Retina Roundup

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Low-Dose Supplementation With Retinol Improves Retinal Function In Eyes With Age-Related Macular Degeneration But Without Reticular Pseudodrusen

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Purpose: The aim of this study was to determine the functional impact of oral vitamin A supplementation in patients with intermediate age-related macular degeneration with and without reticular pseudodrusen (RPD) demonstrating dysfunction in dark adaptation.

Methods: Five patients with intermediate age-related macular degeneration and without RPD (AMD group; mean ± SD age 78.0 ± 4.7 years) and seven with RPD (RPD group; age 74.1 ± 11.2 years) were supplemented with 16,000 IU of vitamin A palmitate for 8 weeks. Assessment at baseline, 4, 8, and 12 weeks included scotopic thresholds, dark adaptation, best-corrected and low luminance visual acuities, and the low-luminance quality of life questionnaire.

Results: In the linear mixed model, rod intercept time improved significantly in the AMD group (mean [95% CI] change -1.1 minutes [-1.8; -0.5] after 4 weeks ($P < 0.001$) and -2.2 min [-2.9 to -1.6] after 8 weeks of vitamin A supplementation ($P < 0.001$). The dark adaptation cone plateau also significantly improved (i.e., more sensitive cone threshold) at 4 and 8 weeks ($P = 0.026$ and $P = 0.001$). No other parameters improved in the AMD group, and there was no significant improvement in any parameter in the RPD group despite significantly elevated serum vitamin A levels measurable in both groups after supplementation ($P = 0.024$ and $P = 0.013$).

Conclusion: Supplementation with 16,000 IU vitamin A, a lower dose than used in previous studies, partially overcomes the pathophysiologic functional changes in AMD eyes. The lack of improvement in the RPD group may indicate structural impediments to increasing vitamin A availability in these patients and/or may reflect the higher variability observed in the functional parameters for this group.

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Retinal Artery Angles in High Axial Myopia and Its Relationship With Visual Function

Liang J, Xie T, Chen L, Huang C, Wei P, Li P, Liu K, Zou Z, Fang D, Zhang S

Purpose: To evaluate the retinal artery angles in high axial myopia and assess the correlation with other morphometric and functional parameters.

Methods: This cross-sectional study included 112 eyes of 112 patients with high axial myopia. Based on axial length (AL), the participants were divided into three groups: group 1 ($26 \leq AL < 28$ mm), group 2 ($28 \leq AL < 31$ mm), and group 3 (≥ 31 mm). Scanning laser ophthalmoscopy imaging was used to analyze the retinal artery angle (Yugami correlated angle [YCA]). Retinal vascular densities (VDs) in both superficial capillary plexuses (SCPs) and deep capillary plexuses were evaluated. Fixation behavior, including retinal mean sensitivity (MS), macular fovea 2°, 4° fixation rate (P1, P2), and 68.2% bivariate contour ellipse area, were analyzed by microperimetry. Finally, the correlation between YCAs and AL, VDs, best-corrected visual acuity (BCVA), and fixation behavior was assessed.

Results: The YCAs showed significant differences among the three groups (all $P < 0.001$, respectively). Compared to group 1, the YCA decreased in group 2 ($P < 0.001$) and continued to decrease in group 3 ($P = 0.043$). The correlation analysis revealed that smaller YCAs (YCA, YCA1/2, YCA1/4) were positively correlated with the longer AL ($\rho = 0.580, 0.545, 0.448$, $P < 0.001$) and lower VDs in any sector in SCPs (all $P \leq 0.05$). Furthermore, smaller YCAs were positively correlated with decreased BCVA ($\rho = 0.392, 0.387, 0.262$; all $P < 0.001$) and reduced MS ($\rho = 0.300, 0.269, 0.244$; all $P < 0.05$).

Conclusion: Smaller YCAs were correlated with longer AL, lower VD in SCP, decreased BCVA, and reduced MS. The YCAs might reflect vascular deformation caused by axial elongation and could potentially be useful in predicting visual function in high axial myopia.

