

AMERICAN JOURNAL OF OPHTHALMOLOGY®

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• **A19 Importance of patient advocacy during the COVID-19 pandemic.** *Jesse D. Sengillo*

ORIGINAL ARTICLES

• **1 Plateau iris and severity of primary angle closure glaucoma.** *Monisha E. Nongpiur, Sushma Verma, Tin A. Tun, Tina T. Wong, Shamira A. Perera, and Tin Aung*
This study investigated the distribution of plateau iris in eyes across varying severity of primary angle closure glaucoma (PACG) using standardized ultrasound biomicroscopy criteria. Findings of a higher proportion of plateau iris in severe PACG compared with early-to-moderate PACG emphasizes the need to consider the presence of plateau iris as a possible factor for disease severity or worsening in eyes with persistent angle closure after laser peripheral iridotomy.

• **9 Five-year outcomes of converted mushroom keratoplasty from intended deep anterior lamellar keratoplasty (DALK) mandate 9-mm diameter DALK as the optimal approach to keratoconus.** *James Myerscough, Harry Roberts, Angeli Christy Yu, Mohamed Elkadim, Cristina Bovone, and Massimo Busin*
With evidence of excellent 5-year visual and survival outcomes, 9-mm deep anterior lamellar keratoplasty is the optimal primary surgical approach to keratoconus. If significant intraoperative complications occur, 2-piece mushroom keratoplasty can be performed instead of a 9.0-mm conventional penetrating keratoplasty, thereby maintaining the refractive advantages of large-diameter keratoplasty while allowing limited exchange of the central recipient endothelium.

• **19 Ocular biometric determinants of anterior chamber angle width in Chinese Americans: the Chinese American eye study.** *Benjamin Y. Xu, Jacob Lifton, Bruce*

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Burkemper, Xuejuan Jiang, Anmol A. Pardeshi, Sasan Moghimi, Grace M. Richter, Roberta McKean-Cowdin, and Rohit Varma

Decreased width of the anterior chamber angle is an important risk factor for increased intraocular pressure and primary angle closure glaucoma, a leading cause of permanent vision loss and blindness worldwide. Quantitative measurements of biometric parameters describing anatomical structures are associated with angle closure and PACG. In this study, we investigate anatomic mechanisms of angle closure by developing statistical models that assess the relative and unique contributions of these biometric parameters to decreased angle width.

• **27 Automated noncontact facial topography mapping, 3-dimensional printing, and silicone casting of orbital prosthesis.** *Ernesto H. Weiss, Mauro Fittipaldi, Carlos A. Concepcion, Daniel Pelaez, Landon Grace, and David T. Tse*
A proof-of-concept workflow study for the fabrication of custom orbital exenteration prostheses using automated noncontact scanning, 3D printing, and silicone casting. All first copy of the 3D-printed orbital prosthesis produced good symmetry, color match, prosthesis fit, and comfort of wear. This novel workflow has the potential to provide an efficient, standardized fabrication process of a custom exenteration prosthesis and to overcome the barriers to custom prostheses worldwide: access and cost.

• **37 Vogt-Koyanagi-Harada Disease Managed with Immunomodulatory Therapy within 3 Months of disease Onset.** *Ei Ei Lin Oo, Soon-Phaik Chee, Kelvin Kin Yan Wong, and Hla Myint Htoon*

The introduction of immunomodulatory therapy within 3 months of high-dose systemic corticosteroids in patients with acute Vogt-Koyanagi-Harada disease did not prevent the occurrence of sunset glow fundus (58.6%). The addition of immunomodulatory therapy within 6 weeks resulted in better visual outcomes but not fewer eyes with sunset

glow fundus nor better uveitis outcomes. Using historical data, the development of chronic recurrent disease was significantly reduced compared with adding immunomodulatory therapy only when uveitis was not controlled.

