

Eye disease cure: Electric therapy?

By THOMAS LEE Star Tribune

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ScyFIX

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Electricity has been used to shock hearts, ease pain and even treat depression. Now, apparently, it can even thwart blindness. ScyFix, a Chanhassen start-up, has developed a device that treats diseases such as glaucoma and macular degeneration by shooting electric currents into the eye. The company, which is conducting clinical trials in India and the United States, hopes to sell the first device approved by the Food and Drug Administration designed to restore eyesight. "To me, this is the pacemaker for the eye," said Dr. Darrell DeMello, ScyFix president and a former executive at Boston Scientific Corp.

ScyFix, a featured new technology presenter at last month's annual Life Science Alley conference, hopes to eventually raise \$60 million to \$70 million to finish its clinical trials.

Neuromodulation, or electric stimulation, first gained prominence in the 1960s through the use of deep-brain and spinal-cord stimulation to treat pain. Doctors at the time had begun to realize pain was not just the result of the direct activation of pain receptors but rather a complex series of electric and chemical interactions throughout the nervous system. Therefore, electricity could be used to manipulate those interactions.

Medtronic Inc. laid the groundwork for the medical device boom in Minnesota by developing the implantable pacemaker, a device that uses electric impulses to regulate heartbeats. Today, companies like St. Jude Medical and Uroplasty are developing implantable devices to fight chronic pain and incontinence. Doctors are also harnessing electricity to treat Parkinson's disease, deep depression, and obsessive compulsive disorder.

But until now, the idea to use electricity to slow or even reverse the effects of eye diseases like glaucoma has never made it out of a laboratory, said Dr. Thomas Samuelson, a founding partner of Minnesota Eye Consultants. Samuelson, an ophthalmologist, recently developed a new surgical procedure to treat glaucoma in a minimally invasive way.

Neuromodulation for the eyes is "nowhere near the clinical level," said Samuelson, who is not connected to ScyFix. "As a glaucoma specialist, it has never come up as a treatment for glaucoma."

Glaucoma, wet and dry eye macular degeneration, and retinitis pigmentosa, which severely reduce vision or cause blindness, have become more prevalent in the United States, especially as the country's baby boom population ages. People suffering from such age-related diseases will jump from nearly 30 million today to 43 million by 2020, according to the American Academy of Ophthalmologists.

Medical outsider leads firm

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More

Thomas Harold first came up with the idea for ScyFix in 2002. An Internet entrepreneur and a former executive at General Mills, Harold became interested in studies that showed electricity could restore sight. Drugs, however, could only slow the effects of some diseases.

"I thought to myself: 'No cure? No therapies? That's interesting,'" said Harold, who is now chief executive of ScyFix.

Specifically, the studies showed electricity could stimulate the production of neurotrophins, a family of proteins that can instruct optic nerve, retinal neurons and photoreceptor cells not to die. In addition, neuromodulation can also repair cell membranes, allowing cells to absorb nutrients, release wastes, improve blood flow to the eye and rewire faulty nerve connections.

Working with doctors and engineers, Harold, who has no medical background, developed a device that releases low-intensity electric currents into the eyelids through electrodes. A complex mathematical equation programmed into the device controls the amount and frequency of the electricity. Patients can administer the treatment at home twice a day for 20 minutes.

Harold says he is highly encouraged by the results so far: Since 2002, the device has halted progression of diseases in 95 percent of the 1,000 patients tested in 29 countries, according to ScyFix.

"Everything stopped getting worse," Harold said. "That was a win in itself."

In addition, 80 percent of the patients reported vision improvement. There were no side effects, the company said.

Harold and DeMello envision developing an implantable eye device and possibly using electricity to correct common eye problems such as nearsightedness. But even Harold admits there are many unknowns regarding eye diseases and the effects of electric stimulation.

Still, Samuelson of Minnesota Eye Consultants thinks the treatments are worth exploring.

"If you can stimulate [the nerves] somehow, it might help," he said. "It seems like a reasonable thing to evaluate."

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