

Prism glasses expand the view for patients with hemianopia

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Innovative prism glasses can significantly improve the vision and the daily lives of patients with hemianopia, a condition that blinds half the visual field in both eyes. The peripheral prism glasses, which were invented by Dr. Eli Peli, a Senior Scientist at Schepens Eye Research Institute, were evaluated in the first community-based multi-center trial of such a device, which is published in the May issue of the *Archives of Ophthalmology*. The study was coordinated by Dr. Alex Bowers, a Senior Scientific Associate at the Institute.

“This is the first real breakthrough in the rehabilitation of patients with this condition,” says Peli, a world-renowned low vision expert, the Moakley Scholar in Aging Eye Research at Schepens and a Professor of Ophthalmology at Harvard Medical School. Peli had searched for a solution for his hemianopia patients for many years before designing the peripheral prism glasses, creating a prototype in his laboratory.

More than a million Americans suffer from hemianopia, which blinds the vision in one half of the visual field in both eyes, resulting from damage to the optic pathways in the brain. Most commonly caused by strokes, it can also be the result of brain damage from tumors or trauma. A patient with this condition may be unaware of what he or she cannot see and frequently bumps into walls, trips over objects or walks into people on the side where the visual field is missing.

Peli’s goal was to find a way to expand the visual field. He did this by attaching small, specially designed high power prisms on the top and

bottom of one spectacle lens, leaving the center of the lens untouched. The prisms pull in images missing from the visual field above and below the line of sight on the side of the vision loss, and alert the patient to the presence of a potential obstacle or hazard. The patient can then move his/her head and eyes to examine the prism-captured image directly through the clear center of the lens.

Prisms by their nature can shift images from one side of the visual field to the other side (e.g., from the right side of the field to the left side). Before Peli's invention, others had tried to develop prism glasses to bring the missing part of the patient's visual field into view. However, these previous techniques placed the prisms in the center of the glasses, which resulted in double vision, which is disturbing and confusing. Peli's solution was to keep the central part prism free and place prisms above and below.

The Archives of Ophthalmology study evaluated the glasses' ability to improve a patient's walking mobility, which includes obstacle avoidance. Forty-three patients were fitted with prism glasses in 15 community-based clinics around the country. The clinicians interviewed them at six weeks and after 12 months. Success was measured by how many patients continued wearing the prism glasses and by their ranking of the prisms' effectiveness in assisting with obstacle avoidance while walking.

Thirty-two participants (74 percent) continued wearing the glasses at week six. At 12 months, 20 (47 percent) were still donning the spectacles eight hours a day and rating them as "very helpful" for obstacle avoidance. These 12-month-plus patients were reporting significant benefits for a variety of obstacle avoidance scenarios (e.g. walking in crowded areas, unfamiliar places, shopping malls). According to Bowers, the first author of the paper, "These results indicate that the glasses have great promise for helping patients resume normal daily life".

Dr. Peli partnered with a small optical company in Vermont—Chadwick Optical, Inc. who funded the study in part through a National Institutes for Health (NIH) small business grant. Peli and Karen Keeney, the President of Chadwick Optical, created a permanent version of the prisms with higher optical quality and better durability than the temporary prisms that were fitted at the start of the study. These permanent prisms were provided to 15 of the study patients when they became available.

A new, higher power, version of the permanent prism glasses recently developed by Chadwick Optical should also further expand the visual field and be even more beneficial for patients' mobility, according to Peli. The prototype used in the study expanded the peripheral upper and lower visual fields by 20 degrees without obstructing central vision. The new glasses expand the field by 30 degrees.

Source: Schepens Eye Research Institute

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