



# Poster Presentations

*120th Annual AOA Congress & 47th Annual  
AOSA Conference: Optometry's Meeting®*

*June 21-25, 2017*

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# Poster Presentations

## Optometry's Meeting® • Washington, DC • June 21-25, 2017

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**THIS YEAR IS DIFFERENT: POSTERS WILL NOT BE SORTED BY CATEGORY! THEY WILL BE SORTED BY DATE AND TIME; PLEASE MAKE A NOTE OF THE DATE AND TIME OF ALL POSTER SESSIONS SO YOU DO NOT MISS ANY OF YOUR CHOSEN AUTHOR(S). ALL POSTER SESSIONS WILL BE IN THE EXHIBIT HALL.**

### POSTER SESSION #1

ALL POSTERS WILL BE ON DISPLAY  
THURSDAY JUNE 22, 2017 FROM 4PM – 7PM  
FOR - PRE-REVIEW.

### POSTER SESSION #2

Friday June 23 from 1 pm to 2 pm

#### Poster #1 BV - Binocular Vision

*A Case of Juvenile Bilateral Functional Amblyopia*  
Breanne B. McGhee, O.D., MEd

#### Poster #2 BV - Binocular Vision

*The association between stereopsis and ocular sensory dominance*  
Cui Yu, M.D.  
Additional Author(s)  
Ziming Liu, M.D.  
Hua Bi, O.D., Ph.D.

#### Poster #12 BV - Binocular Vision

*Covering all bases in a patient with chronic progressive external ophthalmoplegia*  
Mandip Kaur, O.D.  
Additional Author(s)  
Marina Su, O.D.

#### Poster #14 CL - Contact Lens

*Effects of Orthokeratology Lens on High Myopia in Adolescent concerning Their Visual Acuity and Development of*

*Diopter*

Yang Yin, Ph.D  
Additional Author(s)  
Wu Zhengzheng, M.S.  
Du Nian, B.S.

#### Poster #16 CL - Contact Lens

*Effects after overnight orthokeratology on corneal higher-order aberrations for myopia*  
Wei Zhao, Ph.D

#### Poster #17 CL - Contact Lens

*Peripheral Refractive Error with Multifocal and Spherical rigid gas-permeable contact lenses*  
Can Chen, M.S.

#### Poster #18 CL - Contact Lens

*A Novel Fitting Algorithm for Alignment Curve Radius Estimation Using Corneal Elevation Data in Orthokeratology Lens Trial*  
Kai Wang, M.D. & Ph.D.  
Additional Author(s)  
Lu Zhang, M.D.  
Yue Zhang, M.D.  
Yanlin Liu, M.D.  
Mingwei Zhao, M.D., Ph.D.

#### Poster #27 CL - Contact Lens

*Resolution of Conjunctival Compression Prior to Impression-Based Scleral Device Fitting*  
Muriel Schornack, O.D.

#### Poster #32 V - Low Vision/Vision Impairment & Rehabilitation

*Permanent Cortical Visual Impairment*  
Kirandeep Kaur Chatha, B.S.

#### Poster #40 OD - Ocular Disease

*Can a Mathematics entrance test predict the success of first year Optometry students in an Optics course?*  
Shankaran Ramaswamy, B.S., Ph.D  
Additional Author(s)  
Roger West, O.D., Ph.D.

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#### **Poster #41** **OD - Ocular Disease**

*Bilateral CRVO in a Patient with Type 2 Membranoproliferative Glomerulonephritis*

Andrew J Sacco, O.D.

#### **Poster #42** **OD - Ocular Disease**

*Retinal Ganglion Cell Loss as Evidence Leading to Previously Undiagnosed Stroke*

Erica Vanderpool, O.D.  
Additional Author(s)  
Megan Patterson, O.D.

#### **Poster #13** **BV - Binocular Vision**

*Mystery Headaches Due to V Exotropia Pattern*

Gary Roth, O.D.  
Additional Author(s)  
Michel Millodot, Ph.D.  
Liat Bantz, Ph.D.

#### **Poster #45** **OD - Ocular Disease**

*Avoiding Misdiagnosis with Retinitis Pigmentosa*

Melissa Engle, O.D.  
Additional Author(s)  
Daniel Smith, O.D.

#### **Poster #47** **OD - Ocular Disease**

*Macroform Recurrent Corneal Erosion: Treatment and Management*

Jazzmon Sherman, O.D.  
Additional Author(s)  
Ivan H. Garcia, M.D.

#### **Poster #48** **OD - Ocular Disease**

*Outcome and Complications of Femtosecond Laser-assisted High Myopic LASIK Combined With Collagen Crosslinking*

Huiying Liu, Ph.D

#### **Poster #49** **OD - Ocular Disease**

*Analysis of refraction and ocular components in 450 college students with normal visual acuity of Uygur nationality*

XiaoMing Huang, M.S.

#### **Poster #50** **OD - Ocular Disease**

*OCT sheds light on suspicious ONH appearance of patient with giant cell arteritis, reveals true nature of disc edema*

Gurinder S. Multani, O.D.  
Additional Author(s)  
Amy Falk

#### **Poster #84** **OD - Ocular Disease**

*Choroidal Thinning in Pachychoroid Spectrum Disorders (PSDs)*

Daniel Epshtein, O.D.

#### **Poster #85** **OD - Ocular Disease**

*Thrombotic Thrombocytopenic Purpura: An Etiology of Central Retinal Vein Occlusion*

Cerina Buchanan, O.D.

#### **Poster #96** **PC - Primary Care**

*Validation of the Effect of Glare on Contrast Sensitivity Under Mesopic and Photopic Conditions*

Paul Alan Harris, O.D.  
Additional Author(s)  
Zachary German, Student  
Laurel Roberts, Student

#### **Poster #97** **PC - Primary Care**

*Untreat Eye Disease in Down Syndrome*

Dominick M. Maino, O.D., MeD

#### **Poster #115** **PH - Public Health / Policy**

*Analysis of Related Factors Inducing Dry Eyes in Tibetan Children Aging from Seven to Twelve Years*  
Wei Deng, M.D.

## **POSTER SESSION #3**

*Friday June 23 from 3 pm to 4 pm*

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#### **Poster #3** **BV - Binocular Vision**

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## Poster Presentations

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*Co-Management of surgically assisted vision therapy for adult strabismus*

Nina Teng, B.S.  
Additional Author(s)  
Shankaran Ramaswamy, O.D.

#### **Poster #4** **BV - Binocular Vision**

*In Vivo Confocal Microscopic Investigation of the Cornea After Autologous Implantation of Lenticules Obtained through SMILE for Treatment of Hyperopia*

Meiyan Li, M.D., Ph.D

#### **Poster #5** **BV - Binocular Vision**

*Becoming "EXO" Man*

Lauren Lombardi, O.D.

#### **Poster #19** **CL - Contact Lens**

*Changes and diurnal variation of visual quality after orthokeratology in myopic children*

Wanqing Jin, M.D.  
Additional Author(s)  
Haochen Guo  
Anpeng Pan  
Qinmei Wang  
Jia Qu

#### **Poster #20** **CL - Contact Lens**

*Management of Lagophthalmos with Gas Permeable Scleral Contact Lenses- An Alternative to Tarsorrhaphy*

Melanie Frogozo, O.D.

#### **Poster #21** **CL - Contact Lens**

*Prediction of orthokeratology lens decentration with corneal elevation*

Zhi Chen, M.D., Ph.D

#### **Poster #25** **CL - Contact Lens**

*Anterior Uveitis in Scleral Lens Overwear: A Ring of Fire*

Calista Ming, O.D.  
Additional Author(s)  
Julie Rodman, O.D., M.S.  
Perla Najman, O.D.

#### **Poster #33** **LV - Low Vision/Vision Impairment & Rehabilitation**

*Visual Phenomena*

Tiffany Khoo, O.D.

#### **Poster #51** **OD - Ocular Disease**

*Choroidal Neovascular Membrane Mimicking Choroidal Melanoma in Hereditary Kidney Disease*

Melissa A. Suckow, O.D.  
Additional Author(s)  
Caryn LaBuda, O.D.  
Stephanie Klemencic, O.D

#### **Poster #52** **OD - Ocular Disease**

*ONH and Macular Atrophy secondary to Pseudotumor Cerebri from Minocycline Use*

Angela Fung, B.S.  
Additional Author(s)  
Kathryn Deliso, O.D.

#### **Poster #54** **OD - Ocular Disease**

*Perineural Invasion of Squamous Cell Carcinoma Resulting in Multiple Cranial Nerve Palsies*

Angela Diamantakos, O.D.  
Additional Author(s)  
Jenna Blechman, O.D.  
Michelle Caputo, O.D.  
Norma Schatz, M.D.

#### **Poster #55** **OD - Ocular Disease**

*Anatomical explanation of optic disc pit maculopathy associated with good visual acuity*

Nataly M. Fahim, O.D.  
Additional Author(s)  
Munish Sharma, O.D.

#### **Poster #57** **OD - Ocular Disease**

*Bilateral Acanthamoeba Keratitis: I Don't Believe Ya!*

Cassandra Baker, O.D.

#### **Poster #58** **OD - Ocular Disease**

*Papilledema*

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Alyssa Campagnone, O.D.  
Additional Author(s)  
Kathryn Deliso, O.D.

**Poster #59**  
**OD - Ocular Disease**

*More Than Meets The Eye*

Raymond Guimond, O.D. Student  
Additional Author(s)  
Anne Reuter, O.D.

**Poster #69**  
**OD - Ocular Disease**

*Early presentation of neuroretinitis with photo documentation of progression.*

Justin Burden, BS / OS4

**Poster #120**  
**CL - Contact Lens**

*On-eye performance of lotrafilcon B lenses packaged with a substantive wetting agent*

Jessie Lemp, M.S., Ph.D.  
Additional Author(s)  
Jami Kern, Ph.D.  
Carol Morris, Ph.D.

**Poster #86**  
**OD - Ocular Disease**

*Pseudophakic Pupillary Block*

Heena Patel, O.D.  
Additional Author(s)  
Amy Falk, O.D.

**Poster #87**  
**OD - Ocular Disease**

*Serial Specular Microscopy Imaging in Corneal Endotheliitis*

Daniel Epshtein, O.D.

**Poster #88**  
**OD - Ocular Disease**

*Recurrent Transient Vision Loss in a 19-year-old Woman with Peripapillary Staphyloma*

Muriel Schornack, O.D.  
Additional Author(s)  
Tomo Yamada, O.D.

**Poster #98**  
**PC - Primary Care**

*A new valid and reliable questionnaire to determine the causes of asthenopia*

Ruzhi Deng, Ph.D

**Poster #99**  
**PC - Primary Care**

*Corticosteroids and Immunosuppressant use in Juvenile Dermatomyositis*

Erelida Gene, B.S.  
Additional Author(s)  
Anne Reuter, O.D.  
Stephanie Rice, O.D.

**Poster #116**  
**PH - Public Health / Policy**

*Correlation analysis of the myopic classification and its influencing factors for 240 tibetan children aged 7 to 12 years*

Wei Deng, Dr.

## POSTER SESSION #4

*Friday June 23 from 4 pm to 5 pm*

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**Poster #6**  
**BV - Binocular Vision**

*Double Trouble*

Lauren Lombardi, O.D.

**Poster #7**  
**BV - Binocular Vision**

*Accommodative Esotropia Treatment Revealing Vertical Strabismus and Ocular Torticollis*

Michael W. Smith, OD  
Additional Author(s)  
Kassandra Johnston, O.D.

**Poster #8**  
**BV - Binocular Vision**

*Stress-Induced Esotropia in an Optometry Student*

Margaret K. Bailey, O.D.  
Additional Author(s)  
Kelly Frantz, O.D.

**Poster #22**  
**CL - Contact Lens**

*PATIENT AND ECP SATISFACTION IN THE UNITED STATES WITH A NOVEL WATER GRADIENT DAILY DISPOSABLE*

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#### MULTIFOCAL CONTACT LENS

Mohinder Merchea, O.D., Ph.D, MBA  
Additional Author(s)  
Dwight Akerman, O.D., MBA  
Jessica Mathew, O.D., Ph.D.  
Carla Mack, O.D., MBA

#### **Poster #23** **CL - Contact Lens**

##### *Parental Perceptions of Contact Lenses for Pediatric Patients*

Jennifer Vickers, O.D.  
Additional Author(s)  
Amy Waters, O.D.

#### **Poster #24** **CL - Contact Lens**

##### *Management of Filamentary Keratitis with Scleral Lenses*

Emily Korszen, O.D.

#### **Poster #26** **CL - Contact Lens**

##### *Real World Evaluation of Patient Experiences with Multifocal Contact Lenses*

Jill Saxon, O.D.  
Additional Author(s)  
William Reindel, O.D.  
Marjorie Rah, O.D., Ph.D

#### **Poster #28** **CL - Contact Lens**

##### *Presbyopia, Salzmann's and Sjogren's: A Multifocal Scleral Lens Success Story*

Samantha J. Rao, O.D.  
Additional Author(s)  
Andrea Janoff, O.D.

#### **Poster #36** **LV - Low Vision**

##### *Improvement of visual quality using corneal topography-guided customized ablation treatment for patients after radial keratotomy*

Liu Ting, M.D.  
Additional Author(s)  
Qiuxia Kan, M.D.  
Ji Bai, Professor

#### **Poster #39** **LV - Low Vision**

##### *Binocular Pupillary Response Measurements in Division I Collegiate Athlete*

Navjit K. Sanghera, O.D.  
Additional Author(s)  
Katie Foreman, O.D.  
Susan Ann Kelly, Ph.D.  
Stephen Beckerman, O.D.

#### **Poster #60** **OD - Ocular Disease**

##### *A Career in MSG or a Life with MS*

Jacqueline Hallauer, O.D. Student  
Additional Author(s)  
Lt Krista Green, O.D.  
Anne Reuter, O.D.  
Sara Bustamante, O.D.

#### **Poster #61** **OD - Ocular Disease**

##### *Atypical Presentation of NAION*

Stefanos Kotsokalis, O.D.

#### **Poster #62** **OD - Ocular Disease**

##### *Panuveitis in a Heroin Addict*

Michelle Yudina, B.A.  
Additional Author(s)  
Shankaran Ramaswamy, O.D.

#### **Poster #64** **OD - Ocular Disease**

##### *Recovery of vision after tumor resection in a patient with compressive optic neuropathy*

Jessica Rodriguez, B.A.  
Additional Author(s)  
Kathleen O'Leary, O.D.

#### **Poster #65** **OD - Ocular Disease**

##### *Not Your Typical Macular Degeneration: Retinal Angiomatous Proliferation*

Danielle Gretz Chambers, O.D.  
Additional Author(s)  
Mark McKenzie, O.D.

#### **Poster #67** **OD - Ocular Disease**

##### *Polypoidal Choroidal Vasculopathy*

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Stephanie Arnio, B.S.  
Additional Author(s)  
Jami Parsons-Malloy, O.D.

#### **Poster #68** **OD - Ocular Disease**

*Optic Disc Pits: The Choice of Observation*

Brittany Jones, B.A.  
Additional Author(s)  
Anne Reuter, O.D.

#### **Poster #70** **OD - Ocular Disease**

*Late onset retinal detachment in retinopathy of prematurity*

Dieu-Hong Ho, O.D.  
Additional Author(s)  
Suzanne Wickum, O.D.  
Kassaundra Johnston, O.D.

#### **Poster #71** **OD - Ocular Disease**

*Choroidal Melanoma*

Kinjal Patel, O.D. Intern

#### **Poster #72** **OD - Ocular Disease**

*The depth of OCT: Seeing the Unseen*

Andrea Briggs, B.S.  
Additional Author(s)  
Jamie Parsons Malloy, O.D.

#### **Poster #89** **OD - Ocular Disease**

*Focal Choroidal Excavation in Central Serous Chorioretinopathy*

Daniel Epshtein, O.D.

#### **Poster #101** **PC - Primary Care**

*Vitamin D Supplementation Reduces Atopic Dermatitis Severity*

Mark Hakim, O.D.  
Additional Author(s)  
Nancy Wiggins, O.D.

#### **Poster #102** **PC - Primary Care**

*Corneal Illusions-Brought to You By Off Label Proparacaine*

*and HSK*

Lauren E. Fereday, M.S., O.D.(2017)  
Additional Author(s)  
Richard Wood, O.D.  
Kathryn Deliso, O.D.

#### **Poster #110** **PH - Public Health / Policy**

*Epidemiological survey of visual acuity and refractive error of pupils in Yilong County in Sichuan Province of China*

Yang Yin, Ph.D.  
Additional Author(s)  
Li Dongfeng, MBA  
Wu Zhengzheng, MBA

## **POSTER SESSION #5**

*Saturday June 24 from 9 am to 10 am*

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#### **Poster #9** **BV - Binocular Vision**

*Keep It Down: Using Horizontal Vergence to Control Hypotropia*

Caitlin Miller, O.D.  
Additional Author(s)

#### **Poster #10** **BV - Binocular Vision**

*Visual Skill Training Correlations with Baseball Statistics in Minor League Players.*

Adam B. Blacker, O.D., M.S.  
Additional Author(s)  
Charles E. Shearer, O.D.  
Bronson W. Hamada, O.D.  
Scott M. Krauchunas, O.D., Ph.D.

#### **Poster #11** **BV - Binocular Vision**

*The Effectiveness of Visual Functions to Identify Acute Mild Traumatic Brain Injury*

Steven R. Klein, O.D.  
Additional Author(s)  
Jose E. Capo-Aponte, O.D., Ph.D.

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#### **Poster #43** **OD - Ocular Disease**

*A Case Report Depicting Chandler Syndrome, a Subtype of ICE Syndrome*

Megan Patterson, O.D.  
Additional Author(s)  
Erica Vanderpool, O.D.

#### **Poster #29** **CL - Contact Lens**

*Preventing Eucleation from Corneal Inflammation secondary to Microbial Keratitis*

Anna Liew, O.D. Student  
Additional Author(s)  
Joseph Jamie Thimons, O.D.  
Jami B. Parsons, O.D.

#### **Poster #30** **CL - Contact Lens**

*New Technology on Original Concepts: Iris Printed Scleral Lens*

Jesus Martinez, O.D.  
Additional Author(s)  
Naomi Chun, O.D.  
Jan PG Bergmanson, O.D., Ph.D., Ph.D h.c., DSc

#### **Poster #31** **CL - Contact Lens**

*To evaluate subjective and objective visual performance of DAILIES TOTAL1 Multifocal (DT1MF, delefilcon A, Alcon) contact lenses.*

Jason R. Miller, O.D., MBA

#### **Poster #35** **LV - Low Vision/Vision Impairment & Rehabilitation**

*Low Vision Rehabilitation and management of Choroideremia*

Justin Paul Kozloski, O.D.  
Additional Author(s)  
Stephanie Schmiedecke, O.D.

#### **Poster #37** **LV - Low Vision**

*Corneal power and refractive state following small incision lenticule extraction for myopia*

Ting Liu, M.D.  
Additional Author(s)  
Yu Ting, M.D.  
Ji Bai, M.D.

#### **Poster #44** **OD - Ocular Disease**

*Management Options for Central Serous Retinopathy*

Roya Attar, O.D.  
Additional Author(s)  
Jessica Haynes, O.D.  
Mohammad Rafieetary, O.D.

#### **Poster #63** **OD - Ocular Disease**

*Corneal Edema*

Katrina Hrubiec, O.D. Student  
Additional Author(s)  
Anne Reuter, O.D.

#### **Poster #66** **OD - Ocular Disease**

*Susac Syndrome or Atypical Multiple Sclerosis*

Jenna Koskey, O.D.

#### **Poster #73** **OD - Ocular Disease**

*"Herpes Zoster Ophthalmicus and Subsequent Neurotrophic Keratitis: Crouching Danger, Hidden Symptoms"*

Detlef J. Sleichter, B.S.  
Additional Author(s)  
Kathleen O'Leary, O.D.

#### **Poster #74** **OD - Ocular Disease**

*Bitemporal Pallor: A Case of Suspected Toxic Optic Neuropathy*

Kimberly A. Wadas, B.A.  
Additional Author(s)  
Shankaran Ramaswamy, O.D.  
Cynthia Normandie, O.D.



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#### Poster #75

##### OD - Ocular Disease

*Loteprednol etabonate ophthalmic gel 0.5% for inflammation associated with dry eye disease: Outcomes of a 12-week Phase 2 clinical study*

David G. Evans, O.D.  
Additional Author(s)  
John D. Sheppard, M.D.  
Jon I. Williams, Ph.D.

#### Poster #76

##### OD - Ocular Disease

*A Mountain or a Mole Hill? Determining the Management of Vitreomacular Traction*

Amanda Tompkins, O.D.

#### Poster #77

##### OD - Ocular Disease

*Posterior Orbital Inflammation With A Normal Funduscopy Exam*

Katherine B. Lynch, O.D.  
Additional Author(s)  
Erica Ittner, O.D.  
Ashley Speilburg, O.D.

#### Poster #78

##### OD - Ocular Disease

*Plaque formation BRAO and beyond*

Lauren Mangano, O.D.

#### Poster #79

##### OD - Ocular Disease

*Patient sees light; doctor sees white- A case of Multiple Evanescent White Dot Syndrome*

Charlene Singh, O.D.  
Additional Author(s)  
Omar S. Punjabi, D.O.  
Jeffrey T. Joy, O.D.

#### Poster #80

##### OD - Ocular Disease

*Amniotic Membrane for Corneal Chemical Burns*

Kelly Pereira, B.S.  
Additional Author(s)  
Amy Falk, O.D.  
Michael S. Cooper, O.D.

#### Poster #81

##### OD - Ocular Disease

*Surgical Intervention in Fungal Keratitis*

Marsha Ann Thomas, O.D.  
Additional Author(s)  
Rebekah Montes, O.D.  
Padhmalatha Segu, O.D.

#### Poster #82

##### OD - Ocular Disease

*Metastatic Choroidal Melanoma from Primary Leiomyosarcoma*

Rachel Roman, B.S.  
Additional Author(s)  
Kathleen O'Leary, O.D.

#### Poster #108

##### PC - Primary Care

*Intracranial mass in a 5-year-old*

Bhumika Patel, O.D.

## POSTER SESSION #6

*Saturday June 24 from 12 pm to 1 pm*

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#### Poster #34

##### LV - Low Vision/Vision Impairment & Rehabilitation

*Fitting a Telescope to Enable a Low Vision Patient to Pursue His Love of Playing Music*

Kathryn Werner, O.D.

#### Poster #38

##### LV - Low Vision

*Visual outcomes after balanced salt solution infiltration during lenticule separation in SMILE for myopic astigmatism*

Ting Liu, M.D.  
Additional Author(s)  
Kajjian Chen, M.D.  
Ji Bai, M.D.

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## Poster Presentations

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#### Poster #46

##### OD - Ocular Disease

*Optical Coherence Tomography Angiography (OCTA) features in patients with Retinitis Pigmentosa (RP).*

Calista Ming, O.D.  
Additional Author(s)  
Julie Rodman, O.D., M.S.  
Perla Najman, O.D.

#### Poster #83

##### OD - Ocular Disease

*Differentiating Polypoidal Choroidal Vasculopathy from Wet Age-Related Macular Degeneration*

Jansi Damarla, O.D.  
Additional Author(s)  
Kelly Thompson, O.D.

#### Poster #90

##### OD - Ocular Disease

*Peripheral Pigmented Chorioretinal Atrophy*

Nadine Ahmed, O.D. Student  
Additional Author(s)  
Jami Parsons-Malloy, O.D.

#### Poster #91

##### OD - Ocular Disease

*Managing vision loss in Retinitis Pigmentosa*

Marie Mantelli, O.D.

#### Poster #92

##### OD - Ocular Disease

*Homonymous Hemianopia: Thinking Beyond the Glaucoma Suspect*

Kevin Sorya, O.D.  
Additional Author(s)  
Kathleen O'Leary, O.D.

#### Poster #93

##### OD - Ocular Disease

*An Atypical Presentation of a Classic Red Eye*

Harneet Randhawa, O.D.  
Additional Author(s)  
Tricia Newman, O.D.

#### Poster #94

##### OD - Ocular Disease

*The Element of Elevation: Ocular Toxocariasis*

Elisabeth Anderson, O.D.

#### Poster #95

##### OD - Ocular Disease

*Chalazion...or is it?: Atypical MRSA Presentation*

Felicia Dupras, O.D. Student

#### Poster #100

##### PC - Primary Care

*Concussive effects (mTBI) in veterans from the Iraq and Afghanistan conflict era in relation to other physical and psychological health problems.*

Thomas G. Urosevich, O.D., M.S.  
Additional Author(s)  
Stuart N. Hoffman, D.O.  
Richard E. Adams, Ph.D.  
Charles R. Figley, Ph.D.  
Joseph A. Boscar, Ph.D., MPH

#### Poster #111

##### PH - Public Health / Policy

*Prevalence, Incidence, Progression and Risk Factors for Myopia and High Myopia among Children in Central China: the Anyang Childhood Eye Study*

Shi-Ming Li, M.D., Ph.D.

#### Poster #103

##### PC - Primary Care

*Clinical competency in ocular fundus examination using ophthalmoscopic virtual reality simulation systems*

Larry Hou-Yan Ng, O.D.  
Additional Author(s)  
Yeung Lau, B.S.  
Ming-Kit Cheng, B.S.  
Jiameng Wang, B.S.

#### Poster #104

##### PC - Primary Care

*An Atypical Presentation of Diabetic Retinopathy*

Reena Lepine, OD,  
Additional Author(s)  
Joanne Smith, O.D.

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#### **Poster #105** **PC - Primary Care**

*Migraine Headaches and Demonstrated Longstanding Visual Field Loss*

Kathryn Surdovel, O.D., MPH  
Additional Author(s)  
J. Patrick Smith, O.D., M.S.  
Laura Dowd, O.D.

#### **Poster #106** **PC - Primary Care**

*Brachial to Radial Systolic Blood Pressure Amplification in Young, Healthy Adults*

Lauren Bruehl, B.S.  
Additional Author(s)  
Bradley Schuster, B.S.  
Patricia Cisarik, Ph.D.  
Daniel Fuller, O.D.

#### **Poster #107** **PC - Primary Care**

*Patent Foramen Ovale and Transient Ischemic Attack Ocular Manifestations*

Roger W. Studd, O.D. Student  
Additional Author(s)  
Kathleen O'Leary, O.D.

#### **Poster #109** **PC - Primary Care**

*Method Comparison for Blood Pressure Measurement: an Oscillometric Wrist versus LED Sphygmomanometer*

Bradley Schuster, B.S.  
Additional Author(s)  
Lauren Bruehl, B.S.  
Daniel Fuller, O.D.  
Patricia Cisarik, Ph.D.

#### **Poster #113** **PH - Public Health / Policy**

*Prevalence of myopia among children in coastal east China*

Wei Sun, Ph.D.

#### **Poster #114** **PH - Public Health / Policy**

*A Student Evaluation of Interprofessional Education Day at Nova Southeastern University, Health Professions Division*

Leon Nehmad, O.D.

#### **Poster #117** **PH - Public Health / Policy**

*Annual change of ocular biometry parameters in schoolchildren: five years follow-up*

Ping Tang, M.S.  
Additional Author(s)  
Yin Guo, M.S.  
Li Juan Liu, M.S.  
Liang Xu, M.D.  
Yi Feng, B.S.

#### **Poster #118** **PH - Public Health / Policy**

*Survey: A Public Health Investigation into Current Recommendations and Knowledge of Pediatric Vision Care*

Alicia Feis, O.D.  
Additional Author(s)  
Matthew Byers  
Brett Christensen  
Nicholas Cutunilli

#### **Poster #119** **PH - Public Health / Policy**

*Driving Exposure-Adjusted Motor Vehicle Collision Rates in Biopic Drivers with Central Vision Impairment*

Ellen E. Segerstrom, O.D.  
Additional Author(s)  
Alicia M. Zhou, O.D., M.S.  
Roanne E. Flom, O.D.  
Thomas W. Raasch, O.D., Ph.D.  
Bradley E. Dough, O.D., Ph.D.

**Posters are peer-reviewed and only those that meet the acceptance criteria are selected for presentation.**

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## Poster Presentations

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#### POSTER SESSION #1

ALL POSTERS WILL BE ON DISPLAY  
THURSDAY JUNE 22, 2017 FROM 4PM – 7PM  
FOR - PRE-REVIEW.

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#### POSTER SESSION #2

Friday June 23 from 1 pm to 2 pm

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#### POSTER #1

##### **BV - Binocular Vision**

##### **A Case of Juvenile Bilateral Functional Amblyopia**

**Breanne B. McGhee, O.D., MEd**

Juvenile Bilateral Functional Amblyopia, or Streff Syndrome, is an involuntary, amblyopia variation believed to be a result of near or emotional stress. Streff Syndrome is characterized by transient clinical features including decreased visual acuities at distance and near, reduced stereopsis, color vision deficiencies, and visual field defects.

A 12 year old African American female presented to clinic for a vision exam with concerns of reduced distance and near vision. The patient reported difficulty reading small font printed letters and poor visual comfort during prolonged reading. The patient's ocular and medical histories were unremarkable; however excessive testing anxiety was reported by the parent. Unaided acuities were 20/40 OD, 20/30 OS (distance) and 20/50 OU (near). Cover test unveiled a low exophoria at distance and near. Motilities were full and without restrictions OD, OS. Dynamic retinoscopy revealed a moderate lag of accommodation. Local stereoacuity with Randot was 40 arc seconds without suppression. Color vision and confrontation visual fields were normal OD, OS. Manifest distance refraction revealed mild hyperopic correction with no improvement in visual acuities

under cycloplegic conditions. Anterior and posterior health were unremarkable for pathology OD, OS. A clinical diagnosis of Streff Syndrome was made and plus near lenses were prescribed. The goals of the plus lenses were to normalize accommodative responses through the AC/A relationship, improve visual symptoms and maximize comfort.

Over two months of progress evaluations, there were improved distance and near visual acuity, increased stereoacuity, reduced lag of accommodation, and stable color vision and visual field findings. This case illustrates the potential benefits of plus near readers in Streff Syndrome to help improve visual comfort and symptoms induced by stress. Vision therapy maybe appropriate if conjugative accommodative and vergence dysfunctions are present. A referral for psychology evaluation and stress reliever exercises should also be explored and recommended to care for the underlying etiologies.

#### POSTER #2

##### **BV - Binocular Vision**

##### **The association between stereopsis and ocular sensory dominance**

**Cui Yu, M.D.**

##### **Additional Author(s)**

**Ziming Liu, M.D.**

**Hua Bi, O.D., Ph.D.**

“Information: Ocular dominance refers to the preferring of visual input from one eye to the other, also exists. It is not clear whether fine stereopsis(lower stereothreshold and quicker response) would only be found in persons with two balanced eyes. In this study, we set to quantify the relationship between stereopsis and ocular sensory dominance.

