# Studies performed on Metrovision's products - 2016 -

**Patrick Kim, MD and Sung Yong Park**

# Correlation between Quantification of Metamorphopsia and Optical Coherence Tomography Findings in Patients with Epiretinal Membrane

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## Purpose

To investigate the quantification of metamorphopsia with a novel method that uses MonPackONE (Metrovision, Perenchies, France) and to compare the relationship between metamorphopsia score and spectral-domain optical coherence tomography (SD-OCT) findings in patients with epiretinal membrane (ERM).

## Methods

This study included 37 eyes of 35 patients with idiopathic ERM. We examined the patients using SD-OCT and quantified the degree of metamorphopsia using the MonPackONE. On the topographic map of the Early Treatment Diabetic Retinopathy (ETDRS) grid, central retinal thickness at the fovea (1 mm), and parafovea (3 mm) was measured with the SD-OCT software. The correlation between these factors was analyzed. We repeated the metamorphopsia test twice in 22 eyes of 11 healthy subjects in order to calculate intraclass correlation coefficients (ICCs) and evaluate the reproducibility and reliability of the new metamorphopsia test.

## Results

On the ETDRS grid, the retinal thickness (μm) of the central, superior, inferior, nasal, and temporal subfields was 495 ± 102, 428 ± 98, 454 ± 78, 434 ± 83, and 463 ± 95, respectively. The mean total metamorphopsia score was 24.8 ± 13.9, while those for the superior, inferior, nasal, and temporal subfields were 14.7 ± 9.1, 15.1 ± 8.6, 15.9 ± 8.9, and 14.6 ± 8.6, respectively. Linear regression analysis revealed that total metamorphopsia score was significantly related to central retinal thickness ($p = 0.01$). Moreover, each subfield of parafoveal retinal thickness positively correlated with metamorphopsia subfield score ($p < 0.01$–$0.023$). The ICCs for the metamorphopsia tests of the healthy individuals showed almost perfect repeatability (>0.9) in all subfields.

## Conclusions

The degree of metamorphopsia in ERM could be quantified objectively on each subfield using the MonPackONEmetamorphopsia test. The degree of metamorphopsia significantly correlated with retinal thickness measurements based on SD-OCT.

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## MonPackONE and multiple sclerosis

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Acta Ophthalmologica Volume 94, Issue S256 2016
abstracts from European Association for Vision and Eye Research Conference (EVER), Nice, October 2016

### Purpose
To asses visual function in patients with Multiple Sclerosis (MS) using the new device MonPack One visual stimulator (Metrovision, France).

### Methods
Forty eight eyes from relapsing-remiting MS patients and forty six eyes from controls were included. Disease duration, ophthalmic outbreaks and type of treatment were assessed. All patients underwent visual function evaluation using MonPack One visual stimulator. The protocol consisted of psychophysical tests (low contrast 10% ETDRS visual acuity -VA-, contrast sensitivity [1, 2, 5, 10, 20 cycles per degree], FAST 30 static visual field, and electrophysiological testing (pattern electroretinography-ERG-, multifocal reversal visual evoked potential -VEP-)

### Results
A statistically significant decrease was observed in the MS group compared with controls in low contrast 10% VA (0.08 ± 0.27 vs. 0.43 ± 0.50, respectively), well-read number letters (39.70 ± 5.58 vs. 31.90 ± 8.20), low (0.5 and 1 cpd; $p < 0.05$) and medium spatial frequencies (2 and 5 cpd; $p < 0.05$) in contrast sensitivity, in all visual field parameters and central (1,556.81 ± 1,120.97 vs. 798.80 ± 585.58 nV/deg$^2$) inferior nasal (798.50 ± 390.14 vs. 523.90 ± 262.71) and inferior temporal (830.40 ± 380.09 vs. 677.55 ± 730.19) sectors of the multifocal VEP. No differences were found in pattern ERG.

### Conclusions
MonPack One visual stimulator allowed the study of visual function in a controlled and protocolarized way. MonPack One detected low contrast visual acuity, contrast sensibility, visual field, and multifocal visual evoked potential alterations in patients with MS.

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## Birdshot Retinochoroidopathy: Prognostic Factors of Long-term Visual Outcome

American Journal of Ophthalmology, Volume 170, October 2016, Pages 190–196

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# Purpose
To determine the prognostic factors of long-term visual outcome in birdshot retinochoroidopathy (BRC).

# Methods
DESIGN: Retrospective case series. STUDY POPULATION: Successive HLA-A29+ BRC patients whose latest visit was between May and August 2013 at a single tertiary center (Pitié-Salpétrière Hospital, Paris). OBSERVATION PROCEDURE: Endpoint visual status (remission or deterioration) was determined for each patient based on clinical and ancillary data from the latest visit including optical coherence tomography (OCT), automated visual field (AVF), and angiograms. MAIN OUTCOME MEASURE: Epidemiologic, clinical, OCT, AVF, angiographic, and electrophysiological data at baseline were correlated to final visual status.

# Results
Fifty-five patients were included. Mean observation period was 8 years (range: 0.6-23 years). Mean disease duration was 9.8 years (range: 1.2-32.7 years). Female-to-male sex ratio was 1.6:1. Factors of good visual prognosis (remission vs deterioration) included at baseline: late age of disease onset (49.5 vs 45 years, *P* = .05), presence of vitreous inflammatory reactions >2+ (35.9% vs 6.2%, *P* = .04), vascular leakage on fluorescein angiograms (FA) (44.4% vs 12.5%, *P* = .03), absence of macular pigment epithelium atrophy on FA (88.9% vs 62.5%, *P* = .05), and presence of macular edema on OCT (33.3% vs 6.2%, *P* = .04). Preserved electrooculography light peak and Arden ratio (*P* = .06) and presence of choroidal spots on infracyanine green angiograms (80.0% vs 53.3%, *P* = .08) seemed associated with the best prognoses.

# Conclusion
This study suggests a series of prognostic factors of long-term visual outcome in BRC. Keeping in mind the insidious evolution of the disease, knowledge of such prognostic factors should help tailor the treatment and monitoring of birdshot patients

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## Analysis of macular sensitivity using multifocal electroretinogram and microperimetry in central serous chorioretinopathy patients after half-dose photodynamic therapy

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### Purpose
To evaluate macular functional changes using multifocal electroretinography and microperimetry after half-dose photodynamic therapy with verteporfin (HD-PDT) in acute and chronic central serous chorioretinopathy (CSC) patients

### Methods
The charts of 101 CSC patients submitted to half-dose PDT were reviewed. A total of 117 eyes with acute or chronic CSC underwent half-dose PDT using 3 mg/m$^2$ verteporfin infused over 10 min. Serial recordings of BCVA using the ETDRS charts, macular thickness using OCT and retinal sensitivity using both microperimetry (MP) and mfERG were performed at baseline and at 3, 6, 12, 18, 24, 36, 48, 60 and 72 months after treatment. A longitudinal assessment for each of these parameters and a Spearmen's correlation analysis between them was performed.

### Results
Compared to baseline, a significant increase in N1, P1 and N2 mean amplitudes was registered after HD-PDT, as well as a significant decrease in N1, P1 and N2 mean implicit times, both for central and peripheral rings. A correlation analysis showed significant correlations between BCVA and the first-order component of retinal response for the most central ring (<2°). Significant correlations were also found between P1 implicit time and mean central macular thickness both at 36 ($p = 0.030$) and 72 months ($p = 0.037$). Central 4 degrees retinal sensitivity significantly correlated with N1 amplitude ratio at 72 months ($p < 0.01$) and P1 implicit time differences at 6 ($p = 0.013$) and 12 months ($p = 0.014$).

### Conclusions
mfERG demonstrated an increased retinal sensitivity in PDT-treated CSC patients. Changes in BCVA, central macular thickness and central retinal sensitivity significantly correlated with the mfERG responses. HD PDT treatment improved both structural and functional outcomes and mfERG is an important objective parameter to evaluate functional changes in follow-up.

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# Relation of visual field defect with pupil in patients with primary open angle glaucoma

Guoji Yanke Zazhi(Int Eye Sci) 2016;16(8):1498-1500

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## Aim

To evaluate the pupil light reflex in patients with primary open angle glaucoma, and to investigate the relation between pupil and visual field defect.

## Methods

From July 2014 to October 2015, 115 eyes in 86 patients with primary open angle glaucoma and 23 eyes in 16 healthy individuals were continuously enrolled in this study. All the subjects received comprehensive eye examination, visual field examination (Humphrey, SITA Standard 24 - 2) and dynamic pupil measurement (MonCV3 Metrovision). According to the visual field and the Glaucoma Staging System, the patients with glaucoma were divided into 5 subgroups: stage 1, stage 2, stage 3, stage 4 and stage 5. The parameters of pupillary light reflex were as follows: pupil diameter ( minimum, maximum ), latency and duration of contraction, latency and duration of dilatation, contraction amplitude, contraction and dilatation speed, and percent of pupil contraction ( PPC ). SPSS 19. 0 statistical software was used to analyze the measurement results.

## Results

The control group significantly differed from the stage 4 subgroup (P = 0. 032) and stage 5 subgroup (P = 0. 014) in terms of minimum pupil diameter; there was significant difference in the pupil contraction speed between groups ( F = 648. 675, P < 0. 01 ), and the contraction speed in stage 5 subgroup was significantly lower than those in the other subgroups and control group (P< 0. 05); the control group significantly differed from the stage 3, stage 4, and stage 5 subgroup in terms of PPC ( P < 0. 05 ). Pupil contraction speed, PPC and minimum diameter showed correlation with the stages of glaucoma.

## Conclusion

Pupil contraction ability in patients with primary open angle glaucoma was impaired, and the degree of impairment is related with the degree of visual field defect.

**M. Bouladi, R. Bouraoui, R. Limaiem, N. Chaker, F. Mghaieth, L. El Matri**

## Combination of global electroretinogram and sd-oct in the etiology of infantile nystagmus

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Acta Ophthalmologica Volume 94, Issue S256 2016
abstracts from European Association for Vision and Eye Research Conference (EVER), Nice, October 2016

### Purpose
To study the combination of global electroretinogram (ERG) and SD-OCT in the etiology of infantile nystagmus.

