

# Challenges and opportunities for optometry and optics in Europe

Abstracts of the 10<sup>th</sup> EAOO annual conference

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**Saturday 18 May 2019**

Saturday 18 May 2019

Keynote speech, 14:00-15:00

**Title:** Managing Myopia: Why? How? Who? And When?

By

**Prof. Ian Flitcroft**



Ian Flitcroft is a consultant paediatric ophthalmologist principally based at the Children's University Hospital, Dublin.

He is also Associate Clinical Professor of Ophthalmology in UCD and Adjunct Professor of Vision Science in DIT. He has special clinical interest in inherited paediatric eye disease and electrophysiology. He studied medicine at Oxford University, where he also completed his D.Phil at Oxford in visual neurophysiology, and St Mary's Hospital/Imperial College, London.

He has been involved in the field of experimental myopia for almost 20 years, principally in the areas of computational modelling, the optical control mechanisms of eye growth and human choroidal thickness measurement.

He was awarded the Fincham Medal in 2001 by Worshipful Company of Spectacle makers for his work in this field. As well as his research on the mechanisms guiding eye growth he has been long term advocate for the public health implications of myopia and for the need for biological treatments of myopia. He is a lead investigator on several myopia treatment trials.

General session, 15:00-15:30

**MYOPIA CONTROL MANAGEMENT**

Presenter: Giancarlo Montani

**Authors:** GIANCARLO MONTANI<sup>1</sup>

**Affiliation:**

1) Corso di Laurea in Ottica ed Optometria. Università del Salento, Lecce LE, Italy

**Key words:** myopia control, patient

**Abstract:** The purpose of presentation will be to conduct an overview of evidence-based knowledge regarding the optical procedures effective to reduce myopia progression in children and adolescents. Further aim will be to provide a clinical protocol to consider for the selection of the strategy more effective considering patient's characteristics. The first part will be characterized by a review of the evidence of generally accepted optical methods for controlling myopia progression (including: bifocal or progressive addition ophthalmic lenses, orthokeratology, bifocal and antimyopia designs soft contact lenses) and on their plausible mechanisms of action (reduction in peripheral hyperopic defocus, reduction of accommodative lag and esophoria at near). In the second part will be considered information useful to evaluate who are the candidates to recruit, the right age to start and the protocol of the examinations useful to select the treatment more indicated for the candidate and to track the changes of the myopia over time. In the final part will be provided some guidelines helpful to select the more effective optical procedure considering the patient's characteristics and the indication useful to organize the follow-up visits to evaluate the effectiveness of treatment prescribed.

Saturday 18 May 2019

General session, 15:30-16:00

**HOW TO COMMUNICATE MYOPIA CONTROL WITH CHILDREN**

Presenter: Philippe Seira

**Authors:** PHILIPPE SEIRA<sup>1</sup>

**Affiliation:**

1) Institute of Optometry, School of Engineering, University of Applied Sciences Northwestern Switzerland (FHNW), Olten Switzerland

**Key words:** myopia control, children, contact lenses

**Abstract:** Contact lenses are increasingly popular with children. Although there is not much difference between fitting children or adults with them, is communicating with young clients different? Now, we have a lot of possibilities to correct myopia and to try to control the myopia progression! But what tools do we have at our disposal for conveying important messages? What are the issues related to good communication with children and young adults? In recent years, children have represented a large part of my clientele; it is through communicating with them that I have developed the different communication techniques that will be shared with participants.

Saturday 18 May 2019

Anterior Eye Track , 16:30-17:45

**ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY**

Presenter: Dr. Stefan Bandlitz

**Authors:**

STEFAN BANDLITZ<sup>1</sup>

**Affiliation:**

1) Höhere Fachschule für Augenoptik Köln (Cologne School of Optometry), Germany 2) Ophthalmic Research Group, Life and Health Sciences, Aston University, Birmingham, UK

**Key words:** Optical-coherence-tomography, Ocular-surface, Tear-film, Contact-lens

**Abstract:**

Since its invention in 1991, optical coherence tomography (OCT) has become increasingly important as an in-vivo imaging technique in the medical community. Although of value to many other fields, this new technology is especially useful in ophthalmology and optometry. Due to the high resolution of modern OCT instruments, non-invasive OCT images are able to give information previously only available by invasive biopsy. The main application domain of optical coherence tomography lies in the assessment of the posterior ocular segment. However, the assessment of the anterior segment with OCT is gaining importance. Imaging and quantifying normal and pathological features of the ocular surface, tear film, cornea, anterior chamber and in contact lens wear are clinical applications. Due to this, contact lens researchers and contact lens fitters are becoming more interested in optical coherence tomography.



