# ILLINOIS COLLEGE OF OPTOMETRY

## 2012 RESEARCH PRESENTATIONS

### TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>AOA</th>
<th>AAO</th>
<th>ARVO</th>
<th>COVD</th>
<th>WCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLOBAL SPECIALTY LENS SYMPOSIUM</td>
<td>INT. AGENCY FOR THE PREVENTION OF BLINDNESS</td>
<td>INT. BRAIN INJURY ASSOCIATION</td>
<td>INT. SOCIETY FOR EYE RESEARCH</td>
<td>SOCIETY FOR NEUROSCIENCE</td>
</tr>
</tbody>
</table>

[Click each title to explore]
AOA

28 ICO PRESENTATIONS
This study looked at the reading rates of children prior to a reading fluency training program to improve overall reading performance. A King Devick computer therapy (KDCT) program has been recently developed and used in Chicago, a predominantly African American K-8 school system, to serve as a potential saccadic therapy for reading. The King-Devick (K-D) test, is a widely used clinical test that assesses whether the speed and accuracy of saccadic eye movements is age-normal. Many studies have reviewed the reliability and repeatability of this test on children. A King Devick computer therapy (KDT) program has been recently developed and was used in this study as a potential saccadic therapy program to improve overall reading performance. This study looked at the reading rates of children prior to and after undergoing King Devick computer therapy (KDT).

**METHODOLOGY**

Students in grades 2-4 from the St. Elizabeth School in Chicago, a predominantly African American K-8 school, were screened through a comprehensive eye examination. All patients requiring refractive correction were assigned to limited saccadic vision. The King Devick Test (K-D Test) of Ocular Motility was administered.

A total of 17 subjects of 45 who failed the K-D Test were entered into the study. A web-based reading evaluation, the Scholastic Fluency Formula Assessment System, was administered to subjects to serve as a measure of baseline and post-treatment reading performance. Fluency was measured as a function of the reader’s speed and accuracy. The reader’s speed referred to how many words were read per minute (WPM) while accuracy pertained to detecting errors such as mispronunciation and word omission. Of the 17 subjects, 14 were placed in the treatment group while the remaining 3 were assigned to placebo therapy. All subjects were masked while examiners conducted the testing groups (e.g. comparison of 1st graders to 1st graders, 2nd graders to 2nd graders and so on). The placebo group was presented with individual numbers positioned in the center of the computer screen, which did not move, and the subjects were asked to verbalize the number. As subjects in the training group improved, the speed of rapid number presentation was regularly increased.

**RESULTS**

At the conclusion of the study, the placebo group had a mean word improvement of 3.13 words as compared to N = 3.02 words in the treatment group (p = 0.045) and sub-group analysis of grades 2 and 3 showed a mean word improvement of 21.84 among the treatment group as compared to 12.81 for the placebo group (p = 0.0247). Class Results between pre-therapy WPM compared to post-therapy WPM are found in Figure 2.

**CONCLUSION**

The results of this pilot study show a significant improvement in reading fluency among individuals who underwent RNN therapy as compared to placebo. Limits of our study include a relatively small sample size and limited segmentation of the study groups. Future investigation should have a larger sample size and with grade-based segmentation of the testing groups (e.g. comparison of 1st graders to 1st graders, 2nd graders to 2nd graders and so on). This study also suggests that RNN therapy may be most effective when applied to younger age groups with documented eye tracking inefficiencies. The relationship between reading fluency and comprehension has been documented and additional research into improved comprehension with saccadic training should also be investigated. **REFERENCES**

1. Krumholtz, I. “Results From a Pediatric Vision Screening and Its Ability to Predict Academic Performance.” Optometry no. 73 (2001): 400-401
Septo-optic Dysplasia Diagnosed in a Teenage Female

Andria M. Pihos, OD & Wendy Haaland Stone, OD
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL

Table of Contents

BACKGROUND
Septo-optic dysplasia (SOD), also known as de Morsier syndrome, is a rare congenital anomaly that is associated with a combination of optic nerve hypoplasia (ONH), midline brain defects, and pituitary hormone abnormalities with subsequent endocrine deficits. ONH may be unilateral, or more commonly bilateral, and is often the first presenting feature. The midline neuroradiological abnormalities include agenesis of the septum pellucidum, absence of the septum pellucidum or both. The endocrine deficits include hypopituitarism and 60% have an absent septum pellucidum. The reported incidence of SOD is 1/10,000 live births. The diagnosis of SOD is usually made clinically when two or more of these features are present, however it is a phenotypically variable disorder in which any of the features can occur in isolation or in combination with one another. 30% of SOD patients have manifestation of the complete triad of signs, while 62% have hypopituitarism and other more recently identified associations with ONH are independent of septum pellucidum development. Borchert concludes that agenesis of the septum pellucidum is detected accidentally in most cases and that this association is the least significant and least prognostic of ORH’s associated abnormalities. The pathogenesis of SOD is likely an early prenatal event that an undiagnosed case presents. Facilitation of early diagnosis could minimize the additional neuro-ophthalmic consult, disc photos and an MRI. Nonetheless, some degree of visual impairment is expected in patients with SOD. In cases where SOD has been identified, it is likely that an eye doctor may be the first to recognize and associate the absence of a septum pellucidum, as is consistent with the diagnosis of septo-optic dysplasia. (See Figures 3 and 4.)

DISCUSSION
The etiology of septo-optic dysplasia is unknown. The majority of SOD cases occur sporadically and a variety of theories have been proposed to account for the pathogenesis of SOD. The potential abnormalities found in SOD all involve structures of the forebrain that develop from the anterior neural plate. Any insult occurring at 4-6 weeks gestation during the critical period of morphogenesis for the anterior neural plate could account for the features of SOD. Both genetic and environmental factors have been thought to play a causative role in the disorder. Proposed etiologies include environmental teratogens and viral infections. The pathologies of SOD's have also been reported to be associated with reduced maternal age. A number of familial cases have led to the identification of mutations in key developmental genes, which suggests a genetic cause is possible. However, any genetic diagnosis has only been identified in a small minority of cases. The interaction between genetic and environmental factors is demystified by variable phenotypes and penetration of patients with SOD.

CONCLUSION
Septo-optic dysplasia is associated with multiple congenital abnormalities and is often diagnosed in infancy; however, it can go undiagnosed until growth failure occurs. As demonstrated with this patient, an eye doctor may be the first to recognize and associate some of the features in order to make a diagnosis of SOD. In cases where SOD has been identified, it is likely for patients to seek eye care for their varying degrees of visual impairment. Optometrists need to be aware of this condition and have an understanding of the multi-disciplinary approach to its management in the event that an undiagnosed case presents. Facilitation of early diagnosis could minimize the additional neurodevelopmental burden placed on a patient with untreated hormonal abnormalities and reduce the risk of less common, but potentially fatal, features such as hypoglycemia and adrenal crisis.

REFERENCES

CASE SUMMARY
A 19 year-old developmentally delayed, short-statured female presented for an eye exam with complaints of longstanding poor vision with use of a spectacle prescription since infancy. Medical history revealed a phenotypically variable disorder in which any of the features can occur in isolation or in combination with one another. 30% of SOD patients have manifestation of the complete triad of signs, while 62% have hypopituitarism and other more recently identified associations with ONH are independent of septum pellucidum development. Borchert concludes that agenesis of the septum pellucidum is detected accidentally in most cases and that this association is the least significant and least prognostic of ORH’s associated abnormalities. The pathogenesis of SOD is likely an early prenatal event that an undiagnosed case presents. Facilitation of early diagnosis could minimize the additional neuro-ophthalmic consult, disc photos and an MRI. Nonetheless, some degree of visual impairment is expected in patients with SOD. In cases where SOD has been identified, it is likely that an eye doctor may be the first to recognize and associate some of the features in order to make a diagnosis of SOD. In cases where SOD has been identified, it is likely for patients to seek eye care for their varying degrees of visual impairment. Optometrists need to be aware of this condition and have an understanding of the multi-disciplinary approach to its management in the event that an undiagnosed case presents. Facilitation of early diagnosis could minimize the additional neurodevelopmental burden placed on a patient with untreated hormonal abnormalities and reduce the risk of less common, but potentially fatal, features such as hypoglycemia and adrenal crisis.

Figure 1: Right optic nerve hypoplasia
Figure 2: Left optic nerve hypoplasia
Figure 3: Absence of the septum pellucidum on a T2 weighted coronal MRI
Figure 4: Absence of the septum pellucidum on a T1 weighted axial MRI

CONTACT INFORMATION
Andria Pihos, O.D.
3241 S. Michigan Ave
Chicago, IL 60616
ophth@ico.edu
www.ico.edu
BACKGROUND
The most common tumors of the ocular surface are corneal and conjunctival intraepithelial neoplasia (CIN). Depending on geographic location, the incidence of occurrence ranges from 0.13-1.9 per 100,000 people. Clinical features include leukoplakic or gelatinous lesions with associated feeder vessels. Corneal findings appear granular or frothy in either large geographic pattern or smaller island-like patches. These lesions are slowly progressive and very rarely develop into malignant squamous cell carcinomas. Newer diagnostic equipment, such as Anterior Segment Optical Coherence Tomography (AS-OCT), can help localize the lesions, although currently there are no studies or literature of using OCT to follow CIN treatment. The OCT image would show a thickened hyper-reflectivity of the epithelial layer. Treatment includes excision followed by adjunctive treatment of cryotherapy, radiation or chemotherapies. The most common adjunctive therapies today are mitomycin-C, 5-fluorouracil and interferon-α-2b (INFα2b).

CASE REPORT:
A 39-year-old Caucasian male presented for a corneal consult. The patient had seen two corneal specialists prior to his visit with no clear diagnosis. A detailed history revealed no systemic health conditions and no studies or literature of using OCT to follow CIN treatment. The pathology report received stated: Squamous hyperplasia with viroplastic (human papillomavirus) features. The patient was prescribed INFα2b 1ml/400 units/mL four times a day and was followed on a two to three week basis. After one month of INFα2b the corneal lesion was reduced to 0 from 1.5mm and one month later the lesion had completely resolved. Repeat topographic imaging showed normalization of the astigmatism with no inferior steepening. The pathology report stated: Squamous hyperplasia with viroplastic (human papillomavirus) features.

REFERENCES
- Pe’er, Jacob. Neoplasia in India - Most mitosis occurring in the limbal region. Geographic pattern or smaller island-like patches. Granular or frothy appearance. Leukoplakic or gelatinous lesion. Proliferation of epithelial cells. Several years of follow up. Intraepithelial neoplasia using ultra high-resolution optical coherence tomography. Bascom Palmer Eye Institute, Miller School of Medicine, University of Miami, Miami, Florida, USA. Ophthalmology. 2011 Aug;118(8):1531-7. Epub 2011 Apr 20.
- Guru Prasad Manderwad, MS; Chitra Kannabiran, PhD; Santosh G. Honavar, MD; Geeta K. Vemuganti, MD, DNB. Lack of Association of High-Risk Human Papillomavirus in Ocular Surface Squamous Neoplasia in India. Arch Pathol Lab Med—Vol 133, No 10 Oct 2009
- Priy, Jacob. Ocular Surface Squamous Neoplasia. Dept of Ophthalmology, Hadassah University
**Visual Findings in Waardenburg Syndrome**


Illinois College of Optometry/Illinois Eye Institute
Chicago, IL

**BACKGROUND**

Waardenburg Syndrome is a rare autosomal dominant condition with a prevalence of ~1/40,000-1/50,000. There are four variations (See Table 1), with Type I and II occurring most commonly. The major signs of Waardenburg Syndrome are sensorineural hearing loss, iris pigmentary changes, and dystopia canthorum. Other signs can include mental retardation, a broad nasal root, underdevelopment of the wings of the nose, hypopigmentation, and dystopia canthorum. The older child exhibited bright blue irides OU, compound hypertrophic astigmatism OU, orthophoria, accommodative insufficiency, and had a history of Attention Deficit Hyperactivity Disorder. Figures 3 & 4 show her appearance, especially the strikingly bright blue irides. While the other child had dark brown irises OU, hypertropia OU, an intermittent exotropia of 17 pt at distance and 35 pt at near, and a history of spina bifida. Figures 5 & 6 show her appearance. Anterior and posterior ocular health was normal in all 3 girls. The girls were given refraction correction to enhance their classroom abilities and vision therapy was recommended for the exotropia and accommodative insufficiencies. The pertinent exam findings for all 3 children can be found in Tables 1-4.

**CONCLUSION**

Waardenburg Syndrome is a rare condition that can affect both the hearing and the visual system. While most published reports have examined the genetics of the condition and treatment options for the hearing loss, awareness of possible connections to eye postural issues, accommodative issues, and refractive issues overall need to be further investigated. The importance of good visual care in any patient with a history of a deficit in the other senses cannot be overlooked, and any enhancements to the visual system can improve their overall quality of life significantly.

**CASE SUMMARY**

These African-American female siblings ages 5, 6, and 8 were brought to the clinic for comprehensive eye exams. All three had histories of their mothers smoking throughout the pregnancies, prematurity, and learning disabilities. The youngest child did not have a diagnosis of Waardenburg syndrome, but did have hypotropia and convergence excess, as well as a history of a shunt. While the youngest child did not have any hearing loss, she spoke infrequently and was said to be extremely shy and quiet around strangers. Figures 1 & 2 show her appearance. The older two were both diagnosed with Waardenburg Syndrome, and both had sensorineural hearing loss, a broad nasal root, and dystopia canthorum. The older child exhibited bright blue irises OU, compound hypertrophic astigmatism OU, orthophoria, accommodative insufficiency, and had a history of Attention Deficit Hyperactivity Disorder. Figures 3 & 4 show her appearance, especially the strikingly bright blue irides. While the other child had dark brown irises OU, hypertropia OU, an intermittent exotropia of 17 pt at distance and 35 pt at near, and a history of spina bifida. Figures 5 & 6 show her appearance. Anterior and posterior ocular health was normal in all 3 girls. The girls were given refraction correction to enhance their classroom abilities and vision therapy was recommended for the exotropia and accommodative insufficiencies. The pertinent exam findings for all 3 children can be found in Tables 1-4.

**Table of Contents**
References

Optometry School Graduates Self Perception of Confidence Upon Graduation and 1 Year Later: Does Residency Training Truly Increase Confidence?

**PURPOSE**

Optometry students decide to pursue a postgraduate residency program for a variety of reasons; to increase knowledge base; improve proficiency in optometric procedures; gain exposure to a specific area of specialty; have the opportunity to teach, lecture and supervise student interns; gain an advantage in an increasingly saturated job market; or increase the likelihood to subsequently enter academic or hospital based care. Bartlett and colleagues found that 85% of graduates had selected residency education to enhance their clinical skills. Additionally, there is also the anecdotal belief that the additional year of training will boost the self-confidence level of a new graduate. Self-confidence is an attitude that allows individuals to have a positive and realistic perception of themselves and their abilities. Naturally this type of self-reflection can impact career choice, performance and success.

**METHODS**

A seven question Zoomerang survey (Fig 1) was sent to 155 members of the ICO Class of 2010 in order to assess their level of self-confidence in their patient care and management skills upon graduation and again after one year in various modes of practice. 19.6% of this class was accepted into a residency program.

**RESULTS**

40 of 155 surveys were completed (25.8%). Of the 40 respondents, 7 had pursued a residency, mostly in Primary Care/Ocular Disease (66.7%) with the others split evenly between Cornea and Contact Lens and Low Vision/Vision Rehabilitation. Upon graduation, these 7 rated themselves primarily as Often Confident (71.4% from 14.3%), while those who had entered a different mode of practice (optometric, ophthalmological, commercial based or hospital setting) had a much smaller shift to Very Often Confident (36.4% from 24.2%). (Fig 2) The majority of graduates who did not enter a residency program were employed by commercial optometry (37.5%), followed by private group optometric practice (34.2%); private optimistic group practice (9%), and hospital or academic based practice (5%). (Fig 2) When broken down by gender, females were more likely to enter commercial practice (71.7% versus 35.7%) and males were more likely to enter private optimistic group practice (42.4% versus 15.5%).

Gender also appears to be a factor in the graduates’ level of self-confidence; only female students felt Rarely Confident (20.8%) upon graduation and were less likely to report feeling Very Often Confident as compared to their male colleagues after one year in practice (33.3% vs. 56.3%). (Fig 4)

Interestingly, one year later, the residency trained members of the class had a significant shift to Very Often Confident (71.4% from 14.3%), while those who had entered a different mode of practice (optometric, ophthalmological, commercial based or hospital setting) had a much smaller shift to Very Often Confident (36.4% from 24.2%). (Fig 2) The majority of graduates who did not enter a residency program were employed by commercial optometry (37.5%), followed by private group optometric practice (34.2%); private optimistic group practice (9%), and hospital or academic based practice (5%). (Fig 2) When broken down by gender, females were more likely to enter commercial practice (71.7% versus 35.7%) and males were more likely to enter private optimistic group practice (42.4% versus 15.5%).

Gander also appears to be a factor in the graduates’ level of self-confidence; only female students felt Rarely Confident (20.8%) upon graduation and were less likely to report feeling Very Often Confident as compared to their male colleagues after one year in practice (33.3% vs. 56.3%). (Fig 4)

Interestingly, one year later, the residency trained members of the class had a significant shift to Very Often Confident (71.4% from 14.3%), while those who had entered a different mode of practice (optometric, ophthalmological, commercial based or hospital setting) had a much smaller shift to Very Often Confident (36.4% from 24.2%). (Fig 2) The majority of graduates who did not enter a residency program were employed by commercial optometry (37.5%), followed by private group optometric practice (34.2%); private optimistic group practice (9%), and hospital or academic based practice (5%). (Fig 2) When broken down by gender, females were more likely to enter commercial practice (71.7% versus 35.7%) and males were more likely to enter private optimistic group practice (42.4% versus 15.5%).

Gender also appears to be a factor in the graduates’ level of self-confidence; only female students felt Rarely Confident (20.8%) upon graduation and were less likely to report feeling Very Often Confident as compared to their male colleagues after one year in practice (33.3% vs. 56.3%). (Fig 4)

**CONCLUSION**

While a small sampling, this survey appears to justify the widely held belief that a post-graduate optometric residency improves the self-perceived confidence in patient care and management skills of the new graduate. It also determined that women were less likely to be self-confident than their male counterparts upon graduation. This survey was sent to the Illinois College of Optometry Class of 2011 upon graduation and will be resent in June 2012 to determine if their responses are consistent with their predecessors and to increase the sample size for statistical analysis.

**REFERENCES**


Penicillin G is the treatment of choice for ocular and neuro-syphilis. Although alternate treatments (i.e. azithromycin, tetracycline, doxycycline, ceftriaxone) are available, they are considered to be less effective at eradicating syphilitic infection.

Penicillin G allergy amongst the general population is supported to be 10%; however the rate of self-reported PCN allergy is considerably higher than the rate of individuals with positive skin testing. Skin testing is properly performed with both major and minor PCN determinants and indicates whether IgE-mediated hypersensitive response is expected. For PCN allergic patients with positive skin testing, drug desensitization is recommended.

Drugs desensitization involves stepwise introduction of sub-therapeutic doses of the offending medication under medical supervision until therapeutic levels are reached. After therapeutic levels are reached, the patient was released and treated via PICC line for fourteen days with 24 M units/day of PCN G K. Following PCN treatment, the patient was referred and admitted for IV PCN G desensitization PCN treatment. After therapeutic levels of PCN were reached, the patient was released and treated via PICC line for fourteen days with 24 M units/day of PCN G K. Following PCN treatment, the patient was referred and admitted for IV PCN G desensitization PCN treatment. After therapeutic levels of PCN were reached, the patient was released and treated via PICC line for fourteen days with 24 M units/day of PCN G K.

Blood work was ordered to help rule out systemic causes. RPR and MHA-TP were negative. During the clinical evaluation and diagnostic evidence of active ocular syphilis. The patient was referred and admitted for IV PCN G K. Following PCN treatment, the patient was referred and admitted for IV PCN G desensitization PCN treatment. After therapeutic levels of PCN were reached, the patient was released and treated via PICC line for fourteen days with 24 M units/day of PCN G K. Following PCN treatment, the patient was referred and admitted for IV PCN G desensitization PCN treatment. After therapeutic levels of PCN were reached, the patient was released and treated via PICC line for fourteen days with 24 M units/day of PCN G K.

After determining whether the cause of ocular inflammation is syphilis, patients self-reporting PCN allergy should be asked specific case history questions concerning continuous IV infusion pump as well as protocols have been described in the literature concerning continuous IV infusion pump as well as a combined protocol of oral, subcutaneous, and intramuscular methods of administration.

As the incidence of syphilis is rising, it is important to keep in mind all options regarding treatment, even those that may have more inherent risks due to drug hypersensitivity.

REFERENCES

Erica A. Ittner, O.D.
Illinois College of Osteopathic/Nikon Eye Institute
Contact Information
www.ico.edu
Low Vision Rehabilitation for Homonymous Hemanopsia secondary to Cerebrovascular Accident to the right Occipital lobe

Faheemah Saeed, O.D., F.A.A.O.
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL

INTRODUCTION

Many systemic conditions can lead to a homonymous hemianopiaVF defect. These include ischemia, stroke, tumors, anomalies, migraine and vascular malformations. Congruent VF loss compensation may only be achieved either by field expansion via peripheral mobility as this primary concern. He may have used field expansion via peripheral mobility as this primary concern. He may have used field relocation with binocular prisms. The VF relocation by prismatic corrections for hemianopia only work when the patient is looking into the prism. The Expansion Prism (EP) fitting technique as described by E Peli was utilized for the patient being reported here. This method employs a peripheral monocular sector prism, which is restricted to the upper and lower peripheral fields. It extends across the entire lens and is hence effective in any gaze. Other tools for low vision rehabilitation for this patient included yellow filters, typoscopes and a low power LED hand held magnifier.

CASE REPORT

A 62-year-old African American male presented with a complaint of a VF defect on the left side and a history of a CVA that had happened one year ago. Confrontation visual field testing revealed a Left homonymous hemianopia. He had central diplopia due to an esotropia. Prisms were fitted unilaterally on the side of the hemianopia. The base of prism is directed toward the field loss. Prisms are fitted unilaterally, on the side of the hemianopia.

Nearpoint Estimation Assessment:
Uncorrected, patient read 0.45 BM on the Light house near vision test reading speed was “choppy”, often missing the first couple of words in each sentence. He also complained of diplopia. The introduction of prisms was required to read 0.45/46 with near. A study eye was also fitted to demonstrate a trial for expanded reading tasks. The use of low vision devices help the “blindfolded” and not just by magnification.

Binoculars are not the best option in this case. Reading-only glasses are a good alternative to the use of binoculars. Bifocals and progressive lenses are an alternative to provide good illumination.

Assessment with Non-optical devices:
The use of typoscopes was demonstrated to introduce another device to assist in tracking position on the page. Typoscopes eliminate “crossing over” and reading backwards and background glare. Patients with visual field loss, especially those with a hemianopic deficit, have poor sacades and pursuits and benefit from tools that provide feedback.

Assessment with Filters:
Light yellow filter was demonstrated to patient for indoor use to enhance perceived brightness and contrast. The patient appreciated the tint and the tint was ordered over his habitual distance-only Rx.

Visual Field Testing:
Automated (Octopus) VF test results confirmed a left sided homonymous hemianopsia with macular splitting (see Figure 1).

Monocular Sector E. Peli Prism Correction:
The patient was fitted with the Monocular sector prism, as suggested by E Peli (see Figure 2). The horizontal EP system, is resistant to the upper and lower peripheral fields. The prism was fitted with central diplopia was effective in any gaze. 40∆ prism on fellow prism was fitted with the patient looking straight ahead. The prism was fitted with central diplopia was (~12mm) so that the prism did not interfere with central vision during normal head bobbing, leading to central diplopia.

Monocular Sector E. Peli Prism Correction:
The patient was fitted with the Monocular sector prism, as suggested by E Peli (see Figure 2). The horizontal EP system, is resistant to the upper and lower peripheral fields. The prism was fitted with central diplopia was effective in any gaze. 40∆ prism on fellow prism was fitted with the patient looking straight ahead. The prism was fitted with central diplopia was (~12mm) so that the prism did not interfere with central vision during normal head bobbing, leading to central diplopia.

Visual Field Testing:
Automated (Octopus) VF test results confirmed a left sided homonymous hemianopsia with macular splitting (see Figure 1).

Monocular Sector E. Peli Prism Correction:
The patient was fitted with the Monocular sector prism, as suggested by E Peli (see Figure 2). The horizontal EP system, is resistant to the upper and lower peripheral fields. The prism was fitted with central diplopia was effective in any gaze. 40∆ prism on fellow prism was fitted with the patient looking straight ahead. The prism was fitted with central diplopia was (~12mm) so that the prism did not interfere with central vision during normal head bobbing, leading to central diplopia.

Monocular Sector E. Peli Prism Correction:
The patient was fitted with the Monocular sector prism, as suggested by E Peli (see Figure 2). The horizontal EP system, is resistant to the upper and lower peripheral fields. The prism was fitted with central diplopia was effective in any gaze. 40∆ prism on fellow prism was fitted with the patient looking straight ahead. The prism was fitted with central diplopia was (~12mm) so that the prism did not interfere with central vision during normal head bobbing, leading to central diplopia.

Instructrions/Training for using the Monocular prism:
- The patient was instructed to look centrally only through the carrier lens, and not through the prism.
- With the patient looking straight ahead, a target was presented in the field exclusion area. When the prism patient was aware of the target, he was asked to rotate his head to look straight at the target, through the prism-free area.
- Central diplopia was demonstrated by adding prism to move his head so that he was looking directly through the prism at the target. It was explained that central diplopia should be avoided.

After trying the EP horizontal system for 4 weeks, the patient reported that he was having less difficulty with mobility and was better able to avoid obstacles. The prism system provided cues that made him turn his head towards objects on his right side. The temporary design helped increase awareness of his surroundings in unfamiliar places. Octopus dynamic VF test was repeated to measure the horizontal field expansion across the midline. A 100 expansion was measured in this case (see Figure 1).

DISCUSSION

Low vision rehabilitation is as much an art as it is a science. Engineers and computer programmers are very good at finding out how light falls on an object. But it is the human eye that really makes sense of it. The brain can detect objects even when they are in the blind spot. One reason is that the brain has a mechanism for detecting objects that are in the blind spot. Another reason is that the brain has a mechanism for detecting objects that are in the blind spot. Patients with visual field loss, especially those with a hemianopic deficit, have poor sacades and pursuits and benefit from tools that provide feedback.

REFERENCES

CONCLUSIONS

This case illustrates an example of success with the Expansion Prism (EP) system. Extensive patient education and rehabilitation training that extends over weeks allows subjects to progress to successful results and acceptance of the prism correction.

CONTACT INFORMATION

Faheemah Saeed, O.D., F.A.A.O.
Illinois College of Optometry/Illinois Eye Institute
3241 S. Michigan Ave
Chicago, IL 60616
fsaeed@ico.edu

Table of Contents
Orbital Metastatic Disease

Heather McLeod OD, FAAO

Illinois College of Optometry/Illinois Eye Institute

Orbital metastatic disease is associated with a poor prognosis. The prognosis of the orbital metastases depends on the nature and the dissemination of the primary cancer. Median survival is reported between several months to several years. Death is generally due to the systemic progression of the disease. Due to the poor prognosis of these patients, most orbital metastases are treated palliatively. The goal is achieving patient comfort and preserving vision when possible. In case of pain and are comfortable may be observed while treating the primary cancer. When quality of life is affected treatment must be instituted.

Management of orbital metastases requires a multidisciplinary approach. It is necessary to consult with the treating oncologist to inform them of the ocular findings. It is also important when delivering grim news to direct patients toward counseling. Patients can be made aware of this service when you are educating them about their condition. The patient declined counseling when offered by the social worker. She was made aware that if she changed her mind it was available at any time. She was also provided with a referral to Cancer Care, a nonprofit organization that provides free support services. The patient’s oncologist was contacted and updated on the findings. He reported that the patient had been in denial over her disease for some time. She had been receiving monthly treatment of Zometa which is indicated for the treatment of bone metastases. It is a third generation bisphosphate that helps to prevent osteolytic bone reabsorption by binding to the bone. Zometa’s inhibition of osteoclast activity helps to reduce or delay bone complications from metastases such as fractures and hypercalcemia. The oncologist decided to treat her palliatively with radiation.

Graves’ Disease
- most common cause of proptosis
- unilateral/proptosis
- extraocular muscle restrictions
- pain
- lid edema
- conjunctival injection
- diagnosis of exclusion

Orbital Cellulitis
- pain
- extraocular muscle restrictions
- periorbital swelling
- lid retraction
- bilateral, can be asymmetric

Grave’s Disease
- pain
- extraocular muscle restrictions
- globe displacement
- unilateral, proptosis
- swollen and erythema of outer third of upper lid

Lacrimal Gland Tumor
- pain
- conjunctival injection
- eyelid edema

CONTACT INFORMATION
Heather McLeod OD, FAAO
341 S. Michigan Ave
Chicago, IL 60616
hemcleod@ico.edu
www.ico.edu

CONCLUSIONS
Orbital metastases are uncommon and are usually associated with advanced disease. This case demonstrates the importance of considering orbital metastases in the differential diagnosis in patients who present with orbital disease.

DIFFERENTIAL DIAGNOSIS
- Orbital Neoplasm
  - principle concern with h/o cancer
- Orbital Inflammatory Disease
  - conjunctival injection
  - eyelid edema
  - pain
- Orbital Cellulitis
  - pain
  - extraocular muscle restrictions
  - periorbital swelling
  - lid retraction
- Orbital Metastatic Disease
  - most common cause of proptosis
  - bilateral, can be asymmetric
  - lid edema
  - periorbital swelling
  - extraocular muscle restrictions

DISCUSSION
Metastatic disease to the orbit is associated with a poor prognosis. The prognosis of the orbital metastases depends on the nature and the dissemination of the primary cancer. Median survival is reported between several months to several years. Death is generally due to the systemic progression of the disease. Due to the poor prognosis of these patients, most orbital metastases are treated palliatively. The goal is achieving patient comfort and preserving vision when possible. Patients who have normal visual function and are comfortable may be observed while treating the primary cancer. When quality of life is affected treatment must be instituted.

Management of orbital metastases requires a multidisciplinary approach. It is necessary to consult with the treating oncologist to inform them of the ocular findings. It is also important when delivering grim news to direct patients toward counseling. Patients can be made aware of this service when you are educating them about their condition. The patient declined counseling when offered by the social worker. She was made aware that if she changed her mind it was available at any time. She was also provided with a referral to Cancer Care, a nonprofit organization that provides free support services.

The patient’s oncologist was contacted and updated on the findings. He reported that the patient had been in denial over her disease for some time. She had been receiving monthly treatment of Zometa which is indicated for the treatment of bone metastases. It is a third generation bisphosphate that helps to prevent osteolytic bone reabsorption by binding to the bone. Zometa’s inhibition of osteoclast activity helps to reduce or delay bone complications from metastases such as fractures and hypercalcemia. The oncologist decided to treat her palliatively with radiation.

BACKGROUND
Orbital metastases are unusual, occurring less frequently than metastases to other sites of the body due to the small amount of blood that travels to the orbit. They most frequently metastasize from primary cancers of the breast, lung, and prostate. The clinical signs of orbital metastases are the same as those associated with other orbital disease; the most common presenting signs being proptosis and ocular motility disturbances. Unfortunately, metastatic orbital disease is associated with a poor prognosis since it is usually a sign of advanced disease.

CASE REPORT
A 60 year old African American female presented for a complete eye exam. Her medical history was remarkable for breast cancer for which she was treated with partial mastectomy and reported to be in remission.

EXAM FINDINGS
- BCVA: 20/25- OD, OS
- Refraction: +0.75-0.50x155 OD, +1.25-0.50x180 OS
- PERRL-APD
- Vision: normal with Ishihara plates OD, OS
- Resistance to retropulsion OS.  Proptosis absent in old base 105
- Hertel Exophthalmometer: 16mm OD, 19mm OS with diagnostic pattern
- Visual Fields: non-specific defects that did not fit a diagnostic pattern
- MRI of brain and orbits and thyroid function testing were ordered. MRI revealed lesions in the intracranial and extracranial space of the left orbit and left parietal lobe that were consistent with metastasis. Calvarial lesions within the right parietal bone and left frontal bone were also noted which are suggestive of metastatic bone disease.

MRI revealed lesions in the intracranial and extracranial space of the left orbit and left parietal lobe that were consistent with metastasis. Calvarial lesions within the right parietal bone and left frontal bone were also noted which are suggestive of metastatic bone disease.
Ocular Hypertension in a Patient with Osteopetrosis

Heather McLeod OD, FAAO, Scott Richter OD
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL

BACKGROUND
Osteopetrosis is a rare inherited disease characterized by increased skeletal mass and bone density. Osteoclasts fail to resorb bone leading to abnormally dense bones that are brittle and prone to fractures. The most common ocular complication is optic atrophy. Optic atrophy can develop from optic nerve compression due to narrowing of the optic foramina or due to increased intracranial pressure from cerebral venous outflow obstruction leading to chronic papilledema. The challenge of differentiating optic atrophy from glaucomatous optic atrophy and when to institute treatment is illustrated by this case.

Three Categories:
- Malignant Infantile Form - autosomal recessive
- Intermediate Form - autosomal recessive
- Adult Form - autosomal dominant

Ocular Manifestations:
- Optic Atrophy
- Papilledema
- Strabismus
- Cranial Nerve Palsies
- Nystagmus
- Retinal Degeneration

Systemic Manifestations:
- Anemia
- Thrombocytopenia
- Hepatomegaly
- Renal Dysfunction
- Seizures
- Mental retardation
- Sensorineural hearing loss
- Developmental delay
- Dysarthria
- Mental retardation

TREATMENT
Bone marrow transplant to provide osteoclast precursor cells which can form normal osteoclasts. Vision may be preserved with optic canal decompression. The optic canals have been shown to widen after bone marrow transplant.

CASE REPORT
A 20 year old Caucasian female with a known history of bilateral optic atrophy due to osteopetrosis presented for a consult.

Exam Findings:
- BCVA: 20/200 OD, Count Fingers OS
- Refraction: +1.25-2.00x090 OD, OS
- Pupils: round and reactive to light with 2+ APD OS
- EOMs: full range of motion with small amplitude nystagmus
- CVF: bitemporal defect OD, OS
- CT: Constant left exotropia
- Biomicroscopy: unremarkable OD, OS
- IOPs: 22mmHg OD, 24mmHg OS
- Fundus evaluation revealed C/D ratio of 0.7 with diffuse pallor of the optic nerves OU

Follow up examinations revealed consistently elevated IOPs with anatomically open angles and Goldmann visual fields revealed overall constriction that was greater inferior temporal OD > OS. The patient’s pressure is currently managed with Alphagan TID OU. Visual fields and optic nerve heads have remained stable during five years of follow-up.

CONCLUSION
This is a unique case of osteopetrosis with ocular hypertension which is unreported in the literature. Visual loss from osteopetrosis has been reported from optic atrophy and possibly a primary retinal degeneration in the infantile form. This patient was treated with ocular hypotensives, in part due to her already compromised optic nerves.

REFERENCES
A cranial nerve VI palsy after head trauma leads to an instrosopic ocular posture that leads to an ophthalmoplegic abduction deficit and horizontal diplopia.

### BACKGROUND

A 25 y/o AAF presents for sudden onset horizontal, binocular diplopia, beginning after head trauma. She reports intermittent loss of consciousness and reduced hearing from her right ear. Trauma occurred three days prior.

**Medical History:** Current everyday smoker

**Medications:** Denies all

**BCVA:**

- OD = 20/20
- OS = 20/20

**EOM’s:**

- OD = PERRLA
- OS = APD

**Pupils:**

- OD = WNL
- OS = -

**Complicated Traumatic Cranial Nerve VI Palsy:**

- Denies all

**CT Results:**

- Visual fields intact

**PHOTOS:**

- Figure 1: Forced duction test
- Figure 2: Juncrion of the middle and posterior fossa
- Figure 3: Traveling nerve

**CT Results:**

- Mode of Assessment: S&I
- Result: S&I

**PHOTOS/Table 1**

<table>
<thead>
<tr>
<th><em>Pathway</em></th>
<th><em>PREPATHWAY 1</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Surgical correction</em></td>
<td><em>Fresnel prism</em></td>
</tr>
<tr>
<td><em>Botulinum toxin injections</em></td>
<td><em>Lid taping/occlusion</em></td>
</tr>
</tbody>
</table>

### CRANIAL NERVE VI PATHWAY 2,4

- *Axons emerge from the ventral aspect of the brainstem at the level of the pontomesencephalic junction*
- *The nerve runs anteriorly in the subarachnoid space to pierce the dura adjacent to the dural venous sinus*
- *Running forward along the apex of the petrous bone, the nerve undergoes a sharp bend to enter the cavernous sinus*
- *Within the cavernous sinus, CN VI sits lateral to the internal carotid artery*
- *CN VI enters the orbit through the superior orbital fissure, within the annulus of Zinn*
- *The nerve then enters the lateral rectus muscle and when stimulated leads to abduction of the globe*

### DISCUSSION

- *Unilateral cranial nerve VI palsy occurs in 1-2% of head trauma cases*
- *The most frequent cause of nonfatal head injury is secondary to motor vehicle accident, while work-related and recreational trauma are also significant contributors*
- *Dural entry points are the most frequent site of injury, specifically at the petrous apex*
- *Ocular neuropathy after head trauma can vary greatly, ranging from direct trauma to the globe, sensorineural, or ocular motility de
havior*
- *Traumatic CN VI palsy has a high association with skull fractures and intracranial hemorrhage, and therefore acute presentations often require neurosurgery*
- *Traumatic cranial nerve VI palsies have a spontaneous recovery rate of 73% at six months and the median time to recovery was 90 days.1,2*

### TREATMENT OPTIONS

- *Lid taping/occlusion*
- *Fresnel prism*
- *Botulinum toxin injections*
- *Surgical correction*

### REFERENCES


### CONCLUSION

- *Typically begins treatment with the least invasive options first and progress to injected/surgical options once stability is demonstrated*
- *Fresnel Prims is a temporary option that is cost effective and can relieve symptomatic diplopa effectively*
- *Initial co-management with neurology is often indicated to rule out life threatening complications*
- *A majority of unilateral traumatic CN VI palsies will spontaneously resolve, without intervention, around 60 days after the initial injury*
- *Patients’ that have lasting symptoms should consider surgical intervention after three months of stability and at least six months since the initial traumatic event*

### CONTACT INFORMATION

Jessica Condie, O.D.
Puja Desai, O.D.
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL 60616

Jessica Condie, O.D. • Puja Desai, O.D.
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL 60616

Jessica Condie, O.D. • Puja Desai, O.D.
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL 60616
Anterior scleritis is a disease characterized by scleral inflammation that presents with classical symptoms and diagnostic findings. Except for sclerocornea, anterior scleritis is characterized as having a symptom of extreme photophobia.

