

Bionic eye team sees far into future

Two innovators hope to put Australia first in the race to build a bionic eye. Leigh Dayton reports | *July 05, 2008*

STEVE Horan needed glasses as a two-year-old toddler, thanks to a hereditary condition known as retinitis pigmentosa.



Doctor Vivek Chowdhury with Steve Horan, who has volunteered to receive a bionic eye. Picture: Bob Finlayson

Today, at age 30, he has severe visual impairment. He has no peripheral vision, can't read or even see an eye chart, and gets around with the help of his guide dog Casey.

That may change in a few months. Horan has volunteered to be the first person to receive an Australian bionic eye, a prosthesis akin to the bionic ear developed by Australian scientist Graeme Clark and marketed worldwide by Sydney-based Cochlear Ltd.

"I don't expect too much for myself," confesses Horan. But he quickly adds that there's only one way to find out if the prototype prosthesis developed by Sydney ophthalmologists Minas Coroneo and Vivek Chowdhury works -- by giving it a try. "So I stepped up," says Horan.

As it turns out, plenty of people worldwide are also stepping up, from volunteers such as Horan to large teams of scientists, bioengineers, computer whizzes and eye specialists such as Coroneo, with the Prince of Wales Hospital and the Sydney Eye Clinic, and his POW offsideer Chowdhury.

The race is on. The group that's first to build and commercialise a bionic eye able to restore lost vision or amplify rapidly dwindling eyesight will not only dramatically improve the quality of life for people who "see" the world with the help of a long stick or a patient guide dog, they'll make a motza.

It's little wonder that groups in the US, Germany and Japan have received hundreds of millions of dollars' worth of government support. The current leader is the well-endowed Doheny Eye Institute at the University of Southern California, and its spin-off company Second Sight Medical Products Inc.

Last February, Second Sight received US Food and Drug Administration approval to conduct a three-year trial of its Argus II Retinal Prosthesis System, and implants have begun in the US, Mexico, Switzerland, France and the UK.

Like all the overseas devices, the Argus consists of an externally worn camera which transmits signals to a microchip which processes them, sending the data to an array of vision-stimulating electrodes implanted inside the eyeball, on or near the retina.

Prospects of a home-grown bionic eye gained prominence in April during the 2020 Summit in Canberra. Health co-chair Michael Good summed up summiteers' sentiment: "Having 20-20 vision by 2020 mightn't be such a bad idea." The PM agreed, enthusiastically endorsing the notion of a national effort to build a bionic eye: "This is a huge public good that we should be in engaged in."

It's unlikely the PM knew that for some years Australia has funded a growing number of groups working on bionic eyes. It's likely he did know that a consortium of several of those groups -- represented by The Bionic Ear Institute in Melbourne and National Information Communications Australia (NICTA) -- wants \$40 million over five years to build a bionic eye, similar in concept to the Argus. They made a submission to the summit.

This week The Australian reported that Health Minister Nicola Roxon's office has already met people from The Bionic Ear Institute regarding the establishment of a Medical Bionic Institute that could build a bionic eye. The Australian also revealed that until it made specific inquiries, neither Roxon's office nor Innovation, Industry, Science and Research Minister Kim Carr's office had contacted Coroneo or Chowdhury.

The upshot is that next week the pair will meet one of Roxon's advisers. It may seem extraordinary that they were overlooked. After all, the two have a prototype bionic eye that's gone through animal testing and proof-of-concept trials with 10 people, including Steve Horan. No other Australian group is that far along the developmental pathway.

Moreover, thanks to their ability to beg, borrow and make do with the research equivalent of twist-ties and sticky tape, Coroneo and Chowdhury did the job for less than \$100,000.

How? "It's the paradox of thrift," explains Chowdhury. "We had to be smarter." Being smarter meant turning to Jim Patrick, chief scientist with Cochlear Ltd.

"We're using their electrode technology, not reinventing the wheel, so we were able to leapfrog over international groups," he said. They also received help with animal trials from University of Western Sydney physiologist John Morley, and have pulled together a surgical team to assist with Horan's implant, free of charge.

There's another paradox here, one demonstrating the psychological adage that perception is reality. While, as Coroneo says, "innovation occurs in the least expected places, and it's not always about money", it really is about expectations and money.

Roxon, Carr and company were presented with a big, bold vision from the NICTA-Bionic Ear Institute consortium. Why fuss with two outliers?

Still, as spokespeople for the ministers note, the little guys may fit within new policy and funding initiatives now taking shape. At present, Carr's department is conducting the National Innovation System review, aimed at targeting priority research areas.

Recommendations will be tabled at the end of this month and the Government will respond by year's end. "This will clearly have implications for bionic research," Carr's spokesperson said. According to Roxon's department -- with lead carriage of bionic eye projects -- the new \$10 billion Health and Hospitals Fund was designed to support strategic investments in health.

While it's unclear where hefty funding for the proposed Medical Bionic Institute sits in the 2008-09 federal Budget, the HHF could provide the \$200,000-\$300,000 Coroneo and Chowdhury need to trial their prosthesis.

As officials thrash out ways to make bionic eyes more than a 2020 vision, they might consider lessons from overseas. Results have been disappointing, with rumours of lawsuits by volunteers who lost residual vision through complications from surgery and components.

That won't trouble Steve Horan, as Coroneo and Chowdhury's electrode array sits outside the eye. They claim their design is safer and cheaper than alternatives and they're keen to put it to the test. "It will either work or it won't," says Coroneo. "That's what research is all about."