



Schwartz Communications



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<http://www.amd.org/our-newsletter/170-artificial-vision.html>

Restoring Vision

The idea that we could restore vision in people who are blind or severely visually impaired is an intriguing one. Scientists are getting closer to this reality every year.

There are different approaches to the problem and each has its own merits and concerns. At this year's Academy of Ophthalmology meeting, we heard updates on some long-standing efforts and a few new ones.

Chemical Reanimation of the Blind Retina

This very early laboratory research is exciting, though it will be years before there is any attempt to do a human clinical trial. Researchers are using a small molecule that confers light sensitivity to blind mice.

The pupil of your eye gets larger or smaller depending on the amount of light hitting the retina.

In very bright light, it becomes very small, in order to protect the eye. In a blind mouse, the pupil of the eye does not move, because the retina cannot respond to light. But when these mice were injected with the molecule AAQ, the pupils began to react to light, indicating that the brain was receiving light from the neurons in the eye.

Because AMD destroys the photoreceptor (light sensitive) cells in the human retina, there is hope that this therapy could develop into a treatment for macular degeneration. If AAQ can create light sensitivity, eventually, it may be able to turn that light into images. Chemical reanimation is

a long way off, but can now be added to the list of possibilities for the restoration of sight.

Retinal Prosthesis

One of the early efforts at artificial vision is the Argus system from Second Sight. Dr. Mark Humayun, from the University of Southern California, presented an update on the project.

The latest version uses an array of 60 electrodes, implanted in the retina and connected with a cable to a camera mounted on a pair of glasses. The camera gathers the light and sends it to the device in the retina. The device then sends visual signals to the brain.

Thirty-two patients in 5 countries have received the implant. Every one of the research subjects, blind from retinitis pigmentosa, had some perception of light and could perceive movement and find objects. Dr. Humayun shared a video of one of the patients, which showed her able to identify successfully smaller white letters on a black background. The test allowed the researchers to track her movements to observe how she scanned the larger letters in order to figure out which ones they were. As the letters got smaller, they fell entirely into her visual field and she no longer had to scan to see them.

The Argus II system will have a CE mark this year, which certifies that a product has met consumer safety, health and environmental safety, health or environmental requirements in the European Union. Second Sight is preparing a submission to the FDA as well.

Retina Implant AG

The agenda for the meeting always includes an open space for "late breaking news." This year, **Retina Implant AG** used that time to present an update on their artificial vision project. The device has 1500 pixels in a 3mm x 3mm square and is placed on top of the retina. Instead of having a camera mounted on a pair of glasses, the device itself does the gathering of light and sends it to the brain. An external power source is implanted behind the ear, just under the skin.

Clinical trials in Europe began in November 2005 with 11 patients who have retinitis pigmentosa. A 1500 electrode microchip was implanted beneath the retina. This is a different approach to the one used by Second Sight, which implants on top of the retina.

The implant was left in the eye for three months and patients received training in the best way to use the vision they obtained. Because the light hits the implant directly (instead of through a camera), patients could move their eyes in a normal way to scan objects, instead of moving the entire head. Even without training, the participants were able to discern objects like windows and in some cases to identify letters and read.

Retina Implant began their second clinical trial earlier this year in Germany and is expanding the trial to other European countries including the U.K. and Italy. In this clinical trial patients will receive the 1500 electrode implant permanently. If this second trial supports the earlier results, Retina Implant will submit the device for CE mark approval.