CASE REPORT

A 40-year-old African American male presented with a chief complaint of red eyes OU starting 2-3 weeks ago OD and 2 weeks ago OS. The patient reported nothing white discharge in the morning and had previously tried Visine®, Zaditor®, and erythromycin ointment (his daughter’s Rx) without improvement. He has also tried Zaditor®, Zynaira®, and Zyrtec®. His eyelids felt irritated with mild tenderness to touch OD > OS starting one week prior.

Past Ocular History

• Traumatic uveitis in 2007
• Glaucoma suspect based on C/D ratio and CCT o R NFL OCT normal OD, OS
• Asthma (mometasone/Albuterol®)
• Allergies (cetirizine)

Pertinent Findings

• Pupils, EOMS, Confrontational Fields: normal
• Angina (nitroglycerin)
• TRACE U/L/LL edema OD > OS
• Lids/Lashes:
  o OD: 2+ temporal bulbar injection with temporal injection started to decrease after two months of treatment. Options were considered for this patient, his pain with touch.
• Lacrimal gland biopsy – negative for granulomas or evidence of sarcoidosis
• No change in vision, no pain. Patient very concerned about persistent red eyes.
• No change in slit lamp examination
• Plan: ordered laboratory tests. TTC 1 week or sooner if symptoms worsen.

LABORATORY TEST RESULTS:

Day 38

• Last flare-up 3 days ago
• No change in slit lamp examination
• B-scan: focal thickening associated with anterior scleral injection 141412

Day 44

• No change in vision, no pain. Patient very concerned about persistent red eyes.
• No change in slit lamp examination
• Plan: Sent to uveitis specialist for second opinion to consider starting oral prednisone.

Day 57

• Present to Ophthalmology Grand Rounds - open discussion on prescribing oral prednisone, given lack of pain symptoms
• Plan: Continue indomethacin 50 mg po tid. Would consider prednisone or methotrexate if no improvement. Ordered chest X-ray (Fig. 5) to rule out sarcoidosis because of fat stranding noted on CT scan.

Update

Lacrimal gland biopsy – negative for granulomas or evidence of sarcoidosis
No longer taking indomethacin
No pain or flare ups reported at last examination
Residual redness remains
No recurrences to date

DISCUSSION

Scleritis is classified as anterior or posterior. Anterior scleritis is further classified as diffuse, nodular, necrotizing with inflammation and necrotizing without inflammation (keratoclonia perennis). This patient had anterior diffuse scleritis, which is the most common form. Onset is typically in the 5th decade of life, with an increased prevalence among women. Unfortunately, recurrences are common. The classic symptom with this form of scleritis is deep, severe pain that spreads across the face and forehead. The pain often wakes patients in the morning and slightly improves during the day. The eye appears red because of increased inflammation and vascular dilation. The outer graft episclera will appear congested and swollen. The cornea may also have a grey-blue hue due to rearrangement of the corneal stroma. Approximately 25-50% of scleritis is associated with a systemic disease. Common associations include:

- Autimmune disease – 39.2%
- Rheumatoid arthritis – 10.3-18.6%
- Wegener’s granulomatosis – 3.8-8.1%
- Relapsing polychondritis – 1.6-6.4%
- Systemic lupus erythematosus – 1.4-10.1%
- Ankylosing spondylitis, reactive arthritis, psoriatic arthritis – 0.5-1.5%
- Infectious disease – 8.9%
- Herpes zoster ophthalmicus – 5.2%
- Lyme disease – 5.2%
- Syphilis – 2.1%
- Lyme disease – 1.0%

The most common treatment for diffuse anterior scleritis is oral NSAIDs such as 25 mg or 50 mg indomethacin tid. For recalcitrant scleritis or scleritis non-responsive to NSAIDs, oral prednisone 20 mg to 60 mg to be prescribed daily. For topical treatment options include immune-suppressing drops (such as methotrexate or cyclosporine), subconjunctival corticosteroid injections, and biological therapies (such as infliximab or etanercept).

REFERENCES


CONCLUSION

This case illustrates a unique presentation of anterior sarcoid. Typically severe peripheral pain is considered necessary to diagnose a patient with diffuse anterior scleritis. In this case, however, the patient had little to no pain, but evidence of scleritis was present on B-scan and MRI. Although a less common cause of scleritis, an underlying etiology of sarcoid is suspected based on chest X-ray findings even though laboratory tests suggest no active disease. While more aggressive treatment options were considered for this patient, his ocular injection started to decrease after two months of indomethacin.
INTRODUCTION

Hydrops is a complication associated with advanced corneal ectasia. A spontaneous break forms in Descemet’s membrane and the underlying endothelium resulting in a rapid influx of aqueous humor causing corneal edema and loss of transparency. This sudden influx of aqueous humor enters the stromal stroma, resulting in intrastromal edema, epithelial edema, as well as epiretinal edema with bullae. These clues may reach the corneal surface and cause corneal perforation. Symptoms are variable ranging from a mere foreign body sensation or cosmetic concern to a painful, photophobic eye. Hydrops occurs with corneal ectasia, most commonly keratoconus, but rarely also presents with pellucid marginal degeneration, keratoglobus, posterior keratoconus, and keratitis. These clefts are visualized as black spaces. The cornea maintains a blue color and the intrastromal break, the number of intrastromal clefts present, and allows one to visualize the location of Descemet’s membrane. Further peristromal fluid can be observed as determine the severity of the case. Retroillumination aids in determining whether the corneal disruption is infiltrative like an ulcer or merely fluid-filled, as in hydrops and bullous keratopathy. An optic section allows one to visualize the location of Descemet’s break, the number of intrastromal clefts present, and how close the clefts are to perforating the surface. This is often better visualized with a cobalt blue filter, where the cornea remains a blue color and the intrastromal clefts are visualized as black spaces.

CASE REPORT

A 48-year-old African American female presented to the Urgent Eye Care Clinic with symptoms of mild discomfort, marked intercystic stroma, and a foreign body sensation in her right eye for the past eight days. The patient denied contact lens wear, previous episodes, and a self-reported eye examination history remarkable for a “dry eye.” OD. Best corrected spectacle correction was CF -1.00 OD and 20/20-1 OS. Biomicroscopy revealed epithelial and internal edema with multiple bullae, an intrastromal cleft, and a Descemet’s break OD (Figure 1, 2, & 3). Slit lamp examination OS was revealed epithelial and stromal edema with multiple clefts. The puff was a “lazy eye” OD. Best corrected spectacle correction, which improved her vision to 20/100 OD and 20/20- OS.

DISCUSSION

The time necessary for complete resolution of corneal hydrops is variable and depends on the size of the break. In hydrops, literature reports resolution of hydrops ranges from 5-36 weeks with an average resolution time of 6 weeks. Once the break is closed, endothelial pumps can then resume their function and pump out the aqueous fluid from the stroma. A pucker is often left at the site of the initial break. Potential complications during the healing period include microbial keratitis and perforation. Perforation necessitates an urgent consult for glue repair and/or a corneal transplant. However, status-post hydrops patients tend to have a greater rate of rejection. It is not possible to predict the outcome of hydrops with any certainty. The presence of hydrops indicates that the corneal integrity is compromised. Acute corneal hydrops is a rare presentation in routine eyecare settings that can be difficult to diagnose and manage, especially in patients who have undiagnosed, corneal ectasia. It is often easily and successfully managed topically. The risk for infection and/or perforation is uncommon, but all cases still require close observation. Patients with corneal hydrops have varying presenting signs and symptoms often being misdiagnosed. Through the utilization of RTVue Anterior Segment Optical Coherence Tomography (AS-OCT) and particular slit-lamp techniques that assisted the practitioners in diagnosing and managing hydrops in a patient with undiagnosed pellucid marginal degeneration.

ACUTE CORNEAL HYDROPS IN PELLUCID MARGINAL DEGENERATION

Marian L. Langa, OD, Jennifer S. Hartunian, OD, FAAO
Illinois College of Optometry/Ilinois Eye Institute
Chicago, IL

Table of Contents

References


Contact Information

Marian L. Langa, OD
Illinois College of Optometry
Chicago, IL 60618
mlanga@iico.edu
www.iico.edu
INTRODUCTION
There has been considerable research to determine the relationship between visual skills and athletic performance.1 In sports performance the skills of the visual system may be separated into a software and a hardware component. The hardware components of vision refer to the non-task specific mechanisms like ocular health, visual acuity, accommodation, fusion, and depth perception. The software components are the more cognitive aspects of vision such as visual perception, visual concentration, visual reaction time, central-peripheral awareness, and visualization.2,4 The literature contains that these software components of the visual system may be malleable.3,5 While there is currently no concrete evidence of a direct relationship between superior visual skills and athletic performance, it has been suggested that athletes can improve the elements of their visual software system, they can elevate their athletic performance.

Historically vision screening has been performed in order to detect visual defects and investigate whether visual performance attributes are associated with superior athletic skills. Increasingly vision screening is also being used to develop and implement vision training programs meant to enhance athletic performance by improving the software elements of the visual system. For these reasons it is important to have reliable baseline results for the components of the vision system.

The Wayne Sports Vision Trainer, also commonly known as the Wayne Saccadic Fixator, has been used in vision screenings to assess some of the software aspects of the vision system including eye-hand coordination, perceptual reaction time, and hand speed of the athletic populations.12 Unfortunately, the reliability of this device has not been established. The purpose of this investigation was to determine the test-retest reliability of the Proaction and Release and Locate programs of the Wayne Sports Vision Trainer in a cohort of professional soccer players.

METHODS
Twelve male members of a Major League Soccer team, ages 17-35, participated in a comprehensive sports vision screening based on the American Optometric Association Sports Vision protocols.2 This screening included the Wayne Sports Vision Trainer.2 The Wayne Sports Vision Trainer measures eye-hand coordination by evaluating visually guided motor responses to a lighted target. Normal room illumination was used with the athletes standing centered at eye level of the middle target of the Wayne Sports Vision Trainer. The Proaction test (program 1) involved the athletes touching targets in the periphery within a 30 second time period while maintaining steady head and body posture. The test score represented the number of light targets pressed within this 30 second period. For the Release and Locate test (program 4) the athlete began with a finger on an indicated peripheral location at approximately 1 1/2 blocks on the panel. A light then moved to a different location across the board at approximately the 9 o’clock position. The athlete moved his finger to the second light as quickly as possible. The results measured the release time from the first location and the motor time it took the athlete to press the second light target. Each athlete performed two consecutive trials of the Proaction and Release and Locate Wayne Sports Vision Trainer tests.

RESULTS
The results of the Wayne Sports Vision Trainer proaction test demonstrated that the subjects scored significantly better in the second trial as compared to the first trial (Figure 1). On the other hand the results of the Wayne Sports Vision Trainer hand speed release time did not reveal a statistical significant difference between the two trials (Figure 2). The motor speed (locate) test indicated that the subjects had statistically significant quicker motor speed in the second trial as compared to the first trial (Figure 3).

The Intraclass Correlation Coefficient (ICC) was calculated for these tests in order to assess their test-retest reliability. The ICC for neither the proaction test (r=.326; p=.051) nor the motor hand speed test (r=.125; p=.166) was statistically significant. These results suggest that there was variability between the test and retest trials. The ICC was statistically significant for the reaction release test (r=.550; p=.012). This indicates less variability between the test and retest trials for this test.

CONCLUSION
The Wayne Sports Vision Trainer Proaction and Release and Locate tests demonstrated a learning curve between the first and second trials. This suggests that multiple trials are required to determine an accurate baseline of performance. Single evaluations may not adequately reflect visual skills in athletes. Further investigation is needed to determine how many trials are necessary to establish a reliable baseline.
Sturge-Weber Syndrome

Kathleen O’Leary O.D.
Illinois College of Optometry/ Illinois Eye Institute
Chicago, IL

BACKGROUND
Sturge-Weber syndrome occurs sporadically in approximately 1/50,000 births. It is a neurocutaneous syndrome that has a classic triad consisting of benign facial, leptomeningmal and ocular hemangiomas. Ocular hemangiomas can occur in the conjunctiva, choroid and episclera, which can in turn cause secondary glaucoma. Choroidal hemangiomas can develop which can compromise ocular health or visual function.

CASE REPORT
A 5 year-old female diagnosed with glaucoma in the left eye, secondary to Sturge-Weber Syndrome. She underwent a trabeculotomy at 7 weeks old. Due to an inability of the trabeculotomy alone to sustain an acceptable IOP, she was put on Travatan Z, 1 drop at night in the left eye, at 4 years old. She is currently undergoing a trabeculotomy at 7 weeks old. Due to an inability of the trabeculotomy alone to sustain an acceptable IOP, she was put on Travatan Z, 1 drop at night, in the left eye.

2011 EXAMINATION FINDINGS
- Distance VA (by LEA): 20/20 OD, 20/200 OS
- Refraction: plano OD, +0.75 OS
- PERls (-) AFD
- CF: Poor cooperation understanding OD and OS
- EOM: full OD and OS
- SLE (See Figure 2)
- Externals (See Figure 1)
  - Left facial nerves
  - Enlarged asymmetric globe OS-OD
  - SLE (See Figure 2)
  - Lid/Lashes: clear OD and OS
  - Conjunctiva: clear OD and OS
  - Hypervascularity
  - Cornea: clear OD and OS
  - Periphery: choroidal hypervascularity
  - Iris: clear OD and OS
- Diameter OD: 11.5mm
- Distance OD: 11.5mm
- Enlarged asymmetric globe OS-OD
- SLE: (See Figure 2)
- Lid/Lashes: clear OD and OS
- Conjunctiva: clear OD and OS
- Hypervascularity
- Cornea: clear OD and OS
- Periphery: choroidal hypervascularity
- Iris: clear OD and OS
- Hypervascularity
- Diameter OD: 11.5mm
- Astigmatism OD and OS
- M A C U L A : flat OD and OS

DISCUSSION
Ocular manifestations of Sturge-Weber Syndrome include unilateral increased corneal diameter, increased axial length, and choroidal and conjunctival hypervascularity. Increased intraocular pressure and increased cup to disc ratio relative to the contralateral eye is indicative of secondary glaucoma. Patients may develop amblyopia at a young age due to anisometropia, strabismus, visual field loss secondary to glaucoma, choroidal hemangiomas compromising macular structure or complications that may arise during a surgical procedure to lower IOP. In this patient it is thought that choroidal folds may have developed secondary to hypotony during the trabeculotomy. This in turn compromised the macula and acuity. Patients with Sturge-Weber syndrome should be followed routinely for IOP checks and dilated fundus examinations to look for elevated diffuse choroidal hemangiomas that could compromise ocular health or visual function. OCT, fundus photos and b-scans can also be implemented in follow-up care. Proper eyewear should also be worn for protection.

REFERENCES

CONTACT INFORMATION
Kathleen O'Leary
951 S. Michigan Ave
Chicago, IL 60616
Kathleen@ ICO.edu
www.ico.edu
**Spontaneous Resolution of Vitreomacular Traction Syndrome observed by Optical Coherence Tomography: A Case Report**

Danielle Leong, O.D., Leonard Messner, O.D., F.A.A.O
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL

**BACKGROUND**

Vitre-Macular Traction Syndrome (VMT) occurs as a result of incomplete or anomalous posterior vitreous detachment (PVD) in which vitreous liquefaction and separation of the vitreous interface do not occur simultaneously leading to anomalous vitreo-retinal adhesions and specifically vitreous adhesions (VMA). This may lead to persistent attachment at the macula and VMT resulting in disruption of the retinal layers, macular edema, decrease in visual acuity and metamorphopsia. VMA can cause a multitude of other macular disorders including macular hole formation and epiretinal membrane which must be differentiated from VMT. Fundoscopically these may appear essentially identical making it difficult to separate these diagnoses. However the use of spectral domain OCT (SD-OCT) has allowed better visualization of the vitreo-retinal interface and has become an essential tool when differentiating VMAs and monitoring for change. Additionally, recent advances in pharmacologic vitreolysis may offer a new, less-invasive treatment option for patients with VMT.

**PERTINENT FINDINGS**

**Chief Complaint:** 36 year African American female presented with symptoms of decreased vision in the right eye for 6 months duration.

**Medications:** None

**BCVA:** 20/20 OD; 20/20 OS

**Pupils/Slit Lamp Exam/Extracocular muscles/ Confrontations:** unremarkable

**IOP:** tonometry OU

**DFF:** (See Figure 1) OD: small, well-circumscribed, red ring at the macula

**OSS:** normal

**Table of Contents**

1. **Circles**
   - SD-OCT of macula (See Figure 2)
   - OD: vitre-Macular traction area, Persistent vitreo-retinal adhesion at the macula
   - OS: Normal foveal depression

**Diagnosis:** Vitreo-Macular Traction OD

**Figure 1:** Fundus photo showing red appearance to macula OD and central OD.

**Figure 2:** Circles SD-OCT at initial presentation showing persistent vitreo-retinal adhesion at the macula OD and circinal based depression OS.

**Figure 3:** Circles SD-OCT change analysis at follow up OD, showing release of vitreo-retinal adhesion and absence of the foveal depression.

**Figure 4:** Fundus photo showing release of vitreo-retinal adhesion and return of normal foveal depression OS.

**Figure 5:** Normal foveal depression.

**Circles**

- SD-OCT of macula (See Figure 2)
- OD: vitre-Macular traction area, Persistent vitreo-retinal adhesion at the macula
- OS: Normal foveal depression

**Diagnosis:** Vitreo-Macular Traction OD

**DISCUSSION**

Vitre-Macular Traction (VMT) is the result of axial (interior-posterior) traction from anomalous PVD (aPVD) in which there are non-simultaneous rates of vitreous syneresis and syneresis release from the retinal surface 1-8. These persistent vitreo-retinal adhesions can elevate the retina leading to symptomatic vitreo-macular adhesions of decreased vision. VMT can be associated with epiretinal membranes that cause a additional tangential traction and worsening of symptoms 9-11. The progression of VMT (see Video at link below) in which Hicks et al (1994) reported 11% spontaneously resolving over 6 weeks and Odrobina et al (2011) reported 45% spontaneously resolving over an 8 month follow-up. 1-11 OD also reported that 21% of eyes with persistent VMT progressed to full thickness macula holes and there was a strong correlation with ERM and larger adhesion areas leading them to believe that it played a role in this persistent traction.

The recommended management of VMT is to monitor the patient every 3 months with regular dilated fundus examination and medical SD-OCT to monitor for change. 1-11 Home amsler grid and may be helpful for patients to self-monitor central vision change. Lastly surgical intervention with vitrectomy and membrane peel may be considered if there is progressive vitreo-retinal structural change as observed with SD-OCT, progressive reduction in vision, or persistent significant symptoms beyond 3 months. 1-11 Since surgical intervention is recommended based on persistent subjective symptoms, management options as well as the risks and benefits to each should be discussed in detail with the patient. Considerations should include the individual patient’s visual demands, if they outweigh the risks to vitreo-retinal surgery, surgical intervention, cataract formation, and risk of infection, if and the patient could benefit from visual improvement reported in nearly 80% of cases. 1-11

Recent innovations in vitreolysis agents used as an intravitreal injection have shown to induce complete PVD. 1-11 These pharmacologic vitreolysis agents, such as Ocriplasmin (ThromboGenics) which is a recombinant truncated form of human plasmin, have proteolytic activity against components of the vitreous and vitreo-retinal interface. It can induce liquefaction and vitreous detachment at the internal limiting membrane. Initial studies have shown nearly 30% resolution of VMT. 1-11 These vitreolysis agents are an emerging treatment modality that may change the future management of patients with VMT.

**CONCLUSION**

We present a case of VMT with spontaneous resolution after 3 months observed with SD-OCT. In the literature, spontaneous resolution of VMT is a rather infrequent observation in cases of VMT with limited visual and structural disturbance is appropriate using the spontaneous resolution as documented in this case. For persistent VMT the traditional treatment of choice has been pars plana vitrectomy with membrane peel for concurrent epiretinal membrane. Recent innovations in vitreolysis agents used as an intravitreal injection have shown to induce complete PVD. These pharmacologic vitreolysis agents are an emerging treatment option that may change the future treatment and management of patients with VMT.

**REFERENCES**

Case of Unilateral Sickle Cell Retinopathy in a Pediatric Patient

Paula McDowell, OD
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL

BACKGROUND

Sickle cell disease is prevalent in approximately 5 to 10% of African Americans in the United States. There are three main types of sickle cell disease related to retinopathy: homozygous sickle cell disease (SS type), sickle cell disease (SC type) and sickle cell-thalassemia disease (S-Thal type). Around 40% of these patients with SC type are expected to develop proliferative sickle retinopathy. Typical findings of sickle cell retinopathy include salmon patches and sunburst lesions, and proliferative retinopathy may show sex fan neovascularization or vitreous hemorrhages. In pediatric patients, a large range of sickle cell retinopathy has been reported, anywhere from 17 to 98%. Despite the large range of prevalence, there is varying information as to when children with sickle cell disease should have dilated fundus exams.

DISCUSSION

A 9-year-old African American male with known history of sickle cell disease (SC type) presents for his yearly comprehensive eye exam. Exam data can be found in Table 1. A follow up exam reveals very little change in retinopathy; however, at that time the patient had been scheduled for a spleen surgery. Based on the systemic history, this patient may be at higher risk for developing further retinopathy. The literature regarding sickle cell retinopathy in children does not specify laterality in patients who have sickle cell retinopathy (SR), only prevalence. The Jamaican Cohort Study showed that early changes in retinopathy include peripheral arterial closure and arteriolar stenosis. Since this patient did not undergo a fluorescein angiogram on these patients to detect early or subclinical changes. While several studies recommend screening for sickle cell retinopathy in children at 9 years old, it is possible that retinopathy may occur sooner in those with the disease, specifically SC type. This patient is on a six month follow-up schedule, alternating visits with a pediatric hematologist and a retina specialist. This author recommends that all patients with sickle cell disease should be followed at least annually with a careful dilated fundus exam, regardless of age. It may also be beneficial to perform a fluorescein angiogram on these patients to detect early or subclinical changes.

REFERENCES


CONTACT INFORMATION

Paula McDowell, OD
Pmcdowell@ico.edu
www.ico.edu

Table 1 - Patient Exam Data

<table>
<thead>
<tr>
<th>Exam Data</th>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD: -0.50 x 180 20/20+</td>
<td>9 yo-African American Male</td>
</tr>
<tr>
<td>OS: -0.50 x 180 20/20+</td>
<td>(n) Sickle Cell Disease (SC type)</td>
</tr>
<tr>
<td>CT: orthophoria</td>
<td>Medications: Folic Acid, Vitamin, Tylenol 3 pm, Ibuprofen pm</td>
</tr>
<tr>
<td>NPC: OD small area of regressed fibrovascular proliferation as seen on fluorescein angiogram.</td>
<td>4th grade, doing well in school</td>
</tr>
<tr>
<td>OS: OD small area of regressed fibrovascular proliferation as seen on fluorescein angiogram.</td>
<td>(n) speech delay</td>
</tr>
<tr>
<td>(+) Sickle Cell Disease (SC type)</td>
<td></td>
</tr>
</tbody>
</table>
Classic Findings of Noonan Syndrome in 5 Year Old Twins with Refractive Amblyopia

Paula McDowell, OD
Illinois College of Optometry/Blinos Eye Institute
Chicago, IL

Table 1 - Determining a Positive Diagnosis of NS1,5

<table>
<thead>
<tr>
<th>Other Findings</th>
<th>Major</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broad forehead</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertelorism</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Downward slanting palpebral fissures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Definitive Noonan Syndrome: Typical Face (+ 1 major OR 2 minor) OR Suggestive Face (+ 2 major OR 3 minor)

Table 2 - Case Data

<table>
<thead>
<tr>
<th>Common for Noonan Syndrome</th>
<th>Male Twins</th>
<th>Female Twins</th>
</tr>
</thead>
<tbody>
<tr>
<td>(+) Family History</td>
<td>Father (+) Noonan Syndrome</td>
<td>Father (+) Noonan Syndrome</td>
</tr>
<tr>
<td>Normal birth weight</td>
<td>5 lbs, 7 oz</td>
<td>5 lbs, 5 oz</td>
</tr>
<tr>
<td>Birth weight without lenses</td>
<td>Unrecorded</td>
<td>Unrecorded</td>
</tr>
<tr>
<td>Congenital Heart Defects</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Mild motor delays</td>
<td>Walked at 2 yo, began to speak at 3 yo</td>
<td>Unable to tell</td>
</tr>
<tr>
<td>Mild cognitive delays</td>
<td>Overall difficulty in school, being evaluated for IEP</td>
<td>Unable to tell</td>
</tr>
<tr>
<td>Facial dysmorphology</td>
<td>Hypertelorism, inverted triangle shaped face, flat nasal bridge, ptosis</td>
<td>Hypertelorism, inverted triangle shaped face, flat nasal bridge, ptosis</td>
</tr>
<tr>
<td>High myopia</td>
<td>OD: 5.50 -2.50 x 180</td>
<td>OD: 5.50 -2.50 x 180</td>
</tr>
<tr>
<td>Refractive Error</td>
<td>OS: 4.50 -1.50 x 180</td>
<td>OS: 5.50 -1.50 x 180</td>
</tr>
<tr>
<td>Astigmatism</td>
<td>OD: 4.75 -0.50 x 90</td>
<td>OS: 5.75 -0.50 x 90</td>
</tr>
<tr>
<td>Amblyopia</td>
<td>BCVA 20/30 (OD) 20/50 (OS)</td>
<td>BCVA 20/20 (OD) 20/40 (OS)</td>
</tr>
<tr>
<td>Large Cup ratio</td>
<td>OD: 10.7</td>
<td>OD: 10.6</td>
</tr>
<tr>
<td>OS: 10.9</td>
<td>OD: 10.8</td>
<td></td>
</tr>
</tbody>
</table>

Case Summary

Five year old African American twins (male and one female) present with parent complaints of squinting, sitting close to the television, and poor school performance. They both have a diagnostic of Noonan Syndrome, and positive family history of a father with Noonan Syndrome. They both have a gestation age of 34 weeks, motor and cognitive delays, and are in the process of special education evaluation. Retinoscopy revealed high myopia and high refractive error and variable astigmatism in each child, and subjective refraction was attempted but unsuccessful. Binocular function was adequate, showing global stereopsis, while the facial exhibited a large exophoria at near. Hypertelorism, downward slanting palpebral fissures, and a flat nasal bridge were noted for each twin upon external exam. Dilated internal exam revealed abnormally large cup to disc ratios for both the male and female (1.7 OD, 0.8 OD and 1.8/0.8 DS, 0.8/0.8 OS, respectively). A one month post-dispense follow up visit showed good reported compliance of glasses wear, and improved visual acuity, but still reduced from average for both patients. Amblyopia was observed with no improvement in acuity with addition of minus lenses. Both children have been diagnosed with refractive amblyopia, and are being closely monitored. Case data is summarized in Table 2.

References


Contact Information
Paula McDowell, OD
Pmcodowell@ico.edu
www.ico.edu
INTRODUCTION
Myopic macula schisis is the separation of the inner layers of the retina from the outer layers due to progressive physiological splitting of a myopic eye and/or posterior staphyloma formation. Although the development of macula schisis in a myopic eye is not uncommon, the condition often goes unrecognized because it is difficult to detect based on examination alone. However, technological advances in the development of the ocular coherence tomography (OCT) has provided an assistance in the detection of the condition. An electroretinogram (ERG) is also helpful in detecting the extent of damage to the various layers of the retina involved in this condition.

CASE REPORT
A 66-year old black male presented for his comprehensive examination with complaints of floaters in both eyes. His best corrected visual acuity, with a myopic prescription, was 20/30 and 20/70 in the right and left-eye, respectively. Confrontation visual fields, extrastriates, and pupil testing were unremarkable. Amsler grid testing was normal in the right eye but central metamorphopsia was noted in the left eye.

Dilated fundus examination was limited due to media nuclear sclerosis and cortical cataracts in both eyes. Biomicroscopic examination revealed moderate nuclear sclerosis and cortical cataracts in both eyes. Dilated fundus examination was limited due to media opacity, but there was no clinically significant elevation of the macula noted in the right eye (Figure 1A). Clinical observation of the left-eye was difficult due to the myopic choroidal atrophy of the fundus but showed questionable elevation (Figure 1B).

An OCT performed revealed a fairly intact macula in the right-eye (Figure 2A) and a macula schisis with a foveal detachment in the left-eye (Figure 2B). The ERG results of both eyes were within normal range for all stimuli. There was a slight reduction in b-wave amplitude and slightly increased b-wave implicit times of the left eye as compared to the right eye.

DISCUSSION
The pathophysiology of myopic macula schisis has been attributed to traction on the retina from multiple factors, including adhesion to the posterior vitreous cortex, rigidity of internal limiting membrane, and retinal vascular traction. Foveal detachment occurs when the tractional force causes separation of the photoreceptor layer from the RPE.

With the development of the OCT, improved visualization of the fine structures involved with macula schisis have been possible, such as the appearance of columnar structures within the space bridging the inner and outer retinal layers. Additionally, OCT imaging has also allowed for detection of foveal detachments, which helps aid in better management of the patient.

An ERG is a mass electrical response of the retina to light stimulation. The two components that are most often measured are the a-wave, which is the typically the negative component, and the b-wave, which is usually larger in amplitude. The time from flash onset to the trough of the a-wave and from flash onset to the peak of the b-wave are referred to as “implicit times.” The a-wave reflects the activity of photoreceptors in the outer retina, and the b-wave reflects the health of the inner layers of the retina.

CONCLUSION
High myopia predisposes patients to degenerative conditions, such as myopic macula schisis. Without proper detection and management, this condition can lead to progressive decrease in visual acuity due to the disruption of the neurosensory elements. This case demonstrates the importance of considering OCT in the workup of myopic patients presenting with visual problems, specifically, when clinical observation is difficult due to myopic choroidal atrophy of the fovea. An ERG is also useful in the understanding of the extent of involvement and visual consequences to the various layers of the retina due to myopic macula schisis.

REFERENCES
Humira was initiated secondary to the severity of the aggressive treatment regimen of methotrexate and for rheumatologic or infectious disease. However, an no clear etiology secondary to negative lab results month. The pediatric rheumatologist report stated bilateral hand pain at seven years of age for one examination. On review of Systems, the patient report rheumatology was made for blood work and physical a day in both eyes was prescribed. Referral to pediatric uveitis with band keratopathy OU. Durezol four times the visual axis greater OD than OS. Anterior chamber and vitreous has been quiescent.

At this time, the patient has unverified etiology of uveitis with a suspicion of juvenile idiopathic arthritis. The patient specifically does not meet the criteria outlined by International League against Rheumatism. Because of the absence of the diagnosis and the history of bilateral hand pain, the patient is being closely followed under this suspicion. Studies have shown that 19% of patients develop arthritis after the diagnosis of uveitis so this diagnosis has not been completed ruled out. JA associated uveitis has been described as poor for long term visual and functional outcomes. One third of patients will have substantial visual impairment with 10% becoming blind. Some of the risk factors for poor visual progress consist of male gender, children with initial uveitis before diagnosis of arthritis present, younger age, and longer duration of uveitis. The patient has all of these risk factors. Given the relatively poor progress early, aggressive treatment with immunosuppressive agents was advocated.

CONCLUSION

A young child with presenting with hand keratopathy and decreased vision should be investigated for chronic inflammation. This case discusses the ocular manifestations of severe juvenile idiopathic arthritis, the differentials for childhood uveitis, and the importance of co-managing for proper patient care.

REFERENCES

1. Abdwani R. Challenges of Childhood Uveitis. SQU Med J 2009; 24:257-262 1
2. Cunningham ET, Suhler EB. Childhood Uveitis-young patients, old problems, new perspectives. JAMA 2004; 292:102-104 2
INTRODUCTION

An orbital mucocele is a benign, slowly expanding, chronic cyst of the sinus that secretes mucous. It accounts for two to eight percent of all sinus tumors and has been associated with ocular symptoms such as diplopia, ophthalmoplegia, proptosis, orbital displacement, reduced visual acuity or color vision, orbital pain, and headache. Ocular involvement may be the first sign of a mucocele.

CASE HISTORY

Patient M.B. - 65 yo African American male
• CC: diagonal binocular diplopia at distance and near 6 months when looking left or right and has been associated with ocular symptoms
• Sinus congestion has been getting worse over the last few years

• Postnasal drip
• Allergies
• Medications: Insulin, Metformin, Lancet, HCTZ/Spray

FOLLOW-UP EXAMS

8/26/11

• Patient M.B. returns after an emergency patient complaining of dull pain with eyelid swelling OD • 2 days
• 4/10 pain occurring above the forehead, worse with palpation
• Diplopia remains the same
• All clinical testing is stable except for mild redness of the right upper lid
• Pain is attributed to sinuses
• Plan: obtain the previously ordered MRI and RCT following MRI 9/8/11

10/24/11

• Patient M.B. returns stating some improvement in diplopia since starting the medications prescribed by ENT
• Clinical testing remains the same except his OD ON eye only has slight restriction in all superior gazes (90% motility) and MidoBasal has improved at distance

11/18/11

• Patient M.B. returns with no change in diplopia from previous visits
• All clinical findings including DFE: no signs of optic nerve compression remain stable except there is now slight restriction in superior gaze OD (90% motility)
• MRI: 24-2 essentially full OD; OS
• Plan: Monitor in 1 month, surgery scheduled for 12/9/11

DIAGNOSIS

This patient was diagnosed with binocular diplopia secondary to a right posterior-frontal sinus mucocele with orbital involvement including bony erosion & superior rectus/possible optic nerve involvement.

Orbital musculocele:
• A benign, slowly expanding, chronic cyst of the sinus that secretes mucous
• Occurs when a sinus is obstructed
• Displace/deform structures by pressure and bone retraction and remodeling
• Mucous secretion increases pressure on bony orbit leading to thinning and erosion
• Erosion of bony orbit allows mucous to expand into orbital cavity
• Can extend into the orbit, surrounding sinuses, nasal canal, canthus, or skin
• Proptalgia, intermittent – 1, and TNF have been found at the junction between bone and mucous
• Results from congenital anomalies, inflammation, infection, surgery/truma, allergic, mass lesion
• Usually chronic sinusitis, trauma, surgery
• Made of clear or yellow, thick mucus and lined with respiratory epithelium with no evidence for malignant change
• Surgery is the most common sign of a frontal mucocele
• Proptosis, eye pain, and reduced vision but less common with frontal mucous
• Eye involvement may be the first sign of a mucocele
• Rarely nasal symptoms
• CT or MRI
• CT: for showing bony erosion or mucous, swollen up as hyperdense mass
• MRI: differentiates mucous from other tumors

OUTCOME

Patient M.B. presented to remove the frontal sinus mucocele on December 8, 2011. It was a combined external-endoscopic surgical approach. He returned both December 2011 and February 2012 for follow-up eye appointments. Eye findings were normal, and he reported no longer having diplopia.

TREATMENT

Treatment generally requires complete surgical removal of the cyst
• Reversing the path for proper drainage
• Destruction of the sinuses needed
Two surgical approaches:
• External – incisions on the face and/or in the mouth, rarely used
• Better visualization of sinuses
• Endoscopic – small telescopic device placed in the nose without any incisions
• Surgery on NP’s sinuses
• Determined by otolaryngologist

CONCLUSION

Orbital sinus mucocele should be a differential diagnosis in patients with signs and symptoms consistent with an orbital mass who have a history of chronic sinus infections. Treatment involves complete surgical removal of the mucocele as well as management of sinuses.

REFERENCES

References available upon request.

Atypical presentation of a frontal sinus mucocele with diplopia & ocular pain

Nico M. Kosciuk, O.D.

Jesse Brown VA Medical Center & Hines VA Hospital

Ilinois, Chicago, IL

3241 S. Michigan Ave

Contact Information

Nicole Kosciuk
3241 S. Michigan Ave

Chicago, IL 60616

nicole.kosciuk@va.gov

www.ico.edu
The relationship between visual skills and athletic performance has not been well established in the literature. Several epidemiological studies suggest that the athletic population has a significant need for vision care. American Optometric Association (AOA) Sports Vision Section has addressed this need by developing sports vision specific testing which can help assess an athlete’s visual profile for each particular sport and also determine particular areas of weakness or strength. Recently there has been an increased awareness and discussion of sports-related concussion. A concussion is defined as an insult to the brain caused by an external physical force that may produce a diminished or altered state of consciousness that results in impairment of cognitive abilities or physical functioning and/or a disturbance of behavioral or emotional functioning. This type of injury can result in damage to any part of the visual system. As a result, patients who present with concussion commonly have a wide array of visual complications including accommodative, ocularmotor, and binocular dysfunctions as well as photosensitivity, strabismus, and visual field loss. The goal of this investigation is to define normative values for sports vision testing and establish a comprehensive baseline that can be used to evaluate the effects of concussion on the visual system as they relate to athletic performance. The testing battery will serve as a baseline for comparison after an athlete is concussed.

INTRODUCTION

The relationship between visual skills and athletic performance has not been well established in the literature. Several epidemiological studies suggest that the athletic population has a significant need for vision care. American Optometric Association (AOA) Sports Vision Section has addressed this need by developing sports vision specific testing which can help assess an athlete’s visual profile for each particular sport and also determine particular areas of weakness or strength. Recently there has been an increased awareness and discussion of sports-related concussion. A concussion is defined as an insult to the brain caused by an external physical force that may produce a diminished or altered state of consciousness that results in impairment of cognitive abilities or physical functioning and/or a disturbance of behavioral or emotional functioning. This type of injury can result in damage to any part of the visual system. As a result, patients who present with concussion commonly have a wide array of visual complications including accommodative, ocularmotor, and binocular dysfunctions as well as photosensitivity, strabismus, and visual field loss. The goal of this investigation is to define normative values for sports vision testing and establish a comprehensive baseline that can be used to evaluate the effects of concussion on the visual system as they relate to athletic performance. The testing battery will serve as a baseline for comparison after an athlete is concussed.

