RESIDENCY REPORTS:
Resolution of Pars Planitis Induced CME After Oral CAI Treatment of Steroid Responsive Glaucoma

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CLINICAL EQUIPMENT:
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American Optometric Association / American Optometric Student Association 2008 Meeting Report

CLINICAL REVIEW AND RESEARCH:
Studies on AC/A Ratios Determined Using the Modified Thorington Dissociated Phoria Test

LITERATURE REVIEW: Photic Sneeze Reflex
In This Issue

This issue features articles by students, alumni, and residents of the Indiana University School of Optometry. Two residents share insights and cases from their year of residency. Two optometry alumni contribute to the discussion of the new cards for training convergence designed by a graduate program alumna. Two current students present a report on their trip to the 2008 American Optometric Association / American Optometric Student Association meeting. And lastly, we have an article summarizing four studies on the measurement of AC/A ratios using the modified Thorington dissociated phoria test and a review on the little known photic sneeze reflex.

David A. Goss
Editor

ON THE COVER: The Tondel arrows card (top) and the Tondel loops card.

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Introduction

Pars Planitis is an idiopathic intermediate uveitis seen in young healthy adults. A common secondary complication is cystoid macular edema (CME). Treatment can include topical non-steroidal anti-inflammatory drugs (NSAIDS), oral steroids, intra-vitreal injections and sub-Tenon’s capsule injections. Unfortunately, topical NSAIDS did not work for our patient and he developed a steroid induced glaucoma as the result of a sub-tenon’s injection for CME. In attempts to treat the glaucoma with oral carbonic anhydrase inhibitors (CAI), a significant unexpected resolution of CME was found.

Case Presentation

Initial Presentation 8/05 (See Figure 1)
The patient presented at our clinic with a history of pars planitis and CME and was on no medication at the time.

VA: 20/20 OD, 20/80 OS  Pupils: –APD OU  
Slit lamp examination (SLE): WNL OD, 1+ fine keratic precipitates (KP) OS, 1+cell OS; Vitreous: 2+vitreous cells OS;  
IOP: 14 mmHg OD, 13 mm Hg OS  
C/D: 0.4 OD, 0.4 OS.  
Dilated Fundus Examination (DFE): 4+CME OS  
with 708 micron central macular thickness,  
Epiretinal membrane (ERM) OS  
Plan: Start Acular qid and Lotemax qid OS, Oral Prednisone 40mg qd with slow taper.

Visit on 11/05
The patient reported: “I notice no real change in my vision.”
VA: 20/80 OS  
SLE: Improvement in vitritis with persistent CME.  
IOP: 19 mmHg OS  
Plan: 40 mg Sub-Tenon’s Kenalog injection OS today by consulting M.D. D/C Lotemax. Continue Acular.

Visit on 2/06
Patient subjectively noticed no change in vision.
VA: 20/40 OS  
IOP: 26 mmHg OS  
DFE: trace vitreal cells, persistent macular edema with mild ERM OS. CME still present on OCT.  
Plan: Monitor IOP closely

Visit on 6/06
Previous follow ups reveal no change in IOP. However, at this visit the patient presented with significant pain in OS.
VA: 20/50 OS  
SLE: trace cell OS  
IOP: 43 mmHg OS  
DFE: persistent macular edema with no significant change in the vitreous.  
Plan: Start Alphagan P and Timolol bid OS, Xibrom bid OS. RTC for IOP check.

Visit on 8/17/06
Patient compliant with medication. No real change
Visit on 8/24/06
Patient noticed tingling in extremities and significant fatigue, but noticed some improvement with vision.
VA: 20/30 OS
IOP: 34 mmHg OS
OCT: Remarkably decreased CME, normal foveal depression noted.
Plan: Continue current medications.

Visit on 9/7/06
Patient noted that side effects are tolerable, and no change in vision was noted.
VA: 20/30 OS
SLE: 1+Posterior Subcapsular Cataract (PSC) noted OS
IOP: 43 mmHg OS
Plan: Continue Alphagan P and Timolol bid OS. Change Neptazane to Diamox 500mg Sequels bid.

Visit on 9/13/06
Patient noted tingling in extremities but stated that it is tolerable.
VA: 20/25 OS
IOP: 38 mmHg OS
Plan: Continue Alphagan, Timolol and Diamox Sequels. Refer to ophthalmologist for poor response to medical management.

Visit on 9/18/06
Patient evaluated by M.D.
IOP stable at 31mmHg OS.
Plan: No surgery or laser recommended at this time. Monitor IOP.

Visit on 9/28/06
Questionable compliance with glaucoma medication. Patient had also discontinued Diamox due to severe side effects.
VA: 20/30 OS
IOP: 42 mmHg OS.
Plan: Continue previous glaucoma medications and add Xalatan qhs OS.

Discussion
Pars planitis is an inflammatory intermediate/posterior uveitis that usually affects healthy young patients although it has been linked with juvenile rheumatoid arthritis and demyelinating diseases. This disease is usually not visually threatening but patients can have bouts of cystoid macular edema that can blur the vision.1 Relapses of this inflammation are common. It is thought that anywhere from 20 to 50% of patients with an intermediate uveitis will have cystoid macular edema. Treatment for this can include topical NSAIDS or steroids.2 Due to the nature of this condition, steroids are usually the first line treatment. This can be with oral prednisone or an injection of steroids. If the injection is used, the patient is to be followed closely for a steroid induced intraocular pressure spike.3 Another type of treatment that has been used to decrease the cystoid macular edema is oral carbonic anhydrase inhibitor.

Figure 2. Stratus OCT results at visit on 10/06.
inhibitors. It is thought that acetazolamide increases the absorption of fluid across the retinal pigment epithelium and acidifies the subretinal space by pulling the fluid from the retina through the RPE into the choroidal space.\(^4\) Carbonic anhydrase inhibitors are thought to work better on this uveitic type of retinal swelling (fluid from the RPE) than swelling that is from retinal vessels such as diabetic macular edema.\(^4\) One way of using carbonic anhydrase inhibitors is to use 250mg of acetazolamide twice a day in combination with an anti-inflammatory agent.\(^5\) In one study when these medications were used together on macular edema patients, a statistically significant increase of 0.29 lines on the visual acuity chart was found.\(^5\) These results can vary, however. Eyes that were found to have active inflammation or require immunosuppressive therapy still had a statistically significant benefit from acetazolamide, but less than standard uveitic cystoid macular edema.\(^5\) In some cases after the CME is resolved the carbonic anhydrase inhibitor can be tapered and even discontinued. In another study, 82% of patients were able to decrease the dosage or even stop the acetazolamide without visual acuity suffering or the cystoid macular edema recurring.\(^6\)

**Conclusion**

The patient was followed closely as the intraocular pressure was consistently elevated. The OCT was used to monitor if possible damage had occurred with the retinal nerve fiber layer of the patient’s left eye. During this evaluation, the retinal nerve fiber layer of the left eye was found to be within the normal range of thickness while the retinal nerve fiber layer in the asymptomatic right eye was paradoxically found to be severely decreased at less than 100 microns with no other correlating signs. This finding was repeatable over several visits. Also, after several months, the macular thickness finally returned to normal. The eye pressure remained elevated despite maximal medical treatment so the patient was referred to a glaucoma specialist. A filtering surgery was performed in hopes to reduce the IOP and delay the progression of secondary glaucoma. The patient was questioned on any history of optic neuritis or other demyelinating symptoms and there were none noted. The patient was referred to a neurologist to rule out a demyelinating disease. An MRI was ordered and revealed many suspect multiple sclerosis lesions.

