicit names of appropriate individuals from program staff, current study section members, and their own colleagues. The expertise that is represented on the study section must reflect the expertise required to review the applications that come in. Thus, to a large extent, the research community determines the number of individuals and type of expertise represented on the study section panels.

WHAT IS PEER REVIEW?

Remember that peer review is the heart and soul of the process. To succeed, you must imagine yourself as a reviewer looking at your application. Ask yourself what is unclear, where there are flaws in the logic, and whether it presents a good idea. The first funded application will be the most difficult to write, but you will get better at it! The rewards of obtaining an opportunity to pursue your own ideas, to develop your own niche in the scientific world, and to reap the professional rewards of being recognized all make it a worthwhile endeavor [9].

At NIH there are more than 100 study sections, each composed of twelve to fifteen individuals considered to be experts in the section's field. Each grant application is assigned several reviewers (two to three) from the standing study section by the SRA [10]. An option available to the SRA that is frequently used is to add one or more individuals to the study section on an *ad hoc* basis to provide missing expertise required for the review. The SRA may also solicit opinions from outside readers, and their comments are read from an open letter at the time of the grant review. Although the outside readers do not cast a vote for the priority score that the application receives, their comments are available to the voting reviewers when they determine their scores.

Each proposal is assigned to two primary reviewers, who prepare extensive written reviews of the proposal, and a reader or discussant. Reviewers carefully consider the overall originality and significance of the proposal, the background of the work, preliminary data of the applicants, study design in terms of its completeness and feasibility, the resources and qualifications of the principal investigator and other key personnel, and propriety of the budget. It is the job of the reviewers to present the proposals they read to the other members of the study section at the meeting and give their opinion as to the meritorious value of the application. Outside reader opinions are read by the SRA. If the evaluations of the reviewers differ, a discussion is held at the study section, and a compromise regarding the score is usually reached. Then all members of the study section (twelve or more) cast their individual votes on the basis of the

discussion. To achieve a fundable score, a grant application must receive a vote of "outstanding" from most (if not all) of the reviewers. Any discussion or difference of opinion among the reviewers will dampen the enthusiasm of the other members of the study section. Thus, it is absolutely imperative that your research plan contain the best ideas that you have to offer, organized in a cogent and meaningful way. Any flaw in the logic will be an excuse to move you out of the fundable range. Remember, each of the study section members has come to the meeting with the understanding that less than 20% of what they review will be funded. Thus, they will cast their "outstanding" scores very sparingly. The scoring is as follows:

- 100–150 Outstanding
- 150–200 Excellent
- 200–250 Very Good
- 250–350 Good
- 350–500 Acceptable

Scores are converted to percentile rank based on the scores of all the proposals in that study section for that review cycle and for the previous two cycles. This smoothes out discrepancies in overall scoring between study sections. Percentile ranking for grants that are assigned to a special study section are calculated against the entire DRG base.

A recent change in the review procedure identifies those proposals judged to fall below the fiftieth percentile. Those so identified are not discussed by the study section, are provided written comments from two or three assigned reviewers, and are not scored.

WHAT IS A CONFLICT OF INTEREST?

Conflict-of-interest regulations are strictly enforced in study section review. If it appears that reviewers could derive any possible benefit, either real or imaginary, from a funded grant, they are disqualified from all discussions pertaining to the review of that grant. In fact, they physically leave the room when that grant application is reviewed. Any application from their institutions, for example, whether or not they are friends or colleagues of the grantee, creates an "apparent conflict of interest." Omissions of declarations of conflict of interest are grounds for another review. NIH is totally committed to preserving standards of highest quality and objectivity in its reviews.

WHAT IS A PINK SHEET?

Once a grant application is reviewed, it is the SRA's responsibility to collect the written reviews from all the reviewers who were assigned the application, combine the reviews into a readable summary that accurately represents the discussion and distribute copies of it to program staff [11]. The Summary Statements are then mailed to the applicants. The Summary Statements are frequently called "pink sheets" because several years ago, they were always printed on pink paper. Although they are now usually printed on white paper, the name "pink sheet" continues to be used by some individuals. The Summary Statement is an overview of how the study section evaluated the research proposal. As such, it constitutes the best advice on how to improve your application if you did not get a fundable score.