METHODS

Twenty-two male Major League Soccer athletes ages 18-35 were tested on 21 sports vision related tests including:

- History
- Visual acuity
- Pupillometry
- Near Lancaster
- Cover test
- Near point of convergence
- Color vision
- Stereopsis
- Autorefraction/refractometry
- Accommodative amplitudes at distance
- Howard Dolman Depth Perception
- Wisconsin Sports Vision Project (WSPV) Darteccor
- Eye Dominance test
- Visagraph III fixation, saccades and reading profile
- Tachistoscope
- Vision and balance
- Wayne Saccadic Fixator
- Proaction and handspeed
- Color vision
- Visual acuity
- Near point of convergence
- Cover test
- Pupillometry
- Internal eye health evaluation
- Grade Level Efficiency
- Directional Attack Difficulty (%)
- Reading Rate (Words Per Minute)
- Average Span of Recognition
- Regressions/100 words
- Fixations/100 words
- Visagraph Reading

RESULTS

Average values and standard deviations were established for the sports vision performance tests where appropriate (or that had numerical data). (Figures 1-9 show the data from Table 1). Criteria for failure of history, near point of convergence, distance accommodation amplitudes, Frequency/Dividing Technology automated perimetry, Tachistoscope testing, Howard Dolman Depth Perception and ocular health assessment can also be found in Table 1. Visagraph testing was performed and findings can be seen in Table 2.

CONCLUSION

Clinically significant numbers of the professional athletes in this study cohort demonstrated problems with visual acuity, ocular health, binocular vision, and exhibited visual symptoms. The visual performance testing established normative data for this population and may help determine how deficits in these visual skills may interfere with optimum athletic performance at the elite level. As the diagnosis and management of concussions in sports becomes more scrutinized, this battery of sports vision tests can serve as a baseline for comparison after an athlete is concussed to determine if and when he/she is ready to return and perform at pre-concussive levels.

REFERENCES


Table of Contents

Sports Vision Evaluation Findings in an Elite Athlete Population


Illinois College of Optometry/Illinois Eye Institute

Chicago, IL
Progressive outer retinal necrosis (PORN) can be a visually devastating disease. Most often associated with varicella-zoster virus (VZV) and seen in immune-compromised hosts, possible complications of PORN include rapid necrotizing retinopathy with macular involvement, optic neuropathy, and ultimately, secondary retinal detachment. If diagnosed early and treated aggressively, visual complications can be prevented; however, there is no current consensus on the most appropriate antiviral regimen.

CASE REPORT
A 52-year-old African American male presented to Urgent Care Service with a chief complaint of floaters OU of two weeks duration. He denied flashes, curtain or other vision loss. His medical history was positive for diabetes and he was recovering from a recent bout of “chickenpox” with facial scarring secondary to lesions. Best corrected vision was 20/20 OD, OS. Slit lamp examination, ocular motility, and pupil testing were normal. Dilated fundus exam for the posterior pole was unremarkable in both eyes. Peripheral examination showed confluent areas of peripheral retinal necrosis with trace vitreous in both eyes.

A presumptive diagnosis of PORN was made and the patient was immediately admitted to the hospital where he was promptly started on intravenous (IV) acyclovir. The patient disclosed to hospital staff he had recently undergone HAART treatment. Blood work revealed CD4+ count of 84. A presumptive diagnosis of HIV positive and currently undergoing HAART treatment. Prophylactic barricade laser photocoagulation was applied to the peripheral retina in each eye shortly after admission. 1 of 5 treated retinas detached compared to 4 of 4 untreated retinas.

Barricade laser in combination with IV and intravitreal antivirals also shows promise. Scott et al performed barricade laser in combination with IV and intravitreal antivirals and what treatment should be initiated. The largest study investigating PORN treatment was by Engstrom et al. They showed that with IV acyclovir and/or ganciclovir 42 of 63 eyes progressed to NLP within 4 weeks. Barricade laser for prevention of retinal detachment was not effective either, as only 1 of 14 treated eyes remained attached. Other treatment options, IV and intravitreal antivirals, are more promising as Ciulla et al showed that 5 of 12 eyes treated with both IV acyclovir and ganciclovir, intravitreal forskarnet, and ganciclovir had acuity of 20/20 or better. Barricade laser in combination with IV and intravitreal antivirals also shows promise: Scott et al performed barricade laser in combination with IV and intravitreal treatment, 1 of 5 treated retinas detached compared to 4 of 4 untreated retinas.

CONCLUSION
This case demonstrates that if diagnosed and treated aggressively, visual complications of PORN can be avoided. Due to the low incidence of PORN, consensus has not been reached as to when treatment should be initiated. The largest study investigating PORN was by Engstrom et al. They showed that with IV acyclovir and/or ganciclovir 42 of 63 eyes progressed to NLP within 4 weeks. Barricade laser for prevention of retinal detachment was not effective either, as only 1 of 14 treated eyes remained attached. Other treatment options, IV and intravitreal antivirals, are more promising as Ciulla et al showed that 5 of 12 eyes treated with both IV acyclovir and ganciclovir, intravitreal forskarnet, and ganciclovir had acuity of 20/20 or better. Barricade laser in combination with IV and intravitreal antivirals also shows promise: Scott et al performed barricade laser in combination with IV and intravitreal treatment, 1 of 5 treated retinas detached compared to 4 of 4 untreated retinas.

REFERENCES
BACKGROUND
Numerous studies reporting the changes in intraocular pressure (IOP) after phacoemulsification with intraocular lens (IOL) implantation have been published. Many of the studies have conflicting results so it is hard to be sure how much the IOP is actually reduced as well as the actual mechanism behind the reduction. Most research reports between 2-4 mm Hg intraocular pressure (IOP) reduction in open angle glaucoma patients which remains stable for the first several years post-surgery. Results of older studies don’t directly apply today because of advances in surgical techniques and intraocular lens technology. Many studies also combine angle closure glaucoma and open angle glaucoma subjects so they tend to overestimate the IOP reduction after cataract surgery as angle closure glaucoma is known to have greater the IOP reduction after surgery. The etiology shown that the higher the IOP before surgery, the IOP reduction following cataract surgery with IOL implantation are as follows:

DISCUSSION
Our patient’s decrease in IOP was larger than most of the current literature suggests. However, studies have been made over the past 15 years with a variety of medications and was currently using Xalatan oph and Combigan oph with an IOP of 15 OD and 15 OS. Best corrected visual acuity was 20/30 OD and 20/30 OS. Biomicroscopy revealed 3+ nuclear and 1+ cortical cataracts in both eyes. Gonioscopy showed trabecular meshwork in all 4 quadrants of both eyes. After surgical consultation, the patient elected to have phacoemulsification cataract surgery in both eyes which was uncomplicated. Approximately 4 months after the initial surgery and 2 months after the second surgery, the patient presented for follow-up. The patient maintained the surgeon’s instructions and instead of discontinuing the medications associated with the cataract surgery, she also discontinued her glaucoma medications for 1 week prior to the appointment. Her IOP at the visit was 15 OD and 15 OS. Intraocular pressure 1 month later was 14 OD and 15 OS and 2 months later 16 OD and 17 US without treatment. Because of a possible progression in the visual field, Xalatan was restarted in the OS only. About three years after cataract surgery her IOP has increased to 20 OD and 20 US while taking the Xalatan OI.

CONCLUSIONS
All the mechanisms for IOP reduction after cataract surgery are somewhat speculative. None of the proposed mechanisms explains all the results, which are still somewhat variable, so it is likely a combination of the mechanisms as well as the different anatomy and physiology of individual eyes.

REFERENCES

CONTACT INFORMATION
Annie Rozwat, O.D.
arozwat@ico.edu
www.ico.edu
Bilateral Peripapillary Choroidal Neovascularization Presenting as Polypoidal Choroidal Vasculopathy

Shelly Byun, OD; Stephanie Hlemeinc, OD
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL

INTRODUCTION
Myopic macula schisis is the separation of the inner layers of the retina from the outer layers due to progressive physiological elongation of a myopic eye and/or posterior staphyloma formation. Although the development of macula schisis in a myopic eye is not uncommon, the condition often goes unrecognized because it is difficult to detect based on examination alone. However, technological advances in the development of the ocular coherence tomography (OCT) has provided an assistance in the detection of the condition. An electroretinogram (ERG) is also helpful in detecting the extent of damage to the various layers of the retina involved in this condition.

BACKGROUND
Polypoidal choroidal vasculopathy (PCV) is characterized by abnormal branching of vascular networks in the chorio-capillaris associated with angiomatous dilations causing serous retinal leakage and hemorrhage. Choroidal lesions vary in size and location, but are most commonly found in the peripapillary region, followed by the macular and midperipheral regions. Once considered a rare condition, it has been reported that PCV may occur in all races, but most often in heavily pigmented individuals, with men and women being equally affected. Its incidence is also higher in patients with hypertension, diabetes mellitus, and/or posterior staphyloma formation. Although the prevalence of polypoidal choroidal vasculopathy is considered age-related, the condition is also seen in patients with other conditions such as angiod streaks, melanocytoma. Lesions are typically bilateral, although unilateral cases have been reported.

CONCLUSION
Polypoidal choroidal vasculopathy is a condition that was once considered a rare disease. However, the prevalence is often underestimated due to the rate of misdiagnosis. The recurrent nature of the abnormal choroidal vessels creates a challenge in managing and treating patients with PCV. It is important to educate the patient about the recurrent nature of the condition and monitor closely for any changes.

REFERENCES

CONTACT INFORMATION
Shelly Byun, OD
3241 S. Michigan Ave
Chicago, IL 60616
sbyun@ico.edu
www.ico.edu
Cerebral venous sinus thrombosis (CVST) is an uncommon cause of pseudotumor cerebri (PTC). CVST has been identified in up to 9.4% of PTC cases. Patients are often undiagnosed at initial presentation due to the variability in clinical presentation. Risk factors, clinical signs, and symptoms are similar between CVST and idiopathic intracranial hypertension (IIH). An important distinction between CVST and IIH is an increased mortality rate secondary to cerebral hemispheric, pulmonary embolisms, and brain herniation in patients with CVST. Magnetic resonance venography (MRV) is the investigation of choice to confirm the diagnosis. CVST and IIH are differentiated based on clinical signs and symptoms alone. The variability in clinical presentation for CVST patients lends to the difficulty in diagnosis. And, although the variability in clinical presentation for CVST patients leads to the difficulty in diagnosis, it is important to note that the mortality rate secondary to cerebral hemorrhage, pulmonary embolism, and brain herniation in patients with CVST is higher than previously reported. Acetazolamide (DiamoxTM) is the first-line drug in the treatment of PTC. It acts by decreasing cerebral spinal fluid (CSF). However, this patient was started on topiramate (TopamaxTM). Topamax is a weak carbonic anhydrase inhibitor that is FDA approved for the treatment of seizures and prevention of migraines. It is a newer medication that has also been used in the treatment of PTC. It reduces CSF and causes dose-dependent weight loss as a result of loss of appetite and decreased thirst. However, acute myopia and angle-closure glaucoma are important side effects to consider before initiating therapy. Although there are a few studies to be efficacious and well-tolerated by patients, larger, placebo-controlled trials are needed to ascertain the efficacy of topiramate in the treatment of PTC. However, weight loss remains the most important treatment for patients with PTC.

**REFERENCES**


**HEADACHE AS THE PRESENTING SYMPTOM OF CEREBRAL VENOUS SINUS THROMBOSIS**

Shirly Byun, OD, Leonard Messner, OD
Illinois College of Optometry/Illinois Eye Institute
Chicago, IL

**BACKGROUND**

Headache as the Presenting Symptom of Cerebral Venous Sinus Thrombosis

A 42 year old African American female presented to the clinic with a frontal headache that began 4 months prior.

Medical History: Hypertension, controlled with medication and on allergy to sulfa medication.

Best corrected VA: Right 20/20 OD and OS

DME: Bilateral disc edema with small cup to disc ratios and no hemorrhages (Figure 1).

DFE: WNL.

Visual fields: VPL.

Additional testing: MRA/MRV was ordered ruling out a space occupying lesion (Figure 2). The MRV showed a left venous sinus thrombosis.

**CASE SUMMARY**

**Diagnosis:** Pseudotumor cerebri secondary to left venous sinus thrombosis

**Treatment:** The neurologist initiated treatment with Topamax and the patient was placed on a weight loss program with a nutritionist.

**CONCLUSION**

It is difficult to differentiate between idiopathic intracranial hypertension and cerebral venous sinus thrombosis based on clinical signs and symptoms alone. The variability in clinical presentation for CVST patients leads to the difficulty in diagnosis. And, although the variability in clinical presentation for CVST patients leads to the difficulty in diagnosis, it is important to consider CVST due to the variability in clinical presentation for CVST patients and its potential for contributing to this variability. Cadaver studies have shown that 1 in 4 cadavers had an absent lateral sinus and there was major variability in the caliber of the cerebral sinuses. The unaffected transverse sinus may also compartmentate for the thrombotic sinus. Therefore, the incidence of CVST in the normal population is likely higher than previously reported.
Rehabilitation of Homonymous Hemianopia Through Eli Peli Field Expansion Lenses.

Sonal R. Pandya O.D.
Jesse Brown VA Medical Center – Hines VA Hospital

INTRODUCTION

Eli Peli expansion prism (EP) lenses are an effective therapy in patients with hemianopia by providing obstacle avoidance and overall improved mobility, allowing up to 30 degrees of binocular visual field expansion.

CASE HISTORY

A 77 year old African American male presents for a low vision evaluation with a chief complaint of “bumping into things on his left side”.

Medical History:
- Hypertension
- Multiple cerebral-vascular accidents of the right occipital lobe in 2004 and 2011
- Hypothyroidism
- Depression
- Chronic Renal Insufficiency
- Gouty arthritis
- Congenital Heart Failure
- Cataracts
- Congestive Heart Failure
- Gout
- Depression
- Hyperlipidemia
- Hypertension

ANCILLARY TESTING

Goldmann visual fields demonstrate a left incongruous incomplete homonymous hemianopia attributed to his multiple CVAs that had progressed from his previous GVF in 2005.

CLINICAL FINDINGS

Best corrected visual acuity is 20/20 in both eyes. Pupils are round, reactive to light with no afferent pupillary defect. Exotropia measures 14 degree in both eyes and confrontation visual fields yield a left complete homonymous hemianopia in the right eye and a left incomplete homonymous hemianopia in the left eye. Cover testing shows a 25 prism diopter alternating exotropia.

Anterior segment examination is unremarkable with intraocular pressures measuring 14 mmHg in both eyes. Dilated fundus examination reveals no nuclear sclerosis in both eyes but is otherwise unremarkable. Clinical examination warranted Goldmann visual field (GVF) for further evaluation.

TREATMENT AND MANAGEMENT

After the low vision exam, treatment recommendations included EP lenses in conjunction with scanning therapy. Scanning therapy encompasses three simple but fundamental steps necessary for successful mobility: First and foremost, when scanning, one must stop in place. Secondly, patients are instructed to turn their heads a full 360 degrees towards the affected side. Lastly, patients are advised to scan into the defect with large saccadic movements. Once our patient was proficient in these steps of scanning therapy, EP expansion lenses were applied. At first, 40∆ base out Fresnel prism was adhered to the upper portion of the lens, on the side of the visual field defect. After additional training and two weeks of successful adaptation, another 40∆ base out Fresnel prism was adhered to the lower portion of the lens. Prior to dispensing, the patient was trained to focus through the central prism-free portion of the lens to detecting peripheral images induced by the prism. Six weeks after the application of the first prism, he had successfully adapted to the lenses, noting improvement in obstacle avoidance as well as peripheral awareness. Due to his good outcome, permanent ground in prism segments were made into his habitual prescription. Additionally, these lenses have worked since its introduction into 57∆ diopter horizontal and oblique variations.

ACKNOWLEDGEMENTS

REFERENCES
Ectopia lentis, or lens subluxation, can be the result of trauma, systemic conditions like Marfan’s syndrome or homocystinuria, or as an isolated idiopathic condition. Ocular complications from a subluxed lens in children may result in:

- Leukocoria
- an increase in antimetropia
- amblyopia
- phakolytic glaucoma
- uveitis
- lens displacement into the anterior or posterior chamber

Typically, if contact or spectacle lenses cannot suitably correct the ametropia, aphakia can be used to increase the size of the aphakic zone or a lensometry may also be considered.

## Background

**Ectopia lentis**

- Ectopia lentis OD, OS – mother
- Full term with unremarkable medical history
- Lens displacement into the anterior or posterior chamber

See Table 1

- Phacolytic glaucoma
- Amblyopia

Typically, if contact or spectacle lenses cannot suitably correct the ametropia, aphakia can be used to increase the size of the aphakic zone or a lensometry may also be considered.

### Treatment and Management

- **Ectopia lentis**
  - Amblyopia, Ectopia lentis OD, OS – mother
  - Full term newborn with unremarkable medical history

See Table 1: Exam Findings

- Cycloplegic refractions:
  - Cycloplegic refraction yielded 2 different prescriptions:
    - A compound myopic astigmatic prescription through her lens
    - A hyperopic prescription with a lower astigmatic component through her aphakic zone

See Table 2: Visual Acuity - Uncorrected, Aphakic and Phakic Corrections

- Cycloplegic refraction yielded 2 different prescriptions:
  - A compound myopic astigmatic prescription through her lens
  - A hyperopic prescription with a lower astigmatic component through her aphakic zone

See Table 2: Visual Acuity - Uncorrected, Aphakic and Phakic Corrections

### Follow-Up

- No surgical correction recommended at this point secondary to adequate vision with SFXs
- Placed both cycloplegic prescriptions for FTW

See Table 3: Visual Acuity with Contact Lenses vs Spectacle Lenses

### Discussion

- This case is unusual, as the patient preferred to use her aphakic zone to see despite expectations that the largest, central phakic zone be used. Her corrected acuities were better in the aphakic zone by 4 lines OD and 3 lines OS, and acuities were further improved by use of contact lenses.
- The future, as her pupils decrease in size, the addition of aphakia may be necessary to maintain her vision through her aphakic zone.
- Although this patient tested negative for homocystinuria, genetic testing was advocated to further rule out other systemic disease. It is especially important to rule out mutations in the FBN1 gene, which according to the Ghent system is diagnostic for Marfan’s syndrome, an autosomal-dominant connective tissue disorder that involves the ocular, cardiovascular and skeletal system. Even in the absence of dermatological or skeletal features typical of Marfan’s syndrome, genetic testing may diagnose individuals at risk for related life-threatening cardiovascular complications that present solely with bilateral ectopia lentis.

### Clinical Pearls

- Surgical consultation: risks including post-operative inflammation, retinal detachment, strabismus and amblyopia must be considered.
- Consider acuity with both aphakic and phakic prescriptions
- Use an appropriate working distance to prescribe an ADD with aphakic prescription
- Even if sole presentation is ectopia lentis, consider genetic testing to rule out Marfan’s.
- Consider contact lenses to decrease magnification or miscalculation seen with spectacle lenses

Proper counseling regarding myopia risk and full time spectacle or contact lens use

### References


### Table 2: Visual Acuity - Uncorrected, Aphakic and Phakic Corrections

<table>
<thead>
<tr>
<th>Lens Type</th>
<th>Uncorrected</th>
<th>Aphakic</th>
<th>Phakic</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD</td>
<td>20/40</td>
<td>20/20</td>
<td>20/20</td>
</tr>
<tr>
<td>OS</td>
<td>20/30</td>
<td>20/20</td>
<td>20/20</td>
</tr>
</tbody>
</table>

### Table 3: Visual Acuity with Contact Lenses vs Spectacle Lenses

<table>
<thead>
<tr>
<th>Lens Type</th>
<th>Contact Lenses</th>
<th>Spectacle Lenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD</td>
<td>20/20</td>
<td>20/20</td>
</tr>
<tr>
<td>OS</td>
<td>20/20</td>
<td>20/20</td>
</tr>
</tbody>
</table>

### Table 1: Exam Findings

- Visual acuity: Uncorrected, Aphakic
  - OD: 20/20
  - OS: 20/20

- Visual acuity: Spectacles
  - OD: 20/20
  - OS: 20/20

### Figure 1

- External picture of inferior temporal lens positioning with attached zonules, OD. The phakic zone can be clearly seen as occupying the majority of the pupil area.

### Figure 2

- External picture of inferior temporal lens positioning with attached zonules, OS. The phakic zone can be clearly seen as occupying the majority of the pupil area.
Evaluation Validity of US Visual Processing Tests on English Speaking Trinidadian Children

Block, Sandra S. OD, MEd, FAAO, FCVO - Chicago, Illinois College of Optometry
Sandra E. Wang-Harris, OD, FAAO, Canelia Powdhar, Madelynn Applewhite-Waldron - Trinidad, University of the West Indies

Table of Contents

PURPOSE
This study investigated the validity of applying commonly used US visual information processing (VIP) tests to Trinidadian children. The study was conducted to determine if visual perceptual tests which were developed and standardized for North American children are valid for Trinidadian children.

WHAT IS BEING STUDIED?
Visual informational processing involves the ability to acquire and interpret information about the environment and is different from refractive errors. 2. Tests for the processing of visual information that were used in this study are; Test of Visual Perceptual Skills (TVPS-3), Gardner Reversal Frequency Test (GRFT), the Beery-Buktenica Developmental Test of Visual Motor Integration (VMI) and Developmental Eye Movement (DEM) tests.

WHY IS IT AN IMPORTANT QUESTION?
This study is seeking to determine if the data used in the USA to assess visual information processing skills can be applied to Trinidadian children.

METHODS
STUDY SAMPLE
Standard 3 students from two schools were recruited to be a part of the study. Students were eligible for the study if 1) consent was given by their parent or guardian; 2) the child was Standard Three; 3) the child had no known diagnosed intellectual or physical impairment; 4) the child had not been previously tested for visual processing skills; 5) the child was willing to participate, and attended one of two typical elementary schools in Trinidad. The subjects spoke English and attended one of two typical elementary schools which represent the general ethnic make-up of the island. The school followed the British mode of education.

RESULTS
A general comparison with one sample t-test revealed a statistically significant difference between the subjects and the US data for the TVPS and VMI. The mean standard score for 6 TVPS subtests (Table 1) and the VMI were below a scaled score of 10 (range 0-17) with the Spatial Relations subset at 11.1. Data from 60 subjects revealed that the scaled scores from item 7 of 7 subjects of the TVPS were normally distributed. Figures 4 and 5 demonstrate the distribution of the scores for the TVPS and VMI, respectively.

CONCLUSIONS
Caution is suggested in applying the current data to any student outside the US or even to foreign trained students until further studies are conducted. Further investigations are required for determining the reliability, sensitivity, specificity and causes for the lack of validity of the tests for English-speaking Trinidadian children.

LIMITATIONS AND ERRORS
1. Experimenter error: inconsistencies
2. Subject error: Fatigue, Distraction
3. Teachers critical analysis of student academic performance

REFERENCES

CONTACT INFORMATION
Contact Information
Sandra S. Block
sblock@ico.edu

Table 1: Comparison of teachers’ reporting of reading skills to academic performance reporting.

Table 2: Comparison of teachers’ reporting of reading skills to individual DEM results, showed the DEM had a sensitivity of 0.4 and specificity of 0.8.

Table 3: Comparison of teachers’ reporting of reading skills to individual DEM results, showed the DEM had a sensitivity of 0.4 and specificity of 0.8.

Table 4: Comparison of teachers’ reporting of reading skills to individual DEM results, showed the DEM had a sensitivity of 0.4 and specificity of 0.8.
Prevalence of Refractive Error in 6–7 Year Olds as Compared to 11–12 Years Old at the Chicago School-Based Vision Clinic

Sandra S. Block, OD, M Ed, FAAO, FCVO, Diplomate, Public Health and Environmental Vision Section
Melissa A. Suckow, OD - Illinois College of Optometry, Chicago IL

PURPOSE

This cross sectional study compared refractive errors in children 6–7 yrs of age to those 11–12 yrs seen at 80 all Princeton Vision Clinics in 2011. The study also looked at the differences in Hispanic and African American children at the 2 age ranges to see if the refractive error changes reflect changes seen in previous studies.

METHOD

The study consisted of a retrospective review of 5,232 children. Of those, 1,720 children were found to be 6–7 years of age or 11–12 years.

DEMOGRAPHICS

AGE

All 5,032 students seen during 2011:

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>6–7 year olds</td>
<td>542</td>
<td>90.4</td>
</tr>
<tr>
<td>11–12 year olds</td>
<td>1036</td>
<td>92.5</td>
</tr>
</tbody>
</table>

CONCLUSIONS

This study confirmed that the children in the midwest show the same myopic shift from younger age groups to the older age group that has been reported in other studies.

In addition, while race for AA or H children alone does not appear to impact the change in spherical equivalent with age, age and the combination or age and race do.

When looking at cylinder alone, race does have an effect.

The limitations of the study include the lack of longitudinal data and a convenience sample. Data will continue to be collected with the hopes of reporting more data in the future.

SUPPORTERS

Organizations: Alcon, Anonymous, Blue Cross and Blue Shield of Illinois, Chicago Community Trust, Good-Life, Grant Healthcare Foundation, Keeler Instruments, Lloyd A. Fry Foundation, OneSight, Richmond Products, Star Optometric Instruments, Vision Assessment Corporation, Volk, along with individual donors.

CONTACT INFORMATION

Sandra S. Block
sblock@ico.edu
www.ico.edu

Table of Contents
Proper wear of contact lenses is essential to the eye health and successful wearing experience of the contact lens patient. Education of the patient concerning lens wear and maintenance, and their understanding of the potential consequences of non-compliance, have been extensively studied and appear to be directly correlated with the levels of success or failure. The education provided at the initial fitting must be reinforced at subsequent follow-up visits to selectively the important message of compliance, as studies show that patients may be non-compliant because they do not understand the scientific reasons behind utilizing the correct procedures. Thus, the primary goal of this study was to investigate and compare the overnight contact lens wearing habits between optometric students at the Illinois College of Optometry. The presumed hypothesis was that students who were given extensive, factually based scientific information in a classroom setting would be more likely to be compliant in their own contact lens wear schedule as compared to those who had yet to be introduced to that coursework.

### Methods

The four classes at the Illinois College of Optometry were separated into two population groups. The first group (Group A) was comprised of the 165 members of the graduating Class of 2015 (3rd year) and 165 members of the Class of 2012 (4th year) who had taken at least one required contact lens course at the Illinois College of Optometry. A Zoomerang survey (Fig 2) was sent via e-mail to determine the two groups’ contact lens wearing habits as well as their knowledge of their habitual lenses approved wear schedule.

### Results

![Fig 3](image)

A total of 67/662 surveys were completed (10.1%). Group A contained 31 students (46.2%) and Group B contained 36 students (53.7%).

- Approximately 22.6% (n=7) of students in Group A were considered non-compliant contact lens wearers, which was similar to the non-compliance rate of 25% (n=9) in Group B. 67% of Group A members (n = 112) who had been educated to remove their lenses prior to sleeping indicated that they did not, and slept with lenses on, which again was similar to 58% seen in Group B members (n=12). (Fig 3)
- More members of Group A wore silicon hydrogels than standard hydrogels (59% vs 41%). 20% more members of Group B wore standard hydrogels than silicon hydrogels (59% vs 41%), while more members of Group B wore extended or overnight wear?

### Conclusion

The working hypothesis was that upperclassmen that had received a formal contact lens class in their didactic curriculum, which included discussion of the different types of contact lens brands, materials and wearing schedules as well as potential negative consequences of soft lens extended wear such as corneal neovascularization and microbial keratitis, would be more compliant with their own lens wear schedule than their lower classman colleagues whose knowledge about proper contact lens wear and the risks of non-compliance was likely equivalent to that of a typical patient. However, at least with this small sampling, it appears that formal didactic education does not translate into greater compliance in an optometric student population. They also were not more likely to know if their lenses were approved for extended use. An explanation could be in the subjects themselves, even the students in the early part of the optometric program may be more cognizant of anything ocular related, and ask more questions of their doctors, teachers and classmates than an average clinical patient. Another explanation could be the small sample size. Therefore, with such a small survey-response rate it is difficult to determine statistical significance and extrapolate to the general population whether or not extensive patient education would improve patient behavior as it relates to contact lens wear.

### Contact Information

Elyse L. Chaglasian, OD, FAAO
ecchaglas@ico.edu
www.ico.edu

---

#### Table of Contents

1. Please indicate your gender: 
   - Male
   - Female
2. Please indicate your ICO graduation year: 
   - 2012
   - 2013
   - 2014
   - 2015
3. Do you currently wear soft contact lenses? 
   - Yes
   - No
   - c. Don’t remember
4. What type of soft contact lenses do you wear? 
   - a. Soft hydrogel lenses (SHL)
   - b. Silicone hydrogel lenses (SIL)
   - c. Don’t know
5. When fit for contact lenses, were you specifically instructed (by your doctor or doctor’s representative) to remove them before sleeping? 
   - Yes
   - No
   - c. Don’t remember
6. Do you ever wear your soft contact lenses while sleeping for periods longer than two hours? (if No, proceed to Question 9) 
   - Yes
   - No
    
7. If yes, how often do you do so? 
   - a. Very often
   - b. Often
   - c. Sometimes
   - d. Rarely
   - e. Never
   - All the time
8. If you wear your soft contact lenses while you sleep, for approximately how many nights per week? 
   - a. 1-2
   - b. 3-4
   - c. 5-6
   - d. 6-7
9. To the best of your knowledge, are your soft contacts approved for extended or overnight wear? 
   - a. Yes
   - b. No
   - c. Don’t know
10. What is the brand of your soft contact lenses? (write in) ____________________
11. What is the name of your soft contact lenses? (write in) ____________________

---

#### Fig 1

![Fig 1](image)

#### Fig 2

![Fig 2](image)

#### Fig 3

![Fig 3](image)

#### Fig 4

![Fig 4](image)
A patient presents with recurrent nodular scleritis initially unresponsive to multiple treatments. Lab work-up was ordered to rule out infectious or inflammatory etiologies especially collagen vascular disorders, which came back normal. Throat, urinalysis, CBC with differential were ordered to rule out leukemia and lymphoma, which were also normal. After careful examination, peripheral, scalloped deep stromal infiltrates with a 1.5mm clear zone in between the limbus and cornea in the right eye suggested a corneal immune ring likely caused by HSV. Thus, the development of a corneal immune ring lead to the correct etiology of herpes simplex virus and successful response to the anti-viral therapy resolving both the corneal immune ring and scleritis.

**BACKGROUND**

Corneal immune rings also known as the Wessely phenomenon is the result of systemically formed antibody diffusing into the cornea containing residual antigens. Another study describes the corneal immune ring as the reverse Wessely phenomenon where the antigen or soluble immune complex of antigen diffuses into a physiologically antibody-sensitized cornea, and remains due to a lack of corneal vascularization. Activation of complement by the immune complexes triggers cellular infiltration, resulting in the appearance of immune rings. Both models share common properties including corneal manifestations, where the initial peripheral corneal haze results in a sharply demarcated arc or ring, which then migrate toward the center of the cornea. The two theories differ in what is considered the predominant infiltrative cell type: neutrophils in the Wessely phenomenon but lymphocytes in the reverse Wessely phenomenon.

**PERTINENT FINDINGS**

1. Clinical findings
   a. BCVA: 20/20 OD, OS
   b. IOP: 23mmHg OD, 20mmHg OS
   c. Anterior segment examination was remarkable in the right eye for a corneal immune ring from 2:30-7 o’clock, mild corneal thinning with small refractile particles at 7 o’clock. Small stable area of stromal thinning nasally and a small nodule nasally with overlying 2+ injection. Left eye unremarkable.
   d. Posterior segment examination revealed 1+ nuclear sclerosis OD, OS, C:D: 0.5:0.1:0.5 OD, 0.5:0.3:0.5 OS. Posterior pole and periphery were unremarkable OD, OS.
   2. Laboratory studies
      a. CBC, differential, ANA, ESR, RHEUMATOPR, ACE, Lysozyme, HLA, RF, quantiferon Gold, ANCA, and albumin were all normal.
      b. Conjunctival culture revealed normal flora.

3. **DIFFERENTIAL DIAGNOSIS**
   a. Recurrent nodular scleritis secondary to herpes simplex virus
   b. Staphylococcal marginal keratitis
   c. Leukemia
   d. Lymphoma

4. **DISCUSSION**
   
   Corneal immune ring also known as the Wessely phenomenon is the result of systemically formed antibody diffusing into the cornea containing residual antigens. Another study describes the corneal immune ring as a reverse Wessely phenomenon where the antigen or soluble immune complex of antigen diffuses into a physiologically antibody-sensitized cornea, and remains due to a lack of corneal vascularization. Activation of complement by the immune complexes triggers cellular infiltration, resulting in the appearance of immune rings. Both models share common properties including corneal manifestations, where the initial peripheral corneal haze results in a sharply demarcated arc or ring, which then migrate toward the center of the cornea. The two theories differ in what is considered the predominant infiltrative cell type: neutrophils in the Wessely phenomenon but lymphocytes in the reverse Wessely phenomenon.

5. **TREATMENT/ MANAGEMENT**
   
   The patient was started on oral indomethacin 25mg TID PO for treatment of his recurrent scleritis, since the patient responded well during the first episode. Due to minimal response, the dosage of indomethacin was increased to 50 mg TID. Erythromycin qbedtime was continued. Following a significant improvement for both the corneal immune ring and scleritis, the patient remained symptomatic, and the clinical picture was more consistent with a corneal immune ring, usually caused by HSV. The patient was administered oral Acyclovir 800mg QID, and prednisolone acetate 1% QID OD was continued. A significant improvement for both the corneal immune ring and scleritis continued. Following a significant improvement for both the scleritis and immune ring to the initial dose of Acyclovir, the patient was tapered to a maintenance dose of 400mg BID. Unrecognized HSV infection can cause chronic scleritis. Thus, prolonged administration of acyclovir is required for effective therapy.

6. **CONCLUSION**
   
   Corneal immune rings can masquerade as peripheral staph marginal infiltrates. Thus, if the patient is not responding to treatment, consider corneal immune as part of the differential. Viral causes of scleritis are also often under diagnosed. Consider viral etiologies when scleritis does not respond to treatment or when the laboratory work up is negative. Effective management and treatment of ocular HSV disease is based on an understanding of the immune pathological mechanisms of corneal inflammatory disease initiated by the virus, the immunological mechanisms involved in recovery by the disease, as well as the host’s humoral and cellular immune status during virus latency and during recurrent episodes of infection.

**REFERENCES**

Utilization of Text Messaging in the Glaucoma Patient Population

Heather McLeod OD, David Simpson BS
Illinois College of Optometry, Chicago, IL

PURPOSE
Compliance and adherence to glaucoma treatment is suboptimal in more than half of patients. It is important to develop innovative and effective ways to increase the compliance of glaucoma patients. Automated text messaging has been shown in studies to increase rates of attendance to medical appointments and therefore may also be an effective tool to improve treatment compliance. Elderly people have lower ownership rates of mobile phones than the general population but the number is growing. A survey was developed to determine the percentage of glaucoma patients who own cell phones, receive text messages, and have an interest in text message reminders as a method for increasing compliance with treatment.

METHODS
Patients of the Glaucoma Clinic at the Illinois Eye Institute, who were receiving medical treatment for glaucoma, were asked to complete a 6 question survey about cell phone usage prior to their examination.

RESULTS
1. Do you have a cell phone? Yes – 62/85 No – 23/85
2. Do you carry it with you most of the day? Yes – 52/62 No – 10/62
3. Do you have the capability to receive text message on your cell phone? Yes – 41/62 No – 21/62
5. Would you want to receive free text messages to remind you to take your eye drops? Yes – 20/41 No – 21/41

CONCLUSIONS
A substantial number of glaucoma patients own cell phones and utilize text messaging. Automated text message reminders may be a cost effective and time efficient strategy to increase patient compliance with treatment. Further studies will investigate this hypothesis.

CONTACT INFORMATION
Heather McLeod, OD
hemcleod@ico.edu
www.ico.edu
BACKGROUND

Post-surgical contact lens fits can be difficult secondary to corneal irregularity and limited lens modality availability. Small or large diameter GP lenses are often required to correct the irregularity and provide stable vision. Custom soft lenses have played a limited role for these corneas due to limited parameters, materials, and lack of oxygen transmission. Today, there are more contact lens options available to optimize vision and comfort. Described here are 3 patients with irregular corneas following surgical procedures that failed with other lens modalities and were secondary to different corneal surgical procedures.

CASES

PATIENT 1

46 year old Caucasian female

History: Diagnosed with myopic astigmatism at a young age. She underwent LUXOR OU 15 years prior and had an enhancement OD last year. She had previously worn soft toric contact lenses. CC: She complained of decreased vision and ghosting of images throughout the day. Uncorrected visual acuities at distance: 20/30 OD, 20/10 OS. Uncorrected visual acuities at near: 20/30 OD, 20/10 OS. Slit lamp photos demonstrating an acceptable fit with the RevitalEyes custom soft lenses made in the Definitive material. Paracentral steepening. Topography OD, s/p PKP, irregular astigmatism.

Figure 1 and 2: Topographies OD, OS showing central flattening and peripheral steepening.

Lens pair 1:

RevitalEyes BC POWER OAD VA
OD 8.7 +0.50-4.25x080 20/50 Add +2.50 46.94/57.14 @141
OS 8.7 plano-1.50x150 20/20

Figure 3, 4, and 5: Slit lamp photos demonstrating an acceptable fit with the RevitalEyes lens.

The right and left lenses fit well and the patient was very comfortable. The patient reported that the clarity of vision would often fluctuate throughout the day. The lenses were re-ordered with an increased center thickness which improved the patient’s quality of vision.

PATIENT 2

56 year old Asian male physician

History: Underwent a PKP OD 18 years ago secondary to an ocular infection s/p trauma. He had attempted GP and hybrid lenses in the past. Significant discomfort, pain and redness were noted when wearing contacts. CC: blurred vision, slight discomfort, unstable lenses. Presented wanting new spectacles for work. Previous contact lens intolerance caused hesitation towards new lenses.

SRX            VA   Add  Sim Ks
OD +4.25-6.00x077 20/30 +2.50 33.14/44.56 @158
OS -0.50-0.75x165 20/20 38.78/40.32 @096

Image distortion was evident with the refraction.

Figure 6: Topography OD, s/p PKP , irregular astigmatism.

Lens 1:

RevitalEyes BC POWER OAD VA
OD 8.1 +1.25-6.00x070 14.8 20/25

Figure 7: Slit lamp photo demonstrating an acceptable fit with the RevitalEyes lens.

The patient is now wearing the lens comfortably for 14 hours a day. The lens provided improved stable acuity throughout the day.

PATIENT 3

A 16 year old Caucasian male

History: Presented for a contact lens fit OS following a full thickness penetrating corneal accident in chemistry class. CC: blur with SRx alone, would like to improve vision with contact lenses. He has worn soft toric lenses prior to the accident.

