

AMERICAN JOURNAL OF OPHTHALMOLOGY®

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PERSPECTIVE

- 153 Misery perfusion, diffusive oxygen shunting and interarterial watershed infarction underlie oxygenation-based hypoperfusion maculopathy. *David McLeod*

The ischemic mechanism underpinning “perivenular para-central acute middle maculopathy” is currently under investigation using new angiographic technologies. However, as first proposed 40 years ago, the answer probably lies in classical oxygen physiopathology (ie, misery perfusion and the Krogh cylinder). Thus, ongoing oxidative metabolism in upstream tissues deprives downstream tissues of oxygen, resulting in interarterial “watershed infarction of fundal interneurons”. Diffusive oxygen shunting transcends the minutiae of retinal microvascular anatomy.

shows that half-dose photodynamic therapy is the superior treatment in chronic central serous chorioretinopathy regardless of whether the leakage pattern is focal or diffuse.

- 11 Factors predictive of double anterior chamber formation following deep anterior lamellar keratoplasty. *James Myerscough, Cristina Bovone, Michael Mimouni, Mohamed Elkadim, Erika Rimondi, and Massimo Busin*

The postoperative incidence of double anterior chamber formation following deep anterior lamellar keratoplasty (DALK) in this series of 591 eyes was found to be 8%. Scarred corneas of both normal and abnormal shape are independent risk factors for double anterior chamber formation following DALK, along with intraoperative central perforation and the occurrence of a type 2 bubble.

ORIGINAL ARTICLES

- 1 Focal and diffuse chronic central serous chorioretinopathy treated with half-dose photodynamic therapy or subthreshold micropulse laser: PLACE trial report No. 3. *Thomas J. van Rijssen, Elon H.C. van Dijk, Paula Scholz, Myrte B. Breukink, Rocio Blanco-Garavito, Eric H. Souied, Jan E.E. Keunen, Robert E. MacLaren, Giuseppe Querques, Sascha Fauser, Susan M. Downes, Carel B. Hoyng, and Camiel J.F. Boon*

It is unknown if the outcome of treatment is different between chronic central serous chorioretinopathy patients with focal or with diffuse leakage on fluorescein angiography. In this study, patients with focal or diffuse leakage were treated with either half-dose photodynamic therapy or high-density subthreshold micropulse laser. This study

- 17 Loss of peak vision in retinal vein occlusion patients treated for macular edema. *Mustafa Iftikhar, Tahreem A. Mir, Gulnar Hafiz, Ingrid Zimmer-Galler, Adrienne W. Scott, Sharon D. Solomon, Akrit Sodhi, Adam S. Wenick, Catherine Meyerle, Kim Jiramongkolchai, T.Y. Alvin Liu, J. Fernando Arevalo, Mandeep Singh, Saleema Kherani, James T. Handa, and Peter A. Campochiaro*

Long-term prospective follow-up of patients with central or branch retinal vein occlusion treated with anti-vascular endothelial growth factor injections demonstrated need for continued injections in most patients. There was improvement to a mean peak vision of 20/32 with subsequent decrease to 20/80 in central vein occlusion and 20/50 in branch vein occlusion; in many patients undertreatment played a role. New treatments that provide

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sustained suppression of vascular endothelial growth factor should be investigated in retinal vein occlusion.

• **27 Pterygium prevalence and its associations in a Russian population: The Ural Eye and Medical Study.**

Mukharram M. Bikbov, Rinat M. Zainullin, Gyulli M. Kazakbaeva, Timur R. Gilmanshin, Venera F. Salavatova, Inga I. Arslangareeva, Nikolai A. Nikitin, Songhomitra Panda-Jonas, Artur F. Zaynetdinov, Renat A. Kazakbaev, Ildar F. Nuriev, Renat I. Khikmatullin, Yulia V. Uzianbaeva, Dilya F. Yakupova, Said K. Aminev, and Jost B. Jonas

As examined in the population-based Ural Eye and Medical Study on a rural and urban, typically multiethnic Russian study population aged 40+years, mean pterygium prevalence per individual was 2.3% (95% confidence interval: 2.0, 2.7). A higher prevalence was correlated with older age, rural region of habitation, and lower educational level, while pterygium prevalence was statistically independent of most other systemic or ocular parameters. A pterygium was not a biomarker for an internal medical disease.

