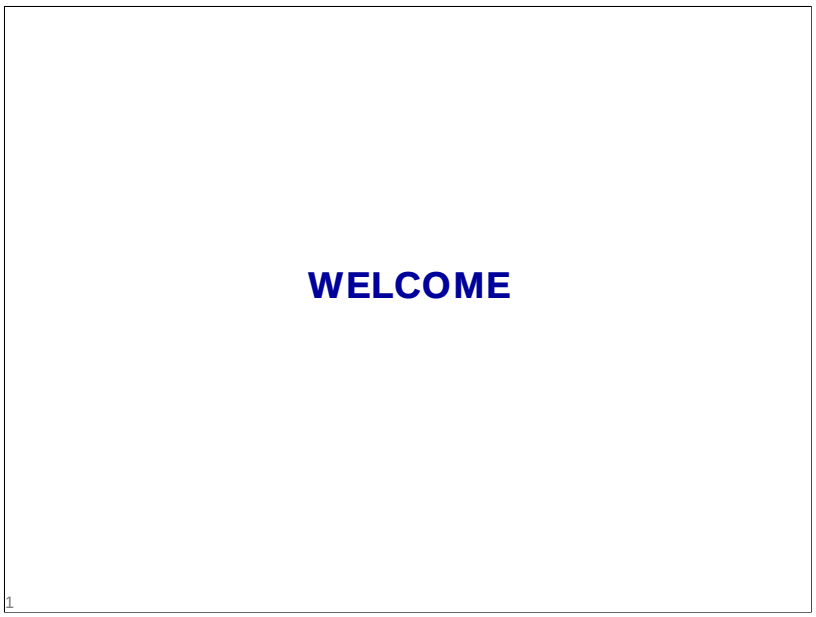
WELCOME
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Advice on NIH SBIR & STTR Grant Applications

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April 2004

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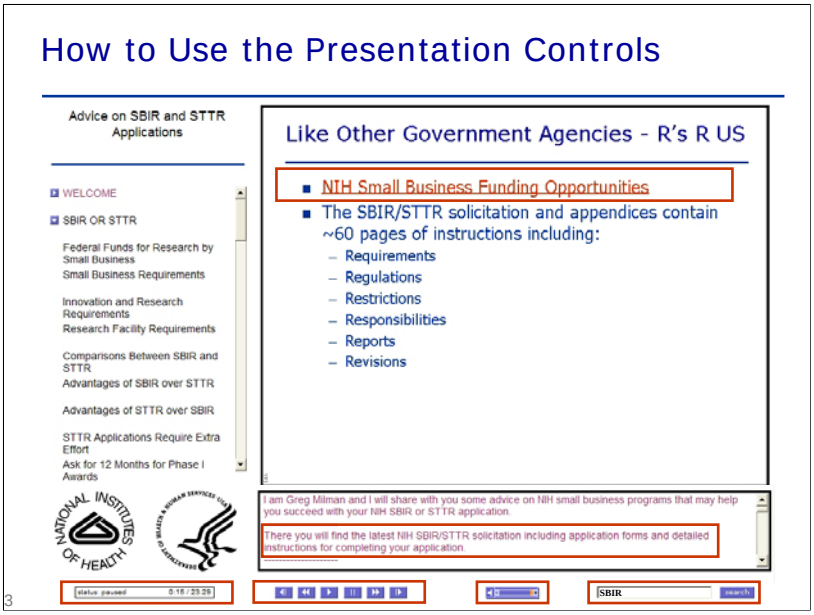
Hello, and welcome.

I am Greg Milman and I will share with you some advice on NIH small business programs that may help you succeed with your NIH SBIR or STTR application.

This presentation was last updated in April 2004.

You can send your comments, suggestions on topics you would like added, and criticisms by email to gmilman@niaid.nih.gov.



The status window shows the number of minutes you are into the presentation and its total length.

There are six control buttons at the bottom. The buttons from left to right enable you to move to the previous slide, back-up in a slide, play a slide, pause a slide, jump-forward in a slide, and move on to the next slide.

The speaker control allows you to adjust the volume level.

The scrolling text displays the script with the current position highlighted in blue.

The names of the main headings and slides under the headings are shown at the left. Clicking on a name brings you to that point in the presentation.

Clicking on a main heading right arrow expands to show all the slides under it. Clicking on its down arrow contracts the names under that heading.

The search window allows you to find and display occurrences of a selected text in the presentation. For example, if we type SBIR, the text window will show all occurrences of SBIR.

Clicking on the displayed occurrence will bring you to that site in the presentation.

Links to information on the Internet are in red and underlined. First, pause my presentation and then click on a link to open it in a new window. Close the link window and click the play button to continue.

OK, we're ready to begin my advice.

The Small Business Funding Opportunities link will open the official NIH site.

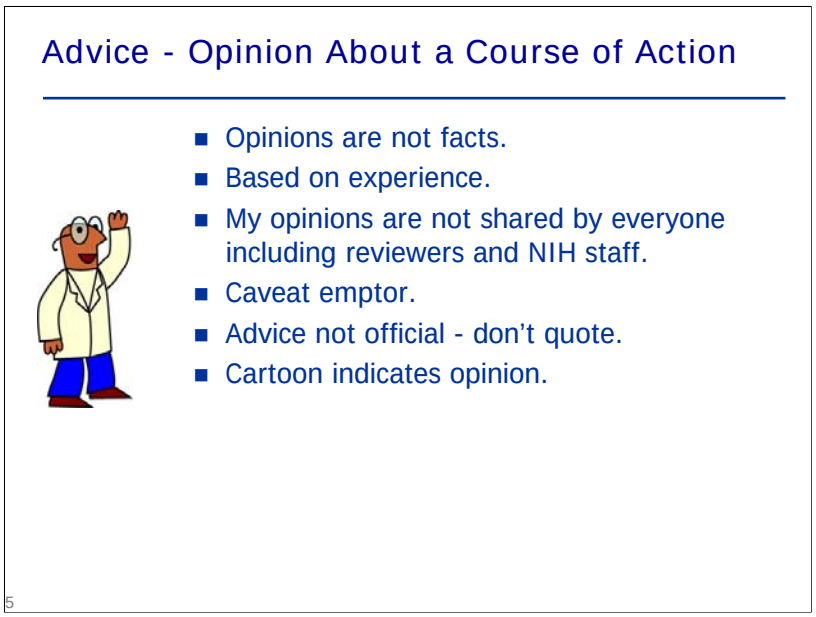
There you will find the latest NIH SBIR/STTR solicitation including application forms and detailed instructions for completing your application.

You will also find other important information including the latest notices and updates on policies and procedures.

I sometimes think that R's are US.

The NIH SBIR/STTR solicitation and appendices contain approximately 60 pages of instructions including requirements, regulations, restrictions, responsibilities, reports, and of course, revisions to all of the above.

Read the solicitation carefully for the specifics.



What I will mostly provide is Advice - that is information and guidance that are opinions and not facts, and certainly not official.

My opinions are based on experience both as an NIH branch chief and, prior to that, as a successful applicant for NIH small business funds. In the last 13 years, I have provided advice to hundreds of companies. This presentation enables me to convey this same advice to you.

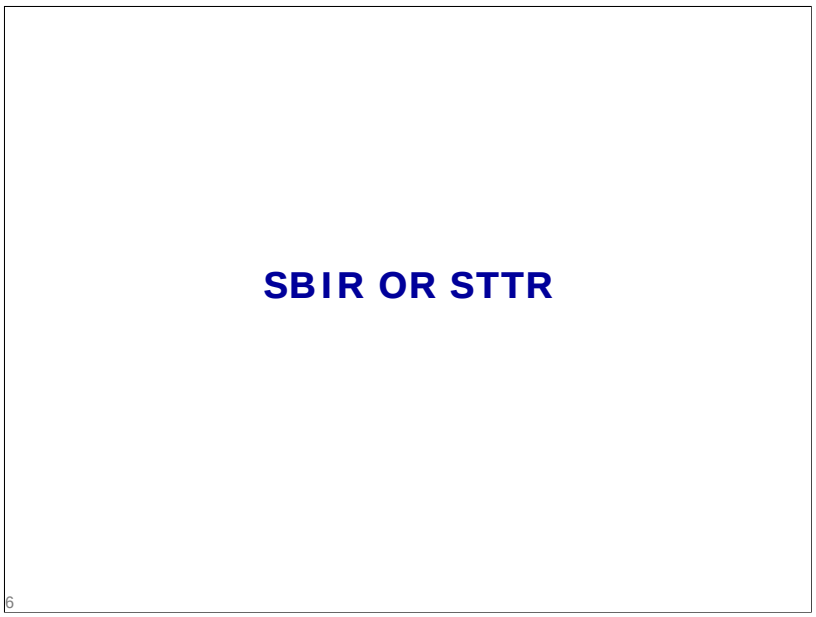
Please remember that my opinions are not necessarily shared by everyone including those who may be your reviewers or your NIH staff representatives.

Caveat emptor applies, you follow my advice at your own peril.

Since my opinions are not official, it will not help you to declare that you are following advice that you received from me.

To help you distinguish opinions from facts, I have included a cartoon on all slides with opinions.

Any resemblance between me and the cartoon character is purely coincidental.


SBIR OR STTR
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Congress has mandated that all federal agencies that conduct research should designate a percentage of their research funds for small business.

Small Business Innovation Research (SBIR) funds support research by a business with or without an academic partner.

Small Business Technology Transfer Research (STTR) funds are also awarded to a business. However, STTR recipients must have a US research institution as a collaborative research partner.

Let me begin by describing what is meant by small, by business, by innovation, and by research.

Legislation specifies requirements for a small business to qualify for SBIR or STTR funds. The "business" criterion means you must be a "for-profit" entity.

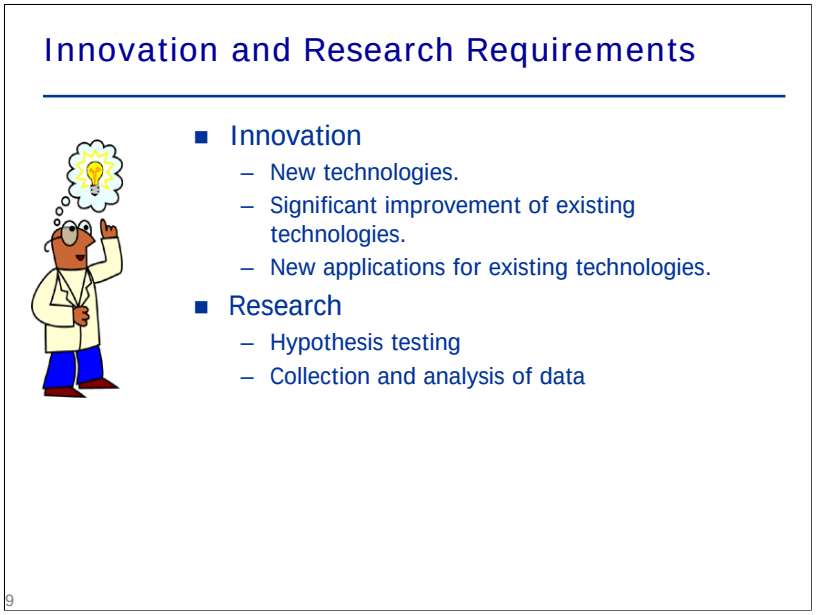
Most biotechnology companies easily meet the "small" criterion since you can have up to 500 employees.

The small business must have a majority ownership by US citizens and must not be owned or controlled by another organization. At the present time this means that companies owned over 50% by a venture capital corporation do not qualify but this may soon change.

The principal location of the small business must be in the US, and all the research supported by NIH SBIR or STTR funds must be conducted in the US.

Finally, the small business must conduct a major part of the NIH supported research in facilities that it controls. Failure to demonstrate this last requirement is the most common reason for either non-award or delayed award of NIH small business funds.

I will explain my interpretation of "control" after I tell you about "innovation" and "research."



SBIR and STTR applications must be innovative and should propose research and not development.

"Innovation" could be new technologies, significant improvement of existing technologies, or new applications for existing technologies. Applications showing little innovation will probably not engender much enthusiasm from a review committee.

I emphasize “research” because most reviewers will feel that funds should be used for research and not for development. I define research as testing an hypothesis by collecting and analyzing data.

In the Grantsmanship section, I will illustrate how you can spin a development into a research project.

Research Facility Requirements

- You need a lockable door to your research facility.
- You need to control who has the key and when they can enter.
- Space may be located in a collaborating institution's facility but you will need a written agreement, a lease.
- Bench space in another's research laboratory is not "a controlled facility."
- Research facility is required at time of award, not necessarily at time of application.

