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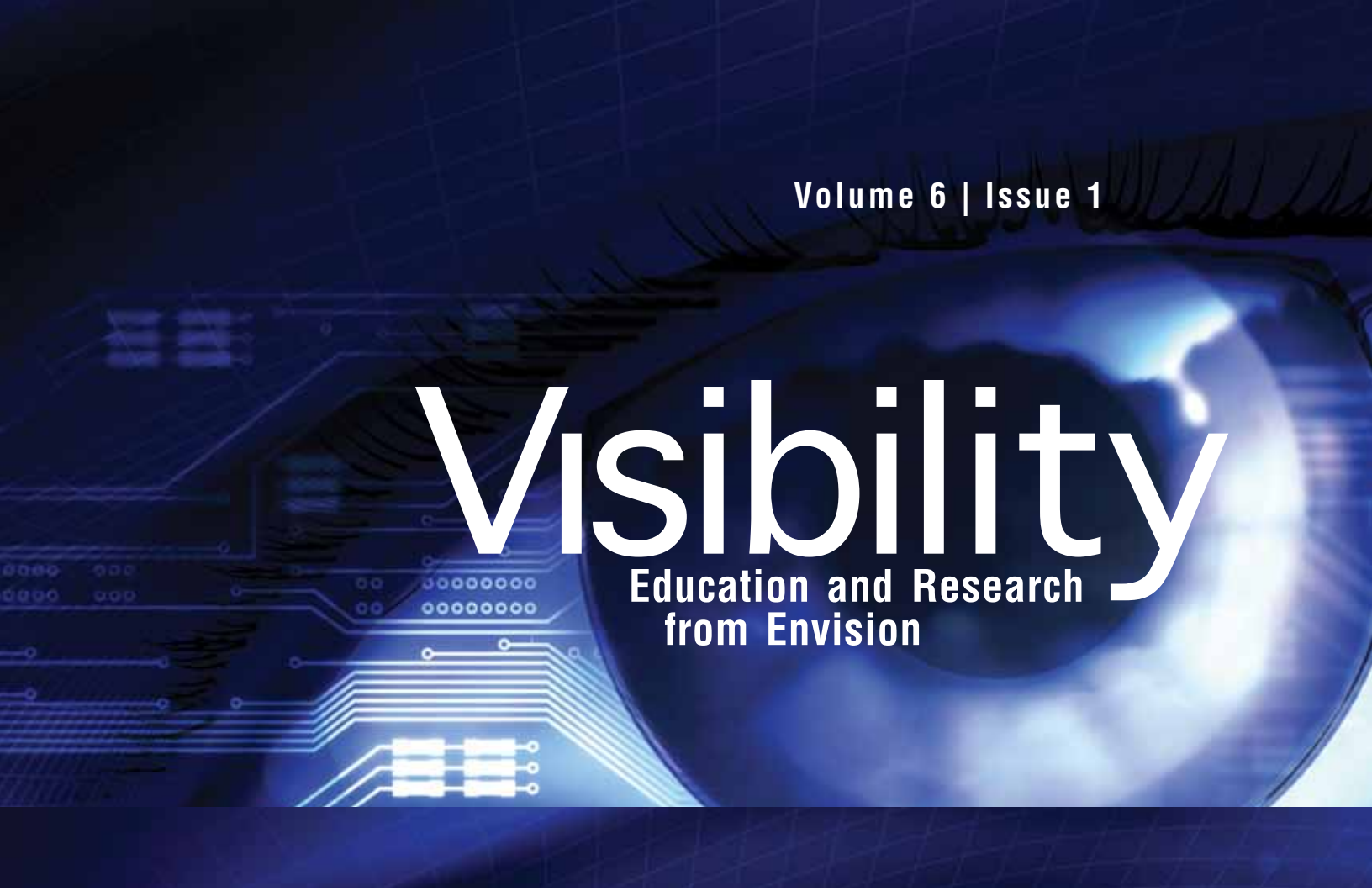

Visibility
Education and Research from Envision

Depression and Vision Rehabilitation: Recognizing and Managing This Prevalent Co-morbidity