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Changes of optical coherence tomographic hyperreflective foci in Rhegmatogenous retinal detachment patients after successful surgery

Wu M, Chen L, Lin L, Fan Y, Li H, Lian H, Zheng B

Purpose: To assess the changes of hyperreflective foci (HRF) in rhegmatogenous retinal detachment (RRD) patients after successful reattachment surgery.

Methods: Twenty-nine macula-off RRD eyes with successful reattachment surgery were retrospectively analyzed. Optical coherence tomography (OCT) was used to image macular regions and measure HRF in outer retina and inner retina at 0.5, 1, 3, 6, 12 months after surgery. The relationships between HRF and photoreceptor layer status, visual outcomes were evaluated.

Results: After retinal reattachment, HRF mainly distributed at the location where external limiting membrane (ELM) or inner and outer segment (IS/OS) line was disrupted. The HRF numbers in outer and inner retina were greater in eyes with discontinuous IS/OS line than eyes with continuous IS/OS line (all $p<0.05$). In the outer retina, HRF increased in the initial three months after retinal reattachment, and then decreased gradually after 3 months ($p<0.05$). The HRF number in the outer retina at postoperative 0.5 months was associated with favourable visual outcomes at 6 and 12 months ($r=-0.487$, $p=0.025$; $r=-0.626$, $p=0.005$, respectively), nevertheless, the HRF number at 3 months was correlated with poor visual results at 6 and 12 months ($r=0.441$, $p=0.017$; $r=0.477$, $p=0.019$, respectively).

Conclusion: HRF mainly occurred near the site where ELM or IS/OS line was injured after retinal reattachment. In the outer retina, the number of HRF gradually increased in the first 3 months and then gradually decreased. The early appearance of HRF in the outer retina was associated with a good visual prognosis, while the late appearance may suggest a less favorable visual outcome.

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The Effect of Post-Coronavirus Disease 2019 Infection on the Retinal Microvasculature

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Purpose: To evaluate the short-term microvasculature changes of the macula and optic disc following coronavirus disease 2019 (COVID-19).

Methods: This study included 150 eyes (50 eyes of healthy controls and 100 eyes of patients) during the 1st month following COVID-19 recovery, as evidenced by two negative polymerase chain reactions. A complete ophthalmic examination and optical coherence tomography angiography were performed to detect the deep and superficial macular vessel density (VD). In addition, the VD of the optic disc was evaluated.

Results: Deep VD (DVD) showed a statistically significant decrease in post-COVID-19 patients, particularly those with severe COVID-19. This reduction occurred in the whole image, parafoveal, and perifoveal VD ($P = 0.002$, $P = 0.002$, and $P < 0.001$, respectively). Concerning the superficial VD (SVD), only the superior hemisphere of the whole image density was statistically significantly reduced ($P = 0.037$). There was no statistically significant difference in foveal VD (both deep and superficial vessel) among the study groups ($P = 0.148$ and $P = 0.322$, respectively). Regarding the foveal avascular zone (FAZ), there was no statistically significant among groups ($P = 0.548$). Regarding the optic disc, the whole image VD and redial peripapillary capillary VD demonstrated a highly significant decrease, particularly in cases of severe COVID-19. Conversely, inside disc VD showed a nonsignificant change among the study groups.

Conclusion: According to the findings of the current study, retinal microvasculature was affected in the 1st month following recovery from COVID-19. DVD was significantly reduced more than SVD. In addition, peripapillary VD decreased, whereas the FAZ was unaffected.

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5) Alzheimers Dement 2023 Aug 23

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Thinner inner retinal layers are associated with lower cognitive performance, lower brain volume, and altered white matter network structure-The Maastricht Study

van der Heide FCT, Steens ILM, Limmen B, Mokhtar S, van Boxtel MPJ, Schram MT, Köhler S, Kroon AA, van der Kallen CJH, Dagnelie PC, van Dongen MCJM, Eussen SJPM, Berendschot TTJM, Webers CAB, van Greevenbroek MMJ, Koster A, van Sloten TT, Jansen JFA, Backes WH, Stehouwer CDA.