“Thirty-eight subjects participated in the study. For each subject, ocular sensory dominance was

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quantified with the continuous flashing technique and ocular dominance index(ODI) was computed. A subject with an ODI value greater than 2 was classified as having clear ocular dominance. A subjects with an ODI value less or equal to 2 was classified as having balanced eyes. For stereopsis, the stereothresholds were measured with random dots stimulus with a 3-down-1-up staircase algorithm at 7 viewing durations ranged from 50 to 1000ms. The functions for stereothresholds versus viewing durations were analyzed by an empirical model of quadratic summation. Two parameters, T<sub>min</sub>, which is the critical duration at which the stereothreshold becomes independent of duration, and D<sub>min</sub>, which is the stereothreshold when the function becomes asymptotic, were derived from the model.

47% of the subjects (18) showed two relatively balanced eyes and 53% (20) had clear ocular dominance. T<sub>min</sub> in the subjects with balanced eyes were significantly shorter than that in the subjects with clear ocular dominance (148.8±69.1 vs. 353.2±262.9 msec, p<0.01). However, D<sub>min</sub> were not different between those two groups (42.9±23.5 vs. 60.5±50.4, p=0.19). T<sub>min</sub>, not D<sub>min</sub>, showed significant positive correlation with ODI (R=0.58, p<0.01).

Ocular dominance refers to the preferring of visual input from one eye to the other, also exists. It is not clear whether fine stereopsis(lower stereothreshold and quicker response) would only be found in persons with two balanced eyes. In this study, we set to quantify the relationship between stereopsis and ocular sensory dominance.

#### POSTER #12

##### **BV - Binocular Vision**

##### **Covering all bases in a patient with chronic progressive external ophthalmoplegia**

**Mandip Kaur, O.D.**

##### **Additional Author(s)** **Marina Su, O.D.**

Chronic progressive external ophthalmoplegia (CPEO) is a rare condition that is characterized by slowly worsening ptosis and bilateral ocular immobility. It often is a mitochondrial disorder that can be associated with Kearns-Sayre syndrome, a triad composed of CPEO, pigmentary retinopathy and cardiac anomalies or oculopharyngeal dystrophy.

A 29 year-old Hispanic male presented with diplopia primarily in downgaze and upgaze. Upon initial examination, he had extraocular muscle restrictions in all gazes with a mild paralytic ptosis in both eyes. There was no evidence of pigmentary retinopathy upon dilated fundus examination and his visual fields were full. His recent cardiac evaluation was unremarkable. His symptoms of diplopia had been worsening and he had no prior management. Alternating cover test revealed exotropia greater at near than at distance. Von Graefe testing revealed alignment at 3ΔBI at distance and a range between 10-15ΔBI at near over his right eye. Since he was symptomatic in downgaze, a Fresnel prism of 3Δ was placed over the right eye at a height that did not interfere with his primary gaze. He was advised to start pencil push up therapy 5-10 repetitions daily to strengthen his convergence. The prism needed to neutralize his diplopia will likely change as his condition worsens. A referral to oculoplastics is also warranted in the future for ptosis repair.

In conclusion, patients who are diagnosed with CPEO need an inter-professional care approach that involves primary eye care providers and various optometric management to address the patient's needs.

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**POSTER #14**

**CL - Contact Lens**

**Effects of Orthokeratology Lens on High Myopia in Adolescent concerning Their Visual Acuity and Development of Diopter**

**Yang Yin, Ph.D**

**Additional Author(s)**

**Wu Zhengzheng, M.S.**

**Du Nian, B.S.**

To observe the effects of orthokeratology lens on high myopia in adolescent.

Collected 12 adolescent people (18 eyes), with their myopia diopter among -6.25D ~ -7.00D. All of them worn orthokeratology lens overnight every day for 9 months. At different time points as 1 day, 1 week, 1 month, 3 months, 6 months and 9 months, we checked each eye on slit lamp, lens fitting, visual acuity and corneal topography. After 9 months, we also checked diopter and axial length for all the 18 eyes.

Visual acuity of all the 18 eyes (for naked eyes) was improved after one week. In 11 eyes (61.11%), the visual acuity stayed between 0.6~0.8(included 0.8). There were 3 eyes (16.67%) whose visual acuity was above 0.8. After 9 months, the diopter and axial length of the 18 eyes seemed have no significant progress compared to the data of 9 months ago( $t=0.784, P=0.444$ ).

Orthokeratology lens could improve the visual acuity (for naked eyes) of adolescent with high myopia. It might also delay development of myopia diopter.

**POSTER #16**

**CL - Contact Lens**

**Effects after overnight orthokeratology on corneal higher-order aberrations for myopia**

**Wei Zhao, Ph.D**

To evaluate corneal higher-order aberrations induced by overnight orthokeratology for myopia.

A prospective study was conducted in 100 eyes of 50 patients with overnight orthokeratology for myopia, who were followed up for at least 3 months and attained uncorrected visual acuity of 20/20 or better. Keratron-Scout (Optikon) topographer was used to examine the corneal higher-order aberrations in 6-mm.

Orthokeratology significantly reduced manifest refraction from  $-2.53 \pm 1.32$  diopters to  $-0.53 \pm 0.56$  diopters ( $P < 0.05$ ) and reduced average corneal curvature from  $42.35 \pm 1.18$  diopters to  $40.27 \pm 1.29$  diopters ( $P < 0.05$ ). The corneal total Root-mean-square (RMS) aberrations, fourth-order spherical aberrations, vertical coma aberrations and the difference of peak and valley aberrations were significantly increased by orthokeratology ( $P < 0.05$ ). Horizontal coma and the all trefoil aberrations were not significantly increased ( $P > 0.05$ ).

In spite of the better UCVA, corneal higher-order aberrations significantly increased, even in clinically successful orthokeratology cases. The increases in the higher-order aberrations perhaps could worsen the visual quality.

**POSTER #17**

**CL - Contact Lens**

**Peripheral Refractive Error with Multifocal and Spherical rigid gas-permeable contact lenses**

**Can Chen, M.S.**

A number of studies reported that reduction of peripheral hyperopic defocus can effectively slow down the development of myopia. As gas permeable contact lens (GP) materials and designs improve, a new design multifocal RGP lens was productd. The purpose of this study was to measure the relative peripheral refractive error after multifocal and spherical rigid gas-permeable (GP)

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lens wear in myopic patients and to determine whether multifocal GP lenses with a distance center design reduce hyperopic defocus in peripheral retina.

24 myopic patients were recruited and only the right eye was selected as the experimental eye. These subjects (male: 9, female: 15) aged from 18-25 years, with an average of  $20 \pm 2.71$  (Mean $\pm$ SD) years. Their refractive error was  $-2.63 \pm 1.29$ D (OD). They were taken five auto-refraction readings centrally and at 10, 20, and 30 degrees temporally, nasally while wearing a multifocal GP lens with a +3.00D add (Hiline, Taiwan, China) and wearing a spherical GP lens (Hiline, Taiwan, China) after one hour rest.

At baseline and fitted with spherical GP lens, myopic patients showed relative peripheral hyperopia compared with central refraction and increased as the eccentricity increases. Multifocal GP lens wearing reduced hyperopic defocus at 20 and 30 degrees eccentricity. These two lenses have no significant differences in peripheral refractive error at 10 degrees eccentricity. Multifocal GP lens significantly reduced hyperopic defocus at 20 and 30 degrees eccentricity among myopic patients. These data suggest that the Multifocal GP contact lens may provide a potential approach for myopia control.

#### POSTER #18

##### CL - Contact Lens

##### **A Novel Fitting Algorithm for Alignment Curve Radius Estimation Using Corneal Elevation Data in Orthokeratology Lens Trial**

**Kai Wang, M.D. & Ph.D.**

**Additional Author(s)**

**Lu Zhang, M.D.**

**Yue Zhang, M.D.**

**Yanlin Liu, M.D.**

**Mingwei Zhao, M.D., Ph.D.**

To evaluate a novel fitting algorithm for estimation of alignment curve (AC) radius during orthokeratology lens (ortho-k lens) trial.

Fifty myopic children with a mean age of  $9.73 \pm 0.92$  years were recruited in this study and separated into two groups. AC radii were estimated by both traditional method using flat K readings and eccentricity values and by a novel fitting algorithm, which was composed of two fitting steps, including circle fittings using corneal elevation data (exported from a Sirius system) from corresponding AC region at 256 meridians over anterior cornea, followed by a toric fitting, based on these calculated AC curvatures. Parameters of the final ordered lenses were determined by fluorescein analysis and corneal topography. The number of lens trials was recorded for each patient, and the consistencies of AC radius and astigmatism between the first trial lenses and the final ordered lenses were tested by Pearson correlations and Bland-Altman plots.

The numbers of trials for the novel algorithm and traditional method were  $1.2 \pm 0.4$  times vs.  $1.8 \pm 0.7$  times, respectively, and Mann-Whitney test showed significant difference between them ( $z = -3.27$ ,  $p = 0.001$ ). AC radii of the first trial lenses estimated by the novel fitting algorithm were more close to that of the final ordered lenses compared with the traditional method, which was confirmed by both correlation analyses and Bland-Altman plots, showing a R square value of 0.994 for the fitting algorithm and 0.927 for the traditional method, respectively. Similar results could also be noticed for astigmatism estimation.

AC radius and astigmatism of ortho-k lens could be better estimated by two steps of fitting algorithm using corneal elevation data from the corresponding AC region, which may shorten the time needed for ortho-k lens trial and achieve better lens fitting status.

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**POSTER #27**

**CL - Contact Lens**

**Resolution of Conjunctival Compression Prior to Impression-Based Scleral Device Fitting**

**Muriel Schornack, O.D.**

Scleral lens wear may cause persistent changes in conjunctival contour. These changes must be considered when refitting a patient into impression-based scleral devices. This case describes the process of refitting a patient whose original scleral lenses caused considerable conjunctival compression into EyePrint PRO devices.

A 62 year old Caucasian male with bilateral penetrating keratoplasty presented with hazy vision and discomfort with his current scleral lenses. Best corrected visual acuity was 20/20 OD, 20/20 OS, but slit lamp evaluation revealed areas of marked sectoral impingement of the conjunctiva beneath scleral lens haptics in both eyes. Corneal touch was present over the areas of highest elevation in both eyes. Upon removal of his lenses, distinct impressions of the lens haptics remained visible in the conjunctivae, and reactive hyperemia was noted in the inferonasal quadrants of both eyes. Corneal staining corresponded to areas of corneal touch. The patient requested a refit into EyePrint PRO devices. Given the degree of conjunctival compression, we recommended that he discontinue lens wear and return for further evaluation in 2 weeks. He was provided with a prescription for spectacles, through which he achieved 20/30 OD and 20/50 OS. Upon his return, conjunctival compression and inflammation had improved, but was still present. He continued to wear spectacle correction for another two weeks. At his next visit, conjunctival tissue appeared only mildly compressed without signs of active inflammation. Impressions were obtained, and EyePrint devices were ordered. The devices provided excellent fit, and acceptable visual acuity.

A spherocylindrical over-refraction was performed, and revised devices were ordered with the necessary power adjustment. With the revised devices, patient was able to resolve 20/20+3 OD, 20/20+2 OS, and 20/15-1 OU. Devices provided excellent haptic alignment and complete corneal clearance.

The accuracy of the impressions from which EyePrint PRO devices are designed is critical to achieve the desired fit. If prior scleral lens wear has considerably altered conjunctival contour, it may be advisable to discontinue lens wear until conjunctival contour stabilizes prior to obtaining impressions.

**POSTER #32**

**LV - Low Vision/Vision Impairment & Rehabilitation**

**Permanent Cortical Visual Impairment**

**Kirandeep Kaur Chatha, B.S.**

Cortical visual impairment (CVI) is a reduced visual response secondary to a neurological issue causing a disruption in the occipital lobes or the visual pathways. Presentation includes either an eye exam with no pathology, strabismus, or significant refractive error or abnormal visual behavior which does not correlate with the eye condition. CVI patients are categorized into different ranges depending on their abilities and needs. Common visual/behavioral characteristics found in CVI patients are, variable vision, light gazing, inability to distinguish between a background versus a foreground, intact color vision, a tendency to hold objects close, and preference for using peripheral vision.

A 9 year old Caucasian female diagnosed with Cortical Vision Impairment (range 7-8: Visual Curiosity from Cortical Visual Impairment: An Approach to Assessment and Intervention by Christine Roman-Lantzy) secondary to global



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developmental delays and seizures. She was non-verbal and had limited motor skills. Several strategies were implemented to use skills she already possessed in order to optimize her visual function. These intervention strategies included, using simple colors/backgrounds to encourage visual attention and engagement, using a lightbox or a backlit screen on a computer or mobile device to provide initial attention and motivation for a new learning activity, and encouraging visual guided reach for improved interaction with objects. Eyegaze tracking technology was also a major component of the treatment strategy as it worked on developing deliberate precise and controlled eye movements which could later be used as a means of assistive technology in daily tasks. Visual acuities with eyeglasses were 20/200 in both eyes. She demonstrated limited convergence ability with poor fixation and a high frequency intermittent exotropia. The anterior and posterior health of the eye was unremarkable. All of the above abnormal visual findings were attributed to the CVI.

Patients with CVI should undergo a functional and medical eye examination to identify any abnormalities within the eye or in visual behavior that may contribute to the visual difficulties. Although certain visual issues such as refractive error can be corrected for, functional improvement strategies are emphasized as the mainstay treatment as CVI cannot be treated medically.

#### **POSTER #40**

#### **OD - Ocular Disease**

#### **Can a Mathematics entrance test predict the success of first year Optometry students in an Optics course?**

**Shankaran Ramaswamy, B.S., Ph.D**

**Additional Author(s)**  
**Roger West, O.D., Ph.D.**

Optics courses are fundamental to an

Optometry curriculum and its mastery is prerequisite for subsequent optometric education and clinical care. First year optometry students often experience greater difficulty with optics courses which is attributed to their inability to successfully solve problems that involve basic mathematics like trigonometry or logarithmic function. The primary purpose of this study is to determine if a mathematics entrance test can predict the success of first year Optometry students in an optics course. The hypothesis is that the students who score below 70% in the mathematics entrance test, will have difficulty (potentially fail) in the optics course. A mathematics entrance test (MET) with multiple choice questions was administered to 73 first year optometry students in the very first day. These questions tested the basic concepts in trigonometric and logarithmic functions. In addition, an educational background survey was administered to collect basic demographic information about their prior education. Pearson correlation and specificity and sensitivity between the MET and course performance were calculated. The results indicated a very weak correlation ( $r=0.113$ ,  $p<0.05$ ) between the MET and the optics course performance. The specificity and sensitivity was 84.5% (CI 73.97% to 92.00%) and 0% (CI 0% to 84.19%) respectively. Correlations between four midterm and final exam were moderate (Midterm I  $r=0.64$ ,  $p<0.05$ ; Midterm II 0.63,  $p<0.05$ ; Midterm III 0.54,  $p<0.05$ ; Midterm IV 0.59,  $p<0.05$ ) The MET was good in predicting who will pass the optics course but was poor in predicting the failures. It had a poor correlation with the optics final score. Midterm exams had better correlation with optics final scores. The MET was insufficient to predict the performance in the optics course as it had limited number of questions and other extraneous factors that may have impacted its predictability.

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**POSTER #41**

**OD - Ocular Disease**

**Bilateral CRVO in a Patient with Type 2 Membranoproliferative Glomerulonephritis**

**Andrew J Sacco, O.D.**

We describe a case of bilateral central retinal vein occlusion (CRVO) in a patient with Type 2 Membranoproliferative Glomerulonephritis ("Dense Deposit Disease.") Type 2 Membranoproliferative Glomerulonephritis (MPGNII) is a disease affecting the glomeruli of the kidneys; patients typically present with hematuria and/or proteinuria, acute nephritic syndrome or nephrotic syndrome. The diagnosis is made by demonstration of "dense deposits" in the glomerular basement membrane of the kidneys. These dense deposits are histopathologically identical to the drusen that may deposit within Bruch's membrane in the retina of these patients. Patients often have progressive visual deterioration due to retinal atrophy, subretinal neovascular membranes, macular detachment or central serous retinopathy

We describe a 49 year old woman with MPGNII with nephrotic syndrome who developed central retinal vein occlusion (CRVO) OS and venous stasis OD leading to another CRVO. She is s/p kidney transplantation with failure and on dialysis awaiting another kidney. At the time of this report the patient had a remote history of CRVO OS with stable 20/400 vision. Her vision is stable at 20/25 OD on serial Eylea injections. Retinal examination also shows placoid deposition in the both retinas consistent with MPGNII.

This case describes bilateral CRVO as a result of nephrotic syndrome in Type 2 Membranoproliferative Glomerulonephritis. A review of the literature shows few if any references to bilateral CRVO in MPGNII. As there are many retinal findings in this disease, it is important for the primary care optometrist to become familiar with them and this disease state

**POSTER #42**

**OD - Ocular Disease**

**Retinal Ganglion Cell Loss as Evidence Leading to Previously Undiagnosed Stroke**

**Erica Vanderpool, O.D.**

**Additional Author(s)**  
**Megan Patterson, O.D.**

Transneuronal retrograde degeneration (TRD) occurs in the retinal ganglion cells (RGCs) following the death of neurons in the visual pathway. TRD of RGCs after cerebral infarction can be detected in vivo by measuring the NFL+GCL+IPL or ganglion cell complex (GCC) thickness using SD-OCT. GCC analysis is centered on the fovea, the physiologic division for crossed and uncrossed fibers to the visual cortex, and is shown to be a more sensitive indicator of inner retinal thinning than the RNFL in many disease processes.

A 67-year-old Caucasian male reported to clinic for a second opinion, after being labeled a glaucoma suspect based on large optic nerve head cupping OU. Distance visual acuities were 20/20 OD and 20/20 OS with correction. Extraocular muscles were full. Pupils were equal, round and reactive to light with no APD present. Anterior segment findings were unremarkable. Intraocular pressures were 17 mmHg OD and 16 mmHg OS. Dilated optic nerve appearance revealed symmetric 0.6 round cupping OU, with healthy rim tissue 360. Cirrus SD-OCT revealed a superior temporal reduction in GCC thickness OD, superior nasal reduction in GCC thickness OS, and unremarkable RNFL OU. Humphrey Visual Field 24-2 baseline testing revealed a congruous left inferior quadrantanopsia, with no glaucomatous defects OU. The patient denied any loss/change in vision, known history of stroke or stroke symptoms. MRI was ordered. A brain MRI without contrast revealed increased signal/flair within the right parietal lobe, consistent with a lacunar infarct.

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A neurology consult was scheduled, in which imaging results were reviewed. The patient was educated on signs and symptoms of a transient ischemic attack and instructed to seek emergent medical care if they occur.

TRD preserves the topographical organization of the ganglion cell layer as it is projected to the visual cortex and evaluated by a visual field. GCC analysis is a more specific measure of inner retinal thinning, with excellent reproducibility, and is an essential tool for detecting cerebral infarction or intracranial lesions that affect the visual pathway.

#### **POSTER #13**

##### **BV - Binocular Vision**

##### **Mystery Headaches Due to V Exotropia Pattern**

**Gary Roth, O.D.**

**Additional Author(s)**  
**Michel Millodot, Ph.D.**  
**Liat Bantz, Ph.D.**

V-pattern exotropia is an exodeviation with greater exotropia in upgaze than in downgaze. There must be a difference of at least 15 (others say 10) prism diopters between upgaze and downgaze in order to qualify for this classification. It may be due to physical damage to muscle tissue, mechanical restriction, or innervational deficiencies. Each eye may turn out symmetrically or asymmetrically, and the condition may be accompanied by headaches, asthenopia, reading problems, etc. Treatment options include visual therapy, yoked and/or non-yoked prisms, and strabismus surgery.

A school-aged girl with low hyperopia and history of an unusual birth complained of longstanding headaches. Various healthcare professionals (pediatrician, optometrists, ophthalmologist, neurologist) failed to find the cause of this complaint. Multifocal spectacles and

vision therapy gave no relief. Years later an optometrist diagnosed V Exo(intermittent)tropia Pattern, and upon consultation with a colleague, prescribed yoked base-up prism, and later added base-in prism -- resulting in marked improvement in symptoms. Additional diagnoses include alternating cortical suppression, as well as a non-isophoric vertical phoria.

V pattern exotropia is not routinely tested for in the standard eye examination. We presented a case wherein a young child went undiagnosed for years, despite a history of headaches. We recommend that all eyecare practitioners add upgaze and downgaze testing to their testing regimen for all patients, or at the very least for those who are symptomatic.

#### **POSTER #45**

##### **OD - Ocular Disease**

##### **Avoiding Misdiagnosis with Retinitis Pigmentosa**

**Melissa Engle, O.D.**

**Additional Author(s)**  
**Daniel Smith, O.D.**

Rather than being considered a primary diagnosis, Retinitis Pigmentosa (RP) is now regarded as the resulting phenotype for a collection of inherited retinal degenerative diseases resulting in a loss of photoreceptors. Most clinicians are familiar with characteristic features pertaining to RP, such as nyctalopia, constricted visual fields, waxy pallor of optic nerve, arteriolar attenuation, bone/pigment spicules in the retinal periphery, and reduced amplitude ERG. However, atypical forms of RP exist, resulting in unfamiliar ocular signs, and further complicating clinical decision making. To avoid misdiagnosis, it is important for clinicians to be made aware of these. Atypical forms of retinitis pigmentosa may include retinitis pigmentosa

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inversus, retinitis pigmentosa sine pigmento, retinitis punctata albescens, and sector retinitis pigmentosa. Lastly, it is also important to recognize that vitreal cells and debris are common in RP, often misleading clinicians to misdiagnose patients with vitritis. Given the many clinical subtleties of RP, clinicians should also be aware of new management options such as the Argus II Retinal Prosthesis and retinal transplants.

A sixteen-year-old Hispanic female presented to the clinic complaining of progressively deteriorating night vision in both eyes for the past four years. Best corrected visual acuity was 20/40 in OD and OS with normal color vision, pupil function, and extraocular motilities. Posterior segment examination showed 1+ cells in the vitreous with substantial vitreal debris, pale optic discs, vascular attenuation, pigment disruption in the macula, white peripheral retinal lesions, and an isolated bone spicule all of which were present in each eye. After performing a HVF 24-2, OCT of the macula, fundus autofluorescence, fluorescein angiogram, and an ERG, a diagnosis of retinitis pigmentosa was made.

This case, unique given the presentation of vitreal debris and whitish peripheral retinal lesions, could mislead clinicians to a diagnosis other than retinitis pigmentosa. Therefore, all eye care providers should be educated on the atypical forms of RP, their unfamiliar ocular sequelae, and certainly new management options for patients with retinitis pigmentosa.

#### **POSTER #47**

#### **OD - Ocular Disease**

#### **Macroform Recurrent Corneal Erosion: Treatment and Management**

**Jazzmon Sherman, O.D.**

**Additional Author(s)  
Ivan H. Garcia, M.D.**

Recurrent Corneal Erosion (RCE) is poor adhesions between the epithelium and basement membrane frequently from previous corneal trauma. Macroform RCE is when the malformed adhesions is large with loose epithelium. This case represents a patient with a RCE characteristic of Macroform.

51 y.o. female presents on 11.28.16 with a history of RCE OS. She woke up with pain (9/10) worse than the previous episode. Anterior Segment: 3+ conjunctival injection, corneal defect with loose epithelial tissue lower 2/3 of cornea. Diagnosis: Recurrent corneal erosion. Treatment: 80% of epithelial tissue debride in office and cornea covered with bandage contact lens (BCL). Start Besivance TID OS and Ilvero qd OS. Monitor in 2 days. Follow-up day 2: Patient still reports pain. Anterior Segment: 3+ conjunctival injection, with loose epithelial tissue under BCL. Treatment: Performed by Ivan H. Garcia, MD. BCL was removed and the epithelium was completely debride. Cornea bed was massaged with a spud and Prokera amniotic membrane graft was inserted into the affected eye. Start Cyclopentolate BID, continue Besivance TID and take Motrin + Tylenol q4hrs PO for pain. Monitor in 1 day. Follow-up day 3: Pain slightly improved. Anterior Segment: 1-2+ conjunctival injection, Prokera ring graft intact. Treatment: continue Cyclopentolate BID, Besivance TID and Motrin + Tylenol q4hrs. Monitor in 4 days and 6 days. Possible graft removal on the 6th day. Follow-up day 9: Reports blurry vision and FBS. Anterior Segment: white/quiet conjunctiva, Prokera ring graft intact. Treatment: Prokera ring removed by Noel Rosado, MD. Residual punctate keratitis remaining, cornea completely re-epithelialized. Discontinue Cyclopentolate BID and Besivance TID. Start Erythromycin ointment qhs OS. Monitor in 1 week. Follow-up day 18: reports improvement of vision and pain. Anterior Segment: mild punctate keratitis remaining. Treatment: discontinue erythromycin ointment qhs OS and start Preservative Free artificial tears QID OS. Monitor as scheduled in 5 months.

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Prokera amniotic membrane graft was proven to aid in re-epithelization of corneal tissue and improve patient symptoms. Macroform RCE require complete corneal debridement to allow limbal stem cells to produce new epithelial tissue with better adhesions to the basement membrane.

#### POSTER #48

##### OD - Ocular Disease

##### **Outcome and Complications of Femtosecond Laser-assisted High Myopic LASIK Combined With Collagen Crosslinking**

**Huiying Liu, Ph.D**

The purpose of this study was to evaluate the safety and efficacy of ultraviolet A irradiation cross-linking on completion for cases of high myopic laser-assisted in situ keratomileusis (LASIK) and to discuss the factors affecting the complications.

Methods: Seventeen consecutive LASIK cases (thirty two eyes) treated with femtosecond laser flap and the excimer laser platform were evaluated perioperatively for uncorrected visual acuity, best corrected spectacle visual acuity, refraction, keratometry, topography, cornea pachymetry, and corneal optical coherence tomography. All eyes at the completion of LASIK had cross-linking through the repositioned flap. Follow-up duration was 3–6 months. Results: Mean UCVA changed from  $0.048 \pm 0.023$  to  $1.020 \pm 0.111$  logMAR. 3 eyes gained a 1 line better, 22 eyes were equal and 4 eyes sustained a 1 line worse UCVA compare with preoperative BCVA. Obvious dry eye and corneal epithelial exfoliation were observed on 3 eyes. Different degrees of corneal haze were observed on 8 eyes. All cases were cured after active treatment. None of the cases developed signs of ectasia or significant regression during follow-up.

Femtosecond LASIK combined with crosslinking may get a significant improved UCVA. Some patients may undergo dry eye and corneal

subepithelial, while they are mostly temporary. Prophylactic cross-linking may reduce the possibility of post-LASIK ectasia.

#### POSTER #49

##### OD - Ocular Disease

##### **Analysis of refraction and ocular components in 450 college students with normal visual acuity of Uygur nationality**

**XiaoMing Huang, M.S.**

There were 450 college students with normal visual acuity of Uygur nationality were selected and evaluated with ocular examinations, and 899 eyes were enrolled. Measurements of refraction, axial length, anterior chamber depth, crystal thickness (all by A-scan ultrasonography), the corneal curvature (by keratometry) and the direct ophthalmoscopy were taken. The correlation between refraction and ocular components (axial length, anterior chamber depth, crystal thickness, corneal curvature) were analyzed by statistical methods.

Of these 899 normal visual acuity, 444 eyes were hyperopic ( $+0.75 \sim +2.50$ D), 440 eyes were emmetropia ( $0 \sim +0.50$ D), and 15 eyes were myopia ( $-0.50 \sim -1.25$ D). Axial length and anterior chamber depth showed significant differences among myopia, emmetropia and hyperopic ( $P < 0.05$ ). There was no significant difference of emmetropia and hyperopic in the ocular components between right eyes and left eyes ( $P > 0.05$ ). Axial length, anterior chamber and corneal power depth showed significant effects of emmetropia and hyperopic between boys and girls. There was no significant difference of emmetropia and hyperopic in crystal thickness between boys and girls ( $P > 0.05$ ). Boys had longer axial length, deeper anterior chamber depth and less flatter corneas than girls.

There are myopia, emmetropia and hyperopic

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in normal visual acuity students of Uygur nationality in Xinjiang Tarim University. Boys have longer axial length, deeper anterior chamber depth and less flatter corneas than girls in emmetropia and hyperopic. The ocular components show significant effects on Uygur nationality. It is important not only for study of refraction but also for investigation of the diseased eyes of Uygur nationality.

#### POSTER #50

##### OD - Ocular Disease

##### **OCT sheds light on suspicious ONH appearance of patient with giant cell arteritis, reveals true nature of disc edema**

**Gurinder S. Multani, O.D.**

##### **Additional Author(s) Amy Falk**

Affecting medium to large arteries, Giant-Cell Arteritis, otherwise known as Temporal Arteritis, affects a small population. A severe loss of vision is associated due to the posterior ciliary artery involvement. Inflammation of these arteries continues to the optic nerve head. Immediate transfer to the ER is necessitated to treat and prevent loss of vision in the fellow eye. In this case, an elderly patient with GCA presents with a sinister ONH appearance that warrants evaluation with more than the human eye.

An 82 y.o. white male presented for an IOP check after starting new glaucoma drops. He was taking 5mg oral Prednisolone to treat Temporal Arteritis. BCVA was 20/60 OD and 20/30 OS; IOP was 13 and 14 OD and OS, respectively. One month prior, BCVA was 20/40 in the right eye. Slit lamp fundus exam revealed an edematous ONH appearance. Visual field showed inferior and superior arcuate scotomas in the right eye. The patient was referred to the in-office retina ophthalmologist for a second opinion. OCT scans

were ordered due to suspicion of a posterior vitreous detachment still in its early stages. Imaging helped support the hypothesis presented by the ophthalmologist; the vitreous-ONH interface was elevating the nerve tissue, causing the appearance of disc edema. The patient was released and educated on the findings and asked to monitor his vision and other signs of temporal arteritis. In the future, a vitrectomy will be considered if traction increases and causes further decrease in visual acuity.

CT analysis aided in the diagnosis of this patient and saved a potentially costly and time-consuming visit to the emergency room. While this patient is under prophylactic treatment with oral steroids, the ONH appearance was concerning. The primary care provider was contacted and updated on the patient's condition.

#### POSTER #84

##### OD - Ocular Disease

##### **Choroidal Thinning in Pachychoroid Spectrum Disorders (PSDs)**

**Daniel Epshtein, O.D.**

Pachychoroid spectrum disorders include central serous chorioretinopathy, pachychoroid pigment epitheliopathy, pachychoroid neovascularopathy, and polypoidal choroidal vasculopathy; these conditions are thought to be the result of a hyperpermeable choroid. Though the etiology of the choroidal abnormality is still unknown, evaluation of choroid with newer imaging technologies is slowly elucidating the disease process in PSDs.

Optical coherence tomography (OCT) images of thirty-one consecutive patients with PSD were evaluated in a retrospective manner. The cohort ranged from twenty-eight to sixty-three years of age with a significant male predominance of twenty-nine males to two females. The author had

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previously evaluated all patients with dilated fundus exam and analyzed all OCT images during the course of a normal ophthalmic examination. Only one eye of each patient was used for this analysis. In cases of bilateral disease, the right eye was chosen for inclusion. All OCT images were evaluated for dilated choroidal vessels and choroidal thinning underlying retinal pathology.