Kara Crumbliss, OD

The primary roles of vision rehabilitation are to maximize visual function, facilitate adjustment to low vision and enhance quality of life. In order to do this effectively, providers must be knowledgeable about non-ocular conditions that commonly present in the low vision population. They must also adapt their examinations and encompass testing and treatment strategies in order to achieve successful rehabilitation and maintain quality of life for patients with compounding etiologies for their symptomatology. True clinical depression is a mood disorder in which feelings of sadness, loss, anger or frustration interfere with everyday life for weeks or longer.[1] There are many contributing factors that may trigger onset of depression including significant change or stressful life events. Loss of vision may fall into either one of these categories. It seems intuitive that rates of depression would be higher amongst individuals dealing with vision loss than the general population. Indeed, this is well substantiated in published research. Older adults who are visually impaired report higher levels of depression than those who are not visually impaired,[2-4] while nearly half of patients with visual impairment who visit rehab centers report problems with emotional or psychological adjustment.[5]

Since both depression and vision loss may interfere with daily functioning and activities of daily living, treating vision loss without recognizing and treating depressive symptoms may not allow a patient to successfully meet their rehabilitation goals. This is supported by research showing that depression can prevent patients with low vision from achieving optimal rehabilitation outcomes.[6-8] Additionally, depression has been reported

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ABOUT ENVISION FOUNDATION

The mission of the Envision Foundation is to secure funding for the successful delivery of services offered by the Envision Vision Rehabilitation Center and the education programs of the Foundation. Envision Foundation focuses on fundraising to ensure that no patient is ever turned away—regardless of ability to pay; public education to help prevent blindness; and professional education to determine best practices in order to serve patients who are blind or low vision.

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Depression and Vision Rehabilitation... continued from front page

to be a more significant predictor for functional impairment than severity of vision loss.[9] Individuals who report depression at the start of rehabilitation do not respond as well functionally to the goals of vision rehabilitation.[8]

Despite the preponderance of research documenting this relationship and the need for the co-management of these conditions for successful rehabilitation outcomes, only 11.8 percent of rehab centers in the United States have a psychologist on staff.[5] This low number may be in response to financial practice management due to limited consensus and publication on reimbursement strategies for incorporating mental health professionals (MHPs), including social workers, psychologists and psychiatrists, into vision rehabilitation. Multidisciplinary management with outside referral of patients to an MHP is a viable option for patient management, yet only 31 percent of eye health professionals routinely screen for depression as part of patient management; conversely, 60 percent of rehabilitation workers do so.[10] In this same study by Rees et al, knowledge seemed to be a key barrier, as 80 percent of eye health practitioners reported they would like to be more knowledgeable about signs and symptoms of depression.[10] So it seems that while practitioners recognize they should screen for depression, few are doing so. Eye health professionals may be at a loss as to how and when to do this, and don't necessarily understand the impact of overlooking this treatment on rehabilitation strategies.

Research has yet to firmly establish the change in outcomes for clinical depression and low vision treatments when combined,

and to understand which, if either, should take priority. Yet, it is inferred that the symbiotic relationship would require treatment of both. Low vision rehabilitation and counseling may reduce risk of depression in individuals with vision impairment.[11] This antidepressant effect may benefit the practitioner and patient; however, the converse may also be true. Clinicians failing to identify and treat depression may result in poorer rehabilitation outcomes as depressive symptoms have been shown to correlate with perceived difficulty of activities of daily living and do not reliably correlate with levels of vision loss or worsening acuity.[12-13] For example, a patient with relatively good acuity suffering from depression as a result of the stress of vision loss may have restored visual acuity and reading ability with a low powered magnifier in the office, yet they may still claim they cannot read and it is too difficult as they perceive the difficulty of the task in the context of depression and not acuity. In this instance, the practitioner, failing to screen, recognize and refer for treatment of the depression, will be frustrated as the vision problem is not the only barrier to successful rehabilitation.

