Cell

American Idol and NIH Grant Review

Peer review is an essential part of identifying scientific projects worthy of NIH funding. An Analysis article in the June 2, 2006 issue of *Cell* (Bonetta, 2006) highlighted the fact that six years after the reorganization of the NIH integrated review groups, further streamlining of NIH grant peer review is still needed. The NIH is well aware of the problems related to the peer review process, and Toni Scarpa, the director of the Center for Scientific Review, is committed to further reform of the current system (Scarpa, 2006). As an NIH study section member, I would like to point out some of the idiosyncrasies of the current system.

A typical day at one of the many NIH study sections goes something like this. Of approximately 50–70 investigator-initiated/R01 applications reviewed, about half are triaged and the rest are subjected to lengthy discussion, despite the fact that in most of the cases the initial scores are close. Like the amateur singers on the television talent show *American Idol*, each grant application is evaluated by three reviewers. And, when opinions are conflicting, the three reviewers may display a peculiar resemblance to the *American Idol* judges, Paula Abdul (sympathetic), Randy Jackson (neutral), and Simon Cowell (hostile). Due to the specialization of science, the discussion is often limited to the three reviewers, with the other study section panelists rarely participating. Indeed, sometimes, while the three reviewers wrangle over a particular application, others are busy on their laptop computers. It is difficult to determine whether these panelists are reading the application under discussion, preparing for the next discussion, or answering their emails. The necessarily inexpert or distracted panelist often sides more easily with the *Cowellesque* reviewer, who is trashing the application, especially when there is not enough money to go around. This leads to the perception that "the nasty reviewer always wins." Remember, everyone on the study section votes to determine the final score—even those who are busy with their emails.

There are roughly 250 R01 study sections, with an average of 24 members per section. As each study section meets 3 times annually, the NIH needs to identify approximately 18,000 reviewers each year. The total annual cost of reviewing more than 50,000 R01-type grant applications (not including fellowships, P01 projects, roadmaps, etc.) is estimated to be about $50 million, which covers expenses and honoraria for the panelists, renting the meeting rooms and audiovisual equipment, etc. This amount does not take into account the number of days the reviewers spend analyzing grant applications (the honoraria cannot possibly cover this) or, more importantly, the months the applicants spend assembling their applications. Assembly of the grant application—25-pages plus index, budget, budget justification, CVs, resources, checklist, and unlimited appendices—requires 2–6 months of hard work by the PI, postdoctoral fellows, students, and administrative assistants. Considering that over 50,000 R01 applications are submitted every year, and that each of these oversized applications could cost tens of thousands of dollars in salary time to assemble, the total cost for application and review of all R01s could conceivably amount to more than $1 billion/year.

I have a few suggestions for ways to decrease the time to write/review NIH grant applications, which would both save money and free up time for scientists to pursue other activities, such as *science*.

(1) The first step would be for new grant applications to be submitted as letters of intent. Prescreening of applications would avoid in-depth review of poor-quality applications and would decrease the number of reviewers needed, allowing the best reviewers to be selected to serve on study sections.

(2) Next, applications approved at the letter of intent stage could be submitted in full, but in a much shorter format. Currently, applications must be perfectly balanced: there needs to be enough preliminary data to predict the success of the project, but not to the point where the proposed work appears obsolete. But if one knows too little, the application will be smeared as too risky. Much of the current 25-page format comprises scientific fluff that includes extensive details, alternative strategies/approaches, and pitfalls that are intended to circumvent the critique of whoever is playing the *Simon Cowell* role. Rather than rewarding grant-writing skills, reviewers should focus on the big picture: the likely impact of the proposed work and, in the case of competing renewals, productivity. R01 applications are not PhD dissertation proposals, and it must be presumed that if the applicant is the PI of a project, he or she knows how to do science. If not, natural selection will take its course.

(3) Applicants are currently required to describe the work to be accomplished over the entire grant period and to include timelines that are sometimes unrealistic. The notion of anticipating what a scientist will be doing even one year hence is difficult enough; anticipating five years into the future is impossible. Indeed, if the scientific enterprise were predictable, science would be banal, perhaps even boring. After describing the project, a general idea about directions and future plans should be enough.

(4) Critiques and percentile scores could be sent electronically to the NIH to avoid reviewers having to travel to Bethesda, Maryland. The written critiques could replace the discussion in guiding panelists who are not reviewers to posting a priority score. In the small percentage of cases in which the opinions of the reviewers are widely divergent (in my

experience this happens in <15% of cases), a conference call could be organized.

Progress in science is determined at two levels: funding and publication. Peer review of research papers describing the results is completely electronic. If it works at this level, it can also work for the grant review process. Online study sections would streamline the current process and allow revised applications to be prepared in a timely fashion. Electronic review also ensures that the same reviewers will review the revised application. Each study section would be managed like a scientific journal and be distinct from the other study sections, keeping its own system to calculate scores and percentiles. Submission deadlines could be maintained, increased in number per year, or even become completely open, as is the case with scientific journals.

Peer review is the basis for any progress in science. Peer review allows every aspect (concepts, directions, progress, budgets, etc.) of grant applications to be judged by working scientists. However, the current NIH grant evaluation system, in place for 60 years, often resembles the evaluation process in *American Idol*. Either there is not much difference between scientists and amateur singers, or it is time for the grant review process to be updated to accommodate the rapidly moving world of modern science.

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