### Methods
Sixteen children with infantile nystagmus, and no evident etiology in the normal ophthalmic examination underwent ERG with ISCEV guidelines and SD-OCT.

### Results
Median age was 8.7 ± 2.9 years (3.4–14.6 years). ERG and SD-OCT were both normal in 6 children. In 9 children, ERG showed cone dysfunction and OCT allowed differentiation between achromatopsia in 4 children and cone dystrophy in 5 children. Two children had rod and cone dysfunction in ERG and OCT was normal. Dysfunction in inner-layer retina was found in one child who had X-linked juvenile retinoschisis diagnosed with OCT.

### Conclusions
ERG is useful in the etiologic diagnosis and prognosis of infantile nystagmus. Its combination with SD-OCT allows better characterization of the etiology of nystagmus especially in diseases involving the macula which may guide molecular study, help performing genetic counseling, and facilitate future gene therapy.

**M. Bouladi, R. Bouraoui, R. Limaiem, N. Chaker, F. Mghaieth, L. El Matri**

# Onset-offset visual evoked potentials in the diagnosis of ocular albinism in infantile nystagmus

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Acta Ophthalmologica Volume 94, Issue S256 2016
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## Purpose

To study the contribution of onset-offset visual evoked potentials (VEP) in the diagnosis of ocular albinism in infantile nystagmus.

## Methods

Case report.

## Results

Observations: Two girls aged respectively three-year old and six-year old presented with infantile nystagmus. Ophthalmic examination showed visual acuity of 2/10 bilaterally, a brown iris, with positive transillumination and depigmented fundus without any other depigmentation of skin or hair. Flash VEP showed probable crossed asymmetry of P2 amplitude. P100 wave was unrecordable in 60' Pattern VEP. 60' onset-offset VEP were performed and showed evident crossed asymmetry in C1 and C2 waves which confirmed the diagnosis of ocular albinism. SD-OCT was also performed and showed foveal hypoplasia.

## Conclusions

Ocular albinism is more difficult to diagnose than the oculo-cutaneous albinism since it is limited to ophthalmic manifestations. Onset-offset VEP are very useful in nystagmus patients because they are less sensitive to ocular oscillations and showed more evident crossed asymmetry than flash or pattern VEP.

**J. Charlier**

# Comparison of multifocal pattern ERG responses to luminance and chromatic contrast stimulations

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Acta Ophthalmologica Volume 94, Issue S256 2016
abstracts from European Association for Vision and Eye Research Conference (EVER), Nice, October 2016

## Purpose

To evaluate the relationship between ganglion cells properties and responses obtained with multifocal pattern ERG.

## Methods

6 normal subjects were tested with 3 types of multifocal ERG stimulations: standard flash, pattern reversal with luminance contrast (black / white) and pattern reversal with chromatic contrast (red / green). The amplitude density and implicit times (ms) of responses were evaluated as a function of eccentricity with respect to fixation.

## Results

The amplitude density of responses was much smaller for pattern reversal stimulations than for flash stimulations with a ratio of 2.5 at the fovea (57 nV/deg2 vs. 146 nV/deg2) and 13 at 15 degrees of eccentricity (3.2 nV/deg2 vs. 43 nV/deg2). The responses to chromatic contrast were significantly delayed in comparison with luminance contrast.

## Conclusions

The variation of amplitude density of multifocal ERG responses with eccentricity was found similar to the variation in density of photoreceptors for flash stimulations and of ganglion cells for pattern stimulations.

**Haydar Gölemez, Nilgün Yıldırım, Ahmet Özer**

# Is multifocal electroretinography an early predictor of glaucoma?

Documenta Ophthalmologica February 2016, Volume 132, Issue 1, pp 27–37

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## Purpose
To investigate the potential use of mfERG as an objective functional test that can express inner and outer retinal changes during the early stages of glaucoma.

## Methods
One hundred and twenty-six eyes of 126 patients were included. There were 30 healthy (Group 1), 28 glaucoma suspect (Group 2), 48 early glaucoma (Group 3), and 20 advanced glaucoma cases (Group 4). After complete ophthalmic examination, Humphrey visual field analysis and mfERG were performed. These examinations were performed three times at 6-month intervals, and only the last examination results were used for the analysis. Visual fields global indices and mfERG implicit time and amplitudes were evaluated and analyzed by ring system (central 5°, 5°–10°, 10°–15° and >15°). One-way ANOVA and ROC curve analysis were used for statistical analysis.

## Results
There was no statistically (one-way ANOVA) significant differences in patient age between groups ($p = 0.126$). For all rings, we detected statistically significant differences for the mean implicit time (latency) of the N1, P1, and N2 components between the advanced glaucoma and control subjects and between the advanced glaucoma and glaucoma suspects. The N2 amplitudes were significantly decreased in all rings in the advanced glaucoma patients when compared with control subjects. The N2 amplitude was significantly different between healthy subjects (Group 1) and early glaucoma subjects (Group 3) in the central 2° and 2°–5° rings. We used MedClac ROC curve analysis to identify the best parameters for discriminating between control subjects (Group 1) and early glaucoma patients (Group 3). The N2 implicit time for the central 2° ring ($p < 0.0001$), N2 amplitude for the central 2° ring ($p = 0.0001$), P1 implicit time for the 2°–5° ring ($p = 0.0001$), N2 implicit time for the 2°–5° ring ($p = 0.0003$), and N2 amplitude for the 2°–5° ring ($p = 0.001$) had ≥0.7 AUC values and were the best parameters in the ROC curve analyses that included the VFA parameters

## Conclusion
Alterations of amplitudes and implicit times of N2 response in the central area may be able to detect glaucoma earlier than VFA. In addition, with progression to advanced glaucoma these changes can be significant in all retinal areas. Although implicit times of all mfERG components are significantly delayed in glaucoma, both delayed implicit time and decreased amplitude of N2 wave in the central area are effective predictors in early glaucoma diagnosis.

**Marion Cuvier, Anne-Charlotte Laporte, Anne-Lise Seyler**

# L'adaptation à l'obscurité

*Revue Francophone d'Orthoptie*, Volume 9, Issue 1, Pages 13-16. 2016

Service d'ophtalmologie, Hôpital Hôtel-Dieu, Paris

## Summary

The darkness adaptation test allows to evaluate one of the aspect of visual function. Even though this exam remains an uncommon practice, it can be used for several indications: to assess someone's capacity for a job, during the driver license test or to complete a checkup prescribed for scotopic vision issues. It is an additional test realized by the orthoptist. It enables to fully assess the patient's complaint and to give essential information for the ophthalmologist to fine tune and diagnose the visual function issue with certainty.

**A. Poujade, E. Le Page, D. Baudet, G. Edanb, B. Mortemousque, F. Mouriaux**

# Rapid improvement in visual function after high-dose oral corticosteroids in patients with inflammatory optic neuropathy

Journal Français d'Ophtalmologie Available online 24 August 2016

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## Purpose
To study the progression of visual acuity and visual function parameters in patients with optic neuritis (ON) treated with high-dose oral corticosteroid therapy.

## Methods
This retrospective descriptive monocentric study included nine patients with ON treated with orally administered methylprednisolone at 1000 mg per day for three to five days. The follow-up visits were performed on day 4 (D4), day 15 (D15), day 30 (D30) and day 90 (D90) after treatment was begun. The initial examination (D0) and the follow-up visits included a visual acuity (VA) assessment according to the Early Treatment Diabetic Retinopathy Study scale, a contrast sensitivity test and a 30.2 automated visual field (Visual Field Index [VFI]). The overall subjective tolerance of the treatment was assessed by patients on a scale from 0 to 10.

## Results
We observed an improvement of all parameters from D4. From D0 to D4, the average VA increased from 40.1 letters to 57.9 letters, the average VFI from 40.9% to 70.3% and the overall average contrast sensitivity from 7.7 dB to 11.3 dB. From D15 to D90, the average VA increased from 77 letters to 80.3 letters, the average VFI from 91.2% to 97.9% and the overall average contrast sensitivity from 15.4 dB to 16.7 dB. Four patients rated tolerance at 10 (excellent), three between 8 and 9, and two at 6.

## Conclusion
We demonstrated rapid improvement of visual function parameters in patients with ON after high-dose oral corticosteroids.

**Farideh Sharifipour, Mohammadreza Razzaghi, Alireza Ramezani, Mohsen Azarmina, Mehdi Yaseri, Roham Soheilian, Masoud Soheilian**

# Systemic oxygen therapy versus oral enalapril for treatment of diabetic macular ischemia: a randomized controlled trial

International Ophthalmology April 2016, Volume 36, Issue 2, pp 225–235

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## Summary

The purpose of this study was to evaluate the structural and functional effects of systemic oxygen therapy and enalapril in patients with diabetic macular ischemia (DMI). This randomized clinical trial consisted of 105 eyes with DMI divided into three groups. Group I received systemic oxygen by face mask at a flow rate of 10 L/min; Group II received 5 mg enalapril daily; and Group III received placebo tablets for 3 months. Best-corrected visual acuity (BCVA), central macular thickness (CMT) measured by optical coherence tomography (OCT), extent of foveal avascular zone (FAZ) on fluorescein angiograms, and electroretinograms (ERG) were obtained at baseline and after 3 and 6 months. Overall, 102 patients completed the study. Baseline characteristics were not significantly different among groups. Significant improvement in BCVA and decrease in CMT and FAZ occurred at months 3 and 6 in oxygen group compared to deterioration in enalapril and control groups (All *P* values <0.001). ERG parameters were significantly better in oxygen group compared to enalapril group at months 3 and 6 and better than those in control group at month 3. Normobaric oxygen therapy for 3 months in DMI decreased CMT and FAZ and improved BCVA and ERG parameters. Enalapril did not show any favorable effect.

**Sepehr Feizi, , Mohammad Ali Javadi, Hossein Mohammad-Rabei**

# An Analysis of Factors Influencing Quality of Vision After Big-Bubble Deep Anterior Lamellar Keratoplasty in Keratoconus

American Journal of Ophthalmology Volume 162, February 2016, Pages 66–73.e2

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## Purpose
To identify causes of reduced visual acuity and contrast sensitivity after big-bubble deep anterior lamellar keratoplasty (DALK) in keratoconus.

