

COVD 41ST ANNUAL MEETING

Papers and Posters

The following presentations and posters were presented during the 2011 COVD 41st Annual Meeting in Las Vegas, Nevada.

Oral Research Presentations

THE FISCHER FIXTEST FOR FIXATION AND SACCADE REACTION TIME DIFFERENTIATES BETWEEN SYMPTOMATIC AND ASYMPTOMATIC ADULT PATIENTS

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Background: The Fischer FixTest is a stand-alone device for evaluating the quality and control of fixations and saccades, using temporal and spatial processing in overlap and gap tasks. Previous research on anti-saccade reaction time reports a significant difference between dyslexic subjects and a normal control group. This investigation compares the saccadic reaction times between symptomatic and asymptomatic patients.

Methods: Forty adults (ages 22-29) were evaluated with the Fischer FixTest using the three components of fixations, jump saccades and anti-saccades. All subjects had a comprehensive exam and visual efficiency evaluation, demonstrating unremarkable ocular health and binocular vision function. No subject had reading or learning problems. All completed a Quality of Life Survey (QLS) that provided a nearpoint symptom score, identifying individuals as either symptomatic or asymptomatic. The subjects completed all assessments within one 60 minute testing period.

Results: The FixTest anti-saccade reaction times were significantly different ($p < 0.05$) between symptomatic (620 ms, SD 74) and asymptomatic groups (557 ms, SD 79). Similar results were noted

with fixations and jump saccades and other FixTest subtests. The mean jump saccade reaction time was 622 ms (SD 81) for symptomatic subjects and 571 ms (SD 75) for asymptomatic subjects, with greater differences for middle saccades also noted.

Conclusion: This study shows that the FixTest procedures for fixations, jump prosaccades and anti-saccades can be effectively administered to adult subjects. The FixTest demonstrated significant differences in reaction times between symptomatic and asymptomatic subjects for all 3 procedures. The results of this study informs clinicians about these assessment tools and how their scores related to patient symptoms.

THE EFFECT OF SUCCESSFUL TREATMENT OF SYMPTOMATIC CONVERGENCE INSUFFICIENCY ON READING PERFORMANCE IN SCHOOL-AGED CHILDREN

Mitchell Scheiman, Christopher Chase, G. Lynn Mitchell, Eric Borsting, Marjean Kulp, Susan Cotter, and CITT-RS Study Group

Purpose: To evaluate the impact of successful treatment of symptomatic convergence insufficiency (CI) using office-based vergence/accommodative therapy (OBVAT) on reading performance in children

Methods: Children (N=44) ages 9 to 17 years with symptomatic CI were administered the Gray Oral Reading Test (GORT-4), the Test of Silent Word Reading Fluency (TOSWRF), the Test of Word Reading Efficiency (TOWRE), and the Wechsler Individual Achievement Test II (WIAT-II) at baseline and 8 weeks after completion of a 16-week program of OBVAT for CI. Treatment outcome (successful, improved, non-responder) for CI was determined using a composite score of symptoms as measured by the CI Symptom Survey, the near point of convergence, and positive fusional convergence at near.

Results: The subjects demonstrated a broad range of reading ability with baseline reading scores ranging from 1 to 99 percentile on most of the tests. The composite and subscale mean scores were not

significantly different than the published norms except for the TOWRE sight word reading subscale (mean = 95.4, $p = 0.009$) and the TOWRE composite score (mean = 94.6, $p = 0.003$) which were significantly below published norms (mean=100, SD=15). After treatment for CI, significant improvements were found for reading comprehension (mean = 4.2, $p = 0.009$) and pseudo-word decoding (mean = 1.9, $p = 0.043$) standard scores as measured by the WIAT-II. These improvements were related to treatment outcome ($p = 0.011$) with the largest improvements occurring in those who were successfully treated for CI (mean = 8.2). No significant improvements were observed in the composite or subscale standard scores on the GORT, TOSWRF, and TOWRE tests.

Conclusions: Although children with symptomatic CI showed significant improvements in reading comprehension as measured by the WIAT II reading comprehension subtest, improvements in reading were not found using the GORT, TOSWRF, or TOWRE. Future studies should include a placebo control group and a longer period of follow-up should be considered.

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CORRELATION OF READING FLUENCY WITH VISUAL MOTION SENSITIVITY TESTS, READING RATE, AND PSEUDOWORD DECODING

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Purpose: Children with reading disability have been shown to have a reduced sensitivity to motion as measured by coherent motion threshold (CMT) and critical flicker frequency (CFF). A retrospective analysis was conducted to evaluate whether there is a correlation between reading fluency as measured by the Test of Silent Word Reading Fluency (TOSWRF) and these visual motion sensitivity tests, as well as reading rate (as measured with the Visagraph II Eye Movement System), and pseudoword decoding (as

measured with the pseudoword decoding subtest of the Wechsler Intelligence Achievement Test i.e., WIAT-II).

Methods: 68 children between the ages of 7-16 years presented to the principle investigator's optometric practice for a vision therapy evaluation between June 1st 2010 and March 31st 2011. As part of the standard protocol for vision therapy evaluations in this office, they were tested using the CMT, CFF, TOSWRF, WIAT-II (pseudoword decoding subtest) and Visagraph II. The participants were divided into reading ability groups based on the published recommendations from the TOSWRF manual. Individuals at the 25% or below were labeled as Poor Fluency, individuals in the 26th to 74th % were labeled Average Fluency, and those in 75% or higher were labeled as Good Fluency.

Results: Pearson correlations were computed between the dependent variables revealing several important relationships: Fluency (TOSWRF) correlates significantly with all of the dependent measures selected for study. Of these measures, the WIAT-II score correlates the most strongly, at the moderate level, $r = .569$. Reading Rate (Visagraph II) is the next strongest correlate of Fluency, with changes in Rate accounting for 26.5% of the variance in Fluency. The variables of CMT and CFF were combined with Rate in two follow-up logistic regressions to determine whether their inclusion added to the classification accuracy of Rate. Both variables act to improve the specificity of Rate, which alone has a high likelihood of false positives; CMT maintains the sensitivity of Rate more while boosting specificity, while CFF causes a drop in the sensitivity of rate while greatly improving specificity. Rate with CFF and Rate with CMT both have an overall accurate prediction of fluency of 84%.

Conclusions: Fluency (as measured with TOSWRF) correlates with CMT, CFF, Reading Rate, and WIAT-2 (pseudoword decoding). Combining Rate with a motion sensitivity test (CMT or CFF), maintains a good sensitivity while greatly improving specificity. Optometrists should consider adding a motion sensitivity test to Visagraph II reading rate when evaluating school age children who may be at risk for reading fluency deficits.

VISUAL, ELECTROENCEPHALOGRAPHIC AND BEHAVIORAL DIFFERENCES IN INDIVIDUALS SCORING LOW AND HIGH ON ATTENTION MEASURES USED IN THE DIAGNOSIS OF ADHD

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Background: Greater accommodative lag and vergence deficits have been linked to attentional deficits similar to those observed in attention deficit hyperactivity disorder (ADHD). In our previous study a significantly greater accommodative lag was observed in normal young adults in the -2.00 D stress condition, which resulted in a significantly poorer performance on the Conners Continuous Performance Test (Conners CPT), a computerized test of sustained attention (Conners CPT) used in the diagnosis of ADHD (Poltavski, Biberdorf, Petros 2011). In the present study we hypothesized that adults showing attentional problems on instruments used in the diagnosis of ADHD would exhibit greater accommodative deficits and poorer performance on the Conners CPT in response to the -2.00 D accommodative stress than individuals scoring in the high attentional range on these instruments.

Methods: On the basis of their scores on the Current Symptoms Scale by Barkley and Murphy (1998) 40 participants (ages 18-25) were assigned to either low or high attention groups. Each group completed two counterbalanced experimental sessions. Each session included computerized completion of the Conners CPT with simultaneous recording of dynamic accommodation from the right eye using the Grand Seiko WAM-5500 autorefractor and frontal EEG activity using the Neurosky Mindset headset. In one of the sessions participants completed testing normally while in another session accommodative stress was induced with -2.00 D lenses.

Results: The results confirmed our previous findings (Poltavski et al., 2011) of increased accommodative lag in the stress condition for both groups. More importantly, however, the low attention group had significantly greater accommodative lag in the stress condition than the high attention group and showed poorer performance on some measures of the Conners CPT. Additionally, the two groups differed in the amplitude of frontal EEG components.