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Controlling a research facility means that you have the same rights as you would if you were renting an apartment.

Control means you have both the authority and ability to limit access to your facility by closing and locking a door.

Business research facilities can be located in a collaborating institution provided they meet the "control" requirements. A sign on your door can demonstrate it is your space.

In contrast, bench space in a someone else's research laboratory is not "a controlled facility."

You do not have to let your current lack of research space keep you from writing an SBIR or STTR application if you have made plans to obtain space should you receive an award. Describe in the resource section of your application the arrangements you have made to occupy and control a research facility and the resources you will have available to you at the time of award.

Comparisons Between SBIR and STTR

		SBIR	STTR
Agency Research Budget		2.5%	0.30%
Award Guidelines	Phase I	$100K 6 mo	$100K 12 mo
	Phase II	$750K 2 yr	$750K 2 yr
Academic Partner Required		no	yes
Sub Contracts (Max)	Phase I	33%	60%
	Phase II	50%	60%
PI Business Employee >50% time		yes	no

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There are some major differences between NIH SBIR and STTR awards.

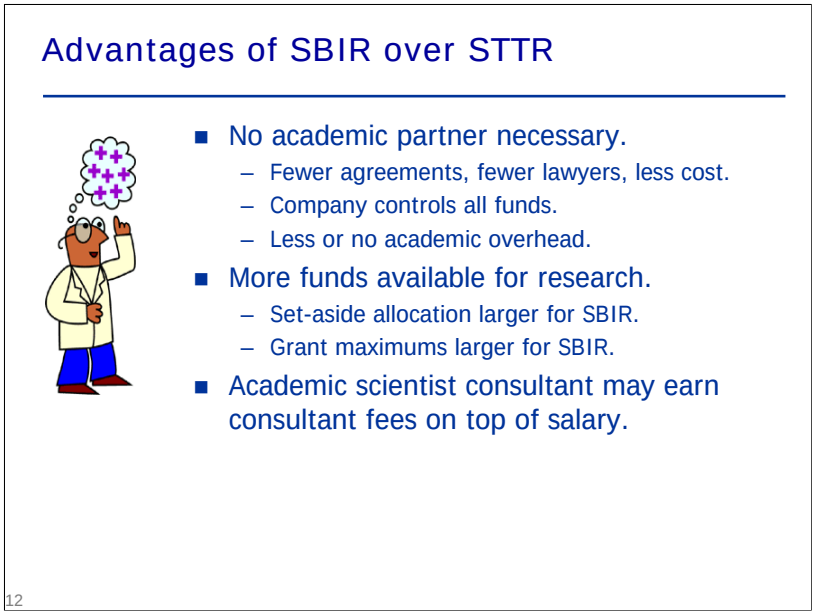
First, the pot of money for SBIR awards is about 8 times larger than that for STTR awards.

Second, the normal award guidelines are somewhat different for SBIR and STTR although many NIH components show considerable flexibility in both the time and amount of awards.

Third, an STTR award requires an academic partner and the amount of subcontracting allowed by an STTR award is considerably greater than that for an SBIR award.

Fourth, and perhaps most significant, an SBIR principal investigator, abbreviated as PI, must be employed over half time by the business during the award period. In contrast, an STTR PI may be an academic employee and need not receive any salary from the business.

As I will describe next, each type of award has its advantages.



SBIR awards have multiple advantages over STTR awards.

SBIR awards do not require an academic partner, meaning fewer agreements, fewer lawyers, and less cost. The company controls all the funds, and SBIR research dollars are not used to support overhead in an academic institution.

The pot of funds available for SBIR awards is larger than for STTR awards, and the normal award amounts are larger too.

As an academic scientist, you may be better off financially in a consultant role on an SBIR award compared to a PI role on an STTR award.

For example, suppose an investigator has a salary of $100,000 and is employed by an academic institution that allows its faculty to consult one day a week and keep the earnings. In this hypothetical situation, the investigator can accept a $20,000 consulting fee from the business in addition to the $100,000 academic salary.

In contrast, the same faculty member acting as PI on an STTR award can only receive the $100,000 academic salary and cannot accept a consulting fee for the same work.

Advantages of STTR over SBIR

- Company may lack credible PI, e.g.,
  - Scientist with expertise in area of application.
  - Clinician with access to medical setting.
- PI role essential to academic scientist.
  - Promotion, etc.
  - May be easier to avoid conflict of interest.
- Potentially better access to academic facilities, intellectual property, support, e.g., IRB and animal welfare committee.
- Higher percent subcontract possible.

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STTR awards have different advantages over SBIR awards.

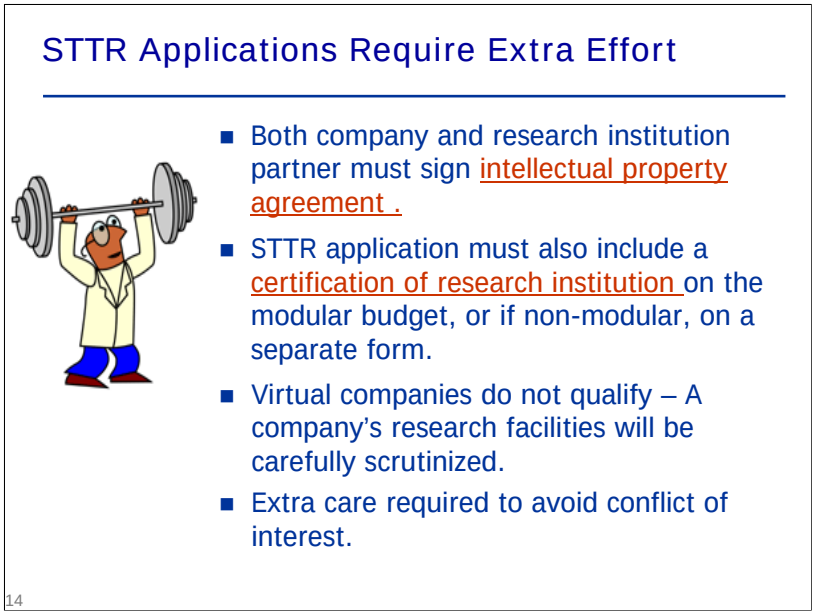
If a company lacks a credible PI, an academic PI may provide the credibility for funding.

For example, you might require a PI with demonstrated expertise in the area of science in the application, or perhaps a clinician who could monitor a clinical trial.

A PI role may be essential to the academic scientist for promotion, to avoid conflict of interest or for other reasons.

In addition, an academic PI may enable the company to have better access to academic facilities, intellectual property, and support; for example, institutional review boards and animal welfare committees.

Finally, an STTR award allows you to pay a higher percentage of the award as a subcontract with an academic institution which may be particularly important for clinical trials.



STTR applications require extra effort. Failure to know and follow the rules could result in your having to pay back NIH for funds received. Worst-case scenario, you could go to jail for fraud.

Your signature on the budget page of the application certifies that you will sign an intellectual property agreement with your research institution partner prior to an award. Click on the link for a model agreement which should be revised to meet the needs of you and your research institution partner. Although the agreement should not be included in your application, a copy may be required by NIH prior to funding.

It is likely and even not unreasonable that your research institution partner will demand ownership of the intellectual property developed through STTR funding. I suggest that you include in your intellectual property agreement an exclusive license at a reasonable rate. Also, I suggest that you describe in the agreement any intellectual property that the company brings to the partnership so that its future ownership will not be in doubt.

In addition to an intellectual property agreement, STTR applications must include a certification by your research institution partner that a consortium arrangement has been signed or will be signed when you receive an award. Click on the links to the required forms which must be included in your application.

Remember that virtual companies do not qualify for NIH small business programs and STTR applications will be carefully scrutinized by Grants Management Staff.

You must be particularly careful to avoid conflict of interest issues if you are the STTR faculty component and also have a financial interest such as equity ownership in the company.

Ask for 12 Months for Phase I Awards

- Unless you are positive you can complete the Phase I in 6 months.
- Reviewers will know if what you propose will take longer.
- You can apply for Phase II funding when you complete your Phase I objectives.

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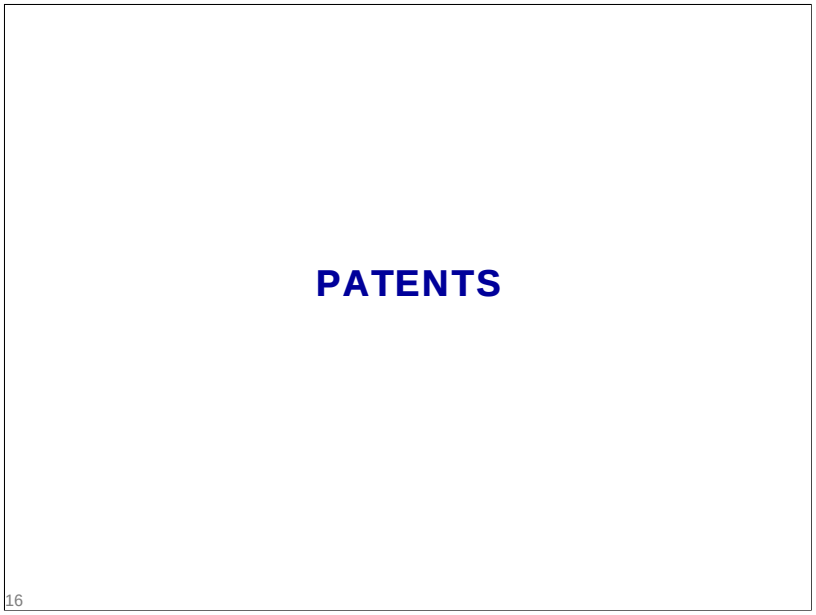
Returning to comparisons between SBIR and STTR awards, the normal time for an STTR Phase I is one year. In contrast, the normal time for an SBIR Phase I is listed as 6 months.

I suggest that you always ask for 12 months for Phase I because most projects take that long. Reviewers will not trust your judgment if you propose to accomplish a 12 month project in a six month time-frame. In addition, there is no disadvantage to asking initially for 12 months for Phase I. However, if you only ask for six months and later discover that you need more time, you will have to get approval for a no-cost extension.

The reason there is no disadvantage to asking for more time is that you are not required to wait till the end of Phase I to apply for Phase II. If your Phase I research has been ongoing following your Phase I application, and you have completed your Phase I objectives, you can apply for Phase II funding on the next receipt date following the receipt of your Phase I award.


PATENTS
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Patents on Intellectual Property

- DO NOT submit a grant application until you have applied for patents on your intellectual property.
- Patent protection is an absolute requirement for a business.
- Core technology must be protected (patented, patent pending, or provisional patent pending).
- Company must own title to patent or have exclusive license to it.

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I strongly recommend that you protect your intellectual property before you describe it in a grant application. I would not depend upon confidentiality agreements signed by reviewers or the fact that grant applications are not public documents.

Patent protection is an absolute requirement to obtain funds for commercialization. Although it can take considerable time for a patent to be issued, at a minimum your inventions should be protected by Patent Pending or Provisional Patent Pending.

If the intellectual property belongs to the academic institution where the research was done instead of to you, you should insist that the institution file the patent application before you submit your grant application.

Also, if the intellectual property is owned by an academic institution, then it is important that you an have a signed exclusive license to commercialize it.

Pursuing a patent application can cost $10,000 or more. Before spending big bucks on patent costs, you or an academic institution will probably want to be assured that funds will be available to commercialize the invention.

Since June 1995, inventors have been able to file a low-cost provisional patent application that establishes a filing date and allows one year's use of Patent Pending.

The provisional filing fees is only $160 or $80 for a small entity.

The provisional application allows up to a one year's delay in the cost and effort of pursuing a formal patent application. During this year, you can disclose the invention to investors and seek funding through grant applications with little risk that the invention will be stolen.

I would like to emphasize that the provisional application's major use is to protect your invention while you seek funds necessary to show that the invention is worth commercialization and thus worth the cost of a full patent application.

You should file a full patent application and not a provisional application if you know that the invention is worth commercialization and if funds are available to pursue the full patent application.

Provisional Patent Cautions

- Provisional applications are not examined on their merits.
- The disclosure of the invention in the provisional application must be as complete as possible to support full application.
- Full patent application must be filed within one year.
- Each inventor must be named in the provisional application.
- The non-provisional application must have one inventor in common with the inventor(s) in the provisional application.
- Amendments are not permitted in provisional applications after filing, other than those to make the provisional application comply with applicable regulations.

