

Visual implants

Seeing the light

These days, using silicon chips to allow machines to see is commonplace. So why not use them to restore sight to the blind? That is the reasoning behind a study being carried out in the eye hospitals of Tübingen and Regensburg universities, in Germany. The study, led by Eberhart Zrenner, has implanted chips into the eyes of seven people who have lost their sight to a disease called retinitis pigmentosa.

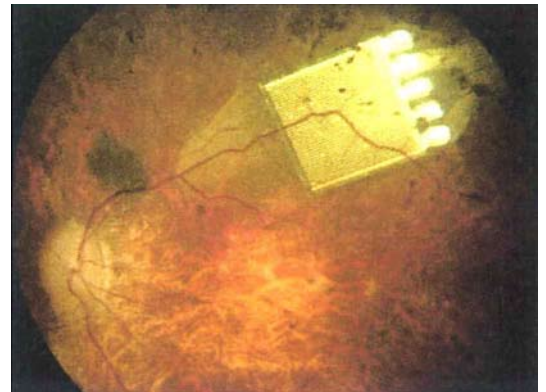
Retinitis pigmentosa is an inherited disorder that accounts for 11% of cases of blindness and has no medical treatment. It gradually destroys the rods and cones that detect light in the retina of the eye. However, it does not harm the optic nerve, which transmits electrical impulses from the retina to the brain. Feed appropriate signals to this nerve, Dr Zrenner reasoned, and the brain would be able to see again.

The chip that does this was designed by a firm called Retina Implant. Its researchers used technology found in digital cameras—photodiodes that generate an electrical signal when light strikes them.

By putting 1,540 such sensors on a chip that can be implanted over the retina, the company has created a device that can build up an image that has 1,540 pixels.

Each diode stimulates the nerve cells that have their endings in the retina (unlike the photoreceptors, these cells are unharmed by retinitis pigmentosa), and the nerve cells in question then relay the individual signals to the brain via the optic nerve. The power to drive all this comes through a cable that is connected to a small battery slung around the patient's neck, though Retina Implant intends to deliver power to a production version by electrical induction. That would not require anything to penetrate the skin.

The seven volunteers spent a month with the implants and reported being able to distinguish between dark walls and a light window, and a dark table and white plates. The picture generated by the device was coarse compared with normal vision because of the small number of pixels it contained (a healthy eye has 120m rods, which produce the bulk of the image, and 6m cones, which



An electronic device restores some vision to the blind

add colour to it). Neither did the patients see fully in colour, although they reported being able to distinguish white, grey and yellow tones. Nevertheless, enough sight was restored to make a difference to each of the volunteers' lives.

The researchers now want to repeat the experiment and keep the implants in place for at least a year. (Their original research licence was limited to four weeks.) They hope this will be long enough for their patients' brains to learn how to interpret the images more accurately than they now can. Later versions of the devices will also have more pixels, so the images should be better. As to cost, Walter Wrobel, the boss of Retina Implants, reckons about €25,000 (\$35,000). That is less than the bill for training a guide dog—and the implants will not require feeding. ■