Discussion/Conclusion: The results confirmed that sustained attention can be influenced by accommodative stress and suggest that people with attentional deficits may have greater instability in their accommodative system, which can contribute to and potentially exacerbate their attentional problems. These findings have direct implications for diagnosis and treatment of ADHD.

Poster Presentations

AN UNUSUAL CASE OF PERSISTENT DIPLOPIA IN A PATIENT STATUS POST TRAUMATIC BRAIN INJURY

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Background: Diplopia is a common visual consequence of traumatic brain injury. In most patients who had normal binocular vision pre-trauma, the use of correcting prism and/or vision therapy can usually eliminate the double vision all together, or at minimum in certain positions of gaze, as in the case of certain cranial nerve palsies. There are rare cases where the deficits are more central in nature, namely in the cortex which results in sensory fusion deficit. We present a case where a patient who before his trauma reported no strabismus, afterwards develops constant double vision, with no point of fusion. We also present neuro-rehabilitative vision therapy procedures systematically used with patients with acquired brain injury which through neuroplasticity enhances visual processing deficits.

Methods/Case Summary: AP is a 52 year old male veteran who presents for a head trauma evaluation for brain injury sustained while in Afghanistan. He was diagnosed with post-concussive syndrome. His symptoms are constant moderate double vision, light headedness and dizziness with a feeling of being off balance, difficulty walking and general disequilibrium. He has a constant alternating exotropia which is variable between 20-25 prism diopters at distance and at near with no centration or fusion point. On the amblyoscope and on free space testing there is no correcting prism where the patient can fuse. Motility is full with unsteady fixation OD/OS with moderate saccadic intrusions.

Results: Neuro-optometric visual therapy was initiated to address post trauma vision syndrome symptoms. The initial emphasis in therapy was to work on oculomotor deficits which incorporated bio-feedback as a therapy method. On the tenth session of therapy a banqueter filter was placed on his non-dominate eye to eliminate the diplopia since no indication of fusion was possible.

Discussion/Conclusion: We presented a rare case of cortical sensory fusion deficit, where standard optometric treatment through the use of correcting prism and central fusional therapy is not effective. Instead through the use of a banqueter filter to eliminate central diplopia, we are able to enhance peripheral fusion and continue with neuro-rehabilitative therapy to enhance visual processing with the understanding that central fusion may not be attainable.

THE RELATIVE CONTRAINDICATION FOR STRABISMUS SURGERY IN PATIENTS WITH VESTIBULAR DYSFUNCTIONS

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Background: Balance and equilibrium are maintained by three major systems: vestibular, visual, and proprioceptive (spinocerebellar reflex), which are integrated in the cerebellum. A defect in any one of these systems can cause imbalance and place an increased amount of stress on the other two systems. In addition, because the cerebellum is plastic, with time it can learn to adapt to the defects and return to a state of balance. By understanding this system, it is apparent that if strabismus surgery is performed on a patient with a longstanding defect in the vestibular system, there will be resulting dizziness and imbalance post-surgically.

Methods/Case Summary/Results: Patient GA is a 31 year old white female who initially presented at the Vision Therapy service of the University Eye Center of SUNY State College of Optometry complaining of double vision, dizziness, and headaches status-post two consecutive strabismus surgeries. Prior to the strabismus surgery there was a large angle decompensated exotropia that was needed increasingly higher quantities of prismatic correction.

At the initial exam, the patient was diagnosed with a moderate angle non-comitant esotropia and accommodative insufficiency, for which vision therapy was initiated. After 18 sessions, there was an improvement in all findings, and the diplopia was essentially non-existent. A pair of +0.75 reading glasses and maintenance therapy were prescribed.

Four months later, the patient returned complaining of eye pain, headaches and persistent dizziness, which were impacting the patient's daily life. Binocular findings were stable and there was moderate accommodative infacility. Vision therapy was recommended to improve accommodative facility and more importantly visuo-vestibular therapy to improve dizziness symptoms. After 10 sessions of vision therapy with fair improvement in symptoms, pt. GA obtained a consult from a neuro-otologist. VNG, chair rotation, caloric, as well as other vestibular testing were performed and pt. GA was diagnosed with vestibular dysfunction and possible mild Meiere's disease, which most likely had been present most of her life. Pt. GA recalled a history of clumsiness and car sickness as a child. A second opinion revealed a diagnosis of inconclusive vestibular dysfunction vs. vestibular headaches and recommended that she start vestibular therapy. Patient GA completed 8 more sessions of vision therapy, at the re-evaluation her accommodative facility had improved and her distance prescription was decreased, which furthermore reduced the severity of her symptoms. She was scheduled to be re-evaluated in three months to monitor her symptoms and also progress with vestibular therapy.

Discussion/Conclusion: The relationship between vision and balance is an important one, although the in-depth knowledge of visual system by the neurotologist and vestibular system by the eye care professional is lacking. Strabismus surgery plays a major role in altering the visual input into the balance integrator (cerebellum), and if it already fragile from an underlying vestibular dysfunction, this can have significant negative effects to the patient. Because vision and balance are so inter-related the authors strongly believe that it is important to ask key questions that could possibly indicate an underlying mild vestibular dysfunction.

PIERRE ROBIN SYNDROME: A CASE STUDY PRESENTATION

Laura Ashe, Student, Class of 2013, Southern College of Optometry; Angela Howell, OD, Southern College of Optometry

Background: Pierre Robin Syndrome is a condition that manifests both ocular and systemic symptoms. The manifestations are displayed in ocular and facial characteristics of affected patients. A case study of a patient with Pierre Robin syndrome in the pediatric patient is presented for review. Ocular and facial features observed for diagnosis are presented for the optometric physician.

Case Report/Subjective: A seven year old white male presented to the office with his caregiver. The caregiver was concerned about the child's eyes and vision. History revealed developmental delays in speech and motor skills. Flovent was taken to manage respiratory problems. He was reported to have a feeding tube in place and to have had a tracheostomy to assist in breathing.

Objective: Patient's estimated visual acuity was 20/40 in each eye based on nonverbal Lea symbols testing. He could fixate and follow light or a moving target. He was equally agitated when the right or left eye was occluded. Hirshberg testing revealed centered reflexes with no strabismus present. Pupils were equal round and reactive to light with no afferent pupillary defect. Retinoscopy revealed +0.25-0.50X180 OD and = 0.50 OS with crisp approximately equal reflexes. Intraocular pressure was soft by digital tonometry in each eye. External examination showed a pale blue iris and normal ocular adnexa in each eye. External ear features were underdeveloped on both sides. No internal ear structures were present on the right side. The right hand had only four fingers with no thumb present. The right arm was maldeveloped. Body structure was compact with mobility limitations in walking. Posterior pole evaluation with direct ophthalmoscope revealed bright foveal light reflexes and normal retinal structure. No retinal abnormalities were noted.

Plan: Reassure caregiver about absence of strabismus, and high myopia at this time, monitor at six months for ocular growth and development no prescription at this time. Discussed ongoing therapy for occupational and physical needs, and the importance of follow up care with caregiver.

Discussion: Pierre Robin Syndrome has ocular and systemic features that may present to a primary care optometrist. A team approach with primary care pediatricians, developmental psychologists, physical and occupational therapists is advised to maximize outcomes for these patients.

CONVERGENCE INSUFFICIENCY IN DIZYGOTIC TWINS

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Background: As with many systemic conditions, ocular findings have been well documented to occur in greater frequency in twins versus the normal population. Concordance rates for particular disease conditions (e.g. strabismus) are often significantly greater in twins than in non-twin siblings. The contribution of genetics in the development of convergence insufficiency, a common binocular, has not been investigated previously.

Case Reports: A nine year old black male complained of frontal headaches since breaking his full-time wear glasses several months prior. The headaches were described as moderate and lasted a few hours. He was an "A" student. His COVD-QOL score was 23. Uncorrected visual acuity was 20/25 OD, OS at distance and 20/30 OD, OS at near. Corrected acuity was 20/20 OD, OS at distance and near. Cover test revealed orthophoria at distance and 8 exophoria at near. Vergences ranges at near in phoropter were X/12/6 BI and X/12/0. Near point of convergence was 7/12 X 3. A diagnosis of convergence insufficiency was made and a regimen of vision therapy recommended.