• **45 A randomized controlled trial comparing subconjunctival injection to direct scleral application of mitomycin C in trabeculectomy.** *Jiun L. Do, Benjamin Y. Xu, Brandon Wong, Andrew Camp, Philip Ngai, Christopher Long, James Proudfoot, Sasan Moghimi, Diya Yan, Derek S. Welsbie, and Robert N. Weinreb*

Trabeculectomy remains a mainstay in glaucoma management. To determine the degree to which mitomycin C application techniques affect surgical outcomes, preoperative subconjunctival injection or intraoperative direct scleral application of mitomycin C were compared.

• **53 Omidenepag isopropyl versus latanoprost in primary open-angle glaucoma and ocular hypertension. The Phase 3 AYAME Study.** *Makoto Aihara, Fenghe Lu, Hisashi Kawata, Akihiro Iwata, Noriko Odani-Kawabata, and Naveed K. Shams*

This investigator-masked, randomized, controlled phase 3 study compared the efficacy and safety of a first-in-class EP2 receptor agonist, omidenepag isopropyl (OMDI) 0.002% ophthalmic solution with latanoprost 0.005% ophthalmic solution over 4 weeks of treatment. OMDI treatment had noninferior lowering of intraocular pressure compared with latanoprost. There were no serious adverse events in either group or discontinuations because of the study drug.

• **64 An ophthalmic rating scale to assess ocular involvement in juvenile CLN3 disease.** *Simon Dulz, Yevgeniya Atiskova, Eva Wibbeler, Jan Wildner, Lars Wagenfeld, Christoph Schwering, Miriam Nickel, Udo Bartsch, Martin Stephan Spitzer, and Angela Schulz*

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The Hamburg CLN3 ophthalmic rating scale enables physicians to quantify the ocular disease progression in CLN3 disease and may serve as a surrogate endpoint in clinical trials related to CLN3 disease.

• **72 Comparison of long-term rotational stability of three commonly implanted intraocular lenses.** *Daniel Schartmüller, Luca Schwarzenbacher, Elias Laurin Meyer, Sabine Schriebl, Christina Leydolt, and Rupert Menapace*

To compare the long-term rotational stability of the Acrysof, Tecnis, and Envista intraocular lenses from the end of surgery with the patient still supine on the operating table using sequential imaging examinations up to 4-7 months.

• **82 The extent of angioid streaks correlates with macular degeneration in pseudoxanthoma elasticum.** *Sara Risseuw, Jeannette Ossewaarde-van Norel, Colette van Buchem, Wilko Spiering, Saskia M. Imhof, and Redmer van Leeuwen*

Patients with pseudoxanthoma elasticum suffer from calcification of Bruch's membrane, leading to macular degeneration and visual impairment. In this cross-sectional study, the extent of angioid streaks as a proxy for the extent of Bruch's membrane calcification was associated with choroidal neovascularization and more severe atrophy. Longer angioid streaks increase the risk on macular degeneration, which is relevant when counseling patients with pseudoxanthoma elasticum on their visual prognosis.

• **91 Ophthalmic corticosteroids in pregnant women with allergic conjunctivitis and adverse neonatal outcomes: propensity score analyses.** *Yohei Hashimoto, Nobuaki Michihata, Hayato Yamana, Daisuke Shigemi, Kojiro Morita, Hiroki Matsui, Hideo Yasunaga, and Makoto Aihara*

The association between exposure to ophthalmic corticosteroids during pregnancy and adverse neonatal out-

comes was investigated for women with allergic conjunctivitis, using a large database. Congenital anomalies occurred in 5.5% and 4.9%, respectively; in preterm births in 3.4% and 3.9%, respectively; in low birthweight in 5.9% and 7.0%, respectively; and the composite outcome in 11.7% and 11.7%, respectively, of exposed and unexposed women. Propensity score analyses showed that use of corticosteroid was not associated with any increase in these outcomes.

• **102 Unique geospatial accumulations of uveal melanoma.** *Marlana Orloff, Mike Brennan, Shingo Sato, Carol L. Shields, Jerry A. Shields, Sara Lally, Arman Mashayekhi, John Mason, Miguel Materin, Michael Mastrangelo, and Takami Sato*

Uveal melanoma is a rare and fatal cancer with no known cause. Despite only 2,500 cases diagnosed annually in the United States, this study identified the following 3 geographic accumulations of uveal melanoma in North Carolina, Alabama, and New York. In those 3 locations, there are numerous cases of uveal melanoma among people living in close proximity. This paper summarizes the initial observations made regarding those unique cases.