The American Academy of Ophthalmology, American Optometric Association, American Occupational Therapy Association and Association for Education and Rehabilitation of the Blind and Visually Impaired have endorsed the Optimum Low Vision Rehabilitation Service Delivery Model

which recognizes that support services, including counseling, community resources and support groups, form part of the optimum delivery model of vision rehabilitation services.[14] Still, directives on best practice patterns were not given in this model. Based on our knowledge that 80 percent of eye health practitioners would like to be more familiar with the signs and symptoms of depression, how do practitioners learn to recognize symptoms of depression?

Getting to know a local mental health practitioner who can provide counseling and depression treatment is imperative for successful practice. Generally, these social workers, psychologists or psychiatrists may not have firsthand experience working with low vision populations, just as eye health practitioners generally lack training and experience in management of depression. A sharing of information between these practitioners can help the rehabilitation team members to understand the others' perspectives on working with individuals who have low vision. Screening tests for depression can be recommended by the counseling professional so that the eye health care professional may use them and provide more appropriate and accurate referrals.

One suggested test is the Patient Health Questionnaire-9 (PHQ-9).[15] This brief depression screening tool takes half the time of other depressive screening scales and can be particularly helpful in objective assessment of depressive symptoms. Better still, it has been validated in a small sample study of the low vision population, and was shown to screen for depression accurately and independently of vision loss.[16] It is non-visual, can be administered by phone for those practices who wish to treat depression prior to or coincident to rehabilitation, and it does not require a degree in psychology to score and interpret. This nine-item rating of state of depression (i.e., how someone is feeling now and in the past several days) on a four-point scale for each question, allows a five-point classification of depression, between mild and severe. Patients having moderate or worse levels of depression should be referred to an MHP qualified to evaluate and manage depression. Practitioners wishing to save examination time may also use the PHQ-2, which is only two questions; however, the PHQ-2, when positive, suggests administration of the PHQ-9 so practitioners must have both on hand in order to accurately complete the PHQ-2 for positive depressive response.[17] For this reason, a personal preference is to habitually complete the PHQ-9 on patients. Anecdotally, since adding a psychologist to our staff, the simple addition of nine questions and an intake provided by an MHP to our patients, there has been an improvement in the rehabilitation outcomes and satisfaction of our patients.

A randomized clinical control to identify which tests, interventions, support groups or group, family or individual counseling, with or without adjunct antidepressant medical therapy, are appropriate for each patient, would help all practitioners incorporate an exact strategy for patient and practice management and is needed. Without such a study as yet published, practitioners can rely on shared experiences and suggest best practice strategies just as this article does. Counseling services provided on-site may be billed for by the appropriately licensed and Medicare registered MHPs. In order to be most cost effective, a part-time or consultant MHP is, in many cases, a better business model in order to provide the service without additional expense to the practice.

Until the benefits of addressing psychosocial issues within vision rehabilitation plans of care are clearly established, it is unlikely that widespread incorporation of psychological support within practices will occur. This review shows that recognizing and appropriately referring for depression is critical to the clinical practice of the vision rehabilitation field. Even non-rehabilitation eye care professionals who diagnose vision loss and its etiology should recognize depression and appropriately refer for treatment, in addition to referral for visual rehabilitation. This can have a positive impact on our patients' quality of life despite the presence of their eye diseases.

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Home Lighting Assessment and Modifications

Monica S. Perlmutter, MA, OTR/L, SCLV

Currently, approximately 2.4 million Americans have low vision and the prevalence of vision disabilities is expected to increase dramatically over the next 20 years.[1] Low vision is defined as a significant reduction in visual function that cannot be fully corrected with the use of eye glasses, contact lenses, or medical treatment, but is severe enough to interfere with daily activities. Low vision is associated with common age-related eye conditions seen in older adults, including macular degeneration and glaucoma. The growing population of older adults with vision loss is at risk for decline in ability to perform daily activities required to age in place.[2]