A nine year old black female complained of blurred vision at distance especially when looking at the blackboard in school. This blur is alleviated by moving closer to the board. She was an "A" student. Her COVD-QOL score was 7. Uncorrected acuity was 20/20 OD, OS at distance and near. Cover test revealed orthophoria at distance and 12 exophoria at near. Vergences ranges at near in phoropter were X/12/6 BI and X/12/0. Near point of convergence was 10/12 X 3. A diagnosis of convergence insufficiency was made and a regimen of vision therapy recommended.

Conclusion: This presentation of a male and female pair of dizygotic twins raises the question as to a familial component in the cause of the

convergence insufficiency. Further twin studies are needed to resolve the actual role of heredity related to convergence insufficiency. The purpose of this case series is to bring attention to the increased likelihood for siblings, especially those from a multiple birth (i.e. twins, triplets, quadruplets), to share ocular phenomena when presenting for an eye exam.

VISUAL ENHANCEMENT THROUGH THE USE OF VISION THERAPY IN A STROKE VICTIM

Naomi Aguilera, OD, Resident in Pediatrics and Vision Therapy, Southern College of Optometry; Maria J. Mandese, OD, FAAO

Background: Spontaneous improvement in visual field defects from brain injury usually occur within the first 6 months of recovery. The use of attentional cueing and vision therapy is instrumental in enhancing awareness of defects to improve safety and mobility. This case demonstrates how vision therapy can be implemented in a primary care setting to enhance visual field improvement.

Case Summary: A 74 year old male presented with history of vision loss persisting 1 month from a stroke within the right side of his brain. The patient lost consciousness and awoke with an initial complaint of diplopia. A few weeks later the diplopia subsided and the patient's wife noticed that he was missing objects on his left side. Visual field testing revealed a left homonymous hemianopia defect. Saccadic and oculomotor activities were used in a patterned three phase training plan. The three phases included: monocular saccadic and oculomotor sequences without spatial cues, sequences with spatial cues, and binocular sequences while sustaining fusion. Visual perception skills such as figure ground, visual memory, and directionality tasks were also incorporated into the final phase. Humphrey visual field sita standard 30-2 was used to document the progress every three months for a year. Results revealed an improved visual field, and increased mobility including the patient's ability to ambulate without the assistance of a cane.

Discussion/Conclusion: This case demonstrates the importance of vision therapy to improve safety and mobility of a patient with a left incomplete homonymous hemianopia. The patient's quality of life and the ability to perform activities of daily living were subsequently improved.

INVESTIGATION INTO THE USAGE OF LOW VISION GRANT AT SOUTHERN COLLEGE OF OPTOMETRY

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Purpose: The Low Vision grant at Southern College of Optometry (SCO) provides up to \$300 worth of low vision optical and non-optical aids to those patients living under the poverty line. Over the ten years the program has been in existence, tens of thousands of dollars and hundreds of devices including glasses, magnifiers and talking watches has been dispensed, helping hundreds of patients perform activities of daily living. This study instigated the use of the grant over a one-year period of time.

Method: A database of patients examined at the Southern College of Optometry between January 2010 and 2011 was evaluated. These patients had received funding through the grant after they were successfully able to document proof of income. The patient age, gender, diagnoses causing the decreased vision, total number of devices, types of devices, and amount of funding provided were recorded.

Results: A total of 82 patients, age 8-92 received a total of 176 items. The breakdown of devices by type was as follows: Optical (magnifiers and telescopes)-62, Non-optical (to aid activities of daily living)-53, Electronic (portable magnifiers)-23, Glasses-32, Contacts-2, Bioptics-2. A total of \$22,074 was dispersed, averaging \$269.20 per patient. The amount ranged from \$45.60 to \$722.00. There were a total of 31 different diagnoses. The three most common encountered were: Diabetes-8 pts, Glaucoma-8pts, and ARMD-7 patients.

Conclusion: As the first of the baby boomer generation is beginning to turn 65, it is expected that a surge of patients requiring low vision services will emerge. This group in general demands to keep active and to continue taking part in the activities that they enjoy. Low vision providers must do all that they can to assist in this pursuit.

VISION THERAPY TREATMENT OF A PIANIST EXPERIENCING DIFFICULTY WITH SIGHT-READING MUSICAL SCORES: VISUAL SKILLS EFFICIENCY AND PROCESSING SKILLS TRAINING

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Background: A 45-year-old Female from Brazil presented with symptoms of slow reading speed, “pulling” sensation, difficulty reading musical scores for piano and blurring vision. She inquired if VT could improve musical performance.

Case Summary: Examination findings included myopia, presbyopia, as well as reduced fusional skills, NPC, and saccadic efficiency. Refractive testing showed OD -1.00 DS, OS -1.00-0.25 x 058 with a +1.50 add OU for 20/15 acuities at distance and 20/20 +2 at near. Depth was 70” and caused right eye to water. NPC was 9” with left eye escape and difficulty regaining fusion. Vergence skills were BO: x/12/7 BI: x/8/6 at 20’ and BO: x/11/7 BI: 14/24/13 at 16”. DEM was V=32 s, H=33s. Visagraph reading profile demonstrated 146-152 fixations/100 words (expected is 57), with 44-46 regressions (expected is 5), efficiency of 0.97, and speed of 192 wpm (norm is 480) with 80% comprehension. Cross Correlation was 0.322. The patient was diagnosed with: Binocular Vision Dysfunction and Deficient Saccadic Eye Movements. Lens and VT treatment goals were increased visual comfort, elimination of symptoms, and improved ability to sight-read highly complex music. The patient completed intermittent office visits with home practice primarily on computer software. Therapy training included acquisition skills: oculomotor and binocularity training exercises and perceptual vision therapy: speed of information processing, perceptual span, peripheral vision, visual attention, & visual memory.

Results: The patient experienced an excellent outcome of increased reading speed, visual comfort, and music-reading accuracy at tempo. Retesting after 9 months of vision training resulted 20/15 acuity with stable refraction. Fusional vergence ranges were BO: x/12/11 BI: x/8/7 at distance and BO: x/22/9 BI: 16/24/20 at near and depth perception improved to 40”. NPC improved to 6”/8”. DEM was V=32 s, H=32 s. Visagraph improved to 112-116 fixations/100 words, 13 regressions, efficiency of 1.48,

and cross correlation of 0.974. Continued practice with vergence and saccades was recommended.

Discussion: The patient achieved all initial therapy goals noting improved accuracy and speed when sight-reading music. She currently plays piano professionally for a modern composer and authors a blog about her vision therapy experience. Skills gained with VT improved her ability to read musical scores accurately and efficiently to tempo.

INFANTILE NYSTAGMUS SECONDARY TO IN UTERO DRUG EXPOSURE IN THE FIRST TRIMESTER OF GESTATION: CASE REPORT

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Alison Leung, BSc, fourth year optometry student

Background: Infantile nystagmus occurs during the first six months of life, and is characterized by involuntary ocular oscillations. Among its many etiologies, reports have shown an association between in utero drug exposure and infantile nystagmus. With the combined use of benzodiazepines and opiates during pregnancy, newborns may present with decreased visual acuity, developmental delays, atypical VEP waveforms, in addition to infantile nystagmus. Drug exposure in utero should therefore be considered in the differential diagnosis of a patient presenting with infantile nystagmus.

Case Summary: A twelve month old Caucasian female presented for her first oculo-visual assessment in 2008 on referral from her primary care physician, due to concerns that her “eyes were moving and not focusing”. Case history revealed the patient was four weeks premature, and her birth mother had a history of drug use during the first trimester. Visual acuity was measured at 20/710 (Teller) OU, and rotational nystagmus was noted in all fields of gaze in the left eye. Cycloplegic retinoscopy revealed a +3.00DS OU, with all other findings unremarkable. Based on these findings and combined with the case history, the patient was diagnosed with (rotational) infantile nystagmus secondary to in utero drug exposure OS, and a referral to a neuro-ophthalmologist was made.

Since the initial assessment, the patient has been seen regularly by both the optometrist and neuro-ophthalmologist, with the diagnosis remaining the same; however due to the nystagmus in the left eye, the patient has since developed amblyopia. The

patient continues to be monitored on an annual basis, with all other developmental milestones being met.

Discussion: When infantile nystagmus presents, drug exposure during pregnancy should be considered as a differential diagnosis. One must always perform a thorough case history including a family history of nystagmus, parental consanguinity, exposure to teratogen during pregnancy, in addition to the birth and perinatal history. A thorough oculo-visual assessment is needed to rule out all possible differential diagnosis that may be the cause of the nystagmus. Appropriate work-up, treatment and management for nystagmus must then be undertaken. Currently there are few studies which investigate the terotogenic relationship between visual developmental delays, nystagmus and in utero drug exposure. This case study hopes to raise awareness about the importance of prevention of drug abuse during pregnancy and to investigate the terotogenic associations between the combined usage of in utero drug exposure and nystagmus.

