The following presentations and posters were presented during the 2015 COVD 45th Annual Meeting in Las Vegas, Nevada.

Quick Hit Presentations

Author: Surbhi Bansal, OD, FAAO, FCOVD, *Clinical Instructor*

Title of Presentation:

Training Compensatory Eye Movements in a Patient with Homonymous Hemianopsia

ABSTRACT

Background: Background: A right homonymous hemianopsia (HH) can be debilitating for a patient in performing their activities of daily living. They may report difficulty while reading, running into objects, tripping, and being startled by people or objects appearing out of nowhere. A HH

Case Summary: History: Patient AS is a 33 year old Israeli male who was referred to the Vision Therapy Service for a longstanding right HH. AS was previously diagnosed with a left midbrain/diencephalic cavernous malformation with recurrent episodes of hemorrhaging. At 17 years of age, AH underwent a resection of a giant brainstem and diencephalic cavernous malformation. Findings: Refractive analysis: Subjective refraction: OD: pl 20/20 OS: +1.00-1.00X005 20/20-. Binocular findings (pre-therapy): 6 exophoria at near; near point of convergence: 10cm/12cm; suppression with step vergences at near; and appreciation of shapes on LANG stereo. Developmental Eye Movement Test: 83.94 sec V and 132 sec H. Keystone: underconvergence and binocular instability. Clock test: difficulty with spatial organization. Visual Field 30-2 Sita Standard: right HH. Diagnosis: Right HH, convergence insufficiency, binocular instability, and deficiencies of saccadic and pursuit eye movements. Treatment Plan: Vision Therapy (VT), estimated sessions 30-35 but may change depending on patient motivation and compliance. Emphasize saccadic eye movements and awareness of the right visual field. Outcome: Motion sensitivity and no longer "seeing black" in the right visual field. Improvement on the DEM, clock test, and NPC.

Discussion: Current treatment methods for HH include yoked prisms, field expansion prisms (e.g. Eli Peli), and VT. Although there are limited studies on VT as a treatment option, this case report will discuss diagnostic tests used to monitor the patient and therapy techniques which increased awareness of the right visual field.

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Title of Presentation:
Prism Management of Acquired Superior Oblique Palsy

ABSTRACT

Introduction: There are a number of research articles in the literature that make recommendations on the treatment options for patients experiencing diplopia secondary to acquired superior oblique palsies. The conventional treatment option is surgery, however, this also presents with many risks. Other treatment options include prism, occlusion or vision therapy. The time course for treatment has not been fully investigated; one would predict that the longer the delay in treatment would decrease its success rate. The importance of co-management with other practitioners has also been rarely addressed.

Case Report/Results: We will present a case report on a 59 yo Hispanic male who presented to the University Eye Center with a longstanding history (20 years) of a traumatic left superior oblique palsy (30 prism diopters) with a large right head tilt. He was unaware that the head tilt was secondary to his vertical misalignment, nor was it addressed at previous eye exams. He was treated with 14 prism diopters split between the two eyes, which enabled him to see single in primary gaze with his head straight. However, after 20 years with a head tilt, he had difficulty keeping his head and shoulders aligned. He was referred to a physical therapist, who estimated good prognosis with 1 year of physical therapy. At his follow up visit he reported clear, single vision with improved head posture. Vision therapy will be considered once physical therapy is initiated. Examination results and photos will be included.

Discussion: This case demonstrates the importance of:

1. Observing your patient in the absence of diplopic complaints
2. High magnitude prism (fresnel or ground in) can be considered a primary treatment option in the treatment of large angle vertical deviations
3. Co-management with other professionals is integral for "true" success. Your examination does not end with just eliminating the diplopia.
4. Patient education is an inherent part of the treatment process.
5. Practitioner being aware of all treatment modalities.

Quick Hit Presentations, *continued*

Author: Derek Tong, OD, FCOVD, FAAO, FNORA, *Adjunct Clinical Assistant Professor, SCCO at MBKU*

Co-Author: Belinda Kuo, OD, FAAO, *Private Practice, Orange California*

Title of Presentation:
A Practical Protocol for Prescribing Yoked Prisms for Traumatic Brain Injury Patients

ABSTRACT

Background: Visual Midline Shift Syndrome (a.k.a. Abnormal Egocentric Localization) is a common finding in patients who suffered from brain injury. Yet, there are very few easy-to-follow clinical guidelines for the optometrist who is new to Neuro-Optometric Rehabilitation to determine the amount and direction of Yoked Prisms to prescribe for the TBI patient with Visual Midline Shift Syndrome.

Procedure: This 3-step clinical protocol consists of (1) DETECTION of Visual Midline Shift with a Wolff Wand, (2) OBSERVATION of posture and spatial localization, and (3) CONFIRMATION of the benefit of Yoked Prisms in-office towards the patient's desired rehabilitative goals.

Application: Yoked Prisms prescriptions can often improve the TBI patient's quality of life by enhancing visual spatial awareness, improving balance, and even reducing the risk of falling.

Unique or Innovative Characteristics: Using real patient case examples, this presentation will review a 3-step clinical protocol (Detection-Observation-Confirmation "DOC") to help the optometrist develop the ability to diagnosis this condition, to evaluate the patient's response and to prescribe Yoked Prisms accordingly.

Author: Cynthia Brown, OD, *Pediatric Resident/Michigan College of Optometry*

Co-Author: Sarah Hinkley, OD, FCOVD, *Professor at Michigan College of Optometry*

Title of Presentation:

Prevalence of Primitive Reflexes in a Pediatric Population and Its Relationship with Directionality and Visual Spatial Skills

ABSTRACT

Background: Primitive reflexes are unconscious physical reactions designed to help a newborn survive. Continuation of these reflexes past the normal developmental timeline may represent irregular cortical development. There is a limited amount of information on retained primitive reflexes (RPR) past infancy in the medical or optometric literature. This study looks at the prevalence of RPR in children and their correlation to directionality and/or visual-spatial difficulties. Methods: A retrospective study was conducted utilizing exam forms of patients that presented to an optometric vision therapy office for visual skills testing in 2011 and 2012. Data regarding the presence or lack of primitive reflexes, specifically the Moro Reflex, Asymmetric Tonic Neck Reflex, Symmetric Tonic Neck Reflex, Spinal Galant Reflex, and Tonic Labyrinthine Reflex, was analyzed. Additionally, data on subject performance on the Jordan Left-Right Reversals Test and the Test of Visual Perceptual Skills- Visual Spatial Relationships (TVPS-VSR) subtest was analyzed. Results: A high prevalence of positive RPR was found in this study; specifically 95.6% for the Moro Reflex, 29.8 % for the Asymmetric Tonic Neck Reflex, 41.2% for the Symmetric Tonic Neck Reflex, 32% for the Spinal Galant Reflex, and 44.7% for the Tonic Labyrinthine Reflex. The majority of subjects scored below normal on the Jordan Left-Right Reversals Test but performed well on the TVPS-VSR subtest. No significant correlation was found between RPR and difficulty with directionality skills or with retained primitive reflexes and visual spatial skills. Discussion: The prevalence of RPR in this study population is high. Health care professionals should be aware of the high prevalence of this condition in their patient bases. More research is needed on potential correlations between RPR and directionality and visual-spatial skills, as well as the relationship between RPR and other visual skills.

Quick Hit Presentations, *continued*

Author: Mary W. VanHoy, OD, FCOVD, FCSO, *Optometrist, President of College of Syntonic Optometry*

Title of Presentation:

The Effective and Rapid Restoration of Binocular Vision with Sudden Onset Alternating Esotropia in a 68 Year Old Female Utilizing Solely Binasal Occlusion on Current Rx and Optometric Syntonic Phototherapy for Eight Weeks

ABSTRACT

Background: 68 year old female referred to me May 2013 for treatment of sudden onset alternating esotropia fbllowing trauma from watching the capture of one of the Boston Marathon bombers. Patient had experienced some intermittent headaches, dizziness, deep pain within ears, a week prior to loss of binocular vision. Her spectacle Ax was six months old, she received excellent annual visual care from her family optometrist. She was in good health with the only medications being for elevated cholesterol but blood pressures were normal to low. Only previous ocular problem was a posterior vitreous detachment in 2009 in her right eye. No previous binocular dysfunctions.

Case Summary: Symptoms: 1) dizziness; 2) disorientation going from lighted room to darkened room; 3) photosensitivity 4) misjudgment of things in space 5) runs into things on her right side

- Rx: 00: + 3.50 - 0.50 X 130 OS: + 4.25 - 0.50 X 030 Add: + 2.75
- Pre-Tx Alignment 18"-20" altemating esotropia with distance fixation; 8"-10" alternating esotropia to high esophoria with near fixation; diplopia with Worth 4 Dot Test; 0/10 stereo with Randot Stereo Test at near; null point 4°-5" from nose
- VAs: OD: 20120 (but vertical shadows around targets @ Dlst) OS: 20/20 (but shadows in lower portion of letters and letters slanted at a 45 degree angle @ Dis!) At near: 20/30 each eye; left eye sees better than right eye despite same VAs
- Functional Visual Fields: five degrees or less for peripheral form fields and central color fields for each eye

Treatment: 1) 20 mm binasal occlusion (3M gift tape) to current Rx 2) 10 mns deep blue syntonic filter followed by 10 mins blue green filter on home optometric syntonic phototherapy lamp on schedule of three consecutive days, one day of rest, three consecutive days twice a day for three weeks followed by same filters but only once a day for remaining five days.

Results: 1) VAs restored to 20/20 each eye at distance and near without the previous vertical shadows or distortion to thaletter; 2) Stereopsis restored to 10/10 correct on Randot Stereo Test at near; 3) Functional visual fields fully expanded In each eye for peripheral form fields as well as central color fields

Discussion: Rather than treating esotropia, syntonic phototherapy addressed the cause, recent traumatic brain injury which strongly illustrates the need to fully understand treatment protocols when utilizing optometric syntonic phototherapy rather than use as a "cookbook" treatment.

Oral Paper Presentations

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Title of Presentation:
Confusion Inside Panum's Area and Symptomatic Convergence Insufficiency

ABSTRACT

Background: Traditional tests of Convergence Insufficiency (CI) have not been particularly accurate in identification of symptomatic CI. Such measures as Near Point of Convergence (NPC) and Positive Fusional Convergence (PFC) are primarily sensitive to CI deficits occurring outside of Panum's fusional area (PFA). At the same time measures of fixation disparity address centralization of dichoptic targets within PFA and may be sensitive to some cases of symptomatic CI that may otherwise be overlooked with traditional measures.

Method: In the present study we compared the utility of NPC and PFC in diagnosis and treatment of CI with a novel test of Near Point of Fixation Disparity (NPFD) and a measure of Associated Positive Fusional Convergence (APFC). These instruments were evaluated in a pediatric sample (age range 6 -17) of 25 symptomatic CI patients and 35 asymptomatic patients with normal binocular vision. The measurements were repeated in the symptomatic group following vision therapy.

Results: ROC curves were generated for the combined probability of CI diagnosis according to statistically-derived NPFD break values greater than 4cm, recovery values greater than 5cm and APFC less than 16ΔBO break and commonly accepted NPC-based criteria (NPC break ≥ 5cm and recovery ≥ 7; and PFC < 15 ΔBO break). The results showed that NPFD-based discrimination among CI-symptomatic and asymptomatic patients yielded 95% sensitivity and 100% specificity, while similar NPC-based diagnostic criteria were no better than chance providing only 19% sensitivity to the symptoms of CI. CI treatment also resulted in significant and disproportionately greater improvements in NPFD and APFC than in NPC and PFC as measured by paired sample t-tests andand corresponding effect sizes.