NORMAL AGE-RELATED CHANGES AFFECTING NEED FOR MORE LIGHT

As a person ages, the quality of their vision worsens due to reasons independent of age-related eye diseases. Several of these changes impact the amount of light that reaches the retina. Reduction in pupil size and the extent to which the pupil dilates decreases with age and allows less light to pass through. The aging lens and cornea causes glare due to light scattering. Slowing of dark adaptation can lead to night vision problems. By age 60, the lens transmits only 20 percent of light; if the person has cataracts, transmission is reduced to as low as 2 percent.[3-5]

RECOMMENDED LIGHTING LEVELS FOR OLDER ADULTS

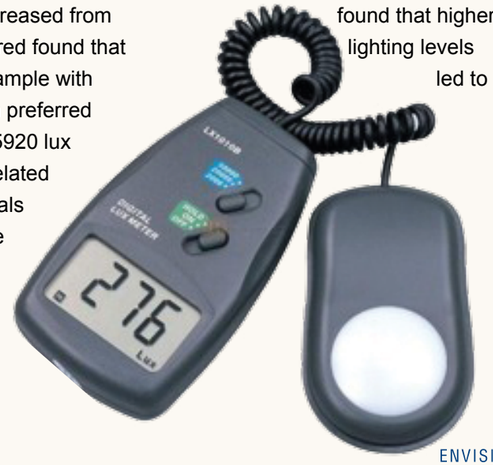
The Illumination Engineering Society of North America (IESNA) recommends lighting levels for a range of domestic tasks performed in the home.[6] For example, a healthy adult age 55 or older reading small print for prolonged periods requires a lighting level of approximately 50 footcandles or 540 lux to read small print for prolonged periods.[6] General activities performed in the kitchen require 30 footcandles or 325 lux. Multiple studies show that home lighting levels are well below these recommended lighting levels.[7-10]

LIGHTING NEEDS OF PERSONS WITH AGE-RELATED OCULAR DISEASE

Individuals with ocular disease may require even higher levels of properly directed light. Study participants with macular degeneration experienced improvements in near visual acuity and contrast sensitivity with lighting levels increased from 300 to 3000 lux.[11] Eldred found that the majority of their sample with macular degeneration preferred illumination levels of 5920 lux or higher.[12] Lighting-related difficulties for individuals with glaucoma include problems with glare intolerance, dark/light adaptation and difficulty with low-lit environments.[13] Cataracts may cause poor vision outside with glare due to sunlight, and during night driving due to headlights and lamps.[14] Persons with glaucoma and cataracts may benefit from additional lighting that is properly directed (i.e. below eye level, directly over reading material) to avoid problems with glare. Unfortunately, environmental lighting in the community cannot be easily modified.

BENEFITS OF OPTIMAL LIGHTING

Several studies have shown that optimal lighting leads to increased visual function.[15-17] One study showed that increasing the amount of light had a significant effect on sentence reading acuity, reading rate and critical print size for persons with macular degeneration.[15] Brunnstrom and colleagues[16] examined the effect of improvement in lighting on activities of daily living, quality of life and well-being and found that higher lighting levels led to improvement in pouring and slicing bread and increased quality of life. In another study, participants were able to see and recognize more objects in a simulated living room with higher lighting levels.[17] Despite the known benefits of lighting, older adults may not fully appreciate the role of lighting and may rate their current home lighting as adequate.[18] Furthermore, improving lighting, contrast and safety may be viewed as less important than learning daily living skill strategies.[19] Older adults and persons with ocular disease would benefit from learning how efficient lighting can promote the greatest use of their residual vision and how inadequate home lighting may lead to loss of activities and pose significant safety concerns.



HOME LIGHTING ASSESSMENT AND OCCUPATIONAL THERAPY

Home lighting should be included in occupational therapy assessment and intervention for a number of key reasons. The literature has established that the aging eye allows reduced amounts of light to reach the retina and that home lighting is well below recommended levels. It is also well documented that many persons with ocular disease require significant increases in lighting and some ocular diseases cause light sensitivity. Lindner and colleagues[10] found that more than 70 percent (54/76) of study participants used ceiling lights versus task lights as primary lighting sources for reading, and only 40 percent used additional task lighting. Given that older adults spend an average of 12 to 16 hours, or 80 percent of their day, in their own homes,[20] it is clear that home lighting is a critical area for occupational therapists to address.