Saturday 18 May 2019

Anterior Eye Track , 16:30-17:45

### **CORNEAL BIOMECHANICS PROPERTIES**

Presenter: Gabriele Civiero

#### **Authors:**

GABRIELE CIVIERO<sup>1</sup>

#### **Affiliation:**

1) Istituto Benigno Zaccagnini

**Key words:** corneal biomechanics, cornea, corneal hysteresis

The study of corneal biomechanical properties has become increasingly important in recent years, in relation to the increasing clinical usefulness related to the knowledge of the structural, material characteristics and properties of the cornea.

**Results** It has been made possible by the association of corneal in vivo live recording techniques, evolved to a non-contact mechanical stimulus, giving rise to a new, dynamic evaluation of the corneal properties. The study of corneal biomechanics is important during the preliminary analysis of refractive surgery (it is helpful in early ectasia diagnosis), in the preliminary analysis and evaluation of successful cross-linking procedure, in the interpretation and correction of measurements of IOP values (in regular, ectatic and postsurgical corneas), in the determination of any potential risk associated to ocular pathologies and, potentially, in the evaluation of alterations given by the use of contact lenses.

**Conclusion:** The analysis of corneal biomechanical characteristics in association with their physiological, surgical and pathological alterations can be improved in order to have an earlier and more accurate diagnosis of ectasia and more reliable prediction of outcome of a surgical procedures.

Saturday 18 May 2019

Anterior Eye Track , 16:30-17:45

### **INTOLERANCE OF CONTACT LENS**

Presenter: Pietro Gheller, Lisa Franceschini, Alessandro Stecca

#### **Authors:**

PIETRO GHELLER<sup>1</sup> , LISA FRANCESCHINI<sup>2</sup> , ALESSANDRO STECCA<sup>3</sup> , LUCA AVONI<sup>4</sup>

#### **Affiliation:**

1) Optometrist FIACLE University di Padova, Ist. Sup. di Ottica e Optometria (Zaccgnini) 2) Optometrist Realvision srl  
3) Stecca Optometria 4) AUSL Romagna Ospedale

**Key words:** intolerance contact lens, questionnaires, refractive surgery

**Purpose:** Contact lens intolerance is a much discussed topic. Ophthalmologists often abdicate to the optician's / optometrist's judgement before proposing surgery (refractive surgery, transplants) to the patient. We believe this to be an expression of the close relationship between experts in the field of optics / optometry and experts in the field of medicine and surgery (ophthalmologists). Contact lens intolerance is defined as the inability to wear contact lenses for more than four hours continuously [2]. It can be occasional, periodic, seasonal or total [3] and can lead to permanent discontinuation or dropout of contact lenses [2]. It's a complex condition that includes both physical, namely anatomic and physiological causes, and psychological causes. The main factors are pre-existing ocular conditions, discomfort associated with contact lenses and clinical conditions resulting from contact lens misuse [1].

**Method:** A survey of patients undergoing corneal transplantation and refractive surgery was carried out based on literature and medical records present at the AUSL Romagna. The motivations for the surgical choice as well as for contact lens intolerance were evaluated. Three questionnaires were prepared (patient, contact lens specialist and ophthalmologist) and distributed to patients on the waiting list for corneal transplantation.

**Conclusion:** The term *contact lens intolerance* is very subjective and vague. The use of specific questionnaires can provide the surgeon with more grounded data on the surgical indication. All sector associations should be involved in the objectification of contact lens intolerance, aspect which leads to eye surgery as indicated by the *Global consensus on keratoconus and ectatic diseases*.