**References**


**Brandy Deckard, O.D., graduated from the Indiana University School of Optometry in 2007. She completed a residency in Ocular Disease in 2008. She is presently practicing in Bloomington, Indiana with Dr. Denise Howard.**
A
fter I graduated in May of 2007, I decided to
further my educational experience by applying
for the residency program in the
Pediatric/Binocular Vision Clinic at Indiana
University. After being accepted, I established the
goals of having a better
understanding of the
treatment strategies for
amblyopia, being able to
institute a complete therapy
program for binocular
dysfunctions, and gaining
more experience with visual
information processing
evaluations and subsequent
therapies.

My most memorable patient that I treated for
amblyopia was a seven year old male. He
presented with vision of 20/250 in the amblyopic
eye. His mother stated that the vision in that eye
was 20/800 when he was initially seen by another
optometrist. His diagnosis was refractive
amblyopia. I first updated his current glasses
prescription to reflect his present refractive error. I
then saw him back in 6 weeks to recheck his
vision. His vision had improved to 20/125, so I
continued glasses wear for another 6 weeks. At
the next visit his vision had stabilized at 20/125, so
I decided to start a patching treatment. His
instruction was to patch his non-amblyopic eye for
4 hours per day. At the return visit six weeks later,
his parent stated that he was compliant with the
patching therapy. His vision had improved to
20/80. I did not change his current treatment at
that time. He was seen for three more follow-ups
in which there was no change in his visual acuities.
On the third visit, I increased the patching to six
hours a day. I saw him again in 6 weeks, still no
improvement. Again six weeks after that when I
saw him there was no improvement in his vision.
At that time I decided to add atropine therapy to his
treatment plan. Initially I started out with one drop
in the non-amblyopic eye only on Saturday and
Sunday mornings. He was to continue patching for
6 hours per day. After two more visits at 6 weeks
apart with no improvement I increased the
frequency of the administration of the atropine. His
new treatment plan was daily dosing (1 drop in the
non-amblyopic eye in the morning) of atropine
which was implemented with the current patching
therapy of 6 hours per day. Six weeks later his
vision did improve slightly to 20/65. I continued
with the current treatment for two more visits. His
vision had reached a plateau at 20/65. Because I
had reached the maximum therapy and his vision
had stabilized, I decided to start weaning him off of
both the patching and the drops. The weaning
schedule was atropine only on weekend mornings
and patch three hours per day. In six weeks he
was weaned further by discontinuing the atropine
and decrease patching to 1 hour per day. Then at
the next visit all therapy was discontinued. During
the weaning process his vision in the amblyopic
eye stayed at 20/65. I saw him again 2 month later
and his vision was still 20/65. He is to return to our
clinic in three months to reassess his vision.

My most memorable patient that I treated for a
binocular dysfunction was a 34 year old female.
She was a professor at the university and was
involved in many research projects. Her chief
complaint was that she could not read for long
periods of time and this was not conducive for her
visual demands. After a short period (15 minutes),
she would experience pain around her eyes and
headaches. Based on the complaints and the
exam findings she was diagnosed with
convergence insufficiency. We started her out on
a therapy program that was loosely based on the
program that is outlined in Mitchell Scheiman and
Bruce Wick’s book *Clinical Management of
Binocular Vision*. She was started out with Brock
String and pencil push-ups. She was to complete
the activities 10 minutes per day. When we saw
her two weeks later, she stated that she had
difficulty with the activities because she would
either start getting a headache or she would
experience nausea. She was only able to
complete the activities for about 2 minutes per day.

By the third session, she was able to continue
the activities for a longer period of time. She also
stated that her eyes feel slightly more relaxed. We
continued her therapy by gradually adding more
challenging activities to her treatment plan. Once
she mastered an activity it was discontinued. She
was given tranaglyphs, prism flippers with the
Brock string, aperture rule, life saver cards, and
eccentric circles throughout her therapy. She had
ten vision therapy sessions with us. At the final
session she was able to accomplish the goals for
the eccentric circle activity. At her progress
evaluation three months after her final VT session,
she was still asymptomatic.

This year I was fortunate enough to present a
poster at the American Optometric Association
Meeting in Seattle. I did a retrospective case study
on visual information processing dysfunction. The

...
The case that I presented was that of a 12 year old male that had presented to our clinic for an evaluation because he was having trouble in school. The parent stated that he has trouble keeping up with his peers in the classroom and this led to low self esteem. The patient stated that when he reads he feels like the words jump around on the page. Based upon the binocular assessment that was done before the VIP evaluation it was determined that he had a vertical phoria. The VIP assessment was started but then was subsequently stopped because some of the test results were very poor possibly due to the vertical imbalance. The patient was then prescribed prism to help correct his vertical imbalance. The patient returned to the clinic one month after having the glasses to be assessed for his visual information processing skills. After the assessment it was determined that he did have an ocular motor dysfunction that was leading to poor visual attention. We recommended an in-office/at-home vision therapy program to help strengthen his processing skills. After 10 sessions of therapy his mother stated that he is not struggling in school and his self esteem has greatly improved. This case changed the way that visual information processing evaluations were completed at the clinic. We now evaluate visual efficiency, visual acuities and binocular status, and subsequently treat any anomalies before beginning any visual information processing assessments. Since studying this case for my poster I have seen a couple of children who had some binocular dysfunction that we treated before proceeding with further assessments.

These are just short synopses of a few of the cases that I have been involved with in this past year. Some of these cases may have seemed pretty straight forward but when you personally get to diagnose, treat, and follow these cases from start to finish it solidifies what you had learned while you were in school.

In closing, I would like to thank all of the faculty members that I have worked with in the past year. I have become a better optometrist because of what I have learned from you.

Michelle L. Frye, O.D., graduated from Indiana University School of Optometry in 2007. She completed a residency in Pediatric/Binocular Vision in 2008. She is joining a private practice in Auburn, IN, where she plans on incorporating vision therapy programs into an already thriving primary care/ocular disease practice.
Abstract

Tondel cards are designed for training fusional vergence for vision therapy in the management of vergence dysfunctions. The two different Tondel cards, arrows cards and loops cards, are similar in concept to other free space fusion cards commonly used in vision therapy. This paper introduces the reader to Tondel cards and presents a small study on the effect of their use on clinical test findings.

Key words: free space fusion, ocular convergence, Tondel cards, vergence disorders, vision therapy.

A common procedure in vision therapy for vergence disorders is the use of free space fusion cards. Examples of free space fusion cards which are commonly used in vision therapy include barrel cards, three dot cards, lifesaver cards, and Bernell free space fusion cards. Tondel cards are new training cards to use for vision therapy. The two different Tondel cards, arrows cards and loops cards, are similar in concept to other cards commonly used in vision therapy.