READING, SYMPTOMS AND SCHOOL-RELATED BEHAVIOR IN CHILDREN WITH SYMPTOMATIC CONVERGENCE INSUFFICIENCY

Chris Chase, PhD, FAAO, Professor, Western University of Health Sciences, College of Optometry; Eric Borsting, SCCO; G. Lynn Mitchell, Ohio State University; Mitchell Scheiman, PCO; Lisa Higson, SCCO; Alex Tadros, Western University and the CITT-RS Study Group

Background: Oral reading errors have not been well researched in children with convergence insufficiency (CI). This paper presents a study of reading performance in CI children before and after office-based vergence/accommodative therapy (OBVAT) and correlates changes in reading errors with symptoms and parental reports of child behavior.

Method: Forty-five children ages 9 to 17 with symptomatic CI completed 16 weeks of OBVAT. The GORT-4 oral reading test was administered before treatment and 2 months after treatment was completed (24 weeks from baseline). Children's near work symptoms and behavior were followed using the Convergence Insufficiency Symptom Survey (CISS) and Child Behavioral Check List (CBCL), respectively.

Results: Oral reading speed and accuracy improved with OBVAT. The most common oral reading errors were substitution, repetition, and self-correction.

Reduction in CISS symptoms was not associated with changes in speed or overall accuracy but did correlate with an increase in substitution errors ($r = -0.52$). Reduction in symptoms also positively correlated with a reduction of school-related problems ($r=0.39$) as reported on the CBCL.

Conclusions: After OBVAT, children with CI showed a moderate improvement in oral reading fluency on the GORT-4. Reading error patterns shifted from a decrease in repetition and self correction to an increase in substitution errors.

DEVELOPMENT AND IMPLEMENTATION OF A PRIVATE PRACTICE EXTERNSHIP: BEST PRACTICES AND LESSONS LEARNED

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SUNY State College of Optometry**

Background: In 2008, SUNY State College of Optometry instituted a program to develop clinical externships in private practices specializing in vision therapy. The goals of the program were to provide the students with an education that included business and practice management in addition to a specialty clinical experience, and to assist the doctors in their development as clinical educators.

Summary: Three private practices were selected based on selection criteria and a site visit. A review of related legal and malpractice issues was conducted for the states in which the selected sites were located. A total of 12 students rotated through these practices during the first year. All student externs are required to keep detailed logs of their patient encounters using Meditrek (a web-based assessment tool). This enabled a comparison of the private practices to other externships. An additional evaluation of the practice management component was required of the private practice externs. A focus group was convened to discuss the project, the findings and to make recommendations for improving the externship experience.

Discussion: A review of legal and malpractice issues was an essential first step in the process of establishing a student externship in a private practice. The development of selection criteria and corresponding externship site application ensured that all the externs received an outstanding and consistent clinical experience. Each practice was

required to develop an office manual for the externs to establish procedures and expectations. A structured practice management curriculum was difficult to implement, but the students were able to learn a great deal informally. The private practitioners appreciated the time and resources spent to help them become better clinical educators.

VERTICAL PRISM:

A SMALL AMOUNT GOES A LONG WAY

**Eric D. Weigel, OD, Pediatric Resident,
Southern College of Optometry**

Background: Patients who present with complaints of headaches, or vague visual symptoms are often the most difficult to manage. A thorough history to explore the nature of the symptoms, including onset, duration, frequency, and severity is essential. Once the more serious differentials have been ruled out, diagnosis and management can be as simple as performing a cover test and prescribing glasses with vertical prism. Three cases will be presented in which vertical prism alleviated the visual symptoms.

Case Summary: A 17 year old White female presented to the office with a chief complaint of headaches. She reported getting sick from the headaches 2-3times per week, for almost 2 years. The headaches are worse with reading and Ibuprofen gave moderate relief. She also reported trouble with falling up stairs and carsickness. All entrance test findings were within normal for this 3.00D myope. No movement was seen on cover test; however the patient reported a vertical “phi” movement which was neutralized with ½ Prism diopter BU OD. She was diagnosed with a vertical phoria. The prism was prescribed and at 1 month follow-up the patient reported almost total relief of her headaches.

A 14 year old Hispanic female presented with complaints of reading trouble because the words on the page jumble after 10-15 minutes and headaches almost every day after school. She also reported falling going upstairs and some carsickness. All entrance tests were within accepted normative data, After reading for 15 minutes, a small vertical “phi” was noted on cover test. She was prescribed ½ prism diopter BD OS for relief of her symptoms due to the vertical phoria. She reported no headaches at her 1 month follow-up appointment.

A 27 year old White female presented with complaints of headaches mainly after close work. She

reported that these headaches have been severe enough to cause her to drop out of medical school after 2 years. All entrance tests were within accepted norms for this low myope. On cover test, a small vertical subjective “phi” movement was neutralized with 1 prism diopter BU OS. At her follow up appointment, she reported relief of her headaches and requested plano glasses with the prism that she could wear over her contacts for driving and reading comfort.

Discussion: The treatment and management of vertical phorias, should be considered when headache/eye strain symptoms are presented. While recent literature related to TBI (Traumatic Brain Injury) demonstrates successful treatment of vertical phorias with prism, the same evidence in the general population is scarce. The purpose of this presentation is to bring light to the topic of small angle vertical phorias, and provide a straight-forward and simple approach for their treatment.

VISION REHABILITATION RESIDENCIES AT THE SOUTHERN COLLEGE OF OPTOMETRY

**Sharon Lee, OD, FAAO, Assistant Professor
Southern College of Optometry; Paul Harris, OD,
FAAO, FCOVD, FACBO; Marc B. Taub, OD, MS,
FAAO, FCOVD**

Abstract: The Southern College of Optometry offers two opportunities for training in the area of Vision Rehabilitation. The residency in Pediatrics and Vision Therapy provides advanced training in the care of pediatric patients as well as using vision therapy as a treatment modality. Residents will gain extensive experience in the diagnosis and management of anomalies of binocular vision and assessment of visual function. Specialty areas of infant vision, strabismus, amblyopia, visual perception, vision therapy, pediatric eye disease, head trauma, special needs, and electrodiagnostic techniques will be explored. This program is supervised by Dr. Marc Taub.

The residency in Low Vision and Vision Rehabilitation provides advanced training in the care of low vision patients as well as using vision therapy as a treatment modality. Residents will gain extensive experience in the diagnosis and management of ocular disease, using optical and non-optical devices to enhance a patient’s vision and the diagnosis and management of anomalies of binocular vision and assessment of visual function. Specialty areas of genetic disorders, multiple disabilities,

acquired brain injury, strabismus, amblyopia, visual perception, vision therapy, and electrodiagnostic techniques will be explored. The resident will work closely with allied health professionals in the vision rehabilitation network including state agencies, local blind rehabilitation centers and hospital settings.

This program is supervised by Drs. Paul Harris and Sharon Lee.

Residents work with other optometric specialties including contact lens and ocular disease, as well as physicians, educators, psychologists, and other professionals in a diverse assortment of clinical and educational settings. These programs are extremely flexible and can be adjusted to meet the resident's needs and desires.

While working at Southern College of Optometry, the resident will have the opportunity to work at a state of the art health care facility with a diverse faculty. The faculty includes the future and a past COVD president, the editor of a major optometric journal, the current Vice-President of the Optometric Extension Program Foundation, seven Fellows of COVD, and 11 Fellows of the American Academy of Optometry. They have lectured nationally and internationally and authored numerous articles and book chapters.

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RESIDENCY IN PEDIATRIC OPTOMETRY AND VISION THERAPY AT THE SOUTHERN CALIFORNIA COLLEGE OF OPTOMETRY

Kristine Huang, Assistant Professor and POVT Residency Coordinator, SCCO

Abstract: The Pediatric Optometry and Vision Therapy (POVT) Residency is based at the Eye Care Center, a fully-equipped patient care facility owned and operated by the Southern California College of Optometry (SCCO). 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. An essay stating the applicant's reasons for applying to the residency program should be submitted along with 3 letters of reference. Applicants must apply through the optometric Residency Matching Services, Inc. (ORMS) and follow application guidelines by February 1. A personal interview is required.