#### **References:**

- 1 - José AP Gomes, Donald Tan, Christopher J Rapuano, Michael W Belin, Renato Ambrósio Jr, José L Guell, François Malecaze, Kohji Nishida, Victor S Sangwan, et al. Global consensus on keratoconus and ectatic diseases. *Cornea*, 34 (4): 359-369, 2015
- 2- Preeji Sudharman, Fiona Stapleton, Jim Kokkinakis, and Mark Willcox. Factors associated with contact lens intolerance in Keratoconus. *Investigative Ophthalmology & Visual Science*, 58 (8): 3924-3924, 2017.
- 3- Bezalel Schendowich and Scott Mcgregor. Managing contact lens intolerance. *Contact Lens Spectrum*, 24 (6): 34-36, 2009.

Saturday 18 May 2019

Open Paper Session 1 - Rapid Fire, 15:00-16:00

### THE EFFECTS OF TWO LONG-PASS FILTERS ON VISUAL PERFORMANCES

Presenter: Silvia Tavazzi

#### Authors:

FEDERICA COZZA<sup>1</sup>, MATTEO MONZIO COMPAGNONI<sup>2</sup>, CHIARA AIROLDI<sup>3</sup>, CHIARA BRAGA<sup>1</sup>, GABRIELE NIGROTTI<sup>1</sup>, FABRIZIO ZERI<sup>1</sup>, SILVIA TAVAZZI<sup>1</sup>, NATALIA VLASAK<sup>4</sup>, SILVANO LARCHER<sup>5</sup>

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1) University of Milano Bicocca, Department of Materials Science and Research Centre in Optics and Optometry (COMiB), Milan, Italy 2) University of Milano Bicocca, Department of Statistics and Quantitative Methods, Milan, Italy 3) University of Eastern Piedmont, Department of Translational Medicine, Novara, Italy 4) Hoya Vision Care, Uithoorn, The Netherlands 5) Hoya Lens Italy, Milan, Italy

**Key words:** anti-glare filters, long-pass filters, best corrected visual acuity, contrast sensitivity

**Purpose:** To investigate the effect of two types of anti-glare filters on visual performances.

**Method:** A group of twenty adults of  $60 \pm 7$  years wearing progressive addition lenses (PAL group) and a group of twenty adults of  $36 \pm 10$  years wearing single vision lenses (SV group) were recruited. Three types of spectacle long-pass filters were compared: clear control lens with regular anti-reflection coating, Standard Drive lens (STD DRIVE, Hoya Japan), and Professional Drive lens (PRO DRIVE Hoya, Japan). Binocular best corrected visual acuity (BCVA) was measured in three condition: photopic ( $BCVA_{\text{photopic}}$ ), mesopic ( $BCVA_{\text{mesopic}}$ ) and under glare ( $BCVA_{\text{glare}}$ ). Contrast sensitivity (CS) was also measured binocularly in photopic condition.

**Results:** Visual improvements with both STD DRIVE and PRO DRIVE lenses compared to the clear one was observed under glare and partially in mesopic condition. For STD DRIVE,  $BCVA_{\text{glare}}$  moved from 0.03 to -0.02 logMAR in PAL and from -0.08 to -0.12 logMAR in SV ( $p < 0.05$ ). For PRO DRIVE,  $BCVA_{\text{glare}}$  passed from 0.03 to -0.01 logMAR in PAL and from -0.08 to -0.12 logMAR in SV ( $p < 0.05$ ). In PAL, the  $BCVA_{\text{mesopic}}$  improved from 0.15 to 0.12 logMAR for STD DRIVE ( $p < 0.05$ ) and to 0.13 logMAR for PRO DRIVE ( $p < 0.05$ ), while no substantial difference was observed in SV. CS also showed significant improvement only in the case of PAL at 6 cycles/deg either with STD DRIVE or PRO DRIVE, and at 12, and 18 cycles/deg limited for STD DRIVE. No substantial differences were observed between the three types of lenses concerning  $BCVA_{\text{photopic}}$ . After testing all the three types of lenses, each for two weeks, the participants were asked about a subjective preference. 78.9% of participants preferred DRIVE lenses in PAL group and 60% in SV group. The most preferred one was the STD DRIVE: 47% in PAL group and 45% in SV group.

**Conclusions:** The benefit due to blue attenuation of filters below the cut-off results in some improved visual performances. This benefit is more significant in older people, likely because the filters overlap the absorption of human macular pigment that can be reduced in its efficiency as optical filter by aging.

