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NEWSLETTER OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

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A HAPPY NEW YEAR TO ALL!

IRGCVD NEWS

1993 IRGCVD Symposium in Tübingen

An information pack is enclosed with this issue which gives details for registration, accommodation and the submission of abstracts. Kindly make a note of the various datelines which apply.

This issue contains:

- 1) Information about the Chinese Journal *Eye Science*
- 2) Literature Review
- 3) Information on Optical Society of America publications

Eye Science

The Journal *Eye Science*, which is published by the Zhongshan Ophthalmic Centre at the Sun Yat-sen University of Medical Sciences in Guangzhou, appears quarterly with two issues in Chinese and two in English. Through the good offices of Dr Shi-zhou Huang, Daltoniana now receives complimentary copies of the English language issues and we now have Nos 1 and 3 for Volume 7, 1991 and for Volume 8, 1992.

Some papers in the Journal have been reviewed in Daltoniana 76 and in the present issue. Members may be interested in the contents lists of *Eye Science* which follow.

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Literature Survey

Pattern-reversal electroretinographic acuity in untreated eyes with subfoveal neovascular membranes. D G BIRCH, J L ANDERSON, G E FISH and B F JOST. Invest Ophthalmol Vis Sci, 33: 2097-2104, 1992.

To define further the natural history of visual loss in eyes with age-related macular degeneration (ARMD) complicated by a subfoveal neovascular membrane, pattern-reversal electroretinograms (ERGs) were obtained from patients randomized to no treatment at the Dallas center of the Macular Photocoagulation Study (Texas Retina Associates). Study eyes (n = 20) were tested during the initial visit and at 3-, 6-, and 12-month follow-up visits. Responses were obtained to phase-alternating checkerboards of varying check size. Extrapolation of the best-fit regression line relating to the logarithm of the check size to amplitude was used to determine "retinal" acuity (log MAR). The pattern-reversal ERG acuity rating ($100 - [50 \times \log \text{Mar}]$) was derived for each visit. Pattern-reversal ERG acuity ratings for all patients across visits were correlated significantly with visual acuity ratings derived from the Bailey-Lovie chart ($r = 0.61, P < 0.001$) and inversely related to neovascular membrane area ($r = -0.55, P < 0.001$). During 1 yr of follow-up, pattern-reversal acuity ratings dropped from 53 to 12, corresponding to an average decrease of approximately 0.2 octaves/month. These results suggest that the pattern-reversal ERG, which samples the resolving power of the central 20°, is a sensitive index of visual loss in age-related macular degeneration - The Authors.

Effect of body temperature on threshold for retinal light damage. P J de LINT, D van NORREN and A M W TOEBOSCH. Invest Ophthalmol Vis Sci, 33: 2382-2387, 1992.

Body temperature is known to influence the threshold for retinal light damage, but the magnitude of the effect has varied substantially between previous studies. The purpose of the present study was to establish a quantitative relation between body temperature in the range of 30-42°C and dose of radiation for a just visible change in fundus. Anesthetized pigmented rats were exposed to 380 nm radiation for 10 min. Four intensities were simultaneously presented. Fundusoscopic changes were noted 2-3d after exposure. At 30°C, threshold dose was 6 J/cm²; at 42°C, it was about 1 J/cm². A fair fit to the data could be obtained with a linear regression between log threshold dose and temperature. The slope was -0.067. In an additional experiment, threshold dose at 500 nm and 41°C body temperature was established at 400 J/cm². These results agree with data in monkey and rabbit, but they vary from earlier data in rats that show a slope of -0.8. Exposure time, damage criterion, and the chromophores involved in retinal light damage are possible factors in the discrepancy - The Authors.

Decreased photoreceptor count in human eyes with secondary angle-closure glaucoma. S PANDA and J B JONAS. Invest Ophthalmol Vis Sci, 33: 2532-2536, 1992.

Glaucoma has been known to be associated with a loss of retinal ganglion cells and their axons throughout the fundus and a decreased count of photoreceptors and retinal pigment epithelial (RPE) cells in the parapapillary region. This study investigated whether glaucomatous changes of the deep retinal layer occur outside the parapapillary region. The nuclei of the retinal photoreceptors and RPE cells were counted in histologic slides of 23 eyes with painful secondary angle-closure glaucoma resulting from perforating corneal injuries. Fourteen eyes with malignant choroidal melanoma not involving the ciliary body or trabecular meshwork served as the control group. No surgical procedure, including laser treatment, had been performed posterior to the ora serrata. There were no hints of retinal vessel occlusion and localized traumatic retinopathy, historically, ophthalmoscopically, or histologically. Photoreceptor count was significantly lower ($P < 0.05$) in the glaucoma eyes than in the control group. Count of RPE cells did not differ between the two groups. This may indicate that glaucoma can be associated with a loss of photoreceptors. This could be important for psychophysical testing and may point to a more widespread involvement of ocular tissues in glaucoma than believed - The Authors.

