

AMERICAN JOURNAL OF OPHTHALMOLOGY®

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EDITORIAL

• **A1 Cultivating the Physician-Patient Relationship in Ophthalmology.** *Natalie A. Afshari and Rebecca R. Lian*

Challenging clinical encounters have the potential to impact both physician satisfaction and clinical outcomes. This editorial explores the current understanding of the causes of difficult clinical encounters, techniques for managing challenging patient interactions, and what is known about difficult clinical encounters in ophthalmology specifically.

• **306 Improving racial diversity in the ophthalmology workforce: a call to action for leaders in ophthalmology.**

Ugochi T. Aguwa, Divya Srikumaran, Ninita Brown, and Fasika Woreta

PERSPECTIVE

• **108 Implications of COVID-19 for Ophthalmologists.** *Helen V. Danesh-Meyer and Charles N.J. McGhee*

The implications of coronavirus disease 2019 (COVID-19; severe acute respiratory syndrome coronavirus 2) for ophthalmologists are discussed in the context of the rapid developments in the understanding of the virology, transmission, and ocular involvement of COVID-19. COVID-19 is predominantly contracted through direct or airborne transmission by inhalation of respiratory droplets. Evidence that aerosol transmission occurs is increasing in particularly prolonged exposure to high concentrations in a relatively closed environment. Based on the current evidence, ophthalmologists should consider measures that include social distancing, wearing masks, sterilization techniques, and managing clinic volumes.

• **333 Digital Screen Time During the COVID-19 Pandemic: Risk for a Further Myopia Boom?** *Chee Wai Wong, Andrew Tsai, Jost B. Jonas, Kyoko Ohno-Matsui, James Chen, Marcus Ang, and Daniel Shu Wei Ting*

Social distancing and lockdown measures instituted during the COVID-19 pandemic may have the unintended effect of increasing digital screen time, near work, and limiting outdoor activities for school-going children and adolescents, all of which are associated with the onset and progression of myopia. Raising awareness among parents, children, and government agencies is key to mitigating myopigenic behaviors that may become entrenched during this period.

ORIGINAL ARTICLES

• **1 Comparison of Lamina Cribrosa Curvature in Pseudoexfoliation and Primary Open-Angle Glaucoma.**

Hun Jae Won, Kyung Rim Sung, Joong Won Shin, Youn Hye Jo, and Min Kyung Song

In this study, pseudoexfoliation glaucoma eyes had more steeply curved lamina cribrosa than primary open-angle glaucoma eyes with a similar level of glaucoma severity. Higher average lamina cribrosa curvature index and older age were associated with the presence of pseudoexfoliation glaucoma. The clinical implication(s) of steeper lamina cribrosa curvature in pseudoexfoliation glaucoma should be investigated in a forthcoming study.

• **9 Longitudinal Macular Ganglion Cell–inner Plexiform Layer Measurements to Detect Glaucoma Progression in High Myopia.** *Joong Won Shin, Min Kyung Song, and Kyung Rim Sung*

A total of 104 primary open-angle glaucoma (POAG) eyes with high myopia and 104 age- and visual field severity-

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matched POAG eyes without high myopia were analyzed. In highly myopic eyes, progressive macular ganglion cell–inner plexiform layer thinning was predictive of visual field (VF) progression, whereas progressive peripapillary retinal nerve fiber layer thinning was not significantly associated with VF progression.

• **21 Disease Relapse After Drug-Free Remission in Ocular Mucous Membrane Pemphigoid.** *Amede Selassie Shifera, Gloria H. Hong, Irfan R. Khan, Chinwenwa Okeagu, and Jennifer E. Thorne*

Seventy-three of 103 (72%) patients receiving treatment of ocular mucous membrane pemphigoid underwent drug-free remission (rate = 0.28 per person-year). The risk of relapse of ocular disease was low (rate = 0.02 per person-year). Remission without relapse appeared to be more likely among patients treated with cyclophosphamide or rituximab, although the number of patients treated with rituximab was low.