Saturday 18 May 2019

Open Paper Session 1 - Rapid Fire, 15:00-16:00

### **IMPLEMENTING READING PERFORMANCE MEASURES IN THE CLINICAL PRACTICE: READING ALOUD OR SILENT?**

Presenter: Sotiris Plainis

#### **Authors:**

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**Key words:** reading, eye movements, fixations, reading aloud

**Introduction:** Many activities of daily living rely on reading, thus, standardized reading texts have been developed to evaluate sustained reading performance. However, a significant inter- and intraindividual variation in reading performance exists, as a result of the high influence of cognitive factors. Here we present a new method based on eye movement analysis that can improve variability in silent reading.

**Methods:** Twenty volunteers with an average age of 30 years (range: 22 to 36 yrs) participated in the study. Reading performance was evaluated using two IReST texts of the similar linguistic difficulty of about 140 words each and 0.4 logMAR print size at 40 cm distance in two conditions. First, participants were instructed to read the texts aloud as fast as they could, trying not to correct any possible mistakes. Second, participants read the texts silently while their eye movements were monitored using an infrared eyetracker (Eye-Link II, SR Research Ltd). A reading comprehension questionnaire was performed to secure a high level of attention. Data analysis included computation of reading speed (in wpm), number of fixations per word (in fpw), fixation duration, and percentage of regressions.

**Results:** Average (SD) reading speed was found to be 205 ( $\pm 21$ ) and 225 ( $\pm 47$ ) wpm for the aloud and the silent reading, respectively with the difference being statistically significant ( $p < 0.017$ ). The repeatability coefficient ( $2 * SD$ ) was better in the aloud (24 wpm) compared to the silent (45 wpm) condition. In the silent condition, the average number of fixations among participants was 1.00 ( $\pm 0.17$ ) fpw, and the repeatability of coefficient 0.19 fpw. Average fixation duration was 208 ( $\pm 19$ ) with the repeatability coefficient being 20 ms. Average percentage of regressions was 14.2% ( $\pm 6.1$ ) and the repeatability coefficient of 7.0%. Reading speed in the silent condition was statistically correlated with the number of fixations ( $r = -0.82$ ) and with fixation duration ( $r = -0.55$ ).

**Conclusions:** Most of the variability in silent reading speed derives from the number of fixations, which is known to depend on cognitive factors. Repeatability can be improved using fixation duration which better characterizes pre-retinal processing. Evaluating reading performance using eye movement analysis can result in a more reliable outcome of reading behavior.

Saturday 18 May 2019

Open Paper Session 1 - Rapid Fire, 15:00-16:00

### READING VISUAL ACUITY VS READING SPEED IN SPANISH CHILDREN POPULATION

Presenter: Juan Carlos Ondategui-Parra

#### Authors:

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**Key words:** Visual Acuity, Reading speed, Reading Visual acuity, Academic Performance

**Purpose:** Vision is a complex and fundamental process in school learning. This is a significant reason to measure with accuracy the visual acuity as a useful tool in the evaluation of visual abilities in children given the current academic and social visual demands. The purpose of this study is to compare the reading visual acuity (RA) in front of the reading speed (RS) in Spanish children population.

**Method:** The design of the study is observational, cross-sectional and cases non-consecutive. 81 children between 8 and 9 years old, of 3rd grade, were evaluated. Clinical information and clinical history were obtained, emphasizing school performance, accommodation and binocularity in near vision. Visual Acuity (VA) was evaluated with a conventional optotype (Bailey-Lovie test) and the DEM. The RA test consists of 3 presentations of 24 sentences each, with a range of AV between 0.8 and -0.3 logMAR. The RS test consists of 6 presentations of 9 sentences each, all of VA 0.5 logMAR. Both optotypes show different but similar sentences of  $11 \pm 1$  words, and  $60 \pm 2$  characters per sentence.

**Results:** The mean and standard deviation of VA were for RE:  $0.09 \pm 0.11$  logMAR, LE:  $0.08 \pm 0.09$  logMAR and  $0.02 \pm 0.09$  logMAR binocular. For RA was RE:  $0.06 \pm 0.11$  logMAR, LE:  $0.04 \pm 0.10$  logMAR and binocular  $0.01 \pm 0.10$  logMAR. There were a significant statistical correlation between the two variables ( $r=0.69$  comparing RE,  $r=0.63$  comparing LE and  $r=0.64$  comparing binocular). Regarding the RS,  $104.94 \pm 33.48$  wpm was obtained in the RE,  $111.47 \pm 33.89$  wpm in the LE and  $109 \pm 33.73$  wpm with both eyes. A significant correlation has been found between the RS with the horizontal adjusted time of the DEM. The correlation between academic performance and VA and RS has also been analyzed.