The arrows cards (Figure 1) were designed for convergence training at near and normalization of the near point of convergence. This card is similar to training that is done with the Brock string and barrel cards in that accommodation and convergence stimuli are moved together in the same plane. Advantages of the arrows card are that it provides clear stimulus for accommodation (tips of each pair of arrow heads), avoids the confusion of trying to perceive mixed colors (as in the barrel card), and allows training vergence movements between different distances.

The loops cards (Figure 2) were designed to provide for vergence training in a variety of near distances, to increase vergence ranges, to allow for training vergences while version eye movements are performed, and to improve dynamics of vergence eye movements. Training with this card is similar to training that is done with the lifesaver cards and Bernell free space fusion cards in that the plane of the convergence stimulus is separated from the plane of the accommodative stimulus. Advantages of the loops cards are that they provide a clear stimulus for accommodation (well defined black lines) allow version movements to be performed while the patient fuses, provides suppression cues (words, math sentences), and has a colorful design that makes the cards attractive and interesting.

A small study was conducted to examine the effect of convergence training with the Tondel cards on clinical test findings. Thirteen subjects between the ages of 23 and 27 years old volunteered to participate in the vision training. Each subject had a contact lens or spectacle corrected visual acuity of 20/20 or better in each eye. Subjects had a stereopsis of 40 seconds of arc or better and did not have a strabismus as
determined by cover test. Each subject was seen for two examinations, pre- and post-training. At each exam, series of tests were performed to assess each participant’s accommodative and convergence status. These tests included cover test, near point of convergence, von Graefe phorias, fusional vergence ranges, and positive and negative relative accommodation. Subjects were randomly given one of the two versions of the Tondel cards (loops or arrows cards). Each subject was to use the card for training ten minutes a day for six weeks. They were provided with adequate instructions on how to use the card.

The subjects were instructed to place the arrows card at the tip of the nose with the purple arrow closest to them. While viewing the card, the tips of the arrows should touch but not overlap and should be in sharp focus. Once the purple arrow was in sharp focus for the subject, they were to then follow the edge of the card smoothly to the next arrow (red). The subjects were cautioned to ensure that as they moved from one arrow to another they were constantly seeing the crossing of the edge. Once success was attained by smoothly moving from one arrow to another, the subject was instructed to attempt to jump from one pair of arrows to another, first in order and then randomly.

For the loops cards, subjects were instructed to hold the card in front of their eyes with the middle rectangle in the midline at approximately 40 centimeters. At first, the subject was told to concentrate on seeing the loops in depth. Next, the subject was to work on clearly seeing the math sentences above and the column of three words below the loops. The subject was then to look at the loops going across the card to train version movements. Subjects were cautioned to maintain fusion by always seeing the depth perception of the loops. Success was attained when the subject was able to look back and forth across the card and notice loops in depth, clear and complete the math equations, and clear the column of three words. For increased difficulty, the subject was instructed to move the card closer.

A ten question symptom survey was answered by the subject to assess reading eyestrain symptoms before and after training. This was used as a subjective gauge to determine if an increase in comfort was observed by the patient. The ten questions were answered as never, infrequently, sometimes, fairly often, and always and were scored as 0 (never) to 4 (always). The survey was patterned after a fifteen question symptom survey that has been validated and used in studies on convergence insufficiency.

Mean test findings before and after training for the 13 subjects are in Table 1. Exophoria was treated as a negative number and esophoria as a positive number. Tests showing a statistically significant improvement at the 0.05 level by the paired t-test were NPC break and recovery.

Table 1. Mean test findings before and after training (standard deviations in parentheses). Units are cm for NPC, prism diopters for phorias and vergence ranges, and diopters for NRA and PRA. The t and p values are from the paired t-test.

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPC break</td>
<td>2.4 (2.8)</td>
<td>0.9 (2.2)</td>
<td>2.245</td>
<td>0.044</td>
</tr>
<tr>
<td>NPC recovery</td>
<td>3.4 (4.0)</td>
<td>1.2 (2.8)</td>
<td>2.419</td>
<td>0.032</td>
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<tr>
<td>Cover test distance</td>
<td>0.1 eso (1.0)</td>
<td>0 (0.8)</td>
<td>0.322</td>
<td>0.753</td>
</tr>
<tr>
<td>Cover test near</td>
<td>0.6 eso (5.1)</td>
<td>0.2 eso (3.6)</td>
<td>0.923</td>
<td>0.374</td>
</tr>
<tr>
<td>Distance phoria</td>
<td>0.5 eso (3.6)</td>
<td>1.1 eso (2.3)</td>
<td>0.682</td>
<td>0.508</td>
</tr>
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<td>Near phoria</td>
<td>1.1 eso (7.9)</td>
<td>0.1 eso (4.9)</td>
<td>0.71</td>
<td>0.491</td>
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<td>Gradient phoria</td>
<td>3.4 eso (5.8)</td>
<td>2.9 eso (4.1)</td>
<td>0.313</td>
<td>0.76</td>
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<tr>
<td>Dist BI break</td>
<td>11.0 (5.7)</td>
<td>9.4 (2.9)</td>
<td>0.83</td>
<td>0.423</td>
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<tr>
<td>Dist BI recovery</td>
<td>4.7 (5.0)</td>
<td>5.7 (1.4)</td>
<td>0.681</td>
<td>0.509</td>
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<tr>
<td>Dist BO break</td>
<td>19.3 (8.0)</td>
<td>21.7 (10.1)</td>
<td>0.729</td>
<td>0.48</td>
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<td>Dist BO recovery</td>
<td>9.2 (8.5)</td>
<td>14.8 (10.4)</td>
<td>3.153</td>
<td>0.008</td>
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<tr>
<td>Near BI blur</td>
<td>14.8 (5.6)</td>
<td>14.0 (5.4)</td>
<td>0.509</td>
<td>0.62</td>
</tr>
<tr>
<td>Near BI break</td>
<td>19.0 (3.9)</td>
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<td>1.32</td>
<td>0.212</td>
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<tr>
<td>Near BI recovery</td>
<td>9.8 (5.2)</td>
<td>9.7 (5.2)</td>
<td>0.057</td>
<td>0.956</td>
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<tr>
<td>Near BO blur</td>
<td>11.5 (10.8)</td>
<td>13.2 (12.6)</td>
<td>0.433</td>
<td>0.673</td>
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<tr>
<td>Near BO break</td>
<td>23.0 (8.9)</td>
<td>27.2 (9.5)</td>
<td>1.562</td>
<td>0.144</td>
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<td>Near BO recovery</td>
<td>10.6 (10.7)</td>
<td>19.9 (10.5)</td>
<td>3.772</td>
<td>0.003</td>
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<tr>
<td>NRA</td>
<td>2.40 (0.57)</td>
<td>2.46 (0.55)</td>
<td>0.322</td>
<td>0.753</td>
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<tr>
<td>PRA</td>
<td>2.40 (0.95)</td>
<td>2.11 (1.06)</td>
<td>0.83</td>
<td>0.423</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>8.5 (6.4)</td>
<td>5.5 (5.1)</td>
<td>3.634</td>
<td>0.003</td>
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</tbody>
</table>
distance and near base-out recoveries, and the symptom survey score. The near point of convergence break decreased by 1.5 cm and the recovery decreased by 2.3 cm. The distance base out recovery increased by 5.5 prism diopters and the near base out recovery increased by 9.2 prism diopters. The subjective responses on the questionnaire went down by 3 points.