• **35 Retinal vein occlusion is associated with low blood high-density lipoprotein cholesterol: a nationwide cohort study.**

Jaeryung Kim, Dong Hui Lim, Kyungdo Han, Se Woong Kang, Don-Il Ham, Sang Jin Kim, and Tae-Young Chung

A low blood level of high-density lipoprotein cholesterol was associated with a significantly higher risk of retinal vein occlusion after adjusting for potential confounders, including age, sex, current smoking, heavy drinking, exercise, income, body mass index, and systolic blood pressure in a nationwide population-based cohort. We observed a synergistically increased risk of retinal vein occlusion between low high-density lipoprotein cholesterol level and hypertension, obesity, young age, male sex, current smoking, diabetes, or hypercholesterolemia.

• **43 Choroidal vascular changes in arteritic and nonarteritic anterior ischemic optic neuropathy.**

Marco Pellegrini, Giuseppe Giannaccare, Federico Bernabei, Fabiana Moscardelli, Costantino Schiavi, and Emilio C. Campos
This study compared macular and peripapillary choroidal vascularity index (CVI) in patients with arteritic anterior ischemic optic neuropathy (A-AION), patients with nonarteritic anterior ischemic optic neuropathy (NA-AION), and control subjects. Macular and peripapillary CVI values were reduced in patients with A-AION compared to those with NA-AION and controls. These parameters may be useful to evaluate quantitatively choroidal vascular dysfunction in A-AION, serving as new additional diagnostic tools to distinguish A-AION from NA-AION.

• **50 Retrospective validation of the Postnatal Growth and Retinopathy of Prematurity (G-ROP) criteria in a Japanese cohort.**

Akihiko Shiraki, Yoko Fukushima, Ryo Kawasaki, Hirokazu Sakaguchi, Miwa Mitsuhashi, Hiromi Ineyama, Yoshikazu Hatsukawa, and Kohji Nishida
The criteria of the Postnatal Growth and Retinopathy of Prematurity (G-ROP) study showed 100% sensitivity for treatment-requiring retinopathy of prematurity (ROP) and had good accuracy as an exclusion tool in ROP screening in a Japanese cohort. This is the first external validation study of the G-ROP criteria, which suggests that the G-ROP criteria could be generalized to different racial/ethnic cohorts in high-income countries.

• **54 Impact of binarization thresholding and brightness/contrast adjustment methodology on optical coherence tomography angiography image quantification.**

Nihaal Mehta, Keke Liu, A. Yasin Alibhai, Isaac Gendelman, Phillip X. Braun, Akihiro Ishibazawa, Osama Sorour, Jay S. Duker, and Nadia K. Waheed

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Binarization is a critical technique in optical coherence tomography angiography (OCTA) image analysis, but there is no consistency in the method used in published OCTA studies. In this study, variations in image binarization and brightness/contrast adjustment methods were found to have a significant effect on OCTA image quantification measurements. A consensus is needed for a consistent method for analyzing images and a means of assessing accuracy in resulting quantification measurements.

• **66 Accuracy and precision of intraocular lens calculations using the new Hill-RBF version 2.0 in eyes with high axial myopia.** *Kelvin H. Wan, Thomas C.H. Lam, Marco C.Y. Yu, and Tommy C.Y. Chan*

This retrospective study reports the prediction error on 127 eyes with high axial myopia ≥ 26 mm using 6 different formulas. The Hill-RBF version 2.0 formula is more precise than the Hoffer Q, Holladay I, and SRK/T and comparable to the Barrett Universal II and Haigis. Among them, Hill-RBF is the only formula whose mean function and variance function of the refractive prediction error is independent of the axial length.

• **74 Microbial keratitis in Taiwan: a 20-year update.** *Hsin-Yu Liu, Hsiao-Sang Chu, I-Jong Wang, Wei-Li Chen, and Fung-Rong Hu*

This study presented the demographics, predisposing factors, microbial profile, treatment outcomes, and antibiotic susceptibility of microbial keratitis at a tertiary referral center in Taiwan from 2007 to 2016. Though contact lens wear remained the most common predisposing factor with *Pseudomonas* species as the major pathogen, chronic disorder-related microbial keratitis was on the rise, along with an increasing trend of oxacillin resistance in *Staphylococcus* species.