Using the Summary Statement or "pink sheet" as a guide, you can revise your application (see Grantsmanship section below) and resubmit. The "Priority Score" (raw score and percentile) is available shortly after the study section has met, and is mailed out on a postcard within a couple of weeks of the review. It can also be obtained by calling program staff. It is the percentile score that determines the relative placement of your grant in the study section in which it was reviewed and it is that score which determines whether you will be funded. It is similar to the process of being graded on a curve. You can think of it as a letter grade. Those applications that are outstanding fall into the As, excellent ones are Bs, good is comparable to a C, and fair is a D. An F does not receive a score, but will receive a Summary Statement. It is worth noting here that in the current climate of increased competition for limited resources, it is not enough to get an A on your application; it has to be an A+ to get funded.

Most applications go through one or more revisions before they receive a fundable score. Thus, the Summary Statement is vital to the revision of an application. Currently, an applicant receives the Summary Statement six to eight weeks after the application is reviewed. This period may be reduced when NIH adopts an "electronic research administration" policy, known as ERA. However, this change is not likely to take place during the next few years, although an experimental implementation may only be two or three years away.

WHAT ARE DUAL REVIEW AND A GRANT AWARD?

NLM's Board of Regents (BOR), which is an advisory group for the entire NLM, meets three times a year, and is made up of extramural scientists, as well as laypersons who are prominently involved in biomedical libraries, medical informatics, and biotechnology. Once your grant application is reviewed by the BLRC and receives a score, it must go to the BOR before any efforts are made to award. Shortly after the board meets, the administration process begins. Program staff sends information forward to the Grants Management Branch (GMB) giving guidelines for the dollar level for your grant. The grants management

specialist may then contact you to discuss changes in the budget that were recommended by BLRC, cuts that were developed by program staff, and other issues regarding the actual budget. Once that process is completed, an "Award Statement" is issued, and only then do you officially begin as a grantee. The dollars are then awarded to your institution and you draw upon them to carry out the work that you have proposed.

WHAT ARE THE POSSIBLE OUTCOMES OF THE GRANTS PROCESS?

There are three possible outcomes to the grants process. The first possibility is that a proposal is not approved and the investigators decide to abandon the research direction. Given the effort expended in the conceptualization and preparation of a proposal, this outcome is extremely undesirable. With good advance planning, the possibility of this outcome can be significantly minimized.

The second outcome is that a proposal does not receive funding, but is recycled and submitted again. Proposals may be resubmitted "as is" (usually not a good idea) to a non-NIH funding agency, revised and submitted to a non-NIH funder, or resubmitted to NIH with revisions, as discussed above. It is certainly possible to have multiple requests for funding for the same project pending at the same time (e.g., at NIH and elsewhere), but it is imperative that this be indicated in the administrative "other support" section of each proposal. If the requests cover the same costs, and if both are funded, one will have to be withdrawn. However, it is possible to obtain complementary funding for the same project from two or more funders when, for example, one grant may supply only salary support for the PI, and another will provide salary support for key personnel and research costs.

The best outcome of the grants process is that a proposal is reviewed favorably and that it is funded. Be alert to the fact that funding is often delayed one or two months from the requested start date, and that the sponsoring institute might require a 10% to 25% cut in the budget. While this may be burdensome, it is a reality in the economics of medical research today. Nevertheless, in such cases the opportunity to carry out the research is presented, and can lead to important contributions to the field, reports and publications of high quality, and, of course, more grants.

WHAT SHOULD I DO WITH MY NONFUNDABLE APPLICATION?

A new triage process has been established to streamline the review of competitive proposals, but it results in less feedback to investigators regarding the proposals that are judged noncompetitive. In these cases, no priority score is given and only a very brief explanation of why the proposal was not reviewed further is provided. This is a recent change in the review process, and there is insufficient experience with it to give sound advice on how an investigator might respond. If you have received notification that your proposal was noncompetitive, it will be valuable to discuss this situation with the scientific review administrator directly by telephone.

If your percentile score does not fall within the payline, you then have to determine your next move. A good rule of thumb is to look at the raw score. If that number is 300 or greater (500 is the worst case), you have a lot of work ahead of you to convince the study section that you have (1) a good idea, (2) a good approach, and (3) the appropriate resources to do the work. Study sections will not give good scores to research that they do not believe meets a need, no matter how excellent an application. You will be heavily discounted for a scientific approach that is not clearly outlined or that proposes more work than can possibly be achieved. You also must demonstrate credible credentials in the area of research that you propose to address, either in your own experience or in that of collaborators or consultants. If you decide to revise, get a mentor involved to help you focus your ideas and improve your communication skills.

HOW CAN I SUBMIT A REVISED APPLICATION?