Of the thirty-one patients, twenty-eight patients had identifiable dilated choroidal vessels. Of those patients with identified choroidal vessels, twenty-one had overlying choroidal thinning. Thinning was noted in both Sattler's layer and the choriocapillaris.

67% of PSD patients had identifiable choroidal thinning. Not all patients with dilated choroidal vessels had choroidal thinning, leading one to hypothesize that there might exist a temporal relationship between dilation of choroidal vessels and atrophy of overlying choroid. Larger scale prospective and longitudinal studies with multimodal imaging are necessary to further elucidate the pathophysiology and great phenotypic variability of PSDs.

#### POSTER #85

##### OD - Ocular Disease

##### Thrombotic Thrombocytopenic Purpura: An Etiology of Central Retinal Vein Occlusion

**Cerina Buchanan, O.D.**

Optic atrophy can present as a result of various etiologies. These can range from a primary source due to trauma, toxicity, or a hereditary condition to a secondary source which can be due to an ischemic, infiltrative, infectious, demyelinating, metabolic, compressive or an inflammatory condition. Thrombotic thrombocytopenic purpura (TTP) is a rare, life threatening hematologic disorder characterized by a pentad of signs. These signs include a low platelet count, hemolytic anemia,

fever, renal dysfunction, and neurological signs of varying severity. This condition has a mortality rate of 90% if left untreated. Ocular involvement is uncommon and usually presents in the preterminal stage. Ocular manifestations include conjunctival hemorrhages, amaurosis fugax, vascular occlusions, choriocapillaris occlusion due to fibrin-platelet thrombi, optic disc edema, serous retinal detachments, and retinal, vitreal, and choroidal hemorrhages.

A 44-year-old middle eastern male presented to the office for routine examination and to receive education on visual prognosis following history of a vein occlusion of the left eye diagnosed in 2008. Systemic history is remarkable for thrombotic thrombocytopenic purpura. Condition was diagnosed after episodes of unmanageable headaches, fever, malaise, rapid onset of multiple system failures, changes in mental status, and unilateral vision loss. Systemic health is also remarkable for diabetes, hypercholesteremia, and hypertension. Remarkable examination findings include afferent system abnormalities, reduced vision, APD, reduce color, brightness desaturation, constant left exotropia, and pallor of the left optic nerve. These findings were present due to history of central retinal vein occlusion secondary to thrombotic syndrome.

The eyes can be damaged in the course of TTP as with any hematologic condition. Prognosis depends on prompt diagnosis, hospital admission, and treatment. Symptoms can be cured with adequate plasmapheresis with or without the addition of plasma cryosupernatant, which he received 10 days after onset of symptoms. His acuity remains reduced. It is consistent with acuity achieved at diagnosis, but it is stable. Although TTP is uncommon, it's certainly a condition that should be ruled out in patients who present with vascular occlusive disease of the retina. Knowing differentials outside of the commonalities are important to consider for definitive diagnosis, proper management, and comprehension.

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#### POSTER #96

##### PC - Primary Care

#### Validation of the Effect of Glare on Contrast Sensitivity Under Mesopic and Photopic Conditions

**Paul Alan Harris, O.D.**

##### Additional Author(s)

**Zachary German, Student**

**Laurel Roberts, Student**

Contrast sensitivity (CS) has been a staple of optometric testing for 40+ years. Glare testing has been mostly research based. CS testing is used to measure the performance of optical corrections from contact lenses, to ophthalmic lenses to IOL implant lenses, particularly multifocal IOL's. Clinical CS testing is often quite time consuming and glare testing has not established itself yet in the clinic. This new Bull's eye concentric rings, sine-wave grating target and the automated testing protocols combine CS and glare testing in an easy to use testing system for both research and clinical use. This study was undertaken to validate the testing system and methods for both research and clinical use.

107 subjects had CS measured under mesopic (4 spatial frequencies) and photopic conditions (5 spatial frequencies) with three different levels of glare and with no glare at all, for a total of 36 different testing conditions. An automatic stepping paradigm was used which made the testing quick and efficient; all 36 thresholds were identified in about 25 minutes of testing.

The CS plots for all conditions under mesopic and photopic thresholds were plotted and compared statistically. The results showed that with all levels of glare reduced CS. The low and medium levels of glare reduced CS to about the same level; both were significantly different than no glare but were not different from each other. High glare reduced CS statistically significantly from

both the no glare and from both the low and medium glare conditions.

The results validate the use of this new sine wave Bull's eye target for measuring CS as well as identifying the levels of glare which drop CS by specific amounts. These curves will provide the basis for determining how well different contact lenses, ophthalmic lenses and IOL's perform under glare conditions and should lead to the development of clinical testing protocols for diagnosing conditions such as cataract, macular degeneration and epi-retinal membranes to name a few.

#### POSTER #97

##### PC - Primary Care

#### Untreat Eye Disease in Down Syndrome

**Dominick M. Maino, O.D., MeD**

This poster presents a single subject case study of untreated eye disease in a patient with Down syndrome. Individuals with Down syndrome have numerous oculo-visual and systemic pathologies that when left untreated can result in blindness and even death. These ocular anomalies often include high refractive error, cataracts, strabismus and various accommodative problems, while the systemic problems involve the heart and the consequences of a decreased immune response.

JD first presented in 2003 at the Neumann Family Services/Illinois Eye Institute Developmental Disability Service for a comprehensive evaluation. No past oculo-visual or medical information was available at that time. He had reduced visual acuity, retinal degeneration, cataract, and mild hyperopia. A referral for a cataract evaluation was recommended, but not scheduled. Over the next decade, multiple attempts were made to obtain appropriate medical and surgical intervention, but numerous factors placed barriers to access for that



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care. Over the next 13 years he had a massive retinal detachment, hyphema and hypermature cataract; resulting in intense pain and a marked decrease in the quality of life. Several years after the onset of these ocular health problems, surgical intervention only became available when the better seeing eye developed a mature cataract with resultant blindness.

It is unheard of for blindness to occur due to cataract in a 1st world country. This is an example of how our health care system failed one of our most needy citizens and demonstrates the devastating effects of untreated eye disease in those with Down syndrome. Eventually appropriate care was given and the patient's quality of life much improved

#### POSTER #115

##### PH - Public Health / Policy

##### **Analysis of Related Factors Inducing Dry Eyes in Tibetan Children Aging from Seven to Twelve Years**

**Wei Deng, M.D.**

To investigate the related factors inducing dry eye and its clinical features in Tibetan children aging from seven to twelve years.

Clinical data of dry eyes of 146 Tibetan children aging from seven to twelve years in our hospital were collected. Then its etiology, clinical symptoms, signs and treatment were retrospectively analyzed. Of 146 cases of Tibetan children with diagnosis of dry eye, 117 cases (80%) daily used the portable electronic devices, mobile phones and tablet computer for more than 1 hour. Ninety-six cases (66%) daily watched computer and television for more than 2 continuous hours. Thirty-four cases (23.3%) used to be diagnosed as allergic conjunctivitis, and 66 cases (45.2%) used to be diagnosed as trachoma and chronic conjunctivitis. The main clinical

symptoms included frequently blinking (59 cases, 43.8%), itching of eye (64 cases, 43.8%), foreign body sensation (56 cases, 38.3%), large amount of secretions (33 cases, 22.6%), redness of eye (56 cases, 38.3%), photophobia (35 cases, 24%) and ocular dryness (42 cases, 28.8%). Schirmer test: 40 cases were of strong positive (<5mm/5min) in 146 positive cases (<10mm/5min). BUT: 36 cases were of strong positive (<5s) in

146 positive cases (<10s). Corneal epithelium of 30 cases were dotted with dye in 1-4 quadrant. The images level of 36 cases in the examination of dry eye instrument were above 3. After a formal system treatment of dry eye, symptoms in all children were eased and all the test result were improved, but it was difficult to insist long-term follow-up visit.

Dry eye disease does exist, which is the results of multi-factors interacting with each other. Video terminal syndrome, portable electronic devices, trachoma, conjunctival inflammation and poor health habits with the eye are the main reasons for dry eye in Tibetan children. Attaching importance to their subjective symptoms and making a detail clinical examination which will help to acquire accurate diagnosis and treatment for these patients should be brought to the forefront of ophthalmic doctors. Therefore accurate diagnosis and combination treatment for the etiology are the key to the prevention and treatment of dry eye in children.

#### POSTER SESSION #3

*Friday June 23 from 3 pm to 4 pm*

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#### POSTER #3

##### BV - Binocular Vision

##### **Co-Management of surgically assisted vision therapy for adult strabismus**

**Nina Teng, B.S.**

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#### **Additional Author(s)**

**Shankaran Ramaswamy, O.D.**

Many adults with strabismus often present with a cosmetically obvious turn but have been told over the years that there is no potential treatment for them. But recent evidence shed some hope for adult strabismus patients who still have centration points or fusion.

37 years old present in clinic with a 35-40 prism diopter constant left exotropia. He rarely have diplopia, and was able to be corrected to 20/20 both eyes. Patient was able to fuse with gross stereopsis at 8 inches. Dilated examination was unremarkable. He was a bit skeptical when a treatment plan was offered since over the past years no one has told him he could be "fixed". Patient participated an initial program of office therapy with intensive home therapy until he was able to hold his eyes straight with normal fusion although occasional blur. Patient has strabismus surgery later and after he participated another 16 weeks of therapy. Now he is able to function with normal fusion and clear vision with no noticeable turn.

Co-management with strabismus surgeons and vision therapy is a great way to give better quality of life for patients with cosmetically obvious turn. Professionals should find common ground in better patients care.

#### **POSTER #4**

#### **BV - Binocular Vision**

#### **In Vivo Confocal Microscopic Investigation of the Cornea After Autologous Implantation of Lenticules Obtained through SMILE for Treatment of Hyperopia**

**Meiyan Li, M.D., Ph.D**

To investigate reinnervation in the implanted lenticule, as well as changes to the cornea, after correcting hyperopia with an autologous

implantation of a lenticule obtained through small incision lenticule extraction (SMILE).

This study retrospectively analyzed reinnervation in the implanted lenticule, as well as microscopic morphological changes in the corneal architecture of the recipient cornea in five patients (with myopia in one eye and hyperopia in the contralateral eye) who received SMILE in the myopic eye and femtosecond LASIK (FS-LASIK) combined with lenticule implantation in the contralateral hyperopic eye. Reinnervation in the implanted lenticule, as well as microscopic morphological changes in corneal architecture, were evaluated by in vivo confocal microscopy. Results: One patient was examined at postoperative week 6, two were examined at postoperative month 2, one was examined at postoperative month 9, and one was examined at postoperative month 12. Regenerated and branched nerve fibers were detected in the implanted lenticule in case 5 who was examined at postoperative month 12. Both the anterior and posterior interfaces showed an absence or decrease of keratocytes and the presence of small particles of various brightness's. Keratocytes in the implanted lenticule presented abnormal morphology in size and shape after surgery in all treated eyes, but showed partial morphological recovery in two patients (case 4 who was examined at postoperative month 9 and case 5 who was examined at postoperative month 12). Several small, bright particles were observed in the transition area between the lenticule and the recipient stroma, with no detectable rejection or haze.

These preliminary findings suggest that nerve fibers will regenerate into the implanted lenticule after autologous lenticule implantation. Keratocytes in lenticules demonstrated a gradual return to a normal morphology.

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**POSTER #5**

**BV - Binocular Vision**

**Becoming "EXO" Man**

**Lauren Lombardi, O.D.**

New research about neuroplasticity is relevant to the treatment of adult patients with strabismus. Historically, the majority of the optometric community supported the notion that there is a critical period; this suggests that there is an end point to the dynamicity of the brain. While there is a more robust response during this critical period, recent literature has shown that certain types of experiences can trigger changes ultimately leading to the perception of stereopsis in a patient with long standing strabismus. This case will outline the office based vision therapy treatment plan and results of an adult with a history of longstanding alternating esotropia.

BS, a 43 year old male presented to the Draisin Vision Group seeking vision therapy to improve his stereopsis and alignment. The initial evaluation revealed 15 LET at distance and near. His centration point was determined to be 3 cm from the nose. In the phoropter, he was able to intermittently fuse and the phoria at distance and near were both greater than 22 EP'. He suppressed all other objective testing at near. After 64 sessions of vision therapy, a cover test revealed 8 EP' at distance and near. His centration point moved back to 4 cm. He was able to gain fusion with worth four dot from the nose to 20 cm. He measured 200 seconds of stereopsis. The phoria in phoropter was 11 EP' at distance and ortho at near. With +1.50 FCC, he measured 6 XP'. His BO ranges were x/30/14 and his BI ranges were x/12/10.

This case supports that office based vision therapy is a tool that can successfully train the eyes to work together in order to gain binocularity and appreciation of depth outside of the critical period described in the literature. It may take more

time in therapy to establish new neural pathways, binocularity and anti-suppression, but if the patient is willing and motivated then it is possible to improve their lives well into adulthood.

**POSTER #19**

**CL - Contact Lens**

**Changes and diurnal variation of visual quality after orthokeratology in myopic children**

**Wanqing Jin, M.D.**

**Additional Author(s)**

**Haochen Guo**

**Anpeng Pan**

**Qinmei Wang**

**Jia Qu**

To assess the changes and the diurnal variation of visual quality after orthokeratology in myopic children.

Forty-four eyes of 22 subjects with mean age of  $10.55 \pm 1.53$  years (8 to 14 years) were enrolled in this prospective study. Their spherical equivalent ranged from -1.25 to -4.25 diopters (D) and astigmatism was less than 1.00 D. Parameters including corneal curvature, ocular objective scatter index (OSI), the modulation transfer function (MTF), root mean square of ocular and corneal wave front aberrations, and contrast sensitivity function (CSF) were measured before and at two time points during the same day after 1 month of orthokeratology.

After orthokeratology, uncorrected visual acuity (UCVA) and spherical equivalent were significantly improved from baseline ( $P < 0.001$ ), and their diurnal variation was not significant ( $P = 0.083, 0.568$ ). OSI increased from  $0.29 \pm 0.15$  to  $0.65 \pm 0.31$  ( $P < 0.001$ ). MTF decreased significantly ( $P < 0.01$ ). Corneal curvature and ocular total aberration decreased ( $P < 0.001$ ) while the ocular and corneal higher-order aberration increased significantly ( $P < 0.01$ ). The CSF under photopic condition decreased at 3

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cpd ( $P=0.006$ ), and increased at 18 cpd ( $P=0.012$ ). The diurnal variation of CSF at 18 cpd under mesopic and high glare conditions, and at 12 cpd under photopic condition were significant ( $P=0.002, 0.01, 0.017$ ).

Orthokeratology can effectively improve the UCVA and high spatial frequency CSF by decreasing the low order aberrations. However, MTF and CSF at low spatial frequency decreased because of the increase of intraocular scattering and high order aberrations. Meanwhile, CSF at high spatial frequency exists significant diurnal fluctuation.

#### POSTER #20

##### CL - Contact Lens

##### Management of Lagophthalmos with Gas Permeable Scleral Contact Lenses- An Alternative to Tarsorrhaphy

Melanie Frogozo, O.D.

Lagophthalmos can lead to corneal ulcers, scarring, and vision loss. Tarsorrhaphy (TRY) is commonly done to protect the ocular surface from lagophthalmos. Although mostly effective, corneal damage may still continue in few patients with TRY. Additionally, TRY decreases visual fields and may be viewed as cosmetically unacceptable. In such cases, scleral gas permeable contact lenses (SCLs) should be considered as alternative treatment.

This case report refers to three patients with constant lagophthalmos. Two adult patients with history of unilateral lagophthalmos resulting in failure of corneal graft in the presence of previous TRY, and one pediatric patient with bilateral lagophthalmos from lissencephaly syndrome. Both adults were re-grafted in the affected eye via penetrating keratoplasty. Lagophthalmos in the adult patients were caused by thyroid ophthalmopathy in one, and a blepharoplasty in

the other. SCLs were fitted on affected eyes of all patients because they protect the ocular surface by creating a pre-corneal fluid reservoir while optimizing vision. The follow-up period was 6 months for all patients. The adult thyroid ophthalmopathy and the pediatric patient wore SCLs on an extended schedule. The blepharoplasty patient wore SCLs during waking hours only. Both adult patients had epithelial defects that healed and stayed resolved with SCLs. The pediatric patient showed improvement of keratitis signs and a right decemetocele with SCLs.

SCLs treatment improved corneal conditions related to lagophthalmos. SCLs should be considered over TRY for management of lagophthalmos due to therapeutic benefits, visual field conservation, and vision improvement.

#### POSTER #21

##### CL - Contact Lens

##### Prediction of orthokeratology lens decentration with corneal elevation

Zhi Chen, M.D., Ph.D

To investigate the influence of corneal elevation asymmetry on orthokeratology (ortho-k) lens decentration.

Thirty-six eyes of 36 subjects were fitted with 4-curve reverse geometry ortho-k contact lenses. Corneal topography was collected before and one month after ortho-k lens wear. The difference in corneal elevation at the 8mm chord of the respective two principal meridians of corneal astigmatism was calculated. Vector analyses were performed on these differences to calculate the magnitude and direction of a vector (corneal asymmetry vector). The relationship between the angle and magnitude of corneal asymmetry vector and lens decentration were analyzed.

Baseline refractive sphere and cylinder for the

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36 tested eyes were  $-2.84 \pm 1.04$  D (range, -4.75 to -1.00 D) and  $-0.21 \pm 0.28$  D (range, -1.00 to 0 D), respectively. The mean magnitude of lens decentration was  $0.72 \pm 0.26$  mm (0 to 1.34 mm). For overall displacement, inferotemporal decentration was most common as observed in 24 eyes (67%). The mean angle of the corneal asymmetry vector ( $202 \pm 39$  degrees) was significantly correlated to the mean angle of lens decentration ( $200 \pm 39$  degrees) ( $r=0.76$ ,  $P<0.001$ ). The magnitude of corneal asymmetry vector significantly contributed to the magnitude of lens decentration (standardized Beta=0.448,  $P=0.002$ ) whereas the other tested variables did not affect lens decentration (all  $P>0.05$ ).

Lens decentration is a common phenomenon in ortho-k that mostly happens towards the inferotemporal quadrant of the cornea. The magnitude and direction of lens decentration is pre-determined by paracentral corneal asymmetry.

#### POSTER #25

##### CL - Contact Lens

##### Anterior Uveitis in Scleral Lens Overwear: A Ring of Fire

Calista Ming, O.D.

##### Additional Author(s)

Julie Rodman, O.D., M.S.

Perla Najman, O.D.

Contact lens overwear with soft lenses has been well documented. Signs and symptoms include pain, redness, tearing, decreased vision, photophobia, punctate epitheliopathy, corneal infiltrates, corneal edema, and anterior uveitis. The underlying etiology is often associated with corneal hypoxia. As gas permeable (GP) scleral contact lenses (ScCL) become more prevalent a similar clinical picture maybe described with overwear.

A 41 year old Hispanic male presented wearing a GP ScCL OS only due to his chief complaint of

redness, tearing, pain, and photophobia OD, which started one-day prior. He denied any recent history of ocular trauma or foreign body insult. His ocular history was positive for Keratoconus, OU; status post corneal crosslinking, OS; and pterygium removal surgery, OS. He had a two-year history of GP ScCL wear in both eyes with an average wear time of 16 hours per day. He was in the process of being re-fitted due to significant conjunctival compression and impingement observed with habitual lens wear, OU. Slit lamp examination revealed circumlimbal and diffuse bulbar conjunctival injection and corneal scarring, OD>OS. Cells without flare in the anterior chamber were observed, OD only. Due to the absence of any systemic conditions associated with uveitis, his habitual lens fit and wear time, and his presenting signs and symptoms; it was concluded that his condition was consistent with anterior uveitis secondary to contact lens overwear, OD. Treatment was initiated with topical corticosteroids a cycloplegic agent, and a prophylactic antibiotic, OD. New contact lenses were ordered with modified parameters, OU to improve fit and oxygen transmissibility.

Patients with contact lens overwear can present with a variety of vague and ubiquitous signs and symptoms. To accurately manage these patients, a systematic approach must be taken to rule out other associated conditions. When contact lens overwear is suspected, measures to increase oxygen to the cornea should be considered including reduced contact lens wear time, modified fit, and altered lens material and thickness. Close monitoring of GP ScCL patients is also necessary to ensure stable lens fit and continued compliance over time.

#### POSTER #33

##### LV - Low Vision/Vision Impairment & Rehabilitation

##### Visual Phenomena

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**Tiffany Khoo, O.D.**

Visually impaired patients may experience Charles Bonnet Syndrome, a visual phenomenon that results from ocular pathology or visual pathway disease. It can cause patient distress if they are unaware of the condition. A study by Abbott et. al. found that 71% of their age-related macular degeneration cohort were unaware of Charles Bonnet Syndrome and its relation to visual impairment.

An 80 year old Caucasian female presented for a low vision evaluation hoping to continue her hobby of knitting. The patient had been previously diagnosed with dry age-related macular degeneration in both eyes. The patient reported sometimes seeing, "golden rings that dance around, then disappear." She denied any neurological or psychiatric conditions, and the possible side effects of her prescribed medications were negative for visual hallucinations. Best corrected distance visual acuities were 20/380 in her right eye and 20/80 in her left. Ocular health findings were consistent with her diagnosis of dry macular degeneration and were otherwise unremarkable.

It is important for eye care providers to ask their patients about Charles Bonnet Syndrome, and proactively educate visually impaired patients of the characteristics of the condition as this may help avoid unneeded psychiatric and medical care.

**POSTER #51**

**OD - Ocular Disease**

**Choroidal Neovascular Membrane Mimicking Choroidal Melanoma in Hereditary Kidney Disease**

**Melissa A. Suckow, O.D.**

**Additional Author(s)**

**Caryn LaBuda, O.D.**

**Stephanie Klemencic, O.D.**

Autosomal Dominant Polycystic Kidney Disease (ADPKD) is a potentially lethal hereditary disease causing cysts on the kidneys. ADPKD also affects the blood vessels and endothelium, with up to 10% of asymptomatic patients having intracranial aneurysms and an increased risk of artery disease. Because the inner retina and renal glomerular system share similar developmental pathways, it is possible that this inherited renal disease may affect the eye, although little is written in the literature regarding this particular disease and ocular manifestations.

A 54 year old Caucasian male with ADPKD presented to clinic with complaints of decreased best corrected visual acuity in the right eye. The patient was diagnosed with choroidal melanoma in the right eye 6 months prior. At diagnosis, the tumor size was estimated to be 5DD in size and located inferior to the optic nerve, encroaching on the peripapillary area. He was scheduled for brachytherapy treatment. One week prior to brachytherapy, the patient presented with sudden vision loss in the right eye. Examination revealed complete vitreous hemorrhage OD and an emergency pars plana vitrectomy was performed. Biopsy of the retinal tissue was negative for cancer cells, but the surgeon's report indicated the presence of a choroidal neovascular membrane. No Anti-VEGF or laser treatment to regress the CNVM were performed. At follow up, OCT revealed a regression of the CNVM, but fluid was still present between the RPE and photoreceptor layer 360 degrees. No treatment was recommended at this time and a 6 month follow up was scheduled. Further decrease in fluid was seen on OCT 9 months s/p vitrectomy. Visual acuity stabilized at 20/60 OD.

This case report follows a patient with ADPKD and ocular complications. Due to the increased risk of endothelial dysfunction and vascular anomalies in ADPKD, ocular vascular disease should be considered early in the differential diagnosis.

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**POSTER #52**

**OD - Ocular Disease**

**ONH and Macular Atrophy secondary to Pseudotumor Cerebri from Minocycline Use**

**Angela Fung, B.S.**

**Additional Author(s)**  
**Kathryn Deliso, O.D.**

Tetracycline antibiotics have a known severe side effect potential to cause a rise in intracranial pressure, otherwise known as Pseudotumor Cerebri. An inability to reabsorb or filter cerebrospinal fluid (CSF) from the subarachnoid spaces causes pressures to rise within the intracranial cavity. Papilledema ultimately results in part with the buildup of CSF and contribution of a force that opposes exiting axoplasmic flow in the optic nerves. Prolonged swelling of the optic nerve heads and a potential leakage of fluid to the macular area can cause visual losses secondary to permanent damage to vital ocular tissue.

A 26-year-old female was prescribed Minocycline for Acne Vulgaris control. Patient had noticed minor and tolerable headaches at the time of usage without any visual complaints. Manifestation of visual symptoms prompted the patient to report to a healthcare professional for evaluation, at which minocycline intake was discontinued and a lumbar puncture was performed to confirm papilledema secondary to pseudotumor cerebri. On ocular examination, patient is using eccentric viewing strategies primarily in the right eye. Correctable visual acuities are 20/25 and 20/20 in the right and left eye, respectively. IOPs and Anterior Segment were unremarkable. Pupils, EOMS, and Color vision were normal. Dilated examination reveals a pale right ONH with macular atrophy with scarring obscuring foveal reflex presence. Left eye ONH appears pink and healthy with a small area of paramacular atrophy. OCT of the ONH revealed

360 RNFL thinning of the right eye. HVF 30-2 standard indicated inferior, superior, and nasal peripheral loss.

Patients who are prescribed tetracycline antibiotics should be properly and thoroughly educated on signs and symptoms that are key indicators for a potential manifestation of pseudotumor cerebri. Given different pain tolerances per individual, and especially for young patients who are desperate acne control, patients may not report symptoms promptly until irreversible damage has already occurred. Education and prompt ocular examinations are pivotal and should be incorporated into management of patients using tetracycline antibiotics.

**POSTER #54**

**OD - Ocular Disease**

**Perineural Invasion of Squamous Cell Carcinoma Resulting in Multiple Cranial Nerve Palsies**

**Angela Diamantakos, O.D.**

**Additional Author(s)**  
**Jenna Blechman, O.D.**  
**Michelle Caputo, O.D.**  
**Norma Schatz, M.D.**

Perineural invasion (PNI) is an infrequent manifestation of cutaneous squamous cell carcinoma (SCC). Metastasis typically occurs through involvement of cranial nerves five and/or seven, likely due to their widespread subcutaneous distribution. Common symptoms include diplopia, pain, paresis, or paresthesias in the distribution of the cranial nerves. This case describes a male with recurrent cutaneous SCC with PNI diagnosed clinically and radiologically.

An 81-year-old male presented with a history of intermittent horizontal and vertical diplopia for approximately five months. During that time, he also noted occasional numbness along the right

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side of his forehead. After multiple evaluations with no clear findings to support the patient's symptoms, the patient was referred to the neuro-ophthalmology department and neuro-imaging was performed. On examination, the patient demonstrated a right sixth nerve palsy and a right fourth nerve palsy. Magnetic resonance imaging of the brain and orbits, with and without contrast, revealed an area of hyper-intensity at the orbital rim above and lateral to the superior rectus-levator complex extending to the superior orbital fissure. Mild enhancement of the right cavernous sinus was also noted. Due to the patient's extensive history of skin cancer (including squamous cell carcinoma just above the right brow), a tissue biopsy of the lesion was recommended. The patient underwent an orbitotomy with biopsy of the lesion near the supraorbital notch. Pathology confirmed the diagnosis of acantholytic squamous cell carcinoma. The patient was then referred to the oncology department for further management. He is scheduled to begin radiation treatment.

PNI is associated not only with local recurrence of SCC, but local and distant metastasis as well. It is typically associated with a poor prognosis. For these reasons, it is essential to obtain a thorough history and recognize certain neurological findings to aid in early detection.

#### **POSTER #55**

#### **OD - Ocular Disease**

#### **Anatomical explanation of optic disc pit maculopathy associated with good visual acuity**

**Nataly M. Fahim, O.D.**

**Additional Author(s)**  
**Munish Sharma, O.D.**

Optic disc pit is a rare congenital anomaly that presents as a gray-white, round or oval shaped depression in the optic disc. It is usually unilateral

and located temporally with normal visual acuity in the absence of complications. 25-75% of patients, in the third to fourth decades of life, may develop maculopathy with progressive vision loss. There is an initial schisis-like separation of the inner layers of the retina which communicates with the pit, followed by serous detachment of the outer retinal layers. Spontaneous resolution of the detachment can occur in up to 25% of cases with visual improvement. Visual acuity has been variably described in literature ranging from 20/20 to 20/600 and decreased vision is usually attributed to maculopathy.

A 66-year-old HF presented for a routine eye examination with complaints of intermittent ocular irritation and dryness. On examination, best corrected visual acuity was 20/25 in each eye and Goldmann applanation tonometry was 16 and 17 mmHg for OD and OS, respectively. On dilated fundus examination, the patient had 2+ nuclear sclerotic cataract in both eyes and normal fundus examination in the right eye. An optic nerve pit with maculopathy was found in the left eye and was confirmed with high-resolution Spectralis SD-OCT. The OCT provided insight into the anatomical explanation of her visual acuity. Although clinical examination revealed macular elevation, the OCT distinguished macular schisis from serous detachment and the absence of the latter in the subfoveal area. The patient was later evaluated by a retina specialist, and FA findings confirmed the OCT findings with the absence of leakage in the subfoveal area.

The decrease in visual acuity from optic nerve pit maculopathy is more dependent on subfoveal serous detachment rather than macular elevation and schisis. The astute optometrist should be able to recognize this condition with the help of modern imaging modalities. This poster will include OCT imaging and FA.



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**POSTER #57**

**OD - Ocular Disease**

**Bilateral Acanthamoeba Keratitis: I Don't Believe Ya!**

**Cassandra Baker, O.D.**

Acanthamoeba is a free-living protozoan parasite that is quite common in our environment. When the parasite causes an eye infection, acanthamoeba keratitis (AK) can be a very serious condition. The leading risk factor for AK is contact lens use—85% of AK cases occur in these patients with common denominators such as poor contact lens care, unfit cleaning methods, or exposure to contaminated water. The incidence reported by the CDC is approximately 1-33 cases per million contact lens wearers. Prompt diagnosis and treatment is crucial for effective management of this sight-threatening condition.

A 14 year-old Asian girl (CC) presented with severe eye pain, light sensitivity, and severely decreased vision OU. Her VA's were LP OD, OS. Slit lamp examination revealed bilateral, large epithelial defects, underlying stromal edema, and endothelial plaques. Upon questioning, CC had recently gone swimming in a lake and was an orthokeratology lens wearer. CC had previously been seen by six eye care professionals and treated unsuccessfully with antibiotics and steroids. To obtain a diagnosis, cultures were taken. Empirical treatment with PHMB and chlorhexidine, alternating every hour around the clock was started, topical antibiotic coverage was continued, and the steroid was discontinued. With a positive culture of acanthamoeba, the treatment was continued and monitored daily until improvement was observed. Medical treatment and monitoring were tapered and adjusted over the course of a few months. Topical Avastin, oral voriconazole, oral prednisone, topical steroids, topical NSAIDs, and amniotic membranes were all used to aid management as well. Six months later, BCVA is

20/60 OS (s/p corneal transplant) and 20/50 OD (awaiting transplant once OS stabilizes).

