NEWS

Japan to slash huge grant scheme

Upstart government brings fresh priorities to science.

In September, 30 research groups in Japan, led by some of the country's biggest scientific names, were celebrating their selection to a new ¥270-billion (US$3-billion) funding programme. But the programme is now under fire from both politicians and researchers, and its funding may be cut by almost two-thirds.

The projects were selected on 4 September — five days after the ruling Liberal Democratic Party lost an election in a landslide, and 12 days before it had to yield power to the Democratic Party of Japan (DPJ). The DPJ needed money to fund campaign promises, such as stipends for families with children (see *Nature* **460,** 938; 2009), and asked all ministries to cut back by at least ¥3 trillion the ¥14.7 trillion that had been allocated this spring as part of a government supplemental funding package.

On 6 October, the science and education ministry announced that it would cut 21% from its supplementary budget. It has not revealed details of where those cuts would be made, but Japan's deputy prime minister Naoto Kan has reportedly laid out a framework by which the Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST) would be reduced from ¥270 billion to ¥100 billion. According to the plan, which had not been made official as *Nature* went to press, ¥70 billion would be cut altogether and the other ¥100 billion would be used for smaller grants to other groups or transferred to a scheme for sending young scientists abroad.

Y. TSUNO/AFP/GETTY

Deputy prime minister Naoto Kan has laid out a plan to cut back on Japan's big-science funding.

The 30 groups scheduled to receive FIRST funding span a variety of fields, from mathematics to neurogenetics and nanobiotechnology. The list includes many of Japan's most famous scientists, including Shinya Yamanaka of Kyoto University, who received funding to set up a stem-cell bank for the induced pluripotent stem (iPS) cells he created; Shizuo Akira of Osaka University, for a project on manipulating immune responses; and Nobel laureate Koichi Tanaka of Shimadzu Corporation in Kyoto, for a mass-spectrometry project on drug discovery and diagnosis.

The shortage of new faces, critics say, could stem from a rushed application and selection process. The 3-week application period ended on 24 July; a team of 24 scientists then gunned through the 565 proposals to reduce the field to 60. One team member told *Nature* that the committee often had to abstain or make ill-informed judgements based on skimming materials. "It's incredible to give that kind of money with no long-term feasibility study or in-depth analysis," says the member, who asked to remain anonymous.

Takafumi Matsui, a planetary scientist at the Chiba Institute of Technology who sat on the second-stage committee that chose the final 30 grantees, defends the process. "I normally read

Cancer metastasis scrutinized

BOSTON

Most cancer research has focused on blocking primary-tumour growth, even though cancer cells that cut loose from tumours and invade other tissues account for 90% of cancer-associated deaths.

But at the first conference on Frontiers in Basic Cancer Research, hosted by the American Association for Cancer Research last week in Boston, Massachusetts, cancer biologists reported that this focus is changing. Many experts are turning to study the secondary tumours that form when circulating cancer cells infiltrate and colonize other organs — a process known as metastasis.

"The time is now ripe for scientifically deconstructing the process of metastasis in different types of cancer," says Joan Massagué of the Memorial Sloan-Kettering Cancer Center in New York City.

At the conference, Daniel Haber of the Massachusetts General Hospital in Charlestown described a microfluidic chip that can detect vanishingly rare tumour cells circulating in the bloodstream. This technique, he says, could identify rogue cancer cells long before metastases form.

And using a novel genetically engineered mouse model of lung cancer, Tyler Jacks of the Massachusetts Institute of Technology in Cambridge and his postdoc Monte Winslow found that a transcription factor called Nkx2-1 is a metastatic suppressor, specific to lung cancer, that is active in primary tumours but shut off in secondary cancers. "This is probably the closest thing you have to taking metastasis from a patient," says Winslow.

Whether a metastatic cancer cell triggers a new tumour is "a big if", says Massagué. What's more likely, he says, is that these cells reseed the same tumour from which they originated. Massagué presented data from mice showing that the circulating cells express genes allowing them to infiltrate tissues. But the primary tumours from which the cells came release signals to attract them back, so if they don't land in a new organ they return home and aggravate tumour growth there. "The tumour is selecting for the worst of its children," says Massagué. He is testing whether these tissue-adapted metastatic cells account for the high rates of relapse seen following many cancer therapies.

Robert Weinberg of the Whitehead Institute for Biomedical Research in Cambridge, Massachusetts, linked metastatic cells to cancer stem cells — rare cells thought to fuel primary-tumour growth — through a common molecular transformation called the epithelial-mesenchymal transition. Weinberg says that this transition allows the metastatic cells

THE BUTTERFLY EFFECT GETS ENTANGLED
Cold-atom experiments show chaotic fingerprints in the quantum world.
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about a lot of fields of science," he says, "so I could quickly judge their merits."