Discussion: The results support the theory that measurements of vergence that are made when targets exceed or enter the outer limits of Panum's region are not as sensitive as associative vergence measurements that reveal how centralized the dichoptic targets are within Panum's region. These new measurements appear to have more value because of their closer relationship to symptomatology, with treatment producing significant improvements by centralizing movement of retinal disparity within PFA. The study thus showed that the use of the NPFD in combination with measurement of APFC at near provides an excellent tool in diagnosis and treatment.

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Co-Author: Angela Chen, OD, MS, FAAO
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Title of Presentation:
An Objective Measure of Accommodative Insufficiency in Children

ABSTRACT

Background: A previous study by Tosha et al showed that adults with visual discomfort displayed accommodative fatigue when viewing a near target for 2 minutes. This result indicated that an objective measurement of accommodation may provide a new method to diagnose ill-sustained accommodative dysfunction. The purpose of this study was to objectively evaluate sustained accommodative responses among school-aged children with and without visual discomfort.

Methods: Twenty-three children were grouped into high (n=13; mean age=11.1,) or low (n=12; mean age=11.7) visual discomfort groups based on their scores on the Convergence Insufficiency Symptom Survey (CISS). Continuous measurements of static accommodation were recorded with a WAM-5500 autorefractor at 5 Hz for two consecutive minutes while the subjects fixated a high-contrast star symbol at five viewing distances (0.33D, 2D, 3D, 4D, and 5D). All children had a clinical evaluation of accommodation and vergence.

Results: The mean CISS score was 33.2 for the high visual discomfort group and 7.2 for the low visual discomfort group. The results showed a significant difference in accommodative response between the high and low visual discomfort groups with the high visual discomfort group exhibiting a higher lag at the 5D ($p=0.0023$) viewing distance. The accommodative lag did not change over time for all viewing distances when comparing the two groups.

Discussion: Children with high visual discomfort had a significantly higher lag of accommodation at the 5D viewing distances compared to children with low discomfort. In the high visual discomfort group, accommodative inaccuracy was present at the start of viewing and did not show an increase over time. The children with high visual discomfort showed an insufficiency of accommodation as opposed to fatigue in the accommodation system that has been reported in an earlier study of college students.

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Title of Presentation:
The Use of Vision Therapy in Treating School Age Children Diagnosed with Attention Problems

ABSTRACT

Background: Attention deficit hyperactivity disorder (ADHD) is the most commonly diagnosed and studied childhood psychiatric disorder. Behavioral disorders often hinder children from reaching their potential in school, who are also more likely associated with visual dysfunctions such as Convergence Insufficiency (CI), Accommodative Insufficiency (AI) and Oculomotor Dysfunctions (OM). Our previous study investigated the use of Vision Therapy (VT) to improve attention span and decrease impulsivity. In this study we attempt to further support our initial conclusions and ultimately suggest that VT can be used to relieve symptoms of ADHD.

Methods: 17 patients between ages 6-17, formerly diagnosed with attention problems (non-medicated), were given at home and in office vision therapy for CI, AI, and OM disorders. Therapy was individualized to the child's diagnosis while under standardized protocol. Attention was objectively measured using the Test of Variables of Attention (TOVA) before therapy was initiated. The TOVA quantifies five variables of attention: Inattention, Impulsivity, Response Time (RT), RT Variability, and Attention Performance Index (API). A visual efficiency examination was repeated at the end of 12 sessions of therapy to confirm successful treatment of the patient's Binocular Vision (BV) disorder. Patients repeated the TOVA and pre- and post-VT data were analyzed using Bland-Altman and ANOVA.

Results: In patients who successfully completed therapy, comparisons of the pre- and post-VT TOVA results showed improvement in all sub-categories - Attention improved +21%, Impulsivity +6.7%, RT+8%, RT Variability +14%, and API +51.3%. Both Attention and RT Variability showed significant improvement ($p=<0.05$). TOVA results were also compared to an age and gender matched normative sample.

Conclusions: The results suggest that VT can be used to successfully improve attention deficit disorders, while concurrently relieving patients from BV disorders. This demonstrates that through a comprehensive treatment for visual disorders, optometrists can help alleviate symptoms associated with attention and behavioral disorders.

Oral Paper Presentations, *continued*

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Title of Presentation:
A Randomized Study of the Effects of 3-D Computer Game-Based Home Vision Therapy on Convergence Insufficiency and Refractive Amblyopia in Children

ABSTRACT

Background: Case studies have shown 3-D video games as a possible option for vision therapy, particularly among children with low-adherence to home-based therapy. In this National Institutes of Health-funded research effort, a 3-D vision therapy action video game (iCare) was studied as an in-home vision therapy solution for children with convergence insufficiency (CI) or refractive amblyopia.

Methods: A randomized trial was performed to compare the effectiveness of iCare to conventional vision therapy software (HTS). Participants were randomly assigned to use either the HTS software (CI n=10; amblyopia n=3) or the iCare game (CI n=9; amblyopia n=2) for twelve weeks of in-home use. The main outcome measures were positive fusional vergence base-out breakpoint (BOB) and near point of convergence (NPC) for the CI group (n=19) and distance visual acuity (DVA) for the amblyopia group (n=5). Secondary outcome measures for both condition groups included frequency of use and subjective software acceptance scores.

Results: Using the post-study data as the sole endpoint, the study found that the NPC ratio of geometric means (pre-study : post-study) was 1.43 (95% Conf.Int.: [1.25, 16.1], $p<0.001$) for the HTS CI group and 1.89 (95% Conf.Int.: [1.22, 2.94], $p<0.001$) for the iCare CI group. The study found that the BOB ratio of geometric means (post-study : pre-study) was 1.27 (95% Conf. Int.: [0.84, 1.93], $p=0.216$) for the HTS CI group and 1.52 (95% Conf.Int.: [1.07, 2.16], $p=0.024$) for the iCare CI group. Between-therapy comparisons showed no significant difference in either BOB or NPC. The amblyopia group contained too few subjects to conduct statistical analyses. For both groups, iCare participants indicated higher frequency of use and higher software acceptance questionnaire score.

Conclusion: The iCare video game improved visual function in CI participants similarly to the HTS software. iCare users exhibited higher adherence and reported higher software acceptance scores.

Oral Paper Presentations, *continued*

Author: Steven Ritter, OD, FCOVD, *Assistant Clinical Professor, SUNY College of Optometry*

Co-Author: Audra Steiner, OD, FCOVD, *Assistant Clinical Professor, SUNY College of Optometry*

Title of Presentation:
Vision Rehabilitation: Understanding, Perceptions, and Perceived Readiness of Future Practitioners

ABSTRACT

Background: Optometrists are the premier providers of vision rehabilitation services. Working with patients of all ages who have diverse needs, histories, and abilities, we offer a portfolio of care that no other profession can match. Given optometry's singular expertise in this area, fostering in future practitioners a sense of authority, enthusiasm, and competence in regards to vision therapy is critical. SUNY Optometry student doctors were polled to determine their level of familiarity with vision therapy; their understanding of the conditions for which vision therapy is appropriate; knowledge about access to rehabilitative care; their perceptions of future competence in the area of behavioral optometry; and their future plans to offer vision therapy services.

Methods: Over 200 interns in the Doctor of Optometry program completed an anonymous survey asking about the above issues. Survey results were analyzed based on year within the program, previous exposure to vision therapy, exposure to classwork, and exposure in clinic.

Results: Most students heard about vision therapy during their research before entering optometry school. Students were able to perceive symptoms as being related to a visual efficiency dysfunction. They seemed confident that vision therapy was an intervention that could benefit people of all ages. Students felt that they would understand vision therapy at a well to very well level upon graduation. A healthy percent expressed interest in providing pediatric and developments vison care. The students had clear ideas about what would enhance their understanding of vision therapy.

Discussion: The findings of this survey will be helpful in further developing ways to engage students' curiosity and instill within them a sense of ownership of vision rehabilitation services. As scope of practice expanded, the profession's acknowledgement that rehabilitation is an area in which optometry provides unique care seems to have waned. Recent inquiries into neuroplasticity and enhanced media coverage of vision therapy have helped rekindle interest. It is incumbent upon us to kindle new interest in developmental and rehabilitative vision early in the career of our future colleagues. We must determine the best ways to ensure Optometry continues to offer these services.

The authors of this poster need report no conflicts of interest.

Poster Presentations

Author: Connie Chih-Chun Lee, OD, *Resident Optometrist/ Pacific University*

Co-Author: Dr. Curtis Baxstrom, *Pacific University*

Title of Presentation:

A 2 Year Old and 6 Year Old Presenting with Congenital Nystagmus Showed Improved Vision and Fixation Control After Vision Therapy

ABSTRACT

Background: Nystagmus is a visual condition of repetitive, involuntary eye movements that are congenital, spontaneous (spasmus nutans), or acquired. Causes of nystagmus include disruption of the visual pathway, peripheral vestibular disease, or central nervous system disease. Treatment has traditionally been correcting refractive error, low vision devices, and pharmacological or surgical intervention.

SUMMARY

History: A 2 year old and 6 year old referred by a pediatric ophthalmologist present with congential nystagmus secondary to optic nerve hypoplasia and X-linked optic atrophy, respectively. Both are foster children with unknown family history.

Findings: 2 year old: BCVA 20/128 OD, OS, OU with Cardiff cards, has a right gaze preference with compensatory head tilt, unable to fixate on light, mild hyperopia, and optic nerve hypoplasia 6 year old: BCVA 20/200 OD, OS, OU with Snellen @ distance, 20/60 OD, OS, OU @ near, dry refraction -6.00sph, wet refraction -5.50sph OD, OS, 4PD esotropia @ distance, 10PD esotropia @ near, no stereopsis, fusion on worth 4 dot, unable to fix and follow, color deficiency, high myopia, and optic nerve atrophy

Diagnosis: Congenital nystagmus (sensory deficient)
Optic nerve hypoplasia and optic nerve atrophy

Treatment: No refractive prescription was recommended at initial visit since there was minimal to no improvement with glasses. We recommended the start of vision therapy procedures including after image transfer, visual-vestibular therapy, and convergence therapy.

Outcome: After 2 months of therapy, patients showed improved nystagmus control and sustained fixation. Both patients thus showed improvement in fix and follow and improvement in visual acuity even without correction.

Discussion: Vision therapy techniques may be considered as alternative methods for nystagmus treatment and control, especially in the pediatric population. The nystagmus is not eliminated, but can be controlled for brief periods of time which allow for improved visual performance.

Author: Dominick M. Maino, OD, MEd, FAAO, FCOVD-A, *Professor, Illinois College of Optometry*

Co-Author: Utang Ekpo, *4th year student, Illinois College of Optometry*

Title of Presentation:
Wolf-Hirschhorn Syndrome: A Case Report

ABSTRACT

Background: Wolf-Hirschhorn Syndrome (WHS) describes a series of malformations caused by a deletion of one copy of the distal short arm of chromosome 4p (called 4p-). WHS is characterized by malformations in the first trimester that cause intellectual disability, delayed development, seizures and a characteristic facial appearance referred to as the "Greek Warrior Helmet Face." The extent of the 4p deletion determines the presence of microcephaly, various midline defects, oculo-visual, cardiac and renal anomalies. In order to provide appropriate eye and vision care for those with Wolf-Hirschhorn syndrome, it is important to understand the etiology, phenotypic expression, systemic and ocular anomalies that are associated with this genetic anomaly. A case report of a nine year, seven month old Caucasian male with WHS is presented.

Case Summary: This case report describes the etiology of WHS, highlighting the associated ophthalmic problems, structural deviations, and systemic phenotypical expression. It also describes the cognitive disabilities, developmental and psycho-educational anomalies present.

Results: A 9 year 7 month old Caucasian male child with Wolf-Hirschhorn syndrome presented with a large angle exotropia, possible glaucoma and high astigmatism. He also has hypertelorism, developmental delays and a history of occupational and physical therapy.