If your score falls between 200 and 300 (the "noncompetitive" range), you should definitely consider a revised application. The closer to 200 the score, the more likely a revision is to succeed [12]. Do not be discouraged, however, if you submit a revised application and still do not get a fundable score. You may have to submit a second revision before you will be funded. However, if your score does not improve substantially with your first revision (or gets worse) you should probably reconsider the whole project and try to develop a new approach or a new idea. Study sections generally use this technique as a signal that they do not want to see an application again.

A score that is less than 200, but is still not fundable, is even more encouragement to submit a revised application. With an excellent revision that addresses every single criticism in the Summary Statement and a bit of luck, your first revision may get funded. It may, however, need a second revision to reach the magic payline. Third revisions are funded occasionally, but not usually. If you have not succeeded by the second revision and do not see how you can substantially improve your application, you should try another project and start over.

For applications between 100 and 150, you will either get funded or just miss the payline. If you miss the payline, you must rely on your best judgment to decide whether to revise and resubmit or to wait in the hope of a change in the payline. Your decision will depend on timing and where you fit into the process. If there is a more likely time for the payline to be revised upward (that is, to encompass more grants), it will be towards the end of the fiscal year, in August or September, when the administration discovers that there are still unobligated funds and is looking for meritorious work to fund. If your grant is in the round of review that falls near the end of the fiscal year and your score is within 1 or 2 percentage points, you may be wise to wait it out. If, on the other hand, your grant was considered in the October Board of Regents meeting, you will have to wait almost an entire year and you might just as well resubmit. Once the revised application is submitted, it replaces the previous one and the review of the revised application will be the basis for an award. Discuss this issue with your program officer, who can often give you a feeling for whether the payline is likely to move or not.

GRANTSMANSHIP

How should I write the grant application?

It should now be obvious that peer review is the foundation of the entire grants process at NIH and the secret to getting funded [13]. The NIH administration is justifiably proud of its system of peer review. Although any method of assessing another's ideas is necessarily imperfect, peer review is still the best method that has been invented. Your ideas have to stand the test of hard scrutiny by scientists who have been selected themselves through peer review. Your application must conform to the highest standards of scientific method, originality, and project management.

What grantsmanship basics should I apply?

To the study section reviewers, you must

- present your ideas cogently in a well-organized fashion, explaining specifically what you intend to do and why your methodology will work (do not expect *a priori* knowledge on the part of the reviewers);
- convince the large portion of the group who are not experts at what you are proposing that it is worthy of their support (there is a compelling need);
- demonstrate preliminary work or pilot studies showing that your plan is feasible and that there is a high probability that you will achieve what you propose to do (although study sections will vote to fund high-risk applications, they do it reluctantly and only when the investigators' qualifications and past records justify the risk); and
- show that you have adequate resources to do the work that you propose (manpower with the appropriate qualifications, in the form of personnel as well as consultants, equipment, computer support, etc.).

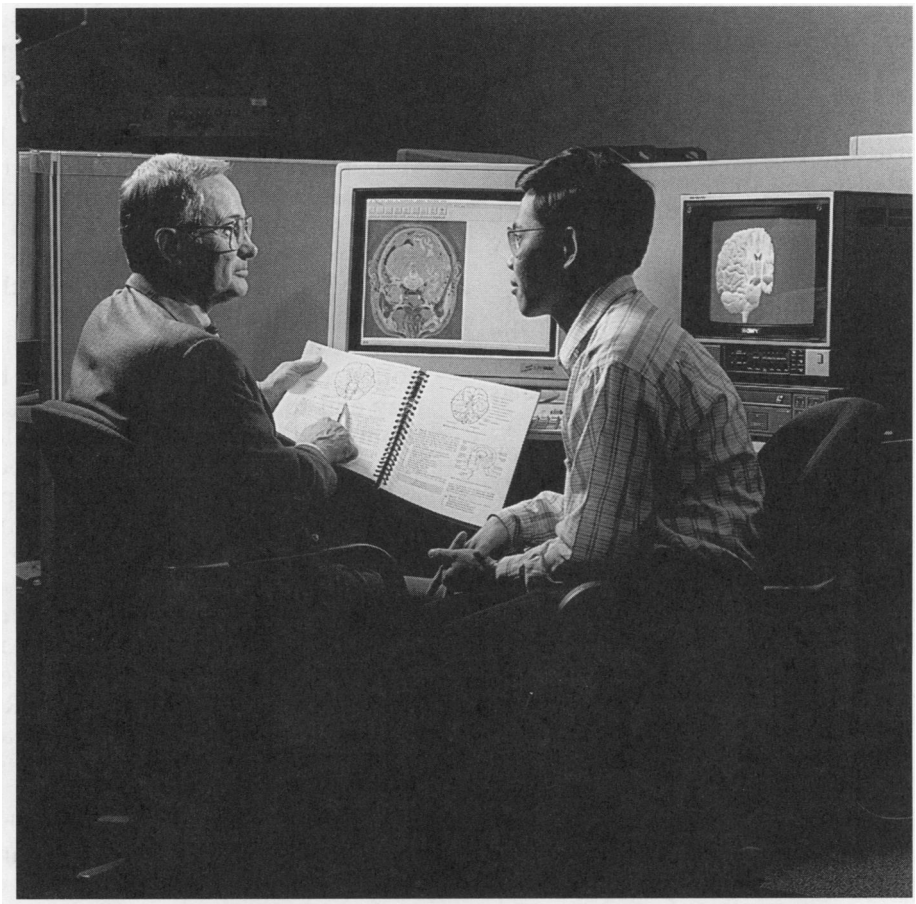
Read the instructions of the grant application carefully and follow all the rules on page limits, figure placement, the number of references to cite (remember to include the title of the article in a citation), font size, and other details. If you can find someone in your institution who has been successfully funded, get a copy of that person's application and use it as a model.