• **28 Public Speaker Characteristics at Meetings of the Dermatologic and Ophthalmic Drug Advisory Committee and the Ophthalmic Devices Panel.** *Mostafa H. Khattab, Michael Weaver, Courtney Cook, Nicholas Kinder, and Matt Vassar*

Public Speakers at meetings of the Dermatologic and Ophthalmic Drug Advisory Committee and the Ophthalmic Devices Panel of the United States Food and Drug Administration with financial conflicts of interest were found to be statistically significantly more likely to speak positively about drug or device approval. Efforts need to be made to increase transparency in this process and decrease the effect of bias.

• **33 Fourier analysis on regular and irregular astigmatism of anterior and posterior corneal surfaces in Fuchs endothelial corneal dystrophy.** *Yoshinori Oie, Yuichi*

Yasukura, Nozomi Nishida, Shizuka Koh, Ryo Kawasaki, Naoyuki Maeda, Vishal Jhanji, and Kohji Nishida

Patients with severe Fuchs endothelial corneal dystrophy had a flatter posterior spherical component, and a larger amount of regular astigmatism, asymmetry, and higher-order irregularity components of the anterior and posterior corneal surfaces. Patients with Fuchs endothelial corneal dystrophy up to grade 5 had anterior and posterior flattening in the inferior cornea, and those with grade 6 demonstrated irregularity in the anterior and posterior corneal surfaces.

• **42 Glaucoma home monitoring using a tablet-based visual field test (Eyecatcher): an assessment of accuracy and adherence over 6 months.** *Pete R. Jones, Peter Campbell, Tamsin Callaghan, Lee Jones, Daniel S. Asfaw, David F. Edgar, and David P. Crabb*

This study evaluates the feasibility of visual field home monitoring. It indicates that glaucoma patients ($N = 20$) are willing and able to perform regular home monitoring and that such tests are capable of delivering clinically useful data.

• **53 Unilateral Versus Bilateral Refractive Lens Exchange With a Trifocal Intraocular Lens in Emmetropic Presbyopic Patients.** *Javier L. Fernández-García, Andrea Llovet-Rausell, Julio Ortega-Usoybiaga, Rafael Bilbao-Calabuig, Fernando Llovet-Osuna, Vasyl Druchkiv, and Alfonso Arias-Puente*

An observational case series retrospective, multicenter, multisurgeon study of emmetropic presbyopes who underwent refractive lens exchange followed by an implantation of FineVision lens. The purpose was to compare visual outcomes and patient satisfaction between unilateral and bilateral trifocal lens implantation in emmetropic patients with presbyopia. Binocular implantation is more successful in UNVA than monocular implantation. However, no significant differences were observed in UDVA, UIVA, and patient satisfaction.

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- **60 Validation of the Newly Proposed World Health Organization Classification System for Conjunctival Melanocytic Intraepithelial Lesions: A comparison with the C-MIN and PAM classification Schemes.** Tatyana Milman, Maya Eiger-Moscovich, Roger K. Henry, Robert Folberg, Sarah E. Coupland, Hans E. Grossniklaus, Hardeep Singh Mudhar, Charles G. Eberhart, Steffen Heegaard, Claudia Auw-Hädrich, Martina C. Herwig-Carl, Karin U. Löffler, Svetlana Cherepanoff, Qiang Zhang, James E. Sharpe, Thonnie Rose O. See, Carol L. Shields, and Ralph C. Eagle, Jr

This study was designed to assess interobserver variability, sensitivity, specificity, and accuracy of the recently developed World Health Organization classification system for conjunctival melanocytic intraepithelial lesions by comparing it with the 2 most commonly used classification systems, PAM and C-MIN. The 3 classification systems had comparable sensitivity, specificity, and accuracy of in their ability to identify lesions with potential for recurrence. The World Health Organization classification system is appropriate for the pathologic evaluation of conjunctival melanocytic intraepithelial lesions.

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- **75 Oral Miltefosine as Salvage Therapy for Refractory *acanthamoeba* Keratitis.** Praneetha Thulasi, Hajirah N. Saeed, Christopher J. Rapuano, Joshua H. Hou, Alpheus B. Appenheimer, James Chodosh, Joann J. Kang, Amber M. Morrill, Neil Vyas, Michael E. Zegans, Richard Zuckerman, and Elmer Y. Tu

This is a retrospective descriptive multicenter case series presenting 15 patients with treatment-resistant *acanthamoeba* keratitis subsequently treated with oral miltefosine, primarily as salvage therapy. It describes the treatment course, side effects, as well as a steroid-responsive inflammatory reaction, often noted 2-5 weeks after starting miltefosine.