AK has remained detrimental despite improvements in treatment. This is attributed to delayed diagnosis and treatment, as well as a need for an improved understanding of the pathogenesis of AK. Delayed diagnosis allows further penetration of the parasite into the cornea making treatment more difficult. Proper contact lens care, hygiene, and wear should be stressed with contact lens wearers. Asking correct questions and educating contact lens patients properly may help decrease the incidence of AK, or least allow for prompt treatment and better outcomes.

**POSTER #58**

**OD - Ocular Disease**

**Papilledema**

**Alyssa Campagnone, O.D.**

**Additional Author(s)**

**Kathryn Deliso, O.D.**

Bilateral optic nerve swelling involves a plethora of testing as well as being able to distinguish between true disc swelling and disc elevation without true swelling. OCT, visual field, fundus photos, fluorescein angiography, and a thorough fundus exam are the key elements that must be included in testing.

A 67 year old male presented with a slight decrease in his vision at distance and near. He also admitted to having occasional headaches which are relieved with ibuprofen. His previous ocular history from five years ago contained a mild diagnosis of cataracts. Examination Findings • Distance VA sc: 20/30 OD, 20/30- OS • Refraction: +0.25 -1. 00 x 75 OD, +0.75 -2.25 95 OS • PERRL (-) APD • CF: full to finger count • EOM: full OU • IOP (Goldman): 18mmHg OD, 19mmHg OS • SLE o Lids/Lashes-clear OU o Conjunctiva-clear, white, quiet OU o Cornea: clear

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OD, foreign body scars OS o Iris-clear OU o AC-deep and quiet OU o Lens-1-2+ nuclear sclerosis OU • Dilated Fundus Examination o Optic Nerve: 0.0 OU-moderate edema with surrounding hemes OU o Macula: flat, clear OD and OS o Vessels: scattered hemes, no diffuse signs of hypertensive retinopathy or venous congestion OU o Periphery: § No holes, tears, detachments OU • Blood pressure: 135/91 • Assessment: papilledema with differentials including AION, hypertensive retinopathy, brain tumor • Plan: Refer to emergency room for further testing and head CT scan. RTC: 2 days visual field

In this case of papilledema, a right temporal meningioma ended up being the culprit. The patient underwent surgery for a successful resection of the meningioma. Although the patient did not show for the visual field, an enlarged blind spot can be predicted. After the resection, one can expect the papilledema to resolve on its own and can take up to 20 weeks to completely resolve. The diagnosis of papilledema can be difficult, such as with bilateral optic nerve head drusen. The right tests must be performed in order to make the correct diagnosis. A CT scan and lumbar puncture may be performed to rule out brain tumors and idiopathic intracranial hypertension.

#### POSTER #59

##### OD - Ocular Disease

##### More Than Meets The Eye

**Raymond Guimond, O.D. Student**

##### Additional Author(s)

**Anne Reuter, O.D.**

As Optometrists, we are sometimes too focused on the eye, when in fact some cases require us to take a step back and evaluate the patient's complete health. We all know the common diseases that can affect the eyes such as diabetes and hypertension, but there are endless

conditions throughout the body that can have an impact on the eyes.

A 57-year-old Caucasian female presented for flashes in her lower left field of view. The flashes started this morning and they seemed worse when wearing her glasses or moving around. It is important to note that the patient had been having mild abdominal pain for the last couple months and was being followed by her PCP for acute pancreatitis. A dilated fundus exam revealed several cotton-wool spots in each eye with also a retinal hemorrhage in the left eye. These findings led us to the conclusion that this was Purtscher-like retinopathy. Acute pancreatitis in most cases causes severe abdominal pain leaving the patient in extreme discomfort. Our patient only had mild pain and was able to go about her day without it truly affecting her. As a result we decided to run blood work in order to rule out other causes of her abdominal pain and retinal abnormalities. The results of the blood work were as followed; increased ferritin levels, increased CEA levels, increased alkaline phosphatase levels, decreased reticulocyte HGB and lastly there were increased levels of CA19-9. CA19-9 is a tumor marker that is usually used to follow patients with pancreatic cancer. The patient and PCP were notified of these findings and they were going to investigate further. In the following weeks, it was confirmed that the patient in fact had pancreatic cancer.

It is vital that we as Optometrists take an interest in the complete health of our patients. Since we are in the field of primary care we can be the first to identify conditions and guide our patients to find the specialized care they might need.

#### POSTER #69

##### OD – Ocular Disease

**Early presentation of neuroretinitis with photo documentation of progression.**

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#### Justin Burden, BS / OS4

Neuroretinitis is an inflammatory disorder characterized by optic disc edema and subsequent formation of a macular star figure. Common causes include: cat-scratch, Lyme, syphilis and tuberculosis. Prognosis is usually good for resolution of retinal edema and macular star formation. The condition is self-limiting but addition of oral antibiotics and/or steroids are thought to be effective for cat-scratch etiologies.

Seven year old white female presents with headache and decreased distance and near vision OS. Symptoms started one day prior to visit and were gradually worsening. The headache was described as a dull ache with predominance on the left side. The patient's mom states this is the first headache she has complained of and was not relieved with children's Tylenol. Additional questioning found that the patient was recently scratched by the family's cat. Exam findings on presentation: BCVA 20/20 OD and 20/40 OS, pupils ERRL with No APD OU, confrontational fields full OU, EOM's full OU, IOPs of 20 OU, cup to disc of 0.4 OD and significant papillitis OS with minor retinal striae temporal to nerve. OCT revealed significant retinal thickening located between optic nerve and fovea as well as optic nerve swelling. Exam findings on one week follow up: BCVA 20/20 OD and 20/200 OS, IOPs of 19 OU, OS showed significant papillitis and prominent exudation (macular star). OCT showed retinal thickening, exudation and sensory retinal detachment of the macula. Patient's serologies were negative and PCP started the patient on oral antibiotics. Exam findings 15 days after initial visit: BCVA 20/20 OD and 20/70 OS, IOPs of 20 OU, papillitis and macular star was resolving. OCT showed near normal retinal thickness with mild sensory detachment and exudation located in the macula.

Proper management of patients with neuroretinitis with close evaluation of headache complaints, regardless of age. Strict protocol of

questions and procedures to work through the common complaint of headaches. Importance of fundoscopic evaluation and/or dilated exam as well as photo documentation and helpful benefits of OCT imaging.

#### POSTER #120

##### CL – Contact Lens

##### On-eye performance of lotrafilcon B lenses packaged with a substantive wetting agent

Jessie Lemp, M.S., Ph.D

##### Additional Author(s)

Jami Kern, Ph.D.

Carol Morris, Ph.D.

The objective was to determine the on-eye performance of Air Optix plus HydraGlyde (AOHG) spherical lenses packaged in EOBO-41 in a sample of habitual Air Optix Aqua lens wearers

Masked AOHG lenses were worn by 45 subjects (90 eyes) for 30 days and cared for with Clear Care®. The pre-contact lens tear film (TF) was recorded during the full inter-blink period using a Tearscope and digital video recording system after insertion, 8 hrs, and 12 hrs on Day 1 and after 8 hrs on Day 30. TF kinetics were characterized by the minimum protected area (MPA) between two natural blinks. Wearers also rated their comfort, vision, and moisture (1= poor to 10=excellent) at insertion and through 12hrs of wear on Day 1. Slit-lamp findings including lens movement and centration were assessed at insertion and Day 30. Twenty randomly selected OD lenses collected at Day 30 were analyzed for total cholesterol uptake.

Mean (SD) MPA on Day 1 was: insertion, 86.8% (24.76%); 8 hrs, 91.0% (14.15%); and 12 hrs, 91.2% (17.68%). Mean MPA at Day 30 8 hrs was 86.9% (24.91%). Comfort, vision, and moisture on Day 1 were rated 8 or better on average across 12 hrs of wear [eg, comfort at insertion 8.9 (1.21); 6hrs 9.0 (1.16); 8hrs 8.7 (1.17); 12hrs 8.1 (1.54)].

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Mean ratings at initial insertion were reported approximately 9 or above for each item. 100% of lenses at insertion and Day 30 had acceptable movement and centration. One ocular adverse event unrelated to AOHG occurred (chemical burn of the eye) and no slit-lamp findings >Grade 2 (mild) were observed. The median (quartile range) ex vivo total cholesterol deposits for AOHG lenses after 30 days was 0.40 (0.15) µg.

AOHG lenses packaged with EOBO-41 maintained on-eye lens surface moisture over 12 hours on a single day and over 30 days of wear. This moisture maintenance on Day 1 corresponded to high levels of comfort, vision, and moisture through 12 hours of wear. Similar to previous results for lotrafilcon A and B plasma-treated lenses, 30-day worn AOHG lenses had low levels of total cholesterol uptake.

#### **POSTER #86**

##### **OD - Ocular Disease**

##### **Pseudophakic Pupillary Block**

**Heena Patel, O.D.**

##### **Additional Author(s)**

**Amy Falk, O.D.**

Pseudophakic pupillary block is a very rare occurrence. This condition can develop at any time after the lens implant surgery, whether it be days, weeks, months, or years after the extraction. Common complications are iris bombe, iridocorneal adhesion formation, increasing intraocular pressure (IOP), and progressive damage to the optic nerve head (secondary glaucoma).

A 72 year-old male presents for a routine eye exam with complaints of slight blur. Patient has mildly visually significant cataract in right eye and pseudophakic left eye. There is a positive ocular history of laser scars in both eyes 360 due to previous bilateral retinal detachments with additional scleral buckle in right eye. Patient was

correctable to 20/50 and 20/30 in the right eye and left eye, respectively. All other ocular findings are unremarkable. He was dilated with 1% Tropicamide. During the dilated fundus examination of the left eye the iris was bowing forward towards the posterior cornea. Pre-dilation intra-ocular pressure of the left eye was measured as 15mmHg and post-dilation was measured as 16 mmHg. An anterior segment OCT was taken of the left eye showing an extremely narrow angle (silt opening). Pilocarpine was dropped in left eye immediately upon completion of OCT scan. Patient was asymptomatic to any acute angle closure pain, nausea or any other common signs and symptoms. A laser peripheral iridotomy was performed in the left eye 30 mins after pilocarpine was administered.

Patient was fortunate to be in-office when pupillary block was in early stages. Von Herrick angles were measured to be IV (open) temporally and nasally pre-dilation. Pseudophakic pupillary block is extremely rare and can happen any time after cataract extraction. Patient was unsure of when cataract surgery was performed, but specified it was greater than ten years. The follow-up is scheduled for one week from acute attack (has not been seen yet).

#### **POSTER #87**

##### **OD - Ocular Disease**

##### **Serial Specular Microscopy Imaging in Corneal Endotheliitis**

**Daniel Epshtein, O.D.**

Corneal endotheliitis (CE) is a rare inflammatory condition of the cornea which is often comorbid with anterior uveitis. CE can be caused by either primary endothelial infection as seen in herpetic corneal disease or secondary to anterior chamber inflammation as seen in anterior uveitis. CE is characterized by pseudo-guttata formation and

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overlying stromal edema.

Two patients with CE were examined with slit lamp biomicroscopy and then imaged with specular microscopy to quantify the level of endothelial disease. Case 1 is an 83 year old black female complaining of blurred vision in the left eye for 1 week. The patient denied pain or light sensitivity. BCVA was 20/20 in the right eye and 20/50 in the left eye. Slit lamp examination revealed pseudophakia OU and diffuse CE OS with overlying mild corneal edema, the remainder of the anterior segment examination of unremarkable. Specular microscopy revealed mild polymorphism and polymegathism OD with 525 micron pachymetry. Specular microscopy in the left eye identified pseudo-guttata with a 591 micron pachymetry. The patient was treated with topical prednisolone 1% Q1H OS and oral Valtrex 1000mg BID. The patient was imaged five days later and significant improvement in endothelial architecture was noted in the left eye. BCVA in the left eye improved to 20/25 and the corneal edema had resolved. Case 2 is a 32 year old South Asian male complaining of light sensitivity and redness left eye only. BCVA was 20/25 in the right eye and 20/40 in the left eye. Slit lamp examination revealed CE with overlying mild corneal edema and grade 3 anterior chamber cells. Specular microscopy was unremarkable in the right eye with 454 micron pachymetry. The left eye had moderate pseudo-guttata changes with 511 micron pachymetry. Topical prednisolone 1% Q1H OS was initiated. Follow up two days later revealed significant improvement in vision and corneal architecture as noted by slit lamp examination and specular microscopy.

Specular microscopy is an excellent noninvasive imaging technique for the quantifiable and qualitative evaluation of CE. Serial images allow for easily identifiable pachymetric and morphological changes to aid in the judgment of disease progression.

## POSTER #88

### OD - Ocular Disease

#### Recurrent Transient Vision Loss in a 19-year-old Woman with Peripapillary Staphyloma

**Muriel Schornack, O.D.**

#### Additional Author(s)

**Tomo Yamada, O.D.**

Transient vision loss (TVL) can be caused by a broad range of etiologies, and can affect both the young and elderly. TVL may be an indicator of serious underlying vasculopathy such as with carotid artery disease and giant cell arteritis. Other causes of TVL include migraines and vasospasms. Closed angles and optic nerve abnormalities are also potential causes for TVL. This case report describes a young woman with TVL in the setting of peripapillary staphyloma (PS).

A 19-year-old woman was referred to us for random episodes of TVL in her left eye. She has had symptoms for the past 2 years, and they occur once every few weeks up to a few times per day, with each episode lasting a few seconds. Symptoms were not associated with physical exertion or heat, and she denied any headaches, diplopia, eye pain, trauma, or dizziness. Yawning would occasionally elicit an episode. She does not take medications. She has celiac disease and mild hypothyroidism but is otherwise in good health. Uncorrected visual acuity was 20/20 in each eye. Color vision, ocular motility, visual fields, and intraocular pressures were normal. Pupil reactions were normal with no APD. Her conjunctiva, cornea, anterior chamber, and lens were normal in both eyes as was her right optic nerve. Her left eye was significant for 360° of peripapillary RPE attenuation and mottling, with an excavated nerve head consistent with PS. Accordingly, OCT imaging of her left ONH revealed a deep, funnel-shaped cup. Carotid ultrasound, MRI of brain and orbits, and MRA of head and neck were normal. CBC with

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differential was normal.

PS is a rare, congenital, and typically unilateral optic disc anomaly. PS and other optic disc anomalies such as morning glory disc have been reported to be associated with TVL. Although its pathophysiology is still unclear, some have theorized that PS and other anomalous optic disc types may be susceptible to developing intermittent contractures that are triggering TVL symptoms. Further study is needed to clarify its pathophysiology.

#### POSTER #98

##### PC - Primary Care

##### **A new valid and reliable questionnaire to determine the causes of asthenopia**

**Ruzhi Deng, Ph.D**

To design a valid and reliable questionnaire to determine the various causes of asthenopia in China.

We developed a 19-item asthenopia questionnaire (AQ-19) in two phases. In the Design phase, we generated a comprehensive 52-item list to create our 1st version. The list included selected items based on a literature review, patient interviews and the Delphi method. In the Validation phase, we conducted a pilot test and retest for item reduction and a questionnaire validity assessment.

Our initial questionnaire contained 52 symptoms and 2 self-evaluation questions. After item reduction and assessment, we generated a 19-item questionnaire. It included 2 self-evaluation items and 19 items that were classified into three domains through factor analysis. Cronbach's  $\alpha$  for the three subscales of this version were between 0.79 and 0.85, while for the complete questionnaire Cronbach's  $\alpha$  was 0.90, with a split-half reliability of 0.80. Factor analysis showed the three components have eigenvalues  $> 1$  and these

explained 54.3% of the variance.

The AQ-19 has acceptable psychometric properties, making it a valid and reliable tool for ophthalmologists and optometrists to evaluate asthenopia as well as to provide the clues to find its causes. It has the potential to be used in clinical trials and outcome research.

#### POSTER #99

##### PC - Primary Care

##### **Corticosteroids and Immunosuppressant use in Juvenile Dermatomyositis**

**Erelda Gene, B.S.**

**Additional Author(s)**

**Anne Reuter, O.D.**

**Stephanie Rice, O.D.**

Juvenile dermatomyositis (JDM) is a rare autoimmune condition that occurs in about 3.2 per million children in the United States with an average onset at 7 years old. It is the most common type of idiopathic inflammatory myopathy (85%) that is three times more common in girls than boys. JDM primarily presents with symmetrical weakness to the proximal muscles and skin rashes. The prognosis of the condition can cause serious long-term health problems if not caught and treated properly. Treatment includes a combination of corticosteroids and immunosuppressant's medication that can have negative impact on patient's ocular health and vision.

An 11-year-old Native American female came in for annual eye exam. Under review of systems, patient was diagnosed with juvenile dermatomyositis in February 2016 and is currently taking hydroxychloroquine for skin rashes. Upon learning about current use, additional procedures were performed: Farnsworth D-15, fundus photo, OCT scan of macula and optic nerve, and visual field 10-2. After careful evaluation of exam and

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tests, education on hydroxychloroquine side effect on vision was given and advised close monitoring with six month follow up visits.

Juvenile dermatomyositis is one of the many rare conditions that need multiple specialists for close monitoring. For optometrist, obtaining baseline results and screening every six month after is vital in making sure the side effects of the medications are not harming ocular health and vision. To check for possible steroid responder or medication toxicity, the following tests should be performed during every 6 month follow up: IOP checks, assessment of ocular lens and fundus, color vision, visual field 10-2, fundus photography and OCT scans.

#### POSTER #116

##### PH - Public Health / Policy

##### **Correlation analysis of the myopic classification and its influencing factors for 240 tibetan children aged 7 to 12 years**

**Wei Deng, Dr.**

To evaluate the myopia classification of Tibetan children aged 7 to 12 years and analyze its influencing factors.

Tibetan children with 7 to 12 years old came to visit our hospital were recruited in this retrospective study. Classification of myopia and its influencing factors were statistically analyzed.

There were 64.1% (154 cases) and 35.9% (86 cases) aged 7 to 10 and 10 to 12 years among 240 Tibetan children diagnosed with myopia, respectively. According to the degree of myopia, children can be divided into three groups: low myopia: 110 cases (45.8%), moderate myopia: 72 cases (30%) and high myopia: 58 cases (24.2%). Using portable electronic devices, such as mobile phone and tablet PC for long time (more than 1h) were found in 182 cases (80%), and watching PC or TV more than 2h could be found in 160 cases

(66.66%). Parents of 92 participant (38.33%) were myopia, while half of them belonged to high myopia. Making outdoor activities less than 2 hours each day could be found in 205 cases (85.4%).

The age of Tibetan children develop myopia become much younger, and myopia degree increases a lot recently. The incidence of myopia in Tibetan children may be attributed to multi factor interaction. Video terminal syndrome, long-term use of portable electronic devices, less outdoor activities could be the main reasons for myopia occurrence. Ophthalmologists should pay adequate attention to it. Vision screening, early medical optometric measurement, timely glasses correction and take more outdoor activities, are the key points to prevent and control of myopia among Tibetan children. Further analysis need to be done based on a larger sample and longer following up period.

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#### POSTER SESSION #4

*Friday June 23 from 4 pm to 5 pm*

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#### POSTER #6

##### BV - Binocular Vision

##### Double Trouble

**Lauren Lombardi, O.D.**

Brain aneurysms can be devastating to vision - especially if they result in a new onset of strabismus. Current research about neuroplasticity is relevant to the treatment of adult patients with a new onset of strabismus. Studies have shown that new experiences can lead to neuronal growth well into adulthood proving that the brain is indeed very dynamic. Using this newfound research as support, optometrists can be confident in treating older patients' binocular vision dysfunctions with office based vision therapy. This poster will outline the results of office based vision therapy treatment

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plan used to improve the overall lifestyle of the patient after suffering a brain aneurysm.

SC, a 45 year old female presented to the Draisin Vision Group with a chief complaint of diplopia, headaches, loss of place, head tilt, and blur at near. She has a positive medical history of two aneurysms secondary to a genetic disorder which led to CN3 and CN7 palsies. She had strabismus surgery to realign her eyes following the second occurrence, but when the diplopia would not subside she was referred for vision therapy by her ophthalmologist. During the initial evaluation, SC had diplopia in all gazes except extreme upper right gaze measured by the worth four dot. Her NPC was measured to be two feet. All additional binocular testing could not be performed. After 32 sessions of office based vision therapy, SC has made huge gains in elimination of diplopia and re-establishing binocular fusion both objectively and subjectively. At her last evaluation, her NPC was measured to be 8cm and she achieved 400 seconds of stereopsis. She could maintain single vision in superior, straight ahead, and inferior gaze out to 16 cm. In the phoropter, she was able to fuse and her phorias measured to be 9 EP at distance and 5EP' at near.

Office based vision therapy is a treatment option for adult patients who have binocular vision dysfunctions caused by brain aneurysms and cranial nerve palsies.

#### **POSTER #7**

#### **BV - Binocular Vision**

#### **Accommodative Esotropia Treatment Revealing Vertical Strabismus and Ocular Torticollis**

**Michael W. Smith, OD**

**Additional Author(s)**

**Kassandra Johnston, O.D.**

Accommodative esotropia is very common in children with a significant amount of uncorrected hyperopia. While uncorrected, the child may not be diplopic because of suppression of the deviating eye or unclear vision masking the double vision. Further investigation is needed if an anomalous head posture is present after correction to determine if a secondary deviation is present. Ocular torticollis is the formation of an abnormal head posture. One may develop torticollis to obtain binocularity from an ocular misalignment. Because of the deviation, the patient attempts to alleviate resulting diplopia with an anomalous head posture. Children with significant refractive errors may manifest with ocular torticollis once they are corrected. This is because the increased clarity causes them to see two distinct images, instead of one blurry image, which they attempt to eliminate by changing their head position.

A 2.8 year old Hispanic female with history of an intermittent alternating accommodative esotropia at near presented for a follow up visit after being prescribed a +2.50 diopter add in a flat top bifocal. The patient's mother reported that the patient would occasionally turn her head as if she was trying to avoid the bifocal. Visual acuities were equal and age appropriate. In primary gaze, 3-4 prism diopter small constant left hypertropia was observed at distance only, and normal ocular eye alignment was observed through her add. Normal global stereopsis was obtained when looking through the bifocal. Because the patient adopted a left head turn while wearing her glasses, 3 prism diopter base down Fresnel prism was placed over the left eye in the distance portion of her flat top bifocals. This led to significant reduction of the anomalous head posture.

Ocular torticollis, the most common cause of pediatric torticollis, is one of many signs that can indicate a young child experiencing double vision. The majority of cases are secondary to a vertical deviation. When present, the goal is to reduce the child's head turn as much as possible until the child becomes old enough to give subjective input.



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Prism can be used to treat the diplopia and help reduce the anomalous head posture.

#### POSTER #8

##### **BV - Binocular Vision**

##### **Stress-Induced Esotropia in an Optometry Student**

**Margaret K. Bailey, O.D.**

##### **Additional Author(s)**

**Kelly Frantz, O.D.**

Patients with intermittent strabismus often experience an increase in deviation frequency when tired or stressed. A 24-year-old Caucasian female was referred for high frequency alternating esotropia, varying from 16-25pd at both far and near due to fluctuating accommodation. She could appreciate no stereopsis without prism, but demonstrated 250" global and 40" local Randot stereopsis through 20pd base-out(BO). Symptoms of diplopia, asthenopia, and cosmetic concerns were present since childhood but had significantly increased since beginning optometry school. Symptoms were exacerbated by the studying demand and performing fusion-based evaluation of clinic patients, such as slit lamp biomicroscopy and binocular indirect ophthalmoscopy. Previous treatment included bifocal spectacles for low hyperopia, but no prism or vision therapy had been implemented. She was highly motivated to achieve comfortable fusion without the need to wear prism.

After good monocular skills were established, vision therapy emphasized binocular/divergence activities. The patient began therapy unable to fuse an ortho demand on Vectograms, so therapy was started from a BO setting, progressing toward ortho. Other activities included variable Tranaglyphs and nonvariable targets in the stereoscope. Over 19 weeks, she completed 13 in-office therapy sessions, as well as home-based activities and thorough visual hygiene training. She was able to

fuse Vectograms at ortho after 4 therapy sessions. After 8 therapy visits, the patient was no longer seeing double at the end of in-office therapy sessions or after patient care sessions. She obtained fusion with stereopsis for the first time while viewing through the slit lamp after 10 therapy visits. She now is able to maintain fusion consistently except for brief diplopia after several minutes of using the slit lamp. Cover test shows 10pdD esophoria at distance and 16pd at near. She continues to perform maintenance therapy consisting of divergence activities and monocular accommodative rock, with emphasis on relaxing accommodation.

With appropriate binocular activities, vision therapy greatly improved this optometry student's control of intermittent esotropia and allowed her to gain stereopsis. She reports a major increase in quality of life due to no longer seeing double at the end of patient care and study sessions.

#### POSTER #22

##### **CL - Contact Lens**

##### **PATIENT AND ECP SATISFACTION IN THE UNITED STATES WITH A NOVEL WATER GRADIENT DAILY DISPOSABLE MULTIFOCAL CONTACT LENS**

**Mohinder Merchea, O.D., Ph.D, MBA**

##### **Additional Author(s)**

**Dwight Akerman, O.D., MBA**

**Jessica Mathew, O.D., Ph.D.**

**Carla Mack, O.D., MBA**

A novel water gradient daily disposable (DD) multifocal (MF) contact lens (delefilcon A, DDMF) was evaluated based on patient and eye care professional (ECP) satisfaction in the United States (US).

Presbyopes who were fit into the delefilcon A MF lens were offered the opportunity to participate in a voluntary survey. Demographic and habitual

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contact lens (CL) information was collected during an initial office visit. After being fitted with DDMF lenses patients were scheduled for follow up after 1-2 weeks where each patient completed a survey assessing satisfaction with the new CL. ECPs also completed a survey before and after fitting patients in DDMF lenses.

Presbyopes (n=105) and ECPs (n=12) from the US completed pre and post-fitting surveys. Mean patient age was 52.4yrs; 71% were female. Habitual CL use was 61% MF, 23% monovision, and 16% single vision. About 27% of presbyopes reported (Agreed/Strongly Agreed) that habitual CL were comfortable at the end of the day. After 1-2 weeks of wearing DDMF, mean comfortable wear time was 12.71h/day vs. 9.66h/day (habitual). Patients reported high satisfaction (Agreed/Strongly Agreed) with DDMF: Feel comfortable at the end of the day (91%); Feel less dry at the end of the day compared to previous lenses (81%); Clear vision from near to far with smooth transitions in between (80%); Vision is clear when using digital devices (81%); Feel less tired when working at a computer (80%); and Distance vision is clear when driving (80%). DDMF lenses were preferred by 85% of presbyopes over their habitual lenses. Nearly four times as many presbyopes agreed vs. disagreed that they felt younger while wearing DDMF lenses. After fitting the new CL, 100% of US ECPs surveyed reported DDMF lenses are easy and efficient to fit. Additionally, 100% would recommend DDMF lenses to colleagues, and 91% reported it was their preferred MF lens and that they would proactively recommend presbyopic CL wearers to switch to DDMF lenses.

Presbyopic patients and ECPs in the US reported a high level of satisfaction with the novel water gradient MF CL, reporting excellent comfort, vision and ease of fit.

## POSTER #23

### CL - Contact Lens

#### Parental Perceptions of Contact Lenses for Pediatric Patients

Jennifer Vickers, O.D.

#### Additional Author(s)

Amy Waters, O.D.

Studies have found that most children have success in learning to wear contact lenses without increased complication rate. The purpose of this survey was to evaluate what factors might influence a parent's decision to consider contacts for their children and evaluate a parent's basic knowledge of contacts.

Parents of all children scheduled at the Children's Mercy Ophthalmology Broadway and North locations were offered to participate in the survey. The investigator was masked as to which parents completed the survey. Parents scored potential factors affecting their decision on a 5 point scale, 5 being much more likely to consider and 1 being unlikely to consider. A total of 100 surveys were analyzed.

Of the 100 surveys analyzed, 16% of parents reported their children were interested in contacts. The median age for those interested was 12 years old, and the median age for those not interested was 4 years old ( $p < 0.0001$ ). Parents reported that child's maturity had the most influence on their decision with a median score of 5. How well the child wore their glasses, sports activities, and interest in contacts all had a median score of 4. Cost, inconvenience, increased follow-up and look of contacts versus glasses all received a median score of 3. In addition, 89% of parents surveyed reported that contacts must be prescribed by a doctor, 96% reported that it was not okay to sleep in all types of contacts, 86% reported that contacts can increase risk of infection, 94% reported sleeping in contacts increased risk of infection,

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82% reported that contacts are safer in adults than children.

Our survey results contribute to the current published data regarding safety and success of contact lens wear in pediatric patients by examining parental perception of pediatric contact lens use. We found that parents consider maturity of the child the most important factor determining contact lens use. Overall, parents have good basic knowledge of contact lens use, which can increase the safety of contact lens use in pediatric patients. The addition of this information can help practitioners guide parental discussions and decisions to maximize the success of contact lens wear.

#### **POSTER #24**

##### **CL - Contact Lens**

##### **Management of Filamentary Keratitis with Scleral Lenses**

**Emily Korszen, O.D.**

Filamentary keratitis is a condition in which mucus and degenerated corneal epithelial cells form filaments that attach to the corneal surface. This condition causes photophobia, tearing, pain, and foreign body sensation, and is often associated with other ocular surface diseases. Treatment of filamentary keratitis is usually aimed at reducing the inflammation and epithelial damage that is believed to contribute to filament formation. Treatments may include artificial tears, mucolytic agents, steroids, and bandage contact lenses.

A 60 year old female presented with severe light sensitivity, ocular pain, grittiness, and foreign body sensation, along with moderate blurry vision OS>OD. She was previously diagnosed with filamentary keratitis OU and Sjögren syndrome with keratoconjunctivitis sicca OU. The patient had been managed with debridement, artificial tears, topical steroids, serum-based tears, punctal plugs,

amniotic membrane therapy, and bandage soft contact lenses; all provided minimal to no relief. Her ocular history was also remarkable for LASIK surgery OU, and her systemic history included rheumatoid arthritis. Entering uncorrected visual acuity was 20/20 OD and 20/70 OS. Biomicroscopy revealed 1+ conjunctival injection OU, 1+ PEE and corneal filaments OD, and 3+ PEE and corneal filaments OS. The patient was fitted with 16.5mm diameter scleral lenses OU. At a follow-up visit three weeks after the initial contact lens dispense, she presented with corrected vision of 20/20 OD and 20/20 OS, significant reduction of corneal staining and filaments, and notable reduction of symptoms.

Scleral lenses serve an important role in the management of ocular surface disease. The tear film reservoir that rests between a scleral lens and the ocular surface provides an environment that promotes corneal hydration throughout the day. The patient discussed above did not find relief with traditional management strategies, but daily scleral lens wear significantly improved her corneal health, comfort, and quality of life. Scleral lenses should be considered a viable management option for filamentary keratitis and associated ocular surface disease, especially when first-line treatments are not successful.

#### **POSTER #26**

##### **CL - Contact Lens**

##### **Real World Evaluation of Patient Experiences with Multifocal Contact Lenses**

**Jill Saxon, O.D.**

**Additional Author(s)**  
**William Reindel, O.D.**  
**Marjorie Rah, O.D., Ph.D**

Real-world performance evaluations capture clinically important information related to a specific population or treatment by allowing wide patient

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selection criteria. The purpose of this evaluation was to assess real world patient experiences with Bausch + Lomb ULTRA for Presbyopia contact lenses for wearer comfortable vision, and satisfaction.

