

the agency plans to hand out the first set of awards under a pilot system that divides about half of its research budget between two mechanisms. One of these, the Foundation Scheme, gives seven years of guaranteed funding to established researchers and five years to early-career investigators. Grant recipients can use the money for any project, but are barred from receiving other CIHR funding. The second mechanism, the Project Scheme, awards smaller grants for specified work over a shorter period.

But researchers who have been reviewing the first set of applications under the new system see potential problems, particularly for early-career researchers, who often have difficulty showing enough preliminary data to justify specific projects or enough of a track record to win an open-ended grant. New investigators submitted about 40% of the 1,366 grant applications for the Foundation Scheme's pilot round, but they were involved with less than 20% of the 467 applications that made it through the first phase of peer review. "Young researchers are left out in the cold," says Jim Woodgett, a molecular biologist at Mount Sinai Hospital in Toronto.

Some institutes also feel imperilled by the changes. Researchers supported by the Institute of Aboriginal Peoples' Health (IAPH) say that they have few funding options outside the CIHR, and would not find it easy to interest external partners in providing support so that they could receive money through the cross-disciplinary common fund. Their field is relatively new and they are under-represented among public-health researchers, so they feel disadvantaged if they have to compete against other institutes for money and for spots on an advisory board that will also oversee other institutes. "We're losing our distinctive voice," says Frederic Wien, a sociologist at Dalhousie University in Halifax who studies aboriginal health.

Such concerns are exactly why the reforms are taking place, says Beaudet: "There were not enough collaborations between institutes." For instance, he says, the other 12 institutes assumed that they did not need to worry about aboriginal peoples' health, because the IAPH would cover all relevant research. The other institutes' inattention to indigenous peoples' health is a huge problem, Beaudet adds.

Wien says that the CIHR has not been responsive to complaints over the past several years. He and others are also concerned that the agency might eliminate some institutes altogether. The 13 divisions have existed since the CIHR was founded, but Beaudet says that, by law, external and internal panels must review the institutes every five years; it has always been possible that some could be eliminated. ■



The increasing sophistication of 3D printing is shown in an ear that melds biological and electronic parts.

MATERIALS

Printed body parts come alive

Conference on 3D printing features made-to-order bones, and organs built using cells as 'ink'.

BY HEIDI LEDFORD

The advent of three-dimensional (3D) printing has generated a swell of interest in artificial organs meant to replace, or even enhance, human machinery.

Printed organs, such as a prototype outer ear developed by researchers at Princeton University in New Jersey and Johns Hopkins University in Baltimore, Maryland, will be on the agenda at the Inside 3D Printing conference in New York on 15–17 April. The ear is printed from a range of materials: a hydrogel to form an ear-shaped scaffold, cells that will grow to form cartilage, and silver nanoparticles to form an antenna (M. S. Mannoer *et al. Nano Lett.* **13**, 2634–2639; 2013). The device is just one example of the increasing versatility of 3D printing.

The New York meeting, which bills itself as the largest event in the industry, will have plenty of widgets and novelties on display. But it will also feature serious discussions on the emerging market for printed body parts.

That business is

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currently focused on titanium replacement hip joints, which can be tailored to fit individual people, and made-to-order polymer bones to reconstruct damaged skulls and fingers. Printed body parts brought in US\$537 million last year, up about 30% on the previous year, says Terry Wohlers, president of Wohlers Associates, a business consultancy firm in Fort Collins, Colorado, that specializes in 3D printing.

Scientists are looking ahead to radical emerging technologies that use live cells as 'ink', assembling them layer-by-layer into rudimentary tissues, says Jennifer Lewis, a bioengineer at Harvard University in Cambridge, Massachusetts. Bioprinting firm Organovo of San Diego, California, already sells such tissues to researchers aiming to test experimental drugs for toxicity to liver cells. The company's next step will be to provide printed tissue patches to repair damaged livers in humans, says Organovo's chief executive, Keith Murphy.

Lewis hesitates to say that 3D printing will ever yield whole organs to relieve the shortage of kidneys and livers available for transplant. "I would love for that to be true," she says. "But these are highly complicated architectures." ■