• **110 Population-based incidence of optic neuritis in the era of aquaporin-4 and myelin oligodendrocyte glycoprotein antibodies.** *Mohamed B. Hassan, Caroline Stern, Eoin P. Flanagan, Sean J. Pittock, Amy Kunchok, Robert C. Foster, Jiraporn Jitrapakulsan, David O. Hodge, M. Tariq Bhatti, and John J. Chen*

Using the Rochester Epidemiology Project database, 110 patients with optic neuritis were identified between January 1, 2000, and December 31, 2018, providing a population-based incidence of 3.9 per 100,000 individuals. Sera were tested for AQP4-IgG and MOG-IgG by using live cell-based assays in most patients. Final diagnosis at last follow-up was multiple sclerosis in 57%, MOG-IgG-associated disorders in 6%, and AQP4-IgG-positive NMOSD

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in 3%. MOG-IgG-ON had better visual outcomes than AQP4-IgG-ON.

- **115 Validation of a compensation strategy used to detect choriocapillaris flow deficits under drusen with swept source OCT angiography.** Yingying Shi, Zhongdi Chu, Liang Wang, Qinqin Zhang, William Feuer, Luis de Sisternes, Mary K. Durbin, Giovanni Gregori, Ruikang K. Wang, and Philip J. Rosenfeld

To study choriocapillaris (CC) perfusion in the progression of age-related macular degeneration (AMD), we needed a compensation strategy to adjust for the shadowing caused by drusen. To validate our compensation strategy, we took advantage of a naturally occurring event in which drusen spontaneously resolved. By measuring the CC with and without our compensation strategy before and after the drusen resolved, we showed that our strategy successfully compensated for the signal attenuation caused by drusen.

- **128 High Expression of Programmed Death Ligand 1 and Programmed Death Ligand 2 in Ophthalmic Sebaceous Carcinoma: The Case for a Clinical Trial of Checkpoint Inhibitors.** Natalie Wolkow, Frederick A. Jakobiec, Amir H. Afrogheh, Sara I. Pai, and William C. Faquin

Programmed cell death ligand 1 (PD-L1) and programmed cell death ligand 2 (PD-L2) are expressed in a high percentage of ocular adnexal sebaceous carcinomas. The current and preceding studies support a potential therapeutic role for immune checkpoint inhibitor drugs in the treatment of advanced sebaceous carcinoma.

- **140 Retinal vasculometry associations with glaucoma: Findings from the European Prospective Investigation of Cancer–Norfolk Eye Study.** Alicja R. Rudnicka, Christopher G. Owen, Roshan A. Welikala, Sarah A. Barman, Peter H. Whincup, David P. Strachan, Michelle P.Y. Chan, Anthony P. Khawaja, David C. Broadway,

Robert Luben, Shabina A. Hayat, Kay-Tee Khaw, and Paul J. Foster

Automated retinal vasculometry assessment showed novel associations between retinal vessel tortuosity and vessel area with glaucoma, in addition to replicating well-known vessel thinning. In the absence of consistent longitudinal evidence, an innovative approach showing a lack of between-eye differences in retinal vasculometry was used to provide further evidence (but not absolute proof) that systemic microvascular changes may cause glaucoma, suggesting that measurement and monitoring of retinal vasculometry may provide further diagnostic cues to glaucomatous development.

- **152 Epidemiology and the estimated burden of microbial keratitis on the health care system in Taiwan: A 14-year population-based study.** Yeo-Yang Koh, Chi-Chin Sun, and Ching-Hsi Hsiao

This population-based retrospective study investigated the epidemiologic characteristics of microbial keratitis and its overall burden on the health care system in Taiwan. Young patients have the highest incidence of microbial keratitis; however, their older counterparts accounted for approximately 80% of health care expenditure of the disease. Diabetes mellitus as well as chronic use of topical anti-glaucoma agents and topical/systemic steroid were associated with disease severity requiring hospitalization and surgical interventions.