Eye Care Professionals (ECPs) were asked to prescribe Bausch + Lomb ULTRA for Presbyopia contact lenses to their presbyopic patients in their clinical practices. After 5 days of wearing Bausch + Lomb ULTRA for Presbyopia contact lenses, comfortable vision, and satisfaction ratings were collected via an online survey. For this evaluation, comfortable vision was defined as "being able to see clearly without a compromise in the comfort of your contact lenses." Data from this survey was summarized to provide patient percentages, frequencies and significance of responses to survey questions.

A total of 437 patients participated in the evaluation (344 previous contact lens wearers and 93 previous eyeglass only wearers). Habitual CL wearers reported comfortable vision with the Bausch + Lomb Ultra for Presbyopia contact lens up close (90%), intermediate distance (92%), at a distance (90%), while doing different physical activities (93%), in low light conditions (88%), in bright light conditions (94%), at all distances (88%) and throughout the day (91%). Habitual eyeglass only wearers reported comfortable vision up close (83%), intermediate distance (89%), at a distance (91%), while doing different physical activities (91%), in low light (84%), in bright light (88%), at all distances (84%), and throughout the day (86%). Of the habitual contact lens wearers and eyeglass only wearers, 96% and 86%, respectively, gave favorable overall ratings for the Bausch + Lomb Ultra for Presbyopia lenses.

Based on real-world evaluations, patients who wore Bausch + Lomb Ultra for Presbyopia contact lenses while performing everyday tasks rated them highly for comfortable vision.

## POSTER #28

### CL - Contact Lens

#### Presbyopia, Salzmann's and Sjogren's: A Multifocal Scleral Lens Success Story

**Samantha J. Rao, O.D.**

#### Additional Author(s)

**Andrea Janoff, O.D.**

Salzmann's nodular degeneration is an uncommon corneal condition in which hypertrophic sub-epithelial opacities form in the peripheral cornea. These patients are often excellent candidates for scleral lenses for the correction of irregular astigmatism and the management of ocular surface discomfort. The condition most commonly occurs in middle-aged women for whom presbyopia is also a concern. Until recently, the only options for presbyopic correction for scleral lens patients was monovision or near vision spectacle wear over lenses. However, with the advancement of multifocal optics now available on several scleral lens designs, we now have the potential to achieve improvement of vision at all distances for these patients.

A 69 year old female patient presented to clinic complaining of ocular irritation and blurry vision with spectacles. She has a history of Sjogren's syndrome and Salzmann's nodular degeneration OD with significant induced irregular astigmatism. She previously tried soft contact lenses which she discontinued due to discomfort. Her best corrected visual acuity with glasses was as follows: OD: DVA 20/40, NVA 20/80 OS: DVA 20/20, NVA 20/20 OU: DVA 20/25, NVA 20/30 The patient was successfully fit with Valley Custom Stable Aurora multifocal scleral lenses. She was fit with a near center lens OD and a distance center lens OS, providing a modified monovision effect. Her best corrected vision with these lenses was as follows: OD (near center): DVA 20/50, NVA 20/20 OS (distance center): DVA 20/20, NVA 20/50 OU: DVA

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20/20, NVA 20/20 The patient now reports that her dry eye symptoms have resolved while wearing the lenses and she is able to see clearly at distance, near, and at the computer.

With the advent of front surface multifocal optics, presbyopic scleral lens wearers can maintain a greater degree of stereopsis absent in full monovision corrections, and benefit from the convenience of eliminating near vision spectacles. Patients who have presbyopia, irregular astigmatism and ocular surface disease are excellent candidates for multifocal scleral lenses as they can achieve optimal visual correction at all distances as well as relief of dry eye symptoms.

#### POSTER #36

##### LV - Low Vision

##### **Improvement of visual quality using corneal topography-guided customized ablation treatment for patients after radial keratotomy**

Liu Ting, M.D.

##### **Additional Author(s)**

**Qiuxia Kan, M.D.**

**Ji Bai, Professor**

To evaluate the clinical efficacy of topography guided customized ablation (T-CAT) in the treatment of corneal surface irregularity, and to objectively evaluate the visual quality of the patients who underwent radial keratotomy (RK).

This was a retrospective analysis. Clinical data of 23 cases (38 eyes) with severe irregular morphology of corneal surface after RK operation were collected. All patients were tested uncorrected distance visual acuity (UCDVA), best corrected distance visual acuity (BCDVA), spherical equivalent (SE), topography, corneal thickness, intraocular pressure (IOP) and OQAS before operation and at 1 day, 1 week, 1 month, 3 months and 6 months after the procedure, respectively. The intra- and post-operative

complications were observed, and the SE, UCDVA, BCDVA and objective visual quality analysis index of 22 eyes were also analyzed. The data were analyzed by paired samples t test.

During the 6-month-follow up, no eye experienced decreasing visual acuity, BCDVA was 0.6 ~ 1.0 ( $0.8 \pm 0.2$ ) and UCDVA was 0.6 ~ 1.0 ( $0.8 \pm 0.2$ ). Achieved and attempted SE refraction was less than 1.00 D. From postoperative 1 day to 6 month, the mean SE refraction change was  $0.51 \pm 1.10$  D. Difference in SE refraction between postoperative 1 day and postoperative 6 month was less than 0.5 D in 20 eyes (52.6%) and less than 1.0 D in 35 eyes (92.1%). Objective visual quality indices at 6 months after operation had statistical significance compared with those of preoperative ( $t = -1.70, -2.45, 3.24, P < 0.05$ ). T-CAT can be an effective, safe, predictable and stable improvement for patients with declined visual quality after RK.

#### POSTER #39

##### LV - Low Vision

##### **Binocular Pupillary Response Measurements in Division I Collegiate Athlete**

Navjit K. Sanghera, O.D.

##### **Additional Author(s)**

**Katie Foreman, O.D.**

**Susan Ann Kelly, Ph.D.**

**Stephen Beckerman, O.D.**

Recently there has been an increased awareness and discussion of sports-related concussion, which can have a negative impact on athletic performance as well as long-term consequences. This type of injury can result in damage to any part of the visual pathway. The integrity and functionality in the pathway can often be analyzed and interpreted based on pupil response. The goal of this investigation is to characterize normative values using the RAPDx

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pupillometer, which simultaneously tests both the direct and consensual pupillary response. A cohort of Division I Collegiate athletes was tested, their pupillary amplitudes and latencies were then documented. This information can: 1) serve as a baseline for comparison after an athlete is concussed, 2) help evaluate the effects of concussion on the pupillary system as it relates to athletic performance, 3) help establish vision-related criteria for determining if and when an athlete is ready to return and perform at pre-concussive levels, and 4) help to establish normative values.

One hundred and eleven male and female Division I Collegiate athletes ages 18-22 were tested using the RAPDx binocular pupillometer. We recorded amplitudes and latency of the pupillary response.

This study reports the mean, standard deviation and range of amplitude and latency values. When male and female data are available, gender differences were investigated with a t test. Data were combined across all sports. Overall gender differences for young Division I athletes were tested with an independent groups t test and found to be non-significant for amplitude and latency. The results of the testing battery will serve as normative values and as a baseline for comparison if the athlete is concussed.

The RAPDx characterizes baseline and previously unknown normative findings for this population. This may help determine how deficits may interfere with optimum athletic performance at the college level. The baseline testing could also serve as an indicator of recovery in acute vs. chronic stages of concussion and help determine if and when a concussed athlete is ready to return to play.

## POSTER #60

### OD - Ocular Disease

#### A Career in MSG or a Life with MS

**Jacqueline Hallauer, O.D. Student**

#### Additional Author(s)

**Lt Krista Green, O.D.**

**Anne Reuter, O.D.**

**Sara Bustamante, O.D.**

Multiple sclerosis (MS) is a commonly diagnosed condition within most optometric practices. MS is often diagnosed with the clinical signs and symptoms observed during a problem focused eye examination and confirmed with magnetic resonance imaging. With nearly 2.3 million people affected world-wide, but it can often be difficult to diagnose. Numerous studies and epidemiologists have concluded that there are multiple risk factors in the development of multiple sclerosis.

MS is currently a controversial diagnosis that has the potential of diverting a 26-year-old African American male's career path as a Marine Security Guard (MSG). The Marine presented to the clinic for a gradual decrease in vision over the last four weeks in his OS more than OD. He denied pain with eye movement, Uthoff's phenomenon and Lhermitte's symptoms. Overall, the marine had unremarkable ocular and systemic health prior to this episode. The entering uncorrected acuity was 20/40, corrected to 20/20 with lenses OD and 20/30, no improvement with pinhole or lenses OS. A grade 4 afferent pupillary defect noted. Dilated fundus examination revealed mild nerve pallor with distinct borders OD and segmented disc edema with a small drance hemorrhage appearance OS. The OCT confirmed significant optic nerve head edema in the OS. The HVF was essentially clear OD and demonstrated a neurological defect as well as a superior arcuate defect crossing the vertical midline OS.

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He was immediately referred to ophthalmology and for CT, MRI, LP and blood work. The Radiologist confirmed white matter lesions present with mild enhancement of the MRI, declaring the etiology as multiple sclerosis. The confirmation of this diagnosis caused this MSG candidate to drop out of the program due to the probability of him deploying for a two-year tour in a remote location without reliable health care. The Marine followed up with a neurologist, after thorough examination and review of the data collected, the neurologist disagreed and finalized the diagnosis as Low-Risk Clinically Isolated Syndrome, lifting the medical duty restriction. Concluding, that the patient has only a 20% chance compared to High-Risk CIS, which has a 60-80% chance of developing MS within several years.

#### POSTER #61

##### OD - Ocular Disease

##### Atypical Presentation of NAION

##### Stefanos Kotsokalis, O.D.

Nonarteritic anterior ischemic optic neuropathy is the most common acute optic neuropathy, occurring most frequently in patients over the age of 50 with vasculopathic risk factors. NAION occurs secondary to occlusion of the short posterior ciliary arteries resulting in temporary infarction of the optic nerve. Patients typically present with sudden unilateral painless vision loss, an APD, and variable visual field defects.

A 63-year-old white male presented with symptoms of a "muddy cloud" in his right eye for four days. His ocular history was remarkable for pre-surgical cataracts OU. Medical history was significant for poorly controlled type 2 diabetes, hypertension, and cardiovascular disease. Testing revealed VA of 20/60- OD, 20/25 OS, inferior nasal restriction of fields OD, and no APD. Dilation revealed extensive hyperemic disc edema with

peripapillary flame hemorrhages and subfoveal fluid. Blood work to rule out GCA was negative: normal ESR, CRP, and platelets. CT/MRI ruled out a space-occupying lesion. A week later, the patient presented with VA CF at 3ft, +APD, severely constricted fields, and worsened disc edema and subfoveal fluid OD. Additional workup including RPR, FTA-ABS, ACE, ANA, Quantiferon-TB, Lyme and Toxoplasmosis titers were negative. Upon further questioning, the patient revealed frequent contact with cats, for which Bartonella titers were ordered. While awaiting results of the Bartonella titers, he was started on 500mg oral Azithromycin x 10 days for neuroretinitis presumed secondary to Bartonella. . The patient was also started on 60mg oral Prednisone QD for progressive NAION with severe vision loss. The patient was followed weekly with continued steroid taper. At the 4-week follow up, Bartonella titers were negative, disc and subretinal fluid had improved, and VA was 20/200+. A diagnosis of NAION was favored over neuroretinitis secondary to systemic history and negative workup.

NAION is associated with hyperemic disc edema, peripapillary flame hemorrhages, and in some patients' subfoveal fluid. Subfoveal fluid likely results from the extension of optic disc edema. Further studies are essential in determining viable treatment options for both NAION and its associated subfoveal fluid.

#### POSTER #62

##### OD - Ocular Disease

##### Panuveitis in a Heroin Addict

##### Michelle Yudina, B.A.

##### Additional Author(s) Shankaran Ramaswamy, O.D.

35-year-old Caucasian male presents for evaluation of Uveitis in the right eye that started 2 months ago. He is experiencing photosensitivity,

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pain, flashes of light and floaters. Optometrist that referred him prescribed Pred Forte every hour and Homatropine twice a day in the right eye for the past month. Patient states no improvement. His medical history included Hepatitis C and MRSA. In addition, he is a heavy tobacco smoker, drinks alcohol and is a heroin addict.

Visual acuity was 20/400 in the right eye with no improvement through pinhole and 20/20 in the left eye. His right eye was pharmacologically dilated and his left eye had a 1+ reaction to light. Adnexa and lashes were normal. In the right eye the conjunctiva was slightly injected, there was stromal edema, 3.5+ cells & flare and a 0.5mm hypopyon. There were areas of broken posterior subcapsular cataracts, the vitreous had 4+ cells and there was no view of the retina. A B-scan was done to rule out a retinal detachment. The B-scan showed a dense vitritis with a flat retina. The left eye was healthy and normal.

The diagnosis was Panuveitis with unknown etiology. It was recommended the patient have a vitrectomy and a full lab work done to understand how to properly manage and treat the patient long term. During the vitrectomy, the surgeon believed it was a fungal etiology and injected the patient with Amphotericin in the operating room. The patient had an excellent prognosis after the vitrectomy on day 1 and day 7 follow up. His vision was improving and the culture came back positive for Candida. He is now being followed by his primary care doctor for further evaluation.

#### POSTER #64

##### OD - Ocular Disease

##### Recovery of vision after tumor resection in a patient with compressive optic neuropathy

Jessica Rodriguez, B.A.

Additional Author(s)

Kathleen O'Leary, O.D.

Meningiomas are tumors that arise from the arachnoid layer of the meninges and account for approximately 20% of all intracranial tumors. A common presenting complaint of a patient with a meningioma is slow, progressive vision loss. Other presenting symptoms may include loss of color vision, visual field loss, headaches, and diplopia, however, many patients remain asymptomatic. Clinical signs depend of the location of the tumor, but may involve proptosis, optic atrophy, ocular paresis, and optic nerve edema.

A 70 year old white male presented to the clinic with a complaint of gradual, painless vision loss in both eyes over the last year and a half. His best corrected visual acuity was counting fingers at one foot in the right eye and no light perception in the left eye. Dilated fundus exam revealed bilateral optic nerve head pallor with no associated edema and a C/D ratio of 0.2 v/h OU. An MRI of the brain and orbits with contrast was ordered and revealed a large planum sphenoidale meningioma. The patient underwent a tumor resection and four months later was seen again at the clinic for a follow up visit. At this exam, his best corrected visual acuity had improved to counting fingers at five feet in the right eye and hand motion at two feet in the left eye. Another six months later, the vision was corrected to 20/40 in the right eye and 3/700 Feinbloom with eccentric viewing in the left. A 30-2 SITA fast visual field of the right eye revealed a central scotoma. These findings have since remained stable and the patient was given a prescription with polycarbonate lenses for protection and was referred to the low vision clinic.

The visual prognosis for a planum sphenoidal meningioma is guarded because many cases go undetected due to the slow progression of the condition. In this case, tumor resection lead to improvement in visual acuity despite the significant damage to the optic nerves that was present at the time of the diagnosis. This case emphasizes the importance of neuroimaging studies in the presence of slow, progressive vision loss.



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#### POSTER #65

##### OD - Ocular Disease

##### Not Your Typical Macular Degeneration: Retinal Angiomatous Proliferation

**Danielle Gretz Chambers, O.D.**

##### Additional Author(s)

**Mark McKenzie, O.D.**

Retinal angiomatous proliferation (RAP) characterizes a unique form of exudative AMD in which the neovascular complex originates deeply in the retina. Unlike other neovascular processes in AMD, RAP originates from the retina and extends posteriorly into the subretinal space, where it can then connect with new choroidal vessels. RAP patients tend to be Caucasian and slightly older than patients with classic or occult CNV. The condition tends to be bilateral and symmetric, with lesions appearing juxtafoveally. The most prevalent clinical signs of RAP are retinal hemorrhages, preretinal hemorrhages, and pigment epithelial detachments.

A 77 year old Caucasian male came in for a dilated eye exam with no visual or ocular complaints. The patient's entering BCVA was 20/25- OD and 20/25- OS. DFE revealed a 1/8 DD heme with associated thickening on the right macula (+)CSME and several dot hemes on the left macula (-)CSME. The retinal heme on the right macula was recurrent from previous visits and OCT showed a large intraretinal cyst at the fovea that had grown since the last visit. The patient was referred to retina within 1 month for a recurrent retinal hemorrhage at the fovea with corresponding macular edema in the right eye. At the retinal visit the patient was diagnosed with retinal angiomatous proliferation in both eyes and treated with Eylea in the right eye that same day. Upon 6 week follow-up to retina, fluorescein angiography revealed that leakage in the right eye had resolved and there was no leakage in the left eye. The

previously viewed retinal hemorrhages in both maculas were resolved and the right eye was treated with Eylea again.

Retinal angiomatous proliferation is an important condition to consider in patients with intraretinal hemorrhages and macular edema. Care should be taken to refer these patients as soon as possible for evaluation and treatment of the condition due to the possibility of a poor visual outcome. When retinal angiomatous proliferation is left untreated, the disease process is allowed to progress and the result is often substantially decreased visual acuity.

#### POSTER #67

##### OD - Ocular Disease

##### Polypoidal Choroidal Vasculopathy

**Stephanie Arnio, B.S.**

##### Additional Author(s)

**Jami Parsons-Malloy, O.D.**

Polypoidal choroidal vasculopathy is an idiopathic vascular disease characterized by a branching vascular network of inner choroidal vessels with multiple terminal aneurysmal protuberances, with leakage causing serosanguinous retinal and RPE detachments and chronic exudation. It is most common in East Asian and African patients and typically presents around age 50-65.

A 65 year-old Vietnamese male presented for a diabetic eye exam. He denied any changes in vision since his last exam 3 years prior. His medical history consisted of Type II diabetes and coronary artery disease. Best corrected visual acuities were 20/25 in the right eye and 20/20 in the left eye. Anterior segment examination was unremarkable. Dilated fundus examination showed multiple areas of confluent exudation in the posterior pole of the right eye. Small, focal exudates were present in the posterior pole of the left eye. OCT revealed multiple

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PEDs in the right eye and a mild serous detachment nasal to the fovea in the left eye. Differential diagnosis at this point in the exam consisted of exudative macular degeneration, central serous retinopathy, and diabetic retinopathy. The patient was referred to retina and fluorescein angiography showed multiple hyperfluorescent areas in the macula from leaking neovascular membranes with blurred margins in the right eye and diffuse hyperfluorescence from leakage in the left eye. Both eyes showed abnormal hyperfluorescence in the late phase. The patient was diagnosed with Polypoidal choroidal vasculopathy, and treatment was initiated with focal laser followed by Avastin injections.

Diabetes mellitus and smoking are both risk factors associated with PCV, both of which this patient had. His visual acuities were better than expected given the retinal signs, which is characteristic of this disorder. Definitive diagnosis must be made with Fluorescein or Indocyanine green angiography to distinguish PCV from other exudative disorders. If treated, the prognosis is generally good but some cases may lead to subretinal fibrosis depending on the size and extent of retinal detachments.

#### **POSTER #68**

#### **OD - Ocular Disease**

#### **Optic Disc Pits: The Choice of Observation**

**Brittany Jones, B.A.**

#### **Additional Author(s)**

**Anne Reuter, O.D.**

Optic disc pits are congenital depressions within the optic nerve resulting from a malformation of the optic nerve during its development. Optic pits are rare anomalies occurring in approximately 1/10,000 patients with the majority occurring unilaterally and at the temporal side of the optic

nerve. Approximately 25-75% of cases may be associated with serous macular detachment.

A 40 year-old white male established patient presented to the clinic for his annual exam and contact lens evaluation. He had no visual complaints and just wanted to renew his current contact lens prescription. He was diagnosed with the optic pit at a young age and was aware of its potential complications. His best-corrected visual acuities were 20/20 in both the right and left eye with no significant change from the previous year's refraction. All entrance testing was unremarkable. His intraocular pressure was normal and anterior segment evaluation was unremarkable. His dilated fundus examination in the right eye revealed the medium sized optic pit located nasally on the nerve head. He also had retinal thickening from 11:00-4:00 extending from the peripapillary area to the periphery. The left eye had a small area of retinoschisis with overlying lattice degeneration. The HRT scan of the macula and nerve head in the right eye showed that the fluid extended into the macular area; however, it was not affecting the fovea. Normal foveal contour was present.

The management for this case was to refer the patient to a retinal specialist for possible treatment. In about 25% of cases, the serous detachment may resolve spontaneously, but with the risk of significant vision loss. In this case, the patient chose to risk spontaneous resolution for 3 months in lieu of the proposed laser photocoagulation. There is controversy regarding the most appropriate treatment for serous macular detachments due to optic pits. Treatments range from, but are not limited to observation, pan retinal photocoagulation (PRP), pars plana vitrectomy (PPV) with PRP, PPV with induced posterior vitreal detachment, and limited vitrectomy with intraretinal fenestration

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**POSTER #70**

**OD - Ocular Disease**

**Late onset retinal detachment in retinopathy of prematurity**

**Dieu-Hong Ho, O.D.**

**Additional Author(s)**

**Suzanne Wickum, O.D.**

**Kassaundra Johnston, O.D.**

Retinopathy of prematurity (ROP) continues to be one of the leading causes of blindness in children. Significant advances have been made in regards to establishing guidelines for treatment and management of ROP. However, despite successful laser treatment at the time of diagnosis, many patients with more severe forms of ROP are still at risk for vision-threatening complications later on in life.

A 16-year-old African American female with a history of retinopathy of prematurity (ROP) and cerebral palsy presents to the clinic for a comprehensive eye exam. The patient was born as a twin and premature at 26 weeks. She has previously undergone laser treatment for ROP in both eyes. Initially, no reports of any changes to vision were reported. The patient denied any flashes or floaters. She has high compound myopic astigmatism in both eyes, with the right eye having a significantly higher refractive error. Best corrected visual acuities were 20/200 in the right eye and 20/30 in the left eye. At the exam one year prior, best corrected visual acuity in the right eye was 20/70. Retinoscopy and manifest refraction indicated a significant hyperopic shift in the right eye. The dilated fundus exam showed significant areas of fluid in the inferior nasal with a full blurred retinal appearance and scattered holes inferiorly in the right eye. Midperipheral laser scars were found in both eyes that were consistent with prior anterior zone 1 ROP. The patient was referred to a retinal specialist the next morning and diagnosed with

total rhegmatogenous retinal detachment with proliferative vitreoretinopathy in the right eye. Subsequently, the patient underwent a scleral buckle with retinectomy of the inferior retina in the right eye. Prophylactic pan-retinal photocoagulation was performed on the left eye.

Even with prompt treatment at the time of diagnosis, retinopathy of prematurity can pose many complications, such as retinal tears and retinal detachments, later on in life. As eye care providers, it is important to be aware of these possible complications and educate our patients accordingly.

**POSTER #71**

**OD - Ocular Disease**

**Choroidal Melanoma**

**Kinjal Patel, O.D. Intern**

Choroidal melanoma is the most common primary malignant intraocular tumor and the second most common type of primary malignant melanoma in the body (Albert 1994). The incidence of primary choroidal melanoma is about 6 cases per 1 million population in the USA. Many patients present with no symptoms however some may experience blurred vision, flashing of lights, floaters, and mild pain.

50 year old white female presented with red eye and decreased vision in right eye for about 4-5 days. She went to emergency room earlier where she was diagnosed with conjunctivitis of the right eye. With further evaluation, she was diagnosed with Ciliochoroidal Melanoma with secondary panuveitis of the right eye. Ocular manifestations include gray-green brown choroidal mass, presence of subretinal fluid, thickness >2mm, illdefined large geographic orange pigment over the lesion, and typically it is a dome, mushroom shaped lesion. Visual Acuities are 20/70 in the right eye with no improvement on pinhole and 20/20 in

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the left eye. Ocular findings included 3+APD in the right eye with abnormal superior nasal field confrontations. In general, the farther away from the optic nerve and the fovea, the larger the mass can reach before the patient notices a visual field defect (Pham, 2010). Anterior segment findings include injection, chemosis, ciliary flush, sentinel vessels, small superior scleral pigment, with 4+ cells in the anterior chamber and in the vitreous. IOP is normal. B-scan confirmed 8.1mm thick mass of ciliary body/choroid.

Melanomas carries a risk of spread to the liver, lung and skin, therefore treatment is important to protect from metastasis. The Collaborative Ocular Melanoma Study is the largest oncology study that compares different size lesions and the appropriate mode of therapy. It takes 7 years for a small melanoma to grow into a large melanoma and an additional 4 years before metastasis occurs (Bell, 2004). Therefore, early detection is key for favorable outcome.

#### **POSTER #72**

##### **OD - Ocular Disease**

##### **The depth of OCT: Seeing the Unseen**

**Andrea Briggs, B.S.**

##### **Additional Author(s)**

**Jamie Parsons Malloy, O.D.**

As with every field of medicine, technology is helping pioneer how we diagnose, treat and manage patients. Most notably the addition of Optical Coherence Tomography, which allows practitioners to see the depth of the retina like never before. This report looks at management of X-linked retinoschisis in a now 16-year-old male. The prevalence of juvenile X-linked retinoschisis occurs in ranges from 1 case per 5,000 people to 1 case per 25,000 people.

This particular case presented in a 16-year-old Caucasian male with complaints of blurry vision at

distance and near. The condition is not any better than on previous exams. The patient's ocular history is significant for Juvenile X-linked retinoschisis, esotropia, bilateral amblyopia, photophobia, hyperopia and astigmatism. Family history is also significant for retinal disease. Aided acuities were 20/150 OD, 20/60 OS at distance and 20/60 OU at near. Pupils are equal, round, reactive and no APD. Visual field is abnormal to finger counting OD and OS. A thorough refraction improved vision minimally. Anterior segment exam was normal. Posterior segment was relatively unremarkable with the exception of a negative foveal reflex. Fundus photos were taken and again were mostly unremarkable. A macular OCT was performed and retinoschisis could be seen OU.

For this particular patient the OCT was critical in his initially diagnosis and to monitor any progression of his condition. Since there is no true treatment for Juvenile X-linked retinoschisis, monitoring the condition is to keep the patient informed. At his most recent exam he was finally ready to seek help from a low vision specialist and the appropriate referrals were made.

#### **POSTER #89**

##### **OD - Ocular Disease**

##### **Focal Choroidal Excavation in Central Serous Chorioretinopathy**

**Daniel Epshtein, O.D.**

Central serous chorioretinopathy (CSCR) is a disorder characterized by retinal and pigment epithelial detachment. Recently, CSCR has been categorized as a pachychoroid spectrum disorder. Newer imaging techniques have revealed significant choroidal changes that occur in conjunction with the classic retinal findings. Dilated choroidal vessels, diffuse choroidal thickening, and inner choroidal layer atrophy are all common choroidal findings of CSCR. Focal choroidal

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excavation (FCE) is an uncommon finding in CSCR which is characterized by a localized bulging of the retinal pigment epithelium into the choroid. The overlying retina may conform to the retinal pigment epithelial contour or be detached by subretinal fluid. Findings are easily evident with optical coherence tomography but are difficult or impossible to pick up with funduscopy.

A sixty-two year old South Asian male was referred by his primary care physician for a diabetic ocular wellness exam. The patient had no complaints and denied any previous ocular trauma or pathology. Best corrected visual acuity was 20/20-2 in each eye. Externals and anterior segment examination were unremarkable. Dilated fundus exam was remarkable for pigmentary atrophy within the posterior pole worse in the right eye than the left, small pigment epithelial detachments in both eyes, and an area of serous retinal detachment in the right eye. Optical coherence tomography confirmed these findings and also revealed a FCE which was invisible to ophthalmoscopy. The FCE had an area of overlying serous retinal detachment. As all findings were nonfoveal and the patient was asymptomatic, no treatment was deemed necessary and the patient was asked to follow up in six weeks. Repeat fundus examination and optical coherence tomography revealed resolution of subretinal fluid and stability in all other previous retinal findings. Since improvement was noted, follow up was extended to six months and the patient was educated on the regular use of an Amsler grid.

FCE is an uncommon finding of CSCR. As CSCR is often self limiting, the optometrist should be aware of the range of findings to prevent erroneous referrals.

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**POSTER #101**

**PC - Primary Care**

**Vitamin D Supplementation Reduces Atopic Dermatitis Severity**

**Mark Hakim, O.D.**

**Additional Author(s)**  
**Nancy Wiggins, O.D.**

Atopic Dermatitis is primarily caused by cellular immune deficiency, elevated immunoglobulin E (IgE) and manifests as a type I hypersensitivity. Abnormal skin reactivity, in the form of eczematous skin eruption, also plays a major role in the development of the disease. Typical clinical presentation consists of periodic skin erythema, edema, vesiculation, and subsequent crust formation. Ocular manifestations of atopic dermatitis include periorbital atopic dermatitis, keratoconjunctivitis and keratoconus. It has been demonstrated the increased presence of Staphylococcus aureus on the skin of atopic dermatitis patients results from decreased levels of cathelicidin and a greater severity of disease in these patients. A recent study demonstrated that vitamin D supplementation could increase cathelicidin production and alleviate symptoms. Consequently, Vitamin D supplementation has been recommended to reduce the presence of pathogens and improve skin condition. In this case, the management of a 67 year old white female presenting with ocular manifestations related to atopic dermatitis is reported.

67 year old White Female presents with ocular irritation related to atopic dermatitis. Medical history was positive for Eczema and Asthma with periodic recurrences of eczema. Patient has bilateral hearing loss since childhood. She was accompanied by a nurse and translator. She was treated with Fluorometholone ophthalmic suspension 0.1% qid OU for 7 days to address her ocular complaints. Three days later, at the first

follow up appointment, she was educated regarding use of Vitamin D supplements prior to start of regimen to improve her skin condition. Patient returned a month later after undergoing Vitamin D supplementation reporting no ocular discomfort and significant improvement in skin condition.

After following typical course for standard of care, patient was directed to a treatment regimen for improving her periorbital edema. Previous studies have shown that vitamin D levels correlate strongly and inversely with the severity of atopic dermatitis. Vitamin D supplementation significantly reduces Staphylococcus aureus colonization, providing a key insight into how supplementation may prevent recurrence of the disease.

**POSTER #102**

**PC - Primary Care**

**Corneal Illusions-Brought to You By Off Label Proparacaine and HSK**

**Lauren E. Fereday**

**Additional Author(s)**  
**Richard Wood, O.D.**  
**Kathryn Deliso, O.D.**

23 year old non extended contact lens wearing patient treated by urgent care dx with pink eye and given drops 2 days ago. She presented with complaints of decreased vision, redness, and 9/10 eye pain OS. She stated her husband was putting an unknown drop in OS to help with pain.