The directional reflectance of the retinal nerve fiber layer of the toad. R W KNIGHTON, C BAVEREZ and A BHATTACHARYA. Invest Ophthalmol Vis Sci, 33: 2603-2611, 1992.

Various optical methods for assessing the retinal nerve fiber layer (RNFL) depend on reflected light, but little is known about the characteristics of the RNFL as a reflecting structure. The authors investigated the angular dependence of light reflected by the unmyelinated nerve fibers of the toad eyecup using a small 500-nm light source that could illuminate the retina from various directions and

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a movable low-power microscope that imaged the retina onto a cooled charge-coupled device in a digital camera system. Measured areas had nerve fiber bundles separated by gaps. Therefore, the reflectance of a bundle alone could be determined from the difference in intensity between the bundle and an adjacent gap. The RNFL reflectance showed striking directional dependence; nerve fiber bundles seen when illuminated from one direction disappeared completely when illuminated from another. Light reflected by a bundle was confined to a conical sheet concentric with the axis of the bundle. The apex angle of the cone was twice the angle between the incident light and the bundle axis, and the orientation of the cone changed with the orientation of the RNFL. This behaviour was consistent with the theory of light scattering by cylinders. Therefore, it was concluded that the RNFL reflectance arises from cylindrical structures. These results have clinical significance for imaging the RNFL in the human eye because the apparent intensity of the RNFL will depend, not just on its thickness, but also on its orientation relative to the imaging system - The Authors.

A comparison of photopic and scotopic electroretinographic changes in early diabetic retinopathy. K HOLOPIGIAN, W SEIPLE, M LORENZO and R CARR. Invest Ophthalmol Vis Sci, 33: 2773-2780, 1992.

Previous studies of early diabetic retinopathy have shown that oscillatory potential (OP) amplitudes are reduced in many diabetic patients. OP amplitude is believed to be a more sensitive indicator of the development of future retinopathy than b-wave amplitude of the scotopic electroretinogram (ERG). Because OPs measured to a bright white flash reflect both rod and cone system activity, it is important to compare OP amplitudes to photopic ERG measures as well as scotopic measures in early diabetic retinopathy. In this study, OPs and ERG responses were measured under photopic and scotopic conditions in a group of diabetic patients. Although OPs were reduced in amplitude in the diabetic group, several other parameters of the scotopic and photopic b-waves were impaired. The results indicate that b-wave activity may indicate retinal changes in early diabetic retinopathy in the same manner as the OPs - The Authors.

Psychophysical evidence for post-receptor sensitivity loss in diabetics. V C GREENSTEIN, A SHAPIRO, Q ZAIDI and D C HOOD. Invest Ophthalmol Vis Sci 33: 2781-2790, 1992.

Although numerous reports show that the sensitivity of the S cone system is decreased in diabetic patients, few studies have been directed toward identifying the possible sites of the sensitivity loss. In this study, a psychophysical technique was used to test hypotheses about sites of S cone system sensitivity loss in a group of patients with early diabetic retinopathy. A model of the S cone system was assumed and the experimental conditions were chosen to distinguish between explanations for S cone sensitivity loss at the receptor level from explanations for loss at a post-receptor level. Within the context of the model, the data were consistent with S cone system sensitivity loss occurring at a post-receptor level - The Authors.

Properties of staircase procedures for estimating thresholds in automated perimetry. C A JOHNSON, B C CHAUHAN and L R SHAPIRO. Invest Ophthalmol Vis Sci, 33: 2966-2974, 1992.

The properties of the staircase procedure as applied in automated perimetry were examined. Two computer simulation models were used to vary different test- and patient-related parameters in clinical perimetry. One model was based on the KRAKEN computer simulation program; the other computer simulation was based on stimulus-response data sets from 11 normal subjects. The results were analyzed in terms of efficiency and accuracy. It was found that: (1) in general, there was an efficiency-accuracy trade-off; (2) increases in response fluctuation produced substantially greater errors in threshold estimates; (3) little or no improvements in accuracy were achieved by increasing the number of reversals; (4) the starting position of the staircase relative to the threshold influenced the efficiency of threshold determinations but not their accuracy; (5) a single-response error reduced the efficiency of staircases; (6) the position of a single-response error in a staircase sequence influenced the accuracy and efficiency of the threshold determination; and (7) more than one response error during a staircase sequence always resulted in a marked reduction in accuracy and/or efficiency. Current perimetric strategies appear to be at or near optimal levels, and therefore, strategies in the future may need to depart from a staircase-style procedure to achieve a significant increase in both accuracy and efficiency. Computer simulation studies can provide an effective means of evaluating perimetric test procedures and defining optimum strategies, which then can be verified clinically by subsequent testing in patient populations - The Authors.

