Increasing R01 Competition Concerns Researchers

Percolating concern over tight funding for individual cancer researchers repeatedly burst to the surface this summer at scientific conferences, advisory board meetings, and other venues, where leading researchers voiced their worries.

“The problem now, with budgets being as tight as they are, is that smaller and smaller percentages of grants are being funded,” said Richard Schilsky, M.D., professor of medicine and associate dean for clinical research at the University of Chicago Hospitals.

“Established researchers as well as young researchers are feeling a pinch.”

Such concerns prompted National Institutes of Health Director Elias Zerhouni, M.D., to tell researchers to “stay calm, cool, and understand the facts.” Speaking at the June 14 meeting of the National Cancer Advisory Board, Zerhouni said, “We still have a very large budget to sustain biomedical research, and I think we will prevail.”

In the area of greatest concern—individual researcher grants, called R01s—nearly three-quarters of researchers who apply to NIH do not prevail. In 2005, just 27.6% of applicants for R01 grants received funding, down from 35% in 2000. At the National Cancer Institute, the success rate in 2004 was slightly farther down, just 25%. Because researchers sometimes apply for two, three, or even four grants, the NIH success rate per grant application is even lower, 22.3%.

The R01 is the NIH’s original research grant. Nearly a third of the NIH’s $28 billion budget goes to some 30,000 R01 grants, which are given to support discrete projects. Each award averages more than $300,000 and can be used for salary, equipment, laboratory remodeling, travel, and publication costs. In addition, R01s can be spent on “indirect costs” such as administrative overhead, making the awards especially attractive for universities, which use them as a measure of faculty members’ progress toward tenure.

The falling percentage of successful grant applications has led Schilsky to worry that the “vagaries” in the NIH review process introduce an element of luck into who gets funded.

“The ability to distinguish among a very small group of outstanding applications—which are the only ones that are going to get funded in the current climate—and to rank order them in any meaningful way is minimal,” he said.

At the advisory board meeting and in a slide show he regularly showed to concerned audiences all summer, Zerhouni blamed a “perfect storm” of seven factors for the tight biomedical budget situation: a ballooning federal deficit, military and homeland security needs, Hurricane Katrina, worries over a possible influenza pandemic, renewed focus on the physical sciences, 3%-5% annual inflation in biomedical research costs, and “postdoubling effects,” referring to increased demand for grants after the NIH budget doubled between 1998 and 2003.

Now President Bush’s request for the fiscal year 2007 NIH budget is flat, at $28.6 billion. (Congress is slated to debate the NIH budget in the fall.) The budget in 2006 was also flat, following increases of 3% in 2004 and 2% in 2005. “We fared fairly well up until last year, when the flat budget made it tough going,” said Zerhouni, pointing to a measure of inflation called the Biomedical Research and Development Price Index.

Since 2003, NIH has lost about 7.3% of its purchasing power, according to the index, which tabulates costs for laboratory and clinic space, equipment, and personnel. In fact, the National Cancer Institute stands to lose even more than the rest of NIH in 2007, with a proposed budget $40 million lower than the institute’s 2006 budget of $4.8 billion.

According to scientists and administrators, the tight bottom line is hurting morale among the nation’s cancer researchers. “People are getting discouraged,” said Norka Ruiz Bravo, Ph.D., NIH deputy director for extramural research. “If you have a flat budget and more people applying, which is the situation we have now, then it is and continues to be highly competitive.”

Ruiz Bravo also pointed to the postdoubling effect. As the NIH budget expanded from $13 billion in 1998 to $26 billion in 2003, academic medical centers invested in new facilities and programs. Doing so in turn attracted new researchers hungry for research dollars. From 1999 to 2003, the number of applicants for R01 grants increased by about 5,300, to nearly 30,000. But after the budget doubled, the number of new applicants accelerated, jumping by 5,200 between 2003 and 2005. “In other words, [there was] a doubling of the scientific demand for grants in the 2 years following the doubling” of the budget, Zerhouni said.

Postdoc Purgatory

Although even senior researchers are “feeling the pressure,” according to Ruiz Bravo, new investigators are hurt most by the budget situation, according to a host of concerned scientists. The average age at first R01 grant is now 42, up from 34 in 1980. Looked at another way, in 1980 nearly 25% of R01 grants went to researchers younger than age 35; today that figure is 4%.