- **160 Clinical and imaging factors associated with the outcomes of tubercular serpiginous-like choroiditis.** Aniruddha Agarwal, Alessandro Marchese, Alessandro Rabiolo, Rupesh Agrawal, Reema Bansal, and Vishali Gupta
- In this retrospective study, color fundus photographs of subjects with tubercular serpiginous-like choroiditis were assessed at baseline, and the active lesions were graded on a self-designed scale for lesion opacity. Lesions with higher

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opacity grades were associated with poor response to treatment and higher risk of paradoxical worsening.

- **170 Biomicroscopic Findings and Management of Anterior Stromal Necrosis After Long-term Implantation of Intacs.** Juan-Carlos Abad, Isabel C. Gomez, Maria A. Henriquez, and Jorge H. Donado

Intacs intracorneal ring segments could present with anterior stromal necrosis that starts with a linear exposure of the central part of the polymethyl methacrylate body beginning around 10 years postoperatively with an estimated incidence ranging from 7% to 9%. After removal of the segments the patient could be left with increased astigmatism.

- **177 A comparison Between the Clinical Features of Pseudotumor Cerebri Secondary to Tetracyclines and Idiopathic Intracranial Hypertension.** Daniel R. Orme, Sravanthi Vegunta, Matthew A. Miller, Judith E.A. Warner, Christopher Bair, Molly McFadden, Alison Voigt Crum, Kathleen B. Digre, and Bradley J. Katz

The demographics, body mass index, examination findings, treatment, clinical course, and visual outcomes of 52 patients with tetracycline-induced pseudotumor cerebri were compared with 302 patients with idiopathic intracranial hypertension. Significant differences as well as significant similarities were observed in the 2 cohorts. The authors conclude that tetracycline-induced pseudotumor likely reflects a spectrum of disease in susceptible individuals.

- **183 Facial Port-Wine Stain Phenotypes Associated with Glaucoma Risk in Neonates.** Ahnul Ha, Jin-Soo Kim, Sung Uk Baek, Young Joo Park, Jin Wook Jeoung, Ki Ho Park, and Young Kook Kim

In the evaluation of facial port-wine stain (PWS), distribution and early onset glaucoma risk in neonates, a greater extent of birthmarks in the S2 area based on the pattern of vascular anomalies and lesions including the lower eyelid entailed

a significantly higher risk of glaucoma within the neonatal period.

- **191 Femtosecond laser-assisted deep anterior lamellar keratoplasty for keratoconus: Multi-surgeon results.** Kunal A. Gadhvi, Vito Romano, Luis Fernández-Vega Cueto, Francesco Aiello, Alexander C. Day, Daniel M. Gore, and Bruce D. Allan

Deep anterior lamellar keratoplasty is a challenging operation. Using a novel and customized femtosecond laser-assisted technique, a reduction of intraoperative complications can be successfully achieved in patients with keratoconus.

- **203 Direct versus indirect corneal neurotization for the treatment of neurotrophic keratopathy. A Multicenter Prospective Comparative Study.** Paolo Fogagnolo, Giuseppe Giannaccare, Federico Bolognesi, Maurizio Digiuni, Laura Tranchina, Luca Rossetti, Angelica Dipinto, Fabiana Allevi, Alessandro Lozza, Dimitri Rabbiosi, Silvia Mariani, Marco Pellegrini, Federica E. Cazzola, Simone Bagaglia, Cosimo Mazzotta, Guido Gabriele, Paolo Gennaro, Giovanni Badiali, Claudio Marchetti, Emilio C. Campos, and Federico Biglioli

Different techniques of corneal neurotization have been proposed to reinnervate the cornea in patients with neurotrophic keratopathy. In this study, the comparative safety and efficacy of the 2 most used techniques (direct vs indirect) were compared for the first time. Both techniques allowed the healing of neurotrophic keratopathy in all cases, as well as the improvement of corneal sensitivity in most patients without any complication. No significant differences were found between the 2 techniques.

CORRESPONDENCE

- **215 Comment on: Characterization of in vivo biomechanical properties in macular corneal dystrophy.** Sridevi

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