Home Lighting Intervention: *Under counter task lighting (top); Ambient lighting – bedroom before and after (middle row); Lighting enhancement– bathroom (bottom left), hallway (bottom middle) and closet (bottom right)*

Lighting preferences are very individual, thus, assessment approaches should include objective and subjective assessment of visual comfort to determine optimal illumination.[15,17,21] Several standard measures include items related to home lighting. The Housing Enabler includes 180 items related to the physical home environment – two of which relate to outdoor lighting and illumination of walkways.[22] The Vision Version of the In Home Occupational Performance Evaluation (I-HOPE) includes assessment of quantity, position and direction of lighting, glare, color, contrast and light changes with day, night or season, however it is only available in French.[23] The Craig Hospital Inventory of Environmental Factors (CHIEF) is a

25-item questionnaire used to identify environmental barriers to participation. The CHIEF was created for large scale research purposes for use in the general population, but is not standardized for use with individuals with low vision.[24] Lighting is assessed in broad terms and is included along with other environmental factors such as noise and crowds. The Home Occupation Environment Assessment (HOEA) is a measure of home safety, and includes items related to physical accessibility, sanitation, proper food storage, general safety and lighting levels at the point of task.[25] Lighting levels are measured with a light meter at the location where the person reads, pays bills, prepares meals or performs other tasks of daily living.

EVIDENCE GUIDING COMPONENTS OF HOME LIGHTING ASSESSMENT

Existing measures do not fully assess the key elements that should be included in a home environment lighting assessment for older adults with low vision; the literature provides evidence that highlights components that should be incorporated. Certainly, the most obvious element to include is an objective measure of illumination. Recommended levels of illumination from IESNA[6] and other literature[7,8] can serve as a guide regarding optimal levels for specific diagnoses, such as macular degeneration.[11,12] Use of a light meter in the home environment will allow the low vision specialist to gather objective data about illumination levels. Glare intolerance and sources of direct and indirect glare should be included in a home lighting assessment. Glare reduces visual comfort and can be controlled with use of filters, window treatments, and covering reflective table and counter tops. Assessment of seating arrangement and positioning of reading material must be considered.[26] Qualitative aspects and comfort within the lighting environment are also important to assess. Four of the 18 study participants in Eldred's study[12] experienced discomfort and eye strain with use of high illumination levels for prolonged periods of time. Bowers, Meek and Stewart found that the ideal level of lighting determined by objective means was higher than levels determined by subjective preference, most likely because of greater visual comfort.[15] Eye strain, satisfaction with lighting environment, ability to tolerate prolonged periods of reading/near-task activity and overall comfort level should also be addressed when evaluating a home lighting environment. A new measure, the Home Environment Lighting Assessment (HELA), is currently being developed by the author and addresses each of these components. The HELA will be available within the coming year; those who are interested can contact the author.[27]

LIGHTING INTERVENTION STRATEGIES

A variety of texts and resources provide general guidelines for lighting intervention strategies which are very helpful, including *Lighting the Way: A Key to Independence* and *Low Vision Rehabilitation: Practical Guide for Occupational Therapists*.[28,29] These resources encourage us to consider overall room and task lighting, to increase the wattage, move the light closer, and reduce glare. For reading, the light should be positioned over the shoulder; for writing, position the light opposite the person's dominant hand. Lights should be dimmed to watch TV or use the computer; paths should be lit from the bed to bathroom door with nightlights. When proposing lighting modifications, clients should be given the opportunity to compare the effect of optimal and sub-optimal lighting.[30] In addition, clients should be allowed to compare their reading performance at different lighting levels because there is variability among individuals.[21] These techniques are logical, but are largely untested, with the exception of increasing light levels as previously described. Potential barriers to making lighting modifications include the resident's resistance to change, preference for a certain type of fixture or décor, limited financial resources to purchase lighting and lack of transportation to shop for fixtures.[29] Common concerns related to use of daylight as a means to boost lighting levels also exist. Older adults may prefer to keep their shades and blinds closed due to security reasons; blinds and shades may not work properly and others may experience discomfort from the glare or draft.[18]

In summary, it is important to assess home lighting in a comprehensive, objective fashion so that we can develop lighting intervention plans that are tailored to the individual.[12,31] Further research examining the efficacy of lighting modifications is warranted.