Her entering VA in OS was 20/LP. Careful examination of OS revealed 4+ bulbar conjunctiva hyperemia, thick hazy cornea with stromal opacities consisting of what looked like a greater than 4mm central corneal ulcer, and hypopyon with cells. When the husband arrived it was discovered he was using Proparacaine 0.5% off label every 30 minutes in his wife's eye. She was started on the following: Besivance Q2h,

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Cephalexin 1 gtt OS Q1h for 2 days (was changed to vancomycin 25mg/ml q1h), Cipro 500mg 1 tablet orally bid 10 days, Cyclopentalate 1% 1 gtt OS qid 1 week, Polytrim 1gtt OS qid 1 week. Culturing media was unavailable at presentation and local ophthalmologist had expired culturing media. The patient was followed daily and the cornea improved over five days to a presentation of OS resolving, central lobular infiltrative stromal scar, moderate SPK inferior, anterior chamber 1+ cells, few deposits on endothelium, no KPs, no hypopyon, 1-2+ edema, red reflex was clearer. She pinholed to 20/40+.The patient's care was taken over by a corneal specialist confirming the diagnosis and treatment. As the cornea improved a steroid was added to help minimize corneal scarring. We discussed options of PROKERA lens vs PK for treatment of the residual scar. Six weeks later the patient reported irritation of OD and then the OS, so she was referred to a different corneal specialist. The patient was diagnosed with HSK OS and treated with oral acyclovir and topical viroptic. Steroids were added soon after to reduce inflammation and scarring. Patient's final acuity was PH 20/70 and is awaiting corneal transplant.

Beware of the patient with access to Proparicane drops. Though the patient presented with a central ulcer and treatment for such was indicated, the initial cause is still unknown. Was it the great masquerader, Herpes Simplex?

#### POSTER #110

##### PH - Public Health / Policy

##### Epidemiological survey of visual acuity and refractive error of pupils in Yilong County in Sichuan Province of China

Yang Yin, Ph.D.

Additional Author(s)

Li Dongfeng, MBA

Wu Zhengzheng, MBA

To know the poor vision rate and refractive errors of pupils in rural area of Yilong County in Sichuan Province of China, and provide data basis for local pupil eye care.

Using cluster sampling in a cross-sectional survey, 281 pupils (562 eyes) in Yingshan primary school in Yilong County underwent ocular examination including uncorrected visual acuity(VA), cycloplegic dioptrics and slit lamp and so on.

Total rate of poor vision(VA<5.0)was 32%, the rate of moderate poor vision (VA ranged from 4.6 to 4.8) and mild poor vision(VA = 4.9) were 14.59% and 13.35% respectively. Poor vision rate of female pupils (36.8%) was statistically higher than that of male pupils(28.2%)( $\chi^2= 4.71, P = 0.03$ ). Poor vision rate was different between different grade ( $\chi^2= 4.37, P = 0.04$ ).While poor vision rate increased with age( $\chi^2=5.16, P = 0.02$ ).The overall prevalence of myopia was 16%. Poor vision rate of grade one and two (37 eyes, with age of  $7.39\pm 0.99$ ) was 34.25%, and prevalence rate of myopia of them was 6.48%. Poor vision rate of grade three and four (43 eyes, with age of  $9.49\pm 0.94$ ) was 21.08%, and prevalence rate of myopia was 15.69%. Poor vision rate of grade five and six (100 eyes, with age of  $11.70\pm 1.12$ ) was 44%, and prevalence rate of myopia was 16.4%.

Poor vision rate of pupils in rural area of Sichuan County in Yilong Province increased with age, and poor vision rate of girls was higher than that of boys. The prevalence rate of myopia of all was significantly lower than national average level for each corresponding age, but it was still increased with age.

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**POSTER SESSION #5**

*Saturday June 24 from 9 am to 10 am*

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**POSTER #9**

**BV - Binocular Vision**

**Keep It Down: Using Horizontal Vergence to Control Hypotropia**

**Caitlin Miller, O.D.**

Vertical strabismus can often be seen as difficult to treat with active vision therapy. Large deviations are often treated with prism or referred for surgery without attempts to improve sensorimotor fusion. This case demonstrates the successful treatment of vertical strabismus following a management plan similar to that for horizontal strabismus.

An 8 year old female presented for her first eye exam with complaints from her teacher of problems with reading. This examination revealed reduced visual acuity in both eyes at distance and near, no random dot stereo, and a 6 $\Delta$  constant left hypotropia at near. She was prescribed her cycloplegic refraction and returned at a later date for further evaluation of her strabismus. At follow-up, the constant left hypotropia remained along with a 4 $\Delta$  left exotropia at near. The patient also showed a significant oculomotor dysfunction, a reduced NPC, and left eye suppression. The patient was enrolled in vision therapy to improve oculomotor skills and attempt to improve binocularity. The vision therapy program emphasized oculomotor skills at first. As oculomotor skills improved, activities were added to break peripheral suppression and improve peripheral sensorimotor fusion. As she progressed, central suppression was eliminated and central sensorimotor fusion was developed. Throughout binocular treatment, convergence was emphasized. It was anticipated that by strengthening the patient's convergence ability, it

would allow her better control over her vertical deviation. At a progress evaluation after 16 sessions of vision therapy, the patient displayed 6 $\Delta$  right hyperphoria and 7 $\Delta$  exophoria at near only. She possessed random dot stereo and showed no suppression. Her oculomotor dysfunction had resolved. Her mother reported improvements with homework, reading, eye tracking and her ability to focus.

This case demonstrates the successful treatment of vertical strabismus with active vision therapy. By focusing on and increasing the patient's convergence ability, she was able to obtain better control over her vertical deviation.

**POSTER #10**

**Binocular Vision**

**Visual Skill Training Correlations with Baseball Statistics in Minor League Players.**

**Adam B. Blacker, O.D., M.S.**

**Additional Author(s)**

**Charles E. Shearer, O.D.**

**Bronson W. Hamada, O.D.**

**Scott M. Krauchunas, O.D., Ph.D.**

Visual Skills have often been measured in baseball players to determine which are required for optimal performance. Doctors, trainers and athletes discern a link between sight and production, but many are left wondering if a visual improvement leads to an improvement in performance. The study attempts to determine if improvement in visual skills is correlated with modern baseball statistics.

Twenty-three minor leaguers visually trained three days a week, for eight weeks. Training utilized: a timed contrast sensitivity chart, timed Hart chart, visual processing speed, random targets, visual reaction time, anticipation accuracy, and strobe glasses. Due to injury and reassignment, sixteen subjects completed their



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training. Training difficulty was increased weekly. On the last day difficulty was returned to each task's initial setting and the difference between this performance and week one's average was used as the improvement value. This value was correlated with offensive data (WH, QAB, 2KHatt, Runs, Hits, Singles, Doubles, Triples, HR, RBI, OBP, OPS, SLG, SO/AB and AVG) from the season.

Between significant visual skill improvements and performance measurements, statistically significant correlations were found with: right to left visual reaction time & 2KHatt ( $r=0.620$ ,  $p=0.01$ ), timed contrast sensitivity chart with OBP & OPS ( $r=0.530$ ,  $p=0.035$ ,  $r=0.588$ ,  $p=0.017$ ), timed Hart Chart & RBI ( $r=0.592$ ,  $p=0.016$ ) and anticipation accuracy and Contact% ( $r=0.636$ ,  $p=0.008$ ).

Previous studies have shown a high prevalence of greater contrast sensitivity in baseball players. Our findings reinforce this relationship. Anticipation and Visual Reaction Time likely have a role to play in baseball success and would require additional study. Timed Hart Chart and its relationship to RBI also demands further study in order to determine whether a true improvement in accommodative facility is the primary factor in this correlation. A surprising absence, is no correlation between improved visual processing speed and performance statistics. Previous studies found a relationship with this visual skill and batting average. This lack of findings may have more to do with the presented target than speed of processing, pointing the researcher towards a study investigating which may have a greater impact on performance, improving experience or improving visual skill.

#### POSTER #11

##### BV - Binocular Vision

##### The Effectiveness of Visual Functions to Identify Acute Mild Traumatic Brain Injury

Steven R. Klein, O.D.

#### Additional Author(s)

##### Jose E. Capo-Aponte, O.D., Ph.D.

The Department of Defense reports there were 357,048 cases of first-time diagnosis of traumatic brain injury (TBI) between 2000 to the third quarter 2016, with mild TBI (mTBI) accounting for 82.3% of all cases. Currently, there is a lack of mTBI objective and subjective biomarkers to identify acute mTBI. This study aims to validate visual functions to identify acute mTBI.

The study included 100 acute non-blast mTBI ( $\leq 72$  hrs post-injury) and 100 age-matched controls (age 19-44 yrs). Saccadic eye movement function was determined with the King-Devick (KD) Test. Near Point of Convergence (NPC) was measured with a near point convergence ruler. The Convergence Insufficiency Symptoms Survey (CISS) was also used to assess visual symptoms.

Subjects with mTBI had significantly higher NPC break (mTBI  $12.49 \pm 7.45$  cm; Control  $7.97 \pm 2.10$  cm;  $P < 0.0001$ ), KD Test completion time (mTBI  $62.01 \pm 19.91$  sec; Control  $45.65 \pm 8.31$  sec;  $P < 0.0001$ ), and CISS scores (mTBI  $24.76 \pm 12.06$ ; Control  $8.82 \pm 7.42$ ;  $P < 0.0001$ ).

These results strongly suggest that NPC can serve as an objective identifier for acute mTBI. The KD Test and CISS can serve as subjective identifiers for acute mTBI. The NPC results also suggest damage to the parasympathetic system. In combination, these tests are ideal since they are hand-held, easy to use, quick, deployable, easily performed by subjects, including mTBI subjects and easily administered by auxiliary staff (non-providers).

#### POSTER #43

##### OD - Ocular Disease

##### A Case Report Depicting Chandler Syndrome, a Subtype of ICE Syndrome

Megan Patterson, O.D.

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#### **Additional Author(s)**

**Erica Vanderpool, O.D.**

Chandler syndrome is one of a triad of rare disorders, which together comprise iridocorneal endothelial (ICE) syndrome. The other subtypes are Cogan-Reese syndrome and progressive iris atrophy. The shared characteristic of the syndromes is an abnormal corneal endothelium, along with anomalies of the anterior chamber angle and iris. ICE syndrome is most commonly unilateral and found in young adult Caucasian women. Chandler syndrome is the most common of the three sub-types at 57%. It is characterized by corneal edema along with possible peripheral anterior synechiae (PAS) and minimal changes to the iris. Patients may experience unilateral blurred vision and/or halos around lights. Management depends on the severity of the disorder's major complications of corneal edema and secondary glaucoma.

A 68-year-old Caucasian male presented to clinic with a chief complaint of mild distance blur, gradually worsening over five years. Best-corrected distance visual acuities were OD 20/20 and OS 20/40. Pupils were equal, round, and reactive to light with no APD. Intraocular pressures were OD 19mmHg and OS 20mmHg. Anterior segment findings OD were unremarkable, but OS revealed a beaten-bronze appearance to the corneal endothelium, corectopia, iris atrophy, and PAS superior-temporal. Posterior segment findings were unremarkable OU. Pachymetry results were OD 537µm and OS 563µm. RNFL SD-OCT confirmed no glaucomatous damage OU. Anterior segment SD-OCT showed open anterior chamber angles and anterior segment photos were taken. Based upon clinical presentation, Chandler syndrome was diagnosed. Extensive patient education on the condition was done, baseline HVF was scheduled, and the patient was told to return to clinic immediately if he experienced any eye pain or change to vision.

Chandler syndrome should be considered in any patient presenting with unilateral glaucoma, iris anomalies, or corneal edema. Superior technology such as in vivo corneal confocal microscopy and ultrasound biomicroscopy can aid in the diagnosis. Glaucoma risk should be examined on all ICE syndrome patients. Advanced surgical interventions are available if major secondary complications occur. Descemet stripping endothelial keratoplasty and deep lamellar endothelial keratoplasty for corneal edema, and glaucoma drainage implants for secondary glaucoma, have all shown high success rates.

#### **POSTER #29**

#### **CL - Contact Lens**

#### **Preventing Enucleation from Corneal Inflammation secondary to Microbial Keratitis**

**Anna Liew, O.D. Student**

#### **Additional Author(s)**

**Joseph Jamie Thimons, O.D.**

**Jami B. Parsons, O.D.**

Microbial keratitis (MK) infection, secondary to overnight contact lens wear, can be treated similar to bacterial keratitis depending on its severity and etiology. Some MK can be so severe after antibiotic treatment that subsequent inflammation must to be treated as well. The main concern after the initial antibiotic treatment, is that inflammation could further thin and cause corneal perforation. Treatment and management of microbial keratitis must include for infection, a broad-spectrum antibiotic treatment, or compounded antibiotic ophthalmic solution, and inflammation, including frequent dosing of a strong steroid or amniotic membrane

A 55 year-old female patient complains of pain, discomfort, and blur at distance OS after sleeping in color contact lens. Initially, the patient was treated with a compounded antibiotic q1hr at a

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different medical facility. After antibiotic treatment, the patient was told that she may need enucleation. Current ocular medication includes Bacitracin ointment OS. VA cc OD 20/40, sc OS 20/CF at 10 feet, IOP OD 17 OS unable. Slit lamp exam OD was unremarkable; OS showed >4mm central ulcer, anterior chamber had no cells and flares. View of the posterior pole was WNL OD, unable to view OS. The patient was instructed to continue Bacitracin/Polymyxin ointment TID OS, we added Azithromycin ointment TID OS, Prokera amniotic membrane OS. We followed the patient biweekly for a month, exchanging a fully used Prokera lens for a new Prokera lens. Steriod was added after the first week. Vision improved from 20/CF @ 10 ft and PHNI to 20/200 and PH 20/100. After 6 months, VA sc OS 20/70, PH 20/50.

Prokera amniotic membrane suspended the inflammation process and prevented corneal perforation. The infected and inflamed cornea healed well with the amniotic membrane and halted the scarring process. The initial haze from the first visit resolved by 95%.

#### POSTER #30

##### CL - Contact Lens

##### New Technology on Original Concepts: Iris Printed Scleral Lens

Jesus Martinez, O.D.

##### Additional Author(s)

Naomi Chun, O.D.

Jan PG Bergmanson, O.D., Ph.D., Ph.D h.c., DSc

Traumatic ocular injuries may be visually debilitating and leave patients with but they can also leave a patient with cosmetic consequences. This can lead to lower self-esteem and perception of oneself. Cosmetic and tinted contact lenses have been used for decades, not just for changing

the color and shape of the iris, but to provide visual benefit including improvement in vision, decreasing photophobia, and enhancing color perception for those with color deficiency. The use of painted scleral lens is nothing new, making its appearance as some of the first cosmetic contact lenses being used in films. These early scleral lenses were made of low DK material and unsuitable for daily use on the eye. With the advancement of higher DK materials, cosmetic scleral lenses take a new spin on old technology and emerge to help patient populations that need it.

A 33 year old Hispanic male presented to the clinic with a history of penetrating trauma 30 years ago in his left eye affecting his cornea and iris. The resulting scar runs limbus to limbus and causes significant corneal and iris irregularities resulting in 20/200 uncorrected visual acuity. The patient's main goals were to improve vision and cosmesis of the affected eye. Custom colored soft contact lenses do not provide improved vision or stability because of the multiple corneal irregularities. The patient was fit in a scleral lens, improving vision to 20/50. Upon consultation of Orion Vision Group, a iris printed scleral lens was made, masking the corneal scarring. The process included proprietary ink that is approved by the FDA, to maintain visual outcome with effects on DK. The patient was monitored closely for any effects on corneal edema, which resulted in no significant difference between lens wear with and without iris printing.

There are still improvements to be made with iris printing technology in proper color matching and extended studies on oxygen transmission but currently, only one company provides iris printed scleral lenses, making options limited. However, for patients who have no alternatives, where surgery yields too great a risk than benefit, an iris printed scleral lens is a viable option.

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**POSTER #31**

**CL - Contact Lens**

**To evaluate subjective and objective visual performance of DAILIES TOTAL1 Multifocal (DT1MF, delefilcon A, Alcon) contact lenses.**

**Jason R. Miller, O.D., MBA**

To evaluate subjective and objective visual performance of DAILIES TOTAL1 Multifocal (DT1MF, delefilcon A, Alcon) contact lenses in a population of daily soft MF contact lens wearers.

A total of 166 subjects wore DT1MF for 14±3 days in this prospective, US multi-site, bilateral clinical trial. LogMAR visual acuity (VA) at 40 cm (near), 80 cm (intermediate), and 4 m (distance) was collected at dispense and follow-up. At the end of the follow-up period, subjects were asked to rate their vision quality at near, intermediate and distance on a 10-point scale (1=poor and 10=excellent). In addition, the range of clear vision was collected at the follow-up visit.

The mean age was 52.0±5.14 and 77.1% were female. The mean logMAR VA at near, intermediate, and distance after 14±3 days of wearing DT1MF was 0.15±0.15, -0.07±0.10, and -0.10±0.07, respectively. These results were similar to the mean logMAR VA at dispense, which was 0.13±0.13, -0.07±0.10, and -0.09±0.07, respectively. The mean range of clear vision spanned from 32.7±8.2 cm to 106.0±17.0 cm, giving a mean range of 73.3±20.5 cm. After wearing DT1MF for 14±3 days, the mean subjective rating for vision quality at near was 7.2±2.0, for intermediate was 8.6±1.2, and for distance was 8.8±1.1.

DT1MF provides a consistent, clear range of vision from near, intermediate, and distance that subjects rated high for vision quality. This range of clear vision allows subjects to perform daily tasks such as cell phone use and computer use with ease.

**POSTER #35**

**LV - Low Vision/Vision Impairment & Rehabilitation**

**Low Vision Rehabilitation and management of Choroideremia**

**Justin Paul Kozloski, O.D.**

**Additional Author(s)**  
**Stephanie Schmiedecke, O.D.**

Choroideremia is a monogenic X-linked [1], progressive chorioretinal [2], rod-cone degeneration. Characteristic nyctalopia, tunnel vision with spared mid-peripheral regions, decreased contrast, and decreased visual acuity occur. Choroideremia occurs due to dysfunction in Rab escort protein-1 [3] that leads to the progressive degeneration in RPE, photoreceptors, and choroid [4]. Early identifying signs consist of pigmentary disturbance at the level of the retinal pigment epithelium.

RG, a 56-year-old Hispanic male with minimal past medical care and no other rehabilitative services or support reports to the Vision Rehabilitation Center at the San Antonio Lighthouse for the Blind and Vision Impaired for low vision services. Pertinent medical history is positive for major depressive disorder and posttraumatic stress disorder. Best-corrected visual acuity in the right eye was 20/200-2 and 20/400-1 in the left eye. Contrast sensitivity loss was profound in the right eye and severe in the left eye. Kinetic visual field testing displayed tunnel vision of less than ten degrees from the point of fixation in all meridians. Due to the degree of contrast sensitivity loss and decreased visual acuity, an electronic portable video magnifier was evaluated. Low vision rehabilitation resulted in successful fluent reading of goal size font. Further contrast difficulty was addressed with filters. Vocational and assistive services recommended, but declined at this time. In the recent past, RG

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was the victim of a robbery and subsequent head trauma that he suspected was due to being targeted for his vulnerability caused by his visual impairment. This incident resulted in a rejection of orientation and mobility white cane training.

Although contemporary investigations into gene therapy hold potential, there is no current effective treatment agreed upon by medical professionals for the pathology of choroideremia. In retinal disorders that result in visual impairment an appropriately timed low vision rehabilitation referral is critical in order to promote function, ensure job security, enhance quality of life, maintain independence, and to make proper interprofessional referrals. This case illustrates the psychological effects of losing vision without guidance of available services.

#### POSTER #37

##### LV - Low Vision

##### Corneal power and refractive state following small incision lenticule extraction for myopia

Ting Liu, M.D.

##### Additional Author(s)

Yu Ting, M.D.

Ji Bai, M.D.

To observe the change of refractive state and possible influencing factors for patients with different corneal power who underwent small incision lenticule extraction (SMILE).

Prospective controlled study was performed between January 2016 and June 2016 for patients underwent Small incision lenticule extraction (SMILE). These patients were divided into 3 groups according to the cornea power: low curvature group ( $K1 \leq 41.00$  D), common curvature group ( $41.00$  D  $< K1$  and  $K2 < 46.00$  D) and high curvature group ( $K2 \geq 46.00$  D). Preoperative and postoperative (1 day, 1 week, 1, 3 and 6 month) ophthalmic examination including uncorrected

distance visual acuity (UCDVA), refractive status, intraocular pressure (IOP) and slit lamp microscope examination were recorded. Subjective refraction and Pentacam HR were detected at 6 month after operation so as to monitor the incidence of intraoperative and postoperative complication. The total corneal refractive power (TCRP) based on Ray Tracing technique was used to evaluate the changes of corneal curvature before and after the procedure. Power vector analysis was used to evaluate the refraction status of corneal topography. At 6 months postoperatively, the Hotelling T2 test was used to compare the refractive status among the groups. Multiple linear regression was used to analyze the possible influencing factors of under-correction / over-correction.

30 patients (60 eyes) were enrolled, in which 15 were females (30 eyes) and 15 were males (30 eyes). And the 3 groups had the same sample size (10 patients and 20 eyes). The low curvature group had the youngest average age ( $22 \pm 4$  yrs.,  $P = 0.012$ ), largest male patients proportion (80%,  $P = 0.004$ ) and biggest average pupil diameter ( $3.26 \pm 0.36$  mm,  $P = 0.012$ ), compared to the other 2 groups. The incidence of OBL (19/20) was significantly higher in the high curvature group (95%,  $P < 0.01$ ). All patients had no loss of vision and UCDVA averaged 5.1 at 6 months postoperatively, but patients with low curvature were slightly "under-corrected" in 1-mm and 2-mm zone (Error values were  $< 0$ ). What's more, in 6-mm zone preoperative SE and postoperative spherical aberration were significant factors affecting the relationship between preoperative corneal curvature and postoperative refractive status ( $P < 0.05$ )

SMILE is safe and effective for patients either with low curvature or with high curvature, but slightly "under-correction" only occurred in low curvature patients in 1-mm and 2-mm zone. In 6-mm zone preoperative SE and postoperative spherical aberration are the influencing factors of the relationship between preoperative corneal

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curvature and postoperative refractive status.

#### POSTER #44

##### OD - Ocular Disease

##### Management Options for Central Serous Retinopathy

**Roya Attar, O.D.**

##### Additional Author(s)

**Jessica Haynes, O.D.**

**Mohammad Rafieetary, O.D.**

Central serous retinopathy (CSR) is a chorioretinal disease that affects approximately ten men and two women per 100,000 people. It can be a potentially chronic and is characterized by the accumulation of subretinal fluid in the posterior pole. The main risk factors for CSR are systemic corticosteroid use, type A personality and pregnancy. The pathophysiology of CSR remains vague, although disorders in both the choroidal circulation and retinal pigment epithelium have been implicated. Most acute CSR cases may resolve spontaneously without treatment within months. A wide array of treatment strategies have been explored for chronic cases of CSR, including Photo Dynamic Therapy (PDT) following vertoporphin (Visudyne) administration, focal laser, intravitreal anti-VEGF, and systemic oral medication such as aldosterone antagonists. However, with the exception of an orphan drug designation for vertoporphin by the Food and Drug Administrator (FDA), to date there is no other approved treatment or international consensus concerning the optimal treatment protocol of CSR.

The authors present five cases of CSR in which different management options were utilized. Each case responded most optimally to a different form of management (Angiography guided focal laser, Angiography guided PDT, anti-VEGF, and oral medication) with one case representing spontaneous resolution. Each case was followed

for a duration of one year or longer with either substantial improvement or complete resolution of subretinal fluid as a final outcome. In addition, these cases highlight the usefulness of imaging strategies such as optical coherence tomography, fundus autofluorescence, fluorescein angiography, and indocyanine green angiography in the treatment and management of CSR.

Management of patients with CSR, particularly in the absence of spontaneous resolution can be challenging. Optometrists must be abreast of potential risks, benefits and alternative of treatment options, particularly in chronic CSR with potential functional vision loss to potentially improve patient's chances for rehabilitation.

#### POSTER #63

##### OD - Ocular Disease

##### Corneal Edema

**Katrina Hrubiec, O.D. Student**

##### Additional Author(s)

**Anne Reuter, O.D.**

Amantadine is a medication that potentiates dopamine effects and is used to treat influenza A, Parkinson's disease, and certain movement disorders. It is also used off label to treat fatigue in MS patients. Ocular side effects include diffuse white sub-epithelial punctate opacities, SPK, and corneal edema.

A 61 year old male presented for his annual eye exam, reporting that his 2 year old glasses have become blurry at distance and near over the past month. The patient is a type 2 diabetic and has MS. On ocular examination, the patient's best corrected vision was 20/30 for the right eye and 20/70 for the left. The anterior segment was remarkable for 1+ Descemet's folds and 1+ guttate of the right cornea, and 3+ central Descemet's folds and 1+ guttate of the left cornea. All other findings were unremarkable. The central corneal

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thickness was measured at 637um, 837um for the right and left eye, respectively. After starting Pred Forte 1% every 4 hours for 4 days, his best corrected vision was 20/25 for the right and 20/50 for the left. The central corneal thickness decreased to 628um for the right and 811um for the left. The patient has no history of pre-existing endothelial disease, no history of surgery or trauma, and no evidence of infection. A review of active medications showed an association between amantadine use and corneal edema; this appeared to be a probable cause. With approval from the patient's doctor, he discontinued Amantadine for 1 month, decreased the Pred Forte to 4 times a day, and return in 2 weeks. At the follow up visit, his best corrected vision and central corneal thickness continued to improve. Two weeks later, his best corrected vision was 20/20 for both eyes, central corneal thickness was 584um and 598um right and left, respectively. Mild central corneal haze in the left eye remained, with no folds or guttate present.

It is important to consider Amantadine use in the differential of bilateral corneal edema, given the dose-effect relationship. The most effective treatment for Amantadine induced corneal edema is discontinuation of the medication.

#### **POSTER #66**

#### **OD - Ocular Disease**

#### **Susac Syndrome or Atypical Multiple Sclerosis**

#### **Jenna Koskey, O.D.**

Susac syndrome is a rare neurological disorder with a clinical triad of encephalopathy, hearing loss, and branch retinal artery occlusion. Patients may present with one or all conditions in the triad, with encephalopathy being the hardest to diagnosis but is almost always present. Encephalopathy has a wide range of symptoms, including loss of

memory, mental changes, fatigue, involuntary eye movements, problems with breathing, and gait issues. Prevalence of Susac syndrome is virtually unknown, due to a common misdiagnosis of multiple sclerosis. Susac syndrome presents similarly to multiple sclerosis in regard to patient demographics (middle-aged females 20-40 years of age), symptoms, and appearance on MRI. Although treatment options for systemic symptoms of Susac syndrome and multiple sclerosis are similar, proper diagnosis is key to long term ocular management.

A 41 year-old white female presents with a referral from the neurology department after finding white matter lesions in the corpus callosum on the MRI of brain and orbits. The patient was experiencing one sided hearing loss, vertigo, severe migraine headaches, numbness in the legs, coordination problems, and intermittently hazy peripheral vision. The patient denied diplopia, pain on eye movements, and no nystagmus was noted. Entrance testing, slit lamp examination, and dilated fundus examination were within normal limits. Fluorescein angiography was performed to detect signs of a branch retinal artery occlusion, but no artery blockage was seen on imaging. The patient was diagnosed with possible Susac syndrome, started on treatment, and monitored at regular intervals to detect any changes to the retinal vessels.

Although rare, Susac syndrome is becoming more prevalent with increased awareness and understanding of the signs and symptoms of the condition. Although multiple sclerosis may present with similar symptoms, the conditions are different and it is imperative to include Susac on the list of differentials. If Susac is suspected, the patient should be monitored at frequent intervals, as a branch retinal artery occlusion can occur at any time in the disease process. Lastly, although the condition is self-limiting, treatment may be beneficial to patients with more severe neurological symptoms to prevent long-term damage.

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**POSTER #73**

**OD - Ocular Disease**

**“Herpes Zoster Ophthalmicus and Subsequent Neurotrophic Keratitis: Crouching Danger, Hidden Symptoms”**

**Detlef J. Sleichter, B.S.**

**Additional Author(s)**  
**Kathleen O’Leary, O.D.**

Herpes zoster ophthalmicus (HZO) is a well-documented and treatable disease. Even with successful treatment of HZO secondary complications can pose sight threatening scenarios with relatively absent symptoms. Reduced corneal sensitivity due to neurotrophic keratitis (NK) can cause a patient problems for years to come. In this particular case, a myriad of factors teamed with NK to yield a challenging management situation.

A seventy-eight-year-old Caucasian female presented for her routine eye exam with no ocular complaints and a history of presbyopia, dry eye, and resolved HZO of the left eye. Restasis and artificial tears were used in combination for her dry eye. Slit lamp examination of the left eye revealed trichiasis with associated corneal tracking, marked sectoral injection of the conjunctiva with adjacent corneal neovascularization, and a 3x3mm peripheral corneal ulcer with surrounding stromal infiltrate. Initial treatment included epilation of the misdirected lashes, increased lubrication drops, discontinuation of Restasis, and a prescription for Vigamox one drop every two hours and Valtrex 1000mg three times daily for seven days. Over the next two weeks the antibiotic was tapered, and switched to Maxitrol drops four times daily with Maxitrol ointment at bedtime. A course of Doxycycline 100mg twice daily for fourteen days was added to promote healing. The ulcer was only reduced to approximately half its original size after five days. Continuing the previous treatment regimen, a Prokera amniotic membrane (AM) was

placed over the left cornea and the eyelids were taped shut for comfort. Follow up care was given every other day for one week before the AM completely dissolved and was removed. Reepithelization of the cornea was achieved with a 2mm stromal scar and dellen remaining.

NK is a serious complication of HZO. If not treated promptly and managed properly, perforation and blindness can ensue. Patient awareness of their reduced corneal sensitivity is key in quick recognition of ocular problems. Amniotic membranes are a safe and effective way to successfully manage this HZO complication without invasive surgical procedures.

**POSTER #74**

**OD – Ocular Disease**

**Bitemporal Pallor: A Case of Suspected Toxic Optic Neuropathy**

**Kimberly A. Wadas, B.A.**

**Additional Author(s)**  
**Shankaran Ramaswamy, O.D.**  
**Cynthia Normandie, O.D.**

Toxic Optic Neuropathy is a painless, progressive, bilateral loss of vision due to alcoholism, tobacco use, and/or poor nutrition. It can also be induced through the use of many common medications, including but not limited to ethambutol, digitalis, and streptomycin.

A 56 year-old male diagnosed with Toxic Optic Neuropathy in both eyes, secondary to a history of alcoholism, poor nutrition, and drug abuse. He reported an average consumption of eight alcoholic beverages a day, five days a week for approximately twenty years. He also reported a history of homelessness, hypertension, diabetes, and Hepatitis C. The patient reported being sober for six years at the time of his examination. The diagnosis was initially made during his routine eye exam due to patient history, abnormalities in both



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color vision and red desaturation, reduced visual acuity, and suspicious optic nerve appearance. Visual acuities were 20/40+ in the right eye, 20/40- in the left eye, with the patient reporting a history of alternating exotropia with possible strabismic amblyopia. Ocular manifestations included trace bitemporal pallor, early visual field defect in both eyes, ganglion cell loss, and nerve fiber layer loss in both eyes.

