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# Clinical trials reveal promising results for neuroadaptation technology

**Investigators are “impressed” with NeuroVision study outcomes.**

*Jena Passut*

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**Richard L. Lindstrom**

Researchers have been looking to the brain to help improve visual function in patients with conditions such as amblyopia, mild myopia and presbyopia. So far, they say they have been impressed with the results of several clinical trials for one company’s program.

Singapore-based NeuroVision Inc. has developed a computer software program that “solely focuses in optimizing the visual processing in the brain” and “neurologically trains the brain to see better,” according to company literature.

The system was approved by the U.S. Food and Drug Administration in 2001 to treat adult amblyopia. Now, researchers want to find out if it has broader applications.

**Daniel S. Durrie**

NeuroVision called on leading U.S. researchers to try the software in clinical trials, including PCON Editorial Board member Richard L. Lindstrom, MD, and Daniel S. Durrie, MD.

“This particular device has some pretty solid science behind it,” Dr. Lindstrom told PCON in an interview. “It seems to be real. It keeps generating the same outcome – about a two-line improvement in visual acuity – regardless of the indication, which is reassuring. That’s enough to matter to patients.”

Dr. Lindstrom and his colleagues at Minnesota Eye Consultants are in the process of testing the software on presbyopic patients who have undergone multifocal IOL surgery.

“We are getting ready to enroll post-LASIK patients who are not happy – a few who have low refractive error,” Dr. Lindstrom said.

Dr. Durrie said the science behind NeuroVision has existed for about 15 years. It was developed in Israel and Asia where myopia is almost epidemic, he said. He admits he was a skeptic at first; now he is on NeuroVision’s medical advisory board.

“The history of visual training processes, specifically in the United States with the See Clearly and Bates methods, has been spotty at best, as far as its scientific basis,” Dr. Durrie told PCON. “Generally, it has not been accepted as working very well, if at all, and has gotten a bad name over the years. The company realizes that, and that is why they are doing scientific studies in the United States to validate whether this process really is helpful to patients.

“I went into this very skeptical,” Dr. Durrie continued. “I didn’t think this was going to work, but I did see a positive effect for the patients in the clinical studies. In general, I was impressed that we could improve vision without doing surgery or without changing the optical structure of the eye, but just by improving the brain’s ability to see.”

### Clinical trials

Dr. Durrie said the technology has been validated in research projects with patients who have low myopia and early presbyopia, post-refractive surgery and post multifocal IOL implants.

“There’s an ongoing project with adolescent amblyopia,” he said. “There’s also a project for people with multiple sclerosis with optic nerve disease, or glaucoma, to see if we can bypass some true pathology and make the brain see better. We’re also studying the neuroLASIK concept.”

Dr. Durrie encouraged other researchers to consider participating in a clinical trial on the technology. “If somebody thinks it’s absolute hogwash and they want to prove that it doesn’t work, those are the people I’d like to get involved,” he said.

### How it works

The science behind NeuroVision is one of neuroadaptation, researchers said. “You are developing the neural pathways to respond better and more efficiently to visual stimuli,” Peter G. Shaw-McMinn, OD, said in an interview. “It improves the lateral interactions between neurons on the visual pathway and improves contrast sensitivity – and that improves visual acuity.”

Dr. Shaw-McMinn, who has tested more than 70 patients for NeuroVision, said adults have more plasticity than researchers realized. It was thought that the brain lost neurons with age, and no new neurons were gained. However, we are able to gain neurons and improve retinal and visual pathway processing, even as we age, he said.

During the program, a patient sits in a darkened room about 5 feet away from a computer screen. The screen flashes a series of Gabor patches, and the patient answers questions with a click of the mouse.

“Single cells in the visual cortex respond optimally to a bar of light as opposed to a flash of light,” Dr. Shaw-McMinn explained. “That is what gives rise to our contrast sensitivity.”

Gabor patches have a particular shape that matches the layout of the neurons at the central cortex, Dr. Durrie said. The patient’s vision is measured during an orientation session, and then the software measures his or her visual weaknesses in spatial frequency, contrast sensitivity, orientation and displacement defects in picking out small images.

The technology then customizes a visual training program for that patient. Each time the patient comes into the office for treatment, the program updates and sends information to a server in Singapore.

“At the end of every treatment you essentially have a score, and then it recalibrates the next lesson for you,” Dr. Durrie said. “It is constantly stimulating your weak spot, then testing your strong spots and moving them up.”