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Case Study: Doc, I Can See the Letters on Your Chart, But I Can't Read: Neuro-Rehabilitation Using the Visual Evoked Potential

Ronald Siwoff, OD, FAAO, DPL-ABO

The Visually Evoked Potential (VEP) is an objective measure of the functioning of the human visual system. It measures the strength of response to the signal (amplitude) as well as the time it takes for the signal to arrive at the primary visual cortex.[1-2] The VEP uses a computer to select electrical signals from the brain that originate from the eye. VEP has been used in the past, primarily with infants and young children, to determine if they have sight.[3-5] Now we find that the technology can reveal secrets of how the human visual system processes information.

The patient ("A.A.") presented with the complaint that she could not read. Distance VA was tested with The Original Distance Chart for the Partially Sighted, arranged by William Feinbloom, OD, PhD. Near VA was established with The Lighthouse Near Acuity Test (Second Edition), Modified ETDRS with Sloan Letters. The patient had sufficient acuities for reading small print. Yet, when she was given text of various sizes, she could not read text at any size, large or small. This finding prompted a VEP evaluation.

Gold cup electrodes (Grass Model F-E56 H Astro-Med Inc., West Warwick, R.I.) were applied to the scalp with EEG paste. The electrodes were placed 4 cm above the inion on midline and 4 cm above the brow on midline. The ground electrode was placed midway between the other electrodes. The impedance of the electrodes, measured prior to testing, was between 6 and 10 K-ohms.

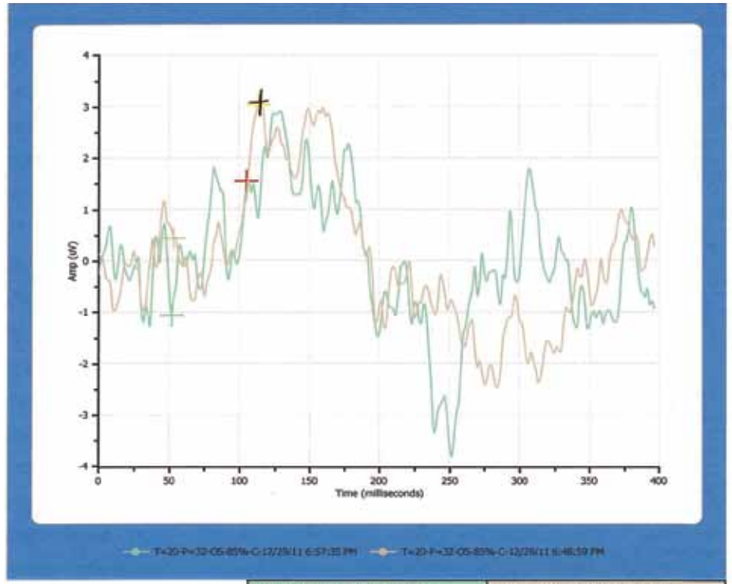
A Diopsys Enfant™ System (Diopsys Inc., Pine Brook, New Jersey, USA) was used with a checkerboard reversal pattern at 85% contrast viewed at one meter. First the check size with the biggest amplitude is selected.

128 X 128	4 cycles/degree
64 X 64	2 cycles/degree
32 X 32	1 cycles/degree
16 X 16	.533 cycles/degree

The contrast was set to Michelson 85%. The mean luminance was 66.25 cd/m^2. The checkerboard reversed at two per second. The testing time was 20 seconds.