Discussion: A diagnosis of Wolf-Hirschhorn syndrome begins with its phenotypical expression of classic facial abnormalities and developmental delay and then confirmed by the presence of a deletion of the Wolf-Hirschhorn critical region (WHCR) (chromosome 4P16.3). The pathogenesis involves multiple genes with the prognosis being determined by the size of the deletion, and the presence of seizures, typical facial characteristics, cardiac problems, and cognitive disabilities. Those with WHS and their families will benefit from genetic counseling and the treatment of any systemic and ocular anomalies present. The management of any psycho-social-educational factors can also improve the individual's quality of life.

Poster Presentations, *continued*

Author: Judy Cao, OD, *Optometric Resident, Center for Vision Development Optometry*

Co-Author: Derek Tong, OD, FAAO, FCOVD, FNORA

Title of Presentation:

Multi-Modality Optometric Treatment of Deep Amblyopia Secondary to Micro-Esotropia and Anisometropia

SUMMARY

A 9 year old Caucasian male was referred for amblyopia treatment by his primary care optometrist. Previous treatment included full-time prescription lenses and part-time direct patching for 3 ½ years. Our evaluation found amblyopia secondary to anisometropia, micro-esotropia and eccentric fixation. A Visual Evoked Potential (VEP) was obtained to estimate his potential visual acuity and rule out optic pathway defect. Shaw lens, office-based vision therapy, home-based syntonics, the Amblyopia iNet (AiNet) and the Perceptual Visual Tracking (PVT) program were prescribed and patient continues to show progress.

Author: Alison Jenerou, OD, FCOVD, *Assistant Professor, Michigan College of Optometry*

Co-Author: Adeline Bauer
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Title of Presentation:
Binocular Vision's Play on Baseball

ABSTRACT

Background: It is largely accepted that a good binocular vision system is critical to being successful in sports. In studies comparing high level baseball players to non-athletes, athletes have displayed exemplary binocular vision above and beyond the average person. Is their success based on innate above average levels of depth perception, or are these high levels trained through years of playing sports? This research sought to discover if this correlation between stereopsis and success is true for the beginning levels of baseball.

Methods: The following study tested the visual acuity, heterophoria, and stereopsis of children that participated in organized little league baseball teams and then compared these values to their batting averages for the season. Results: Through the comparison of the patient's visual data to their batting averages, we found that there is no correlation between the status of the binocular system and the batting averages.

Discussion: The athletes screened all had normal visual acuity and stereopsis, regardless of how many years they had been playing. An innate superior visual system is found in athletes and from this research, it may begin in childhood. In the population studied, there was no correlation found between the success in the sport and the value of the athlete's stereopsis. Other skills may contribute more to the success of each athlete such as reaction time and experience.

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Title of Presentation:
Neuro-Optometric Rehabilitation and Hemi-Yoked Prism:
An Effective Treatment Protocol for Hemianopic Visual Field Loss

ABSTRACT

Background: Patients with history of strokes often manifest visual field loss. As the survival rate of these individuals increases, optometrists continue to play a critical role in the rehabilitation process. This poster describes a successful case of homonymous hemianopia management using visual therapy and hemi-yoked prism to enhance peripheral awareness and ocular scanning. A systematic management model will also be presented to allow for maximum neuro-optometric rehabilitation therapy success.

Case Summary: 23 year-old Indian male college student presented for consultation status post left brain seizure surgery. His complaints included intermittent blur at near, skipping lines when reading and right sided field loss. General neurologic exam was remarkable for gait difficulty requiring a cane for mobility. Systemic and ocular health were unremarkable, including pupils and oculomotility. Patient was diagnosed with convergence insufficiency, oculomotor dysfunction and right homonymous hemianopia.

Results: Patient was prescribed 25 sessions of neuro-optometric rehabilitative visual therapy to improve binocular vision, scanning and right field awareness. After 10 sessions of improved convergence and scanning using the three-point scan protocol, 20 base right hemi-yoked prism was prescribed to further enhance scanning efficiency. Patient had 15 additional sessions to familiarize with the image jump created by the prism, to teach a systematic saccadic fixation out of prism and to automate the process into "real life" routines. At completion, patient reported improved confidence, visual awareness and quality of life.

Discussion: This poster demonstrates an effective protocol allowing patients with hemi-field loss to process visual information in the least amount of time. Rehabilitative therapy reduces the effects of oculomotor, binocular vision, and visual perceptual problems in the overall process of visual scanning. Additionally, patients will use the spatial shift of the hemi-yoked prism by scanning into the prism, reducing the need for excessive head and body movement to identify objects in space.

Poster Presentations, *continued*

Author: Mikaela Bolejack, OD, OSIV/NSUOCO

Co-Authors:
Karli Hubka, OSIV and **Alissa Proctor, OD, FAAO**

Title of Presentation:
InfantSEE® Utilization by NSUOCO Optometrists

ABSTRACT

Background: The InfantSEE program has had a decrease in both the number of providers and the number of exams performed each year since it launch in 2005. We created a survey to evaluate the utilization of this program by Northeastern State University Oklahoma College of Optometry (NSUOCO) graduates to discover the reason for the decrease in exams performed.

Methods: We created a survey using Survey Monkey. The survey contained ten questions that evaluated participants InfantSEE provider status, number of years practicing optometry, number of InfantSEE exams done per year, InfantSEE marketing strategies, how participants obtained education and training necessary to do infant eye exams, reasons for not participating in the program and if they felt comfortable being an InfantSEE provider. The survey was emailed out through Survey Monkey to graduates of NSUOCO. Survey Monkey collected the data and we analyzed it via regression analysis.

Results: Fifty percent of participants were registered InfantSEE providers, while the other half of participants reported that they were not. The majority of providers performed less than five InfantSEE exams per year. Regression analysis showed a strong correlation between the more ways the providers market the program and the more exams they perform each year.

Discussion: We found that there is a relationship between marketing and the number of InfantSEE exams performed. We conclude that if more marketing is done for the program, more InfantSEE exams will be completed each year.

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Title of Presentation:
Autonomic Balance in Postural Orthostatic Tachycardia Syndrome (POTS): A Case Report

ABSTRACT

Background: Postural Orthostatic Tachycardia Syndrome (POTS) is a disorder of the autonomic nervous system that causes tachycardia upon standing. The diagnostic criterion is an increase in heart rate of at least 30 beats per minute within 10 minutes of standing. Other associated symptoms include palpitations, lightheadedness, anxiety and syncope. POTS is a multisystem disorder causing an array of symptoms including, headaches, gastrointestinal problems, and extreme fatigue.

Case Summary: History: GN, a 20 year old male was referred to the Rehabilitative Service of the University Eye Center by his primary care physician with significant visual symptoms associated mostly with reading. He had been diagnosed with POTS 2 years prior.

Findings/Diagnosis: He was diagnosed with convergence insufficiency, accommodative insufficiency and an oculomotor dysfunction.

Treatments: A vision therapy program was initiated. GN experienced significant variability in his ability to complete many vision therapy activities. Pupil size was measured at most office visits as a mechanism to gauge autonomic balance. Reading glasses were prescribed at the 6th visit, and GN began to make noticeable improvements in his visual skills and symptoms.

Outcomes: While he is still enrolled in therapy, the reduction in his symptoms enhanced his ability to function as a full-time student.

Discussion: POTS is a hyperadrenergic syndrome causing visual sequelae of mydriasis and a relative decrease in accommodation. Day-to-day fluctuations in GN's autonomic balance caused fluctuations in his vision that were more resistant to treatment than expected. He was very motivated and significant gains were made. However, POTS is a chronic and debilitating condition that continues to present GN with challenges in many aspects of his life, including a learning-related vision problem. Little is known about the prognosis of POTS patients and it will be interesting to see if GN is able to maintain these improvements in his vision.

Author: Lindsay Wettergreen, OD
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Co-Author: Paul Harris, OD, FCOVD, FACBO, FAAO, *Southern College of Optometry*

Title of Presentation:
The Non-surgical Approach: Successful Treatment of Harmonious Anomalous Correspondence and V-pattern Exotropia

ABSTRACT

Background: Anomalous correspondence is a sensory adaptation that can present in patients that have an ocular misalignment. There are debates on the true mechanism of the condition, but what is most important clinically is how one manages these cases. There are several different philosophies on how to eliminate anomalous correspondence. It is important to discuss these options with the patient and/or parent in order to develop a treatment plan that works best for their lifestyle.

Case Summary: We report a 6-year-old female that was referred for continuation of vision therapy training due to a recent out-of-state relocation. She was enrolled in therapy for treatment of an alternating exotropia at distance and near and had completed 17 sessions prior to referral. Examination revealed a constant alternating non-comitant V-pattern exotropia with over action of the left inferior oblique and harmonious anomalous correspondence. We began weekly vision therapy, emphasizing activities for diplopia awareness, anti-suppression and convergence. Daily homework activities were also assigned to reinforce the in-office training.

Results: Therapy is currently on going, but great improvements have been made. Our patient is showing normal correspondence peripherally with a small central zone of harmonious anomalous correspondence remaining. Suppression is now reported in most therapy activities as the new form of sensory adaptation. She has also begun to report diplopia with addition of small amounts of prism and has excellent vergence ranges in- instrument. We plan to continue weekly therapy session and anticipate binocularity in the future.

Discussion: Anomalous correspondence can be a very challenging condition to eliminate. It is imperative to carefully evaluate the clinical findings as well as the patient's goals in order to develop the best treatment plan. In some cases, elimination of this sensory adaptation can be accomplished with patience and hard work.

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Title of Presentation:
Neuro-Optometric Rehabilitation of Traumatic Sixth Nerve Palsy Secondary to Epidermoid Cyst

ABSTRACT

Background: An epidermoid cyst is a rare benign tumor that accounts for 0.1% of intracranial tumors. Most commonly occurring in the cerebellopontine angle, epidermoid cysts may require surgical intervention in cases involving neurological symptoms, malignant transformation, or increased intracranial pressure. Complications of surgical resection include hearing impairment, cerebellar symptoms, intracranial hemorrhage, and persistent sixth nerve palsy.

Case Summary: A 39 year-old male presents with constant diplopia as a result of sixth nerve injury during intracranial surgery to remove an epidermoid cyst. Initial evaluation reveals a 20-25 prism diopter constant alternating esotropia with complete restriction of abduction in the right eye. A nasal occlusion foil is placed over the lens of the right eye for temporary symptom reduction, and the patient completes 32 sessions of in-office vision therapy with a focus on improving abduction of the right eye, assuring potential for sensory fusion, integrating visual-vestibular and central-peripheral processing, and alleviating other sequelae of traumatic brain injury, including dysfunction of saccades, pursuits, and accommodation. The combination of neuro-optometric rehabilitation and subsequent recession-resection procedure leave the patient with sensory and motor fusion in primary gaze and the ability to abduct his right eye 30 degrees beyond midline.

Discussion: Differential diagnoses of a sudden onset abduction deficit include sixth nerve palsy due to traumatic brain injury, vascular disease, inflammatory disease or intracranial hypertension. MRI and neurosurgical reports confirm iatrogenic traumatic nerve injury in this case. Though recovery is over 50% in those of vascular or inflammatory origin, the prognosis is less favorable for cranial nerve palsy resulting from tumor. In this case, functional vision improvements, including elimination of diplopia in primary gaze, are attained through a combination of vision therapy, neuro-optometric rehabilitative techniques, and strabismus surgery.

Author: Kristen Skelly, COVT

Title of Presentation:
Syntonics as an Adjunct Treatment with Vision Therapy in Patients with Estropia

ABSTRACT

Background: Syntonics, or optometric phototherapy, refers to the branch of ocular science dealing with the application of selected light frequencies to the eye. It has been used clinically for over 70 years with continued success in the treatment of strabismus. A typical treatment plan begins with the patient removing any glasses or contact lenses then viewing a particular frequency of light in a dark room for twenty minutes. This is done for at least three consecutive days each week for a total of twenty sessions.