**Conclusion:** Both RA and RS tests are clinically acceptable because there is a good correlation between VA measures, and present valid academic performance information that does not present Visual Acuity Test.

Saturday 18 May 2019

Open Paper Session 1 - Rapid Fire, 15:00-16:00

## **IMPROVEMENT IN MESOPIC VISUAL FUNCTION ATTAINED BY FREE-FORM PROGRESSIVE LENSES SPECIFICALLY DESIGNED FOR NIGHT DRIVING**

Presenter: Eva Chamorro

### **Authors:**

EVA CHAMORRO<sup>1</sup>, PABLO CONCEPCIÓN<sup>1</sup>, AMELIA GONZALEZ<sup>1</sup>, JOSÉ MIGUEL CLEVA<sup>1</sup>, JOSÉ ALONSO<sup>1</sup>

### **Affiliation:**

1) Indizen Optical Technologies

**Key words:** Night driving, Progressive power lenses, blue-light filter, Mesopic visual function

**Purpose:** The goal of this study is to determine the mesopic visual function of professional experienced drivers when wearing a general-use progressive power lens (PPL) compared to a PPL optimized for night-driving.

**Method:** Visual function in 17 experienced presbyopic drivers (57±3 years old) was evaluated in mesopic illumination conditions after 15 minutes of dark adaptation while users were wearing 2 different free-form progressive addition lenses: A) General use design with standard progression profile and anti-reflective coating (control lens) and B) Special design developed ad-hoc for this study and characterized by a progression profile optimized for night driving with a slight underpowered region above the fitting cross and blue-light filter (test lens). Parameters analyzed were high contrast visual acuity using the ETDRS test (VAm), undistorted distance visual field (VFm) using a rotating platform and glare recovery time after flash (Gt). In addition, subjects were asked to use both pairs of lenses for 7 days and rate their subjective satisfaction (SS) for night driving (scale 1-5). Statistical analysis was performed using Statgraphics Centurion XVI.II software.

**Results:** Clinical assessment revealed significant differences between the control and test lenses. Obtained values were: VAm(A)=-0.06±0.01logMAR and VAm(B)=-0.10±0.01logMAR (p=0.04), VFm(A)=45.14±2.79° and VFm(B)60.48±2.73° (p=0.02), Gt(A)=36.02±2.99s and Gt(B)=24.87±2.90s (p=0.02), SS(A)= 3.59±0.94 and SS(B)= 4.65±0.49 (p=0.00)

**Conclusion:** The new lenses designed to optimize night driving, characterized by a modified progression profile with a slight underpowered region above the fitting cross and blue-light filter, improved mesopic visual function. These lenses provided better high contrast visual acuity, wider undistorted distance visual field, lower glare recovery time and higher user satisfaction for night driving.

Saturday 18 May 2019

## Open Paper Session 2 – Anterior Eye, 15:00-16:00

### THROUGH-FOCUS AND VISUAL PERFORMANCE UNDER DIM-LIGHTING AFTER REFRACTIVE CLEAR LENS EXCHANGE WITH TRIFOCAL IOL

Presenter: Santiago Escandón-García

#### Authors:

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**Key words:** Trifocal IOLs, Presbyopia, Dysphotopsias, Quality of Vision

**Purpose:** The purpose of this study was to evaluate the through-focus and visual performance under dim-illumination conditions after refractive clear lens exchange with trifocal IOLs. A secondary goal was to quantify the post-surgical changes up to 3 months of follow-up in order to evaluate potential adaptive effects to multifocality.