## Design
Prospective interventional case series.

## Methods
This study included 36 eyes in 36 patients with keratoconus who underwent DALK using the big-bubble technique. A bare Descemet membrane was achieved in all cases. Univariate analyses and multiple linear regression were used to investigate recipient-, donor-, and postoperative-related variables capable of influencing the postoperative quality of vision, including best spectacle-corrected visual acuity (BSCVA) and contrast sensitivity.

## Results
The mean patient age was 27.7 ± 6.9 years, and the patients were followed for 24.6 ± 15.1 months postoperatively. The mean postoperative BSCVA was 0.17 ± 0.09 logMAR. Postoperative BSCVA ≥20/25 was achieved in 14 eyes (38.9%), whereas a BSCVA of 20/30, 20/40, or 20/50 was observed in 15 eyes (41.7%), 6 eyes (16.6%), and 1 eye (2.8%), respectively. Preoperative vitreous length was significantly associated with postoperative BSCVA (β = 0.02, *P* = .03). Donor-recipient interface reflectivity significantly influenced scotopic (β = −0.002, *P* = .04) and photopic (β = −0.003, *P* = .02) contrast sensitivity. The root mean square of tetrafoil was significantly negatively associated with scotopic (β = −0.25, *P* = .01) and photopic (β = −0.23, *P* = .04) contrast sensitivity. Recipient age, keratoconus severity, donor-related variables, recipient trephination size, and graft and recipient bed thickness were not significantly associated with postoperative visual acuity or contrast sensitivity.

## Conclusion
Large vitreous length, higher-order aberrations, and surgical interface haze may contribute to poor visual outcomes after big-bubble DALK in keratoconus.

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## Characterizing the Retinal Function of Psammomys obesus: A Diurnal Rodent Model to Study Human Retinal Function

Current Eye Research Pages 1-9 Published online: 23 May 2016

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## Purpose
To compare the retinal function of a diurnal murid rodent, *Psammomys obesus*, with that of Wistar albino rat and human subjects.

## Materials and methods
Adult *Psammomys obesus* were captured and transferred to the animal facilities where they were maintained at 25°C with standard light/dark cycles and natural halophilic plants, rich in water and mineral salts. Standard full-field photopic and scotopic electroretinograms were obtained.

## Results
The right eye of all animals displayed well detectable and reproducible scotopic and photopic electroretinogram (ERG) responses. Results were compared with those obtained from human subjects and Wistar rats. ERG measurement showed that the amplitudes of scotopic responses in *Psammomys obesus* are quite similar to those of human subjects. The amplitude of the photopic a-wave was comparable to that of humans and six times higher than that of the albino rat. The amplitudes of photopic b-wave, photopic oscillatory potentials (OPs), and 30 Hz flicker were all markedly larger in *Psammomys obesus* compared to those obtained from human subjects and Wistar rats. Furthermore, like the human photopic ERG, the photopic ERG of *Psammomys obesus* also includes prominent post b-wave components (i.e. i- and d-waves) while the ERG of Wistar rats does not.

## Conclusions
Our results suggest that the retinal function of *Psammomys obesus*, especially the cone-mediated function, shares several features with that of human subjects. We believe that *Psammomys obesus* represents an interesting alternative to study the structure and function of the normal and diseased retina in a human-like rodent model of retinal function

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# A Color Perimetric Test to Evaluate Macular Pigment Density

Optometry & Vision Science: June 2016 - Volume 93 - Issue 6 - p 632–639

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## Purpose

To evaluate differences in measurements of macular pigment optical density (MPOD) in patients with dry age-related macular degeneration (AMD) and a group of healthy patients (control group). Short-term repeatability of MPOD measures was also assessed in the control group.

## Methods

This cross-sectional study included 31 eyes from 31 patients with bilateral dry AMD, 21 eyes from 21 cases with dry AMD in the study eye and exudative AMD in the fellow eye. The control group included 17 eyes from 17 healthy patients of similar age and sex. The MPOD values were measured using a commercially available color perimetry technique (CP). Short-term repeatability of MPOD measurements by the CP technique was assessed in 20 eyes of 20 healthy subjects who were measured 3 times on 3 consecutive days.

## Results

The mean values for MPOD were 5.59 ± 2.06 dB in cases in which both eyes had dry AMD, 5.25 ± 2.72 dB in cases in which one eye had wet AMD and the studied eye had dry AMD, and 5.97 ± 2.14 dB in the eyes of the healthy control group. The mean value was lower in cases in which the fellow eye had wet AMD; however, no significant difference in MPOD was found between the three groups ($p = 0.659$) or between the group with dry AMD in both eyes and the healthy control group ($p = 0.977$). The intraclass correlation coefficient (ICC) value was 0.664 between day 1 and day 2, and 0.822 between day 2 and day 3.

## Conclusions

Our results do not show a direct relation between MPOD and dry AMD. Color perimetry does not provide acceptable short-term repeatability for measuring MPOD. Learning effects may contribute to the measured test-retest variability. Other studies are needed to determine if CP is suitable for repeated measurements during the long term follow-up with the same patient

**Yasin Aydogmus, Salih Uzun, Fatih C. Gundogan, Umit Hidir Ulas, Turgay Ebiloglu, Mustafa Tugrul Goktas**

# Is overactive bladder a nervous or bladder disorder? Autonomic imaging in patients with overactive bladder via dynamic pupillometry

World J Urol (2016). Published online 16 June 2016

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## Purpose

To evaluate the changes in dynamic pupillometry in patients with idiopathic overactive bladder (OAB).

## Methods

The study included 40 female patients with idiopathic OAB and 40 healthy female volunteers as a control group. Demographic and clinical data were recorded. Dynamic pupillometric parameters were measured with a commercially available unit (MonPack One, Metrovision, France) at baseline and on the 30th day of treatment with an antimuscarinic treatment (drug-agent) (solifenacin 5 mg daily). Initial, minimum, maximum and mean pupil diameters, the latency and duration of contraction and dilatation of the pupil, the amplitude of contraction and dilatation velocity were automatically measured and compared between the groups.

## Results

There were no significant differences between two groups with respect to age and body mass index ($p$ = 0.288, 0.755, respectively). The measurements of initial, minimum and mean pupil diameters were significantly lower in patients with OAB compared to healthy controls ($p$ = 0.007, 0.002, 0.001, respectively). OAB patients had significantly longer latency of pupil dilatation, latency of pupil contraction and shorter duration of pupil contraction than control group ($p$ = 0.028, 0.029, 0.021, respectively). After the antimuscarinic treatment, latency of pupil contraction, latency of pupil dilatation and duration of pupil contraction shortened significantly (all $p < 0.001$). Pupil dilatation velocity increased significantly during the treatment ($p < 0.001$).

## Conclusions

The dynamic pupillometric findings in this study imply impaired autonomic dysfunction, mostly the increased parasympathetic action, in OAB patients and the modulatory effects of antimuscarinic treatment.

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# Transient Retinal Dysfunctions after Acute Cannabis Use

Eur Addict Res 2016; 22:287-291

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## Abstract

Although cannabis is very widespread worldwide, the impact of cannabis on visual function remains poorly understood. This is partly due to numerous difficulties met in developing clinical studies in cannabis users. Here, we report the first documented case of neuroretinal dysfunction after acute cannabis smoking. This observation was favored by the need of an annual ophthalmic evaluation in the context of a chloroquine intake for a systemic lupus erythematosus in a 47-year-old heavy cannabis user. A complete ophthalmic evaluation including visual acuity tests, intraocular pressure, fundoscopic examination, automated 10° central visual field, full-field electroretinogram (ERG) and multifocal ERG was performed twice - 30 min and 5 h after cannabis smoking. A strong decrease (up to 48%) in the a-wave amplitude of the full-field ERG was measured 30 min after cannabis smoking for all scotopic responses compared with the responses 5 h after smoking. Other tests showed reproducible results between the 2 series of measurements. This clinical case suggests that acute inhalation of cannabis affects the photoreceptors functioning. This rare situation suggests further investigations are required on the impact of cannabis on retinal processing, especially since cannabis has been incriminated in car injuries.

**Jyoti Matalia, Vimal K. Rajput, Geetanjali J. Chillal, Bhujang K. Shetty**

# Upbeat nystagmus in a 3.5-year-old boy

Journal of American Association for Pediatric Ophthalmology and Strabismus Volume 20, Issue 1, February 2016, Pages 88–90

Department of Pediatric Ophthalmology, Narayana Nethralaya-2, Bengaluru, India

## Abstract

Upbeat nystagmus is usually a central vestibular nystagmus attributable to structural brainstem or cerebellar lesions. Adult-onset upbeat nystagmus calls for a thorough neurological evaluation. In children, however, it can occur as a transient phenomenon in healthy neonates or as a sensory form of nystagmus that usually transforms into horizontal nystagmus by 2 years of age. We report the case of 3.5-year-old boy with upbeat nystagmus. His ocular examination was within normal limits. Neurological evaluation was normal. Optical coherence tomography testing and Electroretinogram confirmed cone dysfunction. Over the next 6 months the upbeat nystagmus converted to horizontal nystagmus

## S. Okutuku, M. Civelekler, C. Sabanoglu, M. Aparci
## Assessment of the relationship between dynamic pupillometry and exercise heart rate recovery among healthy subjects

European Review for Medical and Pharmacological Sciences 2016; 20: 1344-1349

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### Objective
Dynamic pupillometry (DP) is a simple, non-invasive computerized technique for assessment of pupillary light response which provides data concerning the balance of both branches of the autonomous nervous system (ANS). Heart rate (HR) recovery (HRR) after graded exercise reflects cardiac autonomic activity and predicts cardiovascular events. In this study, we aimed to evaluate the utility of DP as a predictor of cardiac autonomic activity assessed by HRR.

### Patients and methods
A total of 62 consecutive healthy subjects (mean age = 33.7 ± 8.6 years, 39 males and 23 females) were enrolled.
Pupil diameters (R0, R1, R2 and R%): latency (Lc), amplitude (Ac), velocity (Vc) and duration of pupil contraction (Tc): latency (Ld), velocity (Vd) and duration of pupil dilatation (Td) were measured in DP. HRR indices were calculated by subtracting 1st (HRR1), 2nd (HRR2) and 3rd (HRR3) minute HR from the maximal HR during treadmill exercise stress test.