Procedures: The traditional syntonics regimen for a patient with esotropia involves viewing Alpha Delta for ten minutes; this frequency acts as a sympathetic and sensory motor stimulant. The patient then views Mu Delta for ten minutes; this frequency acts as a motor stimulant and produces an exo reflex.

Application: When prescribing syntonics for esotropia it is always in conjunction with a vision therapy program. While patients are viewing Alpha Delta, I expect to see continuous movement of the esotropic eye(s). The patient often reports some sort of ocular irritation during this time. While patients are viewing Mu Delta I often observe prolonged straightening of the eyes, and patients often report feeling more relaxed than they did while viewing Alpha Delta.

Unique Characteristics: In patients with long-standing strabismus I choose to use Theta, which is a significantly stronger sensory motor stimulant than the traditionally prescribed Delta. Many of my younger large angle esotropes demonstrate considerably improved responses when Theta is used in place of Delta. I have often observed patients performing syntonics for 20 minutes without manifesting an eye turn, a task which they are unable to achieve when not viewing the light. It is beneficial to begin the vision therapy session with this protocol, as it improves the patient's feeling tone and performance.

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Title of Presentation:
Multi-Modality Treatment of Diplopia Secondary to Divergence Insufficiency Intermittent Esotropia: A Case Report

ABSTRACT

Background: Divergence Insufficiency Intermittent Esotropia can impact a patient's daily life in many different ways such as difficulties with driving and double vision. Divergence ranges at distance are typically more difficult to train than convergence ranges at near. Techniques in addition to divergence ranges training alone may be necessary in the most successful treatment of intermittent esotropia at distance.

Case Summary: A 22 year old Caucasian male reported double vision for the past 2 years when looking in the distance and in the down-gaze. He has a history of head and ocular trauma at approximately 6 years of age around his left eye. He also reported Marijuana use of about twice a week for the past 12 months. Examination showed left esotropia at distance, accommodative dysfunction, reduced peripheral awareness, and an anterior and right visual midline shift. Treatment included relieving prisms for distance wear, office-based vision therapy, and home-based syntonics.

Results: Patient responded well to treatment with lessening of diplopia, increased peripheral awareness, and improved binocular and accommodative skills.

Discussion: Treatment of Divergence Insufficiency Intermittent Esotropia using a multi-modality approach can be effective in relieving a patient's visual symptoms.

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Title of Presentation:
How much therapy is required to change accommodative responses?

ABSTRACT

Purpose: The purpose of the study was to objectively assess changes in dynamic accommodative responses to a lens flipper task in vision therapy. We will present results from three adult subjects with accommodative infacility to illustrate how the procedure can provide a dose-response relationship between the amount of therapy and changes in accommodative dynamics

Methods: Accommodative dynamics were recorded while the subject performed an accommodative facility task with lenses using the PlusOptix (Nuremberg) Power Refractor (which samples at 50 Hz). The recording was synchronized with a video recording to indicate when the lenses were placed in front of the eye. The facility task was performed monocularly using a ±2.00 D flipper while viewing a target at 40 cm, with an auditory cue to change the lens every 10 seconds. After the baseline assessment, monocular accommodative training was conducted in-office for 15-minute sessions twice per week. The subject's dynamic accommodative responses were recorded after each of the 6 sessions. As a metric of accommodative performance we calculated the time taken for the accommodative response to be within 0.5 D of the target.

Results: All 3 three subjects showed significant changes in accommodative facility following treatment. However, the amount of treatment time needed to reach a response approaching normal did vary by lens type and subjects. There was a rapid improvement after 1 or 2 training sessions as well as slower improvement that required multiple sessions to sustain a normal response. Graphical representation for each case will be presented to illustrate the different types of changes observed during treatment.

Discussion: Changes in the dynamics of the accommodative response can be tracked objectively during accommodative training. Further investigation will allow development of a dose–response relationship of lens training towards normalization of accommodative dynamics in adults with deficient accommodation.

Poster Presentations, *continued*

Author: Audra Steiner, OD, FCOVD, *Assistant Clinical Professor, SUNY College of Optometry*

Title of Presentation:
Visual Rehabilitation of a Patient Following Resection of a Pilocytic Astrocytoma

ABSTRACT

Background: Long-term relationships are one of the benefits of working in optometry. This poster presents a 14-year history of rehabilitative services provided to a patient who presented initially at age 7 years following resection of a pilocytic astrocytoma.

Case Summary: My patient required different levels of interventions through different stages of her life. Communication with her oncologist, teachers, and therapists has been important in helping her achieve her highest level of function. Optometric information was crucial in detecting one of her recurrences of her tumor. a growing sense of autonomy has influenced decision making as she has grown into a young woman.

Results: Vision rehabilitation services have been valuable in helping this patient achieve her goals, including graduating from high school and attending college.

Discussion: This poster will allow presentation of clinical pearls involved in the management of patients with known of suspected neurologic insults. Emphasis in discussion will be placed on interpreting exam results, maintaining open lines of professional communication, and providing respectful care to a maturing patient.

Author: Ethelvina del Carmen Gallegos Gongora, *Student of University of Aguascalientes, Mexico*

Co-Author: Elizabeth Casillas Casillas, MCOptom, *Professor of University of Aguascalientes, Mexico*

Title of Presentation:
Comparison of Perceptual Skills in Children with High and Low Academic Performance

ABSTRACT

Background: Vision is a complex process that involves the brain not only receiving an image, but in understanding what is seen. The perceptual skills refer to the ability to process, organize and understand the visual information that is presented. The aspects of visual perception that influence learning are visual-motor coordination, visual memory, figure-ground perception, spatial relationships, and auditory visual integration. A deficiency in this area could affect academic performance. The objective of the study was to compare the perceptual skills in children with high and low academic performance.

Methods: Descriptive study on 62 cases, age between 7 to 11 years, divided into two study groups, one with academic performance greater than 9, with academic performance 7 or less, both study groups were evaluated with three tests: VOT (Test of Visual Organization) TAPS (Test of auditory perceptual skills),Piaget (Test of left - right concepts}.The statistical analysis was performed using descriptive statistics and comparation of means.

Results: For Piaget Test, children with high academic performance obtained 51.61% and children with low academic performance obtained 64,51%, both groups were below the mean expected for age. Visual Organization test.(VOT) children of high academic performance group obtained a percentile of 68%, the low academic performance group a percentile of 19%. Test of auditory perceptual skills (TAPS) group of high academic performance obtained a percentile of 51%, and the group of low academic performance a percentile of 14%.

Conclusion: In Piaget test, both groups are below that expected mean. While Visual organization test (VOT) and Test of auditory perceptual skills (TAPS) group of high academic performance, obtained a percentile higher of the expected mean and the low average group were deficient, so the perceptual skills are factors involved in the academic performance.

Author: Luis Fernando Barba, PhD, MCOptom, FIACLE

Co-Authors: Elizabeth Casillas, MCOptom, Jaime Bernal, MCOptom, Jedidiah Escareño, Student, Jonathan Rodriguez

Title of Presentation:
Visuo- Perceptual Skills in Children with Down Syndrome

ABSTRACT

Background: Down syndrome is one of the most common birth defects in humans. One in 800 people suffer born in the US. In people with Down's syndrome visuo-perceptual skills are affected due to their diminished capacity for learning and information processing. The perceptual abilities process, organize and understand the visual information presented in the environment. The aspects of visual perception that influence learning are visual-motor coordination, visual memory, figure-ground perception, perception of spatial relationships and auditory-visual integration. The aim of this to compare the status of the visual and perceptual skills in children with Down syndrome and regard to control group without Down Syndrome.

Methods: A nonrandom by convenience sample of 28 patients of which 14 with Down syndrome and 14 without Down Syndrome, the tests measuring visual acuity were assessed with the LEA chart, the refraction with the Mohindra retinoscopy, the visual organization (VOT), the Grooved Pegboard was applied for time and with both hands separately and finally Angels in the snow. Data were analyzed by t-test, chi-square test, frequency values.

Results: We found a 42.85% of poor visual acuity in the Down group compared with the control, there are 9 hyperopic eyes followed by 8 myopic eyes. In the VOT the percentage was 71.42% people below average in the Down group and 0% in the control group compared to Grooved Pegboard was found to slow down more in group testing being that this group is the lower visual ntegration is with angels in the snow both groups scored 100% on the test run.

Conclusion: Of the three tests of visuo-perceptual assessment and Grooved Pegboard VOT are deficient, while Angels in the Snow (gross motor) there is not difference between the groups, meaning ability to do sports without any impediment to a previous instruction.

Author: Christina Grosshans, OD, *Pediatrics and Vision Therapy Resident, Southern College of Optometry*

Co-Author:
Susan Evans, OD, *Pediatrics and Vision Therapy Resident, Southern College of Optometry*

Title of Presentation:
Prevalence of Visual Conditions in a Population of Pediatric Patients with Emotional and Behavioral Problems

ABSTRACT

Background: Although the prevalence of amblyopia, strabismus, and other binocular dysfunctions in the general pediatric population has been documented, little information is available for the rates of these binocular conditions in the pediatric population with psychiatric conditions. With the dramatic increase in pediatric psychiatric diagnoses, it is important to evaluate the frequency of ocular conditions in these patients. This retrospective chart review will provide insight into the prevalence of various visual diagnoses in a population of pediatric patients living in a facility that provides residential mental health treatment for boys and girls who have serious to severe emotional and behavioral problems.

Methods: A retrospective chart review of 74 comprehensive examinations performed on patients living in a facility providing residential mental health treatment during a five month period was completed. All boys were ages 8-17 and girls were ages 11-17 with serious emotional and behavioral problems. The charts were evaluated for the following visual diagnoses: refractive amblyopia, strabismic amblyopia, strabismus, convergence insufficiency, other vergence disorders (DI, DE, CE), accommodative dysfunction, oculomotor dysfunction, and conversion disorder. Patient demographic data and psychological diagnoses were also compiled and evaluated

Results: The prevalence of visual diagnoses in this population were as follows: Amblyopia, 13.5% (strabismic amblyopia, 2.7%; refractive amblyopia, 10.8%); Strabismus, 8.1%; Convergence Insufficiency, 13.5%; Other Vergence Disorders, 4.1%; Accommodative Dysfunction, 16.2%; Conversion Disorder, 6.8%. In total, 45.9% of patients examined were diagnosed with one or more of the above conditions.

Conclusions: We found a three to five-fold increase in the prevalence of amblyopia, strabismus, and other accommodative and binocular vision disorders in our population of pediatric patients with severe emotional and behavioral problems. These results demonstrate a significant need for visual efficiency examinations in this population and suggest these patients might benefit from access to vision therapy.

Author: Sandy Tran, OD, *Vision Therapy and Rehabilitation Resident at Family Eyecare Associates*

Co-Author: Leonard Press, OD, FCOVD, FAAO

Title of Presentation:

Regaining Confidence by Regaining Binocularity in Accommodative Esotropia and Amblyopia: A Case Report

ABSTRACT

Background: Strabismus is not just an ocular misalignment, but a misalignment that translates through the whole body from head to toe. This case describes how the onset of accommodative esotropia and amblyopia can affect self-esteem and the importance of bilateral integration in VT to regain binocularity to re-build confidence for learning, gross-motor performance and social interactions.

Case Summary: A 4-year old Caucasian male presented with accommodative esotropia and amblyopia. Parents noticed an eye turn at age 3 and an ophthalmologist prescribed glasses for moderate hyperopia of both eyes and patching daily for one year. Parents report around this time, he became uncharacteristically cautious and reserved, a different boy than they're used to. An occupational therapy evaluation was done due to concerns of midline crossing and fine motor skills, which revealed difficulty consistent with binocular integration problems. Entering VA was 20/25 OD and 20/60 OS with correction. Cover test revealed a constant left esotropia of 10^ at distance and near. Worth-4-Dot testing revealed deep suppression of the left eye.