Allow lots of time for writing your application. It may take as many as six months from the time you generate your first draft, so you should have it read and critiqued by colleagues who can be trusted to give you an honest opinion, to aid you in revising and rewriting the application. The importance of focusing your research plan and achieving clear and succinct communication cannot be emphasized too much. You have the task of describing a complex topic to a group of people who may not be experts in your particular field, but who are intelligent and knowledgeable scientists who understand scientific method, hypothesis testing, and experimental procedures. It is your job to make that communication work.

Who will read my application?

The first and most important audience the applicant needs to reach is the peer review panel (i.e., study section or initial review group [IRG]), which will read, evaluate, and pass judgment on the proposed study [14]. At the National Library of Medicine, this group is the BLRC. The basic purpose of a proposal is to communicate your ideas, thoroughly yet crisply, to this panel. If you cannot successfully outline the objectives, explain the study methods, or argue for the importance of your project, the proposal will probably be disapproved on scientific and technical grounds.

Peer review panels such as the BLRC convene three times a year (in March, June, and November) to consider proposals received within the previous quarter [15]. The panels consist of experts from biomedical libraries, from federal and state health agencies, and (mainly) from academic and research institutions around the country. These experts represent a range of disciplines (e.g., medical library science, medical informatics, imaging, biotechnology, psychology and sociology, medicine and health policy). You should assume that at least one member of a review panel is knowledgeable about the topics you want to investigate and the methods you propose to use. However,



it is important to remember that you must communicate with the entire review panel.

Peer review panels receive applications to be reviewed in advance and then meet for (usually) a day or two. In that time, they may discuss, critique, and vote on twenty-five or more proposals. This means that often proposals are read and reviews written under great time constraints. Therefore, it is important that the applicant make a proposal as clear and concise as possible, consistent with telling the full story about the intended project. Since there is a page limit for each application, the application must be thorough, yet concise. Reviewers should be able to understand all of the following:

- what the applicant proposes to do
- why the applicant proposes to do it in the manner described
- why the enterprise is worthwhile in its own right and to NLM
- what new contributions the project offers (and how it is related to past or current work in the area)

Reviewers should not be confronted with extraneous material, excessively long literature reviews, or unsubstantiated claims about the project's relevance or importance. Some reviewers take six to eight hours to review a proposal, while others may only take two to four hours of a busy schedule. By making the proposal easier to read, you take better advantage of the reviewers' time and increase your chances for success.

In communicating to the panel members, one of the most critical sections of the proposal deals with the background and significance of the work you want to do. You must convince them that the project is worth investigation and that you can handle the task. The Project Narrative or Research Plan is the heart of the proposal and as such is given the most scrutiny by the review panel. Over the years, conventions have emerged about the structure of research applications, including standard outlines. The Project Narrative or Research Plan is no exception. Although the outline suggested below is not an absolute requirement, it is a commonly used guide for research proposals.

What are the components of an application?

Project title, abstract, and specific aims. The applicant should give the project a succinct and accurate title. Find the key words, phrases, or descriptors that will highlight the population of interest, the medical problems of concern, and the information need and use issues of importance, and then stop [16].

The abstract is a summary of the problem statement, project importance, specific aims, methods, and likely results. It should reiterate the main points of the proposal clearly and concisely. Remember that the abstract will be read carefully by every member of the review panel, and each has an equal vote. If the abstract is clear and compelling, the overall prospects for success in the review process will be enhanced.