All six subjects who used the arrows cards had an NPC to the bridge of the nose at the end of their six weeks of training. Their base-out recoveries improved by an average of 3.3 prism diopters at distance (p=0.105 by paired t-test) and by 5.6 prism diopters at near (p=0.141). The symptom survey score improved by an average of 2.8 points (p=0.047). The seven loops cards subjects had an average decrease in NPC break of 1.7 cm (p=0.172) and NPC recovery of 2.5 cm (p=0.136). Their base-out recoveries increased by 7.4 prism diopters at distance (p=0.04) and 12.3 prism diopters at near (p=0.011). Their mean symptom survey score improvement was 3.1 points (p=0.052).

This study, of course, was limited by the small number of subjects, many of whom initially had mostly normal findings, but it suggests that the Tondel cards may have usefulness in training convergence amplitudes and base out ranges. Tondel cards can be a convenient and simple option for doctors to use as an additional vision training procedure.

References

Nichole Hruban and Melanie Carver graduated from the Indiana University School of Optometry in 2008. Grazyna Tondel, designer of the Tondel cards, attended medical school in Poland and was trained in and practiced pediatrics there. She received M.S. and Ph.D. degrees in vision science from Indiana University, and for several years was a teaching assistant in the vision therapy course at IU. For additional information on the Tondel cards, contact Dr. Tondel at gtondel@sbcglobal.net.
This year’s annual American Optometric Association/American Optometric Student Association (AOA/AOSA) conference in Seattle, Washington definitely “reached new heights” towards optometry’s future! Many important issues were voted on at the AOA House of Delegates Meeting as well as at the AOSA Board of Trustees Meeting. Approximately 800 students attended this national convention, and they experienced organized optometry at its finest. Students learned what our profession is all about at the national level and had fun in the process. Additionally, Optometry’s Meeting, as the AOA calls it, was a unique chance to make new friends from all 19 schools and meet professionals from all over the country. In the first part of this report on what we learned at the meeting, we’ll examine what AOA and AOSA are all about…and get to know some acronyms!

AOA
The American Optometric Association is the premiere organizational authority in the optometric industry. With more than 35,000 members in 6,500 U.S. and foreign communities, the AOA leads the way in its mission of improving the quality and availability of eye and vision care everywhere. Founded in 1898, the AOA is a federation of state, student, and armed forces optometric associations. Through these affiliations, the AOA serves members consisting of optometrists, students of optometry, paraoptometric assistants, and technicians.

Together, the AOA and its affiliates work to provide the public with quality vision and eye care. Through offices in St. Louis and metropolitan Washington, D.C., the AOA:
• Sets professional standards, helping its members conduct patient care efficiently and effectively
• Lobbies government and other organizations on behalf of the optometric profession
• Provides research and educational leadership.
(See www.aoa.org)

AOSA
The purpose of the American Optometric Student Association is to improve the visual welfare and health of the public, to promote the profession of optometry, and to enhance the education and welfare of optometry students. AOSA’s objectives are to serve as a vital source of information to optometry students so they may know more about the rapidly occurring changes in the profession, help students make educated decisions concerning their futures, provide student representation to allied optometric organizations, and provide services that enhance the academic experience. (See www.theaosaa.org)

The AOA and the AOSA are the associations to get actively involved in as optometry students and optometrists. Without organized optometry, we would not be where we are today nor where we hope to be in the future. So, always be a member! Your support is crucial in advancing our practice in optometry.

The Board of Trustees (consisting of the executive committee – President, VP, Secretary, & Treasurer – and two representatives from each of the 19 schools all over North America) met with organizations each day throughout the conference to give you the latest update of what is happening today. We’ve included each organization’s general information and highlights obtained from the meetings.

AOA House of Delegates
The House of Delegates is one of the largest components of Optometry’s Meeting. Delegates represent each school/college of optometry and also each state, and they vote on important issues facing optometry today. IUOSA President and President-Elect, Michael Jorgensen and Kyle King, represented IU at the House of Delegates meeting. Throughout the week, imperative issues dealing with the legislation and politics of optometry are voted on by the House of Delegates. This is an important part of Optometry’s Meeting, as it determines where optometry will be in the future and where the profession of optometry stands on certain issues. During the conference, all students are allowed into the House of Delegates meeting as visitors to observe how the process works.
ARBO (Association of Regulatory Boards of Optometry) Presentation

ARBO is an organization that “serves as the licensing and regulatory arm of the optometric profession by formulating rules, or regulations, that govern and enforce the laws that grant the privilege to practice optometry, which are enacted by state legislatures” (See www.arbo.org). ARBO’s main interest is to protect the welfare of the patients. Within ARBO, there is COPE (Council on Optometric Practitioner Education) that approves of all continuing education (CE) courses and currently represents 50 US optometry boards, four US territories/jurisdictions, and two Canadian boards. COPE’s mission is to:

• coordinate the review and approval of continuing optometric education courses on behalf of state boards on a national basis;
• reduce duplication of effort by state boards;
• create a uniform method of recording continuing education courses on a national basis;
• be the clearinghouse for information about continuing education programs and courses utilized by licensed optometrists to fulfill their continuing education requirements for license renewal; and
• encourage program sponsors to offer high quality CE in appropriate settings with adequate administrative structure.

OE Trackers

OE trackers give each optometrist a unique number that helps track their CE credits electronically throughout the year instead of hassling with all the paper forms you have to send in. This will also track the demographics of optometrists located throughout the country. In addition, you will also have the convenience of tracking your own credits through the website. This number will be assigned to students when they register for Part I of the national boards.

CELMO (Council on Endorsed Licensure Mobility for Optometrists)

This would allow optometrists more flexibility and mobility with their licensure from state to state. There are now ten states that accept CELMO with more continuously looking into it and accepting it. Check the www.arbo.org website to find more information.

NBEA (National Board of Examiners in Optometry) Presentation

NBEA is a non-profit organization dealing with State Boards and the VA (Veteran Affairs). This is the organization that gives Board exams!

• ACMO = Advanced Competence for Medical Optometry at the request of NAVAO (National Association of VA Optometrists) for VA residents.
• NBEA offers the Norman E. Wallis Award(s) to the top scorer(s) on the Part 1 Board Exam. The recipient(s) will get a 100% refund of Boards fees and $500 travel grant for the next Optometry’s Meeting.
• Restructuring of Parts I and II are upon us. The website has been updated with new sample questions and new grid format for looking at the areas covered on the test. They call it the Content Matrix. The test will link the questions to conditions and would be conditions based. For example, what disease/condition may be linked with nerve fiber layer loss? Answer: Glaucoma. Don’t forget that Boards test at the highest level of competency so lasers and injection questions will be on boards now too. Also, injections will be coming to Part III at the earliest for the Class 2010, but may be implemented later.
• Students can check scores online soon after taking the exam!