“For the first time in 33 years, when [young researchers] ask me, ‘What should I do with my career…? ’ I can no longer tell them with a straight face to go into cancer research. Because for the first time in a third of a century, there doesn’t seem to be much of a future...
NEWS

Robert Weinberg, Ph.D., professor for cancer research at the Massachusetts Institute of Technology and member of the Whitehead Institute, told a large session of the annual meeting of the American Association for Cancer Research this spring.

While toiling for their first independent grant, young researchers find themselves in “postdoc purgatory,” said Keith Micoli, Ph.D., a postdoctoral prostate cancer researcher at the University of Alabama at Birmingham and executive board chair of the 3-year-old National Postdoctoral Association. “It’s as discouraging as I’ve ever seen it,” said Micoli, who entered graduate school in 1994. With 73% of applicants getting rejected, “it makes you wonder if it’s even worth trying. At a certain point, luck is involved—it’s who reads your grant.”

Micoli pointed to a postdoctoral colleague at UAB whose recent R01 application was scored at 9%—meaning that it was deemed better than 91% of the applications in its particular grant pool. And yet, the colleague was told he might not receive funding. “He’s seriously thinking about leaving science. He feels like there’s no point in trying, that he’s beating his head against a wall,” said Micoli. The colleague confirmed the information but declined to be identified. “I don’t want to say anything to hurt my funding chances,” he said.

In March 2005, the National Academies tackled the issue in the report Bridges to Independence: Fostering the Independence of New Investigators in Biomedical Research. Chaired by Thomas Cech, president of the Howard Hughes Medical Institute, the committee made a host of recommendations to NIH. They called for a 5-year limit on postdoctoral research; reallocation of funding away from R01 grants and toward new career transition awards; clarification of the mentorship role of principal investigators; new career advising and development opportunities to encourage grantwriting and other research survival skills; university-backed “safety net” funding to help young researchers who have trouble securing NIH funding; and fewer requirements for preliminary data in R01 grant applications.

NIH responded by forming a committee, cochaired by Ruiz Bravo and National Institute of Neurological Disorders and Stroke Director Story Landis, Ph.D., which launched a new “Pathway to Independence” grant. The program, slated to cost $400 million over 5 years, will award 150–200 two-stage grants each year, beginning this fall. (NCI is scheduled to give out 20 of the awards annually.) The grant’s first 2 years will support young investigators as they complete and publish mentored research and pursue a tenure-track job. Years 3–5 will provide funding to help the newly minted scientists launch their own research programs.

Although the National Postdoctoral Association would like to see more of the new grants, Micoli said the intent of the award “is certainly right on the money. I think people who get these awards will be very successful.”

However, Micoli expressed disappointment that NIH has yet to act on the Cech committee’s other recommendations. In particular, he said the postdoc association still hopes NIH will limit the amount of preliminary data it requires on R01 applications. “I think it’s a problem across the entire R01 system, where people use their current [grants] to do research to put together preliminary data for their next R01,” said Micoli. “It’s a crushing barrier for new investigators.”

Ruiz Bravo said her committee considered limiting preliminary data requirements, but because universities regard R01s as the “gold standard” when making promotion decisions, any move seen as a dilution of the grants’ worth would meet resistance. “It would require a culture change on a number of levels,
and it’s not clear based on our previous history [of giving grants with no preliminary data requirements to new investigators] how much we would really gain,” she said.

For their part, Weinburg and Micoli believe that any reform to encourage young researchers will pay off in the long run. In the July 14 Cell, in a commentary titled “A Lost Generation,” Weinburg argued that the vitality of young researchers must be preserved “at all costs.” “Those who control the scientific purse strings seem to have lost sight of the fact that this undoubted success [of the genome project] does not provide a useful template for how most discovery research is conducted.”

On the other side, Ruiz Bravo said that her committee continues to meet regularly, at least monthly, to consider how to encourage young investigators. “This is one of Dr. Zerhouni’s top priorities,” she said.

Zerhouni told the advisory board that, despite the tight budget, “the sky is not falling.” Later he added, “This is the largest investment in research capacity at any time in our history. It has put us in a position of absolute worldwide leadership in terms of our ability to compete for what is going to be the number-one economic activity in the world, health care.”

—Brian Vastag