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News & Views

The flat-funding years and the National Cancer Institute: Consequences for cancer research

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ABSTRACT

The National Cancer Institute (NCI), the principal federal agency for cancer research and training in the US, has contended with a flat budget since 2004, which according to the institute's director is preventing the organisation from keeping pace with the increasing costs of biomedical research. Although the impact of these budget shortfalls are still being debated, Niederhuber believes these so-called “flat-funding years” may pave the way for worrying future trends, resulting in a paucity of novel cancer treatments, a lack of experienced researchers, and increasing mortality rates in years to come.

Figure 1 - NCI Director, John E. Niederhuber. Courtesy of Sarah Bartlett.

The National Cancer Institute (NCI), the principal federal agency for cancer research and training in the US, has contended with a flat budget since 2004, one that NCI Director, John E. Niederhuber, MD, (Figure 1) maintains is failing to keep up with the increasing cost of biomedical research. “Since the completion of the Human Genome Project, we have witnessed a virtual explosion in our knowledge of cancer at its molecular and genomic levels, but the NCI is in the midst of its longest-ever period of below-inflation funding,” Dr. Niederhuber told *Molecular Oncology*. “The cumulative effects of biomedical inflation, which ranges around 3.7–3.8% per year, mean that the NCI’s purchasing power since the 2004 fiscal year has decreased by almost 18%.” The impact of budgetary challenges on cancer research remains subject to debate, and the long term ramifications are unknown. But perhaps not evident today, the true effects may emerge years later with a paucity of novel cancer treatments, fewer experienced researchers, and an increasing cancer burden and mortality rate as the population of the US grows older.

In 2008, more than 1500 people per day in the US will die from cancer, and during their lifetime, about one half of all men and a third of all women in the US will be diagnosed with cancer, according to the American Cancer Society. Deaths from some cancer types, such as esophageal, liver, and thyroid, are on the rise, but in general, cancer incidences

and mortality have declined since the mid-1990s. In addition, within the last decade, the advent of targeted therapies gleaned from a greater understanding of the molecular biology of cancer, has added months, if not years, to the lifespan of patients who would have otherwise died.

NCI Funding, however, has remained in the neighborhood of \$4.8 billion per year since 2004. The flat-line budget followed a near doubling of the budget from \$2.5 billion in 1998 to \$4.6 billion in 2003 after thousands gathered at Washington D.C.'s National Mall in September 1998 demanding an increase in NIH funding. Much progress came out of that funding increase. The typical NCI R01 grant amount increased by about 30% to an average of nearly \$350,000, and the increase sparked the building of new facilities and the initiation of research programs nationwide. Accompanying the increased grant support came the hiring of new faculty, the request (and need) for more grant support, and an increase of about 40% in new grant applications. Such an increase in applications, however, has not since been accompanied by a commensurate increase in funding; thus, the ratio of successfully funded applications has dropped from 32% in 1999 to less than 20% in 2007. In essence, the increase and then leveling off of funding has jolted research funding as brakes to a speeding car.

Research Project Grants for investigator-initiated research proposals, including the P01, R01, R03, and R21 funding mechanisms, account for nearly half of the NCI budget, a percentage that has remained somewhat constant for at least the last 15 years, and about 80% of the NCI budget goes towards supporting extramural research. The official budget proposal for NCI (called "the President's Budget") remains essentially flat at 4.8 billion, while the "Professional Judgement" budget requests 5.2 billion just to maintain the NCI's current level of activity and an additional 800 million to enable new initiatives and to expand current ones. Last year, the \$4.8 billion appropriation for fiscal year 2008 required 3% reductions across each NCI division, office, and center, according to Niederhuber (Figure 2). "This lost purchasing power has had serious consequences. They include extramural laboratories cutting back on postdoctoral fellows, fewer resources with which to conduct needed clinical trials and fewer patients in already funded trials, and scaling back important programs and foregoing the launch of new programs, to cite just a few examples," according to a recent report in the NCI's *Cancer Bulletin*.