### Results
HRR1 was 32.9 ± 8.0 bpm, HRR2 was 55.1 ± 11.6 bpm and HRR3 was 58.3 ± 12.7 bpm, respectively. Correlation analysis revealed significant positive correlations of HRR1 with Vc (r = 0.660, $p$ = 0.001), Ac (r = 0.559, $p$ = 0.001) and Vd (r = 0.412, $p$ = 0.001). HRR had significant negative correlations with Lc (r = -0.442, $p$ = 0.001), R% (r = -0.384, $p$ = 0.002) and Ld (r = -0.286, $p$ = 0.025). Vc [β = 3.995 (1.040 to 6.951, 95% CI, $p$ = 0.009)] and Lc [β = -0.032 (-0.056 to -0.008, 95% CI, $p$ = 0.01)] were found to be significant independent predictors of HRR1.

### Conclusions
Pupillary autonomic functions assessed by DP correlates with cardiac autonomic functions evaluated by HRR. Among the DP parameters analyzed, Vc and Lc were independent predictors of cardiac autonomic functions.

**Chhablani, Jay, Narayanan, Raja, Mathai, Annie, Yogi, Rohit, Stewart, Michael**

## Short-term safety profile of intravitreal ZIV-AFLIBERCEPT

Retina June 2016 - Volume 36 - Issue 6 - p 1126–1131

L V Prasad Eye Institute, Hyderabad, India


### Aim
To evaluate the safety of intravitreal ziv-aflibercept (Zaltrap) in the treatment choroidal neovascularization secondary to age-related macular degeneration.

### Methods
Eligible eyes with choroidal neovascularization secondary to age-related macular degeneration each received a single intravitreal injection of ziv-aflibercept. Comprehensive ophthalmic examinations and detailed systemic evaluations were performed at baseline and Days 1, 7, and 30 after injection, and International Society for Clinical Electrophysiology of Vision standard electroretinography was performed at baseline and Day 30. Primary outcome measures were safety parameters that included signs of clinical and electroretinographic toxicity. Secondary outcome measures included changes in best-corrected visual acuity and central subfield thickness.

### Results
Twelve eyes of 12 patients were treated. None of the patients complained of blurred vision, ocular pain, or bulbar injection at any of the follow-up visits, nor was intraocular inflammation noted. There were no significant differences in implicit times, “a” and “b” wave amplitudes, or b/a ratios at 1 month when compared with baseline ($P = 0.4$). None of the patients experienced serious ocular or systemic adverse events. Mean best-corrected visual acuity improved only slightly at 30 days (LogMAR 0.45 ± 0.31 [Snellen equivalent: 20/60]) compared with baseline (LogMAR 0.37 ± 0.24 [Snellen equivalent: 20/50]; $P = 0.51$).

### Conclusion
Single intravitreal injections of ziv-aflibercept into eyes with neovascular age-related macular degeneration appear to be safe through 1 month. Ziv-aflibercept could become a safe, low-cost therapy for macular diseases in developing countries and in those where intravitreal aflibercept (Eylea) is not available.

**Léa Imbeau, Sadi Majzoub, Alix Thillay, Frederique Bonnet-Brilhault, Pierre-Jean Pisella, Magali Batty**

# Presbyopia compensation: looking for cortical predictors

Br J Ophthalmol. Published online 22 April 2016

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Université François-Rabelais de Tours, INSERM, Imagerie et Cerveau UMR U 930, CHRU de Tours

## Background/aims

New surgical techniques have recently been developed in order to compensate for visual impairment and to improve visual comfort for patients with presbyopia. However, the results are still variable, depending on the correction modality used and/or the patient. The main purpose of this study was to identify predictive electrophysiological markers of post correction visual comfort for patients with presbyopia.

## Methods

Thirteen patients with presbyopia (aged between 45 and 60 years) received successive randomised presbyopia compensation with contact lenses supplying monovision (one eye corrected for distance, the other for near vision) and simultaneous vision (progressive lenses). The period for each type of correction lasted for 3 weeks, with a 2-week break without any presbyopia compensation between the two test phases. Examinations were performed at entry (T0) and after each correction modality (Tmono and Tsimult). They included testing for near and distance visual acuity, stereoacuity, binocular contrast sensitivity and electrophysiological recordings (monocular and binocular visual evoked potentials).

## Results

Follow-up showed no significant differences between the two compensation modalities for either clinical or electrophysiological criteria. However, a significant correlation was found between the difference in TNO score (monovision–simultaneous vision) and the P100 latency evoked by the binocular pattern at T0, suggesting that late P100 latency could be associated with a lesser degree of decrease in stereoacuity with monovision.

## Conclusions

While our findings do not permit decisions regarding the superiority of one type of compensation over another, these preliminary results support using the P100 latency evoked by binocular patterns as a predictor of postcompensation stereoacuity.

**Sefa Dereköy, Fethullah Kenar, Güliz Fatma Yavafl, Tuncay Küsbeci, Faruk Öztürk, Abdullah Ayçiçek**

## The influence of iris color and retina pigment epithelium melanin on allergic rhinitis

ENT Updates 2016;6(1):23–28

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### Objective
The purpose of this case control study is to establish the influence of iris color and retina pigment epithelium melanin on allergic rhinitis.

### Methods
Ninety-nine subjects diagnosed prospectively as allergic rhinitis and 85 control subjects were included in the study. Color of iris was recorded after ophthalmic examination. Electro-oculographic measurement was done after pupil dilatation and Arden ratios were recorded.

### Results
Mean age was 29.44±9.8 years in subject with allergic rhinitis and 32.67±12.9 years in control subjects ($p>0.05$). Measured mean Arden ratio was 158.22±29.4 in subjects with allergic rhinitis and 179.34±29.3 in normal subjects ($p<0.05$). In control group, Arden ratio was significantly higher in eyes with brown iris ($p<0.05$). In subjects with allergic rhinitis, Arden ratio was significantly lower in brown eyes ($p<0.05$).

### Conclusion
An association between allergic rhinitis and melanin content of iris and retina pigment epithelium was found. It can be speculated that pigment-producing system may play a role in the pathogenesis of the allergic rhinitis.

**S Rahimi-Aliabadi, N Daftarian, H Ahmadieh, B Emamalizadeh, J Jamshidi, A Tafakhori, H Ghaedi, R Noroozi, S Taghavi, A Ahmadifard, E Alehabib, M Andarva, P Shokraeian, M Atakhorrami and H Darvish**

# A novel mutation and variable phenotypic expression in a large consanguineous pedigree with Jalili syndrome

Eye , Published online 15 July 2016)

Shahid Beheshti University of Medical Sciences Iran

## Purpose
Jalili syndrome is an autosomal recessive disorder characterized by simultaneous appearance of cone-rod dystrophy (CRD) and amelogenesis imperfecta (AI). Mutations in CNNM4 gene have been identified as the underlying cause of the syndrome. In this study, we investigated a large affected family to identify the causative mutation.

## Patients and Methods
A seven-generation family with 24 members affected with Jalili syndrome were enrolled in the study. Comprehensive ophthalmologic and dental examinations were performed on them. The entire coding region of CNNM4 gene was sequenced for detection of potential mutations.

## Results
Ocular examinations showed nystagmus and photophobia along with early onset visual impairment. Fundoscopic exams revealed a spectrum of macular dystrophies in different family members, from macular coloboma and advanced form of beaten bronze macular dystrophy (bull's eye) to milder form of macular thinning along with a range of pigmentary changes and vascular attenuation in the posterior pole and periphery. Scotopic and photopic electro-retinographic responses (ERGs) were extinguished or significantly depressed. Mutation analysis revealed a novel mutation (c.1091delG) in homozygous form in the patients and as a heterozygous form in the normal carrier subjects.

## Conclusion
We identified a novel homozygous deleterious mutation in CNNM4 gene which causes Jalili syndrome.

**Enzo Maria Vingolo, Carmela Carnevale, Serena Fragiotta, Erika Rigoni, Luca Iacobelli**

## Visual Outcomes and Contrast Sensitivity after Bilateral Implantation of Multifocal Intraocular Lenses with +2.50 or +3.0 Diopter Addition: 12-Month Follow-Up

Seminars in ophthalmology. Published online: 29 Apr 2016

Facoltà di Medicina e Chirurgia I - Università "La Sapienza" di Roma


### Purpose
To evaluate visual acuity and contrast sensitivity after bilateral implantation of AcrySof® IQ ReSTOR® +2.50 D or +3.00 D.

### Methods
A total of 56 eyes with cataract had bilateral implantation of a multifocal IOL. Inclusion criteria were corneal astigmatism less than 1.0 diopters, axial length between 22.0 and 24.0 mm, and no associated ocular disease. Outcome measures recorded 12 months postoperatively were binocular uncorrected and corrected distance, intermediate and near visual acuities, and contrast sensitivity. Postoperative quality of life and patient satisfaction were assessed with the VF-14 Questionnaire.

### Results
Twenty months postoperatively, the mean uncorrected and best-corrected distance visual acuities, UCIVA at 60 cm, and contrast sensitivity were similar in all two groups. UCNVA were better in the +3.00 IOL group than in the +2.50 D group. Patients reported good performance for visual tasks.

### Conclusion
Apodized multifocal IOLs seem a good compromise for non-spectacles life in elderly patients; our study indicates that this solution has a good long-term stability on patients' visual function.