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- **83 Neonatal-Onset Congenital Ectropion Uveae A Distinct Phenotype of Newborn Glaucoma.** Sushmita Kaushik, Deepika Dhingra, Badrinath Vibha, Arshiya Saini, Gaurav Gupta, Sagarika Snehi, Nirbhai Singh, Faisal Thattaruthody, and Surinder Singh Pandav

Neonatal-onset congenital ectropion uveae (CEU) is a distinct phenotype of newborn glaucoma. It has a characteristically bilateral presentation with ectropion uveae, varying degrees of iris hypoplasia, and severe glaucoma. The prognosis is less favorable than that seen in neonatal-onset primary congenital glaucoma. This entity appears to be phenotypically different from the unilateral CEU described in the literature, which has been usually reported in older children.

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- **91 Exposure to Secondhand Smoke in Children Is Associated With a Thinner Retinal Nerve Fiber Layer: The Hong Kong Children Eye Study.** Jian Li, Nan Yuan, Wai Kit Chu, Carol Y. Cheung, Shumin Tang, Fen Fen Li, Li Jia Chen, Ka Wai Kam, Alvin L. Young, Patrick Ip, Clement C. Tham, Chi Pui Pang, and Jason C. Yam

This is a population-based study of 3,103 children to assess the effects of exposure to secondhand smoke on peripapillary retinal nerve fiber layer thickness. Children exposed to secondhand smoke had a thinner peripapillary retinal nerve fiber layer. Therefore, it is recommended that children avoid exposure to cigarette smoke in living environments.

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- **100 Accuracy of artificial intelligence formulas and axial length adjustments for highly myopic eyes.** Huanhuan Cheng, Li Wang, Jack X. Kane, Jianbing Li, Liangping Liu, and Mingxing Wu

Kane outperformed Radial Basis Function 2.0 and Barrett Universal II in extremely myopic eyes. The accuracy of the Kane formula was independent of axial length and comparable to that of Holladay 1 with Wang-Koch adjustment in eyes with high to extreme myopia.

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- **119 An Evaluation of a New 24-2 Metric for Detecting Early Central Glaucomatous Damage.** *Donald C. Hood, Abinaya A. Thenappan, Emmanouil Tsamis, Jeffrey M. Liebmann, and C. Gustavo De Moraes*

Central damage is common in early glaucoma, and the 24-2 test pattern poorly samples this damage. Recently, a new metric, based upon the pattern standard deviation (PSD) of the central 12 locations of the 24-2, has been suggested as an alternative to a 10-2 test. However, neither the PSD(C24-2) nor the PSD(10-2) metric is good measure of early central damage. We recommend a topographic approach based upon optical coherence tomography probability maps, and a 10-2.

- **129 OCT Risk Factors for 3-Year Development of Macular Complications in Eyes With “Resolved” Chronic Central Serous Chorioretinopathy.** *Enrico Borrelli, Marco Battista, Riccardo Sacconi, Francesco Gelormini, Lea Querques, Domenico Grosso, Giovanna Vella, Francesco Bandello, and Giuseppe Querques*

Central serous chorioretinopathy may be complicated by sight-threatening macular complications, including choroidal neovascularization, large regions of retinal pigment epithelium atrophy, and cystoid macular degeneration. Optical coherence tomography may be helpful for predicting the development of such complications in eyes with “resolved” chronic central serous chorioretinopathy.

- **140 The Sociodemographic and Risk Factors for Keratoconus: Nationwide Matched Case-Control Study in Taiwan, 1998–2015.** *Ken-Kuo Lin, Jiahn-Shing Lee, Chiun-Ho Hou, Wei-Min Chen, Ching-Hsi Hsiao, Yun-Wen Chen, Chun-Ting Yeh, and Lai-Chu See*

This population-based matched case-control study in Taiwan found that patients with hyperlipidemia, depression, or DM were less likely to have keratoconus, and patients with asthma, allergic rhinitis, myopia, astigmatism,

or Down syndrome had higher odds ratios of keratoconus. Referrals of patients with the above risk factors from internists to ophthalmologists are recommended for a diagnosis of keratoconus.