More information can be found at the website www.optometry.org. There are sample exams posted, but people say that they are easier than the actual test. They encourage students to plan ahead! NBEA does not endorse any study guides, but they encourage students to go back to the original text, and not use the study guides as the primary source. The NBEA board continues to employ psychometric analysis to monitor the possibility of cheating.

ASCO (Association of Schools and Colleges of Optometry) Report

• ASCO is a non-profit education association and represents the 19 schools in the US, Canada, and Puerto Rico. The following is a list of ASCO’s current projects:
  • Student Loans: ASCO is working with the AOA in Washington to pass necessary legislation to allow optometry to be a part of a loan forgiveness program. Like other health care professions, optometrists would have their loans repaid in exchange for practicing in a community in need of optometric care. The HR 1884 Bill has increased its number of co-sponsors so we are on the right track.
  • Two new schools will be starting this fall and another school in Texas will be coming in the next couple of years as well.
  • Western University of Health Sciences College of Optometry, Pomona, CA. (see http://www.westernu.edu)
  • Midwestern University in Arizona
  • New Residencies are being added this year.
Ten new VA sites each year for the next seven years. Also they are increasing the VA residency stipends this year!

- The Indian Health Service also offers a great option. They may pay up to $120,000 plus $20,000 loan repayment each year.

Undergraduate students wanting to learn more about optometry school can look at [www.opted.org](http://www.opted.org) to find out more information about applications and latest updates.

**Ciba Vision**

Ciba has been working hard at reaching out to students and optometrists. Here are some of the programs they offer:

- **Management & Business Academy™** (co-sponsored by CIBA VISION® and Essilor of America) — For mid-career private practitioners, the Academy for Eyecare Excellence offers the business education for established private optometric practices, including seminars, publications and [mba-ce.com](http://mba-ce.com) website.
- **Corporate Optometry Academies** — For corporate-affiliated optometrists, the Academy for Eyecare Excellence offers practice development education for optometrists practicing in corporate retail settings, including seminars, "best practices" manuals and [oba-ce.com](http://oba-ce.com) website.
- **First Practice Academy™** (co-sponsored by CIBA VISION and Essilor of America) — For new private practice owners, the Academy for Eyecare Excellence offers business education for private optometric practices during their formative years, endorsed by the American Optometric Association.

For more information about these programs please check out [www.cibavisionacademy.com](http://www.cibavisionacademy.com).

**AOA Advantage Program (Student Assistance Foundation)**

This is one of the most beneficial programs offered to members of the AOSA. The AOA has provided an excellent program called AOA Advantage with competitive rates for loan consolidation. Students should look into the best option for their situation; this non-profit loan program can save students thousands of dollars over the years. Check out [www.aoaadvantage.org/AOA](http://www.aoaadvantage.org/AOA) to find out more information.

**OCC (Optometry’s Career Center)**

The OCC is a part of the AOSA, and it is another valuable benefit open to all AOSA members. The OCC provides helpful optometric interviewing tips, cover letter and resume help and job placement opportunities for graduates. AOSA members can look at detailed profiles of doctors in order to find the best fit for future opportunities. Members will receive alerts via email when new postings appear that fit their requirements.

Additionally, members have the option to post resumes on the database so that doctors looking to add another optometrist to their practice may contact you. This is such a valuable resource for students, and as an AOSA member, it is completely free! Contract Review is also available free to AOSA members. See [www.aoa.org](http://www.aoa.org) for more information.

**CooperVision**

The new CooperVision, Inc., "Adopt A Patient" program allows primarily third- and fourth-year optometry students to fit patients in any of CooperVision's contact lenses, free of charge. CooperVision will also provide the patients with a complimentary one-year supply of the prescribed contact lenses. The company expects to invest approximately $200,000 in support of the "Adopt A Patient" program. For more information about the "Adopt A Patient" program, or to order contact lenses for the program, please contact Mark André, FAAO, at mandre@coopervision.com.


**COVD (College of Optometrists in Vision Development) Presentation**

COVD is an organization made up of 1800 optometrists, optometry students, and vision therapists. If you are interested in behavioral and developmental vision care, vision therapy, and vision rehabilitation, this is the organization you want to get involved in. They are working on a mentorship program to connect interested students with active COVD optometrists. Binocular vision kits are provided as a third year AOSA membership benefit are co-sponsored by COVD and the Optometric Extension Program Foundation. The 38th annual COVD meeting will be held this year in Palm Springs, California at Rancho Las Palmas Resort & Spa October 14-18, 2008. There are travel grants and a discounted registration fee for students. Check out [www.covd.org](http://www.covd.org) for more information. Student membership is currently free, so sign up!

**Optometry Giving Sight Presentation**

Optometry Giving Sight was established in 2003 to address the needs of the 250 million men, women, and children around the world who are...
blind or visually impaired simply because they
don’t have access to an eye exam and a pair of
glasses. Optometry Giving Sight is a global
fundraising campaign reaching out to the more
than 200,000 optometrists around the world, and
their nearly 325 million patients, to fund the
solution.

Optometry Giving Sight supports programs that
offer not only eye exams and glasses in countries
with little or no access to them, but that establish
the infrastructure and train the local human
resources required for sustainable, quality vision
care. This is a joint initiative of the World
Optometry Foundation (WOF), the International
Centre for Eyecare Education (ICEE) and the
International Agency for the Prevention of
Blindness (IAPB), and they support the goals of
VISION 2020: The Right to Sight, an initiative of
IAPB and the World Health Organization (WHO).
VISION 2020 aims to eliminate avoidable
blindness by the year 2020, in order to give all
people in the world the right to sight.

Show your commitment and make a donation
as a student on or before World Sight Day, which
is October 9, 2008. For more information, go to
their website at http://www.givingsight.org/

AOA-PAC Presentation

Representatives advocated for attending next
year’s AOA Advocacy Conference, June 22-24,
2009. They would like to beat this year’s record of
100 students and expand that to 200 students next
year. Due to the AOA Advocacy Conference this
year HR 1884 has increased its Co-Sponsors to
142 as of June 10th! They also started a
Facebook Group called America's Vision,
Optometry's Future. Please join and support AOA-
PAC. This is an election year, so the AOA-PAC is
busy supporting representatives who share our
vision for the future of Optometry. We highly
encourage everyone to get involved, donate, and
experience the power of our voice and the law.

Vistakon Vision Care Institute presentation

The Vision Care Institute™ is a state-of-the-art
facility located on Vistakon's Jacksonville, Florida
campus and is dedicated to training 3rd and 4th
year optometry students and residents. Recent
graduates are also encouraged to attend. The
institute was designed to complement your
education and strengthen your confidence as you
move into your role as an eye care practitioner.
LWW’s Health Care Conference Group will
handle all trip logistics, from registration through to
your final departure from Jacksonville. Students
will not be responsible for any out-of-pocket
expenses, including round-trip airfare, meals, and
lodging. Training sessions take place over two and
a half days. This would be an excellent opportunity
for all of us as we learn more about contact lenses.
Don't miss the chance! While all classes are
encouraged to attend, it will be most helpful after
first semester third year when students begin to
learn more about contact lenses. For more
information, visit The Vision Care Institute website
at www.vciregistration.com. This is a very
generous gift provided by Vistakon for all
optometry students. Vistakon also provides travel
grants for Optometry’s Meeting each year.