SRX            VA   Sim Ks
OD +4.25-6.00x077 20/30 +2.50 46.94/57.14 @141
OS -0.50-0.75x165 20/20 38.78/40.32 @096

Figure 8: Highly irregular corneas s/p full thickness corneal laceration repair OD.

Lens 1:

RevitalEyes BC POWER OAD VA
OD 8.1 +1.25-6.00x070 14.8 20/25

Vision improved to 20/25 with the 8.1 lens.

Figure 9 and 10: Slit lamp photos demonstrating an acceptable fit with the RevitalEyes lens.

Several lenses were re-ordered secondary to changing astigmatism after suture removal. He is now able to wear the lenses comfortably daily for twelve hours.

CONCLUSION

Three patients with irregular corneas secondary to different corneal surgical procedures who had previously failed with other lens modalities were successfully fit with the RevitalEyes post-surgical custom soft lens. The RevitalEyes post-surgical reverse geometry custom soft lens in the Definitive material can be made to order in a variety of base-curves and diameters to offer post-surgical patients good vision and comfort while maintaining optimal corneal health. The center thickness can be altered to decrease lens fissure. Depending on the surgical procedure, it may be necessary to start with a base curve slightly steeper than or flatter than the recommended fitting guide (6.4mm) to provide lens stability. With a wide range of powers and base curves available, post-surgical patients can be successfully fit with the RevitalEyes custom soft lenses that provide adequate oxygen to the cornea, optimal ocular health, maximal comfort, and clear vision.

Jennifer S. Harthan OD, FAAO
Illinois College of Optometry, Chicago, IL

Table of Contents
INTRODUCTION

A review of two cases involving five year old male patients who presented to our clinic, each failed a school vision screening. Both patients revealed very high degrees of hyperopia with moderate degrees of astigmatism. Patient I presented with a binocular and equal decrease in visual acuity. Patient II had a monocular decrease in visual acuity represented by deep amblyopia in the left eye. At initial presentation neither patient had an apparent strabismus. After nine months of follow up both cases revealed monocular, strabismic amblyopia and a microtropia. Constant central suppression of the amblyopic eye with peripheral fusion and no stereopsis was found.

The need for extended follow up in order to achieve the most accurate amblyopia diagnosis

Valerie M. Kattouf OD, Briva A. Kadakia OD
Illinois College of Optometry, Chicago, Il

CONCLUSIONS

The proper diagnostic and treatment decisions for an amblyopic patient depend upon the determination of the type of functional amblyopia. Patient I’s high equal, uncorrected refractive error could have easily formulated a diagnosis of Isometropic Amblyopia. Patient II’s high unequal, uncorrected refractive error could have easily formulated a diagnosis of Anisometropic Amblyopia. The eventual outcome of the monocular decrease in visual acuity in both patients led to the proper diagnosis of Strabismic Amblyopia. The conclusion that each patient had strabismic amblyopia allowed for the correct prognosis and treatment plans to be developed. Using the proper test battery to detect the small angle strabismus was crucial in developing goals for occlusion therapy and additional treatment options in amblyopia.

Table of Contents

INTRODUCTION

A Two Case Report

The need for extended follow up in order to achieve the most accurate amblyopia diagnosis

Valerie M. Kattouf OD, Briva A. Kadakia OD
Illinois College of Optometry, Chicago, Il

CONCLUSIONS

The proper diagnostic and treatment decisions for an amblyopic patient depend upon the determination of the type of functional amblyopia. Patient I’s high equal, uncorrected refractive error could have easily formulated a diagnosis of Isometropic Amblyopia. Patient II’s high unequal, uncorrected refractive error could have easily formulated a diagnosis of Anisometropic Amblyopia. The eventual outcome of the monocular decrease in visual acuity in both patients led to the proper diagnosis of Strabismic Amblyopia. The conclusion that each patient had strabismic amblyopia allowed for the correct prognosis and treatment plans to be developed. Using the proper test battery to detect the small angle strabismus was crucial in developing goals for occlusion therapy and additional treatment options in amblyopia.

Table of Contents
The limits of agreement (LoA) between the Pelli–Robson test and the CSV-1000

Susan A. Kelly, Yi Pang, Dana Richter, Calvin Vance, Becky Yang, David McIntosh
Illinois College of Optometry, Chicago, IL

PURPOSE
The PR letter chart is a well-designed test that measures the CS of letters that are large and comprise a stimulus between 2 and 5 cycles per degree (cpd). However, the PR test has not been directly compared with the CS measures obtained with sinusoidal stimuli. When clinicians measure CS they usually use one test or the other but not both. Thus it is of interest to determine how well the two measures of CS agree. In this study we measured the limits of agreement (LoA) between the PR letter contrast sensitivity test and the CSV-1000 which is a chart-based test that measures CS for sinusoidal patterns of four different spatial frequencies; 3, 6, 12 and 18 cpd.

METHODS

SUBJECTS
- CS was measured monocularly in the dominant eye for 38 subjects (mean age 28.2 yr.) on both CS tests in randomized order.
- Criterion for enrollment: Subjects had no ocular disease, normal binocular and color vision and best-corrected logMAR acuity of 0.0 in their dominant eye.
- CS was measured monocularly in the dominant eye for 38 subjects (mean age 28.2 yr.) on both CS tests in randomized order.
- Criterion for enrollment: Subjects had no ocular disease, normal binocular and color vision and best-corrected logMAR acuity of 0.0 in their dominant eye.

TESTING PROTOCOL
- The Vector Vision CSV-1000 presents sinusoidal targets on a translucent chart that is rear-illuminated to a self-calibrated mean luminance of 85 cd/m2. Monocular CS measurements were obtained only with the dominant eye.

PELLI–ROBSON (PR) TEST
- The PR chart was hung on a wall in a quiet laboratory setting and was illuminated evenly by both overhead lamps and a table lamp. There was no glare present and chart luminance was 80 cd/m2. Monocular CS measurements were obtained only with the dominant eye.
- The patient stood 1 m from the chart during testing.
- The patient stood 1 m from the chart during testing.
- Subjects were instructed not to give up too soon when the patient failed to correctly detect two out of three letters.
- Testing stops when the subject fails to correctly detect two out of three letters.

RESULTS
- Mean log CS obtained with the PR test for the 38 subjects was 1.56 ± 0.16 (95% CI: 1.06 to 2.06). The mean log CS scores obtained with the CSV-1000 for 3, 6, 12 and 18 cpd are as follows: 1.77±0.16; 1.96±0.21; 1.36±0.37 and 1.13±0.33.
- The correlation between the log CS for the PR test is plotted versus the log CS for the CSV-1000 in Figure 1. The equation for the best-fitting straight line is indicated on each graph.
- The amount of agreement between these two tests was quantified using the Bland–Altman procedure. The relevant variables calculated for this analysis are listed in Table 1.
- The correlation between the log CS for the PR test is plotted versus the log CS for the CSV-1000 in Figure 1. The equation for the best-fitting straight line is indicated on each graph.
- The amount of agreement between these two tests was quantified using the Bland–Altman procedure. The relevant variables calculated for this analysis are listed in Table 1.
- 1. The mean log CS obtained with the PR test for the 38 subjects was 1.56 ± 0.16. The mean log CS scores obtained with the CSV-1000 for 3, 6, 12 and 18 cpd are as follows: 1.77±0.16; 1.96±0.21; 1.36±0.37 and 1.13±0.33.
- The correlation between the log CS for the PR test is plotted versus the log CS for the CSV-1000 in Figure 1. The equation for the best-fitting straight line is indicated on each graph.
- The amount of agreement between these two tests was quantified using the Bland–Altman procedure. The relevant variables calculated for this analysis are listed in Table 1.
- The correlation between the log CS for the PR test is plotted versus the log CS for the CSV-1000 in Figure 1. The equation for the best-fitting straight line is indicated on each graph.
- The amount of agreement between these two tests was quantified using the Bland–Altman procedure. The relevant variables calculated for this analysis are listed in Table 1.

CONCLUSIONS
1. Although the absolute mean log CS scores obtained from the two techniques only differ by 0.15 log units at 3 cpd, Figure 1 indicates that there is no way to predict the scores obtained from one estimate of CS test to the other at this spatial frequency, or indeed any of the spatial frequencies. The correlation between the results obtained from the two techniques is zero, although with some more spread (i.e. more subjects with more varied acuity) of log CS values, the correlation may increase.
2. Although the two tests measure different thresholds (letter versus detection) and employ different testing protocols, both measure a contrast threshold for a stimulus of about 3 cpd so while some level of agreement might have been expected between these tests this is not the case. The LoA at this frequency is 0.68 log units which is too large to conclude that these two tests can be used interchangeably.
3. The PR plots at each spatial frequency clearly indicate a negative trend such that subjects who have in general a low CS at any frequency will do better on the PR letter test than on the CSV-1000 detection test. The converse is also true: those subjects who have a very high CS will have lower thresholds (i.e. perform better) on the sinusoidal detection test.
Comparison of Motion Sickness Symptoms: Visually Impaired and Non-Visually Impaired

Tracy L. Matchinski, OD, FAAO and Jani E Winters, OD, FAAO
Illinois College of Optometry, Chicago, IL

BACKGROUND

Motion Sickness (MS) occurs when there is conflict between inputs from the visual, vestibular and proprioceptive systems (Reason 1979, Evison 1996). When these systems give conflicting information based on previous experience, this can lead to MS. Which of the sensory inputs is most important is still under debate.

MS has been classified as a multidimensional construct with gastrointestinal, central, peripheral and sopite-related components. The Motion Sickness Assessment Questionnaire (MSAQ) was developed to quantify these related components. The Motion Sickness Assessment Questionnaire (MSAQ) was developed to quantify these related components. The Motion Sickness Assessment Questionnaire statements to assess motion sickness on a 1 to 9 Likert scale. In the MSAQ subjects are asked to rate 16 Sickness Assessment Questionnaire statements.

METHODS

The MSAQ was administered to both VI and NVI subjects who subjectively complained of MS. All patients entering 2 clinical sites that serve VI patients were asked to take the survey. Patients without VI, support staff and optometry students were also asked to take the survey. Total and subscale scores were calculated by summing the response ratings of questions and dividing by the maximum rating score and multiplying by 100. Mean scores were calculated for visually impaired and non-visually impaired subjects. T-test was performed to assess statistical significance (p<0.05).

RESULTS

373 subjects (155 VI and 218 NVI) were surveyed for history of MS. Of those, 37% or 137/373 visual impairment (MS) reported experiencing MS. The MSAQ was completed by 34 VI and 96 NVI subjects. See Figure 1. MS symptoms as assessed by total score and subscale-related subscale, were rated statistically significant more severe by VI subjects compared to NVI (49.9 vs. 44.5 and 42.8 vs. 40.0 respectively). No statistically significant difference between was found for gastrointestinal, central or peripheral MS symptom subscales although VI subjects did rate symptoms in these subscales more severely than NVI subjects.

DISCUSSION

This study demonstrates there may be differences in how VI and non-VI individuals would assess their symptoms from MS. In the population surveyed the VI subjects rated their symptoms more severe in general than did non-VI subjects.

It is unsure what percentage of the population experiences MS symptoms as assessed by total score. The MSAQ was administered to both VI and NVI groups. The VI group was more evenly split between VI and NVI (49.9 vs. 44.5 and 42.8 vs. 40.0 respectively). No statistically significant differences in symptoms were calculated by summing the response ratings of questions and dividing by the maximum rating score and multiplying by 100. Mean scores were calculated for visually impaired and non-visually impaired subjects. T-test was performed to assess statistical significance (p<0.05).

Table 1 shows the subclassification of Motion Sickness Assessment Questionnaire statements. A question that has not been asked or answered: what is the effect of a change in visual input on MS? The purpose of this study was to classify MS symptoms in visually impaired (VI) and non-visually impaired (NVI) subjects and compare the results.

Table 1: Subclassification of Motion Sickness Assessment Questionnaire statements

<table>
<thead>
<tr>
<th>Subclassification</th>
<th>Gastrointestional</th>
<th>Central</th>
<th>Periphera l</th>
<th>Sopite</th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt sick to my stomach</td>
<td>2.9 (1)</td>
<td>3.3 (1)</td>
<td>2.5 (1)</td>
<td>3.5 (1)</td>
</tr>
<tr>
<td>I felt faint</td>
<td>2.9 (1)</td>
<td>3.3 (1)</td>
<td>2.5 (1)</td>
<td>3.5 (1)</td>
</tr>
<tr>
<td>I felt nauseated</td>
<td>2.9 (1)</td>
<td>3.3 (1)</td>
<td>2.5 (1)</td>
<td>3.5 (1)</td>
</tr>
<tr>
<td>I felt dizzy</td>
<td>2.9 (1)</td>
<td>3.3 (1)</td>
<td>2.5 (1)</td>
<td>3.5 (1)</td>
</tr>
<tr>
<td>I felt like I was vomiting</td>
<td>2.9 (1)</td>
<td>3.3 (1)</td>
<td>2.5 (1)</td>
<td>3.5 (1)</td>
</tr>
</tbody>
</table>

**Table 2: Gender and Age of Respondants**

**Table 3: Classification of those Visually Impaired**

Table 3: Classification of those Visually Impaired

Table 4: Mean Total and Subscale Scores for Visually Impaired and Non-Visually Impaired Subjects

**Figure 1: Mean Total and Subscale Scores for Visually Impaired and Non-Visually Impaired Subjects**

CONCLUSIONS

VI may have an effect on patients’ perception of several symptoms. Distance vision and near vision may have an effect of these differences to better care for the VI patients they serve. Patient education and management for VI patients should include possible solutions including visual therapy and training with devices.

REFERENCES


CONTACT INFORMATION

Tracy L. Matchinski, OD, FAAO
TMatchinski@ico.edu
www.ico.edu

Table of Contents
An Atypical Presentation of Progressive Supranuclear Palsy

Nathan E. Goldberg, D.O.
Jesse Brown VAMC - Hines VAH
Chicago, Illinois

CASE HISTORY
A 61 year old African American male presented for eye exam complaining of blurred vision and binocular horizontal diplopia on left, right, and down gaze as well as when attempting to read with glasses. Symptoms had been increasing in frequency and worsening since he first noticed them about 8 months ago.

The patient's medical history was remarkable for hyperlipidemia, hypertension, peripheral vascular disease, colonic and rectal polyps, cervical diskectomy many years after disease onset. Also, falls are usually backwards. Last, the patient occasionally falls forwards when patients are younger than 40 years of age, have severe postural instability and falls. Typically, this occurs many years after onset. Physically, the patient’s vertical supranuclear palsy developed very early, only months after onset of the disease. Also, patients with PSP usually have more trouble looking down than up. Also, the patient’s vertical supranuclear palsy developed very early, only months after onset of the disease.

The patient was diagnosed with probable PSP with a classic Richardson syndrome phenotype. Diagnostic criteria requires that a patient with suspected PSP be older than 40 years of age, have severe postural instability and falls within the first 12 months of disease, and have vertical supranuclear gaze palsy or slowed vertical saccades. Of importance to note, slowed vertical saccades may be apparent initially but a vertical gaze palsy usually doesn’t develop for many years after disease onset. Also, falls are usually backwards rather than forwards as would be seen in Parkinson’s. The MRI of a patient with PSP shows a classic “hummingbird” or “penguin” sign due to prominent midbrain atrophy. This can be seen in the patient’s MRI below.

RELEVANT FEATURES
• Dry eye is common in PSP and can cause blurred vision.
• The disease is rare, estimated at only 6-7 cases per 100,000, and is defined pathologically by the accumulation of tau proteins and neurofilament proteins in specific areas of the brain. Richardson syndrome is the classic form of PSP and is characterized by early onset postural instability and falls.
• Relevant to this case, dry eye syndrome is often a co-morbid condition in PSP secondary to a significantly reduced blink rate, increased meibomian gland disease, and decreased corneal sensitivity. The patient typically asymptomatic although corneal surface disease is apparent.

UNIQUE FEATURES
This case is unique for a number of reasons. First, the patient’s gaze is significantly more restricted superiorly rather than inferiorly. Patient’s with PSP usually have more trouble looking down than up. Also, the patient’s vertical supranuclear palsy developed very early, only months after onset of the disease. Typically, this occurs many years after onset. Physically, the patient occasionally falls forwards when patients with PSP usually have more trouble looking down than up. Also, the patient’s vertical supranuclear palsy developed very early, only months after onset of the disease.

CLINICAL PEARLS
• PSP is a rare disease that has debilitating ocular sequelae. Education on gaze awareness can be very beneficial in reducing symptoms of diplopia.
• Dry eye is common in PSP and can cause blurred vision. Because patients are often asymptomatic, strict education and aggressive treatment is required.

REFERENCES

CONTACT INFORMATION
Thomas R. Stelmack, O.D., F.A.A.O.
Thomas.Stelmack@va.gov
www.ico.edu

PERMISSION TO COPY
This article is copyrighted as indicated in the article. Reuse is limited to personal use and non-commercial use within the institution. The personal use must not be systematically distributed.

An Atypical Presentation of Progressive Supranuclear Palsy

Table of Contents

Pertinent Findings
Diagnosis and Discussion
Treatment and Follow-Up

Diagnosis and Discussion
The patient was diagnosed with probable PSP with classic Richardson syndrome phenotype. Diagnostic criteria requires that a patient with suspected PSP be older than 40 years of age, have severe postural instability and falls within the first 12 months of disease, and have vertical supranuclear gaze palsy or slowed vertical saccades. Of importance to note, slowed vertical saccades may be apparent initially but a vertical gaze palsy usually doesn’t develop for many years after disease onset. Also, falls are usually backwards rather than forwards as would be seen in Parkinson’s. The MRI of a patient with PSP shows a classic “hummingbird” or “penguin” sign due to prominent midbrain atrophy. This can be seen in the patient’s MRI below.

Unique Features
This case is unique for a number of reasons. First, the patient’s gaze is significantly more restricted superiorly rather than inferiorly. Patient’s with PSP usually have more trouble looking down than up. Also, the patient’s vertical supranuclear palsy developed very early, only months after onset of the disease. Typically, this occurs many years after onset. Physically, the patient occasionally falls forwards when patients with PSP usually have more trouble looking down than up. Also, the patient’s vertical supranuclear palsy developed very early, only months after onset of the disease.

Clinical Pearls
• PSP is a rare disease that has debilitating ocular sequelae. Education on gaze awareness can be very beneficial in reducing symptoms of diplopia.
• Dry eye is common in PSP and can cause blurred vision. Because patients are often asymptomatic, strict education and aggressive treatment is required.

Follow-Up
The patient was prescribed separate reading only and distance only glasses, and educated on keeping objects of interest in primary gaze. Artificial tears were started 4x/day OU as well as before watching TV or reading.

The patient returned one month later, denying diplopia but still complaining of blue at distance and near. Anterior segment evaluation revealed inspissated meibomian glands, a mucous strand inferiorly OD and poor tear film.

On physical exam, the patient had symptoms of pronounced difficulties and gait instability. The patient admitted falling ten or more times in the last year, postural difficulties and gait instability. The patient had a distinct incomplete blink and negative Bell’s phenomenon OD, OS. Anterior segment exam revealed pronounced exudate, mucus strand OD and OS.

A recent MRI revealed mild frontal lobe atrophy, midbrain atrophy, periventricular diffuse hypertensities which were likely microvascular changes, and no mass lesions.

Note the patient’s severe gaze restriction.

Diagnosis and Discussion
The patient was diagnosed with probable PSP with classic Richardson syndrome phenotype. Diagnostic criteria requires that a patient with suspected PSP be older than 40 years of age, have severe postural instability and falls within the first 12 months of disease, and have vertical supranuclear gaze palsy or slowed vertical saccades. Of importance to note, slowed vertical saccades may be apparent initially but a vertical gaze palsy usually doesn’t develop for many years after disease onset. Also, falls are usually backwards rather than forwards as would be seen in Parkinson’s. The MRI of a patient with PSP shows a classic “hummingbird” or “penguin” sign due to prominent midbrain atrophy. This can be seen in the patient’s MRI below.

The disease is rare, estimated at only 6-7 cases per 100,000, and is defined pathologically by the accumulation of tau proteins and neurofilament proteins in specific areas of the brain. Richardson syndrome is the classic form of PSP and is characterized by early onset postural instability and falls.

Relevant to this case, dry eye syndrome is often a co-morbid condition in PSP secondary to a significantly reduced blink rate, increased meibomian gland disease, and decreased corneal sensitivity. The patient typically asymptomatic although corneal surface disease is apparent.

Treatment and Follow-Up
The patient was prescribed separate reading only and distance only glasses, and educated on keeping objects of interest in primary gaze. Artificial tears were started 4x/day OU as well as before watching TV or reading.

The patient returned one month later, denying diplopia but still complaining of blue at distance and near. Anterior segment evaluation revealed inspissated meibomian glands, a mucous strand inferiorly OD and poor tear film.

On physical exam, the patient had symptoms of pronounced difficulties and gait instability. The patient admitted falling ten or more times in the last year, postural difficulties and gait instability. The patient had a distinct incomplete blink and negative Bell’s phenomenon OD, OS. Anterior segment exam revealed pronounced exudate, mucus strand OD and OS.

A recent MRI revealed mild frontal lobe atrophy, midbrain atrophy, periventricular diffuse hypertensities which were likely microvascular changes, and no mass lesions.

Note the patient’s severe gaze restriction.
The Effect of Photograph-Assisted Contour Line Drawing on HRT Optic Nerve Classifications

Dominick L. Opitz, OD1; Daniel K. Roberts, OD2; Jacob Wilensky, MD2
1Illinois College of Optometry, 2University of Illinois at Chicago

PURPOSE
Use photography guided placement of HRT3 contour lines to compare change in optic nerve head (ONH) parameters and Moorfield Regression Analysis (MRA) compared to masked expert reviewer for ONH assessment.

METHOD
HRT3 images were captured. Contour lines were placed by an experienced observer using standard three dimensional reconstruction (Group A). Original contour lines were deleted. A second observer used ONH photographs to guide contour line replacement (Group B). Figures 1-3 shows a sample patient’s HRT and color photograph. The mean disc area, mean rim volume, mean nerve fiber layer thickness (NFL), and MRA of both Groups were compared. The MRA of both Groups was compared to the ONH classification of masked expert reviewers.

RESULTS
Data for both eyes of 232 subjects was analyzed (Table 1). The mean disc area of Group A was 1.92mm2 OD and 1.93mm2 OS. The mean disc area of Group B increased to 2.27mm2 OD and to 2.28 mm2 OS (p<0.0001). The mean rim volume of Group A was 0.36 mm3 OD and 0.37 mm3 OS. The mean rim volume of Group B increased to 0.47mm3 OD and to 0.52mm3 OS (p<0.0001). Mean NFL remained unchanged between each Group. In Group A, 15.5% (n=36) OD and 12.5% (n=29) OS had an MRA "outside normal limits”. Only 5.2% (n=12) OD and 5.2% (n=12) OS in Group B had an MRA “outside normal limits”. Only 5.2% (n=112 OD and 5.2% (n=112) OS in Group B had an MRA “outside normal limits”. Figure 4: The number of patients classified as “outside normal limits” was significantly reduced following color photography guided placement of HRT3 contour lines. This data from Group B also showed greater agreement with the masked reviewers.

CONCLUSIONS
ONH photographs to guide the placement of contour lines for HRT3 imaging resulted in more "normal" MRA classifications. Both clinicians and researchers should consider using ONH photographs when marking contour lines with HRT3.

FINANCIAL SUPPORT
This study was apart of a larger investigational study: NEI Grant K23 EY0181883 (DKR)

Table 1: Data of original parameters studied (Group A) and data of parameters after color photography guided contour line placement (Group B).

<table>
<thead>
<tr>
<th>Parameter Studies</th>
<th>Group A</th>
<th>Group B</th>
<th>P Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OD</td>
<td>OS</td>
<td>OD</td>
</tr>
<tr>
<td>Mean Disc Area</td>
<td>1.92</td>
<td>1.93</td>
<td>2.27</td>
</tr>
<tr>
<td>Mean Rim Volume</td>
<td>0.36</td>
<td>0.37</td>
<td>0.47</td>
</tr>
<tr>
<td>Mean NFL Thickness</td>
<td>0.253</td>
<td>0.253</td>
<td>0.253</td>
</tr>
</tbody>
</table>

Table 1: Data of original parameters studied (Group A) and data of parameters after color photography guided contour line placement (Group B).

CONTACT INFORMATION
Dominick L. Opitz, OD, FAAO
dopitz@ico.edu
www.ico.edu

Figure 1: This is a sample patient representing the original contour line placement using standard three dimensional reconstruction. The MRA classification is “Borderline”.

Figure 2: A redrawing of the contour line using photography guided placement of the contour line resulted in an HRT MRA classification of "within normal limits".

Figure 3: Sample subject’s color photo that guided the placement of the redrawn contour line.

Figure 4: The number of patients classified as “outside normal limits” was significantly reduced following color photography guided placement of HRT3 contour lines. This data from Group B also showed greater agreement with the masked reviewers.
**METHODS**

Intraocular pressure (IOP) delays or prevents the progression of primary open angle glaucoma (POAG). Topical ocular hypotensive agents are the mainstay of POAG treatment. Selective laser trabeculoplasty (SLT) has been shown to be an effective adjunctive therapy to reduce IOP. Recently, cataract extraction (CE) has been found to lower IOP. This study investigates the IOP lowering effect of selective laser trabeculoplasty (SLT) followed by clear cornea phacoemulsification cataract extraction (CE) in patients with open angle glaucoma (OAG).

**RESULTS**

In this study, 28 eyes were included, with the mean baseline IOP of 17.5mmHg (range: 26-11 mmHg). Data from Group 1 included all IOP ranges at baseline (n=28). SLT reduced the mean IOP from baseline 10.28% to 15.7mmHg in Group 1 (p=0.002). CE reduced the mean IOP an additional 7.94% to 13.8mmHg in Group 2 (p=0.138). Both SLT and CE reduced mean IOP 12.63% with a mean IOP drop of 1.9mmHg from baseline for Group 2 (p=0.007). Analysis of eyes with a baseline IOP >18mmHg (Group 2) showed a mean baseline IOP of 15.1mmHg (n=17). SLT only reduced the IOP 5.09% to 14.4mmHg in Group 2 (p=0.321). CE reduced the mean IOP an additional 7.94% to 13.8mmHg (p=0.138). Both SLT and CE reduced mean IOP 12.63% with a mean IOP drop of 1.9mmHg from baseline for Group 2 (p=0.007). Analysis of eyes with a baseline IOP >18mmHg (Group 3) showed a mean baseline IOP of 21.2mmHg (n=11). SLT reduced the mean IOP 10.10% to 19.1mmHg in Group 3 (p=0.001). CE reduced the mean IOP an additional 17.39% to 14.6mmHg at 1 year (p=0.001). The total mean IOP reduction from baseline in Group 3 after both SLT and CE was 30.69% or 6.5mmHg at 1 year (p<0.001).

**CONCLUSIONS**

It is our finding that SLT followed by clear cornea cataract extraction via phacoemulsification is most effective in patients with IOP > 18-20 mmHg. This treatment protocol may be a safer and more cost effective option than combined glaucoma and cataract procedures in this patient demographic.
Is CISS a Valid Instrument for Evaluating Oculomotor Dysfunction and Accommodative Insufficiency?

Yi Pang, O.D., Ph.D., Helen Gabriel, O.D., Pep-Lam Xiong, Christine Trinh, Cristina Partida, Robert Joe Hoo, Sandra S. Block, O. D., M. Ed.
Illinois College of Optometry, Chicago, Illinois

INTRODUCTION
The Convergence Insufficiency Symptom Survey (CISS) has been validated to aid in the diagnosis of convergence insufficiency in both children and young adults. Both accommodative insufficiency (AI) and oculomotor dysfunction (OMD) are common binocular vision disorders and these disorders share many common symptoms with CI, including eye strain and headache. The purpose of this study was to assess the validity of CISS in the diagnosis of AI and OMD in children and adolescents aged 9–18 years.

METHODS
A total of 161 subjects aged 9 to 18 years were recruited from an urban school-based eye clinic. All children underwent a comprehensive eye examination including VA at far and near, cover test at distance and near, near point of convergence, manifest refraction, near point vergence tested by prism bar, accommodative amplitude measured by the minus lens method, Developmental Eye Movement test (DEM), and dilated fundus examination with indirect ophthalmoscopy. The CISS was individually administered on each subject. Questions from the CISS were read to each subject by one of the investigators while the subject looked at a printed copy of the test. The results of this study demonstrate that the CISS is a valid instrument that can be used to identify, and evaluate children with OMD diagnosed with convergence insufficiency. Optom.Vis. Sci. 2006;83:281-9.

RESULTS
Complete demographic characteristics of our subjects are listed in Table 2. The mean CISS scores were 15.11 ± 10.23 in the NBV group, 16.71 ± 9.79 in AI group, 27.00 ±13.39 in OMD group, and 21.44 ±10.55 in AI & OMD group. A significant difference was detected among the four groups (P = 0.008). Post hoc tests showed a significant difference between the NBV and OMD groups (P = 0.01) and between the AI and OMD group (P = 0.01) but not among other groups.

CONCLUSION
• Children with OMD had a significantly higher CISS score than children with NBV
• Children with AI did not report worse symptoms than children with NBV using the CISS.
• There was a trend that children with both AI and OMD had a higher CISS score than children with NBV, however without statistical difference.
• The results of this study demonstrate that the CISS is a valid instrument that can be used to identify, and evaluate children with OMD.

Eligibility criteria for normal binocular vision (NBV), AI, and OMD are listed in Table 1. Eighty-two children were qualified for this study, with 18 children in the NBV group, 21 in AI, 16 in OMD, and 27 in AI & OMD group. An analysis of variance was performed to compare the CISS scores among the four groups.

<table>
<thead>
<tr>
<th>Table 1. Eligibility Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eligibility criteria for control subjects</strong></td>
</tr>
<tr>
<td>• Visual acuity 20/25 or better in each eye at near with habitual correction using a Snellen chart</td>
</tr>
<tr>
<td>• No binocular vision problem</td>
</tr>
<tr>
<td>• No strabismus at 3 m or 40 cm by unilateral cover test</td>
</tr>
<tr>
<td>• No accommodative insufficiency as measured by the minus lens method</td>
</tr>
<tr>
<td>• Normal NPC (break &lt; 6 cm, recovery &lt; 9 cm) tested with 20/30 size accommodative target</td>
</tr>
<tr>
<td><strong>Eligibility criteria for accommodation insufficiency (AI) subjects</strong></td>
</tr>
<tr>
<td>• Visual acuity 20/25 or better in each eye at near with habitual correction using a Snellen chart</td>
</tr>
<tr>
<td>• No strabismus at 3 m or 40 cm by unilateral cover test</td>
</tr>
<tr>
<td>• Accommodation amplitude in the right eye less than the age minimum (15 – 0.25 * age-2D) as measured by the minus lens method</td>
</tr>
<tr>
<td>• No other binocular vision problems except AI</td>
</tr>
<tr>
<td><strong>Eligibility criteria for oculomotor dysfunction (OMD) subjects</strong></td>
</tr>
<tr>
<td>• Visual acuity 20/25 or better in each eye at distance and near with habitual correction using a Snellen chart</td>
</tr>
<tr>
<td>• No strabismus at 3 m or 40 cm by unilateral cover test</td>
</tr>
<tr>
<td>• Developmental Eye Movement test (DEM) showed Type I or Type IV</td>
</tr>
<tr>
<td>• No other binocular vision problems except OMD</td>
</tr>
<tr>
<td><strong>Eligibility criteria for subjects with both AI and OMD condition</strong></td>
</tr>
<tr>
<td>• Visual acuity 20/25 or better in each eye at distance and near with habitual correction using a Snellen chart</td>
</tr>
<tr>
<td>• No strabismus at 3 m or 40 cm by unilateral cover test</td>
</tr>
<tr>
<td>• Accommodation amplitude in the right eye less than the age minimum (15 – 0.25 * age-2D) as measured by the minus lens method</td>
</tr>
<tr>
<td>• DEM showed Type I or Type IV</td>
</tr>
<tr>
<td>• No other binocular vision problems except AI and OMD</td>
</tr>
</tbody>
</table>

Table 2. Demographic Characteristics of the Subjects (n = 82)

<table>
<thead>
<tr>
<th>Table 2. Demographic Characteristics of the Subjects (n = 82)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table of Contents</strong></td>
</tr>
</tbody>
</table>

REFERENCES
High-Resolution Ultrasound Echogenic Lines Overlying the Pars Plana in Normal and Age-Related Long Anterior Zonule Eyes

Daniel K. Roberts, OD, Ph.D., 1,2 Chente Nau, D.O., 3 Jacob T. Wemady, M.D.  
Illinois Eye Institute, Department of Clinical Education, Illinois College of Optometry, Chicago, IL. 4University of Illinois at Chicago, Department of Epidemiology and Biostatistics, Chicago, IL. 5Quais Duervier Dean, Madison, WI. 6Mayo Clinic, Department of Ophthalmology, Rochester, MN.

BACKGROUND AND PURPOSE  
Long anterior zonules (LAZ) are characterized by the presence of crystalline lens zonules central to the normal insertion zone on the anterior capsule. 8,9 Sometimes resulting in a very reduced zonule-free zone10 (Fig. 1, left). LAZ often become pigmented from contact with the posterior iris, and related pigment dispersion symptoms. 11 (Fig. 1, right) may be confused with "Glaucoma pigment dispersion syndrome." 12 There may be an elevated risk for glaucoma in LAZ eyes, but definitive association is unknown. In addition to open-angle mechanisms, 11 narrow-angle processes might also increase the risk for glaucoma in certain LAZ eyes. 13 Although LAZ may occur with late-onset retinal degeneration (L-ORAD), 14 another variety occurs apart from L-ORAD most commonly in older, hypertensive women. 15

There has been suspicion that plaques in configuration may have association with LAZ, which theoretically could be related to zonular traction that contributes to forward rotation of the ciliary processes. 16 In a separate investigation involving high-resolution ultrasonography, we frequently detected echogenic lines (Fig. 2) overlying the pars plana in many LAZ and normal eyes, and we speculated these might represent tissue detachments, which could overlying the pars plana in many LAZ and normal eyes, and we speculated these might represent tissue detachments, which could

METHODS  
Subjects included 48 LAZ probands (median age=70 yrs, 40 females), 50 control probands (median age=66.5 yrs, 42 females), 22 LAZ relatives (median age=57 yrs, 14 females), and 24 control relatives (median age=55 yrs, 16 females). Echogenic lines were frequently present among the total group, with quadrant (superior, temporal, nasal, inferior) percentages being S=6.0%, T=3.3%, N=6.0%, I=1.2% for right eyes and S=6.9%, T=3.5%, N=6.0%, I=1.2% for left eyes. Quadrant percentages for LAZ proband right eyes were S=14.6%, T=8.3%, N=4.7% and I=0.5%, and for control proband right eyes were S=14.0%, T=6.7%, N=8.2% and I=0.5%. Combining all subjects, while controlling for age and gender, echogenic lines were more likely in the superior quadrants (S=6.3%, P=0.02) of the LAZ case subjects and their family members than controls.

RESULTS  
After consensus reviewer assessment, quadrant images having characteristic echogenic lines overlying the pars plana were identified. Analyses were conducted using SAS’ Statistical Program, Version 9.2 for Microsoft Windows® (Kary NC).

CONCLUSIONS  
Echogenic lines overlying the pars plana region were common among our subjects. Superior quadrant predilection might be more likely in people with LAZ and their family members, which could suggest gravity- or age-assocciated differences in zonular traction forces that are associated with the LAZ trait.

REFERENCES  
Factors Influencing Improvement in LogMAR Visual Acuity in Patients with Albinism.

Faheemah Saeed O.D., F.A.A.O., Darrell G. Schlange O.D., F.A.A.O.
Illinois College of Optometry, Chicago, IL

PURPOSE
Therapeutic tinted CLs have been shown to improve various aspects of vision in patients with albinism including reduction in nystagmus intensity, reduced symptoms of glare and light sensitivity as well as improved visual acuity (VA) and contrast sensitivity (Saeed & Schlange, 2011; 2012). In the current study, we report the extent to which refractive error affected the magnitude of improvement in logMAR VA with tinted CLs, correction. The impact of VA with best corrected spectacle prescription on the improvement in logMAR VA is also reported here.

METHODS
20 subjects with albinism were enrolled in this project. Visual acuity, using EDRS visual acuity chart was measured 3 times during the course of the study as follows:
1) With best corrected spectacle prescription glasses
2) With un-tinted contact lenses (after 30 minutes of adaptation period)
3) With tinted contact lenses (after 30 minutes of adaptation period)
The relationship between refractive error and improvement in logMAR VA was analyzed with a Pearson’s correlation coefficient (SPSS, Version 17.0, Chicago, IL).

PRESCRIBING THERAPEUTIC TINTED CONTACT LENSES
Toric or spherical, annual replacement soft lenses were ordered after obtaining informed consent from the patient. After confirming the initial fit, the CLs were custom-tinted with an opaque tint and a clear pupil to fully mask the iris translumination defects. The patient’s pupil size was measured in dim illumination. The pupil diameter for the CL was ordered approximately 5.5mm larger than the pupil size to avoid tunnel vision, while the iris diameter on the CL was ordered the same as patient’s own iris diameter.

RESULTS
1. Table: 1 shows the refractive error and the best corrected LogMAR VA obtained with best-corrected Sx, un-tinted CLs and tinted CLs for the dominant eye in 20 subjects.
2. Table: 2 shows the LogMAR VA Improvement as a function of the cylinder component of refractive error. The Pearson’s correlation coefficient calculated is insignificant indicating no significant relationship between the amount of cylinder and the magnitude of logMAR improvement (r = 0.10, p (two-tailed) = 0.51).
3. Table: 3 shows the LogMAR VA Improvement as a function of the spherical equivalent of the refractive error. The Pearson’s correlation coefficient calculated is insignificant indicating no significant relationship between the spherical equivalent and the magnitude of logMAR improvement (r = -0.15, p (two-tailed) = 0.54).
4. Table: 4 shows the LogMAR VA Improvement as a function of the sphere portion of the refractive error. The Pearson’s correlation coefficient calculated is insignificant indicating no significant relationship between the sphere component of refractive error and the magnitude of logMAR improvement (r = -0.16, p (two-tailed) = 0.51).
5. Table: 5 shows the LogMAR VA Improvement as a function of the entering BCVA. There is a significant relationship between the VA obtained with best corrected spectacle prescription and the improvement in LogMAR VA with tinted CLs (r = 0.50, p (two-tailed) = 0.02).

The data indicate that patients with worse VA achieved greater gains in LogMAR acuity with tinted CLs.