The specific aims should pinpoint what you plan to do and expect to achieve. They should be relatively few in number and listed in approximate order of priority or importance. Remember that what you state as your objectives sets the framework and the tone for judging the rest of the proposal. Underscore the major elements of your work that you believe can be achieved: Do not promise to study the world or to answer all the crucial questions in the area, or your proposal may be viewed as unfocused, overly ambitious, and unrealistic.

Background and significance. This is in all likelihood where the applicant will put a literature review. It need not be lengthy, but it should be reasonably comprehensive and up to date. The basic objective is to highlight, succinctly, the gaps in knowledge or practice that the applicant's project will help to fill. The applicant must show an understanding of the important studies that form the foundation for the proposal and must indicate how the project will build on them. The applicant is not expected to review all the relevant literature in great detail; if he or she is conversant with other bibliographies or literature reviews, they should be cited.

If there is no literature or body of knowledge in the area proposed for study, this should be stated. However, rarely does a project start *de novo*; so the applicant would do well to give brief consideration to the research closest to the proposed work. It is also important to show familiarity with NLM-sponsored work. The literature review will presumably pick up relevant published articles or reports. For ongoing projects, one valuable source of reference is the NLM publication called *NLM Annual Report*. It contains an overview of all NLM activities, including the extramural program. The application should indicate how the proposed work builds on earlier or current projects, or addresses new problems not yet investigated through NLM funding. This often provides a lead-in to the next subsection, "Significance of the Project."

Two main points regarding project significance. The importance of the question or issue proposed to be studied and the relevance of the applicant's particular project are the two main points that should be made regarding project significance. As to the former, NLM's Program Announcement notices highlight priority areas for NLM sponsored research. If the proposed topic fits into one of the areas specifically mentioned in the solicitation, the application should say so, because proposals in these areas receive priority for funding. This also assures that the proposal is reviewed by the appropriate review panel.

Make as strong a case as possible here for the importance of the particular project being proposed: It may add to the general body of knowledge about a problem; it may expand the possible ways to organize and deliver health services to meet a particular human need; it may do both. The point is to make a credible, straightforward argument for the important contributions the work will make.

Experimental design and methods. Together with the subsection "Evaluation and Analysis Plan," this is the heart of the Project Narrative or Research Plan. Hence, the study section (e.g., BLRC) panel members will look to see if the applicant has

- identified the important effects, mechanisms, or outcomes to study;
- designed the study in a way that will permit detection of those effects or mechanisms if they occur, and will determine the correct causal factors; and
- stated hypotheses explicitly, presenting a clear rationale for the work proposed. If there are hypotheses to test, they should be stated explicitly. If there are no specific hypotheses, the application should discuss the issues that prompted you to undertake the project.

Study design. The basic objective here is to describe how the project will operate. The research methods will come under close scrutiny in any review. It is crucial that the timing and sequence of the project be clear in the reviewers' minds. Including a descriptive diagram or flow chart that makes the timeline clear often proves very helpful.

The following illustrative questions should be addressed directly in the proposal, but they do not necessarily exhaust the important dimensions to study design that may be pertinent in a particular case:

- What are the variables to be studied?
- What population will be studied and what sample will be used? (The discussion should relate to the important issue of the precision or power of the study and the strength of its eventual conclusions, so the application should indicate here (or in an appendix) whatever power calculations might have been done to justify the sizes. Will the sample size

permit accurate generalization to larger populations?)

Data collection plans. Fully describing the plans for gathering information is critical: What pieces of information are to be collected? From whom, precisely? How often? By what techniques? Are there alternative data collection methods or sources of information that have been considered but were rejected? If so, explain why, especially if the ones dismissed might be less costly.

Uppermost in the reviewers' minds may be the question of how each piece of information relates to the hypotheses to be tested, issues to be studied, or program to be demonstrated [17]. The study design must present a chain of reasoning that is internally consistent—an unbroken set of links, so to speak. These links are critical and the following points are important:

- Give a good, specific description of the match between what is to be investigated and the particular data to be collected. Clarify what the dependent (or response) variables are, what the independent (or treatment or explanatory) variables are, and what factors may need to be measured or accounted for because they might otherwise confound the analyses. If relevant, discuss the project's cross-sectional aspects (comparisons in one time period) and longitudinal aspects (comparisons over time).
- It should be clear by the end of this section that the applicant will not collect data for which there is no obvious use in the study and that the applicant will have obtained pertinent data for all the topics proposed to be addressed. If the data collection instruments already exist in some form, consideration should be given to including them (or at least a subset of them) as an appendix. If the applicant is going to get help from persons who are knowledgeable about these instruments, such as the original developers, the application should state that.
- If the applicant is developing his or her own measures or instruments, the application should state how their reliability and validity will be established. In this instance, the applicant should give at least some idea of what such forms might look like or what elements (e.g., individual illustrative questions) they might contain. Development of data collection instruments does not usually start completely from scratch, so if there are examples of materials on which the forms might be based, they should be included with an indication of how they might be modified, updated, or improved.
- If interviewers, human observers, clerical and technical assistants, or other data collection personnel are to be used, the application should describe how they will be selected and trained. In addition, the application should distinguish between two types of data that may be collected in the study: primary (gathered directly from subjects) and secondary (drawn from sources external to the direct data-gathering). If there are plans to draw on secondary data sources, there should be a discussion of both the advantages and the limitations that they bring to the project.

Data collection problems. If special data collection problems are foreseen, the application should indicate what they are and what efforts will be made to overcome them. It is better to show that consideration has been given to what the potential problems are rather than have reviewers assume that the applicant was not aware that difficulties might arise.

Data base management. No matter how large the proposed study, the application should explicitly address how the data will be held, managed, and processed. (For example, who will have the main responsibility for organizing, storing, and archiving completed questionnaires or data forms? Who will maintain computer data media and make necessary files available to those who will analyze the data? How will the privacy of information on study participants be guarded and guaranteed?)

Evaluation and analysis plan. In this section, the application should explain, as clearly as possible, how the data to be collected will be used and analyzed. This section should convince reviewers that the proposed methods are consistent with the hypotheses and issues to be studied and the data to be collected, and it should persuade them that the quality and nature of the data will support the level of analysis planned.

Analytic methods. This section should discuss the specific analytic methods that are expected to be used to address particular questions. It is often helpful to give examples of the analyses or to show what the tables of results might look like. Often, discussing hypothetical findings based on likely values of the data that will eventually be collected is a useful device for making the analysis plan seem less abstract. The goal is to try to aid reviewers in visualizing the data set that will be compiled, so that they can think along with the applicant about the methods of analyses that seem appropriate and reasonable in addressing the hypotheses and issues to be studied.

Analytic pitfalls. As with data collection efforts, it is better to acknowledge possible problems with the proposed analysis and the conclusions drawn from it and indicate how those that seem most troublesome

would be overcome. It is a good idea to consult a biostatistician or some other person well acquainted with basic research methodology when planning the design and analysis of the project.

How can I improve my application?

If your ideas do not sound new, it just may not be an original idea that you are proposing. Putting a new twist on it or making an improvement to an old idea will not get you enthusiastic supporters. On the other hand, although ideas must be new, they dare not be so new that the reviewers cannot relate to them, as they will feel uneasy about the probability of success. It is tricky to find the right balance of originality and a solid foundation of past work. If you are working with a mentor, be sure to separate your work from that of the mentor. Acknowledge the past accomplishments of your mentor, but point out the ways in which your work is a new contribution and an extension of what has already been achieved. Calibrate yourself by discussing your project with a trusted colleague; someone who will give you an honest answer and who knows enough about the field.

Ideas must address a problem or need. To receive funding from NIH, you must address a biomedical need. Call a program officer for a discussion if you have a question about where your research or project should be submitted. Virtually every problem that you work on in medical libraries, informatics, or biotechnology can be described as addressing a fundamental biomedical need. However, if you do not demonstrate that clearly in your application, it will not necessarily be perceived by the reviewers. The "Background and Significance" section of the application narrative is the appropriate place for a discussion of this aspect.

Can an idea be formulated as a hypothesis?

Study sections are accustomed to seeing research proposals cast in the form of a hypothesis that addresses the questions of whether the idea at hand will make a difference and how the hypothesis will be tested. How will you test the hypothesis? The "Specific Aims" of your Research Plan will most likely comprise the means with which you will carry out your tests. By writing your application in ways that reviewers are accustomed to seeing proposals, you can increase your chances of success. If reviewers have a great deal of trouble understanding what you are proposing, and are forced to refer back and forth between sections, for example, they are not likely to be generous. Formulating your proposal in the form of a hypothesis with specific aims to test the hypothesis will help you to organize your thoughts and structure your research plan in a more readable fashion.