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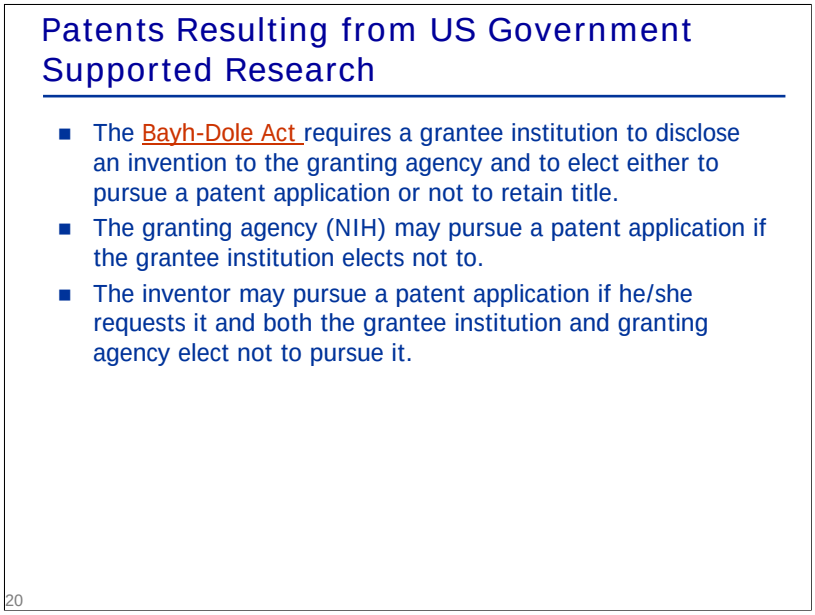
Because provisional patent applications are not examined for merit, inventors often believe that they can prepare and file their own applications without help.

Inventor prepared applications often provide incomplete disclosure which can lead to a variety of problems including complete and total loss of rights.

The provisional application should contain the full and complete disclosure of the invention equivalent to the quality level found in an full application.

I suggest using a professional to write the detailed description that will be used without alteration in a subsequently filed full application.

Remember, the clock is running once the provisional application is filed and the full application must be filed within one year.



Most inventions that form the core technology of small biotech companies result from US government supported research at academic institutions.

The Bayh-Dole Act specifies reporting and ownership requirements for these inventions. The grantee institution must disclose the invention to the granting agency within 2 months of learning about it from the inventor and must elect either to pursue a patent application or not to retain title within a maximum of 2 years.

This time is reduced considerably when the invention is described in a publication.

If the grantee institution elects not to file a patent application, the NIH or other granting agency can file one but usually does not.

Then the inventor may request and receive permission to retain ownership and file the patent application.

MORE FUNDS OR TIME

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Types of NIAID SBIR and STTR Applications

- Normal SBIR or STTR application.
- Fast-Track SBIR or STTR application.
  http://grants1.nih.gov/grants/funding/sbirsttr1/index.pdf#page=18
  - Concurrent submission and review of Phase I and Phase II applications.
- Outside normal guidelines – Higher award levels and longer times accepted for both Phase I and Phase II applications.
  - SBIR-AT-NIAID (Advanced Technology).
  - NIAID Small Business Biodefense Program
- NIAID Competing Continuation of SBIR/STTR Phase II Awards

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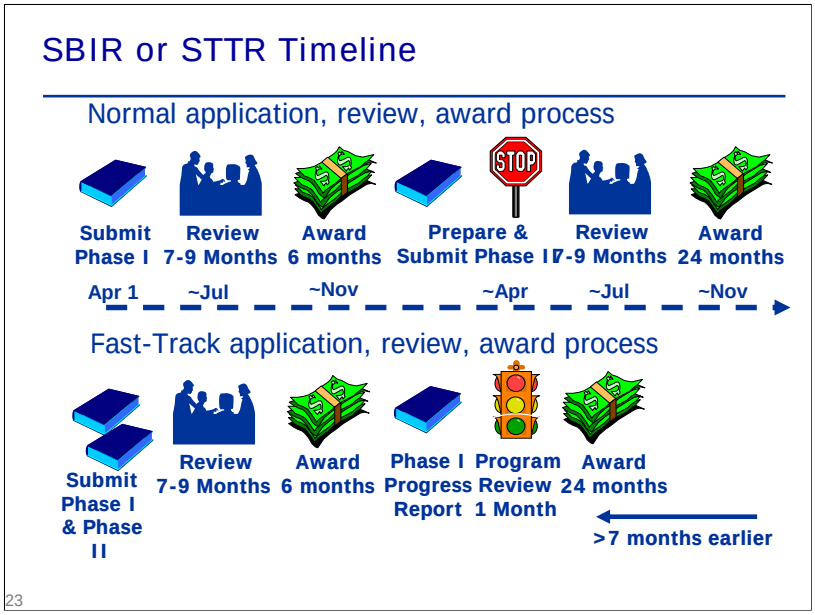
In addition to "normal" SBIR and STTR applications, all NIH Institutes and Centers, abbreviated as ICs, accept Fast-Track applications with concurrent submission and review of Phase I and Phase II.

Also, many ICs will accept SBIR and STTR applications outside the normal guidelines - having higher award levels and longer times for completion.

At NIAID we have the SBIR-AT-NIAID and SBIR/STTR biodefense Phase I/II program announcements and a competing SBIR/STTR Phase II continuation program announcement.

I will describe these programs a bit later. Check other ICs for their programs and policies.



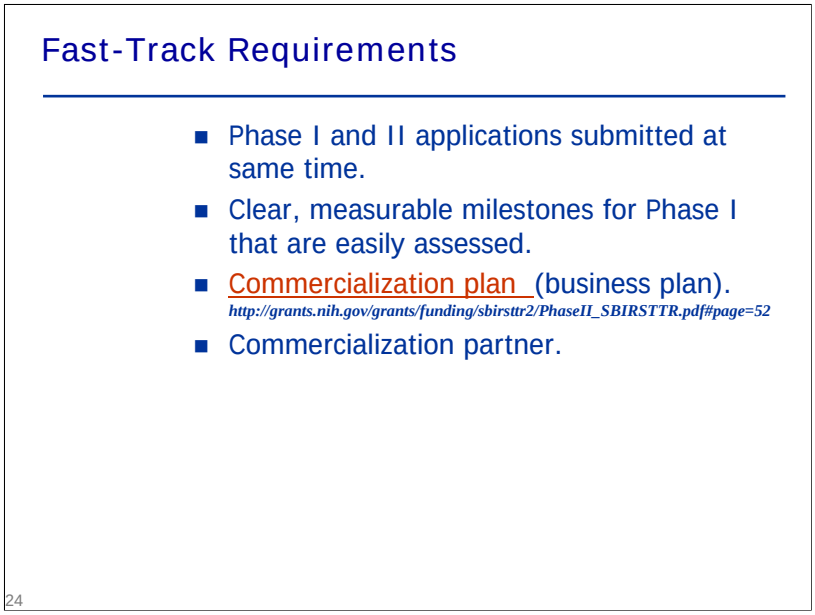
Fast-Track reduces the gap in funding that can occur between the completion of Phase I and the start of Phase II.

For the normal process, you submit a Phase I application, wait 7-9 months for an award, work six months on the project, prepare and submit a Phase II application, and then stop work during the 7-9 month period while your Phase II application is reviewed and awarded.

The Fast-Track application contains both your Phase I and Phase II proposals which undergo concurrent review.

If you receive a Fast-Track award, you proceed normally through Phase I and then submit a progress report to receive approval for Phase II funds.

Program review of your progress may be completed in a short time, and Phase II funding may commence 7 months or more earlier than applications following the normal process.



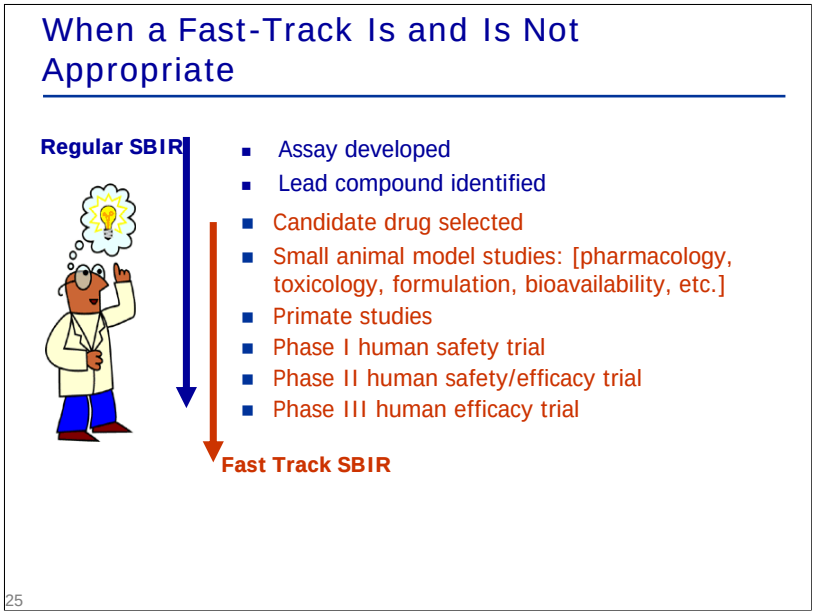
Although Fast-Track provides an opportunity to avoid the funding gap between Phase I and Phase II awards, Fast-Track applications have some daunting additional requirements.

You have to submit both Phase I and Phase II applications at the same time. It is very difficult to write an outstanding Phase II application without knowing the results of Phase I.

To be successful, the specific aims (milestones) for Phase I must be clear and measurable ones that are easily assessed.

Fast-Track applications must also include a detailed commercialization plan up to 15 page in length, in other words, a detailed and thought out business plan for the product.

Finally, Fast-Track applications are encouraged to have a commercialization partner.



Let me describe a drug development project as an example of when a Fast-Track application is and is not appropriate.

Suppose you have selected a drug candidate prior to your SBIR submission. A Fast-Track application is appropriate because you are about to embark on the critical path to FDA approval.

Each step in the process has criteria for determining if your drug candidate should continue or should be discarded and funding halted.

You can write your Phase II application because you know exactly what research is required. As the research you propose will probably not be very innovative, the significance of the new drug to public health should be very high.

A review committee will most likely not feel the necessity to review your Phase I research decisions if they buy into the significance of your proposal.

On the other hand, you should not consider a Fast-Track application if your Phase I results would affect the experimental design of your Phase II application.

If so, reviewers will want to evaluate your decisions.

As an example, suppose you have developed an assay and identified a lead compound, and now want to use Phase I funds to select a candidate drug.

In this case, you should use the regular SBIR route because the review committee will most likely want to see your data and your reasons for selecting a particular candidate for animal and human studies.

Reasons Not to Submit a Fast-Track Proposal

- It is too early in your product development to get a commercialization partner.
- A Fast-Track proposal requires at least four times the effort of a Phase I.
- You lack experience writing SBIR applications.
- You may not need a Fast-Track award to avoid a funding gap.

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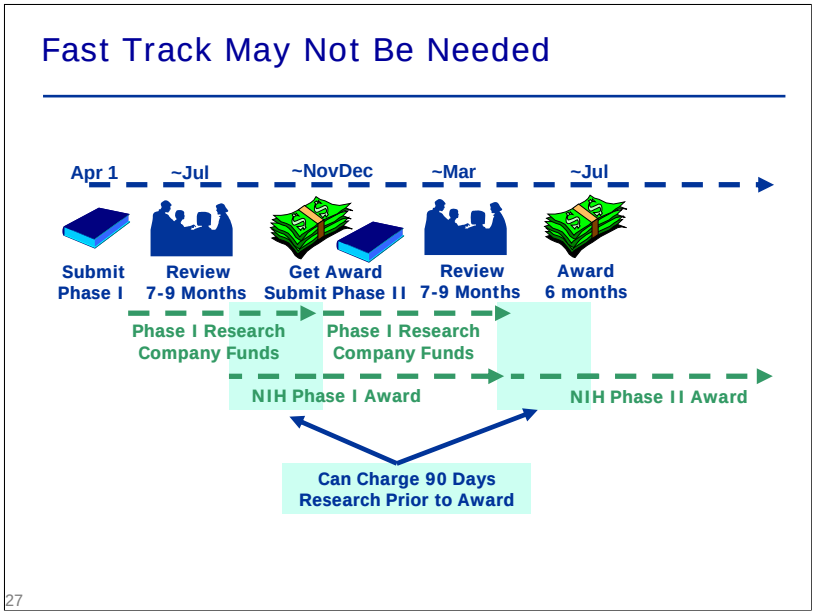
There are other reasons not to submit a Fast-Track proposal.

First, a Fast-Track may not be advantageous to you if it is too early in your product development to get a commercialization partner, of if a partner would demand too much ownership.