• **82 Endophthalmitis rates and clinical outcomes following penetrating and endothelial keratoplasty.** *Durga S. Borkar, Turner D. Wibbelsman, Preema M. Buch, Sara B. Rapuano, Anthony Obeid, Allen C. Ho, Jason Hsu, Carl D. Regillo, Brandon D. Ayres, Kristin M. Hammersmith, Parveen K. Nagra, Irving M. Raber, Christopher J. Rapuano, and Zeba A. Syed*

In this study of more than 3000 patients, the authors found that the rate of endophthalmitis after penetrating keratoplasty was significantly higher than the rate after endothelial keratoplasty (0.7% vs 0.2%; $P = .01$). Concurrent vitrectomy was found to be a risk factor for developing endophthalmitis. In addition, eyes with endophthalmitis following penetrating keratoplasty had worse visual acuity outcomes and higher rates of graft failure compared with eyes with endophthalmitis after endothelial keratoplasty.

• **91 Effect of topical hypotensive medications for preventing intraocular pressure increase after cataract surgery in eyes with glaucoma.** *Ken Hayashi, Motoaki Yoshida, Tatshuhiko Sato, and Shin-Ichi Manabe*

Brinzolamide administered to glaucomatous eyes immediately after phacoemulsification reduced the short-term intraocular pressure (IOP) increase more effectively than travoprost or timolol, suggesting that brinzolamide is preferable for prophylaxis for an IOP spike.

• **99 Incidence, epidemiology, and transformation of ocular myasthenia gravis: a population-based study.** *Tina M. Hendricks, M. Tariq Bhatti, David O. Hodge, and John J. Chen*
This is the first population-based evaluation of ocular myasthenia gravis, which found an overall incidence of 1.13 cases per 100 000 per year and a conversion rate from ocular to generalized myasthenia gravis of 55%.

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- **106 Caregiver burden in primary congenital glaucoma.** *Aditi Kantipuly, Manju R. Pillai, Sujani Shroff, Rakhee Khatiwala, Ganesh V. Raman, S.R. Krishnadas, Alan Lee Robin, and Joshua R. Ehrlich*

This study evaluated the factors associated with variation in quality of life among 70 caregivers of 70 children with primary congenital glaucoma. Rasch-calibrated survey response data was used to identify traits associated with caregiver quality of life, as well as the specific quality of life issues most likely to affect caregivers. Findings are important for maximizing quality of life for caregivers of children with this chronic condition.

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- **132 Quantitative assessment of choriocapillaris flow deficits in eyes with advanced age-related macular degeneration versus healthy eyes.** *Ahmed Roshdy Alagorie, Aditya Verma, Marco Nassisi, and Srinivas R. Sadda*

Overall choriocapillaris flow deficits may not differ significantly between normal eyes and eyes with choroidal neovascularization, but both show significantly less extensive deficits compared with eyes with geographic atrophy. This finding may reflect the overall severity and stage of disease in eyes that go on to develop geographic atrophy compared with those that manifest only choroidal neovascularization.

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- **140 Glucose tolerance levels and circumpapillary retinal nerve fiber layer thickness in a general Japanese population: The Hisayama Study.** *Kohta Fujiwara, Miho Yasuda, Jun Hata, Yoichiro Hirakawa, Sawako Hashimoto, Emi Ueda, Aiko Iwase, Makoto Araie, Takeshi Yoshitomi, Toshiharu Ninomiya, and Koh-Hei Sonoda*

In this population-based cross-sectional study, 1324 subjects who underwent a 75-g oral glucose tolerance test and optical coherence tomography were enrolled. The subjects with prediabetes or with diabetes mellitus

had significantly lower mean circumpapillary retinal nerve fiber layer thickness than those with normal glucose tolerance. This study suggests that the loss of neural tissue in the eye begins at the prediabetic stage, and that hyperglycemia may play a role in the reduction of mean circumpapillary retinal nerve fiber layer thickness.

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- **147 Are descemet membrane ruptures the root cause of corneal hydrops in keratoconic eyes?** *Jack S. Parker, Rénuka S. Birbal, Korine van Dijk, Silke Oellerich, Isabel Dapena, and Gerrit R.J. Melles*

This retrospective study evaluated various disruptions of the posterior corneal layers, for example, selective removal of Descemet membrane (DM) in Descemet membrane endothelial keratoplasty in keratoconus eyes and perforations in Bowman layer transplantation, to re-evaluate any causal relationship with the development of corneal hydrops in keratoconus. Findings suggest that a combined defect in DM and the posterior corneal stroma rather than solely a break in DM is responsible for inducing hydrops in eyes with keratoconus.

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- **165 Anterior segment optical coherence tomographic angiography assessment of acute chemical injury.** *Simon S.M. Fung, Rosalind M.K. Stewart, Sandeep K. Dhallu, Dawn A. Sim, Pearse A. Keane, Mark R. Wilkins, and Stephen J. Tuft*

This prospective observational study used optical coherence tomography angiography to assess for limbal vascular changes in 15 eyes of 10 patients with an acute ocular chemical injury. This imaging technology was able to objectively assess the extent of limbal conjunctival ischemia, and provided longitudinal data of vascular recovery. Imaging-derived findings were highly correlated to visual outcome at 3 months after the injury. The

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imaging is a useful tool in the management of ocular chemical injury.