Results: Weekly one hour VT sessions for 8 months was prescribed with supportive home VT. Goals were to improve VA and depth perception, eye-hand coordination, and bilateral integration. Each progress evaluation revealed improved acuity, stereopsis, and eye-tracking ability. Gross motor skills improved followed by fine motor skills. Parents could not be happier that at the end of therapy all their goals have been met and more.

Discussion: Strabismus affects not just the eyes but the whole body. Once binocularity is compromised, it can affect a person's quality of life. Self-esteem and self-confidence can be affected which affects learning and social interactions. In this case the child recovered his former sense of risk-taking and adventure through recovery of his binocularity.

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Co-Authors:
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Title of Presentation:
Visual Perceptual Skills in Amblyopia

ABSTRACT

Background: Visual Perceptual Skills are used to extract and organize the information of the environment and integrate it with other modalities and higher cognitive functions. Any alteration could affect the learning process. In cases of amblyopia due to the decrease in unilateral or bilateral vision, a deficiency in this area can be expected. The objective of the study was to compare the results of the evaluation of visual perceptual skills in patients with amblyopia and a control group.

Methods: Observational, analytical, comparative, study with 40 participants, 20 of whom were subjects with amblyopia aged six to 14 years, and 20 subjects without amblyopia as a control group. 53% of the subjects were male and 47% female. The aveage age of the experimental group was 9.8 years, and of the control group was 9.5 years. Test of Visual Perceptual Skills 3rd edition (TVPS-3) was administered to all participants and the results were expressed in age equivalents. Analysis of data was conducted through descriptive statistics and t student test.

Results: Between group comparisons for each of the TVPS-3 subtests were as follows, with mean age equivalent given for control group first and then for the experimental group. For Visual Discrimination 11.3 and 5.5 years (p =.001). Spatial Relations 10.8 and 5.7 years (p =. 001). Form Constancy 10.6 and 6.6 years (p = .003). Sequential Memory 12.7 and 5.3 years (p =.001). Visual Figure-Ground 11.9 and 6.6 years (p =.001). Visual Closure 12.4 and 6.6 years (p=.001). The difference was statistically significant (p<.O5). The overall mean age perceptual for amblyopia group was 6.7 years, whereas in the control group it was 11.4 years.

Conclusion: Visual perceptual skills including basic processing, sequencing, and complex processing are deficient in patients with amblyopia.

Poster Presentations, *continued*

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Title of Presentation:
Results of Treatments for Amblyopia at the University of Aguascalientes, Mexico

ABSTRACT

Background: Amblyopia, also known as lazy eye, is usually unilateral but it may be bilateral. It is a condition in which the eye although it is structurally healthy, has decreased visual abilities. Currently amblyopia is the most common cause of poor vision in children, with prevalence between 1 to 5%. There is still controversy regarding the different treatments used to correct this eye condition, such as optical correction (eyeglasses or contact lenses), occlusion, or visual therapy, and which kind of treatment provides better results. The objective of this study was to analyze the results obtained with different types of treatment in cases of amblyopia at the University of Aguascalientes, Mexico.

Methods: Observational study, descriptive and retrospective, whose sample was obtained from collection of data on 55 records diagnosed with amblyopia during the years between 2010 and 2014. The data were analyzed using descriptive statistics.

Results: 49% of cases were in treatment with optical correction and visual training, 42% with optical correction, occlusion and vision training, 9% optical correction and occlusion. 56.16% of cases ended treatment with a visual acuity between 20/20 to 20/40, 27.4% between 20/50 to 20/80 and the 16.44% between 20/100 to 20/400. In relation to the state of binocular vision, 54% of the cases were found in the binocular phase, 44% in the biocular phase and only 2% in the monocular state. Refractive amblyopia responded better to treatment with an average of four lines of improvement in visual acuity.

Conclusion: Treatment with best results was obtained through the combination of optical correction, occlusion and vision therapy. Activie vision therapy not only improves visual acuity, but in addition helps binocularity.

Author: Alisa Nola OD, *Resident Optometrist*

Title of Presentation:

Low Base in Prism Treatment for Post Trauma Vision Syndrome and Visual Midline Shift Syndrome

ABSTRACT

Post Trauma Vision Syndrome (PTVS) and the Visual Midline Shift Syndrome (VMSS) are commonly caused by a mild traumatic brain injury (mTBI). Many PTVS symptoms include diplopia, blur, poor tracking ability, and asthenopia.[1] Common PTVS characteristics consist of exotropia, accommodative dysfunction, convergence insufficiency, low blink rate, spatial disorientation, and headaches.[2] Patients with VMSS may also demonstrate associated motor dysfunction during mobility. Base in (BI) prism was prescribed as a treatment for the symptoms of PTVS and VMSS. Objective improvements were confirmed utilizing Visual Evoked Potentials (VEP).

Patient presented with a history of a ceiling grate falling on her head a couple months prior. Symptoms included headaches, light sensitivity, blurry vision at distance and near, difficulty with reading, diplopia, and photophobia. Pertinent clinical findings included reduced NPC, reduced jump BI and BO vergence ranges, oculomotor dysfunction, low PRA, constricted visual field, and a visual midline shift to the right. Patient was diagnosed with PTVS and VMSS. Functional testing with BI prism revealed improvement in symptoms at distance and near, visual midline shift alignment, better balance with gait, and less photophobia. Patient was prescribed glasses with 0.5 BI prism in each eye. VEP testing demonstrated improvement in amplitude with the application of 0.5 BI prism.

Low amounts of BI prism can reduce signs and symptoms of PTVS and VMSS (1). Padula and colleagues concluded that application of binasal occlusion (BNO) and BI prism demonstrated normalized VEP amplitudes.[3] Ciuffreda et al also produced similar VEP findings in mTBI subjects with BNO only.[4] The VEP is currently used for diagnostic purposes for various diseases and can also be used to assess visual dysfunction and its remediation in mTBI subjects.[5] Objective VEP findings can confirm the benefits of low BI treatment for PTVS and VMSS.

Sources:

1. Padula, William V. "Neuro-Optometric Rehabilitation for Persons with a TBI or CVA." Journal of Optometric Vision Development 23 (1992): 1-8.

2. Suter, Penelope S., and Lisa H. Harvey. Vision Rehabilitation: Multidisciplinary Care of the Patient following Brain Injury. Boca Raton: CRC, Taylor & Francis Group, 2011.

3. Padula, W. V., & Argyris, S. Posttrauma vision syndrome and visual midline shift syndrome. NeuroRehabilitation (1996), 6(3), 165-171.

4. Ciuffreda, Kenneth J., Naveen K. Yadav, and Diana P. Ludlam. "Effect of Binasal Occlusion (BNO) on the Visual-evoked Potential (VEP) in Mild Traumatic Brain Injury (mTBI)." Brain Injury 27.1 (2013): 41-47.

5. Yadav, Naveen K., and Kenneth J. Ciuffreda. "Optimization of the Pattern Visual Evoked Potential (VEP) in the Visually-normal and Mild Traumatic Brain Injury (mTBI) Populations." Brain Injury 27.13-14 (2013): 1631-642.

Poster Presentations, *continued*

Author: Helena Tzou, OD, *Pediatrics and Vision Therapy Resident at Southern College of Optometry*

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Title of Presentation:
No Pirate's Life for Me: Treatment of Refractive Amblyopia Without Patching

ABSTRACT

Background: Refractive amblyopia can be treated by a variety of methods, including patching the amblyopic eye as well as active vision therapy. Active vision therapy even without the use of patching can transform a patient's life.

Case Summary: A seven-year-old female with complaints of difficulty reading and completing homework was evaluated. She was prescribed her first pair of glasses in 10/2012. A Bangerter foil 0.4 was placed on the left lens in 12/2012 due to continued decreased vision in the right eye. Patient was told to complete near activities with the left eye patched for two hours a day. In 11/2013, visual acuity remained stable in the right eye (20/40 at distance and 20/25 at near). Case history revealed that she loses her place when reading; has burning, itching, watery eyes; skips/repeats lines reading; is clumsy; and loses belongings. No forms could be seen; stereo acuity was worse than 400 seconds of arc. No eye turn was observed, near point of convergence was reduced, and poor fixation was observed. The child was diagnosed with refractive amblyopia, hyperopia, and regular astigmatism. Weekly active vision therapy was recommended. The use of Bangarter foils was discontinued due to varying patient compliance.

Results: Thirty in-office vision therapy sessions were conducted with progress evaluations after 8-10 sessions. Grandparents reported improved reading skills and easier completion of homework. She now enjoyed reading and had good comprehension. School performance had greatly improved since beginning therapy; the child received all A's. Visual acuity in the right eye was 20/25+ at distance and 20/25 at near. Stereo acuity was 20 seconds of arc. Further vision therapy was recommended in order to improve vergence ranges.

Discussion: Children with refractive amblyopia can benefit from active vision therapy without the use of patching. Besides improving visual skills, their worlds can be altered in life changing ways.

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Co-Authors: Paula Jarrard, OTD, *Indiana University School of Optometry*
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Title of Presentation:
The Treatment of Visual Efficiency and Visual Information Processing Deficits: A Collaborative Approach

ABSTRACT

Purpose: To demonstrate with a clinical case the success that optometry and occupational therapy have collaborating on the management of patients with accommodative, vergence and visual information processing deficits.

Background: Visual efficiency and visual processing deficits act as a barrier to a child's educational potential and can create difficulties with reading and overall school performance.

Case Summary: 7 year old Caucasian male was seen for the chief complaint of reading problems. Upon examination, it was determined he had reduced NPC, reduced positive fusional vergence ranges, high exophoric posture at near and inaccurate saccadic eye movements. He was initially treated with 12 weeks of in office vision therapy to improve vergence ranges. He demonstrated improvements in symptoms using the CISS as well as clinical data including NPC and positive fusional vergence. Improvements in reading were seen, however he continued to struggle at school so he was internally referred to our occupational therapist for visual information processing (VIP) assessment. He was found to have deficiencies in saccadic eye movements, visual processing speed and figure ground. Collaborative VIP therapy was performed by both occupational therapy and optometry as well as 504 accommodations were provided by his school upon our recommendation. Following completion of visual efficiency therapy and VIP therapy his reading abilities improved and he continues to succeed in school.

Discussion: Typically we treat either visual efficiency or VIP. This is a case in which the patient had both underlying problems creating barriers to his education. It is our role to provide clinical care with visual efficiency first and then visual perception and also to collaborate with other services and specialties when it is most beneficial for the patient.

Author: Mehrnaz D. Azimi Green, OD, FCOVD, *Developmental Optometrist, Vision & Conceptual Development Center*

Title of Presentation:
Double Vision and Ocular Asthenopia Cause by Herpes Zoster Encpehalitis

ABSTRACT

Background: Herpes zoster, commonly known as shingles, is a viral disease characterized by a painful skin rash with blisters in a limited area on one side of the body (left or right), often in a stripe. Patients are initially infected with varicella zoster virus (VZV), also known as chickenpox, which generally occurs in children and young adults. Once an episode of chickenpox has resolved, the virus is not eliminated from the body and can go on to cause herpes zoster often many years after the initial infection.

Herpes zoster ophthalmicus (HZO) occurs when the trigeminal ganglion is invaded by the herpes zoster virus. Neuronal spread of the virus occurs along the ophthalmic (1st) and less frequently the maxillary (2nd) division of the fifth cranial nerve. Vesicular eruptions occur at the terminal points of sensory innervation, causing extreme pain. Nasociliary involvement will most likely cause ocular inflammation, typically affecting the tissues of the anterior segment. Contiguous spread of the virus may lead to the involvement of other cranial nerves, resulting in optic neuropathy (cranial nerve II) or isolated cranial nerve palsies (cranial nerve III, IV or VI).