Second, preparing a Fast-Track application is at least four-times the effort of preparing a Phase I application. Your efforts might be better employed writing more Phase I applications on different concepts.

Third, if you lack experience writing SBIR applications, you probably do not want to start by preparing a difficult Fast-Track application.

Last but not least, as I will describe next, you may not need a Fast-Track award to avoid a funding gap.



If the project you propose is important to your company and if you have the resources to pursue it while you wait for NIH funding, the disadvantages of a Fast-Track application may outweigh the advantages.

For example, let's say you submit a Phase I application and you use company funds to continue research on your project while review proceeds. Now, suppose you receive a Phase I award.

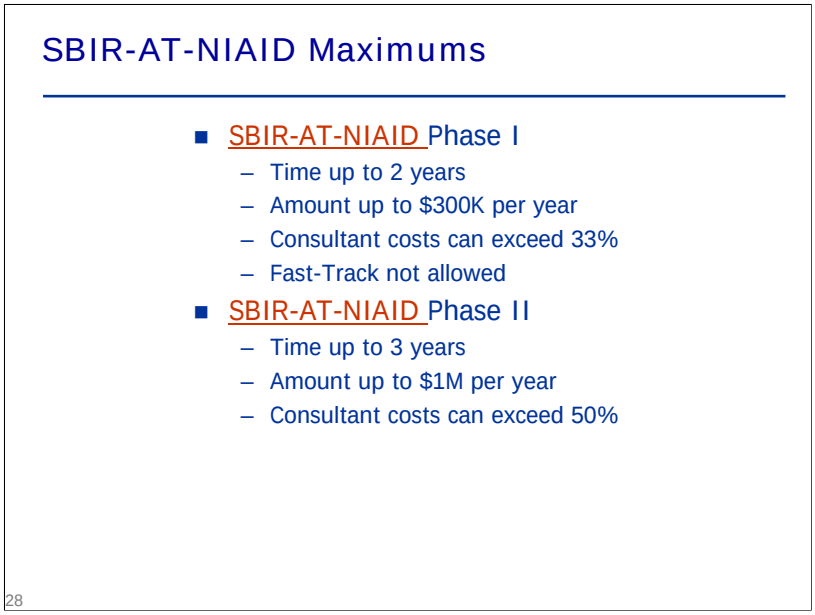
Because you have been working on the project, you may complete your Phase I specific aims prior to getting an award. If so, you can submit a Phase II application on the next application receipt date following your Phase I award. You do not have to wait the six months or more that you proposed in your Phase I application.

Also, If you receive a Phase I award, you are allowed to charge the cost of the research on the project completed during the 90 days prior to the award.

What this means is that if your Phase I application is successful, some of the company's expenses on the project can be recovered.

Then, while you wait for review and award of Phase II, you can continue working on the project using the Phase I and company funds.

And again, if you receive a Phase II award, you are allowed to charge the cost of your research on the project completed during the 90 days prior to the Phase II award to recover some of the company's expenses.



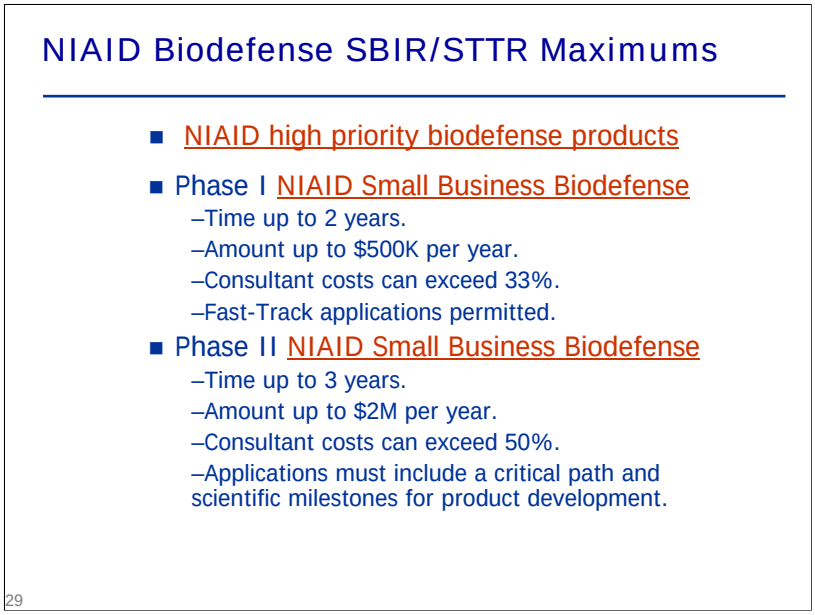
Many ICs have relaxed the normal guidelines for the time and amount of SBIR and STTR awards. For example, NIAID issued the advanced technology program announcement, called SBIR-AT-NIAID.

This announcement says that NIAID will consider funding well-justified Phase I SBIR applications that include high-cost advanced technology or high-cost long-term clinical studies for up to 2 years, amounts up to $300K per year, and consultant costs exceeding the normal maximum of 33%. The SBIR-AT-NIAID announcement does not include STTR or Fast-Track applications.

Both normal and advanced technology SBIR Phase I recipients may submit advanced technology Phase II applications.

NIAID will consider advanced technology Phase II applications for up to 3 years, amounts up to $1M per year, and consultant costs exceeding the normal maximum of 50%.

Although many Institutes and Centers may consider SBIR or STTR applications requesting funds or times above the usual amounts, the next few slides explain why you may be better off staying within normal guidelines.



NIAID has a biodefense program announcement permitting well-justified small business Phase I applications on high priority biodefense products to request Phase I funds for up to 2 years, amounts up to $500K per year, and consultant costs exceeding the normal maximum of 33%. Fast-Track applications are permitted.

Phase I recipients may submit biodefense Phase II applications. NIAID will consider biodefense Phase II applications for up to 3 years, amounts up to $2M per year, and consultant costs exceeding the normal maximum of 50%.

Although many ICs may consider SBIR or STTR applications requesting funds or times above usual amounts, the next few slides explain why you may be better off staying within normal guidelines.

NIAID SBIR Success Rate Thru April 2004

TYPE	Number	Funded
Phase I	2561	22%
Phase II	413	37%
Fast-Track	95	19%
AT Phase I	205	21%
AT Phase II	38	26%
BD Phase I	377	7%
BD Phase II	17	12%
BD Fast-Track	7	14%

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This table shows the cumulative success rate for NIAID SBIR applications from inception of the various programs through April 2004.

22% of unsolicited Phase I applications were funded and 16% of the funded Phase I applicants applied for Phase II.

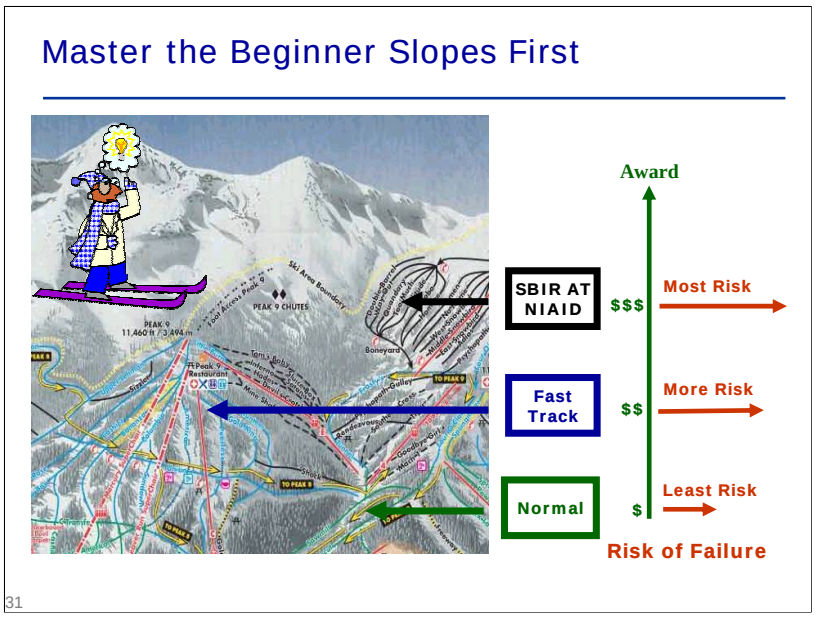
Although about a third of the Phase II applications were funded, the successful Phase II applicants represent only about 6% of initial Phase I applicants.

Compared to 6%, the 19% success rate for Fast-Track applicants appears great but such a comparison is not justified. Fast-Track applicants usually include significant preliminary data, milestones, a product development plan, and commercialization partners that increases enthusiasm of reviewers compared to normal Phase I applications.

Interestingly, advanced technology applications are about as successful as normal applications, but like Fast-track, reviewer scrutiny of advanced technology applications is greater than for normal applications so that better quality applicants self-select to apply.

The low success rate of biodefense SBIR applications illustrates what happens when new applicants are attracted by the availability of large-scale funding.

The next slide illustrates my suggestions on balancing risk and reward.



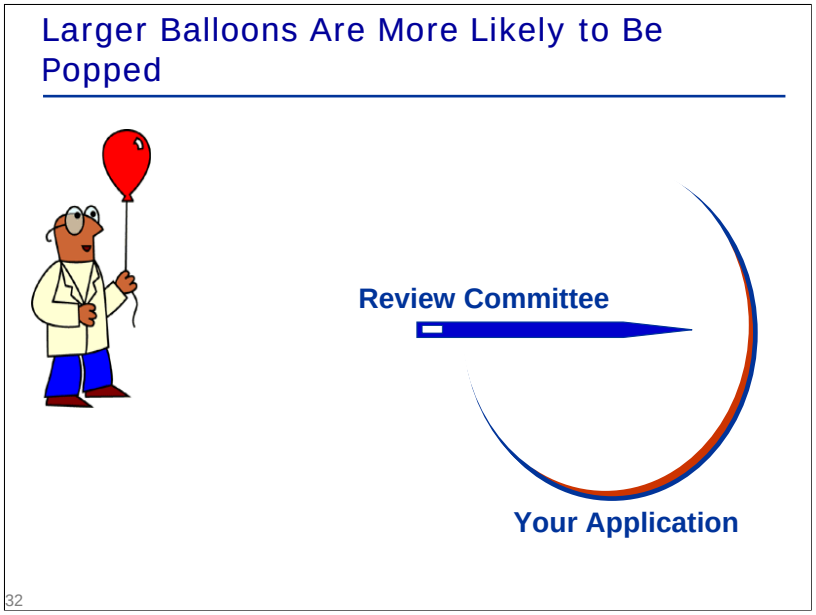
Our advice skier may help you decide what type of application you should consider. Small business applications are like most NIH applications; the more money you request, the greater your risk of failure to receive an award.

The “normal” SBIR application, like the beginner green slopes, is easiest to master but comes with the least funds and also the least risk.

The “Fast-Track” application, like the intermediate blue slopes, requires more proficiency but provides more money. You probably should go up to the blue slopes only after you have received a Phase II award on the green ones.

The “SBIR-AT-NIAID” and similar applications, like the expert double diamond black slopes, require the most proficiency. The black slopes on the top of the mountain should probably be attempted only by those who have mastered the art of SBIR grantsmanship and who have a project which truly could not even begin without extra time and funding.

Keep in mind that about half of applicants master the intermediate or advanced slope. Only you can determine on which slope you belong.



Fast-Track and other large applications that exceed normal guidelines are less likely to be funded because larger balloons are more susceptible to being popped. Review committees use a triage process to spend the most time on applications most likely to be funded.

They search for any weakness in an application which may eliminate it from further consideration. Compared to normal applications, Fast-Track and advanced technology applications are larger in scope and more likely to have a discernable weakness which leads to their downfall.

Like a balloon, the more you expand your application, the more likely it is to have weak spots.

The review committee's sharp criticism will be directed at the first week spot they detect, and they will pop your balloon.

Once the hot air is released, your application is no longer considered seriously.

As a result, the criticisms you receive may not fully describe all that is wrong with your application. If you only patch the identified holes and resubmit, you may miss other problems which may be uncovered at the next review.

Your best strategy is to keep your application as narrow and well-focused as possible, like the smallest balloon.

Stick with a normal application unless your project absolutely positively requires the larger balloon.