Evaluation of a lens opacities classification system II (LOCS II) in the survey population-based sample. JINGJING XU, QIANG YU, SIPING ZHU and SHAOZHEN LI. Eye Science, 7 (3): 140-143, 1991.

In the field work of population-based research, 3 groups of eyes were graded by 2 observers in LOCS II. The reproducibility of LOCS II was evaluated by agreements (85% - 100%) and k values (0.661-1) obtained in our study. The satisfying results show that LOCS II is not only easy to be learned and to be applied consistently by different observers, but also good reproducibility in the field work. The longitudinal cataract study is going to be performed in our plan - The Authors.

Spectral characteristics of electroretinogram in X-linked dichromats - a preliminary study. NONG TIAN, DE-ZHENG WU, SHI-ZHOU HUANG and JIONG-JI LIANG. Eye Science, 7 (3): 146-151, 1991.

Spectral characteristics of X-linked Dichromats (13 protanopes, 20 deuteranopes) were studied with spectral ERG. The results are as follows: the maximal spectral response of the b-wave in protanopes tended to shift toward the short wavelength side and the sensitivity to long wavelengths decreased obviously. The ratio value of the amplitude in 500 nm and in 620 nm (500/620) was greater in te protanope than that in the normal subject. Like the normals, the maximal response of the b-wave in deuteranopes appeared at 550-570 nm. Though the differences between the normals and deuteranopes in the ratio values (600/620 and b/a at 520 nm) were found by means of analysing a, b wave responses at each wavelength, most of the ratio values (600/620 or b/a at 520 nm) overlapped between the normals and deuteranopes. We established the discriminant function or score made up by the combination of two ratios basing on Fishers's rule, which can raise the diagnostic rate for deuteranopes - The Authors.

Quantitative evaluation of flicker ERG waveforms in low vision patients. DE-ZHENG WU, JIONGJI LIANG, LEZHENG WU, TAIQING LUO and MINZHONG YU. Eye Science, 8 (3): 122-125, 1992.

Flicker electroretinograms (FERGs) of 30 Hz were recorded for 46 eyes (23 cases) of low vision, including 38 eyes with retinal diseases and 8 eyes with optic neuropathy, and for 39 normal eyes (33 cases). The recorded wave forms were analysed by two methods: (1) to measure the peak to peak amplitude and pseudophase directly, and (2) to measure the amplitude and phase of fundamental response component (30 Hz) by discrete Fourier transform (DFT). The abnormality ratios between these two methods were compared in low vision patients. All the eyes with optic neuropathy showed normal flicker ERG, the abnormality ratios of directly measured amplitude and the amplitude by DFT were 60.9% in 28 eyes and 71.7% in 33 eyes with retinal diseases respectively, the difference being not statistically significant ($P > 0.05$), while the abnormality ratios of directly measured pseudo-phase and the phase by DFT were 60.9% in 28 eyes and 82.6% in 38 eyes with retinal diseases respectively, the difference being statistically significant ($P < 0.05$). These results suggest that FERGs are an objective way to test the retinal function, and DFT for flicker ERGs are more useful in quantitative evaluation of the retinal function - The Authors.

The spectral VEP in normal subjects and dichromats. SHIZHOU HUANG, DE-ZHENG WU, LEZHENG WU and JIONGJI LIANG. Eye Science, 8: 126-130, 1992.

The spectral VEP in 13 normal subjects (25 eyes), four cases (8 eyes) of protanopes and 8 cases (15 eyes) of deuteranopes were tested. In normal subjects, the shortest latencies of N1, P1, N2 were in 560 nm and the greatest amplitudes of N1-P1 and P1-N2 were in 560-570 nm, around which the latencies were delayed and the amplitudes were decreased as the wave-lengths of stimulative light increased or decreased gradually. The spectral VEP pattern of deuteranopes was similar to the normal subjects. In the protanopes, the shorter latencies of N1, P1, N2 and greater amplitudes of N1-P1, P1-N2 appeared in 520-530 nm and 570 nm, forming the two-troughs and two-peaks shapes, with the shortest latencies and the greatest amplitudes in 520-530 nm. There were statistically significant differences of amplitudes and/or latencies in some wavelengths between the protanopes and normals and between the deuteranopes and normals - The Authors.

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