Herpes zoster encephalitis (HZE) is an uncommon complication of herpes zoster. Encephalitis from Herpes zoster can occur even after months after other symptoms seem to have resolved. Symptoms of HZE include flu-like symptoms including fever, headache, non-specific body aches, increased sensitivity to light and poor appetite. Specific neurological symptoms including speech problems, diplopia, and loss of sensation or motor function can also occur. Patients also experience mental status changes, which are changes to the person's level of cognition, alertness and emotional state. Patients with HZE can experience confusion, irritability, disorientation and drowsiness. Mental status changes can develop over time, often weeks or months. Because herpes zoster frequently occurs in older adults, changes in mental status can be mistakenly attributed to "old age".

Case Summary: 82 year-old female developed HZE causing left leg paralysis, poor bodily elimination control, dizziness, diplopia, motion sickness and ocular asthenopia. No signs or symptoms of HZO were present. Patient was initially evaluated by Dr. Marsha Behshir, OD in the rehabilitation hospital and was referred to our office for neruo-vision rehabilitation. Patient presented with high compound myopia astigmatism and presbyopia with anisometropic Rx wearing progressive lenses. Fresnel prism were applied OD, however patient continued to complain of diplopia.

Poster Presentations, *continued*

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Exam was conducted over a series of visits due to patient fatigue. The results are the following:

Hypertropia OS distance and near, convergence insufficiency, ocular motor dysfunction, and ocular asthenopia.

Patient was given two eye glass prescriptions-one for distance and one for near. Base-in prism to aid in convergence symptoms were applied to patients near glasses. Fresnel prism to compensate for vertical diplopia were applied to both distance and near spectacles. Binasal occlusion was attempted, but patient found unhelpful with symptoms. Optometric vision therapy was recommended and begun once a week, with home activities 3-4 times a week.

Patient currently in vision therapy and reports "...each therapy session is very valuable and rewarding". Patient no longer reporting diplopia, but still experiences general ocular asthenopia, although much decreased since beginning vision therapy.

Conclusion: Health professionals are aware of the ocular complications of HZV in HZO, but not of the ocular complications of HZE. Patients with HZE may suffer from from diplopia and severe ocular asthenopia disrupting their abilities to perform ADL and quality of life, without any signs of HZO. Developmental ocular evaluations are warranted in patients with HZE. These patients may have developmental vision delays that are effecting the quality of their life and they may greatly benefit from developmental vision evaluation and vision therapy.

Author: Jaime Bernal Escalante, *Optometry MS*

Co-Authors: Elizabeth Casillas Casillas, MCOptom, Arizbeth Garcia Velasco, Alexia Raquel Gaspar Vega, Juan Angel Ornelas Cuevas

Title of Presentation:
Comparison of Perceptual Skills in Children with High and Low Academic Performance

ABSTRACT

Perceptual skills are part of a group of visual-cognitive skills used to extract and organize information from the environment. There are essential for learning, through them, the individual interprets the information that receives, where a stimulus, a receiver and a sensation, are involved. The perceptual abilities are classified into three: visual spatial relationship, visual analysis and integration. Methods: An observational, cross-sectional comparative study was made, the purpose, compare the values of the tests of perceptual skills in a Mexican population regarding with standardized values. 300 children between 6 and 12 years were tested. Children with any type of corrected ametropia where included, and those who have a physical disability that does not allow them to perform testing and those who had not parental consent were excluded. Two categories were evaluated; skills of visual analysis and integration skills. Visual analysis was evaluated with Visual Organization Test (VOT). For the category of integration two tests were used; Grooved Pegboard and Auditory Visual Perception Test (TAPS). The analysis included descriptive statistics and t Student. Results: The variables that were statistically significant ($p < 0.05$) were for VOT in boys ($p = 0.001$) and girls ($p = 0.000$). For Grooved Pegboard test in the dominant hand in boys ($p = 0.003$) and non-dominant hand in boys ($p = 0.004$). Conclusion: There is a significant difference between the means found regarding expected. The results show the need to adjust the values of the Mexican population.

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Title of Presentation:
Vision Rehabilitation in a Four-Year-Old Patient Who Suffered Traumatic Brain Injury

ABSTRACT

Background: Adults who suffer a mild TBI can benefit from Optometric Vision Therapy to help recover visual function, such as oculomotor skills (Ciuffreda, 2008). However, current literature shows limited information regarding prognosis and treatment (i.e. Vision Therapy) in cases of severe TBI in the pediatric population.

Case History: In September 2014, a four year old Hispanic male presented to the Eye Care Center for a Pediatric Vision Exam. The chief concern, brought forth by the patient's mother, was evaluation of their son's sight and eye movements. The patient had suffered a traumatic brain injury in January 2014 following asphyxiation from choking on candy. Prior to the accident, all development was typical. Following the injury the patient was wheelchair bound with little motor, speech or visual control.

Results: Our initial examination findings revealed little ability to fixate. We could not elicit any pursuit or saccadic eye movements. The patient was not visually attracted to movement or sound. With the OKN we did get minimal movement for short bursts of time in the nasal and temporal directions. Refractive error was normal for his age. Ocular health appeared normal. A Visual Evoked Potential (VEP) estimated acuity at 20/128 OU.

Discussion: The patient was diagnosed with oculomotor dysfunctions of saccades and pursuits and suspect for binocular vision dysfunction. Vision Therapy was requested by the family and although the prognosis looked poor, we were willing to explore the possibilities with our primary goal being oculomotor control. Currently the patient has been participating in weekly sessions. We have utilized visual stimulation to encourage fixation and have increased this ability. With improvement in oculomotor and binocular control, this will aid as a stimulus to encourage meaningful interaction with his immediate environment as vision rehabilitation is synergistic with the rehabilitation of other sensory systems.

Poster Presentations, *continued*

Author: Matthew Vaughn, OD, *Pediatric and Infants Vision Optometry Resident, SUNY Optometry*

Co-Author: Colleen Dye, OD,
Pediatric and Infants Vision Optometry Resident, SUNY Optometry

Title of Presentation:
Creatively Navigating Road Blocks: Latent Nystagmus and Oscillopsia

ABSTRACT

Background: A 20 year-old female presents to the vision therapy service for evaluation of alternating exotropia. Her medical history is positive for hydrocephalus when she was a child, which was treated surgically with a shunt. She is concerned about cosmesis, and wants to be able to read for longer than 10 minutes without asthenopia.

Case Summary:

Findings:

- 35-40^ CAXT
- Essential emmetropia
- High frequency, moderate amplitude latent jerk nystagmus when occluded
- Reduced accommodative amplitudes, reduced accommodative facility
- Poor scores on the DEM

Diagnosis:

- Large angle constant alternating exotropia
- Moderate oculomotor dysfunction
- Moderate accommodative insufficiency/infacility

Treatments:

- Recommended 20-25 strabismus vision therapy sessions to improve monocular oculomotor and accommodative skills. Surgery was not recommended at this time.

Results:

- When beginning monocular therapy procedures, the patient manifested latent jerk nystagmus with severe oscillopsia when she was patched, and she could not complete any exercises without dizziness. A frosted patch yielded the same symptom, so a +20D lens was used to fog her in-office, with no dizziness.
- For home therapy, a novel septum-type device was constructed out of old stereo glasses frames and cardboard. She is effectively monocular, but enough light is entering the "occluded" eye, producing no latent nystagmus and debilitating oscillopsia.
- The patient has currently completed 6 sessions of vision therapy, yielding positive results as of the abstract submission date.

Discussion: Hydrocephalus occurs when there is an abnormal accumulation of cerebral spinal fluid in the ventricles of the brain. Strabismus and nystagmus are seen in 69% and 44% of cases, respectively, according to many studies. Our patient's end goal is strabismus surgery, and we will be improving her oculomotor and accommodative skills to provide for the best possible outcome when and if she chooses to go through with the surgery, and the septum device is allowing us to do so.

Author: Jennifer Simonson, OD, FCOVD, *Clinic Director/Boulder Valley Vision Therapy*

Title of Presentation:
Van Orden Training Utilizing the Stereoscope for iPad

ABSTRACT

Background: Millard E. Van Orden developed a stereoscopically drawn visual pattern to gain insight on the patient's binocular visual behavior pattern. This drawing records the projection in space of corresponding visual areas. When used for training, the patient receives feedback on the reorganization of visual space and stability of eye posture and binocular vision.

Procedures: Van Orden drawings were completed with the Translucent Correct-eye-scope set at 0-0 and the Stereoscope for iPad set at 0 (optical far-point). The optics of the prismatic lens allow for a distance accommodative and vergence demand, but a physical distance of 20 centimeters. Targets included binocular vision space testing, far point - peripheral control, base-in projection stereo training, and base-out projection stereo training. Instructions were the same for both the traditional and digital drawings and followed the Van Orden Technique of Visual Rehabilitation Instruction Manual (Keystone View Company, http://goo.gl/rZuIws)

Application: This therapy training exercise compared visual performance when looking in a digital environment versus a traditional training environment.

Innovative Characteristics:

1. Ability to complete testing and training in more postures with the same device (standing or sitting, primary gaze or up/down gaze)
2. Ability to add images to electronic health records for performance documentation.
3. Ability to test visual performance when viewing a digital device (clinically noted to cause more visual complaints).

Author: Nicole Sangani, OD, *Vision Therapy and Rehabilitation Resident*

Co-Author: Sheree Fetkin, OD,
Vision Therapy and Rehabilitation Resident, SUNY College of Optometry

Title of Presentation:
An Effective Multimodal Approach of Neuro-Optometric Rehabilitative Therapy in the Treatment of Visual Information Processing Deficits Following Closed Head Trauma

ABSTRACT

Background: Patients with closed head injuries frequently suffer visual information processing deficits that may manifest as or exacerbate pre-existing sensorimotor anomalies including oculomotor, accommodative, and vergence dysfunctions. These patients also often complain of the sensation of disequilibrium, dizziness, and sensory overload. This poster presents a successful case of neuro-optometric rehabilitative management of a patient with significant visual and neurological symptoms following a traumatic brain injury.

Case Summary: A 36 year-old white female presented for consultation following a closed head injury secondary to a snowmobiling accident. Her visual symptoms included difficulty switching from near to far tasks, significant eye strain, difficulty sustaining near work longer than 10 minutes, intermittent blur at distance and near, light sensitivity, and frequent dizziness that worsened in visually stimulating environments. Neurologic symptoms included sensory overload, slow information processing, memory issues, and difficulty sustaining attention. Ocular health and systemic health were unremarkable. She was diagnosed with moderate convergence insufficiency, unstable binocularity with esophoric tendencies at distance, and dizziness/ disequilibrium secondary to dorsal stream processing deficits.

Results: Patient was prescribed 30-35 sessions of biweekly neuro-optometric rehabilitative therapy that followed a specific three-phase protocol: Phase 1 improved the stability of visual input by training fixation and oculomotor skills, Phase 2 enhanced binocular skills and sensorimotor fusion, Phase 3 will emphasize intermodal integration of multisensory stimuli and enhancement of visual processing skills. After 20 sessions of therapy, binocular testing demonstrated resolution of her convergence insufficiency with remaining mild binocular instability still present at distance. Her quality of eye movements and fixation were also significantly improved. The patient reported a reduction in all her visual symptoms. Interestingly, her neurological symptoms were also reported to be significantly improved.

Discussion: This poster demonstrates an effective rehabilitative protocol using multimodal techniques that emphasize top-down visual information and visual spatial processing in the treatment of patients with closed head injury.

Author: Colleen Dye, OD, *Pediatric Optometry Resident, SUNY College of Optometry*

Co-Author: Matthew Vaughn, OD, *Pediatric Optometry Resident, SUNY College of Optometry*

Title of Presentation:

Improving Symptoms Through Vision Therapy in a Patient with Constant Strabismus and Congential Nystagmus Status-Post Null Point Surgery: A Case Report

ABSTRACT

Background: Patients with constant strabismus or congenital nystagmus tend to have a guarded prognosis for outcomes through vision therapy. Positive functional outcomes can be achieved with appropriate goals from both the patient and the optometrist. Aspects of binocularity can be worked to improve symptoms and can motive patients to enhance their functional vision.