WINNING APPLICATION

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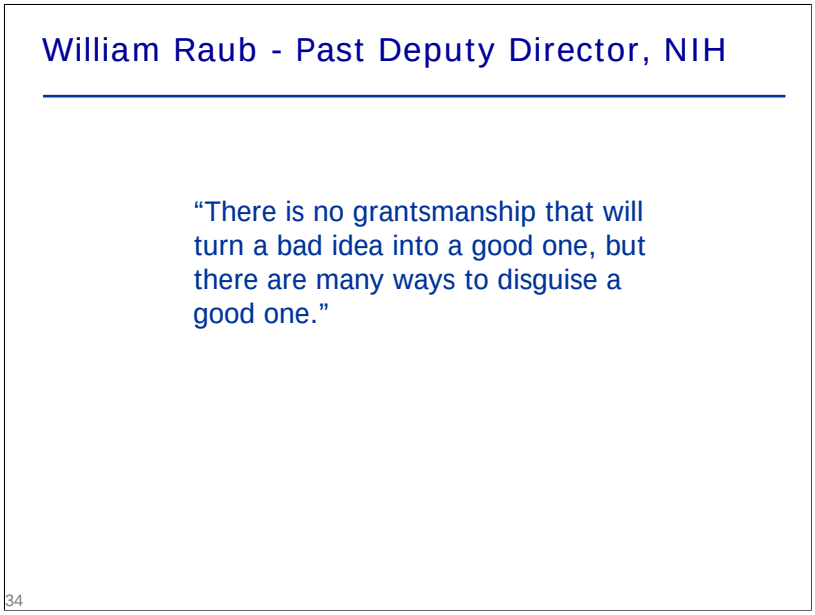
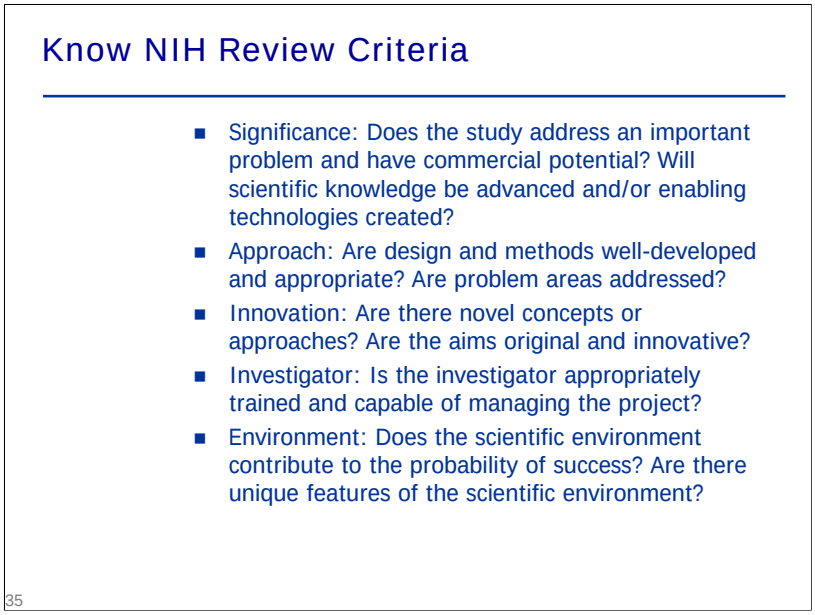


As the former NIH Deputy Director said… "There is no grantsmanship that will turn a bad idea into a good one, but there are many ways to disguise a good one." Creating a clear, well planned, and organized grant application plays a major role in winning over peer reviewers.



Peer reviewers are instructed to use five criteria to evaluate your application: Significance, Approach, Innovation, Investigator and Environment. These are the same criteria used to judge all NIH applications. Although some are more important than others, none is unimportant. Prepare your application to excel in each area. Organize your application to make it easy for reviewers to find information relating to each criteria. When your application is complete, review it yourself. How you would you rate it on each criteria if you were on the review committee?

Phase I Objective

- Establish the technical/scientific merit and feasibility of the proposed R/R&D efforts.
- Not “feasibility” of producing the product.
- Multiple “feasibility” studies may be necessary between the inception of an idea and the sale of a product.
  - The window is open for more than one Phase I and Phase II grant for any product.
  - You should carefully define and limit your proposals.

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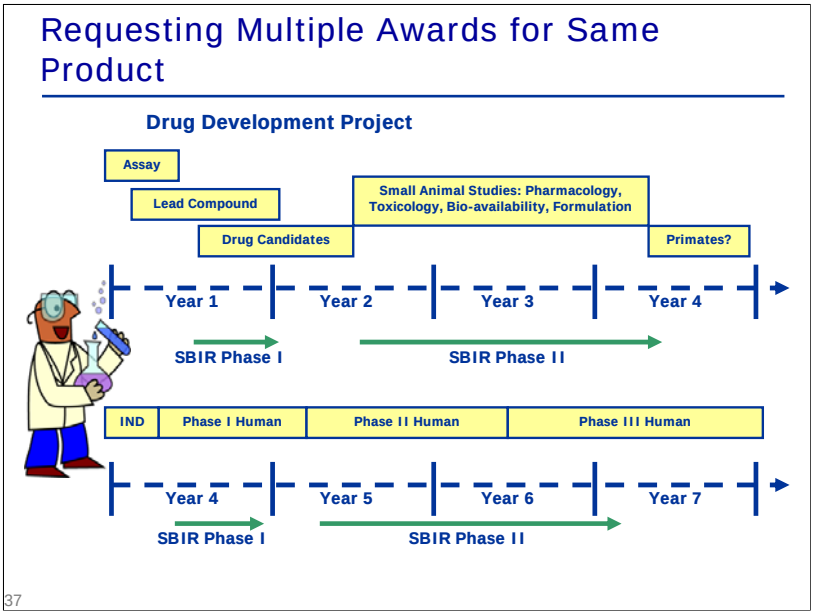
One of the most common mistakes made by applicants is lack of focus - thinking too big. It may not be likely or even desirable to go from concept to product in a single Phase I/II application.

Your objective for Phase I is to establish the technical, scientific merit, and feasibility of Phase II, not of producing your product.

You may need to test feasibility at many steps along the path from concept to product.

If you are careful and limit the scope of your application, you may be able to have multiple Phase I and Phase II funding to support your voyage from concept to product.



Using a drug development project, I will provide an example of how you might request multiple SBIR Phase I and Phase II grants for the same drug product.

The first Phase I takes the project from lead compound to drug candidate. The Phase I is the feasibility study for the first Phase II which takes the drug candidate through small animal model studies.

The second Phase I follows the investigational new drug application and begins human safety studies. Note that the second Phase I is a feasibility study for further human trials. The second Phase II begins the large scale human safety and efficacy trials.

Structure of an Application's "Research Plan"

- Specific Aims
- Significance
- Relevant Experience
- Experimental Design and Methods
- Other Required Information
  - Human subjects
  - Vertebrate animals
  - Consultants
  - Contractual arrangements
  - Literature cited

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The "Research Plan" of all NIH applications has essentially the same format: You organize your application by Specific Aims, Significance, Relevant Experience, Experimental Design and Methods, and other required information. The last set of topics include human subjects, vertebrate animals, consultants, contractual agreements, and literature cited.

I suggest that you label the sections of your application with the same letters and titles used in the SBIR/STTR solicitation. Include sufficient information to meet requirements and to allow reviewers to judge the quality of your application based on the NIH rating criteria.

Your Abstract is not part of the Research Plan, but it is the first, and perhaps only section of your application that many reviewers will read. I suggest that you write it only after you have completed your Research Plan. So, let's talk about your Research Plan first, and then about your Abstract.

Hypothesis

- NIH reviewers are used to hypothesis-driven research.
- If your proposal is primarily development, you still want to focus on research. For example,
  - "Development of a Safety Syringe to prevent needle sticks" could become "Proof that a Safety Syringe reduces needle sticks in a hospital setting."
  - Your simple hypothesis is: "the use of our safety syringes will reduce needle sticks."

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Academic reviewers usually expect hypothesis-driven research.

Even if your proposal is primarily development, you should try to "spin doctor" your application to focus on its research aspects.

Suppose for example, that your initial concept for a proposal was "Development of a safety syringe to prevent needle sticks." This title immediately jumps out at reviewers as a development project and not a research one.

Suppose instead that you "spin" it as "Proof that a safety syringe reduces needle sticks in a hospital setting."

Then, you can present as your hypothesis, "The use of our safety syringes will reduce needle sticks." When you propose to collect and analyze data to prove your hypothesis, you have turned development into research.

Specific Aims - Section A

- Your Specific Aims are the milestones of your research project, driven by the hypothesis you set out to test.
- Do not confuse Specific Aims with long-term goals.
- Specific Aims are the criteria by which success of Phase I will be judged.
- Choose Specific Aims that can be easily assessed by the review committee.
- Include concrete Specific Aims that reviewers will expect.

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Section A of your research plan is called Specific Aims. Begin this section with your hypothesis. Then describe your Specific Aims as the milestones for your Phase I research.

Do not confuse specific aims with long-term goals.

When your Phase II application is considered, reviewers will judge your Phase I accomplishments against the Phase I Specific Aims that you yourself proposed. Thus, you want to select Specific Aims you are reasonably confident that you can accomplish. However, the review committee will doubt your judgment if you omit a milestone that they think is essential prior to Phase II funding.

To be easily assessed, a Specific Aim should be an "end point" as opposed to a "best effort."

For example, in a drug development project, instead of a Specific Aim "to evaluate a number of potential drug candidates," which would be a "best effort," make your specific aim "to select the best drug candidate for further study," which is an "end point."

Significance - Section B

- Significant product potential
  - A product-focused application is more likely to have support of business reviewers.
  - A project with sound financial projections is more likely to attract a partner.
- Significant innovative science
  - A scientifically focused application is more likely to have a knowledgeable reviewer.
- Significant to NIH Institute or Center
  - An application that addresses a program's need is more likely to have a champion.
  - Identify and speak with your potential champion.

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Section B of your Research Plan, Significance, may have different meanings for different reviewers. To be competitive, applications for NIH small business funds need to show a significant product, significant science, and significant need.

Business reviewers will judge your application on its likelihood to lead to a commercially successful product in a reasonable period of time. They are impressed by a project with sound financial projections and partners who will help get your product to the market.

Science reviewers will judge your application on its science innovation and its likelihood to increase knowledge. The more focused the application, the more likely it will be assigned to a knowledgeable reviewer.

Both the product and the science should be targeted to the needs (the mission) of an NIH Institute or Center and to a specific program area administered by a program officer (a champion) who will support funding your project over its competition.

Innovation does not necessarily mean a new paradigm. Either the ends or the means should be innovative, but both do not have to be.

Thus, if the result of the research is critical, it may not be important that your means are not innovative and vice versa.

Illustrate the Significance of Your Research

- Use citations to demonstrate the breadth of your knowledge of both published and unpublished work.
- Describe the state of knowledge in your research area, gaps and roadblocks, and opportunity you have identified.
- Tell why your proposal will increase knowledge and improve public health.
- Identify how the proposed Phase I research milestones will justify Phase II.

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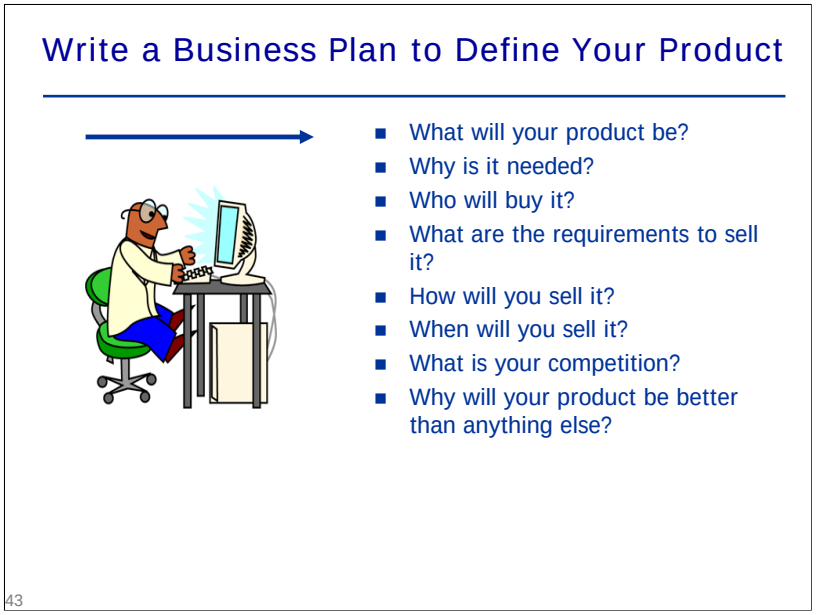
Illustrate the significance of your research by describing the state of knowledge in your research area, the gaps as well as the roadblocks, and how your project addresses these.

Show reviewers you know the field by the breadth of your knowledge of both published and unpublished work.

Tell reviewers explicitly why your proposal is innovative, how it will increase scientific knowledge, and the way in which it could improve public health.