Many critics took exception to the premise of funding such large-scale, focused projects, saying that fundamental research could be losing out. For instance, on 3 October Shinichi Aizawa, president of the Japanese Society of Developmental Biologists, called for policy-makers to better balance applied research with basic science.

Yamanaka told *Nature* that he was reserving comment until the DPJ makes an official statement about the fate of the programme.

Atsushi Sunami, director of the science and technology policy doctoral programme at the National Graduate Institute for Policy Studies in Tokyo, also thinks that the grants are too big. "With this kind of funding, you could do more high-risk, high-return smaller projects," he says. "What will the extra funding achieve for these groups that are already funded? It's not clear. You're pouring water into something that's already full."

But two aspects of the FIRST programme could set a good precedent for Japan, Sunami says. Grantees can take the funding to any institution they please — an attempt to introduce competition and fluidity among research centres. And the grants are given for five-year terms so that grantees don't need to rush to spend, and potentially waste, money at the end of each fiscal year. ■

David Cyranoski

to become both motile and self-renewing. Many aggressive secondary tumours might form from newly converted cancer stem cells, he notes, overturning the standard dogma that stem cells generate non-stem cells.

Meanwhile, Sijin Liu of Tufts University School of Medicine in Boston reported one of the first drug compounds that can directly block metastasis, in a mouse model of breast cancer. Liu showed that inhibiting the ROCK signalling pathway with a small molecule led to around 35% fewer metastases, as well as decreasing the mass of the resulting secondary tumours by nearly 80%.

Until such therapies exist, however, understanding primary tumours remains a major route to indirectly mitigating metastasis, Jacks says. "It could be that we will enter an era of cancer management," he says, "in which our understanding of how tumours advance through these early stages will present us with preventative strategies to block the emergence of later lesions." ■

Elie Dolgin

Fusion delays sow concern

Construction at the site of ITER — the multibillion-euro project to prove controlled nuclear fusion — has been at a standstill since April, *Nature* has learned.

The stoppage comes as European contributors negotiate how to pay for their share of ITER, a collaboration between Europe, Japan, South Korea, Russia, the United States, China and India. The European Union (EU) is by far the largest participant, providing some 45% of construction costs, including the buildings that will eventually house the giant machine in St Paul lez Durance, in the south of France.

Excavations for the buildings, slated to begin this autumn, will not start until spring 2010 — roughly a year after site preparations were completed.

European officials say that the reasons for the delay are technical rather than political, and that they will be able to meet the 2018 deadline for completing construction. "The project is not on standby," says Catherine Ray, a spokeswoman for research for the European Commission in Brussels.

But some researchers are concerned that the political impasse could push back ITER's start date. "I'm worried that whatever we lose now could delay the project's completion," says Günther Hasinger, scientific director of the Max Planck Institute of Plasma Physics in Garching, Germany.

When completed, the machine will heat and compress hydrogen isotopes until they fuse into helium, releasing energy.

In 2006, ITER was slated to cost around €5 billion (US$7.4 billion) to construct and another €5 billion to operate over a 20-year period. But following an extensive design review, the construction costs are now expected to at least double (see *Nature* 459, 488; 2009).

Ray says that the EU had budgeted nearly €10 billion for construction, operation and decommissioning over a 35-year period. But now the 27 EU member states, plus Switzerland, must come up with additional commitments to cover the cost increase. Hasinger says that until they provide a plan for funding, construction is unlikely to begin. "The problem in the European situation is that they need the whole commitment for construction before they can award the contracts," he says.

"I'm worried that whatever we lose now could delay the project's completion."

Sources close to the negotiations say that a number of options are being considered. One would be to secure additional commitments from member states. Another would be a promise from the European Investment Bank, headquartered in Kirchberg, Luxembourg, to provide loans for any additional funds needed.

Such a loan scheme would not be unprecedented: in 2002 CERN, Europe's high-energy physics laboratory near Geneva, Switzerland, took out a €300-million loan to pay for construction costs for the Large Hadron Collider particle accelerator.

Officials say that the situation is under control. Although the budget delays could cause problems down the line, "I am not limited by the amount of money for right now," says Didier Gambier, the director of Fusion for Energy in Barcelona, Spain, which oversees the contracts for ITER's buildings.

Gambier says that the decision to delay contracts was purely technical, and driven in part by the fact that the design of ITER is still being finalized. "We still need to have more information from the other parties," he says. Nevertheless, he says, "we are pushing as hard as we can".

ITER is expected to be completed in 2018 and to conduct its first power-producing experiments in 2026. ■

Geoff Brumfiel

ITER

The ITER site: ready for buildings.