Focus your research plan. How you describe your research plan will determine whether you are funded. Presenting a research plan that is unfocused is one of the most common pitfalls—even for experienced scientists. It is here that the summary statements will give you insights as to how you can improve your application. The reviewers are so practiced at the task of reviewing applications (their terms are for four years and there are three meetings per year) that they will very quickly identify a superficial research plan. It is here also that your institutional colleagues, acting as readers for your first drafts, can be of greatest benefit. Swallow your pride, take their advice, and rewrite.

Communication is the goal. Although you need to be as focused when writing the grant application as you would be when writing a scientific paper, you are not writing a paper. You are writing for an audience whose members have a lot of expertise in their own areas of research and are competent scientists in their own right, but do not necessarily have expertise regarding the concepts and vocabulary of your specific field. Repeat your concepts throughout your application, stating them in different ways. If a reviewer is having difficulty grasping your ideas, reading them expressed in different ways may be the key to understanding. Again, friends and colleagues in the sciences who read your application drafts will be able to point out where your communication skills are lacking. Your readers should be honest enough to tell you if your ideas are understandable or not. Although a reader may not be knowledgeable about the details of the research methods that you propose, the concepts should be expressed in a comprehensible manner. If they are not understood, you should ask specific questions of your readers about what they did not understand. It is all too easy to slip into jargon and believe that it is part of everyone's vocabulary. For example, if you are going to use a mathematical technique that is not part of the tool kit of the average scientist, be prepared to spend a few sentences describing it in layman's terms. It can be a real challenge, but will pay off by helping you to write in a style that you may not be accustomed to. Above all, plan to rewrite your application, perhaps several times.

Uncertainty about new directions. The research plan must be solidly described. A clear methodology for carrying out the research proposed should be presented, and should describe not only how you will attack the problems that you now perceive, but what you will do in the event that your proposed methodology does not work. Many investigators do an excellent job of describing their initial approach, but never consider the possibility that it might fail. Strategies for dealing with blind alleys and failed ap-

proaches are just as important to the research plan as the original concept. Similarly, if there is a flaw in your reasoning about how to approach the problem you can be sure that it will be discovered and that your score will suffer as a result.

Lack of knowledge of published relevant work. The research must have a foundation that rests solidly on the scientific literature. You must convince your reviewers that you know all the work that has been done in your particular area and that you will enhance what is currently known. If there is published work in the literature that is relevant to your project and you are unaware of it, you will lose points. If any of the reviewers on the study section have worked or are currently working in the area that you are proposing, they will certainly be named as primary reviewers. To overlook a publication of a major reviewer will not put your best foot forward. The names of study section members are available online (gopher://gopher.nih.gov:70/11/res/studysect), and a quick review of their publications through MEDLINE is well worth the effort. If any of the study section members have worked in your area of research, you need not only to read their papers and learn what they accomplished, but also to get a feeling for their approach to solving the same problems that you will be facing. Understanding their methodology may assist you in writing your research plan in a way that meets with their approval.

Lack of experience in the essential methodology. If you are proposing to use a particular methodology or technology that is complex, and you do not demonstrate that you can use that technology in a competent manner, you will also lose points. You may understand perfectly how to use the technique or method, but if you never state in your application that you have that expertise, the reviewers could assume that you do not. Again, you must convince your reviewers that you have adequate resources to do the work. Part of those resources, in fact the most important part, is your level of competency and the skills that you bring to the table to address the problems. If you do not have the experience, then add a resource to your application—usually another person—who does have that experience and has the credentials to back it up.

Adequate management of resources. It is good to include a time line, with definite goals and objectives to be reached as a function of time. It is also good to include a time line of your resource management, describing the people, equipment, and consultants will you need and when you will need them. It frequently happens that personnel are cut from the proposed budget because the reviewers or program staff do not see that they have an important role to play. If they are not included in the budget for the appropriate year or time line, it will not be obvious that their expertise is required, and they may be cut from the project.

Too much work for the proposed resources. Sometimes potential grantees erroneously believe that if they propose a lot of extra work at no additional cost, their application will look better than their competitors'. On the contrary, this actually works against an applicant. If the reviewers perceive that you have proposed more work than you can possibly do with the resources that you have allocated to the project, you will lose credibility, as you obviously do not understand the difficulty of the problem you are addressing. If you have identified other resources within your institution but you can get their participation at no cost to the grant, be sure to include this information in the application! If you need additional people, but you have convinced them to donate their time to the project, write them into the personnel sections of the application, but point out they will be at no cost to the grant. If you need an additional computer, but you can get it through a special deal with the computer vendor, list it in the application and describe how you will obtain it at no cost to the government or at less than normal cost. These techniques will actually enhance your case by making it clear that NIH is getting a good deal, and, more importantly, increasing your credibility as a scientist and a manager.