**B.N. Nagesh, Brijesh Takkar, Shorya Azad, Rajvardhan Azad**

# Optical Coherence Tomography and Multifocal Electroretinography in Diabetic Macular Edema: A Neurovascular Relation With Vision

Ophthalmic Surgery, Lasers and Imaging Retina July 2016 - Volume 47 · Issue 7: 626-631

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## Background and objectives

To evaluate retinal neuropathy in patients with diabetic macular edema (DME) with multifocal electroretinograph (mfERG), and to evaluate the simultaneous impact of retinal neuropathy and vasculopathy on visual acuity in subtypes of DME

## Patients and methods

This prospective, controlled, investigative study conducted at a tertiary eye care center of Northern India included 79 eyes of 50 treatment-naïve patients with DME (Group 1), 94 eyes of 50 diabetic patients without diabetic retinopathy (Group 2), and 100 eyes of 100 normal volunteers as controls. Comprehensive ocular evaluation along with mfERG and optical coherence tomography (OCT) were performed for all patients. N1 and P1 mfERG waveforms in the two central-most rings of macula were evaluated for amplitudes and implicit time. OCT was used to sub-classify types of DME and evaluate macular thickness, ellipsoid zone (EZ), and external limiting membrane (ELM) disruption. Best-corrected visual acuity (BCVA) relative to other variables was the primary outcome measure. The three groups were compared for all the parameters inclusive of OCT and mfERG patterns. Further, OCT subtypes of DME were analyzed for mfERG waveform patterns.

## Results

All mfERG values were significantly lower in Group 1 and Group 2 as compared to Group 3 ($P < .05$). BCVA strongly correlated with central macular thickness, EZ, and ELM disruption scores in Group 1 ($P = .001$), but correlated modestly with mfERG waveform amplitudes in Group 1 patients with intact EZ and ELM only. BCVA correlated with mfERG amplitudes in patients with neurosensory detachment, but not in those with cystoid macular edema.

## Conclusion

Neural changes set in before the clinical changes related to vasculopathy manifest in diabetic patients. Neuroretinopathy in patients with DME affects all retinal layers symmetrically in early stages, but impacts the middle retinal layers severely in advanced disease form. BCVA correlates with electrophysiological changes till the time morphological features are visible when stronger correlation is seen with anatomical disruption.

**Elise Donzel, Léa Arti, Sabine Chahory**

# Epidemiology and clinical presentation of canine cataracts in France: a retrospective study of 404 cases

Veterinary Ophthalmology Published online 7 April 2016

Unité de Recherche en Ophtalmologie Vétérinaire, Ecole Nationale Vétérinaire d'Alfort, Université Paris-Est, Maisons-Alfort Cedex, France

## Objective
To determine the epidemiology and the clinical presentation of cataracts in a population of dogs in France.

## Procedures
Records of dogs affected by a cataract presented at the Ophthalmology Unit of Alfort Veterinary School during 2009–2012 were reviewed. The etiology was determined for each dog. The signalment of affected dogs, their medical history, age of onset, stage of progression, location of opacities, and ocular lesions associated were evaluated for each etiology. …
Electroretinography (Métrovision, Perenchies, France) was performed under general anesthesia following a short protocol to evaluate gross retinal function…

## Results
A total of 2739 dogs were presented at the Ophthalmology Unit from 2009 to 2012. Four hundred and four dogs (14.7%) (716 eyes) were diagnosed with a cataract. The population included 218 males (54%) and 185 females (46%). The gender was not recorded for one dog. The mean age (±SD) of all dogs affected by a cataract was 9 years (±3.9 years). Fifty-four breeds were represented. The Yorkshire Terrier was the only breed significantly overrepresented. The causes of cataracts observed were breed predisposition (28%), aging (22.8%), progressive retinal atrophy (12.4%), congenital cataract (5%), diabetes mellitus (4.7%), trauma (3.7%), uveitis (3%), and hypocalcemia (0.2%). In 20.3% of the cases, the etiology could not be determined. Ocular lesions associated with cataracts reported were lens luxation or subluxation (11.1%), glaucoma (3.7%), and retinal detachment (4.2%).

## Conclusions
In a French population of referred dogs, 14.7% were affected by a cataract. The main causes identified were breed predisposition, aging, and progressive retinal atrophy. A breed predisposition for the Yorkshire Terrier was recorded.

**Eren Çerman, Tolga Akkoç, Muhsin Eraslan, Özlem Şahin, Selvinaz Özkara, Fugen Vardar Aker, Cansu Subaşı4, Erdal Karaöz, Tunç Akkoç**

## Retinal electrophysiological effects of intravitreal bone marrow derived mesenchymal stem cells in Streptozotocin induced diabetic rats

PLOS ONE Published online 14 June 2016

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## Abstract

Diabetic retinopathy is the most common cause of legal blindness in developed countries at middle age adults. In this study diabetes was induced by streptozotocin (STZ) in male Wistar albino rats. After 3 months of diabetes, rights eye were injected intravitreally with green fluorescein protein (GFP) labelled bone marrow derived stem cells (BMSC) and left eyes with balanced salt solution (Sham). Animals were grouped as Baseline (n = 51), Diabetic (n = 45), Diabetic+BMSC (n = 45 eyes), Diabetic+Sham (n = 45 eyes), Healthy+BMSC (n = 6 eyes), Healthy+Sham (n = 6 eyes). Immunohistology analysis showed an increased retinal gliosis in the Diabetic group, compared to Baseline group, which was assessed with GFAP and vimentin expression. In the immunofluorescence analysis BMSC were observed to integrate mostly into the inner retina and expressing GFP. Diabetic group had prominently lower oscillatory potential wave amplitudes than the Baseline group. Three weeks after intravitreal injection Diabetic+BMSC group had significantly better amplitudes than the Diabetic+Sham group. Taken together intravitreal BMSC were thought to improve visual function.

**Jalpa Mashru, Hanish Chauhan, Samira Anwar**

# Visual field perimetry for children using the MonCvONE machine

**XIIIth** International Orthoptic Congress. Rotterdam. 27-30 June 2016

University Hospitals of Leicester NHS Trust, UK

## Purpose

Visual Field Perimetry tests in young children can be both difficult and unreliable. For most children, reliability improves after the age of approximately 7-9 years. Our aim was to assess the potential of obtaining accurate visual field results for children under the age of 9 years.

## Method

We used the MonCvONE Machine on a manual option to test Kinetic Perimetry, in a way similar to Goldmann Perimetry. The integrated high resolution infrared video sensor is used to monitor the fixation of the patient throughout the test and can also be used to record objective stimulus responses.

## Results

The results are presented and compared to Goldmann Visual Fields, which show that a reasonable indication of the visual field can be obtained in a younger child.

## Conclusion

The MonCvONE Machine gives reasonably reliable visual field estimates in children under 9 years

**T-L Bizeau, Zanlonghi, A. Armelle, N. Rousseau, C. Bouaud**

# Different uses of an electronic Goldmann

**XIIIth** International Orthoptic Congress. Rotterdam. 27-30 June 2016

Ophtalliance Cliniques Jules Verne-Sourdille Nantes, France

## Purpose

MonCvONE from Metrovision (France) is a new polyvalent and full field projection perimeter entirely compatible with the Goldmann standard and modern perimetry standard.

## Methods

The MonCvONE allows high resolution static perimetry as well as kinetic perimetry with automated and manual modes. The high definition camera of the MonCvONE and its possibility to record the eye movement during an exam also allows us to look further and think of new kinds of examinations.

## Results

One unique feature of MonCvONE is its ability to perform perimetry exams on infants (below the age of 7) and other non cooperative subjects. The operator has a direct control of the stimulus presentation and can record the infant's eye movement responses thanks to the high quality of the video; the video playback is synchronized with the test presentations allowing the off line analysis of results and their control. Thanks to that direct operator control and video recording, we can also study:
(i) the eyes deviation in the nine cardinal positions of gaze, useful for pre-surgery act;
(ii) ptosis and its impact on visual field and (iii) binocular visual field fusion.

## Conclusion

The MonCvONE is a new instrument that has multiple uses including perimetry and assessment of eye movements.

**J. Charlier, X. Zanlonghi, S. Defoort-Dhellemmes**

# Evaluation of video imaging technology during visual field perimetry

ARVO Meeting, Seattle, USA April 2016
Invest. Ophthalmol. Vis. Sci.. 2016; 57(12):3387.

Metrovision, Lille,
Clinique Sourdille, Nantes
CHRU Lille, France

## Purpose

Video imaging consists in recording the entire visual field process in synchrony with the video of the patient's head. Several clinical applications have been investigated to evaluate the clinical usefulness of this new technology.

## Methods

The study included results from 48 visual field exams performed on a MonCvONE full field projection perimeter with synchronized video recording.
The video from a large viewing field camera was recorded in synchrony with the position of the visual stimulus, with other test parameters such as luminance and size and with the patient's response obtained from the patient's press button or from the operator judgment. The study included patients who were unable to perform automated perimetry due to young age or handicap, patients with abnormal eye movements, head posture or ptosis and controls performed after automated perimetry.

## Results

Video recording was extremely useful in the majority of clinical cases. 24 exams were performed on young children (age between 2 and 5 years) using attraction perimetry. The eye orientation responses could be interpreted and validated after the exam. In other cases, the video recording facilitated the interpretation and documentation of visual field results with the inclusion of video snapshots in the examination report.
Additional applications included the recording of cardinal eye gaze positions and of the fusion visual field.

## Conclusion

Synchronized video imaging performed during visual field exams is a clinically useful tool for the examination of patients who cannot perform automated perimetry and for the documentation of artefacts and situations such as ptosis, abnormal eye movements, abnormal head posture and incorrect position of refraction correction.

**Virginie Pichard, Nathalie Provost, Alexandra Mendes-Madeira, Lyse Libeau, Philippe Hulin, Kizito-Tshitoko Tshilenge, Marine Biget, Baptiste Ameline, Jack-Yves Deschamps, Michel Weber, Guylène Le Meur, Marie-Anne Colle, Philippe Moullierand Fabienne Rolling**

# AAV-mediated Gene Therapy Halts Retinal Degeneration in PDE6β-deficient Dogs

Molecular Therapy (2016); **24** 5, 867–876.