- **149 Factors Associated With Favorable Laser Trabeculoplasty Response: IRIS Registry Analysis.** *Ta C. Chang, Richard K. Parrish, Danielle Fujino, Scott P. Kelly, and Elizabeth A. Vanner*

From the IRIS Registry (with a total of 263,480 eyes, mean age of 71.4 years, mean baseline intraocular pressure [IOP] of 19.1 ± 5.0 mm Hg), response rate to laser trabeculoplasty was 36.9% overall and 68.8% for those with baseline IOP >24 mm Hg. Higher baseline IOP was associated with favorable responses, while angle recession, uveitis, and aphakia increased the odds of a nonresponse; 76.3% of nonresponder eyes on medications had fewer medications after laser.

- **160 Clinical and Genetic Analysis of 63 Families Demonstrating Early and Advanced Characteristic Fundus As the Signature Of CRB1 mutations.** *Yingwei Wang, Wenmin Sun, Xueshan Xiao, Shiqiang Li, Xiaoyun Jia, Panfeng Wang, and Qingjiong Zhang*

Yellowish geographic macular degeneration and nummular pigment deposits are 2 major characteristic fundus changes for CRB1-associated retinopathy and the former advances to the latter with age. Recognizing such fundus signature associated with biallelic CRB1 variants may be of value in genetic testing and might be biomarkers for evaluating of effects for upcoming therapy.

- **169 Crystalline Lens Power and Associated Factors in Highly Myopic Children and Adolescents Aged 4 to 19 Years.** *Tianyu Cheng, Junjie Deng, Shuyu Xiong, Suqin Yu, Bo Zhang, Jingjing Wang, Wei Gong, Huijuan Zhao, Mengli Luan, Mengjun Zhu, Jianfeng Zhu, Haidong Zou, Xian Xu, Xiangui He, and Xun Xu*

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This study revealed that greater lens power was independently associated with shorter axial length (AL), younger age, thicker lens and girls. Differences in lens power with age significantly decreased from 9 years in high myopes, which was 1 year earlier than that in non-high myopes. Lens power was negatively associated with AL only in eyes shorter than 27 mm, indicating that influence of AL on lens power might be limited in high myopes.

• **178 Bacterial Dispersion Associated with Various Patient Face Mask Designs During Simulated Intravitreal Injections.** *Samir N. Patel, Raziye Mahmoudzadeh, Mirataollah Salabati, Rebecca R. Soares, John Hinkle, Jason Hsu, Sunir J. Garg, Carl D. Regillo, Allen C. Ho, Michael N. Cohen, M. Ali Khan, Yoshihiro Yonekawa, Allen Chiang, Omesh P. Gupta, and Ajay E. Kuriyan*

This study evaluated if face masks worn by patients during intravitreal injections altered bacterial dispersion around the eye. In this cross-sectional study of 15 participants undergoing simulated intravitreal injections with 6 face mask designs, there was significantly more bacterial dispersion when wearing a tight-fitting face mask without tape compared with wearing a tight-fitting mask with tape. Taping the superior portion of a patient's face mask may limit bacterial dispersion when performing intravitreal injections.

• **184 Clinical Features and Survival of Chinese Children With Trilateral Retinoblastoma During 2006–2019: A Retrospective Multicenter Study.** *Xiaolian Fang, Yizhuo Wang, Jie Yin, Yongli Guo, Lulu Jia, Chengyue Zhang, Mei Jin, Xin Ni, and Junyang Zhao*

This study summarized the clinical features and survival of Chinese patients with trilateral retinoblastoma, which may help early diagnosis and more effective treatments. Clinical records of patients with trilateral retinoblastomas were reviewed to identify clinical characteristics and outcomes.

Trilateral retinoblastoma is a rare intracranial mid-line neuroblastic disease. Increased awareness of this disease may guide early detection, which has been associated with improved outcomes.