Toxic Optic Neuropathy can manifest through a variety of etiologies, and patients must be co-managed with their Primary Care Physician, as well as an Internist. Patients with this condition can be treated with dietary supplements, removal of the causative agent, and careful coordinated care with lifestyle modification. Routine ocular health examinations, as well as follow-up visual field testing, serial fundus photography, and OCT can also aid in tracking both progression of the Optic Neuropathy as well as the effectiveness of the treatment plan.

#### POSTER #75

##### OD - Ocular Disease

##### **Loteprednol etabonate ophthalmic gel 0.5% for inflammation associated with dry eye disease: Outcomes of a 12-week Phase 2 clinical study**

**David G. Evans, O.D.**

##### **Additional Author(s)**

**John D. Sheppard, M.D.**

**Jon I. Williams, Ph.D.**

The ophthalmic corticosteroid loteprednol etabonate (LE) is rapidly metabolized to inactive metabolites in the ocular tissue, thus reducing the potential for steroid-class side-effects. Here we report on the efficacy and safety of LE gel 0.5% compared to cyclosporine emulsion (CsA) in subjects with dry eye disease (DED).

This was a small, randomized, multi-center,

parallel group, exploratory study with limited statistical power. Subjects (N=102) with mild or moderate DED received LE gel BID for 12 weeks (n=36), LE gel BID for weeks 1-4 plus CsA BID for weeks 3-12 (n=33), or CsA for 12 weeks (n=33). Efficacy outcomes, measured at baseline and Weeks 2, 4, and 12, included OSDI, DEQ-5, and Comfort Index questionnaires, corneal staining, bulbar hyperemia, Schirmer score (Week 12 only) and tear film break-up time (TFBUT). Safety assessments included adverse events (AEs), intraocular pressure (IOP) and biomicroscopy/ophthalmoscopy findings.

All three treatments reduced signs (either fluorescein or lissamine green corneal staining, TFBUT, Schirmer score) and symptoms (OSDI, DEQ-5, and Comfort Index) of DED after 12 weeks of treatment. There were no significant differences between LE gel or LE gel + CsA compared to CsA alone for any of the measured outcomes at Week 12 ( $P>0.05$ ). Treatment differences, in terms of improvement over baseline, were noted in favor of LE gel vs. CsA for hyperemia (by keratography) and TFBUT at Week 4 ( $P\leq 0.04$ ), LE gel plus CsA vs. CsA for OSDI at Week 2 ( $P<0.024$ ), and for both LE gel and LE gel + CsA vs. CsA for OSDI visual function domain at Week 2 ( $P\leq 0.041$ ). All three treatments appeared safe and well-tolerated, with few incidences of burning, stinging, or discomfort on instillation. There were few AEs (all ocular), no serious AEs, and only two incidences of elevated IOP ( $>21$  mm Hg), one in the LE gel treatment arm and one during treatment with CsA in the combination treatment arm, both occurring at Week 12. Biomicroscopy/ophthalmoscopy findings were unremarkable.

Results suggest that LE gel 0.5% BID could be a potential treatment for ocular inflammation associated with dry eye disease (DED), warranting further investigation.

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**POSTER #76**

**OD - Ocular Disease**

**A Mountain or a Mole Hill? Determining the Management of Vitreomacular Traction**

**Amanda Tompkins, O.D.**

Vitreomacular traction has infinite presentations with a natural course that has unpredictable outcomes. Macular holes are the immediate and primary concern when considering the treatment plan for these patients. Monitoring with amsler grid, dilated fundus evaluations, and a retinal referral are among the management options for VMT. Determining the appropriate option for your patient is imperative to preserving vision.

A 44 year old African American female presents for an annual eye exam with counting finger at five feet in her left eye. She is a low magnitude presbyopic astigmat. All examination findings were normal with the exception of a pseudohole appearance in her left eye, incomplete PVD in same eye and extensive lattice degeneration in both eyes. Optical coherence tomography revealed dramatic VMT with associated impending macular hole. Immediate referral to a retinal specialist was made for the next day. Vision was improved with a vitrectomy and membrane peel and is now stable.

This case was straightforward in that the need for referral was obvious. However, it brings to light a potentially tricky clinical scenario. It is imperative the clinician have a comprehensive understanding of VMT, the potential outcomes, and the management options based on risk. From closely monitoring the natural course of the PVD in mild cases to a timely referral for severe cases, appropriate management can ensure a positive outcome for many patients.

**POSTER #77**

**OD - Ocular Disease**

**Posterior Orbital Inflammation With A Normal Fundusoscopic Exam**

**Katherine B. Lynch, O.D.**

**Additional Author(s)**

**Erica Ittner, O.D.**

**Ashley Speilburg, O.D.**

Orbital Inflammatory Disease (OID) can present in many ways and involve almost any ocular structure. While isolated anterior segment signs of inflammation are possible with this condition, any posterior segment signs are typically seen as part of the dilated ophthalmic exam. We highlight two cases of orbital inflammation that presented with both anterior and posterior involvement despite an unremarkable retina/vitreous exam.

We present two patients who presented to an urban eye clinic with significant chemosis without atopic history, recent irritant or injury, and significant headache or pain. Their vitreous, anterior chamber and intra ocular pressure were normal with lens changes consistent with the mild reduction in their visual acuity. The patients were African American, one male and one female, aged 63 and 59 respectively. While both patients had significant conjunctival chemosis with mild injection, their dilated fundus examinations were unremarkable. B scan ultrasonography revealed posterior scleral thickening in each case suggestive of posterior segment inflammation. They were referred for ophthalmological consultation and imaging to evaluate the extent of the orbital inflammation and manage the condition.

Orbital inflammatory disease has a variable clinical presentation and may be indicative of a more widespread inflammatory profile. Anterior inflammation, in the absence of a defined allergic history or ocular injury, may indicate a more serious disease process. A normal retinal/vitreous exam

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does not always rule out existing posterior inflammation and B scan ultrasonography should be considered with any atypical or non-improving case of anterior segment inflammation. These patients also require a medical work up to rule out any associated systemic condition. Due to the sight threatening nature of posterior orbital inflammation, it is important that the primary care optometrist recognize the possibility that OID can exist without the traditional signs and symptoms of the disease.

#### POSTER #78

##### OD - Ocular Disease

##### Plaque formation BRAO and beyond

##### Lauren Mangano, O.D.

A branch retinal artery occlusion (BRAO) is a common disorder of the ocular vasculature which stems from the occlusion of a branch of the central retinal artery. BRAO's represent 38% of all acute retinal artery obstructions. This occlusion commonly occurs due to an emboli at the bifurcation of vessels, in particular the temporal retinal arteries. The most common form of emboli are fatty plaques from the carotid arteries or calcific plaques from the heart. A common presenting complaint is sudden monocular vision loss, dimming of vision, or a curtain over vision. The resultant hypoperfusion to the retinal tissue may cause tissue necrosis and permanent visual field loss.

A 67-year-old white male was referred to the VA clinic by an outside OD secondary to a BRAO with plaque identification OS. The patient was confirmed to have 5 plaques throughout the superior-temporal and inferior-temporal vasculature with resultant sectoral, monocular vision loss. Patient complained of a "black spot" in vision inferior-nasal OS. His best corrected visual acuity was 20/25- OD, and 20/30- OS. Patient was full to

finger counting OD and restricted inferior-nasal OS. Dilated fundus exam revealed a large, retractile Hollenhorst plaque along the superior-nasal vasculature exiting the optic cup OS. Upon further examination, 9 more plaques were identified throughout the superior-temporal and inferior-temporal arcades. Fundus photos were taken, revealing in total 19 plaques throughout the posterior pole and mid periphery. Of the 19 plaques, 4 were calcific plaques and 15 were Hollenhorst. The patient was immediately referred to Saint Vincent's hospital for a stroke work up, including a carotid ultra sound and EKG. The carotid ultrasound found >90% stenosis of the right carotid artery and >85% stenosis of the left carotid artery. Thus, a bilateral carotid endarterectomy was performed in order to help save the patient's life.

In this case, sectoral vision loss of a BRAO led to the discovery of a potentially more insidious systemic prognosis had the issue gone untreated. This case emphasizes how ocular health ties directly to systemic health and many major health issue have the potential to be first identified through the eyes.

#### POSTER #79

##### OD - Ocular Disease

##### Patient sees light; doctor sees white- A case of Multiple Evanescent White Dot Syndrome

##### Charlene Singh, O.D.

##### Additional Author(s)

##### Omar S. Punjabi, D.O.

Multiple evanescent white dot syndrome (MEWDS) is a rare inflammatory choroidoretinal condition primarily disrupting the photoreceptor outer segments. It occurs predominately in young, myopic females causing characteristic unilateral yellowish spots of 100-300um at the level of the retinal pigment epithelium

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or deep retina in the posterior pole extending to the periphery. Typical symptoms include sudden decreased vision, central/paracentral scotomas, enlarged blindspot, photopsias, and prodromal viral illness. Other retinal findings include orange-yellow granularity of the fovea or discrete vitritis. Special testing include fluorescein angiography exhibiting "wreath-like" late hyperfluorescence of the white dots and occasional optic nerve leakage. During the active phase of the condition, electroretinogram shows reduced a-wave given inflammatory process causing photoreceptor dysfunction. The signs and symptoms are transient; resolving within 6 weeks after onset without treatment.

16-year-old white female presented to the clinic complaining of acute onset, constant floaters and blurry vision for several months in the right eye. Patient further reports cough, nasal congestion, and headache-like symptoms. Patient's best-corrected vision was 20/40 in the right eye and 20/20 in the left eye. Fundus findings included yellow-white lesions in the posterior pole extending to the periphery in the right eye. Fundus autofluorescence showed small hyperfluorescent lesions. Angiographic finding revealed hyperfluorescent wreath-like swirl configuration confirming the diagnosis of MEWDS. No treatment was initiated initially, at her two week follow-up, patient reported improved symptoms with visual acuity of 20/20 in the right eye and nearly resolved retinal signs.

Multiple evanescent white dot syndrome is a self-limiting rare unilateral retinitis with typically excellent prognosis. No treatment is indicated unless the symptoms persist or recur causing progressive functional losses. In such cases, literature suggests immunosuppressive therapy pulse dose of methylprednisone 1000mg/day for 3 days or betamethasone 200mg/day for 3 days.

## POSTER #80

### OD - Ocular Disease

#### Amniotic Membrane for Corneal Chemical Burns

**Kelly Pereira, B.S.**

#### Additional Author(s)

**Amy Falk, O.D.**

**Michael S. Cooper, O.D.**

Chemical ocular burns, especially those affecting the cornea, are considered ocular emergencies that require prompt treatment and management to avoid permanent visual damage. Sutureless amniotic membranes contain various factors that aid in rapid epithelialization and healing of the ocular surface, making it an ideal course of management for ocular chemical burns, where time is of the essence.

A 25-year-old Asian male presented with a chemical burn in his right eye. He reported getting trifluoroacetic acid during an experiment 1 hour prior to examination. He had immediately irrigated his eye at an emergency eye wash station and subsequently performed irrigation with a Morgan lens for 20 minutes. He reported photophobia, mild pain, lid swelling, and blurry vision. Incoming pH was 7.0. Visual acuities with correction were 20/25 in the right eye and 20/20 in the left eye. Anterior segment examination revealed mild right upper lid edema, 2+ conjunctival injection, and two 1-2 mm corneal burn opacities infiltrating Bowman's layer, one of which within the visual axis. The ocular surface was treated with 2 gtts of besifloxacin in office and a sutureless amniotic membrane was placed on the right eye. The patient was also instructed to take an oral NSAID as needed for pain. Three days later the patient returned with a clear cornea and improved vision.

Amniotic membranes should be considered in patients presenting with chemical burns, especially those at higher risk of visual compromise. These

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membranes are both anti-inflammatory and antimicrobial in nature aiding the ocular surface in a more rapid recovery. It also has a great safety profile, containing less ocular side effects than alternative treatments such as steroid drops.

#### POSTER #81

##### OD - Ocular Disease

##### Surgical Intervention in Fungal Keratitis

**Marsha Ann Thomas, O.D.**

##### Additional Author(s)

**Rebekah Montes, O.D.**

**Padhmalatha Segu, O.D.**

Fungal keratitis can be visually devastating if not diagnosed and managed promptly. Unfortunately, it can resemble bacterial keratitis early in the disease process and is often misdiagnosed. A thorough case history is important to rule out fungal keratitis; one should ask the patient of the possibility of ocular trauma with wood or vegetative matter. A corneal culture, prior to initiation of therapy, is indicated if there is any doubt of etiology or if the ulcer is visually threatening. Late diagnosis can lead to a keratitis that is nonresponsive to therapy and requires surgical intervention.

This case report discusses a 50-year-old Hispanic male who was initially misdiagnosed with bacterial keratitis. About one month after onset, the patient was referred to a corneal specialist who confirmed the diagnosis of fungal keratitis. The patient's presenting visual acuity was counting fingers at 1 foot in the affected eye (OD). Attempts at culturing the cornea were unsuccessful, however, *Fusarium* was finally identified via aqueous humor tap. The patient was prescribed oral, topical and an intrastromal injection of voriconazole; however, the keratitis was nonresponsive. The patient eventually required a therapeutic penetrating keratoplasty. The infection

managed to return and an anterior chamber washout and additional intrastromal injection of voriconazole were required. Fortunately, the infection has not returned and the graft remains clear; however, the patient has visually significant posterior synechiae as a result of severe inflammation. Further surgical repair of the posterior synechiae is now required to improve vision; his current visual acuity is 20/400.

Intrastromal injection provides direct medication to the source of infection when orals and topicals are suboptimal. Therapeutic penetrating keratoplasty removes the source of the infection and aids in controlling the infection. Occasionally, fungal infection can spread to the anterior chamber or posterior chamber. Anterior chamber washout aids in resolving any sources of infection that can reinfect the cornea or graft. A thorough case history and early diagnosis may have prevented this patient from having to undergo extensive ocular surgeries. Surgical interventions for the management of fungal keratitis saved this eye from further ocular complications such as endophthalmitis and phthisis bulbi.

#### POSTER #82

##### OD - Ocular Disease

##### Metastatic Choroidal Melanoma from Primary Leiomyosarcoma

**Rachel Roman, B.S.**

##### Additional Author(s)

**Kathleen O'Leary, O.D.**

Most cases of ocular melanoma are of metastatic origin with the majority arising most from lung cancer in men and breast cancer in women. Approximately 25% of patients that present with metastatic choroidal melanomas have no previous history of systemic disease. Ocular symptoms can include decreased vision, flashes, floaters and visual field defects, although most are

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asymptomatic.

A 70 year-old male, with previous history of leiomyosarcoma, presented to the clinic complaining of cloudy vision in his right eye. BCVA of the right eye was 20/30- and left eye was 20/20- with minimal refractive error. Anterior segment revealed mild nuclear sclerosis, but otherwise unremarkable. Posterior segment revealed a healthy fundus in the left eye. Right eye exam showed a yellow choroidal mass located superior-temporally and surrounded by subretinal fluid that extended to the fovea. OCT confirmed the subretinal fluid and retinal photos were obtained for documentation. The patient was referred to the ocular oncology service at Wills Eye. Their examination revealed a small choroidal lesion measuring 2mm in diameter and 2mm in thickness with trace overlying lipofuscin pigment indicating metabolic activity. Due to the small size of the lesion, photodynamic therapy was recommended to control the mass and reabsorb the subretinal fluid; this treatment restored his vision to 20/20-. Leiomyosarcoma is the most common soft tissue sarcoma and is a malignant tumor arising from mesenchymal cells. This patient was first diagnosed with leiomyosarcoma of his right medial thigh in 2013. Subsequent testing over the years revealed systemic metastatic disease of the lungs, spine, brain and bladder for which he continues to undergo various treatment courses.

Patients with choroidal melanomas should receive a full systemic work-up to determine if the lesion is a primary tumor of the eye or a result of metastatic disease. Treatment of choroidal melanomas depend on the characteristics of the lesion and the results of the systemic work up but include plaque radiotherapy, external beam radiotherapy, photodynamic therapy and enucleation.

## POSTER #108

### PC - Primary Care

#### Intracranial mass in a 5-year-old

#### Bhumika Patel, O.D.

Intracranial tumors are. One of the major signs noticed is papilledema in a healthy person with no predisposing factors of idiopathic intracranial hypertension. Patients usually complain of severe headaches or worsening headaches, nausea, intermittent tropia and diplopia. The symptoms can start as early as four weeks. Treatment depends on the type of intracranial tumors. However, excision, chemotherapy and radiotherapy are used for the treatment of intracranial tumors.

A 5-year-old Caucasian female came in with complaint of lot of nauseating headaches, intermittent eye turn OS and diplopia that started about six weeks ago. Her medical history is unremarkable except for allergies. Her ocular history is remarkable for toxoplasmosis OD and low compound myopic astigmatism OU. The examination revealed unremarkable anterior segment OU. Intraocular pressures were 11mm Hg OU. Dilated examination revealed 4++ optic nerve head edema OU. Maculae were flat and evenly pigmented OU. A chorioretinal scar was observed superior temporal to macula OS. Symptoms and findings warranted an immediate visit to an emergency room to rule out intracranial mass. She was diagnosed with an intracranial mass by third ventricle and hydrocephalus.

Severe headaches, eye turn and papilledema warrant an urgent trip to ER to rule out an intracranial mass. Most patients would present with normal behavior so unless the mass is big. When an intracranial mass is the culprit, mainly surgical option is considered initially.

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**POSTER SESSION #5**

*Saturday June 24 from 12 pm to 1 pm*

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**POSTER #34**

**LV - Low Vision/Vision Impairment & Rehabilitation**

**Fitting a Telescope to Enable a Low Vision Patient to Pursue His Love of Playing Music**

**Kathryn Werner, O.D.**

56 year old white male with a history of bilateral tractional retinal detachments and a central retinal artery occlusion in the right eye with subsequent neovascular glaucoma presented for his bi-annual low vision exam. The patient complained of difficulty reading his sheet music while playing the saxophone. Due to blindness in his right eye and low vision in the left eye, the patient was using a hand magnifier to read and memorize two bars of music at a time. The patient's medical history was significant for Type 2 diabetes mellitus, hypertension, hyperlipidemia, and sleep apnea.

The patient has light perception remaining in his right eye and a best-corrected ETDRS chart visual acuity of 2M/6-2 in the left eye. The patient's working distance for his music stand was measured to be 50 centimeters. Initially, a 2.2x full diameter wide angle Galilean monocular telescope was trialed over his distance prescription OS, but the patient reported blurred vision. A +2.00 ADD was placed over the distance Rx and the patient was able to see two measures of music at a time with clear vision. To test if the patient would benefit from an increase in field, a 1.7x full diameter wide angle Galilean telescope with a +2.00 ADD was trialed; the patient successfully saw three measures of music simultaneously and reported clear vision. Since the patient preferred the expanded field of view, a 1.7x focusable full diameter spiral Galilean telescope was trialed, which the patient ultimately preferred. A Yeoman

frame was then measured for the fitting of the telescope.

Prescribing the appropriate low vision devices for your patients requires an extensive assessment of the patient's activities of daily living. It is very important to provide your patient with devices that allow him to function with regular day-to-day tasks and chores. Additionally, it important to ask about the patient's hobbies so that you can help enable the patient to pursue what gives them enjoyment, despite their low vision or blindness.

**POSTER #38**

**LV - Low Vision**

**Visual outcomes after balanced salt solution infiltration during lenticule separation in SMILE for myopic astigmatism**

**Ting Liu, M.D.**

**Additional Author(s)**

**Kaijian Chen, M.D.**

**Ji Bai, M.D.**

To evaluate the refractive outcomes of the balanced salt solution infiltration during small-incision lenticule extraction (SMILE).

Patients received SMILE to the correct the myopic astigmatism in Daping Hospital of the Third Military Medical University from January to July 2013. Total 52 patients (104 eyes) with myopic astigmatism were enrolled. One eye of each patient received traditional SMILE procedure (control group) and the other received modified SMILE procedure (liquid infiltration group). The corrected distance visual acuity (CDVA) and postoperative uncorrected distance visual acuity (UDVA), refraction, wavefront aberration, intraocular pressure (IOP), and optical quality parameters (modulation transfer function [MTF] cutoff frequency and objective scattering index [OSI]) were evaluated.

UDVA was significantly higher in the liquid

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infiltration group compared with control group at 1 day postoperatively, but not at 1 month postoperatively. Moreover, OSI and MTF cutoff frequency were higher in the liquid infiltration group compared with control group at early follow-up, while there were no significant difference in terms of OSI and MTF cutoff frequency between two groups at 3 months postoperatively. In addition, the predictability was better in the liquid infiltration group compared with control group. Furthermore, the changes of horizontal coma were significantly less in the liquid infiltration group compared with control group. However, there was no difference in the reduction of IOP at one month postoperatively between two groups.

Modified SMILE procedure had better visual outcomes than traditional SMILE procedure for the treatment of myopic astigmatism.

#### **POSTER #46**

##### **OD - Ocular Disease**

##### **Optical Coherence Tomography Angiography (OCTA) features in patients with Retinitis Pigmentosa (RP).**

**Calista Ming, O.D.**

##### **Additional Author(s)**

**Julie Rodman, O.D., M.S.**

**Perla Najman, O.D.**

Retinitis pigmentosa (RP) is an inherited retinal dystrophy characterized by progressive degeneration of the rod photoreceptor cells with eventual degeneration of cone photoreceptors as well. Retinal vascular alterations resulting in reduced perfusion has been described in affected patients. The advent of Optical Coherence Tomography Angiography (OCT-A) has led to in-vivo identification of these vascular abnormalities throughout the retina and choroid. Studies have shown a reduction in vessel density of the superficial capillary plexus (SCP), deep capillary

plexus (DCP) and possibly the choriocapillaris plexus (CCP) in patients with RP.

An 18 year old Caucasian male presented for comprehensive eye examination. His ocular history was positive for RP diagnosed two years prior. He denied any difficulty with his vision or mobility. His medical and family history was unremarkable. Best-corrected visual acuity was 20/20 OD and OS. No abnormalities were noted on entrance testing. Intraocular pressure was 11 mmHg OD and OS. Retinal examination was positive for peripheral and mid-peripheral bone spicules, atrophy of the retinal pigment epithelium and arteriolar attenuation. There was an absence of waxy pallor, epiretinal membrane or macular edema. OCT-A revealed a reduction in the perimacular vascular network density at the level of the SCP, DCP and CCP.

Vascular alterations including arterial narrowing, vessel attenuation and changes in blood flow have been well documented in RP patients. OCT-A now provides a three-dimensional angiographic analysis of the extent of retinal blood flow reduction in these patients. Treatment modalities can be appropriately aimed at targeting viable retinal photoreceptors.

#### **POSTER #83**

##### **OD - Ocular Disease**

##### **Differentiating Polypoidal Choroidal Vasculopathy from Wet Age-Related Macular Degeneration**

**Jansi Damarla, O.D.**

##### **Additional Author(s)**

**elly Thompson, O.D.**

Polypoidal Choroidal Vasculopathy (PCV) is a rare and often debilitating disease of the choroid. It is often mistaken for Age-Related Macular Degeneration (ARMD), however, there are a few marked differences that must be considered before such a diagnosis can be made. This report is on a



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patient who had significant vision loss in his left eye from a presumed fibrotic choroidal neovascular membrane (CNVM) secondary to PCV and how this diagnosis was differentiated from wet ARMD to implement the proper treatment. This poster reviews useful strategies for eye care professionals to distinguish wet ARMD from PCV such that appropriate treatment and care can be delivered.

An 87 year old African American male presented with longstanding severe loss of vision in his left eye and reduced visual acuity in his right eye. This patient had been receiving various anti-VEGF injections in both eyes for presumed wet ARMD at that time. A few years prior, this patient suffered from a large CNVM in his left eye with diffuse disruption to the retinal pigment epithelium in his right eye; diagnosis at this time was considered wet ARMD. During this patient's July 2016 examination, dilated fundus exam revealed extensive fibrotic scarring in his left eye and retinal atrophy in his right eye. Upon review of additional ancillary testing, RPE atrophy was seen on IVFA with atypical pigment epithelial detachments and abnormal hyperfluorescent polyps were revealed. With these findings, this patient's diagnosis was finally concluded as Polypoidal Choroidal Vasculopathy.

PCV and wet ARMD can pose as a diagnostic challenge as both appear strikingly similar. However, there are a few characteristics that are particularly diagnostic solely to PCV. While attempting to differentiate between these two diseases, a comprehensive fundus examination, fluorescein fundus angiography, optical coherence tomography, and indocyanine green angiography can aid diagnosis. As an optometrist, it is vital to be able to differentiate from these two diseases such that we can better educate these patients about their diagnosis, their visual prognosis, and refer for appropriate and adequate treatment.

## POSTER #90

### OD - Ocular Disease

#### Peripheral Pigmented Chorioretinal Atrophy

**Nadine Ahmed, O.D. Student**

#### Additional Author(s)

**Jami Parsons-Malloy, O.D.**

Peripheral pigmented chorioretinal atrophy is rare disorder and is of unknown etiology. Usually the patient is asymptomatic and there is no decrease in vision. It presents as pigment clumps along retinal veins and is usually bilateral and symmetric. There have been many hypotheses as to why this condition may occur however a definitive cause has yet to be found.

A 61 year old African-American male presented for a glaucoma follow up. Vision is stable per patient. Patient's current medical history shows that he is currently on isoniazide due to a positive PPD result. Upon examination the patient had no significant refractive error with best corrected acuities of OD 20/20 and OS 20/20. Fundus examination revealed bone spicule pigmentation w/ chorioretinal atrophy 360 in the periphery OU. Humphrey Visual Field 24-2 showed glaucomatous changes, however no defects that would correlate with peripheral pigmentation findings. Further blood work was ordered to rule out a possible infectious or systemic disease. ANA, RPR, ESR, CRP, CBC, and chem 7 results came back normal.

Inflammatory conditions have been hypothesized to initiate peripheral pigmented chorioretinal atrophy. The patient did have a positive PPD result in the past, however there is still no conclusion as to the reasoning behind the findings. This case shows how further ancillary testing is necessary after an abnormal finding, even if vision may not be affected, to rule out any systemic abnormalities.

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**POSTER #91**

**OD - Ocular Disease**

**Managing vision loss in Retinitis Pigmentosa**

**Marie Mantelli, O.D.**

Retinitis Pigmentosa (RP) is the most common form of hereditary retinal degeneration, classically characterized by progressive night blindness and constriction of peripheral vision. One-quarter of all patients with RP will become legally blind in both eyes; however, it is rare to lose all vision. More than half of all patients with RP have visual acuity of 20/40 or better in at least one eye. Some common, yet overlooked complications leading to decreased central vision in patients with RP include cystoid macular edema (CME), epiretinal membrane (ERM), and posterior subcapsular cataracts.

A 47 year old healthy male with a known history of LASIK, presented with recent onset of blurred distance vision in both eyes for the past three months. He also reported having difficulty navigating through dark rooms for many years, but recently noticed he can see the moon but none of the stars. BCVA was 20/20- OD and 20/25-2 OS. Upon examination entrance testing and anterior segment evaluation was essentially unremarkable. Dilated fundus exam revealed large nerves 0.40 c/d with slight waxy pallor, mild epiretinal membrane OU, significant mid-peripheral retinal pigmented epithelial changes 360° OU, and rare pigment clumps in spicule like shape OU. Visual field testing revealed reliable 360° constriction with MD of -23.04 OD and -20.96 OS. OCT testing revealed bilateral ERMs, central intraretinal cystic spaces and only central photoreceptor integrity line remaining. Ultimately, the patient was referred to a retinal specialist for ERG, definitive diagnosis of RP, and potential treatment of CME.

Although there is no treatment for peripheral vision loss in patients with RP, complications of central vision can be successfully managed. First line therapy for CME includes oral or topical

carbonic anhydrase inhibitors. Other treatment options include initiating Vitamin A therapy or injecting Triamcinolone, however, the literature has shown mixed results. While not all patients will respond to these treatments, these medications often improve visual acuity in the short term and improve the overall functional prognosis long term. Therefore, prompt referral for potential treatment is key to preventing declining central vision in these patients.

**POSTER #92**

**OD - Ocular Disease**

**Homonymous Hemianopia: Thinking Beyond the Glaucoma Suspect**

**Kevin Sorya, O.D.**

**Additional Author(s)**  
**Kathleen O'Leary, O.D.**

Visual field testing is a valuable tool in the diagnosis and management of glaucoma, and also in the assessment of the integrity of the visual pathway. Based on the presentation of the visual field defect, it is generally possible to locate a lesion to the brain as the nerve fibers travel from the frontal lobe to the occipital cortex in a very specific arrangement. As such, homonymous hemianopias affect one side of the visual field of both eyes and are indicative of a lesion posterior to the optic chiasm. The most common cause in adults is stroke, followed by tumors and trauma.

A 68-year-old African American male presented for visual field testing due to prior field defects suspicious for glaucoma. 3 months prior, the patient denied any visual or systemic complaints, and his visual field results showed an inferior arcuate defect in his left eye that correlated with his OCT findings. However, at the current visit, the patient reported difficulty reading and poor health since he was last seen. A month ago, he also underwent coronary artery bypass grafting with no

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complications. His BCVAs were 20/30 and 20/20 in his right and left eye, respectively. Intraocular pressures were normal in both eyes. Anterior and posterior segment evaluations were stable and unremarkable as well. His visual fields revealed a marked, incomplete, right homonymous hemianopia, respecting the vertical midline. Upon further questioning, the patient reported feeling weak since his surgery, with decreased stamina and left hand weakness. The patient was thus diagnosed with right incomplete homonymous hemianopsia suggestive of a transient ischemic attack. The patient was referred for immediate stroke work-up.

The visual loss that occurred within the 3-month follow-up period may have been prevented with the incidental finding. This patient case illustrates the importance of a thorough case history and to always remember to think beyond the obvious, particularly in the analysis of visual field results. Various treatment and management approaches will be discussed, such as optical aids, compensation using rehabilitation techniques, and, based on controversial studies, the potential to restore the blind hemifields through visual stimuli.

#### **POSTER #93**

#### **OD - Ocular Disease**

#### **An Atypical Presentation of a Classic Red Eye**

**Harneet Randhawa, O.D.**

#### **Additional Author(s)**

**Tricia Newman, O.D.**

Subconjunctival hemorrhage is typically characterized as a self-limiting and benign condition, without any surgical treatment intervention warranted. With an incidence rate of 2.9%, subconjunctival hemorrhage is a common cause of an acute, red eye. The absence of pain, infection or inflammation of the affected area, usually leads to an immediate and straight-forward

diagnosis. Most cases are idiopathic with an increased prevalence associated with older age, anticoagulation therapy and concomitant systemic vascular disorders.