CONCLUSION
We are grateful to the Illinois Society for the Prevention of Blindness (ISPB) for funding this project. We would like to thank Dr. Susan Kelly for her help with statistical analysis of this data.

CONTACT INFORMATION
Faheemah Saeed, OD, FAAO
fsaeed@ico.edu
www.ico.edu
Executive Functioning” Attentional Performance Disorders In Adults With Traumatic Brain Injury (TBI)

INTRODUCTION
Traumatic brain injuries (TBI) are often associated with functional disorders and performance issues of the Executive Function (EF) variety. These result in adult attentional problems, reduced task concentration, decreased working memory, and poor stamina for sustained performance, which frequently affects success at work and school. Adults with EF problems have difficulty with distractions and short term memory and therefore make mistakes and respond inappropriately in conditions requiring organization and correct data information. The person with EF may have a high IQ but have an immature type of ADHD, thereby having difficulty performing up to their ability, without the help of a coach or medication. In this case series, we present the results of five adults with history of TBI and the neuro-rehabilitation intervention they received and the attentional problems displayed both pre- and then post-treatment.

CASE REPORT
Our five subjects were given a comprehensive eye exam, visual efficiency evaluation, eye-movement analysis and Quality of Life Survey (QLS). A list of symptoms associated with their TBI and Post-concussion problems include difficulty sustaining mental effort, impaired planning and problem-solving, learning and memory problems, impulsivity, irritability, low frustration threshold, fatigue, tiredness and lack of initiative and dissociation between thought and action. Antisaccades (response inhibition), prosaccades and reading saccades (visually-guided) were evaluated with the FixTest, VisuTest, DEM and King-Divack tests.

Sustained and selective attention was determined with the TOVA (Test of Variables of Attention), a state-of-the-art continuous performance test designed to quantify attention, impulsivity, reaction time and variability of performance (Figure 1 & 2). The TOVA results were compared with age matched non AD/HD subjects and considered as normal if they had an 80 standard score or better (Table 1). An Attention Performance Index (API) was determined for each and provided a single number index of likely attention impairment. Scores greater than 0 suggest minimal or no impairment and scores below 0 suggest increasing levels of impaired functioning. The TOVA API compares the subject’s overall TOVA performance to a sample of individuals independently diagnosed with ADHD. The pre- and post-therapy TOVA results are presented in Table 1 for subject 2 and show improvement in the RT Variability value, an indicator of EF. The pre and post API score is summarized on Table 2 for our 5 subjects.

The Fischer FixTest (Figure 3 & 4) was used to evaluate prosaccades and antisaccades (AS). The AS requires frontal lobe control to inhibit reflex saccades and sustain attention as tested in the Gap Paradigm (Figure 5). Our subjects had difficulty with this voluntary control of saccades and inhibition of reflex saccades, as noted by their increased reaction time (ms). This measure of saccadic and fixation strength is reported in the literature to be decreased with TBI and post-concussion subjects, as it was in our 5 subjects (Table 2). The mean reaction time and standard deviation are reported for pre and post therapy, showing > 1 SD improvement post-therapy. Table 2 presents pre and Post Therapy TOVA data for subject 3.

Treatment included ocular motor therapy, binocular vision therapy and neuro-rehabilitation. The initial pre-therapy TOVA indicated an executive functioning problem in all 5 subjects, with reaction times and variability of sustained response below normal range by > 1 SD (average of 89.5 SD). Attention and impulsivity response scores were generally within normal range (≥ 80 SS). All subjects displayed abnormal reading fluency, inaccurate visually-guided saccades, poor symptomatic score on QLS and slow reaction/response times on the VisuTest.

RESULTS
Positive performance changes occurred in all TOVA areas, comparing pre and post therapy, with an average improvement of > 1 SD (1.5) in TOVA response time (RT) and RT variability EF scores.

Table 3: Pre and Post Therapy TOVA Results for Subject 3

<table>
<thead>
<tr>
<th>TOVA Area</th>
<th>Pre-Therapy</th>
<th>Post-Therapy</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction Time</td>
<td>574(76)</td>
<td>473(48)</td>
<td>95ms</td>
</tr>
<tr>
<td>Variability</td>
<td>3.69</td>
<td>2.11</td>
<td>+1.58</td>
</tr>
<tr>
<td>Index</td>
<td>+4.00</td>
<td>+2.11</td>
<td>+1.89</td>
</tr>
</tbody>
</table>

The single index score Attention Performance Index (API) indicated improvement from negative to positive values in 4 of the 5 subjects. The 5th subject had decreased negative AP post-therapy.

Antisaccade (AS) mean reaction times (ms) improved > 1 SD as a result of therapy, indicating improved control of saccades and ability to inhibit reflex saccades. Prosaccades and visual guided saccades improved pre and post, indicating better sequential saccades and more resistance to peripheral distractors. Other saccadic and tracking test results (EyeTest, DEM, K-D) also improved substantially.

Subjective awareness of post-therapy improvement in attention, eye-movement skills and processing speed was verified by reduced symptoms and QLS responses.

CONCLUSIONS
These 5 cases illustrated the executive functioning (EF), attentional problems and slow visual processing speed present in adult subjects with TBI and their improvement with comprehensive treatment. Optometric vision therapy integrated with neuro-rehabilitation improved on-task abilities, sustained and consistent attention and memory, visual response performance metrics and overall quality of life.
Bilateral Endogenous Endophthalmitis in a Patient with Myelodysplastic Syndrome

Mirage Shah, O.D.
Jesse Brown Veterans Administration Medical Center, Chicago, IL

INTRODUCTION
A patient with myelodysplastic syndrome (MDS), accompanied by refractory anemia is admitted to the hospital for sepsis secondary to bacteremia. Within days, he develops an emergent case of bilateral endogenous endophthalmitis.

CASE HISTORY
An 82 year old white male was seen at bedside in the medical ward. He complained of acute onset blurry vision, floating wavy lines, and achy eyes over the past two days. Hisocular history was significant for IODM since 1995, large physiological cupping, mild DES, and mild bilateral longstanding lid ptosis. The patient’s medical history was significant for MDS with refractory anemia since 2009 status-post chemotherapy, infiltrative lung disease of unknown etiology, and sepsis secondary to bacteremia with pneumonia as a likely source. The patient had an extensive medical history including human insulin, aspirin, heparin, metoprolol, and albuterol inhaler. Of note, he was being treated with intravenous Vancomycin and Zosyn. During the clinical bedside exam, the patient’s responses to testing were coherent, however, he had difficulty performing them due to lethargy and shortness of breath from anemia, higher susceptibility to infection secondary to neutropenia, and a higher likelihood of hemorrhage secondary to thrombocytopenia. Most patients require regular blood transfusions to maintain adequate blood cell counts. Other treatment options include chemotherapy and allogeneic hematopoietic stem cell transplantation. The prognosis for low risk patients is to live 5.7 years after diagnosis, intermediate risk 1.2-2.5 years, and high-risk patients are expected to live only a few months after diagnosis. Ultimately, due to the poor prognoses of MDS, proper supportive care should be of utmost priority.

Our patient had multiple co-morbidities but none more debilitating than MDS. This condition, along with the side-effects from the chemotherapy used to treat it, left him in a highly immunocompromised state. Our patient contracted pneumonia soon after his last round of chemotherapy which was completed a few days before his hospital admission. The lung infection may have become the source for the bacteremia which eventually migrated to both eyes.

CONCLUSION
MDS is a debilitating condition with a very poor prognosis. It creates an immunocompromised and low coagubility state. Endogenous endophthalmitis by Staphylococcus aureus is a rare and serious condition, especially if the pathogen acquires methicillin resistance (i.e. MRSA). Early detection and treatment is the key to preventing vision loss.

CONTACT INFORMATION
Thomas Stelmack, OD, FAAO
thomas.stelmack@va.gov
www.ico.edu

PERTINENT FINDINGS
During the clinical bedside exam, the patient’s responses to testing were coherent, however, he had difficulty performing them due to his weakened state. The dilated fundus exam was difficult due to hazy views from cataracts.

DIFFERENTIAL DIAGNOSIS
1. Symptom of blur — Acute awareness of cataracts vs. a refractive shift secondary to highly varying blood glucose vs. diabetic macular edema
2. Wavy lines in vision — Vitreous syneresis or floaters
3. Hazy view of fundus — Dense cataracts vs. posterior vitritis
4. Retinal hemorrhaging — Background diabetic retinopathy vs. anti-coagulation retinopathy
5. Roth spots — Leukemia vs. periocular anemia vs. retinal ischemia vs. HIV retinopathy

Due to the suspicious nature of the retinal findings and multiple co-morbidities, a retinal specialist was consulted the following day.

ONE DAY FOLLOW-UP
The following day, the patient was transported to the eye clinic. He stated that symptoms of blurry vision, eye ache, and wavy lines in his vision all improved.

DIAGNOSIS, TREATMENT, AND MANAGEMENT
The patient was diagnosed with bilateral endogenous endophthalmitis likely secondary to bacteremia with probable source from pneumonia. MRSA was later found in blood cultures however, a vitreal tap was necessary to determine the true identity of the intraocular inflammation.

Emergency pars plana vitrectomy was considered by the retinal surgeon. However, putting the patient under general anesthesia was deemed too risky considering his weakened state. Instead a vitreous tap and injection was attempted. The vitreous tap was unsuccessful in either eye secondary to the density of the fibrotic tissue in the vitreous. However, intravitreal injections of Ceftazidime 0.1ml and Vancomycin 0.1ml was administered in both eyes. After the procedure, the patient was started on Vigamox 1gtt every 0.1ml and Vancomycin 0.1ml was administered in both eyes. After the procedure, the patient was started on Vigamox 1gtt every 2 hours OD, Pred Forte 1gtt every 2 hours OD, atropine BD OD. Concurrently, intravenous Vancomycin and Zosyn was administered for systemic coverage.

The patient showed gradual improvement in anterior chamber reaction over the following few days. He has since been administered another round of intravitreal antibiotics. At subsequent follow-up exams, his vision and signs of infection continued to improve.

DISCUSSION
MDS is a disorder of the stem cells in the bone marrow which leads to irregular hematopoiesis. It also is a precursor to acute myeloid leukemia (AML). The average age of onset is 73. Symptoms include lethargy and shortness of breath from anemia, higher susceptibility to infection secondary to neutropenia, and a higher likelihood of hemorrhage secondary to thrombocytopenia. Most patients require regular blood transfusions to maintain adequate blood cell counts. Other treatment options include chemotherapy and allogeneic hematopoietic stem cell transplantation. The prognosis for low risk patients is to live 5.7 years after diagnosis, intermediate risk 1.2-2.5 years, and high-risk patients are expected to live only a few months after diagnosis. Ultimately, due to the poor prognoses of MDS, proper supportive care should be of utmost priority.

Our patient had multiple co-morbidities but none more debilitating than MDS. This condition, along with the side-effects from the chemotherapy used to treat it, left him in a highly immunocompromised state. Our patient contracted pneumonia soon after his last round of chemotherapy which was completed only a few days before his hospital admission. The lung infection may have become the source for the bacteremia which eventually migrated to both eyes.

CONTACT INFORMATION
Thomas Stelmack, OD, FAAO
thomas.stelmack@va.gov
www.ico.edu

Table of Contents
Peripheral Ischemia as a Risk Factor in the Management of Diabetic Macular Edema

Ashley Scheurer Spielburg, OD; Bruce Teitelbaum, OD; Leonard Messner, OD
Illinois College of Optometry, Illinois Eye Institute, Chicago IL

INTRODUCTION
Diabetic macular edema (DME) is a major cause of vision loss in diabetic patients. Current management recommendations are based heavily on the results of pivotal clinical studies, the Diabetic Retinopathy Study and Early Treatment Diabetic Retinopathy Study, both published close to 20 years ago. Since that time, fluorescein angiography technology has evolved, providing posterior pole-to-periphery views in a single, high-resolution image by utilizing a scanning laser ophthalmoscope. This allows visualization of up to 200° of retina, compared to ~75° visualized using the 7-standard field composite developed for the Diabetic Retinopathy Study. These images have allowed the discovery of new peripheral retinal findings in diabetic retinopathy and improved visualization of the extent of peripheral retinal nonperfusion. The significance of these findings is under continued debate and may result in changes in the current management protocol for DME.

CASE REPORT

CASE 1
Left eye of a 45 year old African American male with Type II diabetes mellitus, diagnosed in 2010. Since establishing care at the Illinois Eye Institute he has remained free of diabetic retinopathy OU.

CASE 2
Left eye of a 44 year old African American male with Type II diabetes mellitus, diagnosed in 1996. Since establishing care at the Illinois Eye Institute in 2008, he has undergone 4 focal laser treatments OD and 3 focal laser treatments OS for recalcitrant DME. The ISI is 59.5%.

CASE 3
Left eye of a 43 year old African American male with Type I diabetes mellitus, diagnosed in 1985. Since establishing care at the Illinois Eye Institute in 2006, he has undergone 2 focal laser treatments OD and 3 focal laser treatments OS for recalcitrant DME. The ISI is 20.8%.

DISCUSSION
Until recently, identification and quantification of peripheral retinal ischemia has been challenging. With ultra-widefield fluorescein angiography (UWFFA), identification of nonperfused retinas as well as the calculation of an ischemic index, comparing perfused to nonperfused retinas, is possible. Briefly, the total area of gradable fundus is encircled using the area measurement function in the 12 Vantage Review Software (Optos, PLC) and converted to pixels. Then, the area of capillary nonperfusion seen in the arteriovenous phase of the UWFFA is encircled and converted to pixels using the same function. The area of capillary nonperfusion is defined as the area where a dropout of retinal capillaries was detected in the UWFFA image. The area of nonperfusion is divided by the total image area resulting in a decimal value that is converted to a percentage. The above cases illustrate areas of peripheral retinal nonperfusion that would not have been identified with standard FA and are quantified by an ischemic index.

It is well established that peripheral ischemia leads to the release of vascular growth factors that influence the proliferation of neovascularization and increase vasodilation and capillary hyperpermeability in diabetic eyes. It has been suggested that the area of retinal nonperfusion may be proportional to the release of these angiogenic factors and it would follow that UWFFA may provide a more accurate picture of the total amount of retinal nonperfusion.

Improved identification of peripheral nonperfusion may allow for targeted, as opposed to pan-retinal photocoagulation. Limiting the amount of laser energy applied to the eye would decrease laser-induced side effects like visual field loss. Reddy et al. reported a case of proliferative diabetic retinopathy in which targeted retinal photocoagulation caused successful regression of all areas of neovascularization with no evidence of macular edema at any time during the follow-up period. The ability to identify and treat peripheral ischemia may also enhance control of DME. In a recent study, 84% of patients with CSME and non-proliferative diabetic retinopathy were found to have some degree of capillary nonperfusion. In addition, Patel and colleagues found that the higher the number of neovascular foci found on Optos UWFFA, the smaller the decrease in central macular thickness in patients with DME.

They suggested that areas of untreated retinal ischemia may promote recalcitrant DME and that targeted retinal photocoagulation may yield improvement in these cases.

CONCLUSION
In the future, quantification of peripheral ischemia, as imaged with ultra-widefield fluorescein angiography, may impact the management of DME. Treatment with targeted retinal photocoagulation to the nonperfused peripheral retinas may have a role in the management of this condition.

REFERENCES

CONTACT INFO
Ashley Spielburg
ascheurer@io.edu
www.ico.edu

Table of Contents
The Effectiveness of Low-Vision Rehabilitation in Two Cohorts Derived from the VA LOVIT Study

Joan Stelmack, O.D., MPH; X. Charlene Tang, MD, Ph.D; Yongliang Wei, MS, Chicago, Illinois
Robert W. Massof, Ph.D., Baltimore, Maryland

BACKGROUND
The VA Low-Vision Intervention trial (LOVIT) was conducted at two VA medical facilities with a 4-month follow-up to evaluate the effectiveness of a LV rehabilitation program. 126 veterans with macular diseases and visual acuity less than 20/200 and greater than 20/500 were randomized to waiting list control or treatment groups. Patients in the treatment group received 6 weekly therapy sessions (approximately 2 hours each) including a home visit to teach effective use of remaining vision and U Devices that were provided without cost. Five hours of homework were assigned each week and reviewed with the therapist. The treatment group demonstrated significant improvement in all aspects of self-reported visual function compared to the control group.

METHODS
44 patients randomized to LV treatment who did not receive additional treatment after the trial ended at 4 months and 56 patients randomly assigned to the waiting list control group and thereafter to standard therapy were observed. Outcome measures included visual ability domains (reading, mobility, visual information processing, visual motor skills) and overall visual ability estimated from difficulty ratings using the VA LV VFQ-48. A mixed-effects model was used to test treatment effects between groups at baseline, 4 months and one year. Differences in mean scores from baseline to one year and within-group changes from baseline to one year, baseline to 4 months, and 4 months to one year were compared.

RESULTS
At baseline, differences in mean visual ability scores between groups were not significant. From baseline to 4 months, treatment effects increased in the treatment group (p<.001), while mean scores except visual motor skills decreased in the control group (p<.01). From 4 months to 1 year, the treatment group lost visual ability only in reading and visual information processing while the control group gained in all visual ability measures.

CONCLUSIONS
Visual ability improved significantly in both the treatment and control groups from baseline to one year. The LOVIT treatment effect is robust and well maintained.

REFERENCES

FINANCIAL SUPPORT
VA Rehabilitation Research and Development Service Grant No.

CONTACT INFORMATION
Joan Stelmack, O.D.
Joan.Stelmack@va.gov

Table of Contents
School-based vision clinics provide eye care to a large number of children who may not otherwise receive it. However, a number of students also need secondary or tertiary care. There are many reasons children attend school-based clinics. Some of them include lack of parent time, transportation, lack of insurance, and willingness of eye care providers to accept state insurance programs. Given these obstacles, how do we make certain that children referred for eye care providers for continued care of existing conditions.

Of the 516 patients referred, 55 (10.7%) have made and kept their follow up appointments. Of these, 22 referred to their primary care physicians due to headaches or possible hypertension, or to their previous eye care providers for continued care of existing conditions.

All students needing follow up care leave IEI at CPS with a letter to their caregivers explaining the need for follow up as well as the phone number of IEI. However, it was soon realized that the majority of these patients were not scheduling follow up appointments. Beginning in late April 2011, the patient’s information was forwarded to the scheduling staff at IEI, who attempted to call and schedule appointments directly. Within a week, the caregivers receive a phone call directly from IEI to set up an appointment. A reminder note is sent home when glasses are delivered to the school, typically 6-12 weeks after the initial examination.

Of the 170 patients referred, 95 (56%) have made and kept their follow up appointments at the Illinois Eye Institute. Thirteen kept appointments for vision therapy evaluations (5.5%), 10 for strabismus evaluations (5.4%), 14 for retinal evaluations (4.8%), 10 for glaucoma suspect evaluations (1.9%), 7 for corneal evaluations (17.5%), and one patient for other evaluation (1%) (electro diagnostic).indicating that the individual subject variability on each machine was relatively close.

CONCLUSION
Many children seen referred by our clinic for secondary and tertiary care are lost to follow up. An excellent way to ensure complete eye care would be to provide secondary care at IEI at CPS. We are in the process of securing funding for a fundus camera and OCT to enable us to eliminate many of our glaucoma suspect and retinal referrals. These tests could be completed at their initial exam, reducing the need for multiple visits.

As of July 2012, we have expanded our clinic hours to include afternoon appointments three days a week. This allows us to accommodate more parent schedules as well as provide vision therapy onsite.

A position has been added in conjunction with the Chicago Health Corps program to work with caregivers, helping them overcome barriers preventing follow up care for their children. We have also begun in-service lectures to CPS faculty and staff to increase their knowledge of conditions such as strabismus, amblyopia, and convergence insufficiency.

In the future we hope to develop more IEI at CPS sites throughout the city to limit the distance to our clinic for all CPS children.
Refractive Error and Amblyogenic Risk Factors in African American Pre-school Children

Valerie Kattouf OD, Birna Kadakia OD, Megan Allen OD, RaeAnn Nordwall
Illinois College of Optometry, Chicago, IL

PURPOSE
To determine the prevalence of refractive error, amblyogenic risk factors, strabismus and ocular pathology in high-risk African American children from 6 months to 6 years of age in an urban setting.

METHODS
In a multi clinical (n > 150) setting comprehensive eye examinations of 2944 African American children ages 6 months-6 years were performed. All of the children were recruited from Early Intervention/Head Start Programs. Visual acuity determination, cover testing, stereopsis evaluation, cycloplegic retinoscopy and ocular health evaluations were performed by experienced clinicians. Hyperopia and myopia were defined as 1.00D or more in each principal meridian. Astigmatism was defined as at least 1.00D difference in refractive error between the two principal meridians. Amblyogenic risk factors were defined as bilateral spherical refractive error ≥ +4.00D or -6.00D; astigmatic refractive error ≥ 2.50D; anisometropic refractive error ≥ 1.50D in regard to hyperopia and astigmatism; and ≥2.00D of myopic anisometropia and constant unilateral strabismus.

RESULTS
Of the 2944 children examined 2% were 12 months and under, 6% were 1-2 years old, 12% were 2-3 years old, and 29% were 3-4 years old, and 36% were 4-5 years old, 15% were 5-6 years old. The prevalence of hyperopia was 45%; the prevalence of myopia was less than 1%, The prevalence of astigmatism was 12%. Approximately 5% demonstrated risk factors for isometropic amblyopia and 2% demonstrated risk factors for anisometropic amblyopia. Only 1.4% of the patients seen has strabismus. Less than 1% of the children were identified with ocular pathology.

CONCLUSIONS
In the African American preschool population hyperopia and astigmatism were the most prevalent refractive errors. These refractive errors were also the basis for the isometropic amblyogenic risk factors and 90% of the anisometropic amblyogenic factors. High risk African American preschool children demonstrated a greater risk (7%) for the development of refractive amblyopia than in the general population (2-3%); specifically in the form of isometropic risk factors. Isometropic amblyopia accounts for 1-2% of all refractive amblyopia in the general population. 5% of the children in the study were positive for the risk. Constant strabismus was not identified as a significant amblyogenic risk factor in this population. A further study is underway to determine how many of those children with amblyopic risk factors actually developed amblyopia.

Refractive Error Classifications

- Hyperopia > +1.00D
- Myopia > -1.00D
- Essential Emmetropia -1.00D - +1.00 D
- Astigmatism > 1.00 D

Amblyogenic Risk Factor Classifications

- Hyperopia ≥ +4.00 D ≥1.50 D
- Myopia ≥ -6.00 D ≥ 2.00 D
- Astigmatism ≥ 2.50 D ≥ 1.50 D

CONTACT INFORMATION
Valerie Kattouf OD
vkattouf@ico.edu
www.ico.edu

Table of Contents
Macular hole (MH) formation is rare following uncomplicated phacoemulsification (PE). Though the etiology is not fully understood, post-PE MHs are thought to occur due to posterior-tractional forces by the vitreous on the macula due to the altered post-operative vitreous structure. These changes lead to accelerated and incomplete posterior vitreous detachment with vitreoretinal adhesions. Vitreous traction and degeneration of the inner retinal layers are thought to predispose patients for an idiopathic MH, but little has been reported as predisposing a patient for a post-PE MH due to its rare occurrence. We report a unique case of a patient with a stage 1 MH in each eye following respective PE.

**METHODS**

A 76 year old hypertensive African American female with ocular hypertension (treated with travaprost and brimonidine) presented with a foveolar yellow spot and reduced vision (20/25) were discovered OS. OCT confirmed a small stage 1A MH (foveolar detachment) which resolved within three months. The patient was not treated with a topical non-steroidal anti-inflammatory drug in either eye due to an allergy to aspirin. Two years after the first surgery (9 months after the second) the patient is now correctable to 20/20 in each eye, and no subsequent macular changes have been noted at follow-up visits. Posterior vitreous detachments (PVDs) were not reported pre-surgically in either eye, but have been identified subsequent to the surgeries. The patient also has longstanding epiretinal membranes OD, OS.

Subsequently, the patient underwent uncomplicated PE OS. At the second PE OD, dense perifoveal perivascular angiograph was performed to differentiate between fluid leakage and MH. The patient gradually improved during this time.

Bilateral, Consecutive Stage 1 Macular Holes Following Uncomplicated Phacoemulsification Surgeries

**BACKGROUND**

Patients with an idiopathic MH in one eye have a risk of fellow eye involvement of 1-10%. Approximately 50% of MHs spontaneously resolve. MH formation is rare following uncomplicated PE. However, PVD formation is accelerated post-PE due to the anterior-posterior tractional forces and accelerated liquefaction of the vitreous. This is especially true of patients over age 70 years.

**CONCLUSION**

This is the first report of bilateral, consecutive MHs after PE. These MHs appear to have resulted directly from PE. Both eyes had good vision immediately after PE, and an OCT was normal pre-PE OS. There are several possible explanations for the presentation of MHs subsequent to PE in each eye in this case:

- Strong vitreofoveal adhesions pulling on the fovea until a PVD occurs to release the traction.
- Degenerative macular thinning, which may predispose a patient to MH formation.
- Topical prostaglandin analogs have been shown to cause macular changes post-PE. Therefore, the use of travaprost may have played a contributing role in the development of this patient’s MHs.
- Cystoid macular edema causing the MH. No fluorescein angiogram was performed to differentiate between fluid leakage and MH. However, the patient was never treated with a non-steroidal anti-inflammatory drug due to her aspirin allergy, yet the condition resolved leaving the patient with 20/20 vision in each eye. Patients with an idiopathic MH in one eye have a risk of fellow eye involvement of 1-10%. Approximately 50% of MHs spontaneously resolve. MH formation is rare following uncomplicated PE. However, PVD formation is accelerated post-PE due to the anterior-posterior tractional forces and accelerated liquefaction of the vitreous. This is especially true of patients over age 70 years.

**REFERENCES**


**CONTACT INFORMATION**

Wendy Stone, OD
wstone@ico.edu
www.ico.edu
A Comparison of the MacuScope and QuantifEye Macular Pigment Densitometers

Elizabeth Wyles, OD, Robert Donati, PhD
Illinois College of Optometry, Chicago, IL

BACKGROUND
Studies have suggested that reduced levels of macular pigment (MP) may increase risk for developing age-related macular degeneration (AMD). There are two compact commercially available heterochromic flicker photometry instruments that measure MP in the USA. A previous clinical study revealed significant variability between instruments when critically looking at each subject individually. Our aim was to determine if the same variability would be found in a young, healthy, educated population.

METHODS
Seventeen adults between 20 and 30 years of age were recruited from the Illinois Eye Institute patient base. Macular pigment optical density (MPOD) was measured using the MacuScope and QuantifEye. A single-operator collected data in one session for each patient. Whether a subject was first tested on the MacuScope or QuantifEye was randomly determined. Two measurements per eye were taken on each instrument and on the MacuScope or QuantifEye was randomly determined. Whether a subject was first tested on the MacuScope or QuantifEye was randomly determined. Two measurements per eye were taken on each instrument and each eye was used as a separate data point. If the difference was greater than 0.04 between two measurements on a single instrument, a third measurement was taken. Only eyes that successfully tested with both instruments are included in the analysis. Invalid readings were excluded.

RESULTS
Of the 34 eyes eligible for inclusion in the study, we obtained usable data from 31 eyes with the Macuscope and 34 eyes with the QuantifEye. Thirty one pairs of eyes with at least 1 and no more than 4 MPOD readings per eye were used in the comparison of the instruments. The differences in the MPOD measurements between the two techniques are plotted against the average MPOD reading of the two techniques. The mean of the differences (bias) was 0.0292 and reflects the systematic error in the average MPOD reading of the two techniques. The mean of the differences (bias) was 0.0292 and reflects the systematic error in the average MPOD reading of the two techniques. The mean SD of MPOD measurements using the Macuscope was 0.0699. A paired two-tailed t-test was performed using GraphPad Prism 5.0 software and there was no significant difference between the two instruments.

CONCLUSIONS
If MPD is monitored with the possibility of altering treatment, the need for reliable measurements is imperative. Based on this limited study, both instruments appear to demonstrate reliability. However, the population tested was young, healthy and educated which is not representative of the population at large. Thus, the clinician must consider individual patient variability if using MPD as an indicator for AMD risk and/or clinical care.

REFERENCES

CONTACT INFORMATION
Elizabeth Wyles & Robert Donati
ewyles@ico.edu, rdonati@ico.edu
www.ico.edu

Table of Contents
BACKGROUND
Chandler’s Syndrome is a unilateral disease that typically affects women in their middle ages and is a variant of the iridocorneal endothelial (ICE) syndromes. The spectrum of ICE syndromes includes essential (progressive) iris atrophy, Chandler’s syndrome and Cogan Reese (iris neovascular) syndrome. Clinically, Chandler’s syndrome is characterized by mid iris thinning, pupillary distortion, and marked corneal changes which may lead to secondary angle closure glaucoma and thinned corneal edema. Unfortunately, little is understood about the etiology of Chandler’s Syndrome, although links to the Epstein-Barr virus (EBV) and/or a viral etiology have been proposed. This case report reveals the diagnosis of Chandler’s Syndrome in a patient with history of Guillain-Barré Syndrome (GBS).

CASE REPORT
A 55 year-old Caucasian female reported episodic blurred vision of the right eye, noting clouting upon awakening and again at the end of the day. She recalled an isolated episode of increased intraocular pressure (IOP) in the right eye the prior year with normal readings upon follow up. She reported a diagnosis of GBS eight years prior with primarily neurologic manifestations. Upon examination, vision was best corrected to 20/25 in the right and 20/20 in the left eye. The pupil in the right eye was 4 mm in normal room illumination and 5 mm in dim illumination with an ovoid appearance and sectoral response to light. The left pupil was 3 mm in normal room illumination and 4 mm in dim illumination and was round and responsive to light. There was no atypical pupillary defect present. Confrontation visual fields and extra ocular motilities were normal. 74 lamp examination revealed corneal edema in the right eye and deep anterior chambers bilaterally. All other anterior segment structures were normal in appearance with no noted lenticular changes.

IOP readings were 32 mmHg in the right and 14 mmHg in the left by applanation. Gonioscopy showed scattered areas of iridal spur with broad based peripheral anterior synechias (PAS) in the 4-5 o’clock position with areas of peaked PAS at 1, 9:30 and 11 o’clock. Pachymetry was measured at 596 µm in the right and 544 in the left eye. Dilated fundus ophthalmoscopy showed ratios of 0.1 bilaterally.

DISCUSSION
The category of ICE syndromes was first suggested in 1979 by Eagle and Yanoff. These conditions are categorized by a common corneal endothelial dysfunction with varying degrees of abnormalities involving the iris, cornea, and structures of the anterior chamber angle.

IRIS ATROPHY
In contrast to progressive essential iris atrophy and Cogan Reeve (Iris- Nevus) syndrome, in Chandler’s syndrome there are typically minimal changes to the iris structure. Progressive essential iris atrophy often presents with iris atrophy, iris holes, and corectopia while Cogan Reeve (Iris Neovascular) syndrome presents with its stromal nodules.

CORNEAL ENDOTHELIAL DYSTROPHY
Changes to the morphology of the corneal endothelium in ICE syndromes have been confirmed via confocal microscopy and specular microscopy. It has been noted that the normal hexagonal shape of the endothelial cells are replaced by irregularly sized and shaped cells with hyper-reflective nuclei, very similar in appearance to corneal epithelial cells.

Clinically, the appearance of the corneal endothelium is often described as having a beaten metal or hammered silver appearance. It has been noted that the contralateral corneal endothelium in patients with ICE syndromes have subclinically abnormal endothelial cells but no characteristics of ICE cells.

PAS FORMATION
It is believed that corneal endothelial cell proliferation eventually affects the anterior chamber angle causing secondary angle closure glaucoma due to the formation of PAS. PAS are noted to be broad based in nature and anterior to schwalbe’s line. As the condition progresses, the critical IOP level lowers, resulting in need to more aggressively manage IOP.

CONCLUSION
There have been several different etiologies proposed for the ICE syndromes, including a link to EBV, and most recently a link to the herpes simplex virus. Although a direct link is still being debated.

As well, a strong, positive association has been made between GBS and EBV. This case supports the hypothesis of a potential link between ICE syndromes and EBV.

BIBLIOGRAPHY
CLINICAL EVALUATION OF A LARGE DIAMETER RIGID-GAS PERMEABLE LENS FOR THE CORRECTION OF REFRACTIVE ASTIGMATISM

Langis Michaud. OD, MSc, FAAO (Dipl). Stephanie WOO OD, Amy DINARDO-LOTOCKZY OD, MBA, FAAO Jennifer S. HARTTHAN. OD, FAAO Edward S. BENNETT. OD, MS. FAAO (Dipl). Bruce W. MORGAN. OD, FAAO. Renee E. REEDER. OD. FAAO (Dipl)

INTRODUCTION

This study aims to validate the clinical performance of a new large diameter rigid gas permeable lens in a group of subjects with low to moderate (0.75D to 2.75D) refractive astigmatism. It aims to demonstrate whether soft toric or large diameter rigid gas-permeable (LRGP) contact lenses offer the best option for the correction of low-to-moderate astigmatism and to determine which modality is preferred by subjects.

METHODS

This is a multi-site, cross-over, randomized study. Forty subjects (10/10) healthy soft contact lens wearers are randomly assigned to Group A or Group B. Group A is fitted first with a soft toric lens (Biofinity Toric, Cooper Vision) for a month, and then switched to LRGP lens (Blanchard, OneFit P&A Lens), for another month. Group B starts with LRGP lenses and ends the study being fitted with soft lenses. For each type of lens worn, low- and high-contrast visual acuity (VA) are evaluated at both near and far. Ocular health is assessed and compared to baseline. Questions related to vision during day-to-day activities provide an overall quality of vision assessment. The study was sponsored by Blanchard Labs (Sherbrooke, Québec).

RESULTS

Table 1: The table lists the visual acuity and ocular health findings for LRGP and Soft Toric lenses.

<table>
<thead>
<tr>
<th></th>
<th>LRGP</th>
<th>Soft Toric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Acuity (OD)*</td>
<td>-0.2 (+0.7)</td>
<td>-0.4 (+0.1)</td>
</tr>
<tr>
<td>Visual Acuity (OS)</td>
<td>-0.1 (+0.6)</td>
<td>-0.3 (+0.1)</td>
</tr>
<tr>
<td>SPK**</td>
<td>8.1 (+0.7)</td>
<td>8.1 (+0.7)</td>
</tr>
<tr>
<td>Bulbar Hyperemia**</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
</tr>
<tr>
<td>GPC**</td>
<td>1.0 (0.6)</td>
<td>1.0 (0.6)</td>
</tr>
</tbody>
</table>

*Log Mar units (average)
**Extra-translating scale (median value)

Table 2: The table lists the subjective evaluation of the lenses.

<table>
<thead>
<tr>
<th></th>
<th>LRGP</th>
<th>Soft Toric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Use</td>
<td>1.0 (+0.6)</td>
<td>0.0 (+0.8)</td>
</tr>
<tr>
<td>Subjective Comfort (100)</td>
<td>85.1 (22.3)</td>
<td>69.8 (27.1)</td>
</tr>
<tr>
<td>Insertion</td>
<td>82.2 (23.6)</td>
<td>69.8 (27.1)</td>
</tr>
<tr>
<td>Mid-day</td>
<td>81.1 (+0.4)</td>
<td>79.6 (+0.6)</td>
</tr>
<tr>
<td>Evening</td>
<td>83.5 (+0.4)</td>
<td>80.6 (+0.9)</td>
</tr>
<tr>
<td>Overall</td>
<td>81.4</td>
<td>81.4</td>
</tr>
</tbody>
</table>

Table 3: The table lists the contact lens fit findings.

<table>
<thead>
<tr>
<th></th>
<th>LRGP</th>
<th>Soft Toric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lenses showing rotation</td>
<td>9 (+2.5)</td>
<td>12 (+3.3)</td>
</tr>
<tr>
<td>Average</td>
<td>116.6 (+40.1) um</td>
<td>116.1 (+32.5) um</td>
</tr>
<tr>
<td># lenses showing rotation</td>
<td>9 (25%)</td>
<td>12 (33.3%)</td>
</tr>
<tr>
<td>Average LRGP rotation</td>
<td>1.3 (+2.5) deg</td>
<td>2 (+1.6) deg</td>
</tr>
<tr>
<td>Average Soft Toric rotation</td>
<td>29 (+7)</td>
<td>0 (+0)</td>
</tr>
</tbody>
</table>

DISCUSSION

One Fit P&A™ mini-scleral lens is one of the few large diameter gas permeable lenses designed to be fitted on regular corneas. It aims to correct current refractive errors as well as irregular astigmatism.

This study shows that it is possible to adapt LRGP lenses on a current soft lens wearers population with success. Data show that this LRGP properly fitted is as comfortable as a leading brand soft toric lens. Once asked, subjects report that One Fit P&A™ overcomes the Biofinity Toric for visual acuity. Despite the fact that the soft lenses are easier to handle, 50% of the soft lens wearers may consider to switch over LRGP lenses as their lens of choice for the future and would recommend them.

One Fit P&A™ can be considered a valid alternative to refit soft toric contact lens wearers complaining about vision. In both cases, subjects shows a marked preference toward rigid gas permeable lenses because of the quality and stability of their vision even if soft lenses may be considered more convenient.

However, visual fluctuation represent the first reason for astigmatic patients to drop-out from contact lens wear. This study shows that LRGP represent a real alternative for those patients to improve their quality of vision. This represents also a true positive opportunity for practitioners to keep their contact lens patients in the market.

CONCLUSION

• Subjects preferred One Fit P&A™ to Biofinity Toric for vision.
• LRGP was considered as comfortable as the soft toric lens, all the day long.
• One Fit P&A™ could be considered a valid alternative to refit soft toric contact lens wearers complaining about vision.
• Large diameter rigid gas permeable lens could be worn for the same amount of time.

Aknowledgements

This study is sponsored by Blanchard Labs (Sherbrooke, Québec).

Sites involved in this study: University of St Louis. Illinois College of Optometry. Ferris State University. Université de Sherbrooke.

Thanks to Michel Gagnon for technical assistance.
IACLE is a non-profit, non-political international association that is dedicated to raising the standard of contact lens education and promoting the safe use of contact lenses worldwide. The core purpose of the Association is to "educate the educators".

IACLE delivers quality education and teaching resources to its members. These impact both the educators and their students - the contact lens practitioners of the future.

Mission Statement

IACLE aims to increase the number of qualified contact lens educators and improve the quality of contact lens teaching, thereby increasing the number of skilled contact lens practitioners throughout the world and facilitating the use of contact lenses worldwide, in partnership with Industry.