• **193 Indoor airborne microbial concentration and dry eye.** *Sarah Rock, Anat Galor, and Naresh Kumar*

Indoor environment plays a critical role in ocular health, as we spend more than 90% of our time indoors. In this study, indoor humidity was associated with elevated concentration of airborne microbial concentration, especially in older homes. Microbial exposure showed a significant association with meibomian gland disorder ($P < .001$) adjusting for known confounders, including age. Reducing airborne microbial concentration by improving indoor environment can be considered a target intervention.

• **205 An Increased Choroidal Microvasculature Dropout Size is Associated with Progressive Visual Field Loss in Open-Angle Glaucoma.** *Jin Yeong Lee, Joong Won Shin, Min Kyung Song, Ji Wook Hong, and Michael S. Kook*

Eyes with open-angle glaucoma presenting with choroidal microvasculature dropout and visual field defects at baseline showed a significantly greater choroidal microvasculature dropout angular enlargement in association with subsequent visual field progression. Choroidal microvasculature dropout angular changes were significantly correlated with the rates of visual field deterioration. Therefore, we recommend that clinicians obtain baseline optical coherence tomography angiography images of the parapapillary choroidal layer to monitor the choroidal microvasculature dropout angular enlargement for future VF progression.

• **220 Association of Visual Acuity With Eye-Related Quality of Life and Functional Vision Across Childhood Eye Conditions.** *David A. Leske, Sarah R. Hatt, Suzanne M. Wernimont, Yolanda S. Castañeda, Christina S. Cheng-*

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Patel, Laura Liebermann, Eileen E. Birch, and Jonathan M. Holmes

In 397 children 5-11 years of age with a spectrum of pediatric eye conditions and 104 visually normal control subjects, both poorer better-seeing-eye visual acuity and poorer worse-seeing-eye visual acuity were associated with lower functional vision and eye-related quality of life scores, evaluated using the Pediatric Eye Questionnaire. Other factors may also influence relationships, but these data further validate the use of the Pediatric Eye Questionnaire across pediatric eye conditions.

• **229 Central Visual Field Defects in Patients with Distinct Glaucomatous Optic Disc Phenotypes.** Eren Ekici, Sasan Moghimi, Huiyuan Hou, James Proudfoot, Linda M. Zangwill, Jun L. Do, Won Hyuk Oh, Alireza Kamalipour, Jeffrey M. Liebmann, Carlos Gustavo De Moraes, Christopher A. Girkin, Nevin El-Nimri, and Robert N. Weinreb

This cross-sectional study demonstrated that the severity and prevalence of central visual field loss varies among different glaucomatous optic disc phenotypes and glaucomatous eyes. Focal ischemic and myopic glaucoma phenotypes especially may benefit from testing with both 10-2 and 24-2 visual field tests.

• **241 The Use of Systemic Steroids in the Treatment of Herpes Zoster Ophthalmicus-Related Ophthalmoplegia: Case Report and Case Meta-analysis.** Anfei Li, Anika Tandon, Marc Dinkin, and Cristiano Oliveira

The role of systemic steroids in the treatment of ophthalmoplegia in the setting of herpes zoster ophthalmicus is controversial. The result of case-based meta-analysis suggests that extended steroid taper may aid the recovery of ophthalmoplegia in the setting of HZO and should be investigated further in the future.

• **246 Association of Optic Nerve Head Prelaminar Schisis with Glaucoma.** Eugene A. Lowry, Steven L. Mansberger, Stuart K. Gardiner, Hongli Yang, Facundo Sanchez, Juan Reynaud, Shaban Demirel, Claude F. Burgoyne, and Brad Fortune

Schisis within the prelaminar optic nerve head is detected by optical coherence tomography more commonly in glaucomatous eyes than in healthy eyes. The frequency of observing prelaminar schisis increases with worse glaucoma severity, particularly in eyes with thinner optic disc rim tissue and deeper optic cup. Its presence can impact image segmentation and diagnostic parameters, resulting in substantial overestimation of the true rim tissue thickness and underestimation of cup depth.

• **259 Progression of Macular Vessel Density in Primary Open-Angle Glaucoma: A Longitudinal Study.** Cong Ye, Xiaoyan Wang, Marco Chak-yan Yu, Xiao Shang, Kun Zhou, Yan Tao, Fan Lu, and Yuanbo Liang

This longitudinal study demonstrated that the macular vessel density decreased over time in patients with primary open-angle glaucoma and the rate of reduction was influenced by the macular ganglion cell-inner plexiform layer and parapapillary retinal nerve fiber layer thicknesses at baseline.

