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FUNDING

Flirting with disaster

Draconian US federal budget cuts due to 'sequestration' are already having dramatic effects.

BY VIRGINIA GEWIN

For the past five years, Vern Schramm's lab has been working on a promising anticancer agent. The research has been successful — one of his grant-renewal proposals this year to the US National Cancer Institute (NCI) in Bethesda, Maryland, had a score in the top 10%. But a 1% drop in the US National Institutes of Health (NIH)'s payline (the percentage of applications funded), caused by US budget cuts known as sequestration, meant that Schramm didn't get his grant. It was his second NCI grant renewal to go unfunded this year. The consequences have not been pleasant: Schramm has just had to let five postdocs go.

Sequestration, the across-the-board US federal budget cuts resulting from Congress failing to agree on deficit-reduction legislation, became official on 1 March and is exacerbating an already difficult research-funding situation (see *Nature* **494,** 158–159; 2013). Many US scientists dependent on government funding are likely to be affected, from those in long-running big projects that may have to close, to established scientists who have not had grants renewed and must downsize their labs, to the young researchers who will lose their jobs or have difficulty securing funding as a result.

The NIH for example, faces a US$1.5-billion budget cut over fiscal year (FY) 2012–13, which it says will result in the funding of some 700 fewer competitive research projects and the admission of 750 fewer new patients to the NIH Clinical Center in Bethesda. The US Department of Defense and the US National Science Foundation (NSF) each expects to offer 1,000 fewer grants, and the US Geological Survey has slashed its competitive-grants programme in water research to protect funding for key monitoring networks.

With the US economy improving, there is actually less pressure on politicians to compromise on a budget deal that would mitigate future sequestration-related cuts. Reinstatement of pre-sequestration funding levels seems unlikely in the current political climate. In principle, that means the cuts could continue for another nine years, with 8% decreases year over year, says Joseph Haywood, vice-president for science policy with the Federation of American Societies for Experimental Biology in Washington DC. As a result, "morale is very low" in the scientific community, he says.

"Funding lines were difficult before the sequester," says Schramm, who is chair of the biochemistry department at the Albert Einstein College of Medicine in New York City. "Now it is a research crisis."

STRUGGLING TO COPE

Although younger researchers are vulnerable to the cuts, they have some funding opportunities that established researchers do not. Young-investigator awards from private foundations, for example, often target those who have only recently received their PhDs. Young researchers also typically have an edge when it comes to NIH grants. At the NIH's National Heart, Lung and Blood Institute, for example, the payline for grants is 11% overall, but 21% for new investigators.

Worst hit will be assistant and associate professors doing fine, solid work that simply isn't in the top percentiles, says Laurie Glimcher, dean of Weill Cornell Medical College in New York City. To stave off the potential loss of a generation of scientists, her institute is trying to raise a bridge fund to provide relief to researchers who earned high scores but didn't get funded. "When you are funding fewer ▶

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Without additional long-term funding, the C-Mod lab, pictured here in 2012, will sustain major losses as a result of the sequester.

than 10% of grant applications it's almost random — and the psychological impact of that is troubling," she says.

MEDICAL CENTRE MALAISE

Academic medical centres are doubly hit by the sequester. Not only is NIH funding down, but so too are fees that physicians receive under the government's Medicare insurance programme — by about 2%. President Barack Obama's programmes for affordable health care are also being reduced.

"The health-care industry is going through an enormous change, and the sequester on top of it makes an already tough situation now erratic," says Dean Li, vice-dean for research at the University of Utah School of Medicine in Salt Lake City. He says that his school will lose about $19 million in research funding.

BIG LOSSES

The re-evaluation of long-term budgets has hit big physics projects as well. The sequester has meant major changes for the Plasma Science and Fusion Center (PSFC) at the Massachusetts Institute of Technology (MIT) in Cambridge, funded by the US Department of Energy. Money for the centre's cornerstone project, the Alcator C-Mod — a fusion experiment that uses a magnetic field to contain a plasma — was cut from $25 million to $14 million in FY2013, and was set to end in FY2014. Recent action from a congressional committee has extended C-Mod's life and may save some jobs, but the project is still in jeopardy.

If more permanent funds do not surface, C-Mod, which once supported 30 PhD students, will be left with many fewer; and as many as 70 postdocs, technicians and support staff could be laid off. "This was the largest student-training programme in any [fusion] experiment in the world," says Miklos Porkolab, the PSFC's director, lamenting that no graduate students have entered the programme since March 2012. Negotiating budgets post-sequester has made staffing decisions increasingly difficult for administrators such as Porkolab, who is still trying to decipher the budget implications for C-Mod.

At the same time, transnational agreements mean that the United States has had to up its contribution to ITER, the world's largest nuclear-fusion reactor, which is under construction in the south of France. Support for ITER from the United States for FY2014 is $225 million. "When we agreed to ITER over ten years ago, the community supported it but with additional funding, not through cuts to existing research programmes," Porkolab says. Even more disheartening, he adds, is that ITER probably will not be productive until 2025, and the United States won't have a trained pipeline of researchers ready, because its largest training facility will no longer exist.

Innovative national-security technology too will suffer under sequestration. The defence department intends to cancel or delay around 100 tests and demonstrations. "People were worried, initially, that sequestration would be like a jump off the Empire State Building," says Al Shaffer, acting assistant secretary of defence for research and engineering. "It's not going to be like that; it's going to be 1,000 cuts with a knife; slow and continual."

LOOKING FOR SOLUTIONS

The NSF has traditionally been the source of grants for research in biology other than biomedicine. But John Bruno, a marine ecologist at the University of North Carolina at Chapel Hill, has begun to wonder whether he should abandon the NSF altogether, rather than waste precious time writing grant applications that don't get funded.

His department is reconsidering whether NSF support should be a requirement for tenure. But the problem is that philanthropy cannot offer the same level of funding as government agencies once did, he says.

Some young researchers are playing it safe. Megan Williams, an assistant professor in neurobiology at the University of Utah in Salt Lake City, submitted her first grant application to the NIH on 5 June. Unsure about whether she will be funded, she is hoarding grant money received from private foundations and has not hired a postdoc. Williams says that graduate students now ask about funding. They want to know which labs have money, to help them decide which to join.

ALBERT EINSTEIN COLL. MED.

"Funding lines were difficult before the sequester. Now it is a research crisis."
Vern Schramm

David Cox, a neurobiologist at Harvard University in Cambridge, Massachusetts, has decided to take advantage of other countries' science investments. He is taking on foreign scientists who come with money from their home governments. One of his postdocs is paid for by the German government and another by a Taiwanese business conglomerate. "It may be overly dramatic," says Cox, "but I wonder if the last act of the US research establishment will be to serve as a training ground for other countries." ■

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