Atlantic Gene Therapies, INSERM UMR 1089, Université de Nantes, CHU de Nantes, Nantes, France
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## Abstract

We previously reported that subretinal injection of AAV2/5 RK.cpde6β allowed long-term preservation of photoreceptor function and vision in the rod-cone dysplasia type 1 (rcd1) dog, a large animal model of naturally occurring PDE6β deficiency. The present study builds on these earlier findings to provide a detailed assessment of the long-term effects of gene therapy on the spatiotemporal pattern of retinal degeneration in rcd1 dogs treated at 20 days of age. We analyzed the density distribution of the retinal layers and of particular photoreceptor cells in 3.5-year-old treated and untreated rcd1 dogs. Whereas no rods were observed outside the bleb or in untreated eyes, gene transfer halted rod degeneration in all vector-exposed regions. Moreover, while gene therapy resulted in the preservation of cones, glial cells and both the inner nuclear and ganglion cell layers, no cells remained in vector-unexposed retinas, except in the visual streak. Finally, the retinal structure of treated 3.5-year-old rcd1 dogs was identical to that of unaffected 4-month-old rcd1 dogs, indicating near complete preservation. Our findings indicate that gene therapy arrests the degenerative process even if intervention is initiated after the onset of photoreceptor degeneration, and point to significant potential of this therapeutic approach in future clinical trials.

**Jose-Carlos Pastor; Iraxte Zabalza; Ruben Cuadrado; Jose Alberto de Lazaro; Angela Morejon; Yrbani Lantigua; Rosa Coco**

# Visual alterations in a cohort of young male patients with acute/subacute intoxication with mercury vapor

ARVO meeting Seattle May 2016

Investigative Ophthalmology & Visual Science September 2016, Vol.57, 300. doi:

Instituto Universitario de Oftalmobiología Aplicada (IOBA) Valladolid, Sapin

## Purpose

Mercury intoxication is a well known condition with several visual and neurological alterations. But there is still a controversy about the existence of two level of involvement: visual pathway and/or retinal structures. By the end of 2012, 47 workers were affected by mercury exposure for 13 days. Blood levels were high (600-1000 mcg/L, normal < 10 mcg/L) and patients were not chelated. The purpose of this work is to describe the visual disturbances encountered in the most severe affected sub-group, correlating the structural and functional findings

## Methods

A prospective observational study on 23 patients ( range 28-56 years) was approved by Ethical Committee. Functional tests were: visual acuity (ETDRS), color vision (Farnsworth-Munsell, 28 Hue), contrast sensitivity (CSV-1000), visual field (Humphrey 750i), ERG, pERG, mERG and VEP (Metrovision, following ISCEV standard). Additionally autofluorescence, macular thickness by OCT (3D OCT2000, Topcon), and nerve fiber layer thickness (CFNR) (Stratus 3000, Zeiss Meditec) were recorded. Appropriate statistical tests were performed: Spearman, Mann-Whitney, Wilcoxon and t student. Values were compared against normal

## Results

Two patients were excluded, as they have pathological unrelated findings: one idiopathic parafoveolar telangiectasias type 2 and one congenital dyscromatopsia. All patients showed loss of contrast sensitivity in all frequencies, alterations in the discrimination of colors (Confusion index: 1.64±1.18) and defaults in the visual field in 14 out of 22 (MD, mean defect: -8.9 dB). Also increase of latency and decrease of the extent of the b wave (ERG), of the p50 wave of the pERG and an increase of the implicit time of the p100 wave of the VEP. No alterations were registered in the structural tests (macular thickness: 246.1 ± 20.9 µ; CFNR: 101.89 ±11.6 µ) or in the mERG.

## Conclusions

Most of the found alterations were already described in other series. Alterations in the pERG not described have been found. These patients are being followed to analyze the progression of their pathologic findings. Because of the scarcity in reports of this poisoning any new clinical data is relevant.

## Violaine DERAL-STEPHANT

# Estimation objective et rapide de l'acuité visuelle grâce au PEV sweep

Les Cahiers d'Ophtalmologie. N200 Mai 2016 pp18-21

**Haeng Jin Lee, Seong-Joon Kim**

## Factors associated with visual fatigue from curved monitor use: A prospective study of healthy subjects

PLoS ONE 11(10): e0164022. Published online October 4th 2016

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### Purpose
To investigate the factors associated with visual fatigue using monitors with various radii of curvature.

### Methods
Twenty normal healthy adults (8 men, 12 women; mean age, 26.2 ± 2.5 years) prospectively watched five types of monitors including flat, 4000R, 3000R, 2000R, and 1000R curved monitors for 30 min. An experienced examiner measured the ophthalmological factors including near point of accommodation (NPA), near point of convergence (NPC), refraction, parameters during pupil response at light and saccadic movement just before and after the visual tasks. The questionnaires about subjective ocular symptoms were also investigated just before and after the visual tasks.

### Results
The NPA increased after the visual tasks with a flat monitor compared with the curved monitors, with the 1000R curved monitor showing the smallest change ($p$ = 0.020). The NPC increased for every monitor after the visual tasks; the largest increase occurred with the flat monitor ($p$ = 0.001). There was no difference in refractive error, pupil response, or saccadic movement in the comparison of before and after the visual tasks. Among the nine factors in the questionnaire, the score of ªeye painº was significantly higher for the flat monitor versus the 1000R curved monitor after the visual tasks ($p$ = 0.034).

### Conclusions
We identified NPA, NPC, and eye pain as factors associated with visual fatigue. Also, the curvature of the monitor was related to the visual fatigue.

**H. D. Kim, S. Y. Park, P. Kim, M. C. Young, K. S. Choi, Y.-H. Ohn**

# Correlation of retinal wrinkling on optical coherence tomography with metamorphopsia and multifocal electroretinogram in epiretinal membrane patients

54th ISCEV Symposium, Singapore, August 13, 2016–August 18, 2016
Documenta Ophthalmologica August 2016, Volume 133, Supplement 1, pp 9–41

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Department of Ophthalmology, College of Medicine, Soonchunhyang University, Bucheon, Korea

## Purpose
To investigate the correlation between the degree of retinal wrinkling on optical coherence tomograph (OCT), metamorphopsia and parameters of multifocal electroretinogram (mfERG) in epiretinal membrane (ERM) patients.

## Methods
Overall 49 eyes of 48 patients with idiopathic ERM were enrolled. All patients underwent comprehensive ocular examination including fundus examination, spectral-domain OCT scan, metamorphopsia test (MonPack_, Metrovision, Perenchies, France) and mfERG (MonPack_). The metamorphopsia test was performed in 21 points of the field with occlusion of the contralateral eye, and the metamorphopsia scores on superior, inferior, nasal, temporal, and total subdivisions were calculated. Central retinal thickness (CRT) was observed using OCT. In addition, retinal wrinkling ratio was calculated within a 3 mm area of vertical and longitudinal OCT scan image. The mean amplitudes and implicit time of N1 and P1 from in each subdivision were elicited from mfERG. The correlations among retinal wrinkling ratios, metamorphopsia scores and mfERG parameters were evaluated using Pearson correlation analysis.

## Results
The averaged total, superior, inferior, nasal and temporal metamorphopsia scores were 46.3 ± 6.4, 24.3 ± 4.5, 23.7 ± 5.2, 25.3 ± 4.1 and 22.7 ± 4.9, respectively. Metamorphopsia scores showed significant correlation with retinal wrinkling ratios from the inner retinal surface, inner border of inner nuclear layer, and inner border of outer nuclear layer. Metamorphopsia scores revealed correlation with P1 implicit times of mfERG. Moreover, retinal wrinkling ratios were also associated with delay of P1 implicit times of mfERG in each subdivision.

## Conclusions
These results suggested that the metamorphopsia test allows us to evaluate the metamorphopsia in each area individually. The degrees of metamorphopsia revealed significant, correlations with retinal wrinkling on OCT images and parameters from mfERG recording. Further research using same methods after vitrectomy for ERM removal should be informative.

**M. Hamurcu, A. Koseoglu, A. K. Bulut, M. S. Sarıcaoglu**

# Electrophysiologic evaluation in amblyopia

54th ISCEV Symposium, Singapore, August 13, 2016–August 18, 2016
Documenta Ophthalmologica August 2016, Volume 133, Supplement 1, pp 9–41

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## Purpose

To compare healthy eyes and amblyopic eyes in unilaterally amblyopic patients using the pattern VEP, the PERG and the flash ERG.

## Methods

Flash ERG and VEP test results of 41 patients and PERG test results of 31 patients were evaluated in both eyes of unilaterally ambylopic patients who were 15 years or older. The patients were tested following the ISCEV standards using a Metrovision electrophysiological recording system (Model MonPackONE, Perenchies, France). For each patient, each test (VEP, ERG, and PERG) was performed in a separate session. Average latency and amplitude were measured and compared statistically using Student's t test and Mann–Whitney U test; p\0.05 was considered to be statistically significant.

## Results

For all five VEPs recorded, P100 amplitude was significantly decreased (p\0.05) and P100 latency was significantly increased (p\0.01) in amblyopic eyes. For PERGs, P50 and N95 wave amplitudes were significantly decreased in amblyopic eyes (p\0.01) but there was no difference in latency between healthy and amblyopic eyes. For flash ERGs, scotopic b-wave amplitude was significantly decreased (p\0.01) and latency significantly increased (p\0.01) in amblyopic eyes. However, responses were similar in healthy and amblyopic eyes (p[0.05).

## Conclusions

All three electrophysiological test results were statistically different in amblyopic eyes of anisometric amblyopic patients when compared with healthy eyes. Increase in VEP latencies of amblyopic eyes may be attributed to increase in retina-cortex transmission time. Decrease of p50 amplitude in the PERG indicates retinal ganglion cell dysfunction. The flash ERG can detect abnormal retinal function of eyes even in cases where the ophthalmoscopic examination was normal. Since retinal nerve fibers were affected in amblyopic eyes, ERG results were depressed. Depressed amplitude results in PERG was attributed to ganglion cell dysfunction. However, since amblyopia does not affect the process before the ganglion cell layer, flash ERG was not different than normal controls. According to our results, amblyopia is not only a cortical pathology but may also involve retinal pathology that cannot be detected by routine ophthalmologic examination. PERG, flash ERG and VEP are objective methods for diagnosis and follow up of amblyopic patients and valuable guides for clinicians.