• **267 Impact and Characterization of Delayed Pan-Retinal Photocoagulation in Proliferative Diabetic Retinopathy.** Marc Ohlhausen, Carter Payne, Tyler Greenlee, Andrew X. Chen, Thais Conti, and Rishi P. Singh

This retrospective study aimed to investigate the effect of delayed pan-retinal photocoagulation treatment of proliferative diabetic retinopathy on visual outcomes and to characterize the medical and socioeconomic factors that contribute to delayed treatment. Treatment within 31 days of proliferative diabetic retinopathy diagnosis was associated with superior visual acuity at 12- and 24-month

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follow-up. Inpatient hospital admissions were found to be a significant factor in delayed treatment.

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- **275 Efficacy and Safety of Topical Cysteamine in Corneal Cystinosis: A Systematic Review and Meta-Analysis.** *Sukhmandeep Kaur, Phulen Sarma, Hardeep Kaur, Manisha Prajapat, Nishant Shekhar, Jaimini Bhattacharyya, Harpinder Kaur, Subodh Kumar, Bikash Medhi, Jagat Ram, Dipankar Das, Pramod Avti, Ajay Prakash, Rahul Singh, and Anusuya Bhattacharyya*

This systematic review and meta-analysis showed that the conventional cysteamine formulation performed better than the control in terms of improvement and response to therapy and crystal density score. Although both of the Cystaran and Cystadrops formulations performed well in clinical studies in terms of decreasing corneal cystine crystals, Cystaran required more frequent application and a frozen storage condition, whereas Cystadrops was applied only 4 times daily and could be stored in a refrigerator.

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- **286 Uptake, Persistence, and Performance of Weekly Home Monitoring of Visual Field in a Large Cohort of Patients With Glaucoma.** *Selwyn M. Prea, George Y.X. Kong, Robyn H. Guymer, and Algis J. Vingrys*

We report a single-centre, home-monitoring study that evaluates the capacity of an iPad tablet device for monitoring the visual field of glaucoma patients by self-testing at home. Our findings are particularly important with the need for self-isolation during the COVID-19 pandemic. The study finds that home monitoring can produce results comparable to those returned from clinical visits and identifies barriers to uptake and compliance that need to be addressed to facilitate home-testing programs.

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- **296 Nasal or Temporal Internal Limiting Membrane Flap Assisted by Sub-Perfluorocarbon Viscoelastic In-**

jection for Macular Hole Repair. *Hung-Da Chou, Ying-Jiun Chong, Wee Min Teh, Kuan-Jen Chen, Laura Liu, Yen-Po Chen, Ling Yeung, Yih-Shiou Hwang, Wei-Chi Wu, and Chi-Chun Lai*

Previous studies reported successful macular hole closure with superior or temporal inverted internal limiting membrane flaps, either with or without adjunct viscoelastics or perfluorocarbon liquid. Our study demonstrated successful macular hole closure in both nasal and temporal inverted flaps. The sub-perfluorocarbon viscoelastic injection technique provided effective intraoperative and early postoperative stabilization of the single-layer flap. A well-positioned flap peeled from any directions can likely facilitate macular hole closure.

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- **308 Effect of Mindfulness Meditation on Intraocular Pressure and Trabecular Meshwork Gene Expression: A randomized Controlled Trial.** *Tanuj Dada, Nithya Bhai, Neha Midha, Jyoti Shakrawal, Manoj Kumar, Priyanka Chaurasia, Shikha Gupta, Dewang Angmo, Rajkumar Yadav, Rima Dada, and Ramanjit Sihota*

This randomized controlled trial evaluates the efficacy of mindfulness meditation as a holistic treatment option for patients with glaucoma. After a 3-week course of mindfulness meditation significant change in intraocular pressure; upregulation of nitric oxide synthetase-1 and -3 and other neuroprotective genes; downregulation of proinflammatory genes; better trabeculectomy outcomes and improved quality of life were observed.