InfantSEE presentation

InfantSEE™ is a public health program
designed to ensure that eye and vision care
become an integral part of infant wellness care to
improve a child's quality of life. Under this program,
which is working on its third year, member
optometrists will provide a comprehensive infant
eye assessment within the first year of life as a no
cost public health service. The American
Optometric Association encourages parents to
include a trip to the optometrist in the list of well-
baby check-ups. Assessments at six to twelve
months of age can determine healthy development
of vision. Early detection of eye conditions is the
best way to ensure a child has healthy vision for
successful development—now and in the future.
To learn more about this wonderful program go to

APHA (American Public Health Association)
presentation

APHA is the oldest and largest public health
association in the world with 50,000 members
representing over 50 occupations. The association
works to protect all Americans and their
communities from preventable, serious health
threats. APHA represents a broad array of health
officials, educators, environmentalists, policy-
makers and health providers at all levels working
both within and outside governmental
organizations and educational institutions. Visit
www.apha.org to find more information.

OEPF (Optometric Extension Program
Foundation) presentation

The OEPF is an international, non-profit
organization dedicated to the gathering and
distribution of information on vision. By going to
www.oepf.org, many of your questions concerning
vision, vision care, and vision rehabilitation will be
answered. The OEPF helps new doctors find older
optometrists who are ready to retire, and create job
opportunities and practice placement. OEPF also has numerous behavioral vision continuing education programs available at a discounted rate to students. Currently, the OEPF sponsors the binocular vision kits that third year AOSA members receive as a member benefit.

**HOYA Vision Care presentation**

HOYA Vision Care is active in three major fields of business: information technology, vision care, and lifestyle refinement. Their aspheric lenses are designed based on an idea unique to HOYA. Currently, HOYA sponsors the Optometric Reference Guides, which are provided to second year students as an AOSA member benefit. At this year’s conference, HOYA was a significant sponsor, and they even raffled off multiple iPods at the exhibit hall. This year Mike Elton, HOYA marketing, was honored by the AOSA for all the hard work that he does for the students with the AOSA Founder’s Award.

**AOA Contact Lens and Cornea Section (CLCS) presentation**

CLCS is a special interest section of the AOA. They provide leadership and educational opportunities, professional and career advice, and clinical guidance to promote professional patient care in the areas of contact lens and primary eye care settings. Also, there are several CLCS scholarships that were available to students and residents this past school year. Look for more scholarship opportunities this coming year! For more information visit www.aoa.org.

**AOA Sports Vision Section (SVS)**

The Sports Vision Section of the AOA is dedicated to the protection of athlete’s eyes during competition, vision correction, as well as visually enhancing athlete’s binocularity or depth perception. For more information, visit www.aoa.org.

**TLC Vision Corporation presentation**

TLC is an eye care services company, providing doctors with the tools and technologies needed to deliver high-quality patient care. They were one of the most significant sponsors of the AOA meeting this year. TLC sponsored “Is Your Patient a Candidate for Refractive Surgery” lecture, as well as the Trinity nightclub party on Friday night. They provided a wonderful mix of information and fun for everyone who attended the conference.

**Joint Board Certification Process**

A hot topic at our Board meetings was the Joint Board Certification Process. This is joint effort by AOA, AOSA, NBEO, ARBO, ASCO, and AAO. This diverse group is looking into the idea of having Board Certification for Optometrists. There is no set process/proposal created at this point. They are looking at what process has worked for other groups in the health care community of primarily general family practitioners. Why you may ask, because certain states are having difficulties with receiving Medicare/Medicaid reimbursement. Also the group is trying to be proactive so that Optometry can create our own process and not have one made for us by Medicare or other insurance companies. If this is approved by optometry collectively once a proposal has been created, it would still take years for this to be implemented due to having to get laws changed in many states and the program set up.

Next we’ll examine some of the parties and events at the meeting.

**Welcome Reception**

This night was a lot of fun. Students gathered for the Wednesday Night Welcome Reception which was complete with a live band and delicious hors d’oeuvres in a patriotic atmosphere. No doubt that fun was had by all in attendance.

**Optometry Super Bowl**

This was so much fun, and was generously sponsored by Essilor of America. Our very own Adam Russ represented us in this year’s competition! This year’s first place winner ($1,000) was University of California Berkeley, but I’m sure Adam has many tips for next year’s contestant so that we can take home the trophy in D.C.! The room was buzzing (literally and figuratively) with energetic people supporting their representatives up on the stage. The Optometry Super Bowl Spirit Award went to the Pacific University College of Optometry, but IU definitely had a fantastic effort. The 5th Annual IU Quiz Bowl will take place during spring semester to determine our contestant for the 2009 Super Bowl in Seattle.

**TLC Trinity Nightclub**

Students had to register for “Is Your Patient a Candidate for Refractive Surgery,” a lecture provided by TLC, in order to attend the Trinity party. This exquisite Seattle nightclub proved to be a big hit as there were a multitude of rooms packed with optometry students from across the nation. One drink ticket was provided and tasty hors
d’oeuvres were available for hungry awaiting students. Friday night was filled with dancing, food, and lots of fun!

**Presidential Celebration**
Saturday night was specially set aside for everyone to enjoy Jay Leno. Jay was a terrific speaker and left everyone laughing with an unforgettable memory of Optometry’s Meeting in Seattle. Afterwards, a dessert reception gave students and doctors the opportunity to meet with friends and colleagues.

**Convention Center**
It was fun getting free things and learning about many different companies throughout the days we were there. The AOA, Alcon, and Allergan raffled off grants and much more! Hoya and a couple other companies raffled off free iPods.

The conference was a great experience overall. Don’t miss the next conference, which will be held in Washington, D.C., June 24-28, 2009. Registration will start near the beginning of Spring Semester!

**Future Locations and Dates of the AOA Meeting**
- 2009 Washington, DC June 24-28, 2009
- 2010 Orlando, FL June 16-20, 2010
- 2011 Salt Lake City, UT June 15-19, 2011
- 2012 Chicago, IL
- 2013 San Diego, CA

*Danielle Ries is a member of the Indiana University School of Optometry Class of 2010 and is an AOSA Trustee. Shea Ferree is a member of the Indiana University School of Optometry Class of 2011 and is an AOSA Trustee-Elect.*
This paper summarizes a series of studies performed at Indiana University between 1997 and 2001 on AC/A ratios determined using the modified Thorington dissociated phoria test. Three of the four studies were published previously only in abstract form.