Show how the Phase I research milestones you outlined in your specific aims will justify your gaining a Phase II award.

The following are my tips to make your significance section better.



First, write a business plan to help you describe the product potential of your application. If you have not created a business plan, your state or local economic development organizations may be able to help. Your business plan and your significance section should answer the following questions:

What will your product be?

Why is it needed?

Who will buy it?

What are the requirements to sell it?

How will you sell it?

When will you sell it?

What is your competition?

Why will your product be better than anything else?

The second tip is to target the significance of your proposal to the mission of an NIH IC.

Contact the program staff to learn how your proposed research would fit in their portfolios.

Program staff may also provide information that will help you explain the significance of your proposal and perhaps guide you to collaborators who can help you improve your research plan.

You can identify the IC likely to be most interested in your application from the links provided here to each IC's Internet site and to the list of NIH, CDC, and FDA Program Descriptions and Research Topics.

Relevant Experience - Section C

- Previous experience (publications, patents, similar products) basis for Investigator evaluation criteria.
- Preliminary data
  - Solicitation states "Preliminary data are not required."
  - Other applications will present preliminary data.
  - Review committee will have greater enthusiasm for proposals with preliminary data.
  - Preliminary data should support your hypothesis and the feasibility of the project.
  - Preliminary data may consist of your own publications and unpublished data from your laboratory.
  - Interpret results critically. Evaluate alternative meanings.

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Section C of your Research Plan, Relevant Experience, should convince reviewers that you can do the job.

Show all relevant experience, with an emphasis on work you have accomplished that indicates you can direct the proposed research and achieve the aims of your project.

The Investigator evaluation criteria is primarily based on this section and on the biographical sketches of key personnel.

Although the SBIR/STTR solicitation states that "Preliminary data are not required," competing applications will present preliminary data, and review committees may have greater enthusiasm for proposals with preliminary data.

Preliminary data may consist of your own publications and those of others, and unpublished data from your laboratory that support your hypothesis and the feasibility of the project.

Interpret results critically and evaluate alternative meanings. You can be assured that critical members of the review committee will look for explanations other than the ones you propose.

Research Design and Methods - Section D

- Describe Research Design and Methods in parallel to your Specific Aims, including for each experiment:
  - Timelines
  - Rationale, innovation, supporting data and references.
  - Expected results, limitations, potential difficulties and planned statistical analysis if relevant.
  - Criteria for evaluating success, failure, or other possible interpretations.
  - Hazards anticipated – precautions proposed
  - Reagents, animals, human subjects, equipment, etc.
  - Collaborators – purpose & letters of agreement

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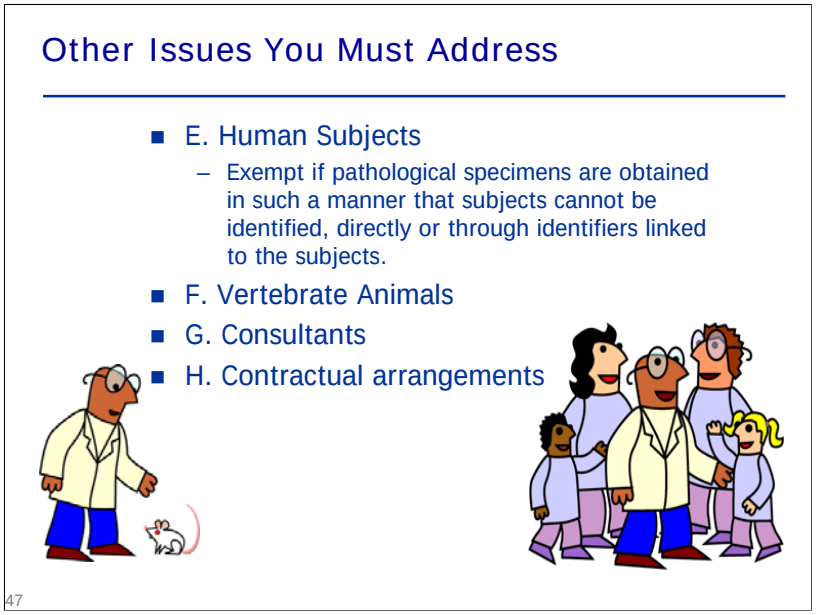
Section D, Experimental Design and Methods, should spell out in detail what you are going to do, how you are going to do it, and your criteria for success. I suggest you include a timeline to convey your entire project quickly to reviewers.

Give a rationale for your choice of experiments. Convince reviewers that your methods are appropriate to your Specific Aims. If your methods are innovative, show how you have changed existing or proven methods while avoiding technical problems. If you are choosing a nonstandard approach, explain why. Provide supporting data and references.

Describe the kinds of results expected and how they would support or contradict your hypothesis. Present other possible interpretations. Define the criteria for evaluating the success or failure of each experiment. If the review committee does not agree with your criteria for success, your application will probably need revision.

Call attention to potential problems and limitations and your strategies to overcome them. Include statistical analysis if possible - reviewers are impressed by statisticians. Describe hazards anticipated and precautions you propose. Spell out your sources of important reagents and equipment, and details of any use of animals or human subjects.

Credible collaborators, often academic faculty, can improve your rating on the investigator criteria. Be sure to explain exactly how they will participate in your proposed research and include letters that describe their agreements with you.



Failure to adhere to regulations on human subjects can easily delay or abort funding for a research project. If your research requires samples from people, try to design your experiments so that you are exempt from human subject regulations.

You are exempt from human subject regulations if you obtain pathological samples that no one, including the provider of the samples, can trace to or identify with a particular subject.

Failure to adhere to regulations on vertebrate animals can also sidetrack your award. Even if you plan to use animal facilities in a collaborating institution, the company needs to have an approved animal welfare assurance on file prior to an award.

You should try to design experiments that do not require vertebrate animals unless you really need them, and if you need them, get your assurance paper work done early.

Follow the guidance in the SBIR/STTR solicitation to include required information on human subjects, vertebrate animals, consultants, and contractual arrangements. Problems with any of these areas will hold up your receiving an award.

Your Title and Abstract

- Your title should be as specific and detailed as possible within the 56-character limitation.
- Your abstract should be a concise summary of your entire application. Clearly and succinctly include your project's:
  - Significance
  - Hypothesis
  - Specific Aims
  - Summary of your approach (Experimental Methods)

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Your title and abstract are extremely important because they will be used by NIH referral staff to assign your application to a peer review group and to an IC; they will be read by all reviewers; and they will form the basis for decisions within an IC if your priority score is in the gray zone I will describe later.

Not only should your title should be as specific and detailed as possible within the length limitations, but if possible, it should also convey some of the significance of your proposal.

Do not include confidential information in your abstract because it will become public if you receive an award.

Think of your abstract as an advertisement for your proposal. It should give readers a complete description of what you intend to accomplish and engender enthusiasm for accomplishing it.

You have limited space, so take time to hone your language to convey your message. Make your title and abstract so enticing that even reviewers not assigned to your application will want to read it.


REVIEW AND AWARD
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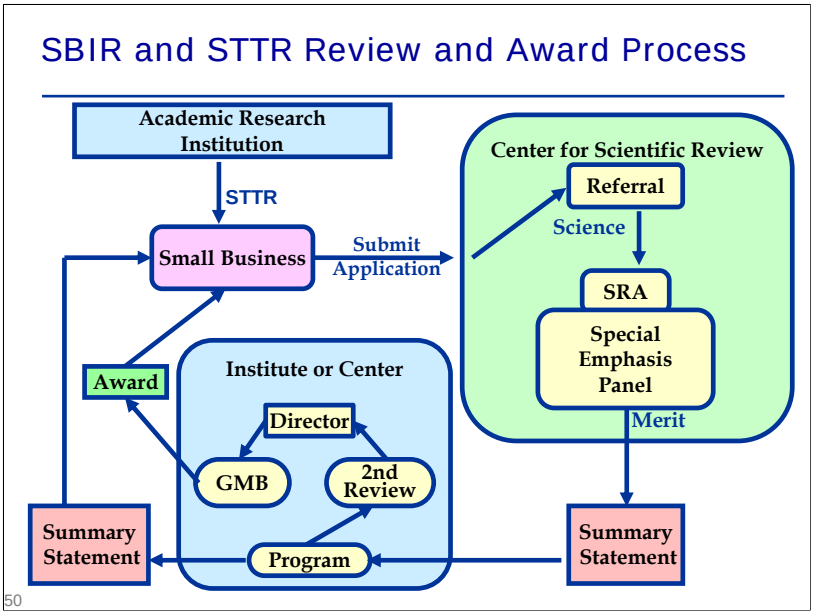

The review and award process for small business applications is quite complex. A small business often interacts with an investigator at an academic institution in an informal partnership leading to an SBIR application or a formal partnership in an STTR application. In both cases, the application is always submitted by the small business to the NIH Center for Scientific Review, CSR.

Based on the science, the CSR referral office assigns the application to a Scientific Review Administrator, an SRA, who convenes a Special Emphasis Panel, an SEP, to review applications that have similar science.

An application is reviewed in depth by at least two primary reviewers. If the application is considered to be among the top 50%, or if one of the panel wants the application discussed, it is discussed by the full SEP, and a merit priority score from one to five is assigned where one is the best and five is the worst. If the application is not discussed by the full SEP, it does not receive a priority score. An applicant should receive notice of a priority score by mail within 10 days following the SEP meeting.

Within 6-8 weeks, the SRA prepares a summary statement containing the primary reviewers written comments, and a summary of the SEP discussion if it occurred including budget recommendations if relevant, and administrative notes.

The summary statement is sent to the assigned IC, where it is directed to the appropriate Program Staff who sends the summary statement to the applicant.

A secondary review group in the IC reviews the scores and summary statements and recommends applications that could be paid if funds are available.

If the IC's Director concurs with recommendations and if the budget office determines that funds are available, the application is released to Grants Management Staff who verify that it satisfies all necessary requirements for an award.

When all policies and procedures are in order, Grants Management Staff issues a Notice of Award.

Special Emphasis Panels (SEP) Composition

- Approximately 75% same reviewers from one meeting to the next.
- Many members also serve on standing Initial Review Groups (IRG).
- Some members ad-hoc with special expertise in science or business.
- CSR Small Business Applications information

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Although the special emphasis panel, may have different reviewers for each review meeting, approximately 75% of the panel members remain constant.

Many of the SEP members also serve on standing Initial Review Groups, known as IRGs.

Others may have special expertise in a science or business area for that particular set of applications.

The Internet site for the Center for Scientific Review Small Business Applications publishes SBIR/STTR review guidelines, a list of current review committees and their SRA managers, and a roster for upcoming review meetings.

Common Reasons for Poor Priority Scores

- Lack of new or original ideas.
- Absence of an acceptable scientific rationale.
- Lack of experience in the essential methodology.
- Questionable reasoning in experimental approach.
- Diffuse, superficial, or unfocused research plan.
- Lack of sufficient experimental detail.
- Lack of knowledge of published relevant work.
- Unrealistically large amount of work.
- Uncertainty concerning future directions.

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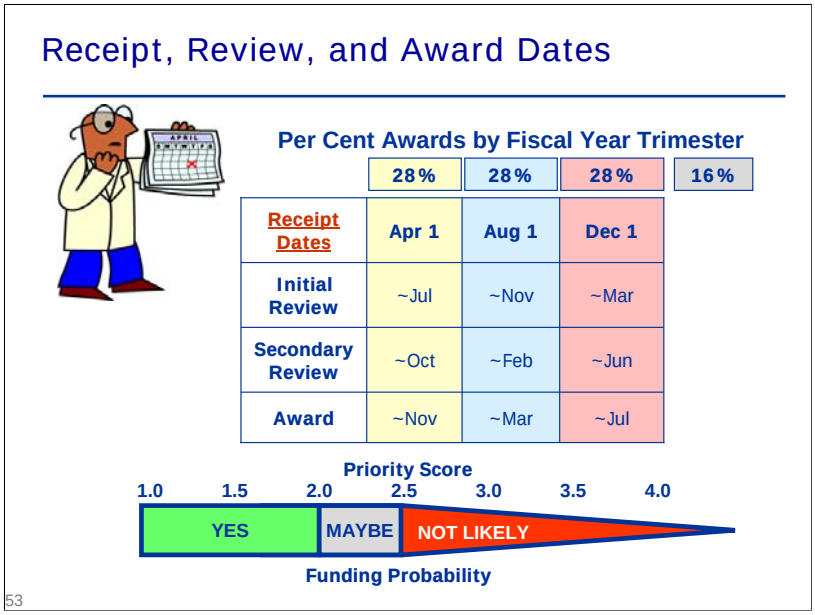
Common reasons for poor priority scores include:
lack of new or original ideas;
absence of an acceptable scientific rationale;
lack of experience in the essential methodology;
questionable reasoning in experimental approach;
diffuse, superficial, or unfocused research plan;
lack of sufficient experimental detail;
lack of knowledge of published relevant work;
unrealistically large amount of work; and,
uncertainty concerning future directions.