What is special about revised applications?

Proposals to NIH may be resubmitted as many as three times. Resubmissions have a special introduction section in which the applicants' response to reviewers' criticisms must be delineated clearly. Reviewers will have a copy of the review summary sheets from the previous submission in hand, so it is imperative that all criticisms be addressed; concerns or criticisms that are not considered justified are best assuaged by scientific evidence. In the revised proposal, all significant changes should also be highlighted for easy identification.

When submitting a revised application, clearly indicate by either a different font, boldface, or some other technique which parts of your original grant application have been modified, revised, or added. Make sure that you address every single point in the critique of the summary statement. You do not have to agree with the reviewers. If they have not understood your proposal correctly, try to determine where they went wrong and explain it again with a different approach. If you ignore the criticism simply because you did not agree with it, you are likely to get exactly the same review and score the second time around.

It is important to understand that a revised proposal may be assigned to a new group of reviewers. This often results from the annual change in the membership of the study section. Do not assume that the reviewers will remember the previous proposal and do not be surprised if new issues that were not mentioned during the previous round are addressed in the review of the revised proposal. The reviewers will certainly consider all the questions raised previously, but they may bring new perspectives to the process, which will be expressed in their reviews. While new concerns may be raised, the submission of a revised proposal should be viewed as an opportunity to show what progress has been made in the interim. In addition to addressing the concerns raised in the original critique, the investigator can make other changes to improve the proposal and report progress.

HOW DO I DEAL WITH THE NIH/NLM BUREAUCRACY?

After a reasonable period of recovery from writing your application and meeting the deadline, you will find yourself feeling naturally curious about what its status is and where you stand in the system. First, you will know which study section it has been forwarded to for review because you will have received a postcard giving the name of the study section once the referral office has made a decision. If you think it has been sent to the wrong place, call your program officer and ask what can be done. Frequently, the program officers can solve the problem with a simple phone call to the scientific review administrator of the appropriate study section who will then retrieve the application.

Occasionally, you will find difficulties in getting the information you need. Some applicants have described their applications disappearing into the "Black Hole of NIH." It is a frustrating experience to deal with a bureaucracy, but as with any bureaucracy, NIH is brimming with hard-working, dedicated, intelligent professionals. The trick in dealing with any bureaucracy is to find the right person. This requires patience and persistence. You may be handed off, forwarded on, and side-tracked until you finally end up with the person you need, but if you persist, you will eventually succeed. Your first point of contact, however, should be the NLM Extramural Programs office. The office can usually direct you to the right place if you do not have the information you need.

Call the SRA who is in charge of the review of your grant only if it is absolutely necessary. If you discover typographical errors throughout your application after you have mailed it in, there is nothing that can be done about them; you must live with the consequences. The SRA may be willing to add materials to an appendix (but remember there are five copies with your application) if they have been inadvertently left out, but any requests to replace pages in your application because of typographical errors or omissions will be vigorously rejected. Try to appreciate the volume of material NIH is dealing with; you simply cannot demand special treatment. Your best insurance is to do a good job of checking the spelling and scrutinizing the package before you mail in your application. Excessive errors will be perceived as sloppiness on your part and the inevitable conclusion drawn from that is that you are probably sloppy in your research as well.

Develop a professional relationship with your program officer. Do not bother program officers too often with your problems (they have many to take care of); be professional and efficient with their time (they appreciate it); put in a good word for them to their supervisors if you get the opportunity (everybody enjoys recognition for doing a good job); and provide them with assistance and help from you when they ask for it (they depend on you for their scientific credibility). When you are a successful grantee from the NLM Extramural Program, you not only make yourself look good, you make them look good and help justify the program. There is something here for everybody, and that is what makes the system work.

FOR FURTHER INFORMATION

For more detailed and specific information on current NLM Extramural Programs (EP), the RFA/RFP process, and proposal budgets and their justifications, as well as on putting the entire package together, you have three options. Contact the NLM EP office directly (a good idea at some point in the process), request related materials from the NIH/DRG Grants Information Office (see above), or visit the Web servers with the complete version of this FAQ. An expanded electronic version of this document is available on NLM's Hyperdoc World Wide Web server, located at http://www.nlm.nih.gov/.

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APPENDIX

The Biomedical Library Review Committee of the National Library of Medicine (NLM)

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Jocelyn A. Rankin, Mercer University School of Medicine
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