THE PEDIATRIC/VISION THERAPY RESIDENCY AT THE PENNSYLVANIA COLLEGE OF OPTOMETRY

**Ruth Y. Shoge, OD, Assistant Professor, PCO;
Jenny Myung, OD, Clinical Instructor**

Background: The Pediatric/Vision Therapy Residency at The Eye Institute of the Pennsylvania College of Optometry at Salus University was established in 1977, one of the first in the country. It is a challenging 54-week educational program that is designed to train the entry-level graduate optometrist to provide competent and efficient care to the pediatric and infant population and vision therapy to both children and adults.

Summary: One of the biggest attractors to 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, learning related vision problems, and vision therapy. Additionally, our residents have the opportunity to enhance their skills in the diagnosis and management of ocular disease in our specialty services such as emergency eye care, neuro rehabilitation of traumatic brain injury, and retina service. The science and research driven atmosphere provides a unique learning and teaching opportunity to the residents as they work closely with faculty and students in the clinic.

Discussion: The Pediatric/Vision Therapy Residency at PCO is a comprehensive program that prepares residents to be confident in the field of pediatrics and vision therapy through an appropriate level of supervision and support of highly trained faculty leading to clinical independence. With the grand re-opening of The Eye Institute in May 2011 and the addition of 14,000 square feet of clinic

education space, it has never been a more exciting time for residents at this institution.

OPTOMETRIC VISION THERAPY AND PRISMS USED FOR DIVERGENCE INSUFFICIENCY

Erica Oosting Zeiders, OD, Optometrist at Vision Therapy Group, Flint, Michigan

Background: Divergence insufficiency (DI) is the least common of Duane's four categories (convergence insufficiency/excess, divergence insufficiency/excess). The etiology is unknown and there is no gender or racial predilection. It is most commonly found in the elderly population, but can be found at any age. When considering a diagnosis of divergence insufficiency, the differentials to be ruled out include convergence excess, basic esophoria, sixth nerve palsy and divergence paralysis.

Case Summary: A 13 year old African American female was seen for a comprehensive eye exam with complaints of swimming words with reading, constant blur, and intermittent diplopia at distance only. Upon examination, visual acuity uncorrected was reduced at distance only with a small myopic prescription correcting to 20/20 OU, base-in ranges were significantly reduced both at distance and near, and a larger esophoric posture was found at distance versus near. All other external and internal findings were unremarkable. A diagnosis of divergence insufficiency and mild myopia, OU was made. Glasses were prescribed for full time wear and optometric vision therapy (VT) was recommended. After eight sessions, VT was discontinued at the family's request and a small amount of base-in prism was placed in her glasses. Six months later, she was asymptomatic, her school grades had improved, and her binocular vision skills were within acceptable ranges.

Discussion: When managing divergence excess, VT and prisms are the best options. A combination of the two is ideal since a patient is less likely to have an issue with prism adaptation when they are used together. There are ways to deal with prism adaptation if encountered. Associated phoria testing is the most effective way of determining the appropriate amount of prism needed for these patients. Most importantly, patient motivation and compliance plays a significant role in the successful treatment and management of divergence insufficiency.

WHAT DOES IT TAKE TO REMOVE A DIAGNOSIS FROM A PATIENT?

Mallorie Lindsey, 3rd Year Student, Southern College of Optometry; Heather Jones, 3rd Year Student; Paul Harris, OD, FCOVD, FACBO, FAAO, Associate Professor, SCO

Abstract: Many times a patient will present with a disease or disorder that has already been diagnosed. Often these conditions are indeed present and can be confirmed rather easily in the course of their patient encounter. Once in a while the condition announced by the patient simply does not fit. This poster explores what happened with one such case, where relatively shortly into our examination it was obvious that the diagnosis that we were presented with did not fit the clinical picture. We expose our thought processes and data obtained to substantiate the removal, beyond the shadow of doubt, of the announced diagnosis and how we arrived at the correct diagnosis. The patient is then followed and subsequent visits validate the approach taken.

A twelve-year-old male presented with unaided visual acuities of 20/400 in the distance and 20/200 at near with both eyes together with no improvement on pinhole. After visits to three previous doctors the patient was told he didn't need spectacles and was diagnosed with Stargardt's, a hereditary disease of the macula. The patient also presented with photophobia and headaches when reading. Chair skills were normal, with a slight reduction in amplitude of accommodation and slight esophoric posture in the distance. Anterior segment evaluation was negative. Posterior Pole evaluation showed no significant findings and was negative for "flecks" consistent with Stargardt's or RPE pigment changes. At this point the faculty supervisor confirmed that the retinas looked normal and we entertained the idea that the patient did not have Stargardt's. However to "remove" this label or diagnosis from the patient placed a burden of proof on us. Therefore, on the same day we did an OCT which showed no RPE thickening and a normal retina. Fundus photographs were taken and showed a high sheen in the mid-periphery which is normal for a patient this age. Distance retinoscopy and stress point retinoscopy showed low plus of equal amounts in both eyes. A presumed diagnosis of the non-malingering syndrome was assigned and he was prescribed +0.50 in single vision form for full time indoor wear.

He was brought back for VEP and visual fields just a few days later. The visual fields showed a massive reduction in the field to a 20-degree central field, which is exactly the opposite of the kind of field one would expect with Stargardt's. The VEP was normal with binocular summation and no latency problems at all spatial frequencies tested.

At a visit one month later he showed improvement in VA, mostly at distance (to 20/30 OU) and the visual field opened up to about 35 degrees. At two months after the first visit he was seen again and now the near visual acuity improved to about the 20/40 level and the visual field increased again to about 45 degrees. This confirms the diagnosis of the non-malingering syndrome and we have officially removed the diagnosis of Stargardt's from his file.

This case points out that as doctors is it our job to question the previous diagnoses and to confirm or deny these ourselves.

For further information please contact: Dr. Paul Harris at pharris@sco.edu.

IMPROVEMENT IN AMBLYOPIA WITH OPTOMETRIC VISION THERAPY

Janna Iyer, OD, Vision Therapy and Low Vision Rehabilitation Resident, Southern College of Optometry

Background: In the offices of most eye care professionals, anisometropic amblyopia is treated with patching, atropine, or a combination of the two. These treatments are aimed at forcing the amblyopic eye into developing better visual acuity. Optometric vision therapy (OVT) may or may not be part of the treatment plan. The case presented will highlight the use of OVT in a case where a conventional medical approach proved unsuccessful.

Case Summary: A 9 year old female diagnosed with refractive amblyopia OS at age 6.5 was previously treated unsuccessfully with a combination of glasses, patching and atropine therapy by multiple eye care professionals. During her initial visit, corrected visual acuity was 20/20 OD, 20/200 OS at distance and 20/20 OD, 20/100 OS at near. Retinoscopy revealed +4.25-0.50x180 OD and +7.00-1.00x180 OS. She showed intermittent OS suppression to 6ft. Her final Rx (with VAs) was +2.75-0.50x180 OD (20/20)+5.25-1.00x180 OS (20/125) with a +2.00 Add OD and OS. She began OVT the following month. Her vision therapy program consisted

primarily of bilateral integration techniques such as slow angels, as well as working on integrating the moro reflex with duck/pigeon walking, moro splat, and starfish. MFBF techniques such as red-green ball watch, the red-clear Hart chart, and red-blue saccadic arrows were also employed with great frequency. At her 12 week progress check, her left eye had improved to 20/80 at distance and near, the best acuity yet since beginning treatment.

Discussion: This case stresses the importance of bilateral treatment for amblyopia. Amblyopia is a binocular vision problem; treatment should emphasize using both eyes. Additionally, OVT emphasizes improving spatial awareness and localization, which are typically poor in amblyopic patients. Gross motor techniques and bilateral integration aid in helping develop better spatial awareness. This case supports the use of OVT for amblyopic patients as an alternative to conventional medical treatments.

INVESTIGATION INTO THE USAGE OF THE FUNDS VISION THERAPY PROGRAM AT SOUTHERN COLLEGE OF OPTOMETRY

Ashley Gentrup, BS, 3rd year student, Southern College of Optometry; Marc B. Taub OD, MS, FAAO, FCOVD; Debra Moore, SCO, Vision Therapy and Rehabilitation Service Coordinator

Purpose: In addition to providing yearly eye exams and glasses to uninsured children, the FUNDS program will also help pay for weekly Vision Therapy sessions Southern College of Optometry (SCO). Private pay patients are responsible for \$40 per session while FUNDS recipients are responsible for a \$10 weekly copay. It is currently internally subsidized by SCO. This study instigated the use of the program over a one-year period of time.