"The cuts at the NCI have had serious consequences and are rapidly making US cancer research relatively uncompetitive," said Dr. Jeffrey W. Pollard, a researcher Director, at the Center for Study of Reproductive Biology and Women's Health and Deputy Director of the Cancer Center at Albert Einstein College of Medicine, in New York. "This is seen most clearly in the intramural program where the flight of senior scientists has been severe," Dr. Pollard said. "The continued cut backs of funded grants both to me personally and to the Cancer Center have put incredible stress on maintaining a program that attracts motivated post-docs and allows long-term research planning, especially as the cost of remaining competitive escalate every day with the need to do animal work, high level imaging, proteomics and genomics, etc."

Perhaps one of the most serious consequences of the lack of grant money is the flight of young investigators from

Figure 2 - The new clinical center of the National Cancer Institutes, on the NIH's Bethesda campus, inaugurated in 2003. Projects like this are being hit by the stalled budget. Courtesy of the NCI.

science, many of whom have elected to pursue alternate career paths. "We think the funding of young investigators is an extremely high priority, because with the funding percentages of approved grants down in the range of 12–20%, it is very discouraging for young people to stay in research," said Jerome W. Yates, MD, MPH, Vice President for National Research for the American Cancer Society. "It is made more difficult given the fact that the median age for investigators receiving an R01 grant is increasing due to pressures at institutions for senior faculty to seek these grants to justify their salary," Dr. Yates said. The average age of a first-time R01 grant recipient is now about 43 years, up from 39 years in 1990.

"Another consideration," said Dr. Yates "is that some of the large projects at NIH may have taken their toll in terms of taxing the individual institutes to support the NIH's Roadmap for Medical Research." The NIH Common Fund was created by the NIH in 2004 and enacted into law by Congress through the 2006 NIH Reform Act to support cross-cutting, collaborative programs among the institutes. "These large projects are certainly desirable, but at the same time, they diminish the flexible money inside the individual institutes that can go toward R01 grant funding," he said.

Despite the challenges, however, the NCI continues to support researchers and institutions across the nation. "What the NCI does best," said Dr. David E. Hill, the Associate Director at the Center for Cancer Systems Biology, at Dana Farber Cancer Institute, in Boston, Massachusetts, "is to keep basic research across a wide range of areas at the forefront of the fight against cancer. While the clinical components are incredibly important, the support of basic research has been absolutely invaluable and essential to any success on the clinical side," Dr. Hill said. One challenge, he added, will be to maintain the rate of success that has come from independent investigators working on reductionist-based projects while expanding programs that call for integrative and systems approaches. "We don't need to all rush out and start doing systems biology but we do need to be looking beyond the reductionist view of diseases/systems," he added.

“One specific accomplishment, which has been of enormous benefit to us and many others, is the development of programs beyond the R01 mechanism,” said Dr. Hill. According to Dr. Hill, the R21 and R33 (exploratory/developmental) grant funding mechanisms have allowed the NCI to be truly supportive of “high risk/high reward” science during a critical period when much of the genomics revolution was just starting. “So much of what we do falls outside of traditional hypothesis-driven research, and the NCI and other NIH Institutes have implemented programs to fund potentially high-impact science that is not always hypothesis-driven,” he said.

The NCI also collaborates broadly with other government agencies and cancer organizations nationwide. The Centers for Disease Control and Prevention and the NCI have established a formal collaboration between NCI’s surveillance research program, Surveillance, Epidemiology, and End Results (SEER) and the CDC’s National Program of Cancer Registries (NPCR), among others. “This collaboration has allowed a more coordinated national cancer surveillance effort that builds upon and strengthens the existing infrastructure, improves the availability of high quality data for measuring the nation’s cancer burden, and advances the capacity for surveillance research,” said Anita Blankenship, a spokesperson for the CDC’s National Center for Chronic Disease Prevention. “The CDC, and the Division of Cancer Prevention and Control, in particular, value its dynamic and productive relationship with NCI toward our common goal of cancer prevention and control in the United States,” she added.