The technology requires a series of 30 treatments of 30 minutes each, about three sessions each week.

“Overall, our myopia and presbyopia test groups improved by 2 to 2.4 lines of improvement in high-contrast vision, which was significant enough for the patients that many of them quit wearing their glasses for distance or quit wearing their reading glasses for near,” Dr. Durrie said.

### Multifocal study

Marlane J. Brown, OD, FAAO is conducting a study with nine multifocal IOL patients at Minnesota Eye Consultants.

**Marlane J. Brown**

“It isn’t changing their prescription,” Dr. Brown told PCON. “It is just training their brains to see better with the new lens implant.”

Dr. Brown said she, too, was skeptical about the technology at first.

“I’m impressed with the results I am seeing,” she said. “I don’t have any hard data yet, but the sponsor, NeuroVision, reports to me that the patients are showing improvement in visual acuity and contrast sensitivity. The patients themselves are reporting it. They are feeling they can, for example, see the computer better or they are putting on their reading glasses less often.”

Dr. Brown said she worried, at first, about some of the patients feeling comfortable mastering the computerized sessions. She learned, however, that they adapted easily. “It is easy to run,” she said.

### Commitment, hope

Researchers admit the treatment is rigorous.

“It’s kind of like going to the gym,” Dr. Durrie explained. “You’re going to have to dedicate yourself to go do your workout. You have to be in a dark room. You have to concentrate. It really does make you tired. It is something for which you have to be dedicated enough to do the treatments.”

For now, the patients in the clinical trials have to go to a doctor’s office several times a week to do the treatments. The company’s goal is to make it an at-home program.

That possibility is exciting, Dr. Brown said. “I can see patients doing this at home and running it like an exercise video,” she said.

Dr. Durrie hopes optometry and ophthalmology will embrace research on NeuroVision. “There is no risk to the patient other than wasting their time and effort to do it. If we find that there’s a use for certain patients groups, I think that would be very helpful,” he said.

The challenge, he said, is getting clinicians to accept that the technology works. “I encourage both the company and the ophthalmic and optometric community to challenge it,” he said. “Here’s something that could potentially help every patient that comes into our office. Everybody has the benefit of seeing better at their brain level. We haven’t taught them how to do that yet.

“We’re challenging it every way we can, and so far we haven’t derailed it,” Dr. Durrie continued. We’re still working on it. I just hope that people look at it with an open mind and believe it’s worth continued research.”

Dr. Shaw-McMinn and others said they could see NeuroVision being used on patients who already have good vision, too.

“I think it’s fantastic for anybody who wants to see better,” Dr. Shaw-McMinn said. “All athletes should consider it, especially those with a visual demand. I’ve started using it with patients with pathology such as macular degeneration. We’re just starting with that, but I think it has a lot of potential for improving their vision.”

### Follow-up results

Retests done on a group of patients in Singapore found that 85% of the patients kept their visual improvements a year later, Dr. Durrie said.

“Of the people who started dropping off, they could do a refresher and perk right back up again,” he said. “What’s nice about it is once you’ve done it, you’ll always get the advantages of it. Even patients who may have cataract surgery at some time or refractive surgery will still get the benefits of their brain seeing better.”

Researchers are not afraid to admit they have been impressed with the results from NeuroVision.

“I think it’s revolutionary,” Dr. Shaw-McMinn said. “We’ve spent all of our time trying to get a sharper image on the retina. For the most part, we’ve always ignored the second part of seeing, and that is interpreting the visual stimuli to the visual pathway. Now we’re paying attention to that. In the future, that holds promise for helping a lot of people.”

### Essilor, Stereo Optical

Essilor International acquired a minority interest in NeuroVision in February 2007. Stereo Optical, a subsidiary of Essilor, was appointed as distributor.

R. Michael Daley, president and chief operating officer of Essilor Lenses, told PCON that Essilor is conducting beta testing in the United States for myopia and presbyopia and is evaluating both its clinical and commercial viability. “We will target one city, train the eye doctors there, have them offer it for a year and see how successful it is,” Mr. Daley said.

The company plans to conduct commercial distribution trials in three test markets: Chicago, the United Kingdom and Singapore and also test the software for at-home and laptop use.

“Essilor was already studying eye movement, head movement and vision – the physiology of vision,” Mr. Daley said. “It’s a natural for us to look at this. It will give us great insight into the neurology of vision and how that works with Essilor products.”

### For more information:


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