**Methods:** Nineteen patients undergoing bilateral refractive clear lens exchange and implanted with a trifocal IOL (FineVision, PhysiOL, Belgium) participated in this prospective, consecutive, case series. Distance VA and through-focus performance (+1.00 to -3.00 in 0.5 steps) was measured. Contrast sensitivity (CS) was measured under photopic conditions (85 cd/m<sup>2</sup>) without glare and mesopic conditions (5 cd/m<sup>2</sup>) with intensive glare (28 lux) using the Functional Visual Analyzer (StereoOptical, IL). Light disturbances were evaluated under monocular and binocular conditions with the Light Distortion Analyzer (University of Minho, Portugal). Subjective quality of vision (QoV) was also assessed with a questionnaire obtaining scores of Frequency, Severity and Bothersome. All procedures were conducted before surgery and at 1 and 3 months after implantation.

**Results:** Through-focus curves at 1 month compared to baseline showed a statistically significant improvement (Wilcoxon test;  $p < 0.05$ ) for vergences between -2.00 (50cms) to -3.00 (33 cms). At -1.50 vergence (67 cms) the difference was not statistically significant ( $p = 0.057$ ) but it was clinically relevant (improved by 0.26 to 0.14 logMAR). Photopic contrast sensitivity showed a significant increase after surgery for the frequency of 3 cycles per degree under photopic conditions ( $p = 0.017$ ). Mesopic CS did not show any significant change after surgery or between 1 and 3 months ( $p > 0.05$ ). Subjective QoV scores remained unchanged for frequency and severity, but bothersome score reduced significantly ( $p = 0.021$ ) between baseline and 3 month measurements. Light disturbance were 21% lower under binocular compared to monocular conditions (binocular summation effect;  $p \leq 0.001$ ) at all visits, but did not change between baseline and follow-up at 1 and 3 months ( $p > 0.05$ ).

**Conclusion:** The trifocal IOLs evaluated in this study showed a satisfactory result after refractive clear lens exchange. The range of intermediate and near vision was significantly extended without significant compromise in terms of CS, light disturbance or subjective QoV under dim-lighting conditions. Improvements in subjective (but not objective) visual performance can be expected up to 3 months after surgery.

Saturday 18 May 2019

Open Paper Session 2 – Anterior Eye, 15:00-16:00

**CUSTOMIZED RGP CONTACT LENSES TO IMPROVE VISUALIZATION DURING PHACOEMULSIFICATION IN SEVERE DISTORTED CORNEAS**

Presenter: Fadi Harb

**Authors:**

WASSEF CHANBOUR<sup>1</sup>, FADI HARB<sup>1</sup>, ELIAS JARADE<sup>1</sup>

**Affiliation:**

1) Beirut Eye & ENT specialist Hospita 2) Lebanese University 3) Mediclinic, Dubai mall

**Key words:** RGP, Contact Lens, Phacoemulsification

**Introduction:** Advanced Keratocouns and Ectatic corneal diseases may lead to corneal thinning and irregular astigmatism. The optical distortion caused by these pathologies may result in poor visibility for the surgeon during Phacoemulsification surgeries. Thus, the risk of complication will increase in intraoperative procedures (capsular rupture, vitreous loss).

**Purpose:** To use Rigid gas permeable contact lenses (RGP CLs), to improve visualization during all the stages of Phacoemulsification surgery in irregular corneas.

**Method:** A customized, 12 mm, RGP CL was designed and manufactured. Two peripheral notches were customized to fit the hands' position of the Phaco surgeon (11 O'clock and 2 Clock in this case series), in order to allow clear corneal incisions.

**Results:** Good visualization of the anterior lens and capsule attained with the RGP fitting with Smooth and non-complicated Phacoemulsification was tested and performed for two patients. In these cases, without RGP fitting, surgery would have not been technically possible.

Improved visualization was reported during all the steps (Capsulorhexis, IA, Phaco. IOL implantation). The grooves helped in stabilizing the CL during the eye manipulation.

This method allows any insertion of surgical instruments and maintains a good stability of the CL during the operation.

**Conclusion:** Customized RGP CLs may help reducing the complication during Phacoemulsification in irregular corneas.



Saturday 18 May 2019

Open Paper Session 2 – Anterior Eye, 15:00-16:00

### **CONFLICTING STUDY DESIGNS IN OMEGA-3 STUDIES FOR OCULAR HEALTH**

Presenters: Elise Kramer, Armin Dudgek

**Authors:**

ELISE KRAMER<sup>1</sup>, ARMIN DUDGEK<sup>1</sup>

**Affiliation:**

1) Miami Contact Lens Institute

**Key words:** Omega-3 fatty acids, dry eye disease, study design

**Clinical topic:** This presentation explores the variability on the design of various studies testing the efficacy of Omega-3 fatty acids on ocular health and how outcomes may be misinterpreted and generalized to specific populations.