Method: A database of patients receiving vision therapy using the FUNDS program at SCO between January 2010 and 2011 was evaluated. Data collected included: the patient age, gender, diagnoses, number of sessions and attendance, and how the therapy ended—completion/dismissal/patient choice.

Results: A total of 86 patients (43 male, 43 female), age 5-23 (average 9.6) attended 845 sessions out of a total 1288 booked sessions (65%). Therapy lengths ranged from 3 sessions to 40 sessions with average of 15 sessions. While 30 completed therapy (35%) and with 81% attendance, 36 were dismissed (42%) with 48% attendance and 20 patients discontinued by choice

(23%) with 58% attendance citing various reasons such as health concerns, schedule changes. The most common diagnoses were Ocular-Motor Dysfunction and Strabismus, and many patients had more than one diagnosis. Patients contributed approximately \$8,000 with SCO contributing \$25,000.

Conclusion: It is important that patients who need vision therapy are able to receive it, especially if they are below the poverty line. Patients living below the poverty line must have every opportunity to excel in the classroom in order to make a better life for themselves.

CRI DU CHAT SYNDROME: CASE PRESENTATION AND REVIEW

**Sarah Sweeney, OD, Optometric Resident,
Vision Care Specialists, Southborough, MA;
Marc B. Taub, OD, MS, FAAO, FCOVD, Southern
College of Optometry**

Background: Patients with Cri du Chat syndrome (CdCs) often present with hallmark signs of the condition including craniofacial malformations, varying degrees of mental retardation, and language/communication delays. They are commonly previously diagnosed and under the care of other medical professionals. However, significant ocular, developmental, and visual-spatial concerns for which CdCs patients are pre-disposed must be identified. The following poster presents a patient with CdCs, and further discusses the occurrence of the syndrome and methods of diagnosis, management, and prognosis of associated ocular sequelae.

Case Summary: A six-year old female presented for an examination and advice on incorporating vision therapy to help reduce the patient's eye turn. The patient had been diagnosed with CdCs in utero. At the age of two, a diagnosis of accommodative esotropia was made. The patient was wearing low to moderate plus lenses a few hours a day. Characteristic signs of CdCs were evident, including micrognathia, high-pitched voice, severe developmental delays, and strabismus. The examination consisted of qualifying and quantifying the strabismus, visual acuity estimation, extraocular muscle testing, and observation of the patient using gross motor movements.

Conclusion: While most CdCs patients will present with a history of diagnosis and management by other health care professionals, the responsibility

of identifying ocular abnormalities and visual-spatial deficiencies remain an essential part of examination. Signs of amblyopia (the leading cause of vision loss in patients with CdCs), strabismus, high refractive error, cataracts, lid/adnexal disease, optic nerve atrophy and/or dysplasia, and poor kinesthetic/spatial awareness may be subtle and challenging to obtain, but must not go overlooked when caring for patients within this population.

EFFECT OF TEST DISTANCE AND WORKING DISTANCE ADJUSTMENT IN THE MINUS LENS TO BLUR METHOD

**Nora Cothran, BS, third year student, Southern
College of Optometry;
Marc B. Taub, OD, MS, FAAO, FCOVD Southern
College of Optometry**

Purpose: The Minus Lens to Blur (MLB) method is one of three clinical methods for measuring amplitude of accommodation (AA). The MLB is performed at a test distance of 40cm and has been documented to underestimate AA, by approximately two diopters when compared to expected values obtained by using Hofstetter's equation for mean AA. It has been proposed that performing the test at 33.3cm instead of 40cm will reduce the affect of minification and that the working distance adjustment should remain 2.50D. This study will investigate the effect that alteration of test distance has on AA obtained via MLB. The relationship between a 3D and 2.50D adjustment when testing is performed at 33.3cm will be examined.

Method: Sixty ocular healthy adult subjects (mean 24.5 years, range 22-30) were recruited. All participants exhibited a minimal corrected visual acuity of 20/20 and were devoid of eye pathology. The MLB was performed four times at each of the following test distances: 33.3cm and 40.0cm. The first trial at each of the test distances was eliminated from analysis to control for practice effects. Order of test presentation was controlled. Statistical analysis was performed using ANOVA with post hoc t-tests.

Results: The mean AA for the two test distances were as follows: (1) 33cm with 2.50D adjustment: 8.62D (+/-2.12) (2) 33.3cm with 2.50D adjustment: 8.12D (+/-2.12) (3) 40.0cm: 7.87D (+/-2.06). The mean difference measured with the MLB and the value derived from Hofstetter's equation was as follows: at 33.3cm with 2.50D adjustment: 1.78D

(overestimation), at 33.3cm with 3D adjustment: 1.28D (overestimation), at 40.0cm: 2.53D (overestimation). The mean AA from all three MLB test distances varied significantly ($p < 0.0001$) from the mean value derived from Hofstetter's equation. Testing at 33.3cm showed no significant difference between the two amounts of adjustment ($p = 0.20$). Testing at 40cm showed significant difference from testing at 33.3cm ($p < 0.0001$).

Conclusions: This study showed that AA, when measured using the MLB method, will vary significantly as a result of the testing distance. Performing the test at 33.3cm instead of the traditional 40.0cm provides an AA that is closer to the value provided by Hoffstetter's equation. Using the expected 3D working distance adjustment when testing at 33.3cm provides the closest values to those produced using Hoffstetter's equation. Using a 33.3cm testing distance with adjustment of 3D, for the non-presbyopic patient, may result in a more accurate measure of the accommodative amplitude.

AMBLYOPIA CHARACTERISTICS AND IMPLICATIONS ASSOCIATED WITH VISUAL EVOKED POTENTIALS

Janette Dumas OD, FCOVD, Assistant Professor Southern College of Optometry; Paul Harris, OD FCOVD, CBO, FAAO, Southern College of Optometry

Background: There are several visual signs associated with amblyopia; however, the lateral geniculate nucleus and visual cortex are also thought to be affected. Visual evoked potentials (VEPs) examine the integrity of the visual pathway from the eye to the primary visual cortex by studying cortical responses to visual stimuli. In amblyopia, pattern reversal VEP is abnormal. Such patients show decreased latencies and amplitudes as compared to normals at higher spatial frequencies. Thus, visual evoked potentials are a valuable objective measurement for amblyopia diagnosis and treatment. This case report demonstrates the characteristic amblyopic signs associated with VEP's.

Case Report: History: KM is a 9 y.o. female that presented to The Eye Center because she was referred by an optometrist to evaluate her amblyopia. She is doing well in school. Her medical history is unremarkable. Findings: Visual acuity was 20/200 OD, 20/15 OS 20/20 OU in the distance and

20/150 OD, 20/25 OS, EOMs were unremarkable, without correction. Cover test: Ortho D and N. NPC: 7/10,7/12,7/13 OD out x3. Accommodative Amplitude: OD UTT, OS 15PD. Refraction: -4.00-1.00x090 20/80 OD, +0.25-0.50x135 20/15 OS. Anterior Segment, unremarkable. Posterior Segment was remarkable for Nerve fiber layer myelination around the ONH 350^o into superior arcades and nasal retina and extended 1.5DD inferiorly. VEP results indicate a classic amblyopic pattern with progressively decreasing amplitudes and longer latencies as the spatial frequency increased. At low spatial frequency (8x8) the amblyopic eye had the same response as the non-amblyopic eye. At high spatial frequency (64x64) the amblyopic eye was significantly reduced in amplitude and had a much longer latency than the fellow eye. Diagnosis: 1. Amblyopia secondary to Myopic Anisometropia 2. Myelination of the NFL near the ONH. Treatment: 1. Prescribe RX full time wear. RTC one month of spectacle wear, at that time consider enrolling in Vision Therapy 2. Monitor, photo document.

Discussion: With the increase in the accessibility for eye care professionals to perform VEPs in practice (Diopsys), optometrists should understand the VEP characteristics of normal patients versus amblyopic patients. This poster presents the VEP of an amblyopic patient and compares the results to a normal patient, expounding upon interpretation and giving a literature review of VEPs regarding amblyopia diagnosis and management.