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- **322 Incidence, Incident Causes, and Risk Factors of Visual Impairment and Blindness in a Rural Population in India: 15-Year Follow-Up of the Andhra Pradesh Eye Disease Study.** *Rohit C. Khanna, Srinivas Marmamula, Pooja Pendri, Asha Latha Mettla, Pyda Giridhar, Seema Banerjee, Konegari Shekhar, Subhabrata Chakrabarti,*

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Gudlavalleti V.S. Murthy, Clare Gilbert, and Gullapalli N. Rao, Andhra Pradesh Eye Disease Study Group

The Andhra Pradesh Eye Disease Study III is a 15-year cohort reporting incidence rate of visual loss, causes, and risk factors. The study reported very high incidence of visual loss with cataract and uncorrected refractive error as a major cause. Using the World Health Organization definition, significant risk factors were increasing age, female sex, illiteracy, past or current smoker, and current alcohol use. Using the United States of America definition, an additional risk factor was lower level of education.

• **338 Localized Optical Coherence Tomography Precursors of Macular Atrophy and Fibrotic Scar in the Comparison of Age-Related Macular Degeneration Treatments Trials.** *Avni P. Finn, Maxwell Pistilli, Vincent Tai, Ebenezer Daniel, Gui-Shuang Ying, Maureen G. Maguire, Juan E. Grunwald, Daniel F. Martin, Glenn J. Jaffe, and Cynthia A. Toth, for the Comparison of Age-Related Macular Degeneration Treatments Trials (CATT) Research Group*

Data from optical coherence tomography (OCT) scans, color fundus photographs, and fluorescein angiograms were used to identify the localized OCT precursor mapping to exact pixels of ensuing atrophy and scar in eyes treated with anti-vascular endothelial growth factor in the Comparison of Age-Related Macular Degeneration Treatments Trials. These data enabled identification of localized OCT precursors present at baseline in an exact pixel location that later develops macular atrophy or fibrotic scar.

• **348 Evaluation of a New Test for the Diagnosis of Congenital Dyschromatopsia in Children: the Color Vision Evaluation Test.** *Anne-Laure Fish, Mohamed Alketbi, and Stéphanie Baillif*

This study evaluated the validity, reproducibility, and feasibility of the Color Vision Evaluation Test for the diagnosis of congenital dyschromatopsia. The test was compared with the Farnsworth 15 Hue standard test. One hundred and fifty-five children were included. The sensitivity, specificity, and reproducibility were higher for the Color Vision Evaluation Test than for the Farnsworth 15 Hue standard test. The test was easy and rapid to perform and was accessible to young children.

• **359 Choroidal Structural Analysis in Alzheimer Disease, Mild Cognitive Impairment, and Cognitively Healthy Controls.** *Cason B. Robbins, Dilraj S. Grewal, Atalie C. Thompson, James H. Powers, Srinath Soundararajan, Hui Yan Koo, Stephen P. Yoon, Bryce W. Polascik, Andy Liu, Rupesh Agrawal, and Sharon Fekrat*

In this cross-sectional comparative study of 112 eyes of 67 subjects with symptomatic Alzheimer disease, 143 eyes of 74 subjects with mild cognitive impairment, and 248 eyes of 137 cognitively healthy control subjects, choroidal structural parameters, including total choroidal area, luminal area, and choroidal vascularity index, significantly differed among groups after adjustment for age, sex, and visual acuity. These parameters deserve further study in subjects in the Alzheimer disease continuum.

• **368 Oxygen Kinetics During Corneal Cross-Linking With and Without Supplementary Oxygen.** *Theo G. Seiler, Maria A. Komminou, Malavika H. Nambiar, Kaspar Schuerch, Beatrice E. Frueh, and Philippe Büchler*

Oxygen appears to be the bottleneck of current corneal cross-linking (CXL) protocols, in particular when using higher irradiances than 3 mW/cm². Supplementary oxygen can increase the stromal oxygen concentration and offers a pathway to potentially increase the efficacy of CXL.