Case Summary: An 18 year old Hispanic male was evaluated and confirmed to have a partially accommodative left esotropia and congenital right jerk nystagmus. He complained of diplopia and skipping lines when reading in addition to the cosmetic appearance of nystagmus. He has a history of prior vision therapy and null point surgery in 2011 in Colombia. His acuities were decreased in each eye and he demonstrated suppression of his left eye. No changes in amplitude of nystagmus or clarity of vision were appreciated with yoked base up prism. He was prescribed vision therapy with emphasis on fixation, oculomotor, and accommodative skills to relieve symptoms, but not alter cosmetic appearance.

Results: Oculomotor control improved with minimal saccadic intrusions or fixation losses in primary gaze. Saccades became more accurate and DEM scores improved. Accommodative amplitudes were increased and became more equal between the two eyes. He no longer experiences diplopia and does not skip lines when reading. He is able to sustain this for hours when he is studying. He was very happy with his functional outcomes after therapy.

Discussion: This report demonstrates the importance of reviewing and discussing patient goals versus doctor goals as well as frequent symptom re-assessment. There are several options for treating strabismus and nystagmus, and the patient remained symptomatic after surgical intervention. Vision therapy could not align his eyes or stop them from moving. However, he demonstrated a significant improvement in his functionality and overall elimination of symptoms related to his binocular vision upon completion of vision therapy.

Author: Christina Esposito, OD, FAAO
Assistant Professor/Midwestern University Arizona College of Optometry

Co-Author: Paul Harris OD, FCOVD, FAAO, FACBO, *Southern College of Optometry*

Title of Presentation:
The Power of Binasal Occlusion as an Adjunct to Standard Bilateral Integration Techniques

ABSTRACT

Binasal occlusion is a type of sector occlusion used in the treatment of constant esotropia. It is used by optometrists to help inhibit any sensory maladaptations that are present and encourage divergence. It is rarely prescribed in isolation. In this case, it was prescribed in addition to a spectacle rx, as well as vision therapy home activities for the parents to do with the child to help encourage bilateral integration.

S.G., a two year old female presents to the school with complaints of an eye turn OS. Parents report that it is has been getting worse over the last 6 months, and they do not want their child to be "funny looking." After careful examination, it was determined that she was a 30 prism diopter constant left esotropia. Refraction revealed a +5.50 OD, OS. With a +3.50, the turn decreased. No further gains were noted with an increase in plus. Glasses were given for full time wear and the patient was to return. Upon return visit, the patient was wearing the glasses but still had a constant left esotropia. It was at that time Binasal occlusion was applied to her lenses. Tape was applied to both lenses and she was to return to clinic in a few weeks for an rx check. On the third follow up visit, the patient was now alternating between both eyes and the parents noticed a difference in her overall affect. The binasals were to remain on the spectacle rx. Due to her living so far away and her age, vision therapy was not initiated. However, a series of activities were discussed to the parents to do at home i.e. crossing the midline, bilateral integration, patty cake etc. to help encourage both bilaterality and binocularity. She was seen a year later, and she is doing tremendously. The binasals are still on the rx, and she is alternating 85-90% of the time. The magnitude of deviation was less. She is walking, and the parents report she is just a happier child. In office vision therapy will be started when she reaches the age of four. This case report discusses, partial accommodative esotropia, Binasal occlusion, and the importance of bilateral activities to be performed with the child at home to provide proper development.

Author: Abby Brotherton, *Optometrist, Inland Eye Specialists*

Co-Author: Allen Cohen, OD, FAAO, FCOVD, *State University of New York College of Optometry*

Title of Presentation:
Rehabilitation of Oculomotor Deficits Following Traumatic Brain Injury

ABSTRACT

Background: Traumatic brain injury can disrupt normal frontal lobe function resulting in oculomotor dysfunction and poor visual motor integration. When integrated with top-down modulation, specific vision therapy techniques can enhance or restore function of the extended dorsal stream. This abstract will provide two such procedures that demonstrate how to affect neuroplasticity changes in the dorsal stream.

Procedure:

Monocular Prism Dips: The patient stands within arms length of a focal target at eye level. The patient fixates monocularly on the center of the target and activates the dorsal stream by visually guiding his index finger to land on the target. While maintaining fixation, the hand is removed, and a 20D loose prism is slowly introduced in front of the patient's eye. The optical image shift is detected by the frontal eye fields, creating a sensory mismatch and in order to regain fixation, the patient initiates a saccadic eye movement via premotor and primary motor corticies. Finally, to integrate the pre-frontal cortex, the patient visually guides his finger to land on the target once more. Top-down modulation allows the patient to correct his movements and accurately make a motor match to the sensory mismatch.

Rotator pegboard with hand-held loop: The patient stands 5 to 10 feet from a standing rotator positioned at eye level. The patient fixates monocularly on a target: a slow rotating peg. Frontal eye fields will be engaged as the patient monitors for intrusion saccades. A hand-held loop is used to "loop around" the target while the patient's head and trunk remain motionless. The extended dorsal stream is modulated through top-down processing, allowing the patient to make conscious corrections to his hand positioning and stay on target. The sensory mismatch lies in the different rotation speeds between the peg and the patient's hand.

Application: These visual rehabilitation procedures are appropriate for any patient, but are particularly effective in the TBI population that present with oculomotor dysfunction. Furthermore, the techiniques require minimal equipment and can even be performed at home.

Unique Characteristics: Incorporating top-down processing in therapy results in a more effective modality for enhancing extended dorsal stream function and improving both clinical findings and symptoms.

Author: Anna Lammers, OD, *ICO Pediatric and Binocular Vision Resident*

Title of Presentation:
When an Eye Turn is More than Strabismus: A Case Report

ABSTRACT

Background: A six-year-old African American male presented for his first eye exam with parental concern regarding a longstanding left eye turn.

Case Summary: Best corrected distance visual acuity was OD: 20/20, OS: 20/200, and OU: 20/20. Best corrected near visual acuity was OD: 20/20, OS 20/30 with eccentric nasal viewing, and OU: 20/20. Pertinent and concerning exam findings prior to dilation included leukocoria, an afferent pupillary defect, unequal Bruckner's reflex and abnormally slow refixation OS on the alternating cover test. These findings suggested an underlying pathology. An intermittent left exotropia was observed, accompanied by an abnormal head turn, eccentric viewing OS when OD was occluded, and poor fixation OS. The dilated fundus evaluation revealed diffuse and coalesced intra-retinal and sub-retinal exudates adjacent to tortuous and telangiectatic vasculature with a fibrotic nodule over the macula.

Results: Coat's Disease was suspected and the patient was referred to a pediatric retinal specialist for consultation and laser treatment. Coat's disease is predominantly diagnosed in males during their first decade of life. It is typically unilateral, and without family history.

Discussion: This case study details differential diagnoses of sensory strabismus and leukocoria, treatment options, as well as long term management for a patient with Coat's disease and subsequent intermittent exotropia.

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Title of Presentation:
Visual Disorders in Agility Dogs with Jumping Problems

ABSTRACT

Background: Background: Agility dog trainers have noticed that some dogs have difficulty jumping obstacles. These dogs often take off too early when approaching a jump, and also drop their heads, perhaps to get a better look at the jump. The purpose of this study was to look for visual abnormalities in dogs with early take off jumping problems.

Methods: 215 trained agility dogs were evaluated using optometric techniques to determine refractive and binocular status. Retinoscopy was performed on undilated pupils. Binocularity was tested using cover test, Hirschberg test, and Bruckner test. Binocular vergence ranges were tested with a prism bar at 16 inches and 6 feet. Handlers self-reported their dogs' jumping ability.

Results: Of the 110 Border Collies (BC) tested, 38 were reported as having a jump problem, 56 were reported as normal jumpers, and 16 were too young to determine. Border Collies with jumping problems tended to have myopia (21/38 = 55.2 %), astigmatism (29/38 = 76.3%), or phoria/strabismus (12/38= 31.6 %). Anisometropia (>0.50 OS or DC) occurred in 28/38 = 73.7% of the BC's with jumping problems. In comparison, normal jumping dogs tended to be emmetropic or hyperopic. Results from other breeds were generally consistent with BC's. The cover test, Hirshberg and Bruckner tests for ocular alignment seemed to be effective in identifying strabismus in dogs. Prism bar vergence ranges did not reveal statistically significant differences between dogs with normal jumping versus poor jumping.

Discussion: Dogs with jumping issues are more likely to have visual disorders than normal jumping dogs. In particular, myopia, astigmatism, anisometropia and strabismus were associated with poor jumping behavior, while poor convergence ability was not. We speculate that, like humans playing sports, dogs require well-focused images with good binocular depth perception. However, unlike humans, dogs may not depend on good convergence skills for good performance.

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Co-Authors: Yoshie Morita, OT, LVA, *Gemstone Foundation, Wildomar, California*

Yukiko Oshima, *Hamade Eye Clinic, Osaka, Japan*

Title of Presentation:

Symotomatic Reading-Related Binocular Problems and Their Relation to Visual Acuity

ABSTRACT

Background: School screening for vision problems typically includes tests for acuity but not binocular function. This is so despite mounting evidence that reading and other academic behaviors are affected when binocular function is poor. This study compares results of the administration of a validated symptom survey (the CISS) to students in the US and Japan, and examines the correlation between symptom severity and distance visual acuity.

Methods: The Convergence Insufficiency Symptom Survey (CISS) was administered to 1357 students in grades 3-6 in six public elementary schools in Los Angeles (LA), California, and to 237 students in grades 3-6 in a school in Osaka, Japan. This survey is sensitive to accommodative disorders as well as to CI. Distance visual acuity was obtained for 245 of the students in LA using Snellen chart and for all 237 of those in Osaka using Landolt C chart.

Results: 78 of the Osaka students (33%) and 703 of the LA students (44%) scored in the symptomatic range on the CISS (16 or higher). The mean scores for each group were 13.2 (+/- 9.3 s.d.) and 15.5 (+/- 10.6 s.d.) for Osaka and LA, respectively. Correlation between symptom score and logMAR acuity was low for both locations (LA correlation between RE acuity and CISS score= 0.178 ($p < .01$); LA correlation LE acuity and CISS = 0.122 ($P<.06$); Osaka correlation RE acuity and CISS score= 0.236 ($p < .005$); Osaka correlation LE acuity and CISS = 0.246 ($p<.005$).

Discussion: At least 30% of students had symptoms of binocular vision disorders, both in LA and Osaka. These symptoms are related to reading. The low correlation between distance visual acuity and symptom scores clearly demonstrates that eye chart testing is not sufficient to detect all problems related to reading.

Poster Presentations, *continued*

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Co-Author: Nicole Sangani, OD, *Resident: Dr. Irwin Suchoff Residency Program in Vision Therapy and Rehabilitation, State University of New York, State College of Optometry*

Title of Presentation:
Visual Input and the Impact on Visual Processing: Two Case Reports

ABSTRACT

Background: Patients with a history of strabismus or amblyopia often present with symptoms of poor visual input. Complaints of blurry or distorted vision accompanied with diplopia and asthenopia are common amongst this population. For many children and young adults who are in an academic environment, poor visual input often leads to visual processing problems.

Case Summaries: 4 year old Hispanic female initially presented to the University Eye Center because she failed a vision screening in school. She was diagnosed with Anisometropic Amblyopia OD and she was prescribed full time spectacle lens wear and patching. She returned when she was 6 years old due to her mother's concerns regarding her academic performance. She was diagnosed with Oculomotor Dysfunction with a Deficit of Saccades. She was later diagnosed with perceptual deficits.