**C. Arndt, S. Berthemy, C. Chiquet, M. Mauget-Faysse**

# Spatial correlation between mfERG and ‘‘en face’’ spectral domain optical coherence tomography changes in patients treated with anti-malarial drugs

54th ISCEV Symposium, Singapore, August 13, 2016–August 18, 2016
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## Purpose
The disruption of the ellipsoid zone band on spectral domain optical coherence tomography (SD-OCT) is one of the characteristic features of chloroquine toxicity. ‘‘En face’’ technology enables a topographic view of changes within different retinal layers, in particular the ellipsoid zone band. The aim of this retrospective study was to compare local responses obtained with multifocal ERG with the results of ‘‘en face’’ SD-OCT and to analyze disparities between the structural and functional findings.

## Methods
In consecutive patients screened for anti-malarial toxicity between July 1st 2014 and June 30th 2015, central visual field, multifocal electroretinogram (mfERG) recording, ‘‘en face’’ SD-OCT, and short-wavelength fundus autofluorescent imaging (SW-FAF) were performed.

## Results
Among the eight patients with abnormal results, three presented with abnormalities on both mfERG and ‘‘en face’’ SDOCT. In these patients, there was a good correlation between focal loss of the mfERG response and disruption of the ellipsoid zone band on ‘‘en face’’ SD-OCT. In one patient with characteristic changes in the ‘‘en face’’ SD-OCT, the mfERG was inconclusive. The four remaining patients had abnormal mfERG with reduced R5/R2 ratios and no SD-OCT changes.

## Conclusions
It appears that when the ellipsoid zone is disrupted, there is a focal loss on mfERG. However, in case of normal SD-OCT findings, mfERG can display functional changes. Although ‘‘en face’’ SD-OCT technology provides a new approach in analyzing focal abnormalities in the photoreceptor- retinal pigment epithelium interface, it is probably less sensitive than mfERG which probably enables detection of functional changes before irreversible lesions occur.

**O. Zambrowski, C. Bottin1, J. Racine, SY Cohen, C. Jung, A. Miere, V. Caillaux, E. Souied**

# Full field electroretinogram changes in non-proliferative sickle cell retinopathy

54th ISCEV Symposium, Singapore, August 13, 2016–August 18, 2016
Documenta Ophthalmologica August 2016, Volume 133, Supplement 1, pp 9–41

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## Purpose
To report full-field ERG findings in patients with early sickle-cell retinopathy according to hemoglobin type.

## Methods
In this observational case series, we included patients seen from November 2014 to April 2016 with sickle-cell disease and non-proliferative retinopathy confirmed by fluorescein angiography (FA) and preserved visual acuity ([20/25). Full-field ERGs were recorded according to the ISCEV standard procedures. The primary outcome measures were scotopic ERG responses as a, b wave amplitudes and b/a ratio of the dark adapted (DA) 3.0 and 10.0 cd s m-2 stimulation. Those responses were analyzed according to hemoglobin type (HbSS or HbSC).

## Results
24 eyes from 12 patients were included: six HbSS and six HbSC patients. When comparing responses between the HbSC group and the HbSS group, the b wave amplitude and b/a ratio of DA3.0 (respectively p = 0.037 and p = 0.0006) and of DA10.0 (respectively p = 0.043 and p = 0.0010) ERG response were significantly lower in the HbSS group. The a-wave amplitude of both DA3.0 and 10.0 were not different depending on group.

## Conclusions
Changes in the dark-adapted ERG response observed in the HbSS subgroup suggest an early involvement of the inner retina, while standard FA did not reveal any proliferative lesions. This could give an interesting physiopathological insight on both the disease and the reason why HbSS patients present less frequently with proliferative lesions than HbSC patients.

**A. Angius, P. Uva, I. Buers, M. Oppo, A. Puddu, S. Onano, I. Persico & al**

# Bi-allelic Mutations in *KLHL7* Cause a Crisponi/CISS1-like Phenotype Associated with Early-Onset Retinitis Pigmentosa

The American Journal of Human Genetics 99, 236–245, July 7, 2016

## Abstract

Crisponi syndrome (CS)/cold-induced sweating syndrome type 1 (CISS1) is a very rare autosomal-recessive disorder characterized by a complex phenotype with high neonatal lethality, associated with the following main clinical features: hyperthermia and feeding difficulties in the neonatal period, scoliosis, and paradoxical sweating induced by cold since early childhood. CS/CISS1 can be caused by mutations in cytokine receptor-like factor 1 (*CRLF1*). However, the physiopathological role of CRLF1 is still poorly understood. A subset of CS/CISS1 cases remain yet genetically unexplained after *CRLF1* sequencing. In five of them, exome sequencing and targeted Sanger sequencing identified four homozygous disease-causing mutations in kelch-like family member 7 (*KLHL7*), affecting the Kelch domains of the protein. *KLHL7* encodes a BTB-Kelch-related protein involved in the ubiquitination of target proteins for proteasome-mediated degradation. Mono-allelic substitutions in other domains of *KLHL7* have been reported in three families affected by a late-onset form of autosomal-dominant retinitis pigmentosa. Retinitis pigmentosa was also present in two surviving children reported here carrying bi-allelic *KLHL7* mutations. *KLHL7* mutations are thus associated with a more severe phenotype in recessive than in dominant cases. Although these data further support the pathogenic role of *KLHL7* mutations in a CS/CISS1-like phenotype, they do not explain all their clinical manifestations and highlight the high phenotypic heterogeneity associated with mutations in *KLHL7*.

**S. Okutucu, M. Civelekler, M. Aparci, C. Sabanoglu, O. Dikmetas, H. Aksoy, B. Yets Sayin, A. Oto,**

# Computerized dynamic pupillometry indices mirrors the heart rate variability parameters

European Review for Medical and Pharmacological Sciences, 2016; 20: 2099-2105

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## Objective
Dynamic pupillometry (DP) is a simple, non-invasive computerized assessment of pupillary light response which provides data concerning both branches of the autonomous nervous system (ANS). Heart rate variability (HRV) analysis assess cardiac health and the ANS modulation on the heart. In this study, we aimed to evaluate the utility of DP as a predictor of cardiac autonomic activity assessed by HRV.

## Patients and methods
A total of 44 consecutive healthy subjects (mean age = 35.9 ± 7.4 years, 24 males) were enrolled. Pupil diameters (R0, R1, R2 and R%): latency (Lc), amplitude (Ac), velocity (Vc) and duration of pupil contraction (Tc): latency (Ld), velocity (Vd) and duration of pupil dilatation (Td) were measured in DP.
Time and frequency domain indices of HRV were obtained from 24-h ambulatory electrocardiographic monitoring.

## Results
There were strong significant correlations of Vc with LF/HF (r = -0.672, $p$ = 0.001) and a measure of HRV: RMSDD (r = 0.654, $p$ = 0.001). R% significantly correlated with PNN50 (r = -0.432, $p$ = 0.003) and RMSDD (r = -0.422, $p$ = 0.004) and LF/HF (r = 0.340, $p$ = 0.024). Vc (β = 0.647, $p$ = 0.011) and Ac (β = 0.320, $p$ = 0.013) were found as independent predictors of RMSSD. Vc (β = 0.578, $p$ = 0.036) was found to be only significant predictor of PNN50. Vc (β = -0.617, $p$ = 0.008) and R% (β = 0.309, $p$ = 0.038) were found to be significant predictors of LF/HF.

## Conclusions
Pupillary autonomic functions assessed by DP correlates with cardiac autonomic functions evaluated by HRV. Among the DP parameters analyzed, Vc was a predictor of parasympathetic indices, and R% was a predictor of sympathetic indicators of cardiac autonomic functions.

**M. Hamurcu, G. Orhan, M. S. Sarıcaoğlu, S. Mungan, Z. Duru**

# Analysis of multiple sclerosis patients with electrophysiological and structural tests

International Ophthalmology First online 18 August 2016

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## Abstract

We aimed to analyze the effects of progressive myelin loss and neurodegeneration seen in patients with multiple sclerosis (MS) on visual tract with electrophysiological and structural tests.

Fifty-one patients diagnosed with MS in the Neurology Department were followed up in neuro-ophthalmology outpatient clinic irrespective of their visual symptoms, and were included in our study. The patients were classified as the ones with the history of optic neuritis (group II) and ones without the history (group I) of optic neuritis. The data, including clinical presentation, retinal nerve fiber layer thickness (RNFLT) measurements, pattern visual evoked potential (pVEP) and flash electroretinograms (ERG) test results, were recorded.

In our study, comparison of pVEP test latencies of groups I and II with each other, and with those of healthy subjects revealed statistically significant differences ($p < 0.05$). The analysis of rod functions on ERG did not show any significant changes ($p > 0.05$). However, both groups showed significantly decreased cone b-wave amplitudes, elongation of latencies, and decreased flicker amplitudes on cone and flicker potentials obtained after light adaptation ($p < 0.05$). There was significant thinning in RNFLT of the both groups when compared to the normal standards. The difference between two groups was statistically significant ($p < 0.05$).

Axon loss is seen in the optic nerve with subclinical or acute optic neuritis in patients with MS. RNFLT analysis and electrophysiological tests are of great importance in diagnosis of MS, as well as to determine progression and to direct neuroprotective therapy in patients diagnosed with MS. Objective analysis methods gain more importance in the diagnosis and follow-up of MS patients, parallel to technological advancements.

**A.S. Stefanescu-Dima, C. A. Corici, M.R. Manescu), T.N.Sas, M. Iancau, C.L. Mocanu**

## Posterior vitreous detachment and macular anatomical changes – a tomographic–electroretinographic study.

Rom J Morphol Embryol 2016, 57(2 Suppl):751–758

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### Aim
Posterior vitreous detachment (PVD) is a physiological phenomenon due to aging characterized by separation of the vitreous cortex from the retina and may induce a variety of pathological events at the vitreoretinal junction. The aim of this study is to highlight *in vivo* anatomical and functional changes in early stages of PVD allowing the correct treatment.

### Material and methods
Non-consecutive case series; optical coherence tomography (OCT) relies on analyzing the reflectivity of coherent light from different anatomical interfaces within posterior vitreous and retinal histological layers, thus acquiring transverse sections through vitreoretinal interface, sensory retina, retinal pigment epithelium and choroid. Modern techniques using Fourier spectral analysis of the reflected light enhance axial resolution to 5–10 µm, almost matching classic histological sections. Integrating these sections, OCT can reconstruct three-dimensional tissue anatomy. Full-field electroretinogram (ERG) evaluates the function of the entire retina evoked by a flash light.