IACLE’s Reach

Membership of the Association is open to all persons who are actively involved in full-time or part-time contact lens education regardless of their professional background.

IACLE currently works with:

- 740 Members at
- 523 Institutions in
- 68 Countries,
- Reaching 18,305 students each year

IACLE’s 4-Step Education Program

IACLE follows a 4-step model when providing support to contact lens educators

- Foundation of Contact Lens Education
- IACLE Contact Lens Course (ILC)
- IACLE Accreditation Examination
- Measure and Gauge of Academic Success
- Student Trial Exams (STF)
- Ongoing Educator Support
- Train-the-Trainer Programs

Foundations of Contact Lens Education

The IACLE Contact Lens Course (ILC) is a 3-module IACLE Contact Lens Course (ILC) that covers basic, intermediate and advanced level topics.

1. Anterior Segment of the Eye
2. Introduction to Contact Lenses
3. Contact Lens Fitting
4. Examination Procedures for Contact Lens Patients
5. Care and Maintenance
6. The Cornea in Contact Lens Wear
7. Contact Lens-related Ocular Complications
8. Special Contact Lens Fitting
9. Special Topics
10. Business Aspects of Contact Lens Practice

Lectures (100 hours)
Practical sessions (81 hours)
Tutorials (12 hours)

IACLE is available in English (Chinese, French, Italian, Spanish and Indonesian subtitles available). It is designed for students in Korea, Portuguese, Russian, German and Italian.

What is IACLE?

- PowerPoint format for both members and non-members to download from the public section of the IACLE website.
- Key to use "to lo" or "insert" into presentations

Distance Learning Program (DLP)

- Developed to aid educators in systematically studying the modules of the ILC
- Helps prepare for the Accreditation Examination
- Members are able to download from the secure section of IACLE website

Edexcel and Remediation Programs

- Focus on "what to teach"
- Tailored using results from both the Accreditation Examinations and the STF to address areas that have been identified as needing further study and instruction.
- Didactic lectures and hands-on workshops provide a means of raising the knowledge levels of educators on topics such as contact lens fitting, care and maintenance and complications

Evaluations

- Focus on what to teach
- Tailored using results from both the Accreditation Examinations and the STFs to address areas that have been identified as needing further study and instruction.
- Didactic lectures and hands-on workshops provide a means of raising the knowledge levels of educators on topics such as contact lens fitting, care and maintenance and complications

Educational Meetings

- Focus on "what to teach"
- Tailored using results from both the Accreditation Examinations and the STFs to address areas that have been identified as needing further study and instruction.
- Didactic lectures and hands-on workshops provide a means of raising the knowledge levels of educators on topics such as contact lens fitting, care and maintenance and complications

Ongoing Educator Support

- Address "how to teach"
- Aim of improving the presentation skills of IACLEs to conduct interactive lectures and workshops
- Skills gained will enable educators to enhance the learning experience for their students

IACLE Accreditation Examination

- Only internationally accredited means of measuring contact lens knowledge
- Successful completion qualifies members for Fellow of IACLE (FIACLE) status

The IACLE, adopted by many teaching institutions around the world, is supplemented by interactive case studies, image collections and video libraries

Measure and Gauge of Academic Success

IACLE Accreditation Examination

- Only internationally accredited means of measuring contact lens knowledge
- Successful completion qualifies members for Fellow of IACLE (FIACLE) status
- Exams are now administered online for all participants with access to the internet

Both exams are now administered online for all participants with access to the internet

- Only 3% of the eventual participants in the 2011 administration of the Accreditation Examination required paper forms

Online Resources

Online lectures (delivered via WebEx) trialed in 2012 for institutions in India that have achieved the IACLE Certificate of Affiliation or rolled out to additional institutions in 2013

Industry

Founded in 1979, IACLE has been supported by the contact lens industry since 1992 through non-restrictive educational grants. Over the years, sponsors have included:

Bausch & Lomb (1992 – present)
CIBA Vision (1992 – present)
Johnson & Johnson Vision Care, Inc. (1992 – present)
Paragon (1990 – 1994)
Akton (1989 – present)
CoperVision (1997 – present)
Abbott Medical Optics (2003 – present)

Conclusions

By increasing the number of skilled and knowledgeable contact lens educators, and improving the quality of education that these educators provide to their students, the result is more confident practitioners fitting and managing their contact lens patients.

Fewer Complications     Consumer Confidence             Fewer Dropouts

Knowledge                   Skills                   Resources                Assessment

Skills                   Resources                Knowledge                   Assessment

EDUCATORS

Knowledge                   Skills                   Resources                Assessment

STUDENTS

Knowledge                   Skills                   Resources                Assessment

PRACTITIONERS

Knowledge                   Skills                   Resources                Assessment

PATIENTS

Contact Lens Market Growth

Restoring Vision Worldwide
ARVO

11 ICO PRESENTATIONS
Purpose: Vision therapy is the current method of treatment for many accommodative and vergence disorders including accommodative insufficiency, accommodative excess, accommodative infacility, convergence insufficiency, and convergence excess. A variety of vision therapy exercises exist, however many have not yet been investigated for effectiveness in a controlled setting. We are reporting preliminary data on controls for two commonly used therapies: Brock String and Monocular Hart Chart, in a study designed to evaluate the effectiveness of individual vision therapies.

This research protocol examined students at Illinois College of Optometry and individual subjects willing to be included in a vision therapy program, regardless of visual efficiency exam (VEE) outcomes. After performing a modified VEE, each patient was placed into at least one visual disorder group. We then established treatment protocols for each of the visual disorders. These protocols were designed to treat each vision disorder with one therapy at a time and evaluate control groups as compared to experimental group therapy. After the completion of each therapy, experimental and control groups were re-examined and data was collected on the effectiveness of the therapy. After completion of the therapy, these patients were then re-examined and assigned to the experimental group for that therapy. Patients from the experimental group were moved onto the next therapy after being randomly assigned to either a control or an experimental group. This has allowed us to test the effectiveness of the control therapies as controls and to collect data on the effectiveness of the experimental therapies. With this information vision therapy can become more efficient and effective.

Methods: Young adults were screened using a modified VEE and a symptom survey. This survey was a combination of the COVD and the CITT symptom surveys. Based on the exam results and survey, subjects were diagnosed with a vergence dysfunction, an accommodative dysfunction, or both. We used a double- masked, modified cross-over design to randomize subjects into either an experimental therapy or a control therapy group. For six weeks, the experimental group used one specific therapy exercise while the control group used a different specific therapy exercise. After this period, subjects were monitored using our VEE and symptom survey and were then placed in another group. The control group became the experimental group while the experimental group moved to the next therapy where they were assigned to either a control or experimental for another six weeks.

The first therapy assessed was Brock String. The experimental group worked binaurally at 3m, using push-up, jumps, and bugs on a string exercise. The control group used the same procedure but with a needed working distance of 3m. The second therapy assessed was Monocular Hart Chart. The experimental group used large Hart Charts at 3m, and small Hart Charts at 45cm. The small charts were then moved in until just readable, and the subjects were then to read a line on the large chart and then a line on the small chart. The control group for Monocular Hart Chart used the same procedure, but the small chart was left at 40 cm.

Degree of improvement was based on the results of the symptom survey, near point of convergence, prism bar vergences, subjective pull away amplitudes, and objective accommodative responses. Objective accommodative responses were collected using the Schirmer test, and then a percentage for accommodative efficiency was calculated by comparing the accommodative response as a fraction of the accommodative stimulus (Response/Stimulus*100). Data is presented as mean ± SEM, and compares pre-therapy to post-therapy values.

Results:

<table>
<thead>
<tr>
<th>Therapy Type</th>
<th>Pre-Therapy</th>
<th>Post-Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brock String Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near Point of Convergence</td>
<td>0.8</td>
<td>0.7 ± 0.0</td>
</tr>
<tr>
<td>Symptom Survey</td>
<td>Score</td>
<td>32.0 ± 3.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monocular Hart Chart Control</th>
<th>Pre-Therapy</th>
<th>Post-Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull Away Amplitude D</td>
<td>8.5 ± 4.7</td>
<td>6.7 ± 2.4</td>
</tr>
<tr>
<td>Accommodative Efficiency %</td>
<td>91.5 ± 9.2</td>
<td>97.5 ± 0.3</td>
</tr>
<tr>
<td>Symptom Survey</td>
<td>Score</td>
<td>43.5 ± 9.9</td>
</tr>
</tbody>
</table>

Conclusions: In order to evaluate the effectiveness of individual vision therapies being used as the experimental treatment for accommodative insufficiency, accommodative excess, accommodative infacility, convergence insufficiency and convergence excess, we wanted to ensure that there was a set of valid controls. The controls evaluated in our protocol do not appear to result in improvement of the objective measurements used to evaluate accommodative and vergence dysfunctions. Further studies are necessary to increase the number of both accommodative and vergence experimental groups to investigate the effectiveness of individual procedures on improving binocular symptoms in subjects with vision disorders. There are also plans to expand the protocol to include additional binocular vision disorders and their accepted therapies. After an analysis of the current experimental treatments has occurred, more effective therapy schedules can be made for patients.

Funded by ICO IRC
A Comparison Of Axial Lens Lengths In A Relaxed State And Accommodative State Using Anterior Segment Optical Coherence Tomography And A-scan Ultrasonography

Kyle D. Klute¹, Marc Landes¹, Jennifer S. Harthan², Rebecca K. Zoltoski².

¹Cornea Center for Clinical Excellence, ²Didactic Education, ³Illinois College of Optometry, Chicago, IL.

Purpose: During dynamic focusing, the shape of the lens changes. Our lab investigates these changes in lens ultrastructure during accommodation. One means to document changes during accommodation is to measure lens thickness. For our research, a technique is needed to measure lens thickness that can be easily used in all patients. Both anterior segment optical coherence tomography (OCT) and A-Scan ultrasonography (A-Scan) may be used clinically to measure the thickness of anterior segment structures. However, a comparison of the two instruments ability to measure the change in the lens during accommodation has not been thoroughly documented. Therefore, we compared Visante™ OCT with Accutome™ A-Scan after presenting increasing accommodative stimuli using minus lenses.

Methods: OCT, A-Scan, and accommodative response was collected on eight subjects, 23-41 years of age, all having normal age-related accommodation. Measurements (right eye only) were first taken with accommodation relaxed while the subject viewed a standard target. Then subjects were given increasing minus lenses to stimulate an increase in accommodation as successive measurements were taken as the subject viewed the same target. iTrace™ wavefront analysis was used with the same accommodative demands to measure the objective accommodative response. Data were analyzed using Systat v11 to correlate accommodative response with lens thickness. Data are presented as mean ± SEM and Spearman Rank Correlation coefficients and p-values are presented.

Results:

<table>
<thead>
<tr>
<th>Lens Thickness (mm)</th>
<th>OCT</th>
<th>A-Scan</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.38 ± 0.06</td>
<td>0.40 ± 0.06</td>
<td>p=0.001</td>
<td></td>
</tr>
<tr>
<td>Lens thickness increase (μm)/ accommodative demand (D)</td>
<td>0.10 ± 0.04</td>
<td>0.14 ± 0.08</td>
<td>p=0.64</td>
</tr>
</tbody>
</table>

Conclusions:

- Our increase in thickness is lower than that reported in the literature. Further analysis and increasing the number of the subjects may correct this discrepancy.
- The higher variability and numbers seen in the Visante can be related to operator error in measuring the lens because it can be difficult to isolate the back surface of the lens on the viewing screen.
- This preliminary evidence indicates that Visante OCT can be used in subjects as a non-invasive measure for changes in lens thickness with increased accommodative demand as an accurate alternative to A-Scan ultrasonography.

<table>
<thead>
<tr>
<th>Lens Thickness (mm)</th>
<th>OCT</th>
<th>A-Scan</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.38 ± 0.06</td>
<td>0.40 ± 0.06</td>
<td>p=0.001</td>
<td></td>
</tr>
<tr>
<td>Lens thickness increase (μm)/ accommodative demand (D)</td>
<td>0.10 ± 0.04</td>
<td>0.14 ± 0.08</td>
<td>p=0.64</td>
</tr>
</tbody>
</table>
Effect Of Accommodation On The Lens Ultrastructure As Measured Using Slit Lamp Photos And Wave Front Analysis

Rebecca K. Zoltoski1A, Elizabeth Wyles1, Jennifer S. Harthan1, Jer R. Kuszak2.

1Didactic Education, 1Illinois College of Optometry, Chicago, IL; 2LensAR Inc., Orlando, FL.

Purpose: During dynamic focusing, the shape, as well as the ultrastructure of the lens is changed. Our lab is investigating these changes, specifically at the sutures of the lens during accommodation. We have hypothesized that unique structural features and organization of fiber cells enables them to interface at the sutures resulting in a change in surface curvature of the lens, as well as an increase in thickness, allowing near focus to occur. We are reporting preliminary data on lens slit lamp photos, OCT of lens thickness changes, and sequential ray tracing analysis of the patterns associated with the lens sutures to provide additional insight into the importance of the ultra-structure of the lens in the accommodative process.

Method: OCT (Visante™), wavefront analysis (iTrace™), and slit lamp photos (Haag Streit, 16X magnification, dilated eye) were collected on normal subjects, between the ages of 23-63 (n=15). The data was collected on the right eye. Accommodation was stimulated using minus lenses in front of the viewing eye in 2.5 D increments until the subject could no longer clearly view the target. For the photos a prism system was used to keep the eye appropriately oriented. The objective accommodative response was calculated as the change from a distance measurement refractive value. ImageJ (NIH) was used to analyze the area of the sutural components. Data were analyzed using Systat v11 to correlate accommodative response with total HOA, SA and the foil patterns, as well as changes in slit lamp suture areas. Spearman Rank Correlation coefficients and p values are presented.

Results:

<table>
<thead>
<tr>
<th>Foil Pattern</th>
<th>Foil Pattern</th>
<th>Foil Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxed 1</td>
<td>5 D 4.1 D</td>
<td>5 D 4.3 D</td>
</tr>
<tr>
<td>2.5 D 1.7 D</td>
<td>2.5 D 1.9 D</td>
<td>2.5 D 0.5 D</td>
</tr>
<tr>
<td>7.5 D 6.1 D</td>
<td>7.5 D 6.1 D</td>
<td>7.5 D 7.3 D</td>
</tr>
<tr>
<td>10 D 3.6 D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusions:
• Lens thickness increases by 0.13 μm/D during accommodation
• The ultra-structure of the lens undergoes a change in the suture pattern that can be seen and numerically defined
• Changes in the foil patterns occur, but more work on larger number of individuals is needed.

As accommodative demand increased as evidenced by an increase in response and lens thickness, changes in the ultra-structure of the lens occur as evidenced by the decrease in area of the dark central region of the suture and in the foil patterns in some individuals. These changes may be caused by the end-to-end arrangement (non-overlapping) of fiber cells at the sutures in the dysaccommodated state, which actively interface (overlap), during accommodation to increase lens thickness.

Funded by NIH Grant EY021015-01 and ICO RRC.
A Survey of Smartphone Usage in Low Vision Patients

Raman Bhakhri1,2, Robert Chun1,2, John Coalter1, Walter M. Jay3.

1Low Vision, Spectrios Institute for Vision Rehabilitation, Wheaton, IL; 2Low Vision, The Chicago Lighthouse for People Who are Blind or Visually Impaired, Chicago, IL; 3Ophthalmology, Loyola University Chicago, Maywood, IL.

PURPOSE

Smartphones are impacting conventional low vision rehabilitation. Features included in these phones allow for magnification, photo capture, GPS with voice navigation, illumination, and more. The availability and development of more accessibility features allows eye care professionals to better accommodate the low vision needs of their patients. We utilized a survey to determine the demographics and current usage of smartphones among visually impaired patients in Illinois.

METHODS

Forty-six patients from the Spectrios Institute in Wheaton, Illinois and the Chicago Lighthouse responded to an IRB-approved survey (21 males, 25 females). Patients were selected randomly at the conclusion of low vision exams or were asked to participate in a telephone version of the survey. Only patients over the age of 18 were eligible to participate, with best corrected visual acuity ranging from 20/70 to No Light Perception.

RESULTS

The mean age of the subjects surveyed was 60.6 years and the range was 18 to 97. There were 16 different diagnoses, with primary open angle glaucoma (8), exudative macular degeneration (7), and non-exudative macular degeneration (5) being the most common. Eleven of forty-six (24%) patients used smartphones (mean age 36, mean visual acuity right eye 20/146, left eye 20/107, 30 of 46 (65%) used a basic mobile phone (mean age 67, mean acuity in the right eye 20/273, left eye 20/320), and 5 of 46 (11%) patients did not own a cell phone (mean age 79, mean acuity right eye 20/515, left eye 20/112). Among the smartphone users, 9 of 11 (82%) patients reported purchasing their phone because of the features offered. The most common features utilized by low vision smartphone users besides basic phone calling included texting (100%), internet (27%), and email (36%). Seven of forty-six (15%) patients reported that a low vision doctor recommended a smartphone for its accessibility features. Twenty of 35 (57%) non-smartphone users (mean age 62) reported they were interested in learning more about adaptive technology features provided by smartphones.

CONCLUSIONS

Younger patients are more likely to use smartphones in their low vision rehabilitation. A low percentage of patients reported any recommendation from their low vision doctors regarding smartphone technology as part of their vision rehabilitation. Though younger patients are using smartphone technology more, older patients are interested in learning about these capabilities.

CONTACT INFORMATION

Raman Bhakhri
rghakhri@ico.edu
www.ico.edu
RETROSPECTIVE REVIEW OF RECORDS FROM A SCHOOL BASED VISION CLINIC SERVING THE CHICAGO COMMUNITY

Sandra S. Block1, Melissa Suckow2, Sabrina Reed2
1School-Based Vision Clinic, Illinois College of Optometry, Chicago, IL. 2Private practice, Chicago, IL.

PURPOSE

The Illinois Eye Institute (IEI) at Princeton opened in January 2011 as a school-based vision program to address the unmet need of vision care for children within the city of Chicago. The program is a partnership between the Illinois College of Optometry and the Chicago Public School system. Each partner contributes to address the problem of lack of access to eye care for children in the school system.

METHODS

Each year, more than 100,000 children in the Chicago Public Schools (CPS) fall into one of these categories:

- Failed vision screenings
- Broken or lost glasses
- Failed vision screenings
- Demonstrated visual problems in the classroom
- Breaks or lost glasses
- Reflected light

CPS and the IEI partnered to open a year-round vision clinic to address this unmet need. The clinic is open to all CPS children during school hours. Local foundations, donations from corporate sponsors, and in-kind services allow the delivery of care.

RESULTS

DEMOGRAPHICS

3,052 children were seen during the first year of clinical operations.

Gender Distribution

- Female: 56.50%
- Male: 43.70%

Age Distribution

- Mean: 11.3 yrs ± 0.05
- Median: 11.7 yrs
- Mode: 8.8 yrs
- Range: 2.0-21.9 yrs

Children who were seen represented 228 schools within Chicago.

- 204 schools - 90% or more of the children attending were considered low income* (95% of patients seen)
- 168 schools - 90% or more of the children were considered low income* (96.5% of patients seen)

*Low-income students are pupils age 3 to 17, inclusive, from families receiving public aid, living in institutions for neglected or delinquent children, being supported in foster homes with public funds, or eligible to receive free or reduced-price lunches.

CLINICAL FINDINGS

Entering distance visual acuity – right eye:

- 20/20 - 1616
- 20/25 - 799
- 20/30 - 323
- 20/40 - 564
- 20/63 - 32
- 20/70 - 202
- 20/80 - 112
- 20/125 - 82
- 20/200 - 144
- 20/400 - 571
- 20/800 - 161
- NLP – Finger Counting - 19

Refractive Error

Dry Autorefraction

- Sphere: 0.40 ± 1.10
- Cylinder: -0.27 ± 0.02

Cyclo Autorefraction

- Sphere: 1.00 ± 0.25
- Cylinder: 0.50 ± 0.02

Table 1: Age Distribution

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-6 yrs</td>
<td>306</td>
</tr>
<tr>
<td>7-8 yrs</td>
<td>947</td>
</tr>
<tr>
<td>9-10 yrs</td>
<td>144</td>
</tr>
<tr>
<td>11-12 yrs</td>
<td>107</td>
</tr>
<tr>
<td>13-14 yrs</td>
<td>76</td>
</tr>
<tr>
<td>15-16 yrs</td>
<td>49</td>
</tr>
<tr>
<td>17 yrs</td>
<td>12</td>
</tr>
<tr>
<td>18 yrs</td>
<td>19</td>
</tr>
<tr>
<td>19 yrs</td>
<td>10</td>
</tr>
</tbody>
</table>

Children, parents, and teachers were informed of vision needs, treatment regimens.

Amblyopia was found in 7.2% of the children, 5.0% required near or replacement glasses. Previously undiagnosed glaucoma was found in 1 patient and was diagnosed but failed to follow through with treatment regimen.

CONCLUSIONS

There is a large unmet need for vision care within CPS. Our clinic provides primary eye care, access to refractive correction, and limited follow up.

When secondary care is required, the challenge is ensuring the patient is able to access appropriate services.

We are working to address referrals, expand services available, and monitor the wear of prescribed glasses.

A unique aspect of this program is that services are offered to all CPS children during school hours.

SUPPORTERS

Proud Supporters of Illinois Eye Institute at Princeton Elementary School

Organizations

Alcon, Anonymous, Blue Cross and Blue Shield of Illinois, Chicago Community Trust, Good-Lite, Grant Healthcare Foundation, Keeler Instruments, Lloyd A. Fry Foundation, OneSight, Richmond Products, Star Ophthalmic Instruments, Vision Assessment Corporation, Vorks

Individuals

Bridget C. Axelson, OD, A. Clinton Greene, OD, Ronald Harrison, OD, Colin Howe, OD, Truman Schmidt, OD, Ms. Sandra Taylor, Ms. Karen Yetter

CONTACT INFORMATION

Sandra S. Block
info@ico.edu
www.ico.edu
A Clinical Comparison of the MacuScope and QuantifEye Macular Pigment Densitometers

Elizabeth Wyles, OD, Robert Donati, PhD
Illinois College of Optometry

BACKGROUND

Age-related macular degeneration (AMD) is the leading cause of blindness among individuals older than 65 years. Studies suggest an increased risk of development of AMD is associated with reduced levels of macular pigment (MP). Many of these studies have investigated MP levels using heterochromatic flicker photometry (HFP). There are two compact commercially available HFP instruments in the USA. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population.

METHODS

Twenty-eight patients with and without signs of early AMD were recruited from the Illinois Eye Institute patient base. Both eyes of the 28 Caucasian and African American male and female aged 50-70 were analysed for macular pigment optical density (MPOD) using the MacuScope and QuantifEye. Data were collected by a single operator in a single session for each patient. Whether a subject was first tested on the MacuScope or QuantifEye was randomly determined. Two measurements were taken on each eye of each subject. In case of inability to complete the test, or if the data were non-usable, a third measurement was provided giving a total of 3 readings per eye. Whether a subject was first tested on the MacuScope or QuantifEye was randomly determined. Twenty three subjects (46 eyes) provided valid data with both instruments. Non-usable data resulted from off-scale readings, machine error, inability of the subject to complete the test, or inadequate visual acuity. Paired and unpaired student’s t-tests were done to compare the statistical significance of the inter- and intra-instrument measurement variability of both instruments. Additionally, a Bland-Altman plot was done for an additional comparison.

RESULTS AND CONCLUSIONS

• There was no significant difference between the mean MPOD readings of the two instruments (Figure 1).
• A repeated measures Bland-Altman analysis revealed that overall, both machines are sufficient to measure MPOD (Figure 2) with an even distribution above and below the mean, but the spread of the paired observations between the limits of agreement demonstrates a lack of precision between the instruments.
• There is a significant difference in intra-instrument measurement variability (p<0.0006) when considering individual subject variability (Figure 3).
• Is this variability acceptable?
• The clinician must take this variability into account if using MPOD as an indicator for AMD risk and/or clinical care.
• If MPOD is being monitored clinically to assess risk of AMD with the possibility of causing altered treatment regimens, the need for reliable data measurements is imperative.

REFERENCES


In this study, we aimed to (Figure 1) investigate MP levels of macular pigment (MP) in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population. Our aim was to determine the inter- and intra-instrument measurement variability in a representative clinical population.
Prevalence of Refractive Amblyogenic Risk Factors in Varying Age Groups of the Preschool Population

Valerie M. Kattouf O.D., Julie Beard, Clara Chang, Amy Tevar
Illinois College of Optometry, Chicago, Illinois

PURPOSE
To determine the prevalence of refractive amblyogenic risk factors in the varying ages of a low-income, underserved preschool population.

METHODS
In a multi-center (n > 100) study comprehensive eye examinations of 6476 children ages 6 months-6 years were performed. Children were recruited from Early Intervention Programs. Visual acuity determination, cover testing, stereopsis evaluation, cycloplegic refraction and ocular health evaluations were performed by experienced clinicians.

The population was aged from 6 months -1year (n=89), 1-2 years (n=330), 2-3 years (n=174), 3-4 years (n=1016), 4-5 years (n=2299), 5-6 years (n=1108), 6+ years (n=1109) and the majority were from non-Caucasian, low-income families.

Hyperopia and myopia were defined as 1.00 D or more in each principal meridian. Astigmatism was defined as having astigmatic refractive error ≥2.50 diopters; spherical refractive error ≥ +4.00 D or –6.00 D in each principal meridian. Astigmatism was defined hyperopia and myopia were defined as 1.00 D or more in each principal meridian. Astigmatism was defined as having astigmatic refractive error ≥2.50 diopters; spherical refractive error ≥ +4.00 D or –6.00 D in each principal meridian.

RESULTS
Seven percent of the entire group were identified as having isometropic amblyogenic risk factors. The birth to 1 year old age group revealed isometropic amblyogenic risk factors in 11% hyperopes and none of the myopes. The 1-2 year old group in 3.5% of hyperopes and 0.6% myopes, the 2-3 year old group in 3.27% hyperopes and 0.4% myopes, the 3-4 year old group in 4.33% hyperopes and 0.27% of myopes, the 4-5 year old group in 4.52% of hyperopes and 0.34% of myopes, the 5-6 year old group in 4.39% of hyperopes and 0.38% of myopes, and the 6+ group in 6% of hyperopes and 1% of myopes.

Isometropic amblyogenic risk factors due to high astigmatic corrections were identified in 6.74% of the children in the study were positive for the risk. Uncorrected hyperopic and astigmatic corrections pose the greatest risk for amblyopia development. In our low-income, preschool population the 3-5 year old age group demonstrates the greatest need for identification and treatment of isometropic refractive amblyopia. The results of this study confirm the importance of early detection and intervention of childhood vision problems, such as amblyopia, in order to maximize a child’s development and learning potential.

CONCLUSIONS
Isometropic amblyopia accounts for 1.2% of all refractive amblyopia in the general population, 7% of the children in the study were positive for the risk. Uncorrected hyperopic and astigmatic corrections pose the greatest risk for amblyopia development. In our low-income, preschool population the 3-5 year old age group demonstrates the greatest need for identification and treatment of isometropic refractive amblyopia. The results of this study confirm the importance of early detection and intervention of childhood vision problems, such as amblyopia, in order to maximize a child’s development and learning potential.

Valerie M. Kattouf OD
vkattouf@ico.edu
www.ico.edu

Table of Contents
Improving the Reliability of the CSV-1000 Test

Susan A. Kelly, Yi Pang, Ph.D, Diana Richter, Calvin Vance, David McIntosh, Becky Young
Chicago, Illinois

Table of Contents

METHODS
Environment
The Vector Vision CSV-1000 presents sinusoidal targets on a translucent chart that is rear-
illuminated to a self-calibrated mean luminance of 80 cd/m².
The standard test distance is 8 feet.
The translucent chart contains four rows of varying spatial frequency patterns, each of which contains two rows of targets of decreasing contrast from left to right. The four spatial frequencies are set at 3, 6, 12 and 18 cpd.
The decrease in contrast from column 1 to column 2 is a 0.3 log unit step, but for all subsequent steps the decrease is 0.15 log units. For each vertical pair in a given column the spatial frequency target is present in either the top or bottom target within the given level of contrast. The other target contains no sinusoidal pattern but is the same mean luminance as the grating pattern. Visual acuity was measured for each subject using the ETDRS acuity chart at a distance of 10 feet.
Subjects
A total of 78 subjects (average age 25.2 years old) were recruited from the student and faculty population at the Illinois College of Optometry (ICO). Sixty-eight subjects returned for the retest.
Criterion for enrollment. Subjects must be willing to be tested on two separate occasions.
Subjects signed a consent form to release clinical files for review and filled out a pertinent ocular history questionnaire.
Protocol
The CSV-1000 measures the CS-O of a subject with the psychophysical method of 2-alternative forced choice paired with the descending method of limits.
For a given spatial frequency at a single contrast level the instructions given by the manufacturer require the subject to view the paired targets and verbally indicate either the target location (top or bottom) or “blank”.
To limit the amount of variability from guessing we chose to reduce the options to either “top” or “bottom” removing the “blank” option. At each spatial frequency subjects identified the location of the test patch in a descending order of contrast. Contrast thresholds were then re-measured for each spatial frequency going from right to left which meant contrast was systematically increased. Each response was recorded as correct or incorrect. The visual acuity of the right eye was then taken and recorded.
Subjects were monocularly tested with their habitual distance correction and then asked to return at least one week later for the next testing wearing their same correction.
Testing was held over a period of 4 weeks at the same site within ICO.
All retesting was done by the same examiner who had initially tested each subject. Each testing session lasted an average of 2.85 minutes.
Scoring Procedure
On the descending trials the contrast threshold was taken as the contrast of the last correct response. The final contrast threshold was defined as the lowest contrast the subject detected correctly on the both ascending and descending trials. We reasoned that in this scenario the odds of getting a given contrast correct by chance was reduced from 0.5 to 0.25.

RESULTS
Test-retest reliability was measured on a total of 68 subjects using three different statistical methods of analysis. All statistical analyses were performed with SPSS Version 17 (SPSS Inc., Chicago, IL).
These included the intraclass correlation coefficient (ICC), coefficient of reliability (COR) and limits of agreement (LoA) which are listed in Table 1 along with the same values obtained from an earlier study that measured reliability using the recommended protocol.
Note that the ICC values obtained with the new protocol are now statistically significant for all four spatial frequencies whereas only one ICC value was significant using the standard procedure.

Figure 1: CSV-1000 Tester

Figure 2: Bland-Altman Plots

Table 1: Reliability Measures of Old Protocol vs. New Protocol

<table>
<thead>
<tr>
<th>Spatial Frequency</th>
<th>Old Protocol vs New Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old Protocol vs New Protocol</td>
</tr>
<tr>
<td></td>
<td>ICC</td>
</tr>
<tr>
<td></td>
<td>COR</td>
</tr>
<tr>
<td></td>
<td>LOA</td>
</tr>
<tr>
<td>3 cpd</td>
<td></td>
</tr>
<tr>
<td>6 cpd</td>
<td></td>
</tr>
<tr>
<td>12 cpd</td>
<td></td>
</tr>
<tr>
<td>18 cpd</td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSIONS

- Using the manufacturer’s recommended protocol the ICC, COR and Bland-Altman plots indicate that the CSV-1000 is an unreliable test.
- However, by changing the protocol slightly we have significantly increased the reliability as measured by the ICC. There was no change in the reliability according to the Bland-Altman plots, but there was an increase in test-retest reliability (vs. its use as a measure of reliability between instruments) has been questioned (Hopkins, 2000).

REFERENCES


DOI: 10.1200/JCO.2011.39.5_suppl.552

Table of Contents

PurPOSE

Chart-based contrast sensitivity tests are generally easy to administer, take little time and are cost-effective for clinicians. However, their test-retest reliability is generally low. We recently reported that the Vector Vision CSV-1000 has low test-retest reliability for adults and children (Kelly et al., 2011). The CSV-1000 test measures CS at four spatial frequencies and varies contrast from suprathreshold to threshold levels near eight steps. The contrast threshold and hence CS is defined as the lowest contrast the subject can correctly guess the location of the test patch rather than respond “blank” at contrast values close to threshold.

It seemed likely that a procedure which reduced the decrease in contrast from suprathreshold to threshold levels over paired targets (see illustration below): they can state that subjects have three options for each set of four spatial frequency patterns, each of which contains two targets of decreasing contrast from left to right. The four spatial frequencies are set at 3, 6, 12 and 18 cpd.
The decrease in contrast from column 1 to column 2 is a 0.3 log unit step, but for all subsequent steps the decrease is 0.15 log units. For each vertical pair in a given column the spatial frequency target is present in either the top or bottom target within the given level of contrast. The other target contains no sinusoidal pattern but is the same mean luminance as the grating pattern. Visual acuity was measured for each subject using the ETDRS acuity chart at a distance of 10 feet.

Subjects
A total of 78 subjects (average age 25.2 years old) were recruited from the student and faculty population at the Illinois College of Optometry (ICO). Sixty-eight subjects returned for the retest.

Criterion for enrollment. Subjects must be willing to be tested on two separate occasions.
Subjects signed a consent form to release clinical files for review and filled out a pertinent ocular history questionnaire.
Protocol
The CSV-1000 measures the CS-O of a subject with the psychophysical method of 2-alternative forced choice paired with the descending method of limits.
For a given spatial frequency at a single contrast level the instructions given by the manufacturer require the subject to view the paired targets and verbally indicate either the target location (top or bottom) or “blank”.
To limit the amount of variability from guessing we chose to reduce the options to either “top” or “bottom” removing the “blank” option. At each spatial frequency subjects identified the location of the test patch in a descending order of contrast. Contrast thresholds were then re-measured for each spatial frequency going from right to left which meant contrast was systematically increased. Each response was recorded as correct or incorrect. The visual acuity of the right eye was then taken and recorded.
Subjects were monocularly tested with their habitual distance correction and then asked to return at least one week later for the next testing wearing their same correction. Testing was held over a period of 4 weeks at the same site within ICO.
All retesting was done by the same examiner who had initially tested each subject. Each testing session lasted an average of 2.85 minutes.

Scoring Procedure
On the descending trials the contrast threshold was taken as the contrast of the last correct response. The final contrast threshold was defined as the lowest contrast the subject detected correctly on the both ascending and descending trials. We reasoned that in this scenario the odds of getting a given contrast correct by chance was reduced from 0.5 to 0.25.

RESULTS
Test-retest reliability was measured on a total of 68 subjects using three different statistical methods of analysis. All statistical analyses were performed with SPSS Version 17 (SPSS Inc., Chicago, IL).
These included the intraclass correlation coefficient (ICC), coefficient of reliability (COR) and limits of agreement (LoA) which are listed in Table 1 along with the same values obtained from an earlier study that measured reliability using the recommended protocol.
Note that the ICC values obtained with the new protocol are now statistically significant for all four spatial frequencies whereas only one ICC value was significant using the standard procedure.

CONCLUSIONS

- Using the manufacturer’s recommended protocol the ICC, COR and Bland-Altman plots indicate that the CSV-1000 is an unreliable test.
- However, by changing the protocol slightly we have significantly increased the reliability as measured by the ICC. There was no change in the reliability according to the Bland-Altman plots, but there was an increase in test-retest reliability (vs. its use as a measure of reliability between instruments) has been questioned (Hopkins, 2000).

REFERENCES


DOI: 10.1200/JCO.2011.39.5_suppl.552
Persistent Pupillary Membranes and Long Anterior Zonules

Daniel K. Roberts, O.D., Ph.D.,* 1, Jacobi Wilkens, M.D.
*Eye Institute, Department of Clinical Education, Illinois College of Optometry, Chicago, IL; University of Illinois at Chicago, Division of Epidemiology and Biostatistics, Chicago, IL; University of Illinois at Chicago, Department of Ophthalmology and Visual Science, Chicago, IL.
Support: NEI Grant K23 EY018883 (DRR).

**BACKGROUND**

Long anterior zonules (LAZ) are characterized by zonular fibrils occurring anterior to the normal intraocular lens (IOL) capsular bag (Fig. 1). LAZ may rub against the posterior iris, become pigmented, and cause a genetic mutation. 12,13 Other anterior zonular abnormalities such as posterior polar fibrous strands (PPM) fibrous strands in subjects with LAZ, we evaluated understanding of its clinical picture and significance is understudied, and better genetic mutation.11,12 Another type occurs apart from genetic associations.11,12

**SUBJECTS AND METHODS**

Subjects were recruited from a single urban eye care facility and presented for a broader investigation seeking to explore characteristics, co-morbidity associations, and etiology of the LAZ phenotype. Within the larger investigation, LAZ probands, control probands, and first-degree relatives, had been recruited over a 2.5-year period. Potential association of PPMs with LAZ had not been recognized during data collection, so data was not collected with this in mind. LAZ probands were recruited from a large database accumulated over 10.2 years, mostly through in-house referrals. The anterior LAZ was present of zonular fibers ≤1 mm to normal near the zonular membrane zone on the anterior capsule (Fig. 1). To ensure definitive cases, subjects with <5 LAZ fibres in both eyes were excluded. Only African-Americans were recruited due to institutional demographics.

Control probands were recruited mainly from an existing database of 5,500 consecutive primary care eye patients examined over a two-year period by the primary study site practitioners. A frequency-matched race, gender, and age-case design was used for control selection. At the exam of the index LAZ and control subjects, family pedigrees were constructed through a standardized interview process, and information on first-degree relatives was completed. Then, eligible first-degree relatives ≤40 years old were also invited for examination similar to the index subjects.

**RESULTS**

The analysis included 223 total subjects, which was comprised of 80 LAZ probands (mean age 79.1 years; 69 females, 11 males), 77 control probands (mean age 78.0 years; 67 females, 10 males) and 66 LAZ probands (mean age 79.5 years; 51 females, 15 males). Along with comprehensive oculu-examiner had goniometry, stereo fundus photography, congruent pachymetry, A-scan ultrasonography, and corneal pachymetry, Humphrey Field Analyzer 15 series threshold visual field testing. To document the presence/incidence of LAZ and PPMs, a combination of gonioscopy, stereo fundus photography and confocal scanning laser tomography were used. LAZ presence was defined with focus on the anterior capsule using a digital photo or a lamp (500-900x resolution). In Fig. 2 these primarily-African-American subjects with PPMs in the left eye only, 4 with PPMs in the right eye only. Among the 77 control probands, 11 subjects had PPMs (2 bilateral, 4 with PPMs in the right eye only, 6 with PPMs in the left eye only). Among the 77 control probands, 11 subjects had PPMs (2 bilateral, 4 with PPMs in the right eye only, 6 with PPMs in the left eye only). Among the 77 control probands, 11 subjects had PPMs (2 bilateral, 4 with PPMs in the right eye only, 6 with PPMs in the left eye only). Among the 77 control probands, 11 subjects had PPMs (2 bilateral, 4 with PPMs in the right eye only, 6 with PPMs in the left eye only). Among the 37 probands and 37 control probands, 11 subjects had PPMs (2 bilateral, 4 with PPMs in the right eye only, 6 with PPMs in the left eye only).