Nine-year-old African American male presented to the University Eye Center regarding an eye turn, intermittent diplopia, asthenopia, and difficulties with near activities and academic work. He was diagnosed with a Constant Alternating Exotropia, Oculomotor Dysfunction and Accommodative Insufficiency. He returned a month later for a Perceptual Evaluation which revealed many deficits in his visual processing skills.

Result: Both patients were prescribed Vision Therapy. The goal initially was to maximize their visual input, including correction of alignment and improvement of visual acuity. Visually processing therapy was heavily incorporated into their program. Both patients suffered from many academic related issues and towards the end of therapy, both patients' parents reported a great improvement in school.

Discussion: This poster discusses two cases of children who had difficulties with visual processing partially as a result of poor visual input. Over the course of therapy, a solidification of visual skills led to an increase in visual processing skills. An increase in the quality of input led to an increases in the quality of output.

Author: Janette Dumas, OD, FCOVD, FAAO, *Associate Professor, Southern College of Optometry*

Title of Presentation:
When Optometric Vision Therapy May Not Be Enough

ABSTRACT

Background: Psychosomatic disorders, emotional stressors resulting in physical illness, can be troubling. When emotional stressors affects vision, it has been described as visual conversion reaction or VCR. The general age of occurrence is 9 to 14 years old. There are several functional vision symptoms that can manifest such as reduced binocular visual acuity, visual field defects, accommodative dysfunction and oculomotor inaccuracies. One key feature to note is the temperament of the patient. In VCR, the patient may be despondent or withdrawn, and their behavior is uncharacteristic. Changes in behavior and temperament may warrant a psychological evaluation in conjunction with the traditional optometric management of lenses, prism, and vision therapy.

Case Summary: DB, a 10-year-old male, was seen at The Eye Center because of reduced vision. Testing showed significantly reduced visual acuity, restricted visual fields, minimal refractive error, and below normal visual perceptual scores. Low plus lenses were helpful, but not curative of the anomalous visual signs. Ocular health was unremarkable. Because of the noted despondency of the patient, the parental guardian was questioned further. It was revealed that DB was the oldest of five and that the children were recently taken from their mother by child protective services. The low plus lenses and vision therapy was prescribed along with a referral to a child psychologist was recommended.

Results: After receiving psychotherapy, the patient's functional vision and perceptual visual signs improved to age appropriate levels. His temperament was pleasant and engaging. Vision therapy was not indicated at the follow-up, but continued use of low plus lenses was recommended for near work.

Discussion: It is encouraged that the optometrist not only evaluate visual signs associated with VCR, but also inquire about psychological stress if the patient's behavior is uncharacteristic and/or despondent.

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Co-Authors: Elizabeth Casillas Casillas, MSCOptom, Mariana Esparza Guerrero, Alan Iván García Cortes, *Universidad Autónoma de Aguascalientes, México*

Title of Presentation:
Variability Assessment Methods for Saccades

ABSTRACT

Saccades are defined as rapid eye movements to quickly align the fovea with the object of interest. The different tests to assess saccades may have variability. The aim of the study was to compare the results of three methods, Southern California College of Optometry (SCCO), Development Eye Movement (DEM) and King-Devick (KD) tests. 105 children between 6 and 12 years were assessed using these three methods, with results classified as adequate or inadecuate. The study subjects 53% were female and 47% male. With SCCO test 80 were adequate and 25 inadequate. With KD 82 adequate and 23 inadequate. With DEM 69 adequate and 36 inadequate. The observed differences were statistically significant.

Author: Tiong Peng Yap, BSc (Hons) Optom

Title of Presentation:
Cortical Processing in a Child with Astigmatic Amblyopia

ABSTRACT

Background: Visual acuity is the primary method used to assess amblyopia, but this is only one of the many indicators of visual function. Visual acuity alone is not sufficiently to accurately diagnose and monitor the progress of treatment; particularly as amblyopia is a result of abnormal development of the visual cortex. This preliminary study attempts to use visual evoked potentials (VEP) to directly investigate the electrophysiological activity of a child with astigmatic amblyopia in reference to its principle astigmatic axes.

Methods: Standard clinical measures were taken as part of a routine eye examination (including logMAR acuities). In addition, single-channel transient VEP and psychophysical grating acuities (Matlab) were measured. Sine-wave achromatic gratings (3cpd) were presented in onset-offset mode (2Hz) along the two principle astigmatic meridians and the results are recorded monocularly. Binocular VEPs are assessed across four orientations (180, 90, 45 and 135 degrees). The stimulus was generated using a VSG2/5 (Cambridge Research Systems) and presented on a gamma corrected Sony CPF-G500 21-inch Trinitron color monitor; and recording electrodes are placed at the occipital area (Oz), reference electrodes at Cz and ground electrode at Fz based on ISCEV standards. Inclusion criteria for the subject are: (1) a recent diagnosis of astigmatic amblyopia, (2) no history of spectacles usage and (3) poor visual acuity. Exclusion criteria are (1) strabismus including microtropia, (2) congenital colour vision anomaly and (3) diseases or neurological conditions.

Results: The 7 year old subject has astigmatic amblyopia with best correctable visual acuities OD 20/40 and OS 20/40 owing to refractive errors OD +2.75 -3.00 x 170 and OS +2.25 -4.00 x 170. Large differences in the VEP amplitude and latency of P100 were found when comparing results from visual stimulus orientated along and perpendicular to the astigmatic axes. When the stimulus was presented on-axis, there was a presence of a large P100 amplitude and also a high latency (i.e. delayed P100). When the stimulus was presented along the perpendicular axis, there was either an absence or marked reduction in the amplitude, high latency and the attenuated morphology of its waveform made it substantially difficult to interpret. The VEPs were compared with their respective grating acuities along and perpendicular to its astigmatic axes.

Discussion: The preliminary findings are interesting but it could not be completely understood based on conventional analytical methods. As it is part of a larger study which investigates astigmatic amblyopia longitudinally, these preliminary electrophysiological findings confirms the necessity of our further studies to utilize more robust analytical instruments, such as fractal correlation dimension which is a nonlinear dynamical parameter quantifying complexity of the electrophysiological system under investigation.

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Co-Authors: Silvia Han, OD, SCCO at MBKU
Raymond Chu, OD, MS, SCCO at MBKU
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Title of Presentation:
Positive Predictive Value of VA Testing with the Use of Plusoptix for Vision Screenings

ABSTRACT

Background: Visual acuity (VA) testing is widely used in school vision screenings to determine whether a child requires further evaluation by an eye care professional, however moderate amounts of hyperopia may be masked by an active accommodative system. Photoscreeners like the plusoptiX are increasingly being utilized, as they are quick, objective, and easy to use. Based on the autorefraction findings, the plusoptiX determines whether a referral is warranted. Supplementing these findings with VA testing may detect children who would be missed by VA testing alone. The purpose of this study was to determine the influence of the addition of plusoptiX testing on positive predictive value (PPV) when administered to children who passed VA testing.

Methods: Students 7-11 years old at one elementary school were screened for vision problems. The screening included (VA) testing with referral criteria set at 20/40 or worse in either eye or an interocular difference of ≥ 2 lines. If a student passed VA testing, autorefraction was performed using the S12 plusoptiX. Those who failed the vision screening were examined at the UEC Fullerton and provided glasses as needed.

Results: 69 students failed the vision screening based on VA or autorefraction after passing VA testing. The PPV of the VA testing alone was found to be 82.2% for prescribing spectacle wear. The PPV of the screening method utilized in this study was 73.9% for prescribing spectacle wear. The addition of autorefraction testing on those who passed VA reduced the number of false negatives thereby increasing the sensitivity of this screening method.

Discussion: This screening method's ability to predict those who need glasses was reduced compared to visual acuity testing alone; however, it was better able to identify those who needed glasses.

Author: Derek Tong, OD, FCOVD, FAAO, FNORA

Title of Presentation:
Private-Practice Residency Program in Pediatric Optometry and Vision Therapy/Neuro-Optometry

ABSTRACT

This residency program is a full-time, formal, supervised program consisting of direct patient care, didactic education, teaching experience, and scholarly activities. It is based at the Center for Vision Development Optometry, the private practice of Dr. Derek Tong located in Pasadena, CA. The learning objectives are achieved through patient care, case studies, and seminars which will facilitate the resident's development into an expert clinician in the areas of pediatric optometry, binocular vision, vision development, neuro-optometry, and vision enhancement.

This program provides qualified graduate optometrists with advanced clinical experience in the diagnosis and management of pediatric eye diseases, binocular vision disorders, visual-perceptual dysfunctions, acquired brain injury, and other functional vision deficits.

A unique component of this program is equipping the resident with the necessary practice management skills to operate a private practice and successfully market its unique services. The resident will also learn to interact and co-manage patients with other optometrists, child development specialists, educators, and rehabilitation professionals.

Link to residency website http://tinyURL.com/VTresidency

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Co-Author: Ruth Y. Shoge, OD, FAAO, *Salus University*

Title of Presentation:
The Pediatric/Vision Therapy Residency at the Eye Institute of the Pennsylvania College of Optometry (PCO) at Salus University

ABSTRACT

The Pediatric/Vision Therapy Residency at The Eye Institute of the Pennsylvania College of Optometry (PCO) at Salus University, one of the first such residencies in the country, was established in 1977. It is a challenging 54-week educational program that is designed to train entry-level graduate optometrists to provide competent and efficient care to pediatric and infant populations, vision therapy, and neuro-optometric vision rehabilitation.

One of the biggest attractions of PCO is its exceptionally strong clinical program. From day one, residents get invaluable experience with our diverse patient population. The Pediatric/Vision Therapy Residency provides the foundation for the management of binocular disorders, strabismus, amblyopia, traumatic brain injuries, learning-related vision problems, and vision therapy. Additionally, our Pediatric/Vision Therapy residents rotate through our affiliated hospital vision clinics, which specialize in pediatric ocular disease and neuro-optometric vision rehabilitation. Residents also have the opportunity to enhance their skills in the diagnosis and management of ocular disease through our specialty services, such as emergency eye care, neuro-optometry, and retina service. The science-and research-driven atmosphere provides a unique learning and teaching experience for the residents as they work closely with faculty and students in the clinic.

The Pediatric/Vision Therapy Residency at PCO is a comprehensive program that assiduously prepares residents for the fields of pediatrics, vision therapy, and neuro-optometric vision rehabilitation. The residency employs an appropriate level of supervision and support from highly-trained faculty and eventually leads residents to clinical independence. With the recent renovation of The Eye Institute, the introduction of The Brain Injury Clinic, and new affiliated hospital sites, it has never been a more exciting time for residents at this institution.

Poster Presentations, *continued*

Author: Angela Chen, OD, MS, FAAO, *Assistant Professor and POVT Residency Coordinator, SCCO at Marshall B. Ketchum University*

Co-Author: Kristine Huang, OD, MPH

Title of Presentation:
Residency in Pediatric Optometry and Vision Therapy at the Southern California College of Optometry at Marshall B. Ketchum University

ABSTRACT

The Pediatric Optometry and Vision Therapy (POVT) Residency is based at the University Eye Center, a fully-equipped patient care facility owned and operated by the Southern California College of Optometry (SCCO) at Marshall B. Ketchum University (MBKU). The residency is a full-time, formal, supervised program combining patient care, didactic education, teaching experience, and clinical research. The mission of the POVT residency is to develop the residents' clinical expertise in pediatric primary care and the assessment and management of binocular vision and visual processing anomalies, using comprehensive optometric procedures and treatment options.

Application Requirements: The applicant must have or will earn an O.D. degree, furnish complete optometric transcripts, and have passed the Basic and Clinical Science parts of the NBEO and furnish official copies of the results. A letter of intent stating the applicant's reasons for applying to the residency program should be submitted along with applicant's curriculum vitae and 3 letters of reference. Applicants must apply through the Optometric Residency Matching Services, Inc. (ORMS) and follow application guidelines by February 1. A person interview is required.