**Actions Taken:** Following a non-exhaustive literature review of various studies, the authors discuss the impact on the variability in study design and methodology used to test the efficacy of omega-3 supplements on ocular health. The authors specifically contrast the study from May 2018, in which the US based DREAM (Dry Eye Assessment and Management) Research Group published a multi-center, randomized, double-blind “real-world” clinical trial assessing the efficacy and safety of oral omega-3 supplementation for the treatment of dry eye disease (DED) with other studies in Europe, having a entirely different study design and showing totally different results. The former study does not support the use of omega-3 supplements in patients with moderate to severe DED whereas other historically, carefully designed studies do.

**Recommendations:** The judicious use of current best evidence should always be combined with clinical expertise in making decisions about the care of individual patients. When reviewing current literature, it is important for the reader to understand the study design and methodology before reaching to treatment paradigm conclusions based solely on results.

Saturday 18 May 2019

### Open Paper Session 3 – Educational themes, 16:30-17:00

#### EVALUATION OF CLINICAL REASONING TEACHING IN A TECHNOLOGY ENHANCED LEARNING ENVIRONMENT

Presenter: Sonja Zinken

**Authors:**

SONJA ZINKEN<sup>2</sup>, GERALDINE CLAREBOUT<sup>2</sup>

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**Key words:** Clinical reasoning, teaching, technology enhance learning environment

**Purpose:** Clinical reasoning (CR) is a skill optometrists use every day to diagnose and treat patients. It is difficult to teach and learn due to the often unconscious cognitive processes occurring. Teaching CR requires three types of knowledge: 1) content knowledge, meaning clinical knowledge 2) pedagogical knowledge meaning knowledge of how to teach and 3) technical knowledge, meaning knowledge about how to integrate technology to enhance learning. These aspects are represented in the TPACK framework. In this research we used the framework as theoretical underpinning to evaluate clinical reasoning teaching in a technology enhance learning environment (TELE). The aim of this study was to highlight areas of faculty development to improve the teaching of clinical reasoning.

**Method:** A qualitative research design was selected to gain insight into lecturers explanation and implementation of clinical reasoning in a TELE. Nine lecturers, involved in the development and lecturing of theoretical and/or practical subjects at the pre-clinical bachelor phase of the optometry department of the Hogeschool Utrecht, took part in individual semi-structured interviews. The ethnographic design enabled the researcher to analyse and evaluate individual views and reasoning for the chosen method(s) for teaching CR. Interviews were transcribed verbatim using atlas.ti. The framework method was used to develop themes based on Merrill's theory of first principles of instruction. This enabled the researcher, to structure what instructional methods are used to teach clinical reasoning and whether these methods are effective, engaging and efficient to enhance learning.

**Results:** Results of this qualitative study reveal showed both pedagogical knowledge and technology content knowledge can be improved.

Most lecturers are using paper-based cases as a method to teach CR. Only one lecturer mentioned the use of real cases to stimulate CR. On asking the reasoning behind the use of the instructional method answers ranged from: *"I've been doing it like this for over 20 years"* to *"It is just in me"*. Technology was not used often. Reasons given were: *"There is not enough time, to try it out"* to *"I don't know what is possible"*.

**Conclusion:** This research has shown improvement is needed in the field of pedagogical knowledge and technological content knowledge to aid the teaching of CR. Faculty development and the availability of medical educationalist to support lecturers are recommended.

Saturday 18 May 2019  
Open Paper Session 3 – Educational themes, 16:30-17:00

## **GROUP WORK AND PEER ASSESSMENT IN ITALIAN OPTOMETRY HIGHER EDUCATION**

Presenter: Fabrizio Zeri

### **Authors:**

FABRIZIO ZERI<sup>1</sup>, RICCARDO CERVIO<sup>2</sup>, MARTA MOSCI<sup>2</sup>, SILVIA TAVAZZI<sup>1</sup>, SHEHZAD NAROO<sup>3</sup>

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1) University of Milano Bicocca, Department of Materials Science & Research Centre in Optics and Optometry (COMiB), Milan, Italy 2) University of Milano Bicocca, Degree in Optics and Optometry, Milan, Italy 3) Ophthalmic Research Group. School of Life and Health Sciences, Aston University, Birmingham UK

**Key words:** Group-work, Peer assessment, Higher Education, Optometry

**Purpose:** Teaching in Higher Education (HE) can be improved using the positive influence of social activity thought activities such as group-work (GW) and peer-assessment (PA). The present study aimed to explore the experience and perceptions of GW and PA held by educators and students in the field of Optometry in Italy.