### Results
Imaging of the vitreoretinal interface with OCT allowed staging PVD and correctly diagnosing its secondary pathologies: cystoid macular edema, vitreomacular traction syndrome, epiretinal membrane, macular pucker, macular hole, macular pseudohole, lamellar macular hole. The cone response of full-field ERG is a marker of retinal damage in macular pathology due to PVD.

### Conclusions
Correct understanding of vitreoretinal anatomic and functional changes due to posterior vitreous detachment is essential for a proper diagnosis and treatment.

## J. CHARLIER

# System for testing visual field of a patient and the corresponding method *

Application for US patent US 20160317023 A1

## Summary

Disclosed are systems and devices for testing the visual field of a patient. The components and functions may include means for selecting the features of successive visual stimuli, a display for presenting said successive visual stimuli to the patient; a video recorder for recording video of movements of at least part of the patent's head, and in particular movements of the patient's eyes, together with time codes, during the presentation of said visual stimuli, and a data recorder for recording, for each visual stimulus, the features and at least one time-code of the video recorder corresponding to the displayed visual stimulus. Various embodiments also provide methods for testing the visual field of a patient.

## S.A. Tabatabaei, M. Soleimani, M.R. Mansouri & al

# Closantel, a veterinary drug with potential severe morbidity in humans

BMC Ophthalmology, 2016, 16, 207-

Eye Research Center, Farabi Eye Hospital, Tehran University of Medical Sciences

## Background

Closantel is a halogenated salicylanilide with a potent anti parasitic activity. It is widely used in management of parasitic infestation in animals, but is contraindicated in humans.

## Case presentation

A 34-year-old man with depression was referred to our center with progressive loss of vision in both eyes 10 days after unintentional ingestion of three 500 mg tablets of Closantel. On fundus examination, left optic disc margin was blurred. His bilateral visual acuity was no light perception (NLP) despite prescribed IV erythropoietin injections 20,000 units daily for 3 days and 1gr intravenous methylprednisolone acetate for 3 days followed by 1 mg/kg oral prednisolone. On macular optical coherence tomography (OCT), a disruption in outer retina was observed. Electroretinogram and visual evoked potential tests showed visual pathway involvement.

## Conclusions

Destruction of neurosensory retina and visual pathways after accidental Closantel use is related to severe visual loss. This case alerts us about the destructive effect of this drug on humans even in low dosage which necessitates preventive efforts to reduce the chance of this morbid side effect.

**T. Schwitzer, R. Schwan, E. Albuisson, A.Giersch, .Lalanne, K. Angioi-Duprez, V. Laprevote,MD**

## Association Between Regular Cannabis Use and Ganglion Cell Dysfunction

*JAMA Ophthalmol*. doi:10.1001/jamaophthalmol.2016.4761 Published online December 8, 2016
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### Importance
Because cannabis use is a major public health concern and cannabis is known to act on central neurotransmission, studying the retinal ganglion cells in individuals who regularly use cannabis is of interest.

### Objective
To determine whether the regular use of cannabis could alter the function of retinal ganglion cells in humans.

### Design, setting and participants
For this case-control study, individuals who regularly use cannabis, as well as healthy controls, were recruited, and data were collected from February 11 to October 28, 2014. Retinal function was used as a direct marker of brain neurotransmission abnormalities in complex mental phenomena.

### Main outcomes and measures
Amplitude and implicit time of the N95 wave on results of pattern electroretinography.

### Results
S Twenty-eight of the 52 participants were regular cannabis users (24 men and 4 women; median age, 22 years [95%CI, 21-24 years]), and the remaining 24 were controls (20 men and 4 women; median age, 24 years [95%CI, 23-27 years]). There was no difference between groups in terms of age (P = .13) or sex (P = .81). After adjustment for the number of years of education and alcohol use, there was a significant increase for cannabis users of the N95 implicit time on results of pattern electroretinography (median, 98.6 milliseconds [95%CI, 93.4-99.5]) compared with controls (median, 88.4 milliseconds [95%CI, 85.0-91.1]), with 8.4 milliseconds as the median of the differences (95%CI, 4.9-11.5; P < .001,Wald logistic regression). A receiver operating characteristic curve analysis (area under the curve, 0.84 [95%CI, 0.73-0.95]; P < .001) revealed, for a cutoff value of 91.13 milliseconds, a sensitivity of 78.6%(95%CI, 60.5%-89.8%) and a specificity of 75.0% (95%CI, 55.1%-88.0%) for correctly classifying both cannabis users and controls in their corresponding group. The positive predictive value was 78.6%(95%CI, 60.5%-89.8%), and the negative predictive value was 75.0% (95%CI, 55.1%-88.0%).

### Conclusions and relevance
Our results demonstrate a delay in transmission of action potentials by the ganglion cells in regular cannabis users, which could support alterations in vision. Our findings may be important from a public health perspective since they could highlight the neurotoxic effects of cannabis use on the central nervous system as a result of how it affects retinal processing.

## I. Habibi, A. Chebil, Y. Falfoul, N. Allaman-Pillet, F. Kort, D.F. Schorderet, L. El Matri

# Identifying mutations in Tunisian families with retinal dystrophy

Sci. Rep. 6, 37455; doi: 10.1038/srep37455 (2016).

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## Summary

Retinal dystrophies (RD) are a rare genetic disorder with high genetic heterogeneity. This study aimed at identifying disease-causing variants in fifteen consanguineous Tunisian families. Full ophthalmic examination was performed. Index patients were subjected to IROme analysis or whole exome sequencing followed by homozygosity mapping. All detected variations were confirmed by direct Sanger sequencing. Mutation analysis in our patients revealed two compound heterozygous mutations p.(R91W);(V172D) in RPE65, and five novel homozygous mutations: p.R765C in CNGB1, p.H337R in PDE6B, splice site variant c.1129-2A > G and c.678_681delGAAG in FAM161A and c.1133 + 3_1133 + 6delAAGT in CERKL. The latter mutation impacts pre-mRNA splicing of CERKL. The other changes detected were six previously reported mutations in CNGB3 (p.R203*), ABCA4 (p.W782*), NR2E3 (p.R311Q), RPE65 (p.H182Y), PROM1 (c.1354dupT) and EYS (c.5928-2A > G). Segregation analysis in each family showed that all affected individuals were homozygotes and unaffected individuals were either heterozygote carriers or homozygous wild type allele. These results confirm the involvement of a large number of genes in RD in the Tunisian population

**S.d Karimi, H. Nikkhah, S.A. Mosavi**

## Unilateral Sectoral Retinitis Pigmentosa in a Patient of Iranian Origin

Razavi Int J Med. 2016 March; 4(1):e35454.

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### Introduction
Sectoral retinitis pigmentosa (RP) is a rare clinical condition.

### Case Presentation
We present a 60-year-old female with a history of mild night blindness and decreased vision in the left eye for about 15 years.

### Conclusions
Fundus examination revealed retinal pigmentary changes in the infero-temporal sector and reduced arterial caliber. In addition, fundus auto-fluorescence, fluorescein angiography, electroretinography and electro-oculogram confirmed these clinical findings. To the best of our knowledge, the present study is the first to describe sectorial RP in the infero-temporal sector of Iranian origin.

**A. Rocha de Sousa, A. Roca, J. Barbosa-Breda, F. Falcão-Reis**

# Retinal toxicity of intraocular silicone oil: a retrospective study

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Abstracts from the 2016 European Association for Vision and Eye Research Conference
Acta Ophthalmologica First published: 14 September 2016

## Purpose

To determine the relation between the use of silicone oil (SO) as an intraocular tamponade and the incidence of unexplained loss of visual acuity.

## Methods

A retrospective study of 175 patients who underwent SO removal at Department of vitreo-retinal surgery at Centro Hospitalar São João between January 2012 and June 2015.

## Results

Nine patients (5.1%) (4 male, 5 female), with a median age of 57 years (range 31–84 years) reported reduction of vision of unexplained cause after SO extractions. The median time of SO fill was 8 months (range 4–21 months). Patients with 2 or more lines of vision loss of unexplained cause after removal of silicone oil (ROSO) showed a mean drop of visual acuity of 0.2. The intraocular pressure (IOP) became elevated in 7 (77.8%) eyes during the follow up period. Only 2.9% of patients who underwent ROSO had cataract as a complication.

## Conclusions

There is a 5.1% overall incidence of unexplained loss of vision in eyes following SO removal, with a high rate in women (55.6%). The main complication observed was ocular hypertension.

## X. Zanlonghi

# Moyens d'étude de la fonction visuelle

In Neuro-ophtalmologie
2ème édition Catherine Vignal Clermont, Dan Miléa, Caroline Tilikete

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**S. Ferreira, A. Carvalho Pereira, B. Quendera, Aldina Reis, E. Duarte Silva, M. Castelo-Branco**

## Primary visual cortical remapping in patients with inherited peripheral retinal degeneration

In NeuroImage: Clinical
Accepted for publication 14/122/2016

## Abstract

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Human studies addressing the long-term effects of peripheral retinal degeneration on visual cortical function and structure are scarce.
Here we investigated this question in patients with Retinitis Pigmentosa (RP), a genetic condition leading to peripheral visual degeneration. We acquired functional and anatomical magnetic resonance data from thirteen patients with different levels of visual loss and twenty-two healthy participants to study primary (V1) visual cortical retinotopic remapping and cortical thickness.

We identified systematic visual field remapping in the absence of structural changes in the primary visual cortex of RP patients. Remapping consisted in a retinotopic eccentricity shift of central retinal inputs to more peripheral locations in V1.
Importantly, this was associated with changes in visual experience, as assessed by the extent of the visual loss, with more constricted visual fields resulting in larger remapping. This pattern of remapping is consistent with expansion or shifting of neuronal receptive fields into the cortical regions with reduced retinal input. These data provide evidence for functional changes in V1 that are dependent on the magnitude of peripheral visual loss in RP, which may be explained by rapid cortical adaptation mechanisms or long-term cortical reorganization.
This study highlights the importance of analyzing the retinal determinants of brain functional and structural alterations for future visual restoration approaches.