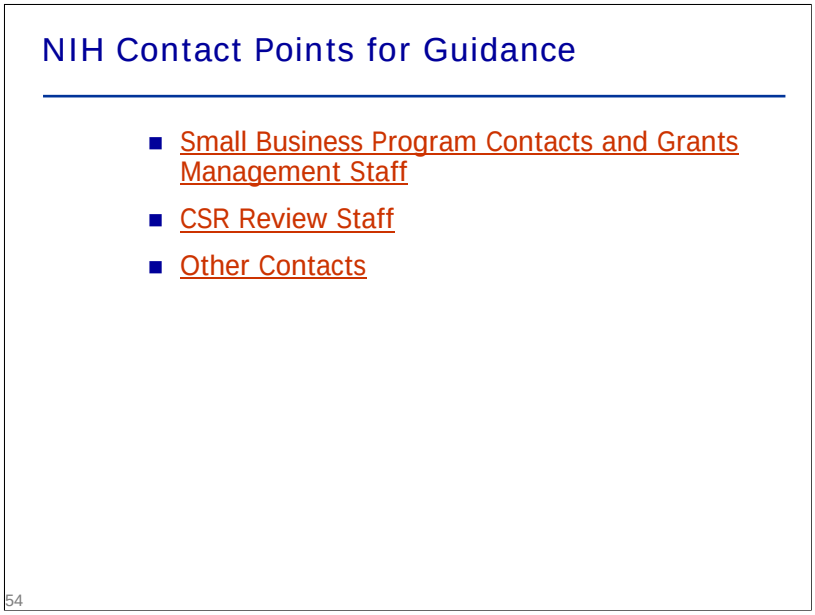
There are some minor differences in treatment of applications for the three application receipt deadlines. NIH operates on a fiscal year that begins October 1st and ends September 31st. Applications received for the April deadline are the first applications to be funded the following fiscal year. If the budget process is delayed, we may not know our budget until sometime into the fiscal year and funding of these first round applications may be delayed.

Even when we know the total SBIR and STTR funds available for the year, we do not know the number of applications and the range of scores that will be received in succeeding rounds until all three review cycles are complete.

Review committees assign applications a priority score from 1.0 being the best to 5.0 being the worst. Based on historical information, we at NIAID know that applications with scores under 2.0 are likely to be funded and those with scores over 2.8 are not. We set a conservative "payline" so that applications received later in the year do not go un-funded because we spent our funds on poorer scoring applications earlier in the year.

As an example, suppose we set a payline that funds 28% of applications each cycle. At the end of the fiscal year we will have spent 84% of our funds. When the scores for all the applications for the fiscal year are finally in, we create a priority list of all unpaid applications and pay starting at the top of the list until the remaining 16% of funds are spent.

As a result of this process, if you receive a score under 2.0, you are likely to be funded without delay. If you receive a score over 2.8, you are not likely to be funded at all. Finally, if you receive a score in the gray zone, regardless of when your application is received, you may need to wait until September to learn if it will be funded.



As you prepare your grant application, you should talk to Program Staff, Grants Management Staff and Scientific Review Administrators. Program Staff are responsible for specific scientific research areas. Grants Management Staff are responsible for administrative and budgetary issues. SRAs are responsible for the review process. SRAs responsible for SBIR and STTR applications are located in the Center for Scientific Review. You submit your application to CSR.

The NIH SBIR/STTR Solicitation contains a list of scientific research areas for each Institute or Center and the Program Staff responsible for each. If you need help identifying the appropriate scientific Program Staff person, contact the IC's Small Business Liaison Staff. Liaison Staff also can explain how their IC manages small business applications. Click on the link to jump to a table in the Solicitation listing all ICs Liaison and Grants Management Staff.

The NIH SBIR/STTR Office is a good source of all information. In the following slides, I will describe these contact points in more detail.

CONTACT NIH

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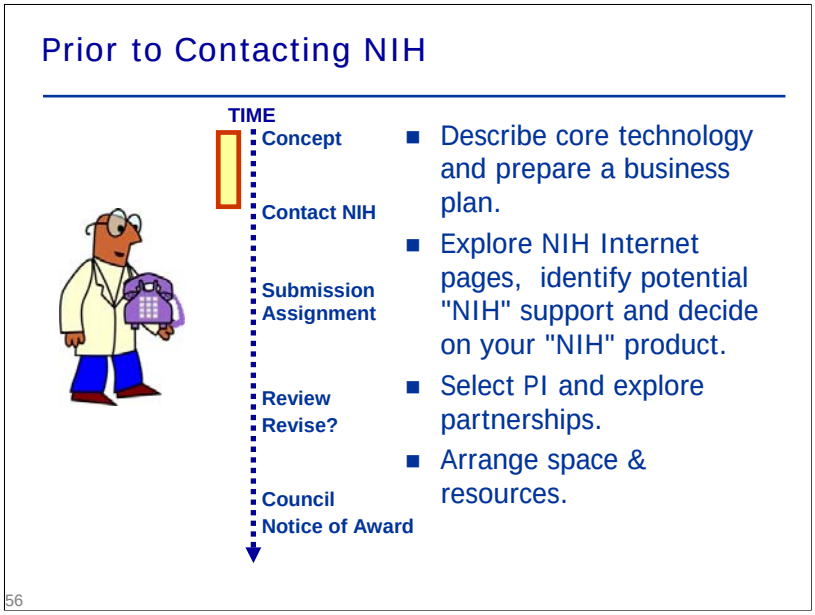


On the left is a timeline that runs from your development of a concept for NIH Small Business Funding to our issuing a Notice of Award.

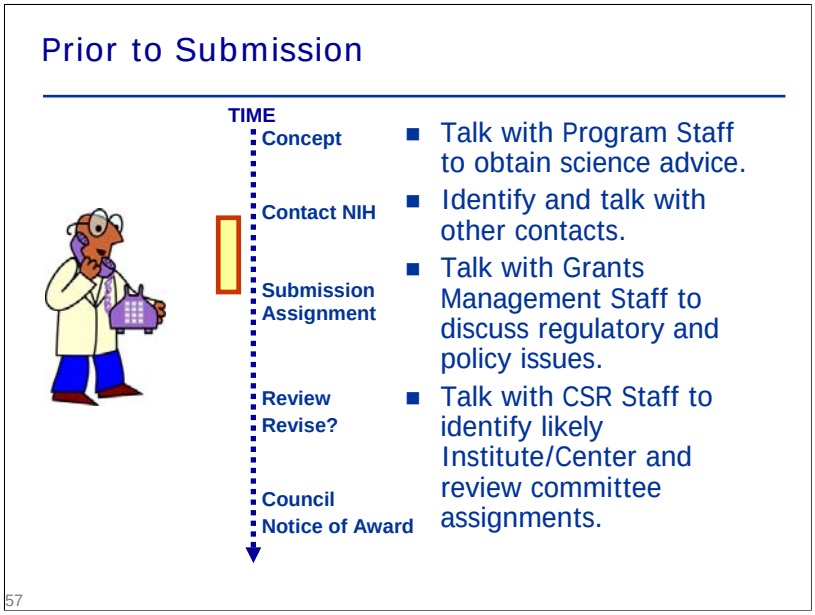
Do your homework before calling NIH.

Identify your core technology and prepare a business plan.

Explore the NIH Internet pages and decide on your likely NIH product and your likely NIH source of support.

Select a Principal Investigator, explore strategic partnerships and arrange for space and resources.

Now you are ready to contact NIH Staff.

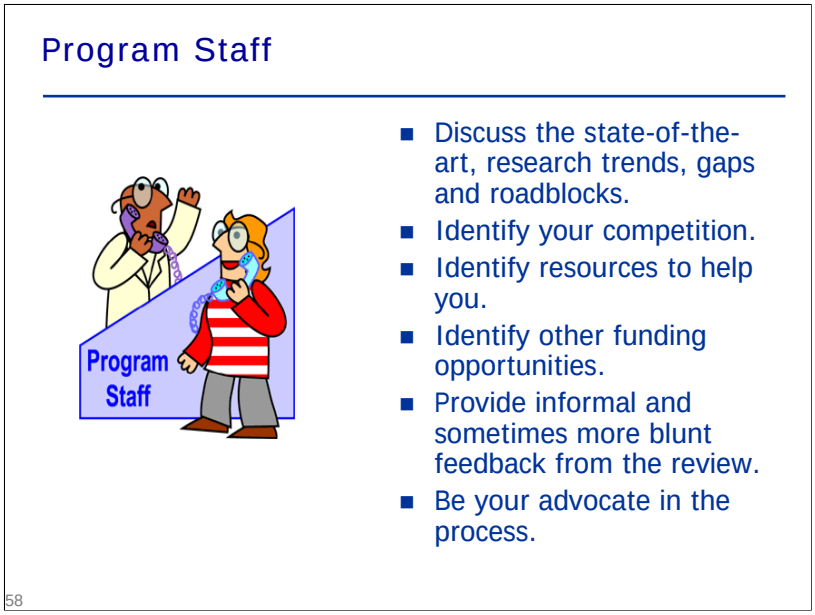


Early in the planning stages of your application, you will want to obtain science advice from Program Staff. The more knowledgeable you are the more productive your conversation is likely to be. You may learn that your technology is more relevant to a different program or Institute.

Ask who you could contact both in and outside NIH to get additional information on your proposed research. Bounce your ideas off as many scientists as possible. Refine your ideas and proposal based on your conversations.

If there are regulatory or policy issues that may affect your application, you should begin conversations with Grants Management Staff.

You could also start communications with the Center for Scientific Review Staff to identify likely review committee assignments for your proposal.



Ask Program Staff to help you better understand the state-of-the-art in your research area. Talk about research trends, gaps and roadblocks, and your competition.

Also, ask program staff to identify resources you might use and other funding opportunities.

Although they do not participate in the review process, Program Staff often attend application review meetings.

When they do attend, they can provide you with informal and sometimes more blunt feedback from the review than you will read in the summary statement.

If a Program Staff person believes in the value of your proposal, she or he may be your advocate for funding if your application is in the gray priority score zone I described previously.

Grants Management Staff

- Administrative matters
- Budget
- Rules and regulations
- Policy issues

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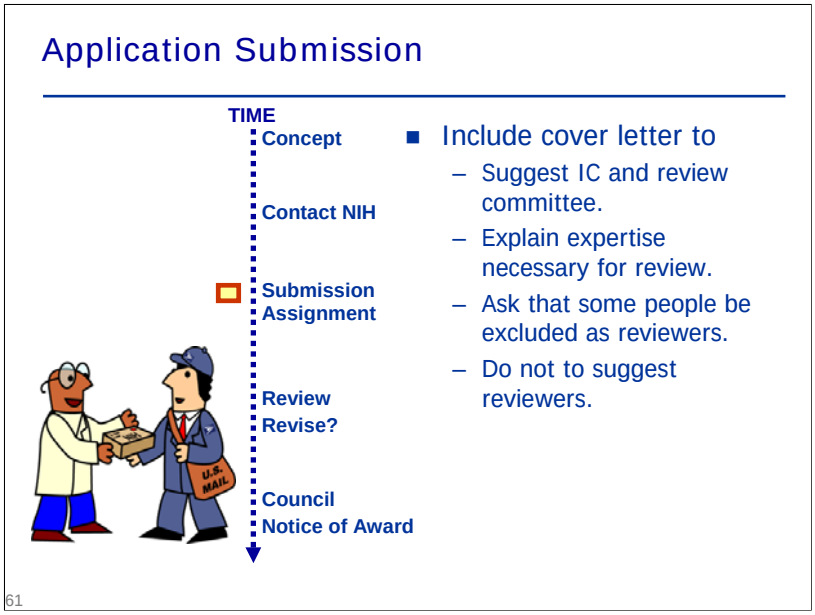
You will mainly interact with Grants Management Staff during and after preparation of a Notice of Award. However, you may want to contact Grants Management Staff prior to submitting an application if you have questions on administrative matters. These include budgets outside the normal levels, rules and regulations, and policy issues on human subjects and vertebrate animals.

Many applicants for NIH grants make the big mistake of believing they should please the NIH Institute or Center to which their application will be assigned. Instead, I suggest you think of the review committee as the "primary customer" for your application. Your chance of getting funded is almost totally dependent on their judging your application better than someone else's.