The NCI is also collaborating with the American Cancer Society. In October 2005, the NCI with support from the American Cancer Society awarded grants to nine academic research institutions to establish the Patient Navigator Research Program (PNRP). Patient Navigators are trained healthcare workers that help patients “navigate” the healthcare system so that the time from the appearance of suspicious findings to cancer diagnosis and treatment is reduced. “There are also many cross-over collaborations with the NCI, for example, our epidemiologists collaborate with the NCI epidemiologists,” Dr. Yates said. “Basically, we have the common goal of trying to find answers and to decrease the incidence and prevent cancer as well as improve the treatments and improve the quality of life of cancer patients,” he added.

The NCI also supports collaborative efforts among laboratories. “Few labs today have all the resources and expertise to do large-scale science but this should not be left up to the bigger research institutes,” noted Dr. Hill. “Smaller labs scattered across the country can successfully work together doing great science when mechanisms are available to support their interactive efforts.”

Worldwide, cancer accounted for 7.9 million deaths (around 13% of all deaths) in 2007 and that number is expected to increase to 12 million worldwide by 2030, according to the World Health Organization (WHO). During the 2005 World Health Assembly, the WHO passed a resolution calling for

improved cancer prevention measures, improved early detection and treatment, and more palliative care in all WHO Member State countries. NCI scientists are helping to implement that global strategy and participate in the WHO Director-General’s Cancer Advisory Committee and WHO’s Cancer Technical Working Group. In addition, the NCI participates in the Program of Action for Cancer Therapy, or PACT Alliance, which help initiate radiotherapy into cancer control programs in the developing world.

The NIH, including the NCI, also funds foreign research labs. “Now that foreign labs are allowed to submit grants,” noted Dr. Hill, “there should be special emphasis on putting together international consortia to bring together unique expertise. These international collaborations would also benefit from the incorporation of quantitative milestones similar to the ones established for the R21/R33 programs,” he added.

“The support of clinical science research through clinical Cooperative groups is critically important,” noted Dr. Yates with the American Cancer Society, who is also President of the National Coalition for Cancer Research, a group of 23 organizations whose primary goal and mission is to ensure that the level of research funding for cancer research is adequate. “The Cooperative groups are not just a testing ground for clinical research but also a vehicle for continuing medical education for the oncologists around the country,” he added. “They also provide research opportunities to younger investigators and directly influence oncology care within communities.”

“The fact that we are in the midst of the longest sustained period of flat funding for NIH has had a very real impact on cancer research and Cooperative groups specifically,” added ASCO President Richard L. Schilsky, MD, Professor of Medicine at the University of Chicago, Illinois. “For example, over the last 2 years, the NCI cooperative groups have closed research programs in brain cancer, melanoma, sarcoma and pediatric cancers; postponed or delayed up to 100 phase II and III clinical trials; and reduced the number of patients participating in clinical trials by almost 3000 per year. We really need to get funding for cancer research back on track to move forward in the fight against cancer.”

“The whole range of science needs to be funded, including discovery work, new technology, basic mechanistic science, animal model work, and therapeutic development work, and the NCI needs to continue to let researchers be creative and imaginative, so that the most significant science for funding can be identified,” said Brian Haab, PhD, Senior Scientific Investigator with the Van Andel Institute Laboratory of Cancer Immunodiagnostics, in Grand Rapids Michigan. “The NCI has effectively brought together collaborative groups, but they should not be involved too much in presupposing outcomes or what will be effective.”

“Regardless of NCI’s level of funding,” Dr. Niederhuber added, “We have a duty to all of our cancer patients to do our best to turn that new knowledge into safe, effective therapies that eliminate cancer or, at the very least, help make cancer a more chronic, less life-ending, disease.”