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- **405 A Cost-Benefit Analysis of VEGF-Inhibitor Therapy for Neovascular Age-Related Macular Degeneration in the United States.** Gary C. Brown, Melissa M. Brown, Sara B. Rapuano, and David Boyer

Cost-benefit analysis of bevacizumab, ranibizumab, and aflibercept for neovascular macular degeneration (NVAMD) discloses that each drug has a positive return-on-investment above the direct ophthalmic medical costs expended for the treatment. Combined 2018 treatments with the 3 drugs theoretically returned a net \$28.5 billion to society over 11 years, with 96.5% of this going to insured patients. Substituting bevacizumab for ranibizumab and aflibercept in the 2018 U.S. cohort of 168,400 new NVAMD patients would have saved an estimated \$1.343 billion in direct ophthalmic medical expenditures over 11 years.

CORRESPONDENCE

- **159 Reply to Comment on: Non-Exudative Perifoveal Vascular Anomalous Complex: The Subclinical Stage of Perifoveal Exudative Vascular Anomalous Complex?** Riccardo Sacconi, Enrico Borrelli, Lea Querques, Francesco Bandello, and Giuseppe Querques
- **446 Comment on: Is this a 737 Max Moment for Brolocizumab.** Marcia Kayath and Dirk Sauer
- **446 Reply to Comment on: Is this a 737 Max Moment for Brolocizumab?** Philip J. Rosenfeld and David J. Browning
- **447 Comment on: Posterior Capsule Opacification With Two Hydrophobic Acrylic Intraocular Lenses: 3-Year Results of a Randomized Trial.** Raimo Tuuminen and Jose I. Belda
- **449 Reply To Comment On: Posterior Capsule Opacification With Two Hydrophobic Acrylic Intraocular Lenses: 3-Year Results of a Randomized Trial.** Christina Leydolt and Rupert Menapace
- **450 Comment on: Nonexudative Perifoveal Vascular Anomalous Complex: The Subclinical Stage of Perifoveal Exudative Vascular Anomalous**

Complex? Jennifer S.N. Verhoekx, Lisette M. Smid, Koenraad A. Vermeer, José P. Martínez Ciriano, and Suzanne Yzer

VSI: AOS THESIS 2019

- **377 Remission of Non-Infectious Anterior Scleritis: Incidence and Predictive Factors.** John H. Kempen, Maxwell Pistilli, Hosne Begum, Tonetta D. Fitzgerald, Teresa L. Liesegang, Abhishek Payal, Nazlee Zebardast, Nirali P. Bhatt, C. Stephen Foster, Douglas A. Jabs, Grace A. Levy-Clarke, Robert B. Nussenblatt, James T. Rosenbaum, H. Nida Sen, Eric B. Suhler, and Jennifer E. Thorne, For The Systemic Immunosuppressive Therapy for Eye Diseases (SITE) Cohort Study Research Group
- Among 832 eyes (584 patients) with non-infectious scleritis, the estimated median time-to-remission of scleritis was 7.8 years. Factors predictive of less scleritis remission included bilaterality of scleritis, and diagnosis with any systemic inflammatory disease (and specifically with rheumatoid arthritis or Granulomatosis with Polyangiitis). Use of statins within the preceding 90 days was associated with 53% more favorable remission incidence. Remission occurs eventually in many cases; further study of whether statins enhance remission incidence is warranted.

VSI: AOS THESIS 2020

- **396 Determining the Tractional Forces on Vitreoretinal Interface Using a Computer Simulation Model in Abusive Head Trauma.** Donny W. Suh, Helen H. Song, Hozhabr Mozafari, and Wallace B. Thoreson
- This study sought to advance understanding of the pathophysiological process of vitreoretinal traction by determining the forces generated during shaking of an infant by using the newly developed FE model. The authors hypothesized that a newly developed FE model could advance understanding of vitreoretinal traction in AHT by

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determining the forces on posterior ocular tissues during shaking of an infant.

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- 430 **Analysis of Predisposing Clinical Features for Worsening Traction After Treatment of Familial Exudative Vitreoretinopathy in Children.** G. Baker Hubbard and Alexa L. Li

This retrospective cohort comparison study of 46 eyes treated with laser for familial exudative vitreoretinopathy (FEVR) found that 13% had worsening of traction after treatment. Comparing baseline features between groups with and without worsening, eyes with proliferative tissue in contact with the lens were at significantly higher risk for worsening traction after laser treatment.

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