Photos courtesy of Otto Yang and Patrick W. Miller

Straight talk with…**Otto Yang** and **Patrick Miller**

Even with a recent influx of research money into biomedical research, competition for grants is unlikely to ease off any time soon. For example, researchers submitted about 20,000 applications for the $1 million 'challenge grants' offered by the US National Institutes of Health (NIH). The agency originally announced it would fund just 200 of these grants, meaning only a tiny fraction applicants will succeed in obtaining them.

Otto Yang and Patrick Miller have experienced firsthand the challenges of writing and reviewing research grants. Yang, an immunologist at the University of California–Los Angeles School of Medicine, has served on multiple NIH grant review panels. In 2005, he authored the *Guide to Effective Grant Writing: How to Write an Effective NIH Grant Application*. Miller, who currently runs a Chicago-area company that provides grant writing workshops and resources, published the book *Grant Writing: Strategies for Developing Winning Government Proposals*. Yang and Miller (pictured above left to right) shared some of their grant writing tips with **Kirsten Dorans**.

How did you become experienced in grant writing?

Otto Yang: I was forced to learn about grant writing through my ongoing career as a researcher. What really opened my eyes to issues about grant writing was serving on a study section at NIH, where I had the opportunity to see numerous grants from numerous people over several years.

Patrick Miller: I wrote grants as an assistant professor at several universities. And then I had the opportunity to work at the National Opinion Research Center at the University of Chicago, where I was a proposal manager and contracts administrator.

How should biomedical researchers pick which grants to apply for?

PM: Personally, I believe it depends on the project idea and how well it matches the program announcement. What you want to have is a good match between what you are trying to do and what the agency wants to fund.

OY: I agree 100%. You have to look at the perspective of the granting institution and how well your ideas will fit what [the institution is] looking for.

What is the most important thing to keep in mind while writing a grant application?

OY: I would say the most important thing is the audience that you're writing to, because if they do not understand or appreciate your points, then they won't like it.

PM: I once again believe that it's the project idea. The idea has to be

something that is innovative and new and crisp. And, at the same time, [the application] has to be communicated very clearly to the reading audience. You know, you can't go along with this application in hand and explain what it's all about to the reviewer in person. So, the written narrative has to be—must be—very clear.

How can applicants make their grant proposals stand out—in a good way—and keep the attention of reviewers?

PM: There's a number of things that you can do, I feel. First of all, the writing has to be very persuasive. You have to persuade the reading audience that this is an important project that needs to be done. At the same time, I think it's very helpful to write it in a brief but crisp form. Lastly, I would say you should use as many graphics, text boxes and similar kinds of [features] to present your ideas as clearly as possible.

OY: Keep in mind that the peer review system means that generally the reviewer's going to be a busy scientist; the best way to make your grant stand out is to be extremely efficient in how you transmit the information.

What are the most common mistakes made on grant applications, both for general grants and for those specifically related to biomedical research?

PM: The first and most important thing is to read the [Request for Proposals] and be compliant. Do what they ask you to do. Pay attention to little things such as checking your budget and making sure the numbers add up. Make sure that you proofread the manuscript before you submit it. Have tough colleagues review the application before you submit it. Reviewers are looking for good ideas presented in a very clear fashion.

> Some people make the mistake of writing the grant in a way that assumes that the reviewer is omniscient and that he or she can organize all of the information for them. —Otto Yang

OY: I would say the most common mistake people make is writing the grant in a way that's not calibrated to the reviewer. Some people make the mistake of writing the grant in a way that assumes that [the reviewer] is omniscient and that [he or she] can organize all of the information for them. These applicants sometimes fail to provide sufficient background information for the reviewer to understand their project.

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How can researchers help ensure that they meet the deadlines for grant applications?

OY: Start early. There are always going to be unforeseen things coming up as you put the project together, especially if the project involves multiple investigators at other institutions. Then, especially, you need to start early, because the level of complexity and unforeseen problems is exponentially increased.

PM: I agree. As a matter of fact, I would look at last year's program applications and look at past winners to get some ideas. Start way early, because that time slips by so quickly.

How can people determine whether their research might be funded by the NIH?

OY: Well, I would say that talking to the program officer is important. Especially if you're responding to a Request for Applications or a Program Announcement (PA), to gauge what the NIH is really looking for.

PM: Absolutely, I think you need to talk to the program officer before, during and after the actual application—especially before. I would send him or her a prospective of my application in maybe one to two pages and ask, 'what do you think? Does this fit under this particular PA umbrella?' And the program officer will give you some honest feedback, or he or she might even give you other directions in terms of other potential funding opportunities.

How should a researcher approach applying for a government-funded grant versus one from a nonprofit organization focused on a particular disease?

OY: It comes down again to the priorities of the potential funder. So if you're applying to a particular organization, it's important to really understand what the purpose of that organization is. [Nongovernmental organizations] are generally not in the business of funding basic science research for its own sake, whereas the NIH is more likely to be interested in that type of work.

How can researchers find biomedical research grants that are not well publicized?

PM: I think you really have to be aware of NIH's website and constantly be looking at that particular website and searching all the time. In addition to that, you need to look at www.grants.gov, which publishes NIH solicitations as well as other types of funding opportunities that are available through databases and professional organizations.

OY: You can actually subscribe to e-mail mailing lists from NIH that will keep you up to date on new funding opportunities. And the web is great resource for looking for private foundations or other sources related to your research interests.

Is there a way people can improve upon their grant writing skills?

PM: Unfortunately, none of us has been trained in grant writing. So, you have to pick it up the hard way—by writing grants. One of the best things you can do is to get bright, smart colleagues to work with you and to mentor you—especially if you're beginning—and ask for their feedback.

OY: I think the idea of getting colleagues to review your applications is fantastic—especially getting colleagues who are in areas of science that are not in the same area that you're writing your grant about. Because if they can understand it clearly, then it's likely to be well written. ■