Using multiple logistic regression to evaluate right eye, LAZ probands were 2.8 more times likely to control than control probands (OR=2.8; 95% CI=1.2 to 5.9; P=0.02). Compared to control probands, LAZ probands were 2.9 times more likely to exhibit detectable LAZ (OR=2.8; 95% CI=1.2 to 6.3; P=0.01) to exhibit detectable LAZ on one or more eyes when compared to control probands. Comparing the right eyes of all subjects among LAZ families to the right eyes of all subjects among control families, while controlling for age, LAZ probands were 2.8 more times likely to exhibit PPMs (OR=2.8; 95% CI=1.2 to 5.9; P=0.02). A similar trend was present for the left eyes (OR=1.9; 95% CI=1.2 to 3.1; P=0.01). Also, LAZ probands were 2.8 more times likely to exhibit PPMs (OR=2.8; 95% CI=1.2 to 6.3; P=0.01) to exhibit PPMs in one or more eyes when compared to control probands. We also assessed whether PPMs were associated with LAZ among all subjects despite not knowing whether subjects belonged to a case or control family. We found that, while controlling for age, subjects who had PPMs in either eye were 2.6 more times likely (95% CI=1.2 to 5.1; P=0.03) to exhibit LAZ in either eye.

**DISCUSSION**

Although PPMs appear to often be sporadic and mild abnormalities, a positive association between LAZ and PPMs was observed. In addition to age, gender, and family history, it is possible that certain factors may enhance the likelihood of clinical LAZ. Other factors such as female gender and environmental factors may enhance the likelihood of clinical LAZ. Other factors such as female gender and environmental factors may enhance the likelihood of clinical LAZ. However, the results of this study suggest that the presence of LAZ in a family may increase the likelihood of PPMs.

**CONCLUSIONS**

Our African-American subjects who belonged to a family in which one or more relatives had LAZ were 2.8 more times likely to also have PPMs than subjects belonging to control families. The results suggest that the presence of LAZ in a family may increase the likelihood of PPMs. However, further research is needed to confirm these findings.

**REFERENCE LIST**

Effectiveness of Therapeutic Tinted Contact Lenses (CL) in Patients with Albinism


4352

Table of Contents

PURPOSE

4. Research Eye Movements

5. RESULTS

6. CONCLUSION

7. ACKNOWLEDGEMENT

8. CONTACT INFORMATION

1. Precalibrating Therapeutic Tinted Contact Lenses

2. Measuring Contrast Sensitivity Function

3. Measuring the effect of glare (Halogen glare Test)

4. Recording Eye Movements

5. Evaluating the performance of the lens (OD, Sx, SRx, CRx)

6. Evaluating the sensitivity of the lens

7. Evaluating the improvement in contrast sensitivity

8. Clinical evaluation of visual function

9. Table 5a indicates that 17 patients reported a subjective improvement in clarity of vision with tinted CL vs. Srx. 8 subjects also showed improved results with tinted CL vs. Srx. Finally, 9 subjects showed improved function with tinted vs. un-tinted CL, while 6 subjects showed no effect of treatment.

10. Table 6a indicates that 13 patients reported a subjective improvement in the comfort of their vision with tinted CL, compared with Srx. Sx, CRx, UF and LG reported most comfortable vision with un-tinted CL.

11. Table 7a indicates that 19 subjects reported a subjective improvement in their sensitivity to glare light with the use of tinted CL. 1 subject reported no change in sensitivity to glare.

12. Table 8a indicates that 16 subjects reported a reduction in glare in their use of tinted CL, as 9 patients reported no change.

8. Table 4a presents Contrast sensitivity measurements, under normal testing conditions. In 16 subjects, contrast sensitivity was improved with tinted CL vs. Sx. 9. Table 5a indicates that 17 patients reported a subjective improvement in clarity of vision with tinted CL vs. Srx. 8 subjects also showed improved results with tinted CL vs. Srx. Finally, 9 subjects showed improved function with tinted vs. un-tinted CL, while 6 subjects showed no effect of treatment. Table 6a shows the average results for the group.

10. Table 6a indicates that 13 patients reported a subjective improvement in the comfort of their vision with tinted CL, compared with Srx. Sx, CRx, UF and LG reported most comfortable vision with un-tinted CL.

11. Table 7a indicates that 19 subjects reported a subjective improvement in their sensitivity to glare light with the use of tinted CL. 1 subject reported no change in sensitivity to glare.

12. Table 8a indicates that 16 subjects reported a reduction in glare in their use of tinted CL, as 9 patients reported no change.

8. Table 4a presents Contrast sensitivity measurements, under normal testing conditions. In 16 subjects, contrast sensitivity was improved with tinted CL vs. Sx. 9. Table 5a indicates that 17 patients reported a subjective improvement in clarity of vision with tinted CL vs. Srx. 8 subjects also showed improved results with tinted CL vs. Srx. Finally, 9 subjects showed improved function with tinted vs. un-tinted CL, while 6 subjects showed no effect of treatment. Table 6a shows the average results for the group.

10. Table 6a indicates that 13 patients reported a subjective improvement in the comfort of their vision with tinted CL, compared with Srx. Sx, CRx, UF and LG reported most comfortable vision with un-tinted CL.

11. Table 7a indicates that 19 subjects reported a subjective improvement in their sensitivity to glare light with the use of tinted CL. 1 subject reported no change in sensitivity to glare.

12. Table 8a indicates that 16 subjects reported a reduction in glare in their use of tinted CL, as 9 patients reported no change.

8. Table 4a presents Contrast sensitivity measurements, under normal testing conditions. In 16 subjects, contrast sensitivity was improved with tinted CL vs. Sx. 9. Table 5a indicates that 17 patients reported a subjective improvement in clarity of vision with tinted CL vs. Srx. 8 subjects also showed improved results with tinted CL vs. Srx. Finally, 9 subjects showed improved function with tinted vs. un-tinted CL, while 6 subjects showed no effect of treatment. Table 6a shows the average results for the group.

10. Table 6a indicates that 13 patients reported a subjective improvement in the comfort of their vision with tinted CL, compared with Srx. Sx, CRx, UF and LG reported most comfortable vision with un-tinted CL.

11. Table 7a indicates that 19 subjects reported a subjective improvement in their sensitivity to glare light with the use of tinted CL. 1 subject reported no change in sensitivity to glare.

12. Table 8a indicates that 16 subjects reported a reduction in glare in their use of tinted CL, as 9 patients reported no change.

8. Table 4a presents Contrast sensitivity measurements, under normal testing conditions. In 16 subjects, contrast sensitivity was improved with tinted CL vs. Sx. 9. Table 5a indicates that 17 patients reported a subjective improvement in clarity of vision with tinted CL vs. Srx. 8 subjects also showed improved results with tinted CL vs. Srx. Finally, 9 subjects showed improved function with tinted vs. un-tinted CL, while 6 subjects showed no effect of treatment. Table 6a shows the average results for the group.

10. Table 6a indicates that 13 patients reported a subjective improvement in the comfort of their vision with tinted CL, compared with Srx. Sx, CRx, UF and LG reported most comfortable vision with un-tinted CL.

11. Table 7a indicates that 19 subjects reported a subjective improvement in their sensitivity to glare light with the use of tinted CL. 1 subject reported no change in sensitivity to glare.

12. Table 8a indicates that 16 subjects reported a reduction in glare in their use of tinted CL, as 9 patients reported no change.

8. Table 4a presents Contrast sensitivity measurements, under normal testing conditions. In 16 subjects, contrast sensitivity was improved with tinted CL vs. Sx. 9. Table 5a indicates that 17 patients reported a subjective improvement in clarity of vision with tinted CL vs. Srx. 8 subjects also showed improved results with tinted CL vs. Srx. Finally, 9 subjects showed improved function with tinted vs. un-tinted CL, while 6 subjects showed no effect of treatment. Table 6a shows the average results for the group.

10. Table 6a indicates that 13 patients reported a subjective improvement in the comfort of their vision with tinted CL, compared with Srx. Sx, CRx, UF and LG reported most comfortable vision with un-tinted CL.

11. Table 7a indicates that 19 subjects reported a subjective improvement in their sensitivity to glare light with the use of tinted CL. 1 subject reported no change in sensitivity to glare.

12. Table 8a indicates that 16 subjects reported a reduction in glare in their use of tinted CL, as 9 patients reported no change.

4. Recording Eye Movements

4. Recording Eye Movements

4. Recording Eye Movements

4. Recording Eye Movements
Changes in Patients’ Performance of Daily Activities after Low Vision Treatment

Joon A. Stelmack, OD, MPH, FAAO, X. Charlene Tang, MD, PhD, Robert W. Massof, PhD, FAAO, for the LOVIT Study Group

Author Affiliations: Blind Rehabilitation Center (Dr Stelmack); Veterans Affairs Cooperative Studies Program Coordinating Center (Dr Tang); Edward Hines Jr. Veterans Affairs Hospital, Hines, Illinois (Dr Stelmack and Tang); Department of Ophthalmology and Visual Science, University of Illinois at Chicago School of Medicine (Dr Stelmack); Illinois College of Optometry, Chicago (Dr Stelmack); and Johns Hopkins Wilmer Eye Institute, Baltimore, Maryland (Dr Massof).

INTRODUCTION

The VA Low-Vision VFQ-481 was developed to capture patients’ self-report of the difficulty they experience performing daily activities. Supplemental questions were included to elicit changes in the devices and strategies patients use to perform activities before and after LV and the importance of performing these activities independently.

METHODS

In LOVIT, 126 Veterans with macular diseases and visual acuity in the better seeing eye worse than 20/500 and better than 20/200 were randomized to immediate LV treatment (LV exam, 6 therapy sessions, home visit and LVAs) or a control group (usual VA low vision care, frequency of “own eyes” responses and use of assistance). The LOVIT trial ended at 4 months.

RESULTS

The VA Low-Vision Visual Functioning Questionnaire-48 (VA LV VFQ-48) was administered to 126 participants at baseline, 4 months, and 1 year follow-up by a masked interviewer.

METHODS OF TASK PERFORMANCE

Results indicate that some activities become less important to some patients as time passes.

4. Importance of performing these tasks independently

Table 1: Importance of performing tasks independently across all 48 tasks on the VA LV VFQ-48

<table>
<thead>
<tr>
<th>Importance Rating</th>
<th>Treatment Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very difficult</td>
<td>T(base) 64%</td>
<td>C(base) 70%</td>
</tr>
<tr>
<td>Moderately difficult</td>
<td>T(base) 21%</td>
<td>C(base) 20%</td>
</tr>
<tr>
<td>Not difficult</td>
<td>T(base) 15%</td>
<td>C(base) 10%</td>
</tr>
</tbody>
</table>


REFERENCES


CONCLUSIONS

LOVIT participants responded most frequently that it was “very important” to perform the tasks included on the VA LV VFQ-48 independently. Patients significantly increased use of LVAs/techniques and required less use of assistance performing reading activities after LV treatment.

ACKNOWLEDGEMENT

Funding provided by VA Rehabilitation Research and Development grant C4357.
Building a School-Based Vision Clinic in Chicago: Our Experience After the First 18 Months

Sandra S. Block, OD, M Ed, Medical Director, School-based Vision Clinic, Illinois College of Optometry, Chicago IL
Melissa A. Suckow, OD Illinois College of Optometry, Chicago IL; Kathleen O’Leary, OD Illinois College of Optometry, Chicago IL

BACKGROUND
The Illinois Eye Institute at Princeton Elementary School-Based Vision Clinic (Clinic) opened as a year round clinic in January 2011. It was born of a partnership between the Illinois College of Optometry (ICO) and the Chicago Public Schools (CPS). The objective of the Clinic was to provide access to the children in CPS who were unable to access eye care services due to lack of insurance or lack of follow through after recommendation from the school. Historically, CPS had attempted several models of eye care delivery with limited success. They attempted to bus the children from individual schools to established eye clinics, but often arrived late and limited the days buses are able to bring patients. This has dramatically increased the exposure of ICO students to the eye care needs of children within the city of Chicago. They learn to work efficiently without compromising the quality of the care they deliver.

CPS and the clinic leadership from the Illinois College of Optometry initiated discussion of how to address the significant unmet eye care need. Eventually, the two parties agreed that CPS would house the clinic and ICO would provide the staffing, including students and faculty. One challenge was locating a building that would be accessible for children with disabilities, that was close to ICO so that optometry students could easily access the Clinic and suitable for care. A recently closed elementary school located 9 minutes from the ICO campus was identified. CPS had 10 lanes moved into the building and ICO added three more. The clinic is open to any child in Chicago regardless of ability to pay. While it was originally listed as a free clinic, clarification was made to list the program as open to those students with insurance including Medicaid and grants will cover those without insurance coverage.

METHODS
The Clinic has been open Monday - Friday in the mornings (8:30-10:00) since January 5th, 2011. CPS arranges for schools to be scheduled during the academic year. The individual schools are responsible for identifying children with the most need and obtaining all the needed paperwork (case history, field trip permission slip, HIPPA and FERPA forms). The school also is responsible for bus transportation and dropoffs, as needed. The Clinic is open for parents to walk in any morning or to schedule appointments.

RESULTS
The first 18 months have shown benefits and challenges. The partnership has taken much effort. Each party has strong desires to succeed but has many layers of leadership. Change is often slow.

The Clinic has been open Monday - Friday in the mornings (8:30-10:00) since January 5th, 2011. CPS arranges for schools to be scheduled during the academic year. The individual schools are responsible for identifying children with the most need and obtaining all the needed paperwork (case history, field trip permission slip, HIPPA and FERPA forms). The school also is responsible for bus transportation and dropoffs, as needed. The Clinic is open for parents to walk in any morning or to schedule appointments.

RESULTS
The first 18 months have shown benefits and challenges. The partnership has taken much effort. Each party has strong desires to succeed but has many layers of leadership. Change is often slow.

The first 18 months have shown benefits and challenges. The partnership has taken much effort. Each party has strong desires to succeed but has many layers of leadership. Change is often slow.

DISCUSSION/CONCLUSION
In spite of these challenges, the Clinic has provided eye care to more than 8200 children during the first 18 months. The partners CPS and ICO are working hard and have plans to address each of the barriers encountered.

Dr. O’Leary has increased the hours of the clinic by seeing patients in the afternoons.

CPS has reduced the number of days that students are not attending and expanded the school day. This should allow for more schools to be seen during the academic year.

Both partners have spent time sharing information about the clinic with representatives from the schools along with many of the social service agencies. Walk-ins and appointments have gone from 493 in all of 2011 to 825 in the first eight months of 2012.

As the new academic year roles out, the Clinic has expanded the hours and services (VT and VIP). Grants have been applied for to obtain an OCT and camera for the building so that the number of children referred for these services will be reduced.

Sandra S. Block sblock@ico.edu
Sandra S. Block, OD, M Ed, Medical Director, School-based Vision Clinic, Illinois College of Optometry, Chicago IL
Melissa A. Suckow, OD Illinois College of Optometry, Chicago IL; Kathleen O’Leary, OD Illinois College of Optometry, Chicago IL

SUPPORTERS
ORGANIZATIONS
Alson, Anonymous, Blue Cross and Blue Shield of Illinois, Chicago Community Trust, Goodwill, Grant Healthcare Foundation, Kuebler Instruments, Lloyd A. Fry Foundation, OneSight, Richmond Products, Star Ophthalmic Instruments, Vision Assessment Corporation, Volks, along with individual donors.

CONTACT INFORMATION
Contact Information
Sandra S. Block
sblock@ico.edu
INTRODUCTION

Individuals with organic pathology often exhibit functional overlays that are frequently ignored by health care providers. This case report presents the diagnosis and treatment of an adult with suspected Multiple Sclerosis (MS)/neurological disease, various ocular pathologies and a number of overlaying functional vision anomalies.

CASE REPORT

DL, who wore contact lenses with a computer/reading spectacle prescription, is a 42 y/o African American female who was first seen in 2012. She was being followed for possible MS/unknown neurological disease, hypertension, and diabetes. She presented with a facial presentation that would suggest that she was in extreme pain and discomfort. DL had numerous complaints that included headaches, blurred vision, diplopia and symptoms associated with allergies and dry eye. She also exhibited a binocular vision dysfunction with the Vissagraph demonstrating ocularmotor abnormalities that showed issues with fixations, regression, average span of recognition, reading rate, and saccade abnormalities. A Test of Variables Attention (TOVA) noted an ADHD score of 4.31 and an APT of -3.69 (Attention Performance Index). She was so disabled that she could not work, return to work, free of all of the original symptoms that persisted however, even though artificial tears, Restasis and other commonly used interventions were utilized. Once prismatic plugs were inserted, the discomfort previously noted was eliminated.

The Visagraph and TOVA (APT); objective assessments of reading/oculomotor and attentional anomalies respectively, showed significant improvements upon the conclusion of therapy. (See graphs, figures, etc).

The symptoms associated with dry eye and allergies persisted however, even though artificial tears, Restasis and other commonly used interventions were utilized. All symptoms associated with oculomotor and all attentional issues were greatly improved or eliminated along with the improved clinical signs.

After 25 in-office optometric vision therapy visits all symptoms associated with the binocular vision, ocularmotor dysfunction and attentional issues were resolved. The vision therapy followed commonly excepted methodologies. The four phases of therapy included Monocular, Bi-ocular, Binocular and Integrative/Habituation therapy techniques.

INTRODUCTION

The symptoms associated with dry eye and allergies persisted however, even though artificial tears, Restasis and other commonly used interventions were utilized. Once prismatic plugs were inserted, the discomfort previously noted was eliminated.

The Visagraph and TOVA (APT); objective assessments of reading/oculomotor and attentional anomalies respectively, showed significant improvements upon the conclusion of therapy. (See graphs, figures, etc).

It is important to point out that the TOVA’s Attention Performance Index (APT) which is a general index of likely impairment that compares our subject to age-matched individuals with ADHD.   Scores > 0 are normal; scores < 0 suggest attention impairment. The Attention Performance Index (APT) is a general index of likely impairment that compares our subject to age-matched individuals with ADHD. Scores > 0 are normal; scores < 0 suggest attention impairment. The TOVA results are divided into four 5 min. quarters assessing Attention, Impulsivity, Reaction Time (RT) and Variability . The TOVA # 1 responses (pre-therapy) were noted over time. It wasn’t until the vision therapy program was completed, however, that the symptoms experienced were eliminated. This may suggest that the oculomotor dysfunctions as demonstrated with objective testing (Visagraph) were the major etiology of discomfort along with the anterior surface disease. This case illustrates how remediating the functional vision disorders that overlay pathological/organic disease, as well as treatment of ocular-surface disease can significantly improve the patient’s quality of life. Up to this point, all other doctors she was working with tended to ignore or minimize her subjective complaints with at least one health care provider suggesting she needed psychiatric intervention. DL has returned to a quality of life that now allows her to work and enjoy recreation without pain. It is important for all health care professionals to remember that functional overlays often accompany pathological disease and that these dysfunctions can be treated successfully and that the presence of an organic/neurological diagnosis does not automatically rule out any treatment option, including optometric vision therapy.

DISCUSSION

It is interesting that although the initial examination and visual evaluation clinical measurements did not appear to change significantly, the symptoms were eliminated completely. What is difficult to demonstrate with numbers is the extreme variability experienced by this patient on a day to day basis. A fair amount of consistency of the clinical findings was noted over time. It wasn’t until the vision therapy program was completed, however, that the symptoms experienced were eliminated. The Test of Variables Attention (TOVA)® is a computerized neurophysiological measure of attention, not a subjective rating of behavior. These measurements are compared to age-matched groups of individuals, independently diagnosed as not having attention disorders. The TOVA results are divided into four 5 min. quarters assessing Attention, Impulsivity, Reaction Time (RT) and Variability . The TOVA # 1 responses (pre-therapy) were noted over time. It wasn’t until the vision therapy program was completed, however, that the symptoms experienced were eliminated. This may suggest that the oculomotor dysfunctions as demonstrated with objective testing (Visagraph) were the major etiology of discomfort along with the anterior surface disease. This case illustrates how remediating the functional vision disorders that overlay pathological/organic disease, as well as treatment of ocular-surface disease can significantly improve the patient’s quality of life. Up to this point, all other doctors she was working with tended to ignore or minimize her subjective complaints with at least one health care provider suggesting she needed psychiatric intervention. DL has returned to a quality of life that now allows her to work and enjoy recreation without pain. It is important for all health care professionals to remember that functional overlays often accompany pathological disease and that these dysfunctions can be treated successfully and that the presence of an organic/neurological diagnosis does not automatically rule out any treatment option, including optometric vision therapy.

Contact Information

Dominick M. Manno, OD, MED, FAAO, FCVO– A  Dominick M. Manno, OD, MED, FAAO, FCVO– A  Dominick M. Manno, OD, MED, FAAO, FCVD– A  Dominick M. Manno, OD, MED, FAAO, FCVO– A  Dominick M. Manno, OD, MED, FAAO, FCVD– A

3241 S Michigan Ave

Chicago, IL 60616

manno@ico.edu

DISCUSSION

It is interesting that although the initial examination and visual evaluation clinical measurements did not appear to change significantly, the symptoms were eliminated completely. What is difficult to demonstrate with numbers is the extreme variability experienced by this patient on a day to day basis. A fair amount of consistency of the clinical findings was noted over time. It wasn’t until the vision therapy program was completed, however, that the symptoms experienced were eliminated. This may suggest that the oculomotor dysfunctions as demonstrated with objective testing (Visagraph) were the major etiology of discomfort along with the anterior surface disease. This case illustrates how remediating the functional vision disorders that overlay pathological/organic disease, as well as treatment of ocular-surface disease can significantly improve the patient’s quality of life. Up to this point, all other doctors she was working with tended to ignore or minimize her subjective complaints with at least one health care provider suggesting she needed psychiatric intervention. DL has returned to a quality of life that now allows her to work and enjoy recreation without pain. It is important for all health care professionals to remember that functional overlays often accompany pathological disease and that these dysfunctions can be treated successfully and that the presence of an organic/neurological diagnosis does not automatically rule out any treatment option, including optometric vision therapy.
Computerized Home Vision Therapy: Patient Preferences

Kathleen O’Leary, OD; Alicia Nehls, OD; Dominick M. Maino, OD, MEd, FAAO, FCVO; Rebecca Zoltoski, PhD
Illinois College of Optometry, Chicago IL

PURPOSE: BACKGROUND

Computerized home vision therapy is a convenient therapy option for patients with binocular vision disorders who may not be able to complete in office vision therapy. When computerized home vision therapy is not used in conjunction with an in-office vision therapy, patient compliance and motivation become two important components in the success and outcome of therapy. This study was done to look at participant’s interest in three different computerized home vision therapy programs.

METHODS

Thirty-one optometry students, aged from 22 to 31 years of age, from the Illinois College of Optometry participated in this study. Participant characteristics are shown in Table 1. Each student performed one horizontal vergence technique from three different computerized home vision therapy programs in a random order. These programs included the HTS (from Home Therapy Solutions), Computer Aided Vision Therapy (Vogel), and RetCorr AB (Sweden). After completing a three minute technique, each participant completed a three minute technique. These programs included the HTS (from Home Therapy Solutions), Computer Aided Vision Therapy (Vogel), and RetCorr AB (Sweden). After completing a three minute technique, each participant completed the HTS system, and 13% Vogel. There was a significant difference in the overall rankings between RetCorr AB and Vogel and HTS vs Vogel (p<0.01). There was however no significant difference found between just RetCorr AB and HTS in how participants answered. This is shown in Table 5.

RESULTS

Statistical analysis noted that 71% of participants preferred using the RetCorr AB therapy device, 19% of the HTS system, and 19% Vogel. There was a significant difference in the overall rankings between RetCorr AB vs Vogel and HTS vs Vogel (p<0.01). There was however no significant difference found between just RetCorr AB and HTS in overall rankings (p=0.091). This is shown in Table 4. In 6 out of the 9 survey questions there was no significant difference between RetCorr AB and HTS in how patients answered. This is shown in Table 5.

CONCLUSION

In the study, RetCorr AB and HTS were both found to be favored by participants. Having an understanding of what patients prefer will help optometrists in selecting appropriate treatment tools for home use. Selecting the most preferred vision therapy program may help increase patient success.

ACKNOWLEDGEMENTS

RetCorr AB
Gary Vogel, Computer Aided Vision Therapy
Home Therapy Solutions

Figure 1: RetCorr set-up
Figure 2: Computer Aided Vision Therapy set-up
Figure 3: Home Therapy Solutions set-up

TABLE 2 Survey Questions: Each answer correlates to a number on the response scale

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technique was easy to understand</td>
<td>RC-HTS-CAVT</td>
<td>p&lt;0.01</td>
<td>0.04</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Technique was boring and was disinterested</td>
<td>RC-HTS-CAVT</td>
<td>p&lt;0.01</td>
<td>0.04</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Would use this software for my vision therapy patients in the future</td>
<td>RC-HTS-CAVT</td>
<td>p&lt;0.01</td>
<td>0.04</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>I would use this software for my vision therapy patients in the future</td>
<td>RC-HTS-CAVT</td>
<td>p&lt;0.01</td>
<td>0.04</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

TABLE 3 Median Responses

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>RC (n)</th>
<th>HTS (n)</th>
<th>CAVT (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technique was easy to understand</td>
<td>1 (31)</td>
<td>2 (30)</td>
<td>3 (31)</td>
</tr>
<tr>
<td>Technique was boring and was disinterested</td>
<td>1 (31)</td>
<td>2 (30)</td>
<td>3 (31)</td>
</tr>
<tr>
<td>Would use this software for my vision therapy patients in the future</td>
<td>1 (31)</td>
<td>2 (30)</td>
<td>3 (31)</td>
</tr>
</tbody>
</table>

Table 3 Response Scale

1: Strongly agree
2: Agree
3: Undecided
4: Disagree
5: Strongly Disagree

# Second Year Students 9

Contact Information
Fax: 312-949-7668
Chicago, IL 60616
3241 S Michigan Ave
Kathleen O'Leary, OD
Gary Vogel, Computer Aided Vision Therapy
Home Therapy Solutions

TABLE 1 Participating Characteristics: Total of 31 participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Data</th>
<th>RC (n)</th>
<th>HTS (n)</th>
<th>CAVT (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Range (years)</td>
<td>23-31</td>
<td>9</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Gender Female</td>
<td>30</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of participants who answered the question</td>
<td>31</td>
<td>30</td>
<td>30</td>
<td>29</td>
</tr>
</tbody>
</table>

TABLE 4 Overall Rankings

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>RC-HTS-CAVT</th>
<th>p&lt;0.01</th>
<th>0.04</th>
<th>0.01</th>
<th>0.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would use this software for my vision therapy patients in the future</td>
<td>RC-HTS-CAVT</td>
<td>p&lt;0.01</td>
<td>0.04</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>I would use this software for my vision therapy patients in the future</td>
<td>RC-HTS-CAVT</td>
<td>p&lt;0.01</td>
<td>0.04</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

ACKNOWLEDGEMENTS

RetCorr AB
Gary Vogel, Computer Aided Vision Therapy
Home Therapy Solutions

CONTACT INFORMATION

Fax: 312-949-7668
Contact Information
Kathleen O'Leary, OD
3241 S Michigan Ave
Chicago, IL 60616
Phone: 312-949-7119
Fax: 312-949-7668
koleary@ico.edu

Figure 4: Dr. Maino with RetCorr representatives

Statistical analysis noted that 71% of participants preferred using the RetCorr AB therapy device, 19% of the HTS system, and 19% Vogel. There was a significant difference in the overall rankings between RetCorr AB vs Vogel and HTS vs Vogel (p<0.01). There was however no significant difference found between just RetCorr AB and HTS in overall rankings (p=0.091). This is shown in Table 4. In 6 out of the 9 survey questions there was no significant difference in how patients answered. This is shown in Table 5.

Figure 2: Computer Aided Vision Therapy set-up

Figure 3: Home Therapy Solutions set-up

Figure 4: Dr. Maino with RetCorr representatives
The Fischer FixTest for Fixation and Saccade Reaction Time Differentiates Between Symptomatic and Asymptomatic Adult Patients

Darrell G. Schlange, OD, FAAO, Dominic M. Maico, OD, MEd, FAAO Brian W. Caden, OD, MA, FAAO, Illinois College of Optometry; Chicago, IL

BACKGROUND

The Fischer FixTest is a stand-alone device for the psychophysical evaluation of the quality and control of fixations and saccades, using temporal & spatial processing tested according to 3 conditions: Fixations, Overlap & Gap Tasks.

Professor Dr. Burkhard Fischer, Centre of Neurosciences, Optomotor Lab, University of Freiburg Germany, developed the Fischer FixTest (as illustrated) and used it to evaluate Fixations, ProSaccades, Anti-Saccades, Reaction time and Error rate in disabled populations including autism and dyslexia.

Fischer reports a study on error rate & reaction time, with a significant difference between dyslexic subjects and a normal control group. Figure below:

- Our investigation compared the saccade reaction times and the error rates of dyslexic and asymptomatic patients, using 1. Fixation Task 2. ProSaccades – Overlap Task 3. Anti-Saccades – Gap Task

<table>
<thead>
<tr>
<th>Table 1: Quality of Life Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-point survey identified subjects as symptomatic or asymptomatic, according to near-point symptoms, with 21 cut off score. Most common in yellow.</td>
</tr>
<tr>
<td>16 symptomatic (40%)</td>
</tr>
<tr>
<td>24 asymptomatic (30%)</td>
</tr>
</tbody>
</table>

PARADIGMS & TASKS

GAP PARADIGM

The latency between the appearance of a target of interest and the onset of a new saccade is ~150–250ms. The introduction of a brief temporal gap of several hundred msec between the disappearance of the initial fixation target and the appearance of a peripheral target (gap paradigm) leads to a reduction in saccadic latency to ~100ms; these short latency saccades are called reflex express saccades (Wong), involving superior colliculus.

GAP ANTI-SACCADe TASK

1. Target begins in the Center
2. Target extinguished after new second
3. 200 ms later (the temporal gap) a new (distracting) stimulus appears randomly right or left.
4. Subject instructed to look to the opposite side (antisaccade). This requires voluntary saccadic control.

OVERLAP PARADIGM

If the initial fixation target remains while a saccade is made to a new target (i.e., the overlap paradigm), the saccade onset is delayed to 200–250 msec. This latency is typical of most voluntary and prosaccades.

OVERLAP PROSACCADE TASK

1. Subject Looks at Center Target (prosaccade)
2. New Target flashes to side and both targets on at same time (the overlap)
3. ProSaccade to the new Target after latency of ~200 msec
4. This ProSaccade is a voluntary saccade

RESULTS

- Our Same Symptomatic & Asymptomatic Groups with Visagraph Recording of Rate
- Comparing Fischer Data and our Study with Asymptomatic and Symptomatic Groups.
- AntiSaccades Percent Correct Responses with ProSaccades & AntiSaccades Differentiate Between Symptomatic and Asymptomatic Adult Patients

<table>
<thead>
<tr>
<th>Table 3: Symptomatic Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixation Reaction Times (ms) - ProSaccades &amp; Anti-Saccades</td>
</tr>
<tr>
<td>Asymptomatic &amp; Symptomatic Groups.</td>
</tr>
<tr>
<td>Comparing Fischer Data and our Study with Asymptomatic and Symptomatic Groups.</td>
</tr>
<tr>
<td>AntiSaccades Percent Correct Responses with ProSaccades &amp; AntiSaccades Differentiate Between Symptomatic and Asymptomatic Adult Patients</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Asymptomatic and Symptomatic Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction Times (ms) - ProSaccades &amp; Anti-Saccades</td>
</tr>
<tr>
<td>Asymptomatic &amp; Symptomatic Groups.</td>
</tr>
<tr>
<td>Comparing Fischer Data and our Study with Asymptomatic and Symptomatic Groups.</td>
</tr>
<tr>
<td>AntiSaccades Percent Correct Responses with ProSaccades &amp; AntiSaccades Differentiate Between Symptomatic and Asymptomatic Adult Patients</td>
</tr>
</tbody>
</table>

CONCLUSIONS

- Significant differences in Reaction Times and Error Rates occur between Symptomatic and Asymptomatic Subjects for all 3 paradigms.
- The QLS survey is helpful to identify symptomatic subjects and the complications they may have on routine vision tests.
- The FixTest results are a sensitive measure for assessing saccadic and fixation performance Pre & Post Therapy (Fischer et al.)
- The FixTest is a good procedure to determine the influence of attention and reflex saccades on fixations and saccades.

- Our subjects included 1. FixTest procedures for Fixations, Jump Prosaccades and Anti-Saccades can be administered to both child and adult subjects.
- Voluntary control of saccades
- Ability to inhibit reflex saccades
- Similar differences are noted between Symptomatic and Asymptomatic patients in other routine optometric tests.

<table>
<thead>
<tr>
<th>Table 5: Saccadic Errors</th>
<th>Correct Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saccadic Errors</td>
<td>Correct Response</td>
</tr>
<tr>
<td>Percent Correct Responses with ProSaccades &amp; AntiSaccades Differentiate Between Symptomatic and Asymptomatic Adult Patients</td>
<td></td>
</tr>
</tbody>
</table>

CONTACT INFORMATION

Darrell G. Schlange, OD, FAAO
dschlange@ico.edu
www.ico.edu
WCO

3 ICO PRESENTATIONS
Developing Independent Thinking During a Residency Program

Christine L. Allison, OD, FAAO, FCOVD, Alicia Nehls, OD
Illinois College of Optometry, Illinois Eye Institute at Princeton Elementary School

The residents are required to give three Grand Rounds presentations to the 4th year students and the faculty based on cases that they see at ICO. Each presentation is to be given in a power point format and lasts approximately 15 minutes.

In order to provide flexibility in the program, the residents can select to work one session in another service at ICO outside of the pediatric service. For instance, they may choose to work in the Vitreo-Retina Service, the Glaucoma Service, the General Ophthalmology Service, or the Low Vision Service.

Each resident averages seeing 1,000 patients during their residency.

RESULTS

The current resident saw patients at this site with ages ranging from 0-99 years. 71% of the patients were Hispanic, 7% African American, and 3% Caucasian. 64% received glasses, and 5% were referred.

The current resident saw the largest percentage of patients in the optometry clinic at an age range of 6-17 years. The number of patients per age can be seen in Figure 1. The ethnicity of the patients was 90% Hispanic as evidenced in Figure 2. The type of diagnosis ranged from refractive errors, to uveitis and viral conjunctivitis as seen in Figure 3. 64% of the patients examined by the resident needed glasses as evidenced in Figure 4.

DISCUSSION

Traditionally students in the United States attend 4 years of Optometry school after completing their Bachelor's Degree from a University or College. Upon the completion of Optometry school, a student may choose to apply for a residency to attain advanced clinical training in areas such as ocular disease, low vision, contact lenses, or pediatrics and vision therapy. There are approximately 340 approved positions, whereas there are only 160 accredited programs offering residencies.

One of the biggest advantages to doing a residency is the constant communication the residents have with other optometrists who are learning from on a daily basis. They can consult with knowledgeable optometrists who mentor them throughout their residency. This shared mentoring is the high point of residency training. However, it is also important that the resident is able to attain some autonomy in patient care. We believe that sending the resident to a site where they are working without the guidance of a mentor in the other room, strengthens their skills and critical thinking. The resident always can contact the program coordinator at any time while they are off-site, but the time they have on their own at the IWS prepares them fully for a private practice experience where they may often be working independently. The full schedule at the IWS also allows the resident the ability to develop the management skills needed to succeed in a busy practice. They have to make quick efficient decisions as to when the patients need to be referred on, or to be asked to return to the clinic for further testing. Working in a community-based health center also provides the resident the opportunity to prepare for a multitude of patients, and career options.

CONCLUSION

Developing independent thinking is an important aspect of any optometric residency program which can often be overlooked. Adding an aspect of off-site independent care to the residents schedule allows the resident to develop this ability while still working within the structure of a residency program.
Integrating Community Based Eye Care into the Optometric Education Program in a Large Urban Setting

Sandra S. Block, OD, M Ed, FAAO, FCVOID, Valarie Conrad, OD, MPH, FAAO. Melissa A. Sukow, OD, FAAO
Illinois College of Optometry, Illinois Eye Institute at Princeton Elementary School

OBJECTIVE
Illinois College of Optometry (ICO) entered into a partnership with Chicago Public Schools (CPS) in 2011 to deliver care to CPS students. The agreement was for ICO to provide eye care and CPS to provide the physical location.

METHODS
During the 11-12 ICO Academic Year, 2nd year students were assigned each day. Four faculty were liaison scheduled schools for each morning that school was in session. The individual school was responsible for identifying children needing care, obtaining consent, and arranging bus service and chaperones. On non-school days, the clinic was open for walk-ins or appointments.

RESULTS
Since January 2011, 800 children have received eye care at our clinic, with ~75% needing new glasses. Rates of amblyopia, strabismus, and eye health problems are higher than expected. The Illinois Eye Institute at Princeton Elementary School Vision Clinic officially opened its doors. The clinic is housed in a previously closed school which is wheelchair accessible. The rooms were converted from classrooms into a working vision clinic. Thirteen refracting lanes were arranged with 3 to 4 per classroom. Up to thirteen students from second, third, and fourth year were assigned each day. Four faculties were assigned each day to precept 3-4 students each day. Our CPS liaison scheduled schools for each morning that school was in session. The individual school was responsible for identifying children needing care, obtaining consent, and arranging bus service and chaperones. On non-school days, the clinic was open for walk-ins or appointments.

Statistics about the Chicago Public Schools:
- Schools - 675 (elementary, high school, charter)
- Enrollment - 404,151
- 41.6% African American, 44.1% Latino
- 87% of the students are from low-income families
- Pre-K, 2nd grade, 5th grade are screened by CPS technicians at the child's school
- Students new to the district or entering K/1st grade are expected to obtain an exam

DEMOGRAPHICS
5,032 children were seen during the first year of clinical operations.

Gender Distribution
- Females 56.30%
- Males 43.70%

Racial Distribution
- African American 30.99% 60.80%
- Hispanic 16.77% 33.30%
- White 100% 2.00%
- Mixed 0% 0%

Age Distribution
- Mean 11.11 yrs 80.05
- Median 11.11 yrs 90.05

Children who were seen represented 228 schools within Chicago.