Due diligence requires that you learn as much as possible about your reviewers. Before you send NIH your application, communicate with CSR staff to identify which SRA and review group is likely to receive it. Ask for a list of committee members who would have reviewed your application if you had submitted it for an earlier receipt date. Many of these same reviewers may be on the committee that will review your application.

I encourage you to conduct a literature search on potential reviewers to learn their areas of expertise. Pay particular attention to the publications of those reviewers likely to receive primary assignment of your application. It is not a good idea to say something in your application that they would disagree with. You can use the National Library of Medicine's Pub Med Central site to search for publications by author.

I also encourage you to use the NIH CRISP database. CRISP stands for Computer Retrieval of Information on Scientific Projects. You can search CRISP to learn if potential reviewers of your application have NIH funded projects. If they do, you can read an abstract about their work. Be particularly cautious if the hypotheses in your application differs from one they espouse.

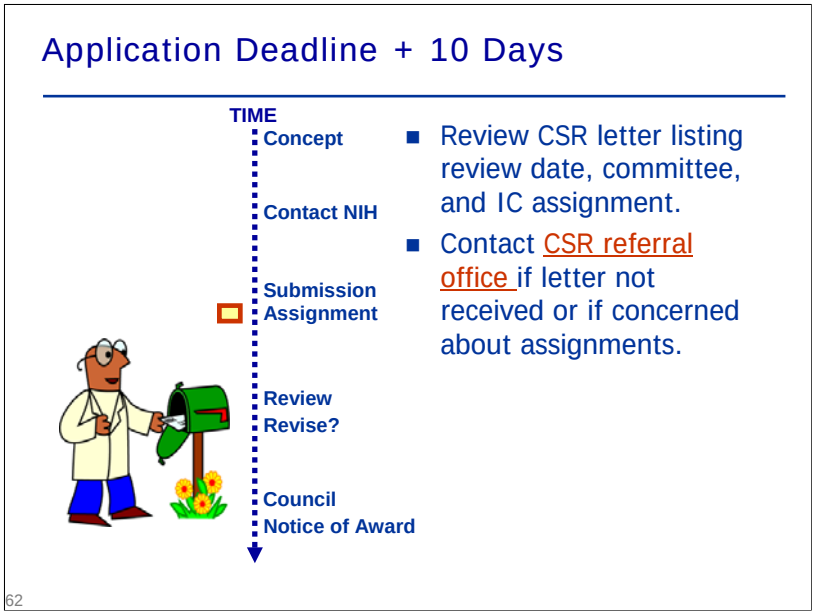


When you submit your application you can include a cover letter requesting its assignment to an Institute or Center. Be sure to explain your reasons.

Also, describe the expertise necessary to review your application.

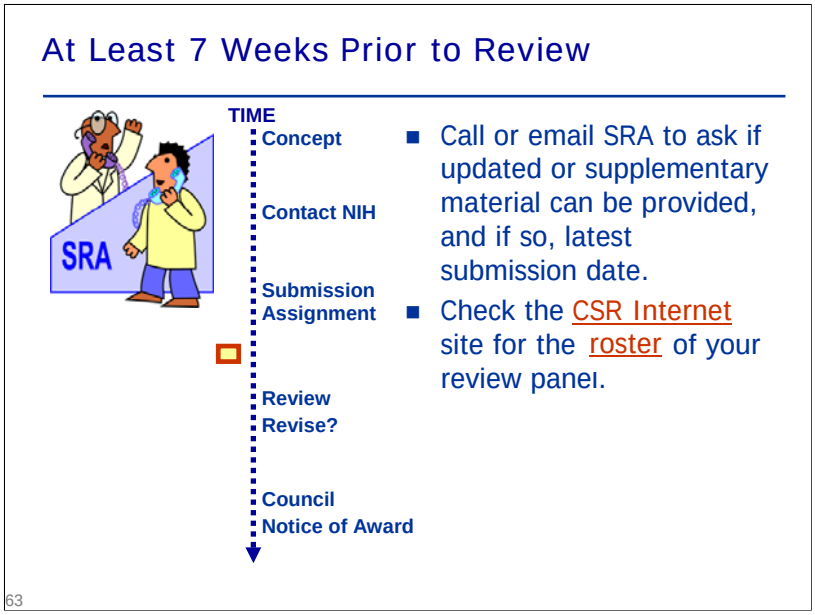
You can request the exclusion of particular reviewers, with your reasons for exclusion. Be careful though! If you exclude too many reviewers, your application may be placed in a panel with little expertise in your scientific area.

Reviewers who know little about your research area may not appreciate its significance and this can lessen enthusiasm for your proposal. Do not suggest reviewers for your application because your suggestion will almost certainly guarantee that they will not be asked to serve on the committee.



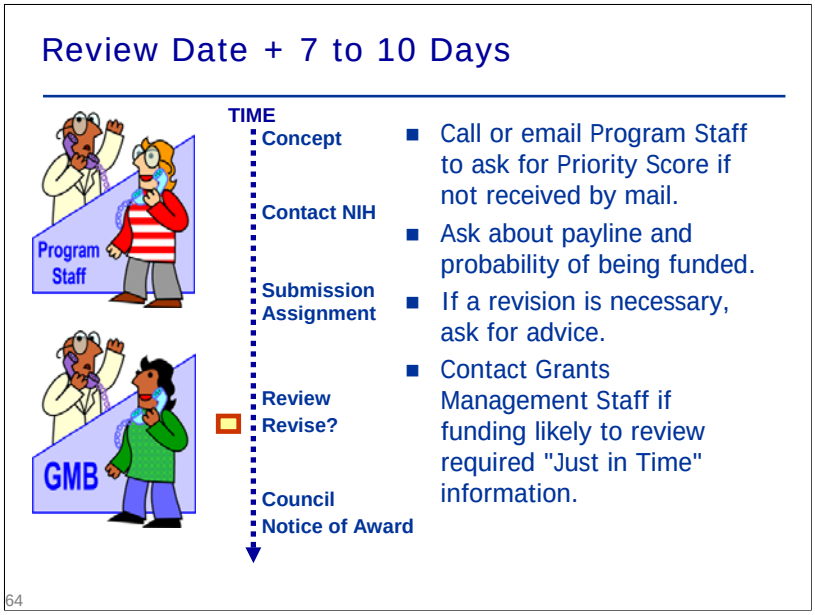
About ten working days after the receipt deadline, you should receive a letter from CSR listing your application's assignment to a review panel, the date the panel meets, and the primary assignment to an NIH Institute or Center.

Call the CSR referral office if you do not receive this letter within three weeks of the receipt deadline, of if you receive the letter but are concerned about the assignments.



There is a limited time window after submission, up to seven weeks prior to review, when you may be able to provide additional information or correct or update some information in your application. If you discover such a need, don't wait, contact the SRA as early as possible with your request.

Also, check the CSR Internet site to see who will be on your application's review panel. This is the time for you to request the exclusion of specific reviewers but you will have to provide good reasons for their exclusion. Be aware that the SRA is under no obligation to agree to any of your requests.

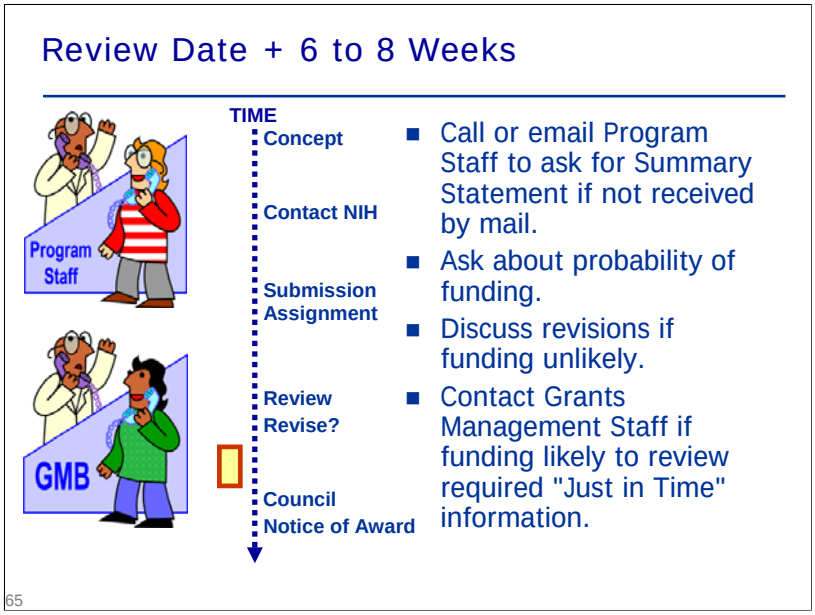


About ten working days after the review meeting, you should receive a priority score in the mail. You can call or email your program staff (but not the SRA) for the score if you haven't received it within three weeks following the review.

Ask your Program Staff about the current payline and the probability of your application being funded.

If you are told that your application is not likely to be funded, ask for advice on preparing a revised application even though you will probably not receive a summary statement for another five to seven weeks.

If you are told that you are likely to be funded, contact the Grants Management staff to review the "Just in Time" information that you will need to provide prior to NIH issuing an award.



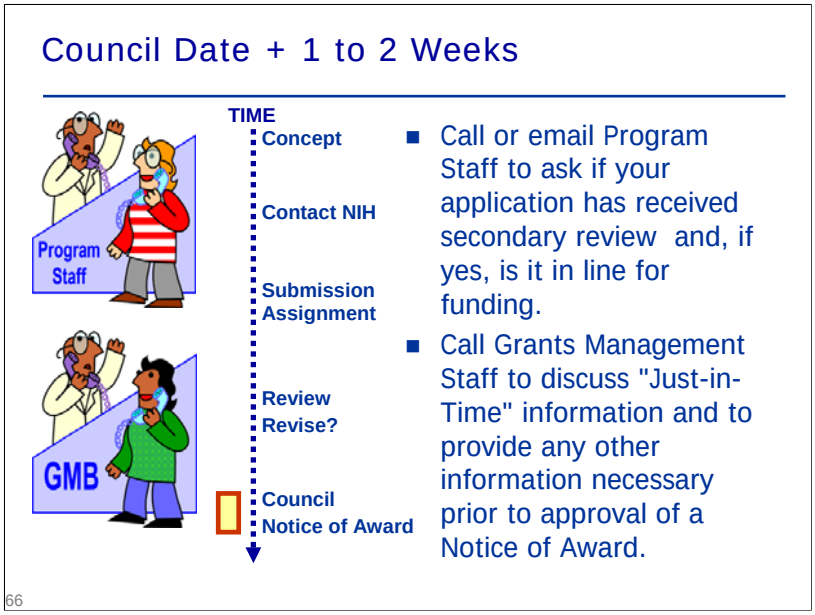
About six to eight weeks after the review meeting you should receive a summary statement.

If after eight weeks you haven't received the summary statement, you can contact your program staff to request a copy.

Again, inquire about the probability of funding.

Discuss revising your application if funding is unlikely.

On the other hand, if funding is likely, I want to emphasize again that you should contact Grants Management Staff to review the "Just in Time" information that you will need to provide prior to NIH issuing an award.



Although you will probably have a pretty good idea if your application is in line to be funded based on its priority score and your communication with program staff, there are additional gates your application must pass through before receiving an award. I described these when I talked about the Review and Award process. Call your program staff to learn if your application has received secondary review and if it is in line for funding.

The Grants Management Office must verify that you meet all the requirements for funding. This gate is the one where many SBIR or STTR applications are delayed or blocked. If you haven't contacted Grants Management Staff by now, this is likely to be your fate too. Call the Grants Management Office to be sure they are satisfied that you meet all requirements for funding and ask when they can issue a Notice of Award.

MORE ADVICE

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Supplements to SBIR & STTR ADVICE

- We do not repeat NIH instructions. Before preparing an application for an NIH grant, read all the instructions, and follow the directions.
- "All About Grants" tutorials help biomedical investigators, especially new ones, plan, write, and apply for NIH research project grants.

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To help you turn your great ideas into a great grant application, I recommend that you visit our “All About Grants” Internet site that will help you plan, write and apply for NIH funding.

You still have to read all the NIH instructions.

Our site provides modules on grant application basics, how to manage your grant award, how to plan a grant application, how to write a grant application, advice on research training and career awards, how to write an application involving research animals or human subjects, how to write a multi-project grant application, and more.

Click on the “All About Grants” icon to open the site.

Thank You

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Thank you for watching this presentation. I hope it improves the success of your SBIR or STTR application. My full contact information is presented here. The best method is email to which I try to respond within 48 hours.