A 70-year-old female, on Coumadin (warfarin), presents to clinic with an acute onset, painless red eye. She denies any pain, fever, headache or recent trauma. Clinical examination reveals a reduction in vision in the affected eye, periorbital ecchymosis and edema, 4+ diffuse conjunctival chemosis, and proptosis. Measurement of intraocular pressure shows asymmetric pressure between the two eyes, with the affected eye's pressure being greater by 5 mmHg. The patient is referred out immediately to rule out retrobulbar hemorrhage, a rare, vision-threatening condition that can lead to permanent vision loss by causing an orbital compartment syndrome. The patient's CT scan leads to a diagnosis of subconjunctival hemorrhage. Coumadin is discontinued immediately. A lateral canthotomy and cantholysis is performed after three days of visual decline and worsening of clinical appearance. The patient shows an immediate reduction in intraocular pressure, followed by an improvement in vision and clinical appearance.

Patients on anticoagulation therapy, such as Coumadin, should be monitored closely by the prescribing physician. Optometrists can play a key role in managing these patients alongside prescribing physicians. Patients should be questioned about their most recent prothrombin time (PT) and International Normalized Ratio (INR) in the presence of both recurrent or severe, acute hemorrhaging. Timely neuroimaging is essential when the clinical presentation mimics the appearance of a retrobulbar hemorrhage to provide patients with the best visual prognosis. Although orbital decompression with a lateral canthotomy and cantholysis is typically reserved for patients with a retrobulbar hemorrhage, our patient showed significant improvement in clinical appearance and vision following this procedure.

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#### POSTER #94

##### OD - Ocular Disease

##### The Element of Elevation: Ocular Toxocariasis

Elisabeth Anderson, O.D.

The EleOcular toxocariasis has a range of clinical presentations. Not all presentations require treatment. It can present as an elevated white peripheral or posterior pole granuloma that can mimic other devastating retinal or choroidal conditions. Other presentations include endophthalmitis, vitreous bands, and vitreoretinal traction.

A 29-year-old Mediterranean female presented for routine eye exam with a complaint of left eye strain with near work for the last 5 years. Patient prefers to close left eye when doing near work. She reports occasional diplopia when she tries to do near work with both eyes open. Her last eye exam was about 5 years ago in Morocco. Symptoms of strain relieved with 3 prism diopters of base in prism and a low myopic SRx. Pupils, EOMs, and CVF and slit lamp and IOP were within normal limits in both eyes. Fundus examination revealed a peripheral, elevated, well-circumscribed, one disc diameter white lesion in the left eye just outside the inferior temporal arcades. Differential diagnoses included retinoblastoma, choroidal melanoma, CNVM with fibrosis, astrocytic hamartoma, coats disease, and ocular toxocariasis. Fluorescein angiography, clinical picture, patient history and demographics led us to a diagnosis of retinal granuloma secondary to ocular toxocariasis.

Toxocara is an often overlooked, but prevalent, parasite with significant ocular manifestations. Age of onset can determine most likely clinical presentation. Adult onset correlates with higher incidences of endophthalmitis and is prevalent in Asian countries with raw meat delicacies. Toxocara infection prevention can be incorporated into patient education. Diagnosis is commonly based

on clinical picture but may be aided by eosinophilia and positive T.canis ELISA titers. Treatment ranges from monitoring to corticosteroids to pars plana vitrectomy. ment of Elevation: Ocular Toxocariasis

#### POSTER #95

##### OD - Ocular Disease

##### Chalazion...or is it?: Atypical MRSA Presentation

Felicia Dupras, O.D. Student

Methicillin-resistant staphylococcus aureus (MRSA), all strains of S aureus resistant to all beta-lactam antibiotics, is a growing health care problem world wide. MRSA ocular infections may manifest in a variety of presentations with preseptal cellulitis being the most common, followed by conjunctivitis, corneal ulcer, endupthalmitis. The following is a atypical presentation of an early MRSA infection of the eyelid guised as a chalazion.

57 year old Caucasian female presented to the clinic with a gradually growing bump on her right lower eyelid for the past 2 days. Mildly tender to the touch and not erythematous or warm to the touch. Examination revealed single focal abscess on right lower eyelid that was suspected to be a atypical chalazion vs. focal abscess of a unknown etiology. Referred to ophthalmology for assessment. Ophthalmology incised abscess and a "bubbly" gaseous puss material was drained. Culture were taken due to atypical presentation of supposed chalazion and results were positive for heavy methicillin resistant staphylococcus aureus (MRSA).

Case demonstrated a atypical presentation of early MRSA infection and culturing was vital for correct diagnose and treatment.

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**POSTER #100**

**PC - Primary Care**

**Concussive effects (mTBI) in veterans from the Iraq and Afghanistan conflict era in relation to other physical and psychological health problems.**

**Thomas G. Urosevich, O.D., M.S.**

**Additional Author(s)**

**Stuart N. Hoffman, D.O.**

**Richard E. Adams, Ph.D.**

**Charles R. Figley, Ph.D.**

**Joseph A. Boscar, Ph.D., MPH**

Traumatic brain injury (TBI) and posttraumatic stress disorder (PTSD) are the signature injuries of the Iraq and Afghanistan conflicts. With the extensive use of Improvised Explosive Devices (IED) the concussive effects from blast contribute to mild traumatic brain injuries (mTBI) in the veteran population. It is hypothesized that mTBI injuries can be associated with other physical and psychological health problems.

As part of a larger study involving veterans from many service eras, we surveyed 289 Veterans who had served during the Iraq and/or Afghanistan conflict era. Data for the study were collected using diagnostic telephone interviews of these veterans who were outpatients of the Geisinger Health System, a large, integrated health care organization in Pennsylvania, and one of largest integrated health services organizations in the United States involved in public health research. Outcome measures were assessed for those who had a history of service related concussion, compared to veterans who did not.

Of the 289 Veterans surveyed, 95.0% were male, 62.2% were 18-44 years old, 93.4% were white race, 76.8% were National Guard/Reserve veterans, and 29.1% reported a history of service related concussive effects (mTBI). Of these veterans with mTBI, 53.6% had high combat

exposure and 60.7% had multiple warzone tours. Additionally, 50.0% had current TBI symptoms; 53.6% reported pain interfered in their life within the last month; 21.4% reported meeting criteria for PTSD in the past year; 54.8% had used psychological services in the last year; 53.6% reported any current disorder (PTSD, Depression, AUD, BSI-GSI) and 46.4% reported fair or poor current health.

A significant number of Veterans from the Iraq/Afghanistan era who had suffered concussive blast effects (mTBI) present with additional physical and psychological health problems in clinical practice. Based on multivariable logistic regression, high combat exposure is the best predictor of a history of mTBI (OR=4.5,  $p<0.001$ ), followed by pain (OR=2.5,  $p=0.004$ ) and having current mental health problems (OR=2.0,  $p=0.029$ ). The primary eye care provider that encounters veterans as patients needs awareness of the health problems associated with mTBI. Additional research, including visual dysfunctions from mTBI and PTSD, is planned.

**POSTER #111**

**PH - Public Health / Policy**

**Prevalence, Incidence, Progression and Risk Factors for Myopia and High Myopia among Children in Central China: the Anyang Childhood Eye Study**

**Shi-Ming Li, M.D., Ph.D.**

To determine the prevalence, incidence and progression of myopia and high myopia among Chinese children and evaluate the impacts of age, gender, parental myopia and time spent in near work and outdoor activities.

A total of 2119 (93.5%) grade 7 students were reexamined in the Anyang Childhood Eye Study (ACES) one year later. Cycloplegic autorefraction with cyclopentolate was performed. Myopia was

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defined as spherical equivalent (SE) refraction  $\leq$  -0.50 diopters (D) and high myopia as  $\leq$  -6.00 D. Progressive myopia was defined as progression of myopia of at least 0.50 D/y. Detailed questionnaires on parental myopia, near work and outdoor activities were administered to the students and parents.

Of 1785 eligible children aged 10~15 (mean, 12.7) years, the prevalence, incidence and progression of myopia were 68.1% (95% CI, 65.9-70.2), 22.1% (95% CI, 18.7-25.5) and -0.49 D/y (95% CI, -0.51 to -0.46), and were 2.9% (95% CI, 2.1-3.7), 1.7% (95% CI, 1.1-2.3) and -0.37 D/y (95% CI, -0.61 to -0.13) for high myopia, respectively. Having either one or two myopic parents was associated with greater odds of prevalent myopia (OR=1.76, 95% CI, 1.35-2.30; OR=8.67, 95% CI, 3.76-19.99, both  $P<0.0001$ ) and high myopia (OR=2.22, 95% CI, 1.17-4.20,  $P=0.01$ ; OR=5.35, 95% CI, 2.47-11.60,  $P<0.0001$ ), incident high myopia (OR=6.46, 95% CI, 2.55-16.40,  $P<0.0001$ ), and progressive myopia (OR=1.43, 95% CI, 1.11-1.83,  $P=0.005$ ). Children in the highest versus lowest tertile of time spent in outdoor activities had lower incidence of myopia (OR=0.55, 95% CI, 0.32-0.95,  $P=0.03$ ) and less progressive myopia (OR=0.66, 95% CI, 0.51-0.86,  $P=0.002$ ). Emmetropic (OR=0.39, 95% CI, 0.30-0.51) and hyperopic children (OR=0.16, 95% CI, 0.12-0.22) had less progressive myopia than myopic children (both  $P<0.001$ ). Amount of near work was not associated with these rates of myopia.

Children in central China had higher prevalence and incidence of myopia and high myopia than children in other areas. More outdoor activities and less myopic parents were associated with lower incidence and less progressive myopia. The incidence of high myopia was associated with parental myopia, but not outdoor activities.

## POSTER #103

### PC - Primary Care

#### Clinical competency in ocular fundus examination using ophthalmoscopic virtual reality simulation systems

Larry Hou-Yan Ng, O.D.

#### Additional Author(s)

Yeung Lau, B.S.

Ming-Kit Cheng, B.S.

Jiameng Wang, B.S.

The purpose of this study is to investigate objectively the effectiveness of clinical training in Binocular Indirect Ophthalmoscopy (BIO) and Direct Ophthalmoscopy (DO) in different stages of internship program in the School of Optometry (SO) of the Hong Kong Polytechnic University (PolyU), using computer-based virtual reality simulation systems. The results of this study can provide practical reference for planning proper clinical training program in the optometry schools. Research Hypotheses The competency of performing ocular fundus examination using simulated BIO and DO improves with increasing clinical experience.

A cross-sectional study was conducted with fourth year optometry students (group 1,  $n=20$ ), fifth year optometry students (group 2,  $n=21$ ), newly graduates (group 3,  $n=11$ ), and registered optometrists with more than 1-year practical experience (group 4,  $n=12$ ). All the subjects performed 8-minute DO and 10-minute BIO with the virtual reality simulators. The procedural and diagnostic competency were evaluated with the calculated scores in the simulators' programs as follows: 1. Light exposure time on simulated retina 2. Percentage of the examined simulated retina 3. The diagnostic scores of findings (multiple choice questions) performed after the examination 4. The combined scores

In BIO simulation, subjects with more clinical

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experience obtained higher diagnostic scores ( $p=0.001$ ), larger examined retinal area ( $p=0.035$ ), shorter examination time ( $p=0.002$ ), and higher efficiency ratio ( $p=0.004$ ). No statistical significance could be seen in the difference of performance among groups in DO simulation. Temporal retina was less examined than nasal retina in both procedures ( $p<0.001$ ). Subjects examined less inferior retina than superior retina in BIO ( $p<0.001$ ), while superior retina was less examined than inferior retina in DO ( $p<0.001$ ).

The competency of BIO improved with clinical training and experience of practice. However, the score of findings showed some tendency of deteriorating in practicing optometrists. No significant difference was found in the performance of DO between groups. Interestingly, different quadrants of retina showed different competency levels in both BIO and DO, which may reflect the real clinical scenarios. The causes of such discrepancy and methods of improving the clinical competency of BIO and DO are suggested.

#### POSTER #104

##### PC - Primary Care

##### An Atypical Presentation of Diabetic Retinopathy

Reena Lepine, OD,

Additional Author(s)  
Joanne Smith, O.D.

A Roth spot is a white centered hemorrhage that results from retinal capillary rupture. The white center is a platelet-fibrin thrombus due to the platelets reaction to the rupture. It is caused by a variety of conditions such as bacterial endocarditis, leukemia, anemia, hypertension, and diabetes. Retinal vascular diseases affect the retinal hemodynamics which result in obstruction and leakage of the vasculature. Some examples are diabetic retinopathy, central retinal vein occlusion,

and ocular ischemic syndrome. Depending on the cause, retinal hemorrhages tend to have a common type (dot-blot vs flame-shaped) and location. Complicating the diagnosis, diabetic retinopathy can occur alongside other retinal vascular diseases.

A 71 year old female presented for a diabetic eye examination. Pertinent anterior segment findings included prominent iris blood vessels along the nasal pupil margin OS. Scleral spur was observed in all quadrants on gonioscopy OU. Fundoscopy revealed a Roth spot OD and mid-peripheral dot-blot hemorrhages OS. Testing was performed to rule out differential diagnoses. Lab results for a complete blood count with differentials, prothrombin time, and blood culture were all normal. Carotid ultrasound did not show signs of a carotid stenosis on either side. Fluorescein angiography revealed macula hyperfluorescence with normal transit times OU. The patient was diagnosed with atypical diabetic retinopathy and macular edema OU. She is being monitored by a retinal specialist without treatment.

Roth spots and retinal hemorrhages can occur in many different conditions and some causes can be life threatening. Making the correct diagnosis can be difficult and extremely important. This case demonstrates the complexity of diagnosing a patient with a Roth spot and mid-peripheral hemorrhages. A correct diagnosis can be determined by a careful history, thorough ocular examination, and additional testing.

#### POSTER #105

##### PC - Primary Care

##### Migraine Headaches and Demonstrated Longstanding Visual Field Loss

Kathryn Surdovel, O.D., MPH

Additional Author(s)  
J. Patrick Smith, O.D., M.S.

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#### **Laura Dowd, O.D.**

Migraine headaches afflict about twelve percent of the general population, with women more frequently affected than men. Twenty five percent of these migraine sufferers experience an accompanying visual disturbance, termed an aura. Current studies believe that migraines are a result of primary neuronal dysfunction that cause changes both intracranial and extracranial. Many times these complicated headaches result in permanent vision loss or permanent scotoma.

A 57 year-old female presented to clinic for comprehensive eye examination complaining of blurred vision and new onset visual disturbances. The patient had longstanding history of migraine headaches, starting at the age of 23, with variable symptoms of nausea, photophobia, phonophobia and blurred vision during attacks. The reported headache frequency was on average two to three times per week with regular use of imitrex and fiorinal providing only mild relief. New symptoms included an aura that seemed to expand outward; the patient reported no headache with the most recent attack. Peripheral vision loss due to migraine had previously been recognized in 2008 using a frequency doubling technology field analyzer which showed scattered, poorly repeatable peripheral vision defects. Repeat testing with static white on white perimetry revealed a 360 degree restriction in fields greater superior compared to inferior. Results of imaging studies, including Head CT and OCT, ruled out other cr

anial and ocular abnormalities. Neurology confirmed a diagnosis of complex migraine. Repeated testing from 2009 through 2016 demonstrated similar 360 degree constriction. Neurologic evaluation has been ongoing and imaging workup has continued to be negative.

Visual field loss is an under recognized complication of migraine headaches, and formal perimetry should always be considered in the standard migraine work up. Structural defects are not always appreciable with conventional imaging, so different visual field analyzers and repeat testing are often required to identify visual deficits.

#### **POSTER #106**

#### **PC - Primary Care**

#### **Brachial to Radial Systolic Blood Pressure Amplification in Young, Healthy Adults**

**Lauren Bruehl, B.S.**

**Additional Author(s)**  
**Bradley Schuster, B.S.**  
**Patricia Cisarik, Ph.D.**  
**Daniel Fuller, O.D.**

Background Central blood pressure (BP) indices are better than brachial BP indices at predicting cardiovascular events, but are clinically impractical to measure. Radial applanation tonometry, a non-invasive technique to estimate central BP, assumes minor differences in brachial vs radial BP. However, laboratory studies have shown significant brachial to radial artery systolic BP amplification (Bra-Rad sys BP amp) in aging healthy people, likely due to age-related changes in arterial structure and function, which could cause radial applanation tonometry to underestimate central systolic BP. Additionally, Clime, et al (2016) found reduced Bra-Rad sys BP amp in diabetics vs controls (9 +/- 8 vs 14 +/-7 mm Hg), suggesting abnormal upper limb hemodynamics in diabetics. The purpose of this study was to determine



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whether Bra-Rad sys BP amp is evident in young healthy adults using common clinical devices and compare the results to those of a previous study.

Methods we used a prospective, observational, randomized, cross-over within subject design to measure BP in 100 young healthy subjects. Seated BP measurements were taken by examiner 1 with device 1 (LED digital arm cuff) and by examiner 2 with device 2 (oscillometric wrist cuff), allowing 1 minute between measurements. All measurements were taken on the left side, with order of device randomized for each subject. Averaged indices from multiple measurements were used to calculate Bra-Rad sys BP amp.

Results Analysis with Mann-Whitney test for independent samples showed that device order did not affect the means of any of the measurements. Mean systolic Bra-Rad sys BP amp was 9.6 +/- 9.70 mmHg. Independent samples t-test indicated a significant difference between mean Bra-Rad sys BP amp in this study compared to control population from Clime, et al.

Discussion Bra-Rad sys BP amp measured with common clinical devices on this study population differed from previously reported values for a non-diabetic control population. Factors contributing to the difference may include age difference and number of subjects in study populations, measuring techniques used, and variability differences between devices. Further studies are needed before Bra-Rad sys BP amp can be used clinically to screen risk for cardiovascular events.

#### **POSTER #107**

##### **PC - Primary Care**

##### **Patent Foramen Ovale and Transient Ischemic Attack Ocular Manifestations**

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A patent foramen ovale is a hole within the septum which separates the left and right atria of the heart. The foramen ovale is noted between the left and right atria of every human fetus, but closes as the child is born and takes its first breath. PFO's are usually investigated in individuals who suffer migraines, TIA's and strokes, with the likelihood of having a PFO greatly increasing in individuals who have a stroke prior to the age of 55.

Chief Complaint: Vision which fades out and then back in on a daily basis. Past Ocular History: Diabetes, Diplopia OU, and Presbyopia OU VA: Distance OD: 20/20-2 OS: 20/20-1 PERRL (-) APD CF: Confrontation fields full to finger counting IOP (NCT): OD: 10 mmHg OS: 10 mmHg EOM: OD: Full OS: Full SLE: Eyelids: blepharitis, MGD Lens: Incipient sclerosis Fundus Examination: Vitreous: clear Optic Nerve: flat, sharp, good color Macula: Flat, no hemes, exudates, or pigmentary changes OU Retina Vessel: normal vessels Periphery: Flat, no RD, or holes Visual Field Central 24-2 SITA FAST: Normal OU Impression: Visual disturbance subjective, Unspecified Plan: Discussed diagnosis in detail with patient. Patient instructed to call if condition worsens, while also ordering vascular work-up (carotids, echo, bloodwork, and brain scan.) Carotid Doppler result: Unremarkable Echocardiography result: Patent Foramen Ovale with R to L Shunt Follow-up: Patient has vision that comes and goes in the right eye. TIA's every day. Recommended closure of patent foramen Final Follow-up: Resolution of symptoms after closure

Upon successful closure of the Patent foramen ovale by the deployment of a 25 mm Amplatzer cribiform atrial septal occluder device there was no longer any shunting visualized. Additionally, the patient ceased to have any TIA's that were occurring on a daily basis with complete blacking out of the vision in the right eye. Although the MD is wary that the symptoms are not in fact TIA's, the prior symptoms have ceased upon closure of the defect.

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**POSTER #109**

**PC - Primary Care**

**Method Comparison for Blood Pressure Measurement: an Oscillometric Wrist versus LED Sphygmomanometer**

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Due to safety concerns, mercury sphygmomanometers are being replaced by automated aneroid or oscillometric devices. Wrist cuff devices (measuring radial artery BP) enhance ease of use; however, diagnostic criteria for hypertension are established for brachial, not radial, artery BP. Several studies have attempted to correlate BP in the two arteries, but no recommended scaling factor has resulted. Regardless of device and location used, variability in measures occurs. Knowing how the variability of the brachial and radial BP measurements compare can help the clinician choose the better location for BP screening. We compared the variability of BP measures at radial vs brachial artery measured with oscillometric wrist cuff and LED oscillometric arm cuff devices in young, healthy adults.

A prospective, observational, randomized, cross-over within participant design was employed to collect BP measurements from 100 young healthy subjects. While subjects were seated, 3 BP measurements were taken by examiner 1 with device 1, followed by 3 measurements taken by examiner 2 with device 2, allowing 1 minute between measurements. Order of device was randomized, and all measurements for a given subject were taken on the left arm.

Mann-Whitney test for independent samples showed no significant effect of device order on the means of any of the measurements. Mean

pressures were (brachial) 112.5 +/- 12.4 mm Hg (systolic) and 75.9 +/- 10.5 mm Hg (diastolic) and (radial) 122.0 +/- 15.9 mm Hg (systolic) and 72.4 +/- 12.27 mm Hg (diastolic). Coefficients of variation were (brachial) 11.1% (systolic) and 13.8% (diastolic) and (radial) 13.0% (systolic) and 17.0% (diastolic). Comparison of variances for brachial and radial measurements with F-test resulted in  $F = 1.63$  (systolic) and  $F = 1.37$  (diastolic), both exceeding the value of  $F = 1.00$  required for significance at  $\alpha = 0.05$ .

Measurements of both systolic and diastolic BP with the devices used in this study demonstrated significantly greater variance for the radial than for the brachial artery locations. Whether a similar difference in variance between the radial and brachial BP measurements would manifest with other instruments or within hypertensive individuals remains to be explored.

**POSTER #113**

**PH - Public Health / Policy**

**Prevalence of myopia among children in coastal east China**

**Wei Sun, Ph.D.**

To examine the prevalence of myopia among preschool and school children in East China.

Using a random cluster sampling from kindergartens, primary schools, and junior and senior high schools from rural Guanxian County and the city of Weihai, the school-based cross-sectional Shandong Children Eye Study included children aged 4 to 18 years. All children underwent a complete ocular examination including measurement of uncorrected visual acuity (UCVA) and best corrected visual acuity (BCVA) and auto-refractometry under cycloplegia. Myopia was defined as refractive error of  $\leq -0.5D$ .

Out of 6364 eligible children, 6026 (94.7%) children participated. Prevalence of myopia

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increased from 20.3% in the 8-years olds to 84.6 in 17-years olds.

In coastal East China, The age of children suffering from myopia was trending younger, about 20% of the 8-years olds were myopic.

#### POSTER #114

##### PH - Public Health / Policy

##### **A Student Evaluation of Interprofessional Education Day at Nova Southeastern University, Health Professions Division**

**Leon Nehmad, O.D.**

The nasolacrimal reflex is a well-established neuronal pathway that plays a critical role in both, bolus and basal tear production. The intranasal tear neurostimulator (ITN) delivers a small electrical current to sensory neurons of the nasal cavity that stimulates the nasolacrimal reflex and induces tear production. The chemical composition of tears is essential for their optimized function. Literature exists suggesting reflex tears may dilute concentrations of certain tear components. The purpose of this study was to quantify total tear lipid and total protein concentrations following acute use of the ITN.

Fifty-five subjects with dry eye were enrolled in a single-arm study. Subjects used the ITN for approximately 3 minutes. Tear volume was assessed by tear meniscus height (TMH) captured by optical coherence tomography (OCT) prior to and immediately following use of the ITN. Up to 10  $\mu$ L of tears were collected using a capillary tube prior to and again 5 minutes after the use of the ITN. Total lipid and total protein concentrations were determined using a modified spectrophotometric sulfo-phospho-vanillin reaction and the micro-bicinchoninic acid protein assay, respectively. Mean difference in OCT was analyzed using paired t-test. Mean difference in total lipid and total protein concentrations were evaluated by

determining an equivalence margin and comparing the 95% confidence interval (CI) of the mean difference to the margin.

Mean post-stimulation TMH ( $634.9 \pm 471.2 \mu\text{m}$ ) was significantly higher than mean pre-stimulation TMH ( $238.4 \pm 131.9 \mu\text{m}$ ;  $p < 0.001$ ). Mean pre- and post-stimulation total lipid concentrations were  $0.391 \pm 0.30 \mu\text{g}/\mu\text{L}$  and  $0.364 \pm 0.25 \mu\text{g}/\mu\text{L}$  and protein concentrations were  $12.6 \pm 5.0 \mu\text{g}/\mu\text{L}$  and  $11.8 \pm 4.0 \mu\text{g}/\mu\text{L}$ , respectively. The 95% CIs for the mean differences in total lipid ( $-0.074$  to  $0.042 \mu\text{g}/\mu\text{L}$ ) and protein ( $-2.11$  to  $0.58 \mu\text{g}/\mu\text{L}$ ) concentrations fell within the equivalence margins.

Use of the ITN resulted in a significant increase (to 2.6x) in tear volume with equivalent concentrations of total lipid and total protein compared with basal tears. These results suggest that stimulation with the ITN provides more than just a diluted reflex aqueous tear.

#### POSTER #117

##### PH - Public Health / Policy

##### **Annual change of ocular biometry parameters in schoolchildren: five years follow-up**

**Ping Tang, M.S.**

##### **Additional Author(s)**

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To assess the annual change and associated factors of ocular biometry parameters in schoolchildren during 5 years follow up. School-based, longitudinal study. 382 Grade-1 primary students from two schools participated in the study located in DongCheng District (urban) and HuaiRou District (rural).

Baseline study was conducted in 2011, and followed up every year. Same comprehensive eye examination was conducted in five years, including

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visual acuity, ocular motility evaluation, auto-refraction, slit lamp, ocular biometry and non-mydratic fundus. Participants were administered detailed questionnaires including regular items, nearwork, social-economic parameters and outdoor activity. Linear regression analysis was used to assess the change of ocular biometry, axial length/corneal curvature, refraction and associated factors.

Mean spherical equivalent was  $-0.55 \pm 1.30$  D at baseline. Mean axial length was  $23.03 \pm 0.96$  mm. Mean axial length/corneal curvature (AL/CC) was  $2.94 \pm 0.11$ . During five years follow up, progression of refraction was  $-0.00 \pm 0.76$ D,  $-0.64 \pm 1.16$ D,  $-0.80 \pm 1.28$ D,  $-1.02 \pm 1.35$ D and  $-1.39 \pm 1.61$ D. Elongation of axial length was  $0.29 \pm 0.34$  mm,  $0.57 \pm 0.69$  mm,  $0.90 \pm 0.53$ mm,  $1.13 \pm 0.58$ mm and  $1.39 \pm 0.68$ mm. An increase in myopic refractive error, after adjustment for age, was significantly associated with less time spent outdoors for leisure ( $P=0.006$ ), less total time spent outdoors ( $P=0.04$ ), or more time spent indoors with studying ( $P=0.005$ ). Elongation of axial length was significantly associated with less total time spent outdoors ( $P=0.02$ ) and more time spent indoors with studying ( $P=0.007$ ) after adjustment for maternal myopia ( $P=0.02$ ). An increase in AL/CC was significantly associated with less time spent outdoors ( $P=0.01$ ) after adjustment for paternal myopia ( $P=0.003$ ).

Progression of myopia, elongation of axial length and change of AL/CC were associated with older age, urban region of habitation, parental myopia, more indoor studying and less outdoor activity after five years follow up. The study provides more evidence in myopia risk factors research.

## POSTER #118

### PH - Public Health / Policy

#### Survey: A Public Health Investigation into Current Recommendations and Knowledge of Pediatric Vision Care

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Pediatric vision care encompasses services to children under the age of 19 and is an essential benefit as mandated by the Affordable Care Act (January 2014). The InfantSEE program provides eye exams to those age 6 to 12 months at no cost, which are essential for the proper growth and development of children as they begin to process and learn. The American Optometric Association (AOA) recommends eye exams at 6 months, 3 years, 6 years and biennially thereafter. However, these services or recommendations are largely unknown. A public health investigation of 286 adults age 18+ aimed to assess pediatric vision care awareness. The majority of participants were not informed by their pediatrician of vision services, were not aware of the InfantSEE program, or when to have their child evaluated.

Our primary objective was to survey the general public about various aspects of vision care, including their demographics and viewpoints on eyecare. The 23 question survey and was created through a private survey monkey account. A hyperlink was sent via email and social media outlets.

Of the 286 participants, 170 (59.40%) are parents. 77.06% of parents reported their pediatrician did not recommend an eye exam. 59.41% reported their child has not received an eye exam. From those who had received an eye exam (68), 22.06% were diagnosed with having an

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eye problem. 81.41% did not know the appropriate age recommendation for a pediatric eye exam. 86.12% had not heard about the InfantSEE program. 97.19% of the participants had medical insurance. When asked if their medical insurance provided vision exams for a child under of the age of 18, 51% said they were unsure or no. All participants were High School graduates with varying income levels.

Children are not being referred for an eye exam by their pediatrician, nor are parents aware of the necessity of this exam, or current programs that are available. Current insurance coverage of such exams is also lacking. We need more awareness of the current recommendations and programs that are available to avoid treatable vision conditions at an early age.

#### POSTER #119

##### PH - Public Health / Policy

##### **Driving Exposure-Adjusted Motor Vehicle Collision Rates in Bioptic Drivers with Central Vision Impairment**

**Ellen E. Segerstrom, O.D.**

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Bioptic telescopic spectacles (BTS) can be used for driving by people with central vision impairment in most U.S. states. However, important questions about the safety of bioptic driving remain. One challenge in answering these questions is that previous studies of collision rates of bioptic drivers have not accounted for driving exposure (miles driven per year). The aim of this study was to calculate the rate of motor vehicle collisions (MVC) per self-reported mile driven for

bioptic drivers in order to facilitate better comparisons with the crash rates of the general public.

Participants were licensed Ohio bioptic drivers. Vision data were collected from medical records and MVC data were obtained from the Ohio Bureau of Motor Vehicles. Participants provided estimates of their mileage for the previous year. The rate of MVC per million miles was calculated using a method similar to that previously used by Massie et al. in which the total number of collisions for all subjects was divided by the total mileage driven.

Seventy-three bioptic drivers participated. Mean ( $\pm$ SD) age was  $51 \pm 16$  years (66% male). Median binocular logMAR visual acuity was 0.70 (20/100). Median log contrast sensitivity was 1.65 (near normal). Estimated annual mileage ranged from 100 to 90,000 miles, with a median of 7,000 miles per year. Forty-two (58%) participants had at least one documented MVC since initial bioptic licensure, with a total of 101 collisions for the group. The calculated rate of MVC per million self-reported miles driven for the entire group of bioptic drivers was 15.3.

To our knowledge, this is the first study to calculate an exposure-adjusted collision rate for bioptic drivers. We found a rate of 15.3 MVC per million self-reported miles driven. MVC rates for the general U.S. population have been reported to range from approximately 4 to 20 MVC per million miles traveled depending on age group, with highest rates for new (teenage) drivers. These findings are important for characterizing the driving safety of bioptic drivers, and may aid in the identification of patient factors that are predictive of driving safety.