The significant advantages of the modified Thorington phoria test suggest that it should be used more commonly than it is presently. It is quick and simple to perform and easy for patients to understand. It is the most repeatable of all dissociated phoria tests.2-4 Smaller phorias than be observed with cover test can be measured.5-8 Commercially available targets for the test include the distance and near Muscle Imbalance Measure cards from Bernell and the Saladin card.9,10 Average values found for the near phoria on the modified Thorington test range from 2 to 3 prism diopters exo for young adults,3,4,11,12 close to the 3 prism diopters exo in Morgan’s norms.13,14

The modified Thorington test is performed by shining a penlight through the hole in the center of the test card. Test cards should be held at the distance for which they are calibrated. A Maddox rod is held over the patient’s right eye with the rods oriented horizontally for a lateral phoria test and vertically for a vertical phoria test. On a lateral phoria test, if the Maddox rod line is seen to the right of the white light, eso is indicated. If the line is seen to the left, exo is indicated. (If the Maddox rod was over the left eye, these directions would be reversed) The patient reports the number through which the red line passes. That number is the number of prism diopters of eso or exo. Additional information on performing the modified Thorington test can be found in various reference books.15-17

In each of the four studies, both stimulus and response AC/A ratios were determined. For the determination of response AC/A ratios, accommodative responses were measured using an Canon Autoref R-1 infrared autorefractor. That autorefractor is an open view instrument that allows the patient to view objects in real space at a distance of the examiner’s choosing. The open view is made possible by an angled infrared reflecting mirror used for the refractive measurement. Dioptric accommodative stimulus was varied by added lenses over the subjective refraction. Monocular accommodative responses were measured while the subjects viewed the Bernell Muscle Imbalance Measure card used for the modified Thorington test.

In each study, response AC/A ratios were calculated using the principal axis regression slope1 with phorias as the y-axis values and accommodative response as the x-axis values. The phorias taken through different adds made it possible to determine gradient AC/A ratios with various pairings of phorias. In the discussion below, +1 D gradient will refer to gradient AC/A ratios determined using phorias through the subjective refraction and a +1.00 D add, -1 D gradient will refer to AC/A ratios found from phorias with the subjective refraction and a -1.00 D add, +1/-1 D gradient for AC/A ratios with phorias using +1.00 D and -1.00 D adds, and +2/-2 D gradient for AC/A ratios taken with +2.00 D and -2.00 D adds.

**Study #1: Repeatability**18

The eight subjects in this study ranged in age from 18 to 40 years, had amplitudes of accommodation of at least six diopters, and were free of asthenopic symptoms. Testing was done at two sessions for each of the subjects. Response

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Study 1</th>
<th>Study 2</th>
<th>Study 3</th>
<th>Study 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean 40 cm phoria</td>
<td>8 young adults</td>
<td>51 young adults</td>
<td>19 young adults</td>
<td>24 children</td>
</tr>
<tr>
<td>Mean slope response AC/A ratio</td>
<td>3.8 (1.3)</td>
<td>5.9</td>
<td>4.7 (2.0)</td>
<td></td>
</tr>
<tr>
<td>Mean +1 D gradient AC/A ratio</td>
<td>2.1 (1.0)</td>
<td>3.3</td>
<td>2.9 (1.5)</td>
<td>2.3 (1.5)</td>
</tr>
<tr>
<td>Mean -1 D gradient AC/A ratio</td>
<td>3.6</td>
<td>3.0 (1.9)</td>
<td>3.4 (2.3)</td>
<td></td>
</tr>
<tr>
<td>Mean +1/-1 D gradient AC/A ratio</td>
<td>3.5</td>
<td>3.0 (1.4)</td>
<td>2.9 (1.5)</td>
<td></td>
</tr>
<tr>
<td>Mean +2/-2 D gradient AC/A ratio</td>
<td>3.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 1. Average phorias and AC/A ratios in the four studies (standard deviations in parentheses). The units for phorias are prism diopters, with negative sign indicating exo. The unit for AC/A ratios was prism diopters per diopter.*
AC/A ratios were found by slope determinations of phoria on accommodative response using lens adds of +1.00, 0, -1.00, -2.00 D, and -3.00 D.

The mean response AC/A ratio was 3.8 Δ/D (SD=1.3). The mean +1 D gradient AC/A ratio was 2.1 Δ/D (SD=1.0). The difference between AC/A ratios on the two sessions (session 1 minus session 2) averaged +0.1 Δ/D (SD=0.5) for the response AC/A ratios and -0.2 Δ/D (SD=1.0) for the +1 D gradient AC/A ratios.

A common method of evaluating repeatability is to find the 95% limits of agreement by multiplying the standard deviation of the differences by 1.96. That number would suggest the range of values within which results would fall 95% of the time. The 95% limits of agreement for the response AC/A ratio was +/-1.0 Δ/D.

The mean response AC/A ratio was 3.8 Δ/D. The mean +1 D gradient AC/A ratio was 2.1 Δ/D. The difference between AC/A ratios on the two sessions (session 1 minus session 2) averaged +0.1 Δ/D (SD=0.5) for the response AC/A ratios and -0.2 Δ/D (SD=1.0) for the +1 D gradient AC/A ratios.

Study #2: Comparison of Gradient AC/A Ratios to Slope Response AC/A Ratio

The subjects in this study were 51 asymptomatic, nonpresbyopic young adults. Phorias and accommodative responses were found using lens adds of +2.00, +1.00, 0, -1.00, and -2.00 D. Various lens combinations were used to calculate gradient stimulus AC/A ratios, which were all between 3.3 and 3.6 Δ/D. (see Table 1). Pearson correlation coefficients were calculated to find how closely the gradient AC/A ratios correlated with the slope response AC/A ratios. The r values for the correlations of the gradient AC/A ratios with the AC/A response were: +1 D gradient, 0.42; -1 D gradient, 0.35; +1/-1 D gradient, 0.63; +2/-2 D gradient, 0.65. Thus the +1/-1 D gradient and +2/-2 D gradient correlated more closely with the response AC/A ratio than the +1 D gradient or the -1 D gradient.

Study #3: Gradient Stimulus AC/A Ratios in Young Adults

Nineteen young adults served as subjects in this study. Phorias and accommodative responses were determined with lens adds of +1.00, 0, and -1.00 D. The mean 40 cm phoria with the subjective refraction was 1.3 prism diopters exo (SD=3.9). The mean +1 D gradient, -1 D gradient, and +1/-1 D gradient AC/A ratios were 2.9 Δ/D (SD=1.5), 3.0 Δ/D (SD=1.9), and 3.0 Δ/D (SD=1.4), respectively. The lower standard deviation for the +1/-1 D gradient indicates less variability than on the +1 D gradient or -1 D gradient AC/A ratios.

Study #4: Gradient Stimulus AC/A Ratios in Children

Twenty-four children ranging in age from 6 to 16 years (mean age, 10.2 years) were the subjects in this study. Phorias and accommodative responses were measured with the following lens adds: +1.00, 0, -1.00, -2.00, and -3.00 D. The mean phoria at 40 cm with no add was 1.9 prism diopters exo (SD=3.7). The mean stimulus AC/A ratios were 2.3 Δ/D (SD=1.5) on the +1 D gradient, 3.4 Δ/D (SD=2.3) on the -1 D gradient, and 2.9 Δ/D on the +1/-1 D gradient.

Comments

The results of these four studies suggest the following:

1. The mean gradient stimulus AC/A ratios in studies 2, 3, and 4 (where the numbers of subjects were greater than in study 1) ranged from 2.3 to 3.6 Δ/D, with standard deviations ranging from 1.4 to 2.3 (See Table 1). These means are slightly lower than Morgan’s mean gradient AC/A ratio of 4 Δ/D.

