COMMENTARY

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TO THE EDITOR:

Approaching the crisis in medical research funding: an important role for nonprofit organizations and medical societies

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Rates of National Institutes of Health (NIH) funding remain historically low, biomedical scientists struggle, and innovative programs are needed. The mainstay of creative science is the NIH R01 grant, an investigator-initiated research award; currently, <15% of R01 applications are funded. This is not the first time that NIH monies have been so constrained. In the early 1990s, 20% of submitted grants were funded, but that dip in research support lasted only 3 years. The current dip is already at year 13, coping mechanisms are exhausted, and basic and translational medical investigators are leaving academic research careers.[1] The recent changes in governmental leadership contribute further uncertainty and angst, making interventions by others, including medical societies, extremely important.

Importantly, the NIH funds ideas, not just clinical trials of promising medicines and devices. Because it catalyzes the technological advances that have made the United States a net exporter of drugs, devices, and diagnostics, declines in biomedical funding will decrease our global economic advantage.[2,3]

In addition, discouraged researchers diminish our scientific future. When mentors are discouraged, graduate student and postdoctoral fellow mentees chose alternative, safer career pathways.[1] The funding crisis has a disproportionate effect on physician-scientists because practicing clinical medicine is a more secure and lucrative option. This dispirited view of research funding dramatically contrasts the current excitement of biomedical research. Technologies such as single cell RNA sequencing, CRISPR-Cas9 gene targeting, robust animal models of disease, and bioinformatic approaches to analyzing big data have made it possible to answer fundamental physiological questions, define new targets, and develop new therapies for many disorders.

Recognizing the discordance between the excitement of science and the rate of research funding, most medical societies have active federal lobbying efforts in support of the NIH. Programs within medical societies themselves are less frequent, perhaps reflecting the overwhelming nature of the problem and doubt whether any individual response could be beneficial. We propose, however, that such programs can have a measurable positive impact. As an example, in 2013, the American Society of Hematology (ASH) initiated a novel Bridge Grant award program to maintain hematology science and retain hematology scientists.[4] Although initially envisioned as a 3-year project (with 2 grant review and funding cycles per year), its success in achieving preset goals led to the open-ended extension of the program, and prompts this Commentary. The impact could be significant if similar programs were replicated by medical societies nationally.

From a financial perspective, the ASH Bridge Grant award program has been an excellent investment. ASH solicited applications from hematologists whose NIH R01 grants had not been funded. ASH provided $100 000 to successful applicants, and their home institution provided $50 000 of new funds, a 2:1 match ($150 000 total grant funds) for cycles 1 through 3. In subsequent cycles, ASH provided $150 000 with the home institution still providing $50 000, a 3:1 match ($200 000 total funds). Cycle 1 through 3 awardees (n = 43) over the next 3 years of follow-up received a mean of $707 637 from the NIH, more than a sevenfold return on ASH's investment.

Surveys of awardees in cycles 1 through 6 (median follow-up, 2 years; n = 64 respondents of 73 awardees) confirmed that these monies were critical for maintaining their research. Several awardees also commented that the peer support implicit in being selected by colleagues for award funding was critical to their morale. Respondents ranked these funds highly for importance in maintaining staff (4.52 of 5), keeping their laboratories open (4.15), and continuing their work in the field of hematology (4.06).

Specific comments included: "The ASH Bridge Grant not only supported my lab in a time of need, but it also, in recognizing the value of my work, reinforced my determination to seek further funding." "The Bridge Grant Program was a lifesaver for me." "The ASH Bridge grant came at a critical time in the progress of our studies on a new approach to treating multiple myeloma." and "The recognition by ASH gave me confidence that my work has value to the field of hematology."

Seventy percent of awardees obtained subsequent R01 funding (vs 33.5% of all scientists that submitted amended R01 applications to the NIH). All awardees except 1 who retired remained in science. Ninety-eight percent of Bridge Grant recipients who responded to the survey from cycles 1 through 6 resubmitted NIH grants (the only exception instead received a large foundation grant). Sixteen percent filed new patent applications. Rates of research publications and scientific presentations were high. Less measurable successes were also evident. For example, ASH Bridge Grant recipients remained loyal to the field of hematology, routinely attended ASH meetings and volunteered for ASH activities.

To be eligible for an ASH Bridge Grant, an applicant can have no more than $250 000 per year in independent research funding and must have submitted an R01 grant application that was scored but not funded. Only the top one-half of NIH applications are formally scored. ASH used being scored as an eligibility criterion to assure that all applications had high scientific merit. Overall, ASH received 213 applications in cycles 1 through 9, and 92 (43%) were funded.

The Bridge Grant application consists of the NIH reviewers' comments, a statement by the applicant describing how these concerns will be addressed, a letter from the home institution committing to the shared funding and describing the importance of the individual to their institutional research mission, and the applicant's NIH-formatted biography. The selection process does not reevaluate the specific aims of the R01 application, but rather focuses on the applicant's response to the study section (NIH review group) critiques, and secondarily, on the importance and novelty of the proposed studies. Preserving the career of a scientist was considered more important than preserving a specific project. Because the Bridge Grant reviewers were blinded to the R01 grant's actual score, individuals with R01 grants closest to the NIH payline were not preferentially funded. Scores by the Bridge Grant reviewers statistically correlated with the applicant's success in subsequent RO1 funding ($P = .043$).

ASH Bridge Grant reviewers consist predominantly of senior scientists and leaders in hematology, departments of medicine, and cancer centers. Importantly, the commitment of reviewers to this program is extraordinary. The 2 study section leaders attended all 9 review sessions during the past 3 years, and turnover among the other reviewers was minimal. This consistency maintained equity in the review standards and processes.

NIH itself is an active partner. NIH Scientific Review Officers routinely alert nonfunded R01 applicants about the bridge program and encourage them to apply. Of those who received ASH Bridge Grant award funding during the past 3 years, 3% were instructors, 25% assistant professors, 41% associate professors, and 31% full professors. Recipients were based at 54 different institutions in 28 states, with no evidence of institutional or geographic selection bias. Awardees included 21 women and 52 men.

Although the approach of the ASH Bridge Grant award program is unique, it should be replicable elsewhere. The national impact would be multiplied substantially if other societies and organizations sponsored similar awards in their respective fields. Stakeholders such as NIH, universities, societies, and foundations can also align to support biomedical research and investigators in many other ways. Coordinated advocacy is critical to advancing science, advancing health, maintaining the biomedical workforce, and maintaining the competitive edge the United States has in exporting biopharmaceutical technology.

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