Background: The retina may provide non-invasive, scalable biomarkers for monitoring cerebral neurodegeneration.

Methods: We used cross-sectional data from The Maastricht study (n = 3436; mean age 59.3 years; 48% men; and 21% with type 2 diabetes [the latter oversampled by design]). We evaluated associations of retinal nerve fiber layer, ganglion cell layer, and inner plexiform layer thicknesses with cognitive performance and magnetic resonance imaging indices (global grey and white matter volume, hippocampal volume, whole brain node degree, global efficiency, clustering coefficient, and local efficiency).

Results: After adjustment, lower thicknesses of most inner retinal layers were significantly associated with worse cognitive performance, lower grey and white matter volume, lower hippocampal volume, and worse brain white matter network structure assessed from lower whole brain node degree, lower global efficiency, higher clustering coefficient, and higher local efficiency.

Discussion: The retina may provide biomarkers that are informative of cerebral neurodegenerative changes in the pathobiology of dementia.

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Retinal Optical Coherence Tomography Features Associated With Incident and Prevalent Parkinson Disease

Wagner SK, Romero-Bascones D, Cortina-Borja M, Williamson DJ, Struyven RR, Zhou Y, Patel S, Weil RS, Antoniades CA, Topol EJ, Korot E, Foster PJ, Balaskas K, Ayala U, Barrenechea M, Gabilondo I, Schapira AH, Khawaja AP, Patel PJ, Rahi JS, Denniston AK, Petzold A, Keane PA; for UK Biobank Eye & Vision Consortium.

Purpose: Cadaveric studies have shown disease-related neurodegeneration and other morphological abnormalities in the retina of individuals with Parkinson disease (PD), however it remains unclear whether this can be reliably detected with in vivo imaging. We investigated inner retinal anatomy, measured using optical coherence tomography (OCT), in prevalent PD and subsequently assessed the association of these markers with the development of PD using a prospective research cohort

Methods: This cross-sectional analysis used data from two studies. For the detection of retinal markers in prevalent PD, we used data from AlzEye, a retrospective cohort of 154,830 patients aged 40 years and over attending secondary care ophthalmic hospitals in London, UK between 2008 and 2018. For the evaluation of retinal markers in incident PD, we used data from UK Biobank, a prospective population-based cohort where 67,311 volunteers aged 40-69 years were recruited between 2006 and 2010 and underwent retinal imaging. Macular retinal nerve fibre layer (mRNFL), ganglion cell-inner plexiform layer (GCIPL), and inner nuclear layer (INL) thicknesses were extracted from fovea--centred OCT. Linear mixed effects models were fitted to examine the association between prevalent PD and retinal thicknesses. Hazard ratios for the association between time to PD diagnosis and retinal thicknesses were estimated using frailty models.

Results: Within the AlzEye cohort, there were 700 individuals with prevalent PD and 105,770 controls (mean age 65.5 ± 13.5 years, 51.7% female). Individuals with prevalent PD had thinner GCIPL (-2.12 µm, 95% confidence interval: -3.17, -1.07, $p = 8.2 \times 10^{-5}$) and INL (-0.99 µm, 95% confidence interval: -1.52, -0.47, $p = 2.1 \times 10^{-4}$). The UK Biobank included 50,405 participants (mean age 56.1 ± 8.2 years, 54.7% female), of whom 53 developed PD at a mean of 2653 ± 851 days. Thinner GCIPL (hazard ratio: 0.62 per standard deviation increase, 95% confidence interval: 0.46, 0.84, p=0.002) and thinner INL (hazard ratio: 0.70, 95% confidence interval: 0.51, 0.96, p=0.026) were also associated with incident PD.

Discussion: Individuals with PD have reduced thickness of the INL and GCIPL of the retina. Involvement of these layers several years before clinical presentation highlight a potential role for retinal imaging for at-risk stratification of PD.

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