2. The +1/-1 D gradient stimulus AC/A ratio showed less variability and better correlation with the response AC/A ratio than the +1 D gradient and the -1 D Gradient AC/A ratios. This may be due to the mathematics of AC/A ratio calculation. For the +1/-1 D gradient AC/A ratio, the denominator is 2, so any measurement error in the phorias is divided by 2. On the +1 D gradient AC/A ratio and the -1 D AC/A ratio, the denominator is 1.

3. The 95% limits of agreement for repeatability of +1 D gradient AC/A ratios was +/-2.0 Δ/D. The higher correlation of the +1/-1 D gradient AC/A ratio than of the +1 D gradient AC/A ratio with the response AC/A ratio suggests that repeatability could be improved by using the +1/-1 D gradient AC/A ratio.

4. In studies 3 and 4, the +1/-1 D gradient stimulus AC/A ratios were similar in young adults (mean, 3.0 Δ/D) and children (mean, 2.9 Δ/D).

5. As has been found in other studies, the stimulus AC/A ratios were less than the response AC/A ratios. In studies 2 and 4, the mean +1/-1 D gradient stimulus AC/A ratios were about 60% of the mean slope response AC/A ratios. In study 1, the mean +1 D gradient stimulus AC/A ratio was 55% of the slope response AC/A ratio.

References

LITERATURE REVIEW: PHOTIC SNEEZE REFLEX
by David A. Goss, O.D., Ph.D.

Between optometry school and graduate school I practiced for a year in the office of Drs. Allen Lande and Donovan Crouch in Storm Lake, Iowa. I can recall being puzzled on one occasion there when a patient reported during a case history, “I sneeze when I go out into bright sunshine.” It wasn’t until a few years later that I found that the likely explanation was that the patient was one who exhibits the photic sneeze reflex.

Everett1 coined the term photic sneeze reflex in 1964 to describe “a tendency to sneeze when exposed to bright light.” Prior to Everett, Sédan2 had described six cases and proposed the term photosternutatory reflex. Subsequent discussion of the reflex has generally used Everett’s term. In elaborating on prior discussions of the condition, Everett’s earliest citation was to an 1875 book, Diseases of the Nose and its Accessory Cavities, by Watson.

The photic sneeze reflex is not a widely known phenomenon. Peroutka and Peroutka3 observed in 1984 that it was not mentioned in any medical or neurological textbook in use at that time. When polling 25 neurologists at the Johns Hopkins Hospital, Peroutka and Peroutka found that only 8% of them knew of the photic sneeze reflex. Everett1 presented information on six young adult white males who sneezed when going out into bright sunshine. Most of them reported a series of two or three sneezes immediately after the initial exposure to the sun. Some of them also sneezed when a bright artificial light was turned on in a darkened room, but some did not. Lewkonia4 reported the case of a 47 year old male who sneezed when ophthalmoscope and slit lamp lights were directed toward his eyes. The patient recalled that he had sneezed upon exposure to sunlight and bright lights since childhood.

Prevalence

Everett1 asked a group of hospitalized patients if they noticed that they tended to sneeze upon exposure to bright sunlight or other bright lights. An affirmative response was given by 8 of 45 white patients (17.8%), but none of 30 black patients.

Everett1 also distributed questionnaires concerning the photic sneeze reflex to medical students and to groups of undergraduate university students. The numbers of students who reported sneezing in response to bright lights were: 42 of 151 white males (27.8%), 16 of 100 white females (16%), 1 of 42 black males (2.4%), and 1 of 46 black females (2.3%). Differences in prevalence by race and gender were statistically significant (white males vs. white females, p<0.05; white males vs. black males, p<0.001; white females vs. black females, p<0.02).

Ten of the white students in Everett’s survey reported noticing an immediate family member having the photic sneeze reflex. Eight of those ten (80%) had the photic sneeze reflex themselves. In comparison, only 20.7% of the white students who had not noticed the photic sneeze reflex in an immediate family member had it themselves. These percentages were significantly different at the 0.001 level by the Chi-square test.

Beckman and Nordenson5 asked a group of 460 blood donors in Sweden whether sudden exposure to a bright light made them sneeze. A positive answer was obtained from 109, for a prevalence of 24%. Beckman and Nordenson reported that they did not find a significant association with gender.

Lang and Howland6 found a tendency to sneeze in sunlight in 15 out of 138 patients (11%) being treated for rhinitis. They also stated that 50 of 144 persons in the Scripps Clinic Medical Group (35%) reported sneezing in sunlight.

Inheritance

Beckman and Nordenson5 questioned 18 families with a total of 37 children about the photic sneeze reflex. In families in which one parent had the photic sneeze reflex, 9 of 14 children had it. In families where neither parent had a photic sneeze reflex, no children out of 23 had it.

Peroutka and Peroutka3 reported on a family with photic sneeze reflex. The index case reported sneezing twice upon moving into bright sunlight. The photic sneeze reflex was present in his father and brother, but not in his mother or wife. The daughter of the index case was observed sneezing twice when being brought into bright sunlight at about four weeks of age. This response had persisted for the intervening six months before their report. Because of the apparent transmission from father to daughter, they suggested an autosomal dominant inheritance.

Hypotheses for Causative Mechanism

Whitman and Packer7 summarized four
hypotheses to explain the photic sneeze reflex, some of which were first suggested by Everett: (1) The first hypothesis posited photic sneezing resulted from an optic nerve-maxillary nerve association similar to a photophobia response from optic nerve to efferent fibers in the ophthalmic division of the trigeminal nerve. (2) A second hypothesis invoked "coactivation of neighboring parasympathetic branches by one stimulus." A bright light might cause lacrimation along with pupillary constriction. The lacrimation might then lead to nasal congestion and sneezing. (3) A third idea was a possible hypersensitivity of the parasympathetic system, with affected individuals having "more stimulus-sensitive nasal mucosa and consequent nasal obstruction or allergic rhinitis." (4) A fourth hypothesis suggested that intraorbital stimulation of the trigeminal nerve and increased ocular sensitivity to light could summate to lead to photic sneezing.

Lang and Howland\textsuperscript{6} discussed 15 patients which they treated for rhinitis, all of which had improvement in their rhinitis as a result of the treatment. That improvement was associated with a lessening of the frequency of sneezing in sunlight in seven of the fifteen. The tendency to sneeze in sunlight was unaffected by the treatment in eight of the fifteen. Lang and Howland suggested that a nasal hyper-responsiveness, as could be caused by rhinitis, plays a role in some cases of the photic sneeze reflex.

Comments

The photic sneeze reflex has been reported to be present in as many as approximately one-third of individuals in some populations. However, it is not a widely known phenomenon. When I checked the indexes of several optometry textbooks and reference books, I found an entry for the photic sneeze reflex only in Diagnosis and Management in Vision Care, edited by Amos.\textsuperscript{8} Exact causes of the reflex are unknown. With awareness of the reflex, practitioners can explain its nature to patients who have observed it.

References

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