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- 175 **The Aurolab keratoprosthesis (KPro) versus the Boston type IKpro: 5-year Clinical outcomes in 134 cases of bilateral corneal blindness.** *Sayan Basu, Juan Carlos Serna-Ojeda, Sirisha Senthil, Rajeev Reddy Pappuru, Bhupesh Bagga, and Virender Sangwan*

The Aurolab keratoprosthesis, a low-cost equivalent of the Boston Type I keratoprosthesis, can be considered for long-term visual rehabilitation in patients with bilateral corneal blindness when affordability or availability of the Boston Type I keratoprosthesis is a limiting factor.

CORRESPONDENCE

- 197 **Randomized, controlled, phase 2 trial of povidone-iodine/dexamethasone ophthalmic suspension for treatment of adenoviral conjunctivitis.** *Jay S. Pepose, Arjun Ahuja, Wenlei Liu, Abhijit Narvekar, and Reza Haque*
- 197 **Cataract surgery and rate of visual field progression in primary open-angle glaucoma.** *Raimo Tuuminen and Andrzej Grzybowski*
- 198 **Risk factors associated with persistent anterior uveitis after cataract surgery.** *Jagdeep Singh Gandhi*
- 199 **Risk factors associated with persistent anterior uveitis after cataract surgery.** *Mina B. Pantcheva*
- 200 **Predictors of neovascular glaucoma in central retinal vein occlusion.** *Dan Călugăru and Mihai Călugăru*
- 201 **Predictors of neovascular glaucoma in central retinal vein occlusion.** *Andrew J. Rong, Swarup S. Swaminathan, Elizabeth A. Vanner, and Richard K. Parrish II*
- 202 **Amniotic membrane transplantation in acute severe ocular chemical injury: a randomized clinical trial.** *Pranita Sahay, Siddhi Goel, Prafulla K. Maharana, and Namrata Sharma*
- 203 **Amniotic membrane transplantation in acute severe ocular chemical injury: a**

- randomized clinical trial.** *Medi Eslani, Alireza Baradaran-Rafii, Albert Y. Cheung, Ali R. Djalilian, and Edward J. Holland*
- 204 **Are descemet membrane ruptures the root cause of corneal hydrops in keratoconic eyes?** *Darren Shu Jeng Ting, Dalia G. Said, and Harminder S. Dua*
- 204 **Are descemet membrane ruptures the root cause of corneal hydrops in keratoconic eyes?** *Jack Parker, Rénuka S. Birbal, Korine van Dijk, Silke Oellerich, Isabel Dapena, and Gerrit R.J. Melles*

AOS THESIS ARTICLES

- 115 **Conjunctival myxoid lesions: clinical-pathologic multiparametric analysis, including molecular genetics (an American Ophthalmological Society thesis).** *Tatyana Milman, Diva R. Salomao, Cristiane M. Ida, Daniel R. Capiz Correa, Hans E. Grossniklaus, Qiang Zhang, Rose A. Hamershock, Carol Shields, Jerry A. Shields, Irving Raber, Christopher J. Rapuano, Ravi Patel, and Ralph C. Eagle Jr*
In a retrospective study, 28 conjunctival myxoid lesions were analyzed histopathologically, immunohistochemically, and with molecular genetic studies and the results were correlated with clinical findings. The study demonstrated that *PRKARIA* gene plays a role in the development of a subset of conjunctival myxomas. With the exception of *PRKARIA* studies, the current immunohistochemical panels could not reliably distinguish between conjunctival myxoma and conjunctival stromal tumor, suggesting that morphology remains the gold standard for diagnosis.
- 184 **Influence of age, sex, and generation on physician payments and clinical activity in Ontario, Canada: An age-period-cohort analysis.** *Yvonne M. Buys, Mayilee Canizares, Tina Felfeli, and Yaping Jin*
Physician billings may be a poor surrogate for work productivity as illustrated by more recent generational

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cohorts having higher payments despite a fewer number of patient visits and for ophthalmology fewer distinct patients. Throughout the study period, males had higher payments than females; after adjusting for number of visits

and distinct patients this difference no longer existed for family physicians however still remained significant albeit reduced for all physicians and ophthalmologists.

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