SIMULTANEOUS MEASUREMENT OF ACCOMMODATION AND EYE MOVEMENTS DURING READING USING THE WAM-5500 AND VISAGRAPH II

Biberdorf, David, OD, FCOVD, Optometrist, Valley Vision Clinic; Dmitri Poltavski, PhD, University of North Dakota

Background: Electronic eye movement recording systems (e.g. Visagraph II, Visagraph III, Readalyzer) have been used by optometrists for almost 20 years to assess oculomotor behavior while reading. These systems have normed data which help optometrists understand the nature of reading eye movement behaviors. Yet, the recordings obtained from these instruments are incomplete in that they do not take into account the accommodative influences on the resultant oculomotor/binocular behavior.

Technological advances have also made measurement of accommodation responses to various stimuli possible (e.g. PowerRefractor; Grand Seiko WAM-5500), but fail to take into account the attentional/cognitive influences that are involved in the dynamic process of reading. While real-time objective measurement of accommodation during reading is desirable, it has remained elusive largely because of the difficulty in maintaining an on-axis instrument alignment with a moving eye. Recently, the feasibility of using the Grand Seiko WAM-5500 open field autorefractor for continuous measurement of accommodation while reading was investigated by Cooper, et al. , who found that the Grand Seiko could accurately measure accommodation even if the recordings were off-axis up to a horizontal limit of +/- 7.5 degrees. Up to three lines of vertical text could be displayed and measured without interference by the upper lid.

Method: This pilot study was an attempt to use the Grand Seiko and the Visagraph II together as a way to simultaneously measure accommodation, pupil size, vergences and versional eye movements of a subject while reading. We present a case of a symptomatic patient diagnosed with convergence insufficiency who had her accommodation and reading eye movements simultaneously measured before and after undergoing vision therapy. We first duplicated all of the stories found in the Visagraph II Eye Movement Recording System Test Manual onto a computer screen using the Expert Mode of the Ace Reader Pro software. With the Visagraph goggles attached to the front of the Grand Seiko headrest and controlled by one computer, selected stories were displayed one line at time on a second computer's screen and controlled by the patient with a mouse. At the end of each read line of text, the subject clicked the mouse to display a new line to maintain a normal rate of reading.

Results: Using paired sample t-tests we observed significant improvement in the patient's accommodative responses (112 samples taken) after the therapy compared to her WAM-5500 measurements at baseline ($M = -1.5$ D vs $M = -1.91$ D). The patient also reported improvements in her symptoms. Changes in binocular skills and reading eye movements have also been observed and are discussed in terms of their clinical significance.

Conclusion: Obtaining objective measurements of real time accommodation and eye movements during reading may help clinicians and researchers understand the interplay of the various processes

involved in reading. We present a feasible method where this can be accomplished using clinically available instruments and two separate computers.

CASE REPORT: MANAGEMENT OF BILATERAL ECTOPIA LENTIS IN A YOUNG PATIENT

**Lynn H. Trieu OD, MS, Clinical Instructor, PA
College of Optometry at Salus University; Alison
Hixenbaugh, OD, PA College of Optometry at
Salus University**

Background: Ectopia lentis (EL) is a genetic connective disorder that refers to the displacement of the crystalline lens from its normal position and is often due to discontinuous or stretched ciliary zonules. This condition can be a partial or complete dislocation and can be either unilateral or bilateral. EL is often associated with Marfan syndrome or homocystinuria.

Case Summary: Patient AB first presented to our clinic when she was 15 months old and was found to have bilateral lens subluxation nasally with OS more displaced than OD. She also had a moderate amount of myopia and astigmatism in both eyes. AB was given a spectacle prescription and referred for an evaluation for Marfan syndrome or other connective tissue disorders. She subsequently returned to our clinic when she was 3, 6, 7, and 8 years old and was found to have increased myopia over the years. Her spectacle prescription was updated with each visit and she was given a bifocal prescription when she was 6 years old for her accommodative insufficiency. Her binocularity and accommodation remained within normal limits with the bifocal correction. The lens subluxation appeared to remain stable through the years. She was also referred for a lens evaluation by a pediatric ophthalmologist, who preferred to monitor the bilateral EL. AB developed isometric amblyopia, which worsened as she became more myopic. Her VA with spectacle correction was 20/40 OD and 20/70 OS before she was fitted with daily contact lenses. After 3 months of contact lens wear, her BCVA remained stable at 20/40 OD and improved to 20/50 OS with the EDTRS chart. She was prescribed reading glasses over her contact lenses to wear during prolonged near work.

Discussion: AB's mother reported that she also had EL in her left eye and has had a history of pneumothorax and a heart murmur. Other health care professionals have evaluated both AB and her

mother for Marfan syndrome but they have not been diagnosed. This case report demonstrates that young patients with amblyopia and accommodative insufficiency secondary to lens subluxation can be effectively and safely managed with contact lenses and reading glasses when surgery is not indicated.

A COMPARISON OF ASSOCIATED PHORIA MEASUREMENTS BETWEEN A NEW TEST FOR FIXATION DISPARITY VERSUS THE WESSON FIXATION CARD AND AO VECTOGRAPHIC SLIDE

Gregory M. Fecho, OD, Assistant Professor of Optometry at Nova Southeastern University; Yin Tea, OD, FMO, Nova Southeastern University; Parla Najman, OD, Nova Southeastern University; Patrick Hardigan, PhD, Chair of the Statistical Consulting Center, NSU

Background: Fixation disparity is a measurement used to detect the presence of stress on the binocular vision system. (Sheedy 1978), The amount of stress correlates to the magnitude of the disparity. The amount of prism required to neutralize the fixation disparity is referred to as the associated phoria and represents the prism amount required to minimize binocular stress. (Dittemore 1992). Although the forced vergence fixation disparity curve is the best representation of overall stress on the system, testing requires significant time to administer than a single associated phoria measure. In fact, the ease of testing and success in reducing symptoms makes vertical associated phoria the test of choice for determining the magnitude of prism to prescribe for vertical heterophoria. (Cotter 1995) Recently, the Vision Assessment Cooperation released a new test to assess the Near Point of Fixation Disparity and Associated vergence. The test is called the Far Fixation Disparity Target (FFDT) and the Near Fixation Disparity Target (NFDT). The FFDT and the NFDT use a similar target design compared to other more established tests of fixation disparity and can theoretically be used to obtain associated phoria measurements despite what it is designed and marketed to evaluate. Our study compares associated phoria measurements obtained with this new clinical test for fixation disparity with currently used clinical tests.

Methods: Associated phoria measures were obtained from 30 students at Nova Southeastern University College of Optometry using the new FFDT and NFDT and more traditional fixation

disparity tests. The AO Vectographic slide was used for distance testing and the Wesson Fixation Card was used for near.

Results: Concordance reliability found good correlation of associated phoria measures at distance and near for patients with vertical fixation disparity. There was very poor concordance for horizontal fixation disparity at both distance and near.

Conclusions: The correlation found with vertical associated phoria measurements makes this simple and inexpensive fixation disparity test a potentially useful new tool for determining prism for treating vertical heterophoria. There was a lack of concordance in measures obtained for horizontal heterophoria. However, prism treatment is not the treatment of choice over vision training for treating symptomatic patients with horizontal heterophoria. Therefore, horizontal associated phoria measurements using this new test would have been less clinically useful than being able to plot the forced vergence fixation disparity curve, which the new fixation disparity test cannot do.

UTILIZING BOTH THE TRADITIONAL VISUAL PERCEPTUAL BATTERY OF TESTING ALONG WITH THE WACHS ANALYSIS OF COGNITIVE STRUCTURES TO BETTER DIRECT VISION THERAPY

Pravina Patel, OD, Pediatric Resident at Nova Southeastern University; Erin Jenewein, OD, MS, FAAO, Assistant Professor, Nova Southeastern University

Background: Vision therapy can help patients with accommodative, binocular, motility, and visual perceptual related problems. When evaluating perceptual skills, patients often times might have weak areas found with one form of testing and more direction is needed in order to target and understand the fundamental reasons of why a patient might have deficiencies in certain areas. Once these gaps are detected it is possible to make the strides in vision therapy that we thrive for in practice.

Case Summary: A 10 year old white male diagnosed with autism initially presented to the clinic with decreased vision and with a history of being in special education. The patient had a previous history of intermittent esotropia and amblyopia. He was having difficulty in school as well. A traditional visual perceptual battery was conducted initially with vision therapy beginning a week later. The patient

had difficulties in the areas of visual spatial, visual analysis, visual motor integration, and auditory visual integration skills, and a diagnosis of oculomotor dysfunction. After 20 sessions, the course of the vision therapy was assessed and the patient was not making improvements in all areas. A Wachs Analysis of Cognitive Structures (WACS) was then performed to gather qualitative information to help direct the vision therapy. The WACS test was used not as a normative age test, but to focus more on the fundamental areas that were not being addressed. After the test was performed, an outline for vision therapy more directed in the areas that the patient had difficulties was addressed. Through the combination of the WACS and the traditional visual perceptual evaluation we were able to direct the vision therapy in a more effective manner.