Testing was performed monocularly with best corrected spectacle correction. The four check sizes were analyzed to determine which produced the largest amplitude. This check size was used four more times with ophthalmic trial frame prisms. The protocol used an 8 prism diopters, base up, base right, base down and base left. The N50, N75 and P100 were all identified. The amplitude was measured by subtracting the N50 from the P100. The orientation of the prism that resulted in the largest amplitude was selected. If two orientations resulted in large amplitudes, the prescribed orientation was placed between both original orientations. For example, if the signals peaked in the Base-In and Base-Up orientations, the prescribed prism for the patient was both BU and BI. If three orientations resulted in large amplitudes, the orientation was placed 180° away from the smallest amplitude. If there was no improvement, no prism correction was prescribed. In the case of "A.A.", 8 prism diopters was the size of prisms in both eyes. In other patients, other sizes of prisms are used, depending on a formula used with acuities. Although, in the case of "A.A.", the prism is the same in both eyes, i.e., same size and direction, this is not always the case; both eyes do not necessarily take the same prism.

The signal must arrive at the primary visual cortex by 100 msecs. If responses to signals are delayed, i.e., there is a latency in response, empty information arrives at Broca's area and, therefore, cannot be converted to language, which is necessary for reading and speech. One way to understand this is to think of a train leaving the station every 100 msec. If the train arrives late, empty boxcars will be sent to the next stop.



	T=20-P=32-OS-85%-C-12/29/11 6:57:35 PM	T=20-P=32-OS-85%-C-12/29/11 6:48:59 PM
Left Cursor	51.66 ms	53.33 ms
	-1.0 uV	0.43 uV
Right Cursor	105.0 ms	113.3 ms
	1.54 uV	3.04 uV
Delta	53.33 ms	60.00 ms
	2.60 uV	2.61 uV
Eye	OS	OS
CheckSize	32	32
Test Time	20	20
Contrast	85	85
Pattern	Checkerboard	Checkerboard
Binasal	N	N
Correction	Y	N
Comments	8 base down	

DIOPSYS

RESULTS

When tested with only the conventional correction, the patient, "A.A.", demonstrated significant latencies in right and left eyes. Prisms decreased latencies in both eyes. The right eye went from 110.0 to 101.6 msecs, and the left eye went from 113.3 to 105.0 msecs. Once prism was added to the correct refraction, "A.A." could read normal print easily.

IMPRESSIONS AND CONCLUSION

Our ongoing research with a large sample of patients has demonstrated that ophthalmic prisms can change VEP amplitudes and latencies and improve visual acuity and function over and above conventional spectacle prescriptions. This method has applications for anyone with mild to severe alexia caused by cortical damage or optic nerve disease.* Our outcomes suggest that when responses to signals are delayed, Broca's area cannot process the information needed to convert the signals into words and sentences, and therefore reading effectively is not possible.

PATIENT OCULAR HISTORY

Patient ID:	“A.A.” 91 YO WF		
Occupation:	Retired executive secretary		
CC:	Cannot read		
DHx:	Age-related macular degeneration, cataracts removed in both eyes		
MHx:	Hypertension, mild dementia, colon cancer		
Allergies:	Scallops, aspirin		
VA Without Rx:	OD	10/20-3	1.25M-1
	OS	10/20-1	1.25M-1
VA With Rx:	OD	10/20-3	.8M
	OS	10/20-3	.8M
Refraction:	OD	+1.25 = -2.50 X 90	10/20
	OS	+0.50 = -2.00 X 105	10/20
		ADD +6.00	OD .63M
			OS .8M
IOP:		OD	15 mm Hg
		OS	15 mm Hg

Retina Evaluation:

OD – The cup/disc ratio was .3. Margins were clear. Peripapillary atrophy was noted. RPE atrophy was noted in the macula. The vein/artery ratio was 2/1. Atherosclerosis was noted. No holes, tears, atrophy or degeneration was noted in the peripheral retina to the ora serrata.
OS – No significant difference from OD observed.

Anterior Segment Evaluation:

OD – The cornea was clear. Arcus senilis was noted 360° around the limbus. No staining with fluorescein was noted. No cell or flare was noted. A well-positioned posterior intraocular lens was noted. The peripheral lens capsule was opacified.
OS – No significant difference from OD observed.

