

Fact sheet: bionic eye

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About blindness and vision loss

Blindness is one of the most debilitating conditions that can severely impact people's ability to lead independent lives. The predominant cause of inherited blindness is retinitis pigmentosa. This affects 1.5 million people world-wide and is characterised by the progressive loss of vision. Age-related macular degeneration is responsible for almost half of all legal blindness in Australia. It predominantly affects people over the age of 65.

About the Australian bionic eye project

Bionic Vision Australia is a national consortium of researchers working together to develop a bionic eye that can restore sight to people with vision impairment due to retinitis pigmentosa and age-related macular degeneration.

In late 2009, the Australian Research Council awarded the Bionic Vision Australia consortium a grant of 42 million dollars.

How will the bionic eye work?

The technology being developed at Bionic Vision Australia consists of a camera, attached to a pair of glasses, which captures the visual scene and transmits radio frequency signals to a microchip implanted in the eye.

Electrodes attached to the chip, convert these signals into electrical impulses, which then stimulate the remaining cells in the retina that connect to the optic nerve. This is then interpreted by the visual processing centres of the brain as an image.

What is the difference between the first and second bionic eye prototypes?

There are two prototypes being developed to suit the needs of different patient groups. The first prototype bionic eye, known as the wide-view device, will use around 100 electrodes to stimulate the nerve cells in the back of the eye. This will allow people with severe vision loss to see the contrast between light and dark shapes regain mobility and independence. This device may be most suitable for retinitis pigmentosa patients.

The second prototype, known as the high-acuity device, will use 1000 electrodes to stimulate the retina and will provide patients with more detailed information about the visual field, helping them recognise faces and even read large print. The high-acuity device may be most suitable for patients with age-related macular degeneration, however, it is still some years before the first patient tests will commence.

Which patients will benefit from a bionic eye?

Patients with severe vision loss due to retinitis pigmentosa or age-related macular degeneration may benefit from the bionic eye development. The bionic eye technology relies on the patient having a healthy optic nerve and a developed visual cortex – patients need to have been able to see in the past for this device to be of benefit to them.

The first patients to receive a bionic eye implant will be those who are experiencing total blindness, however, with time, it is possible that the device will be suitable for patients with low vision.

Development timeline

Researchers are currently working on establishing the safety and efficacy of the bionic vision technology. It is anticipated that the first patient tests with the wide-view device will commence by 2013. The commercial development process should commence shortly after the successful completion of the first patient tests.

About Bionic Vision Australia

Bionic Vision Australia is a national consortium of researchers from:

- the Bionic Ear Institute,
- the Centre for Eye Research Australia,
- National ICT Australia,
- the University of Melbourne and
- the University of New South Wales.

The Australian National University and the University of Western Sydney are project partners.

The first patient trials of the device are planned to take place at the Royal Victorian Eye and Ear Hospital.

Bionic Vision Australia is an initiative of the Australian Research Council.

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