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Artificial Sight

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Retinal diseases such as retinitis pigmentosa, or age related macular degeneration can destroy a person's retina leaving them with a loss of peripheral vision or even blindness. The Artificial Silicon Retina (ASR) developed by Optobionics and the Artificial Retina Component Chip (ARCC) developed by John's Hopkins University and North Carolina State University are on the leading edge to fixing this problem.

In a normal human eye there are four major things that need to happen for us to see. First we must have light pass through the cornea. Next, this light needs to be projected onto the retina. Third, the retina sends a signal to the brain via the optic nerve. And finally, the brain interprets what it is we're looking at.

In the retina there are 125 million rods and cones. There are far more rods than cones, and rods are responsible when there is low light to give us black and white images or outlines of what we see. While cones come into play in a brighter conditions and allow us to see fine details and colors.

retinitis pigmentosa, and age-related macular degeneration are two diseases that can leave the rods and cones inoperable. But since none of these diseases attack the ganglion or the optic nerve, scientists have been developing a way to replace the rods and cones with integrated circuits which will generate a signal to relay a to the brain even though the cones and rods aren't working, hopefully letting the blind once again see.

The Artificial Silicon Retina, by Optobionics, is a small IC which is 2mm wide and thinner than a human hair. The ASR contains as many as 3500 microscopic solar cells, which are able to change light into electrical impulses, taking on the function of rods and cones and functioning like the human retina. Implantation of the device involves only three tiny incisions in the white part of the eye. In these tiny holes go a cutting tool and a vacuuming tool. Once a surgeon gets to the retina they make a small hole and pump some liquid behind the retina to make a small pocket, which will contain the ASR. The ASR uses solar energy for power and with the patient simply looking around normally it gets plenty of solar energy.

The ACCR differs from the ASR in a few aspects. First, rather than being placed behind the retina it is actually placed on the retina. Also instead of simple solar power a patient must wear a special pair of glasses with a tiny laser built into them that shoots a beam at the chips solar cells to provide power.

Current technology allows a patient to see a 10x10 pixel image, which is about the size of a single letter on this page. However development is underway for a chip that will allow the user to see a 250x250 pixel image, which would allow a once blind individual to read a newspaper.

Sources: www.howstuffworks.com
www.optobionics.com
www.devicelink.com/mddi/archive/99/07/003.html