- 204 schools - 80% or more of the children attending were considered low income* (95% of patients seen)
- 166 schools - 90% or more of the children were considered low income* (86.6% of patients seen)

*Low-income students are pupils age 3 to 17, inclusive, from families receiving public aid, living in institutions for neglected or delinquent children, being supported in foster homes with public funds, or eligible to receive free or reduced-price lunch

CLINICAL FINDINGS
Entering distance visual acuity - right eye:

<table>
<thead>
<tr>
<th>Distance</th>
<th>20/20</th>
<th>20/25</th>
<th>20/30</th>
<th>20/40</th>
<th>20/50</th>
<th>20/60</th>
<th>20/80</th>
<th>20/100</th>
<th>20/125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>4921</td>
<td>400</td>
<td>121</td>
<td>323</td>
<td>360</td>
<td>571</td>
<td>571</td>
<td>571</td>
<td>571</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distance</th>
<th>20/20</th>
<th>20/25</th>
<th>20/30</th>
<th>20/40</th>
<th>20/50</th>
<th>20/60</th>
<th>20/80</th>
<th>20/100</th>
<th>20/125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>58</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Cyclo-Autorefractor
- Sphere Cylinder
- Minimum Maximum
- Standard Deviation
- Mean Median

Dry Autorefractor
- Sphere Cylinder
- Minimum Maximum
- Standard Deviation
- Mean Median

Oculomotor
- Count 21

Visual Processing
- Count 1

Non-Refractive Diagnostics
- Astigmatism 2.25 1.08
- Hyperopia -0.27 -1.06
- Myopia 2.73 -0.75
- Strabismus 4.31 3.75
- Amblyopia 7.95 3.75
- Aphakia 11.27 -0.75
- Anisometropia 11.27 -0.75

Visual Acuity Frequency
<table>
<thead>
<tr>
<th>Visual Acuity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/20</td>
<td>4921</td>
</tr>
<tr>
<td>20/25</td>
<td>400</td>
</tr>
<tr>
<td>20/30</td>
<td>121</td>
</tr>
<tr>
<td>20/40</td>
<td>323</td>
</tr>
<tr>
<td>20/50</td>
<td>360</td>
</tr>
<tr>
<td>20/60</td>
<td>571</td>
</tr>
<tr>
<td>20/80</td>
<td>571</td>
</tr>
<tr>
<td>20/100</td>
<td>571</td>
</tr>
</tbody>
</table>

DISCUSSION
Benefits of the Illinois Eye Institute at Princeton Elementary School:
- Providing eyecare to children within the CPS who would otherwise not received care.
- Proving the optometric clinician with clinical experience to income populations.
- Exposing optometric clinicians to the needs of low income populations.
- Developing a niche within the community for the ICO.
- Balancing calendars between ICO & CPS has been challenging.

- During the 11-12 ICO Academic Year, 3rd year students were required to attend EHR training and 4th students were given the break week to travel to their next clinical assignment. This forced closure of the clinic for 3 extra weeks.
- On days when CPS was not in session, the census was reduced to walk-ins and it was challenging to provide sufficient clinical experience. In addition, schools cannot attend until 6 weeks after the first day of the school year due to fiscal concerns from the principals.

CONCLUSION
Illinois Eye Institute at Princeton Elementary School is emerging after our first year as a successful partnership. Many barriers have risen up during the first year. The errors on the way have worked to our benefit as we have adjusted to the needs of each constituent. We realize that we have only addressed a small part of the need for care that exists in the Chicagoland area. As we look towards the future, our goal is to continue to provide clinical experience to our students and quality eyecare to the children within the Chicago Public Schools.

Table of Contents

Day to day operational challenges:
- Most ICO students have clinic, class, quizzes or exams just before or immediately following our clinic. This causes challenges to scheduling and our clinic is currently limited to morning hours.
- The level of clinical skills of the clinicians varies significantly over time. In the beginning of summer quarter, 3rd year students have little experience in providing care to more than one patient in a 3 hour period. CPS is just finishing the year and we still have build-ups of patients attending the clinic. This leads to frustration on both sides in the first 2 weeks of the quarter. The students quickly learn to be more efficient while at the same time the number of patients per day drops.

Addressing referrals and follow up care:
- Problem: Currently, we see children who need additional care. This may be progress checks, contact lens fitting, vision therapy, visual information processing assessments, retinal, corneal, or other advanced care referrals, as well as additional testing such as photos, topography and OCT. We are finding less than 10% of the referrals are being seen.

Potential Solutions:
- With the new academic year, we will be engaging a Chicago Health Corp student to help us address communication with the families to ensure follow up.
- In July, 2012, a full-time staff optometric/doctor will be seeing patients in the afternoon as well as precepting in the morning to provide needed care. This could be augmented by externs in the future.
- Expand on-site services by searching for fiscal resources to purchase needed equipment and work to provide appropriate services at the initial clinic visit.

CONTACT INFORMATION
Sandra S. Block, OD, M Ed, FAAO, FCVOID, Valarie Conrad, OD, MPH, FAAO. Melissa A. Sukow, OD, FAAO

www.ico.edu
Addressing the eyecare needs of Special Olympic Athletes: Results of the 2011 World Games in Athens, Greece

Sandra S. Block, OD, M Ed
Illinois College of Optometry, Chicago, IL
Global Clinical Advisor, Special Olympics Lions Clubs International Opening Eyes

OBJECTIVE

The Opening Eyes program has been providing vision assessments to Special Olympic athletes since 1995. Over the past 16 years, the program has grown with the intention to address eyecare in this vulnerable population. To share the results of the Opening Eyes program which took place in Athens, Greece during the 2011 World Summer Games.

METHODS

The vision screening program offered a comprehensive standardized assessment to all athletes that participated in the games. While the sports venues were spread out around Athens, each delegation had an opportunity to attend the Healthy Athlete venue. There were 7 disciplines: Healthy Hearing, FunFitness, Health Promotion, Special Smiles, MedFest, Fit Feet, and Special Olympics Lions Clubs International Opening Eyes. The Opening Eyes Vision Assessment covers the following areas:

RESULTS

2,670 Special Olympics athletes representing 142 countries participated during the games (60.1% male). For several countries, this was their first opportunity to attend Opening Eyes. 12.1% of the athletes reported that they had not had an exam for more than 3 years and 26.5% reported never having an exam. Refractive errors ranged from -27.00 D to +23.00 with cylinder up to -12.50. Entering visual acuity was less than 20/40 in 30% of the participants. External eye health problems were found and internal problems were found in many of the athletes.

DISCUSSION

While the Opening Eyes program has been around for 16 years, the results of the data from Greece suggest that much work needs to be done to expand access to care for this vulnerable population. Expanding required curriculum and clinical education to include treating people with intellectual disability is still needed.
A Case Series on the RevitalEyes Post-Surgical Lens

Patients who have undergone penetrating keratoplasties (PKP) can be very challenging to fit with contact lenses secondary to the oblate nature and irregularity of the cornea. There are more contact lens options today than ever to optimize their vision and comfort. Custom soft lenses have played a limited role in the management of post-surgical corneas due to material and oxygen transmission resulting in corneal hypoxia and neovascularization. Today, the RevitalEyes post-surgical reverse geometry custom soft lens in the Definitive Silicone Hydrogel material can be made to order in a variety of base curves and diameters to offer post surgical patients good vision and comfort while maintaining optimal corneal health.

We describe here three keratoconic patients who underwent bilateral PKPs in the 1980s. He had previously worn both large diameter gas permeable and hybrid contact lenses. He complained of decreased vision, discomfort, redness, and dryness throughout the day.

Three patients with irregular corneas secondary to penetrating keratoplasties who had previously failed with other lens modalities were successfully fit with the RevitalEyes post-surgical custom soft lens. In all three cases, base curves steeper than the recommended fitting guide were needed to provide stable fittings and acuities. The RevitalEyes standard fitting set includes lenses with base curves of 8.1, 8.4, and 8.7mm. Based on the fitting guide it is recommended to start with the 8.4mm lens. When excessive movement is noticed during the fitting process, a steeper lens may be needed. With highly irregular and oblate corneas, the authors have found that starting with a base curve steeper than the recommended fitting guide (7.8mm) suggests is beneficial in providing lens stability. With a wide range of powers and base curves available, post-surgical patients can be successfully fit with the RevitalEyes custom soft lenses that provide adequate oxygen to the cornea, optimal ocular health, maximal comfort, and clear vision.

CASES

**PATIENT 1**

40 year old Caucasian male

History: diagnosed with keratoconus at the age of 19. He underwent bilateral PKPs in the 1980s. He had previously worn both large diameter gas permeable and hybrid contact lenses.

CC: His vision was poor and he was unable to see well enough to drive. He had attempted spherical and aspheric GP lens designs. Previous lenses lifted excessively and would not stay in position.

The right lens had slight fluting and was re-ordered. The left lens fit well and the patient was very comfortable.

**PATIENT 2**

38 year old African American female

History: underwent a PKP OD in 2004 for keratoconus. She had previously failed with all lens modalities, and was fit with the RevitalEyes custom soft lenses in steeper base curves than the standard.

CC: He complained of decreased vision, discomfort, redness, and dryness throughout the day.

The right lens had slight fluting and was re-ordered. The left lens fit well and the patient was very comfortable.

**PATIENT 3**

68 year old African American female

History: trauma to the right eye. She was s/p PKP and aphakic OD and phthisical OS.

CC: Decreased vision, she had previously failed with all lens modalities due to vision instability and lens discomfort. Patient would like a contact lens to assist her with her low vision devices.

DISCUSSION/CONCLUSION

Three patients with irregular corneas secondary to penetrating keratoplasties who had previously failed with other lens modalities were successfully fit with the RevitalEyes post-surgical custom soft lens. In all three cases, base curves steeper than the recommended fitting guide were needed to provide stable fittings and acuities.

In all three cases, base curves steeper than the recommended fitting guide were needed to provide stable fittings and acuities. The RevitalEyes standard fitting set includes lenses with base curves of 8.1, 8.4, and 8.7mm. Based on the fitting guide it is recommended to start with the 8.4mm lens. When excessive movement is noticed during the fitting process, a steeper lens may be needed. With highly irregular and oblate corneas, the authors have found that starting with a base curve steeper than the recommended fitting guide (7.8mm) suggests is beneficial in providing lens stability. With a wide range of powers and base curves available, post-surgical patients can be successfully fit with the RevitalEyes custom soft lenses that provide adequate oxygen to the cornea, optimal ocular health, maximal comfort, and clear vision.
Many of these patients also suffer from vision impairment due to their "floppiness" can provide correction of virtually any refractive error. Patients with high prescriptions, anomolopsia, and irregular astigmatism also benefit from GP lenses as they provide optimal correction of refractive error.

Scleral lenses cover more of the irregular cornea. Thus the risk of lens loss is high. Soft lenses due to their "flippiness" can also provide a challenge to lens application in particular if patients have concurrent arthritis or other problems that limit their dexterity. Scleral lenses are significantly larger than corneal lenses thus locating the lenses should be less problematic.

Additionally, lens application is often done with a suction cap which may also aid in successful lens wear. Once a successful lens fit is achieved providing a clearer retinal image, these patients often note greater success with the magnification provided by their low vision devices.

The cases presented here are further confounded by the atypical corneal diameters. In the not so distant past, it was a challenge to fit patients with large corneas because the buttons did not come large enough to provide good central position and pupil coverage. Today's large buttons allow us to go as large as 25mm with diameters around 18mm becoming fairly common. Thus, allowing us to easily cover the megalocornea or buphthalmos corneal surface appropriately. Conversely, microphthalmos corneas often required the use of small diameter soft lenses which did not necessarily provide optimal optical correction or very small corneal lenses were required that were difficult to keep centered. We present here a microcornea that was fit with a limited design for a normal diameter cornea that provided a compromised fitting relationship.

### CASES

#### PATIENT ONE

18 year old African American Female Initial visit June 2011 in Low Vision for full eye exam History of congenital abnormalities with multiple surgeries on each eye. She is under the care of a glaucoma specialist who saw regularly. Using 10x telescopes, Zoomtext, camera with zoom, OpenBook scan and read software program. Preparing to go to college and wants to optimize her remaining vision.

Medications: Alphagan P, Alop, Xalatan, Restasis Best spectacles VA OD 10/120 OS 8/400 SK Lamp OD posterior synchiasis, RE7, stromal haze and SPE, lens heavily pigmented with opacity (Figure 1)

OS cornettics, indentations, patient shorts. stromal haze and SPE, aphakic lens (Figure 2).

Topography (Figure 2 and 3)

OD >4D irregular cylinder due to surgery, HVID 12.75, SimK 50.44/52.25

OS : HD irregular cylinder due to surgery, HVID 13.66, SimK 52.78/51.82

Initial contact lens fitting OD 0.78405 OS 18.30 Jupiter 20/200

Lens covers the cornea but is slightly shallow; patient feels vision is more comfortable OD 0.80405 OS 18.20 Jupiter 20/400

Very shallow, edema IN

Next visit July 2011 No change in entering VA or slitlamp Lens fit OD 0.80405 OS 0.75 18.20 Jupiter 20/100

Even coverage good clearance OS 0.78405 20/-4.25 1.2 0.25 steep in periphery Jupiter 20/400

Good coverage, improved central clearance, reduced IN Vision with 10X telescope 20/40.

Patient reports that vision is more comfortable and peripheral awareness is improved.

#### PATIENT TWO

21 year old African American Male Referred by Department of Rehabilitative Services in July 2011 His Congenital rubella with subsequent hearing impairment, cataract and glaucoma.

- aphakia OU
- phthisis OD
- short OS

Medications: Clnopt, Alphagan P, Lumigan, phospholine iodide

SFK: -19.25/-5.00/60 20/100

Topography (Figure 5)

4 D of irregular astigmatism SimK 44.40/48.44

HVID 0.15

OD Fit by ocularist for prosthetic shell OS: Fit with RoseK2IC 7.34(46.00) +1 1.00 1 1.2 standard 20/200 (Figure 4 and 5)

Clearance centrally, aligned in the periphery

Patient's 1st bifocals were improved near from 20/20 at 5cm to 20/200 at 30cm (focal length of the +3)

Patient reports distance and near vision more comfortable.

July 2011 for follow up OD 0.78405 OS 18.00 Jupiter 20/100

Lens fits well, small and a ret maintaining optimal centration (Figure 6)

Near VA with masters crown Cls.-16.2/30 maintains text With magnifier patient is able to read 8M print

Recon lens slightly larger and steepier

Follow-up on new lens (Figure 6 and 7)

DVA 20/200 NVA 20/100 RoseK2IC 7.46(46.00) -4.50 -1.25/180 (to aid in handling)

Good centration and comfort. Patient reports improved functioning with lens and devices. He is leaving next week for New York for a low vision rehabilitation training program. He and his counselor are excited about his improvement and looking forward to enhanced success in the program.

### RESULTS/ CONCLUSIONS

The cases presented here represent challenges to fitting both small and large corneas. Both present multiple challenges in atypical corneal diameters, irregular corneal surface, glaucoma, and low vision. Previously, there were minimal options for those with large and small corneas to provide adequate centration and pupil coverage. Applying semi-scleral fitting techniques with lenses designed for blink use is an evolution of current low vision options. Large corneas are often difficult for these patients to handle due to their small size. These large lenses are also less likely to become dislodged minimizing potential for lens loss. The use of a suction cup may further aid in patient success with lens application and removal. Soft lenses do not correct for the irregularity of the cornea that may result from multiple surgeries. The use of semi-scleral lenses not only aids those with irregular corneal surfaces but also those with irregular corneal diameters. Rather large or small, good vision or poor vision, semi-scleral fitting techniques can enhance visual success.
INTRODUCTION

The preliminary evaluation of potential contact lens wearers includes a careful evaluation of the refractive error, keratometric measurements and health of the anterior segment. The corneal diameter is often times observed but not always measured. The adult cornea has a horizontal diameter of 11.5 to 12.6 mm and a vertical diameter of 10.5 to 11.7 mm. Megalocornea is when the greatest corneal diameter is greater than 13 mm. Microcornea is when the greatest corneal diameter is less than 11 mm.

The following two cases demonstrate how important the size of the cornea is when prescribing contact lenses and highlights new technology that allows us to provide lenses for the slightly unusual patient.

CASE 1
History: Previous hydrogel contact lens wearer who experienced vision fluctuation and discomfort while wearing lenses. Reported soft lenses would “pop-out” occasionally and never felt lenses were fitting properly.

Refractive and Corneal Data:
OD: Unaided VA: 20/60, -2.00 sphere 20/20, K’s 43.00 sphere, normal anterior segment
OS: Unaided VA: 20/100, -2.00 sphere 20/20, K’s 43.00 sphere, normal anterior segment

Diagnosis and Plan:
Microcornea requires a custom size Orthokeratology lens. Ordered Emerald design in 10.2 diameter.

Orthok Results
Day 1: OD 20/15, -0.25-0.50x155
OS 20/20, +/-2
2 months: OD 20/15, +0.25
OS 20/20, +/-2

Photo 4: Topography Comparison Pre fit to 2 months

CASE 2
History: Previous soft lens wearer who tried many brands of lenses. Most currently has a regular daily disposable lens but experiences ocular dryness while wearing lenses. He is interested in Orthokeratology.

Refractive and Corneal Data:
OD: Unaided VA: 20/100, -2.00-0.25x100 20/20, K’s 44.75/45.00@090
OS: Unaided VA: 20/20, -2.00-0.25x100 20/20, K’s 45.00 sphere, normal anterior segment

Diagnosis and Plan:
Large cornea, almost meglocornea, does not allow standard soft lenses to provide adequate corneal coverage and lens overlap. New lathe cut silicone hydrogel lenses permits customization of lens parameters. Ordered SiHy Lenses provided 20/10 vision and were initially very comfortable but after 4+ hours of wear eyes became injected. The 16.5 size was too large.

Photo 2: Megalocornea

Reducing the size to 15.0 with same base curve provided excellent vision, comfort and appearance. The patient exclaimed “I never knew I could see this good with contact lenses! Now I know what people mean when they say soft lenses are comfortable!”

Photo 5: 15.0 Diameter

CONCLUSIONS

The size of the cornea can present challenges when fitting contact lenses. Careful evaluation of corneal diameter will guide the fitter to custom designed lenses. The availability of silicone hydrogel, hydrogel and gas permeable materials offer diverse options to correct the outside of the norm patients. With today’s custom lens options, big or small, there are contact lenses for all.

RESOURCES

Ben Glasgow, M.D.
Metro Optics, Inc. PO Box 8189, Austin, TX 78758, 800-223-1938
Euclid Systems, Corp. 2776 Towerview Rd., Herndon, VA 20171, 800-477-9396
Year 1 – Serving Chicago Public School Children at the Illinois Eye Institute (IEI) at Princeton Vision Clinic

Sandra S. Block, Valerie L. Conrad, Melissa A. Suckow
School-Based Vision Clinic, Illinois College of Optometry, Chicago, IL.

ABSTRACT

PROBLEM
Each year, over 100,000 children in the Chicago Public Schools (CPS) fail vision screenings, have broken/bad glasses, or fail to complete a required exam for entry to school. Lack of follow up and limited access to providers accepting state insurance contribute to poor access to eye care.

PURPOSE
The Chicago Public School (CPS) system, the third largest school district in the United States, served 484,151 students during 2011-2012 academic year. CPS does an excellent job screening the vision of their students and identifying those with vision problems. They ensure that children suspected of vision problems are referred for eye care. The most common reason for referral falls under one of these categories:

- Failed vision screenings
- Broken/bad glasses
- Demonstrated visual problems in the classroom
- Poor academic performance (required to have an eye exam before going to special education)
- Failure to obtain a mandated exam for entry to school in Illinois

Due to lack of follow through by parents and caregivers, along with limited access to providers accepting state insurance, a large portion of these children have not received comprehensive vision care that is needed. CPS has been searching for a mechanism and partnership that will better serve their student body.

METHODS

CPS and the Illinois Eye Institute at Princeton Elementary School partnered to open a year-round vision clinic in January, 2011 to address this unmet need. The clinic is open for patients each morning Monday through Friday. CPS schools bus groups of children to the eye clinic or parents brought their children to the clinic. A CPS employee schedules one school per day to attend the clinic throughout the school year.

Comprehensive care included VA, EOMs, cover test, color vision, stereopsis, visual fields, keratometry, refraction, cycloplegic refraction (if consent received), vergences, accommodation, IOP and anterior and posterior eye health. All children are dilated and cycloplegized if parental permission is provided. Children are provided eyewear if needed or appropriate referrals for additional care when required.

Data reported here represents the patients seen 1/5/11 – 12/31/11.

RESULTS

DEMOGRAPHICS

5,032 children were seen during the first year of clinical operations.

Gender Distribution

- Females: 56.30%
- Males: 43.70%

Age Distribution

- Mean: 11.3 yrs ± 0.05
- Median: 11.1 yrs

Racial Distribution

- African American: 3059 (60.80%)
- Hispanic: 1677 (33.30%)
- White: 100 (2.00%)
- Mixed: 7 (<0.1%)
- Middle Eastern: 10 (<0.1%)
- Unknown: 179 (3.60%)

Children who were seen represented 228 schools within Chicago.

- 204 schools - 80% or more of the children attending were considered low income* (95% of patients seen)
- 168 schools - 90% or more of the children attending were considered low income* (86.6% of patients seen)

*Low-income students are pupils age 3 to 17, inclusive, from families receiving public aid, living in institutions for neglected or delinquent children, being supported in foster homes with public funds, or eligible to receive free or reduced-price lunches.

CLINICAL FINDINGS

ENTERING DISTANCE

Visual Acuity

<table>
<thead>
<tr>
<th>RIGHT EYE</th>
<th>LEFT EYE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>

Frequency

<table>
<thead>
<tr>
<th>Distance</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>

Refractive Error

<table>
<thead>
<tr>
<th>Refractive Error</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.25</td>
<td>100</td>
</tr>
<tr>
<td>-1.50</td>
<td>100</td>
</tr>
</tbody>
</table>

Dry Autorefraction

<table>
<thead>
<tr>
<th>Sphere</th>
<th>Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10.00</td>
<td>-1.00</td>
</tr>
<tr>
<td>-12.00</td>
<td>-2.00</td>
</tr>
</tbody>
</table>

Cycloplegic Autorefraction

<table>
<thead>
<tr>
<th>Sphere</th>
<th>Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>-14.75</td>
<td>-7.50</td>
</tr>
<tr>
<td>-17.25</td>
<td>-0.25</td>
</tr>
</tbody>
</table>

Non-Refractive Diagnoses

- Amblyopia
- Strabismus
- Previous undiagnosed glaucoma
- Previous undiagnosed cataract
- Previous undiagnosed retinal detachment

CLINICAL FINDINGS

Non-Refractive Diagnoses

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amblyopia</td>
<td>300</td>
</tr>
<tr>
<td>Strabismus</td>
<td>300</td>
</tr>
<tr>
<td>Previously undiagnosed glaucoma</td>
<td>300</td>
</tr>
<tr>
<td>Previously undiagnosed cataract</td>
<td>300</td>
</tr>
</tbody>
</table>

CONCLUSIONS

There is a large unmet need for vision care for the students attending the Chicago Public Schools. The IEI at Princeton Clinic has been providing primary eye care, access to refractive correction, and limited follow up since the partnership was created.

When secondary care is required, the challenge is ensuring the patient is able to access appropriate services. The barriers include the understanding of need, parental follow up and financial resources.

Service at the IEI at Princeton recently expanded to include afternoon appointments including vision therapy. In addition, in September, 2012 a Chicago Health Corp member will be assigned to Princeton to attempt to bridge the communication gap between the clinic and families. Beginning in the fall this staff member will address improved follow up for referrals and assist us in monitoring the wear of prescribed glasses.

A unique aspect of this program is that services are offered to any and all CPS children during school hours.

Local foundations, donated from corporate sponsors, and in-kind services allow the delivery of care.
INTRODUCTION

Special Olympics Lions Clubs International Opening Eyes (Opening Eyes) is a global program providing vision assessments and spectacle corrections to individuals with intellectual disability (ID). Opening Eyes began providing screenings to Special Olympics athletes in Minneapolis, US in 1991. In 1995, New Haven, CT athletes needing spectacles to correct for uncorrected refractive errors were provided them. The program has grown over the past 25 years to be in more than 100 countries worldwide. The program has defined protocols. Please see recording form for tests conducted. (Figure 1) The data collected at programs around the world are captured in the Healthy Athlete Software (HAS) data base under the direction of Health One Global.

During 2010, 21,271 athletes were screened and the data from their evaluations were captured. Using World Bank criteria, each country represented by an athlete seen in 2011 was categorized as low, low middle, upper middle, or high level of income. See Table 1 for individual country designation for athletes seen and Table 2 for aggregate numbers of athletes seen by World Bank Level.

RESULTS

The results of our analysis reflect minimal effect from World Bank level.

The preponderance of athletes seen in all programs was male. The only difference by World Bank Level was the missing gender information from the low level. Table 3 shows the distribution of gender.

There was an interesting trend with respect to age of athletes presenting for vision services. As you can see by Figure 2, the high level was more likely to have older athletes.

Case history is limited in this population. One question posed at the Opening Eyes event is “When was your last exam?” While the responses are not always accurate, there is a sufficient of athletes that are able to reliably respond to this question. Results seen in Table 4 show that athletes reported never having an exam much more frequently in the lower three levels (32.3%, 39.3%, and 32.7%) as compared to the high level (6.5%). Please note that if there is any possibility that the athlete is confused, the form is marked “Unknown” so as to avoid inaccurate information.

The remaining data described represents the results of the Opening Eyes vision assessment.

Visual acuity is assessed monocularly at distance (3 meters) and binocularly at near (40 cm) with the athletes current prescription or no lenses if none are with them at the time of testing. There was no difference in visual acuity between World Bank Level at distance or near. Results are shown in Table 5.

The tables on refractive error (Table 6 Sphere & Table 7 Spherical Equivalent) described below reflects the data from the right eye only. No significant difference was found between the right and left eyes. The data is substantially more myopic than one would expect overall. Note that the mean and range of refractive error was the least at the low-middle level and there was a significant difference (p=0.025). There were a substantial number athletes missing refractive data but they were equally distributed among the levels.

Strabismus has a high prevalence in persons with intellectual disability. Opening Eyes assesses strabismus at 3 meters and 40 centimeters with the cover test. There was no significant difference between levels for near or distance testing.

A review of external and internal eye health problems including tonometry revealed no differences between World Bank Levels.

CONCLUSION

An analysis of the 2010 data for Opening Eyes demonstrated that there is a significant prevalence of vision problems but the level of income within the country, which is categorized by the World Bank into one of the four levels, does not correlate with access to eye care as one would expect. It appears that some of the individuals with low income had better access than those with low–middle income and were similar to those with upper middle, while athletes had the best access in countries with high income.

No differences were found in the following areas:

- Entering Visual Acuity
- Strabismus – Distance and Near
- External Eye Health Problems
- Internal Eye Health Problems
- Tonometry

A difference in magnitude of refractive errors was observed. While it was statistically significant, the small difference in myopia between levels is not clinically significant.

Limitations to this study include the fact that athletes self-presented to events to participate in the Special Olympics Lions Clubs International Opening Eyes vision assessment program. Athletes are not representative of all individuals with intellectual disability for several reasons: those with more severe problems generally do not access this opportunity, in some countries access is limited to those in urban settings, and lastly, many athletes already under care do not participate. One other challenge is the magnitude of data missing. Data is collected at events worldwide and it is difficult to ensure all data is collected and accurately entered into the data base.

Analysis of Visual Findings for Persons with Intellectual Disability By Level of Country Development

Sandra S. Block
School-Based Vision Clinic, Illinois College of Optometry, Chicago, IL
INTERNATIONAL BRAIN INJURY ASSOCIATION
1 ICO PRESENTATION
Improving Vision Function in the Patient with Traumatic Brain Injury

Dominick M. Maino, OD, MEd, FAAO, FCVO-A; Professor of Pediatrics/Binocular Vision, Illinois Eye Institute/Illinois College of Optometry; Chicago, Il. USA
Darril G. Schange, OD, FAAO; Associate Professor/Ocular Motility & Binocular Vision, Illinois Eye Institute/Illinois College of Optometry; Chicago, Il. USA

International Brain Injury Association Annual Meeting March 2012 Edinburgh, Scotland

ABSTRACT

Objective: This report reviews a literature note how optometric vision therapy (OVT) can improve the patient’s quality of life after traumatic brain injury (TBI). This presentation discusses the significance of the data reviewed and adds new case reports noted after a regimen of OVT that resulted in improved vision function, quality of life, skills, comfort, reading and driving ability in a patient with TBI.

Case Report: PA, a university professor, is a 53 y/o WP with a history of traumatic brain injury due to a car accident. Her symptoms included falling asleep while reading, avoidance of reading, decreased attention, and major problems parking her car. The patient had a general score of 4.00 while the Visagraph revealed significant problems in span of recognition, fixation, reading difficulty, attention, and major problems parking her car. The patient was referred to the Illinois Eye Institute for OVT to improve her visual function. She was given a visual and neurological assessment because of an automobile accident that resulted in an improved Visual Perception and a possible perceptual midline shift.

ASSESSMENT

The initial assessment (see Table 2) revealed a diagnosis of hyperopia, astigmatism, presbyopia, convergence insufficiency, and compensating it with a cover test. The patient also had a decrease in visual memory and the ability to do tasks that required visual memory. All areas of vision function, functional vision and visual skills targets. Eye-movement characteristics are analyzed and presented as reports or graphs.

TABLE 2: Phase of Optometric Vision Therapy

<table>
<thead>
<tr>
<th>Phase of Therapy</th>
<th>Description</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
</tr>
</thead>
</table>

OUTCOMES

All areas of vision function, functional vision and visual information processing were now completely integrated, such as visual memory and attention, reading, visual memory and the ability to park her car without scratching it. Her driving was also improved. It was somewhat interesting that the patient’s perception of how much she had achieved was less than the data suggests. She needed to be supported with assurance from the therapists and doctors involved in her diagnosis and treatment. The patient was in the process of pursuing tenure at a major university. It is hoped that with all the improvements noted here, achieving this goal and all other goals will now be possible and that her quality of life will continue to improve.

PLAN/TREATMENT

A new prescription for glasses was given. The included correction for the refractive error and presbyopia was +2.00 distance and +2.00 near. The contact lens prescription was +2.00/0.50. A previous record was taken for a possible perceptual midline shift.

Oculomotor Therapy

Oculomotor therapy was used to improve the patient’s visual function. The OVT program had both in and out of office components utilizing real world experiences/therapy as part of vision therapy. Activities parallel of office techniques are typically taught to the patient to be practiced at home, thereby reinforcing the developing visual skills.

SPECIAL TESTING

Table 4: Special Testing

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
<th>Age Matched</th>
<th>Classification</th>
<th>Vision Disorder</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>EyePort</td>
<td>Visual Sensitivity</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>Wayne</td>
<td>BrainWare</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>xOP</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>VLI</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>EyePort</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>Wayne</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
</tbody>
</table>

Table of Contents

1. Introduction
2. CASE HISTORY
3. ASSESSMENT
4. PLAN/TREATMENT
5. OUTCOMES
6. Table 1: Symptoms and Signs
7. Table 2: Phase of Optometric Vision Therapy
8. Table 3: Examination & Progress Evaluation (PE) Findings
9. Table 4: Special Testing
10. Table 5: Representation of Optometric Vision Therapy Processes (Using)

CONTACT INFORMATION
Dominick M. Maino, OD, MEd, FAAO, FCVO-A
dmaino@ico.edu
www.ico.edu

Table 1: Symptoms and Signs

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Description</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Memory</td>
<td>Deficit</td>
<td>Improved</td>
</tr>
<tr>
<td>Visual Attention</td>
<td>Deficit</td>
<td>Improved</td>
</tr>
<tr>
<td>Visual Skills</td>
<td>Deficit</td>
<td>Improved</td>
</tr>
</tbody>
</table>

Table 3: Examination & Progress Evaluation (PE) Findings

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
<th>Age Matched</th>
<th>Classification</th>
<th>Vision Disorder</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>EyePort</td>
<td>Visual Sensitivity</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>Wayne</td>
<td>BrainWare</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>xOP</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>VLI</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>EyePort</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>Wayne</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
</tbody>
</table>

Table 4: Special Testing

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
<th>Age Matched</th>
<th>Classification</th>
<th>Vision Disorder</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>EyePort</td>
<td>Visual Sensitivity</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>Wayne</td>
<td>BrainWare</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>xOP</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>VLI</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>EyePort</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>Wayne</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
</tbody>
</table>

Table 5: Representation of Optometric Vision Therapy Processes (Using)

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
<th>Age Matched</th>
<th>Classification</th>
<th>Vision Disorder</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>EyePort</td>
<td>Visual Sensitivity</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>Wayne</td>
<td>BrainWare</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>xOP</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>VLI</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>EyePort</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
<tr>
<td>Wayne</td>
<td>Distance Perception</td>
<td>20/20</td>
<td>20/20</td>
<td>+2.00</td>
<td>4/4</td>
</tr>
</tbody>
</table>
Establishing anterior epithelial cell viability in pig lens epithelial explants.

RK Zoltoski1, EE Davii, KM Theisen1, and GJ McArdle2

1 Illinois College of Optometry, Chicago, IL
2 Lenticular Research Group, LLC, Downer’s Grove, IL

Methods:
- Three replicates were collected from a local abattoir, and dissected within 2 hours. Lenses were removed and the capsules were collected directly into agar or poly-lysine coated slides. Once the capsules were secured onto the slides, BrdU incorporation was initiated following a method established by Thum et al5.

Slides were viewed and photographed using a Nikon Eclipse Ti-S fluorescence microscope with a DS-Ri 1 digital camera (Nikon). Total cell counts for each microscopic view and the photographs were manually estimated from the same.

We are currently investigating methods to alter lens growth rates. In this pilot study, we are quantifying changes in the lens.

Results

<table>
<thead>
<tr>
<th>Slides</th>
<th>Bulk-Labeled Cells</th>
<th>TUNEL Cells</th>
<th>S. Germinative Zone Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone 1</td>
<td>57</td>
<td>2071</td>
<td>0.73%</td>
</tr>
<tr>
<td>Bone 2</td>
<td>81</td>
<td>1675</td>
<td>1.67%</td>
</tr>
<tr>
<td>Bone 3</td>
<td>17</td>
<td>2066</td>
<td>1.21%</td>
</tr>
</tbody>
</table>

Discussion

- Although the geometric patterns are slightly different, porcine lenses are a viable model to their human counterparts due to similar protein composition to human lenses6 and ease of availability from nearby slaughterhouses.
- We will be utilizing this procedure to establish baseline values for comparisons to treated lenses.

References


Future directions:
- Develop a more accurate and repeatable method for quantifying BrdU labeled cells.
- Identify differences in proliferation between germinative zone vs central capsule.
- Determine the percentage of apoptotic and necrotic cells using TUNEL, a DNA fragmentation marker, and BODIPY-A, a membrane viability marker, respectively.
- Use EdU to localize germinative zone cells in the whole porcine lens.
the parietal lobe, specifically the fibers carrying information from the upper thalamus to the cerebral cortex. Rather than taking a direct path through fibers of the optic radiation take a fairly broad route on their way from the inferior horn of the lateral ventricle, and finally projects posteriorly to end in the internal capsule, follows the calcarine sulcus. The optic radiation is sometimes known as the loop of Meyer and less commonly as the loop of Archambault. These fibers are commonly known as the loop of Meyer and less commonly as the loop of Archambault.

INTRODUCTION

The radiatio optica, or optic radiation, is the fiber tract carrying visual information which begins at the lateral geniculate nucleus, passes laterally through the geniculo-cerebral tract (parietal, temporosphenoidal, and occipital) along with a fifth cerebral lobe. The fibers take in the temporal lobe, and finally projects posteriorly to end in the parieto-occipital cortex.1

Louis Pierre Gratiolet (1815-1865) This French medical doctor and anatomist first anatomically recognized and described the optic radiation in 1856. He is also known for defining the four cerebral lobes (frontal, parietal, temporal, and occipital) along with a fifth central lobe or insula.2

Salomon Eberhard Henschen (1847-1930) This Swedish physician and neuroanatomist produced a map of the visual cortex, although later research would show that he had it upside down.3 He was also the first to describe endurance-related cardiomyopathy and dyscalculia, a specific learning disability involving innate difficulty in learning or comprehending arithmetic.

Paul Flechsig (1847-1929) In 1896, the German neuroanatomist, psychologist, and neuropathologist was the first to give a detailed description of the course of the fibers of the optic radiation.4 He noted the sharp turn that the inferiormost fibers take in the temporal lobe, which some called Flechsig’s temporal knee or Flechsig’s detour. Dr. Flechsig is most notably remembered for his work on myelinogenesis where he devised a map of the cerebral cortex that was divided not by area but by order of myelination.

LaSalle Archambault (1878-1940) In 1906, this American neurologist described this forward curving group of optic radiation fibers in the temporal lobe.5 Dr. Archambault also coined the term geniculo-calcarine tract.

Adolf Meyer (1866-1950) This American physician accurately described the forward arching route of the temporal fibers of the optic radiation in 1913.6 Although Dr. Meyer did work in neurology and neuropsychiatry, he is commonly described as the most prominent and influential U.S. psychiatrist of the first half of the twentieth century.7 He was the first professor of psychiatry at Johns Hopkins University and was the director of the Henry Phipps Psychiatric Clinic from its inception in 1913 at that same institution.

CONCLUSION

It appears that Harvey Cushing, a friend and colleague of Dr. Meyer at Johns Hopkins and the person who Cushing’s disease is named after, used the term “Meyer’s Loop” when discussing a neurologic case that the two of them studied together in 1911. It may be noteworthy that Dr. Meyer did not seem comfortable with this term and freely acknowledged the work of Drs. Henschen, Flechsig, and Archambaut relative to the optic radiation.

In a published discussion of a paper presented at the Sixty-First Annual Meeting of the American Neurological Association in 1935 in which both Drs. Meyer and Archambauldt both participated, Dr. Meyer stated: Unfortunately, one of my friends, Dr. Cushing, has spoken of Meyer’s “loops,” to which I never made claim and which I think ought to be attributed to those who knew it long before my description.

The “loop” or detour had already been pointed out by Flechsig and, as Dr. Archambault said, was recognized as part of the geniculo-calcarine tract.

REFERENCES


CONTACT INFORMATION

B.W. Bakkum
Illinois College of Optometry
Chicago, Illinois 60616

B.W. Bakkum, D.C., Ph.D.
bakkum@ico.edu

Table of Contents