Discussion: There are several techniques to assess visual processing in a patient. Two commonly used tests are the Visual Perceptual and the WACS. Most visual processing tests evaluate the four schemas: visual spatial, visual analysis, visual motor integration, and auditory visual integration. Individuals on the autism spectrum may range in presentation of deficiencies and difficulties in the general schema of development. Visual perceptual testing can be broken down into more basic developmental schemas. Incorporating qualitative information from the WACS and the Visual Perceptual testing can help to further direct the treatment of vision therapy.

SOFT SPHERICAL CONTACT LENS FIT ON A CHILD WITH APHAKIA AND ASPERGER SYNDROME

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Background: Asperger Syndrome (AS) is considered part of the autism spectrum disorder and it is characterized but not limited to the following: social interaction difficulties, communication with repetitive interests and behavior, sensitivity to sensory stimuli, and gaze aversions. Fitting a contact lens on a patient with AS can be challenging if the patient is sensitive to being touched around the eyes. This case highlights the approach on how to fit a young, aphakic patient with AS.

Case Summary: JF is a 4 year old child referred by an ophthalmologist for an aphakic contact lens evaluation. JF had a history of a congenital right cataract, right esotropia and deprivation amblyopia. The patient's mother reported that her son has behavioral problems and a history of poor compliance with spectacle wear and patching. JF's corrected distance visual acuities were 20/200 OD at 60cm and 20/20 OS with Lea symbols. Both parent and child had motivation for the contact lens fit. Several trials were attempted on several days and the patient was successfully fit in a silicone hydrogel lens. His mother was educated on insertion and removal on her son. One month later, the patient was able to achieve 20/40-1 OD with eccentric viewing at 9 o'clock. Although his mother reported that JF demonstrated more anxiety during insertion and removal at home than in office, he had better compliance in wearing the soft contact lens than patching. Three years later, the patient was diagnosed with Asperger's syndrome and is successfully still wearing soft contact lens.

Conclusion: Insertion and removal of a contact lens can be scary for a young child and that is why the parent is first taught the process. This case reports demonstrates that a soft contact lens fit can be successful on child with Asperger syndrome when strong motivation is demonstrated by both the child and parent.

THE PREVALENCE OF AMBLYOPIA AND CONVERGENCE INSUFFICIENCY IN A SCHOOL BASED VISION PROGRAM

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Purpose: There are over 435,000 children in the Chicago public school system and over 20% of those children failed the school vision screenings last year. The Illinois College of Optometry has recently created a partnership with the Chicago public school system to provide comprehensive eye examinations and glasses for those kids who need the follow up care after failing the screening. The data presented here is a representation of the prevalence of refractive amblyopia and convergence insufficiency data among this subset of children.

Methods: The clinic opened in January of 2010 and we have seen 1451 students from 50 different schools up to March 23, 2011. The students are referred to the clinic if they have failed the school screening or if their teacher suspects that vision is playing a role in their studies and preventing them from reaching their potential. There are also kindergartners that present to the clinic because they must receive a mandatory eye examination before entering school. The age range is from 4.3 to 19.2 years of age, with the median age being 11.5. Comprehensive eye examinations including Cycloplegic results with over half of the patients were completed by second, third and fourth year students of the Illinois College of optometry.

Results: Of the 1451 children examined, ninety-four (6.5%) had amblyopia, 77 (5.31%) had convergence insufficiency with 156 (10%) students having greater than a 10 prism diopter exophoric posture at near (this data did not include the intermittent strabismics at near). On initial screening examination 264 (18%) students showed a receded near point of convergence that was greater than 7cm.

Conclusions: The children of the Chicago Public Schools are definitely in need of further access to care to help the large percentages of amblyopes and convergence insufficiency students. The partnership between the Illinois College of Optometry and the Chicago Public Schools needs to continue and also it is a great way to educate those on how vision can affect learning.

BUILDING A SUSTAINABLE SCHOOL BASED VISION CLINIC SERVING A LARGE URBAN SCHOOL DISTRICT

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Background: The Illinois College of Optometry and the Chicago Public Schools (CPS) engaged in a partnership beginning in 2011. The goal was to create a school based vision clinic which could provide comprehensive eye care to the students in the district that do not access care after failing their vision screening.

Methods: Beginning Jan. 2011, IEI @ Princeton opened its doors to serve the students of CPS. Schools in the district bus their students to the clinic. Most of the students are from schools in which more than 90% of the student body receives free or reduced cost

lunches. The schools are responsible to identifying the students in need and to obtain consents from the parent or guardian. Eye care is provided by students from ICO. Glasses are provided by the state insurance program, OneSight, Davis Vision and VSP.

Results: Since the clinic opened, more than 3,000 children received comprehensive eye care. An average of 75% of the children see required new glasses. Amblyopia and strabismus was identified in approximately 6.5% of the patients seen. Several children were diagnosed with eye health problems that required treatment including one child with undiagnosed glaucoma.

Discussion/Conclusion: A review of the patients seen in the first five months suggests that there is a large unmet need for eye care for the students within the Chicago Public Schools. It is also important to note that the students identified in general were good referrals as they showed a large prevalence of vision problems.

VISION AND MOTOR DEVELOPMENT

Scott Moscow

Background: When a child is born, he must learn to use his eyes to gather meaning from the environment. Motor development and visual development are interrelated with other senses. In the early stages of development, the motor skills of moving arms and legs, rolling over and putting toys in the mouth guide the visual system. As vision continues to develop, vision begins to guide the motor systems.

Creeping and crawling are early stages of motor development where both sides of the body are working together (bilateral integration). If there is a problem using both sides of the body together, binocular vision may be affected. It is not unusual to see a child younger than four months of age show an intermittent strabismus as he begins to learn to use the two sides of his body together. If there are delays in the development of bilateral integration, there can be delays in binocular vision. In turn, when there is problem with binocular vision, there can be delays in more advanced motor skills such as walking, riding a two-wheeler, skipping and jumping.

Case Report: A 14-month-old Caucasian female was referred for a vision therapy evaluation because her parents observed her left eye was turning inward approximately 90% of the time. The father had numerous strabismus surgeries and did not have

binocular vision. Uncorrected cover test showed a 25-30, A pattern esotropia OS, and plus lenses did not help the esotropia. Cycloplegic retinoscopy OU near was approximately +3.00D. All other ocular findings were unremarkable. Treatment was to initiate patching OD 2-4 hours per day, eye stretches to move fixation to patients far left and activities for bilateral integration. Since +3.00D OU did not help the esotropia, no glasses were prescribed at this time.

Two and a half months later (16 month and 1 week old), the patient's parents reported her right eye was starting to turn in at times while her left eye was straight. Additionally, the patient was crawling but not standing or walking. Hirschberg estimation was 15-20D esotropia, and cover test estimation was 25-30Desotropia. Treatment was switched to 1% atropine drops OD every other day.

One month later, the patient was loaned +2.00D OU glasses, switched from Atropine drops to cling patch (20/200 acuity) for 2 hours per day (alternating between left eye being patched for two hours one day and then the right eye being patched for two hours the next) and continued home vision therapy activities. Patient's parents were advised to use the loaner glasses when her eye turns in.

Six and a half weeks later, patient ordered her own pair of glasses with added bi-nasal occluders (tape to her glasses) and continued home vision therapy activities.

Six weeks later, parents report alignment 40%-50% of the time, and when her eye turns in, the magnitude of the turn appeared to be less (estimated 15-20D alternating esotropia). Patient started walking 6 weeks after getting new glasses.

Conclusion: The patient started as a 25-30D, A pattern esotropia OS 90% of the time at 14 months. Just over 6 months later, the patient was aligned 40%-50% of the time, and when her eye turns in, the magnitude of the turn appears to be less (estimated 15-20D alternating esotropia). Additionally, the patient was not walking at 20 months. However, she began to walk just 20 days after receiving her own pair of glasses. Vision therapy is used to guide the enhancement of visual skills. A child needs to be in touch with where his body is in space (i.e. his reference point). When the child is secure in his body awareness, he can use his eyes to accurately determine where things are located in space.