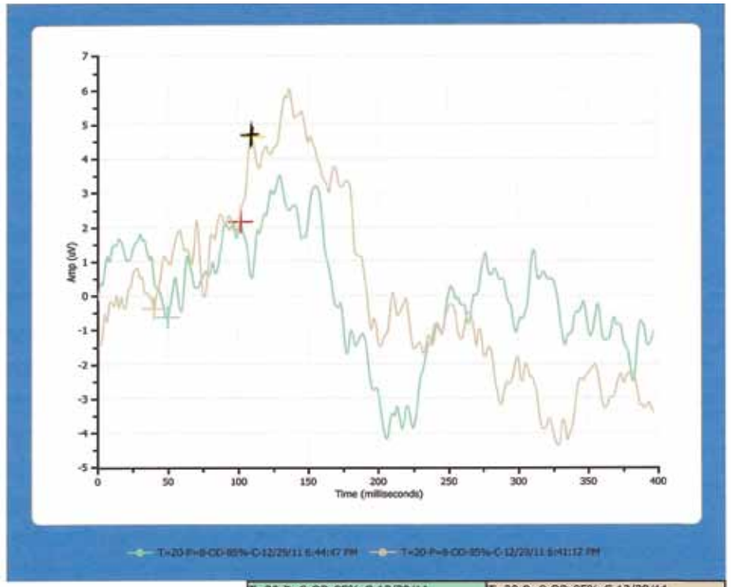
Visual Evoked Potential Evaluation Without Prisms: Abnormal

P-100	OD	110.0
	OS	113.3

Visual Evoked Potential With Prisms:

P-100	OD	101.6
	OS	105.0

Final Rx With Prisms:	OD	+1.25 = -2.50 X 90, 8 PD, DN
	OS	+0.50 = -2.00 X 105, 8 PD, DN
		ADD: +6.00



	T=20-P=8-OD-85%-C-12/29/11 6:44:47 PM	T=20-P=8-OD-85%-C-12/29/11 6:41:12 PM
Left Cursor	50.00 ms	40.00 ms
	-0.6 uV	-0.3 uV
Right Cursor	101.6 ms	110.0 ms
	2.14 uV	4.63 uV
Delta	51.66 ms	70.00 ms
	2.78 uV	5.02 uV
Eye	OD	OD
CheckSize	8	8
Test Time	20	20
Contrast	85	85
Pattern	Checkerboard	Checkerboard
Binasal	N	N
Correction	Y	N
Comments	8 base down	

DIOPSYS

Dr. Siwoff is a member of the National Physician’s Advisory Board, from which he received the 2004 Physician of the Year award. Other awards for his service to the blind and visually impaired community include the Outstanding Scientific Achievement award from the New Jersey Society of Optometric Physicians and the New Jersey Department of Human Services award for Outstanding Accomplishments and Contributions to the Blind and Visually Impaired Community. Prior to his present position as Director of the Siwoff Low Vision Center, Dr. Siwoff was Clinical Assistant Professor of Ophthalmology at the University of Medicine and Dentistry of New Jersey, where he directed the Low Vision Clinic. He later became Director of the Gerald E. Fonda Low Vision Center at Saint Barnabas Hospital in Livingston, New Jersey. Dr. Siwoff holds several patents for technologies to improve the vision of the visually impaired. He has conducted joint research with the NIH and Harvard Medical School.

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2. Sokol S. Visually evoked potentials: theory, techniques and clinical applications. *Surv Ophthalmol* 1976 Jul-Aug;21(1):18-44.
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5. Wygnanski-Jaffe T, Panton CM, Buncic JR, Westall CA. Paradoxical robust visual evoked potentials in young patients with cortical blindness. *Doc Ophthalmol* 2009; 119(2):101-7. Epub 2009 Jun 23.

**The author is preparing a full-length research paper on these results of evolved technical application of VEP.*

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Guest: $100

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Low Vision Grand Rounds – Research on Contact Lenses. Wichita, KS. CE – ACCME, AOTA, COPE

November 9, 2012

Assistive Technology. Wichita, KS. CE – ACVREP, AOTA, CRCC, COPE

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