**Method:** In a first survey, forty-five (43.8±13.0 years, range 24–67) Italian educators of optometric clinical modules answered an anonymous email questionnaire investigating the perception and attitudes towards GW and PA. In a second study, sixty-six third-year undergraduates (22.5±2.0 years; range 20-29) answered a questionnaire investigating the perception and attitudes towards GW and PA at the beginning and at the end of a module of Advanced Optometry structured with a formative/summative GW activity with a final PA.

### **Results:**

First study: Two-third of Italian Optometric educators declared they use GW, but no one used this activity as summative assessment tool. The use of GW was more common in educators with longer teaching experience. Only a quarter of the sample (11 out of 45) answered they used PA at least once. Educators' attitudes towards GW was more positive than PA ( $P < 0.001$ ) and no correlation between their perception of GW and PA was found.

Second study: About 60% and 80% of the interviewed students stated they have never participated with GW and PA respectively. Student' pre-course attitudes towards GW and PA resulted close to values in the middle of the scale (neutral attitudes) with no significant differences and positive correlations between them ( $r_{\text{spearman}}=0.36$ ;  $p < 0.001$ ). If student' GW attitudes were compared with educators' GW attitudes, the latter resulted more positive. Student' post-course attitudes towards GW and PA was enhanced for four out of the eight sub-scales studied.

**Conclusion:** Although GW and PA are considered very good strategies to improve teaching in HE, especially in health-related disciplines, their diffusion in Optometric HE in Italy is quite limited. Among educators there is a stronger barrier (negative attitude) towards PA. Among students, attitudes towards GW and PA were quite neutral but after having experienced the two pedagogical strategies in the module attended, they increased significantly.

Saturday 18 May 2019  
Open Paper Session 3 – Educational themes, 16:30-17:00

## COMPARISON OF OPTOMETRY CURRICULA IN EUROPE, ISRAEL AND INDIA AS A STEP TOWARD ACCREDITATION FOR THE EUROPEAN DIPLOMA IN OPTOMETRY

Presenter: Ellen Svarverud

### Authors:

ELLEN SVARVERUD<sup>1</sup>

### Affiliation:

1) OCULUS Consortium

**Key words:** Optometry curricula, accreditation, European Diploma in Optometry

**Purpose:** OCULUS is an international consortium funded by Erasmus+ with the goal of improving optometry educations in India and Israel to meet the standards of the European Diploma of Optometry administered by the European Council of Optometry and Optics (ECOO). Four optometry schools in Europe, three in India and two in Israel are participating in OCULUS. Two of the European institutions have already been accredited with the European Diploma and provide mentorship to the Indian and Israeli educators. This abstract describes the processes of self-assessment and benchmarking by which the curricula are evaluated according to criteria set by ECOO.

**Methods:** Five optometry departments completed the curriculum self-assessment forms provided by ECOO. The forms were converted into Excel for convenience. The accredited European institutions provided mentorship and ECOO answered frequent questions. ECOO representatives visited all five departments. Forms were submitted and a preliminary opinion provided for each European Diploma topic, based on a three-point scale: *satisfactory*, *some weakness* and *inadequate*.

**Results:** All self-assessment forms were submitted and ECOO provided the benchmark opinions. One education reported technical problems completing their self-assessment so their benchmark is unlikely to reflect the true nature of the program. Thus, the results will be reported for the other four departments. In terms of knowledge-based competencies, all schools received a satisfactory review in *Part A, Optical Technology*. All received either *satisfactory* or *some weakness* in *Part B, Management of Visual Problems* and *Part C, General Health and Ocular Abnormalities*. Clinical based competencies scored with either *some weakness* or *inadequate*. Subject 12, Investigative Techniques, was graded *inadequate* at all departments.

**Conclusions:** Optometry education in Israel and in the schools assessed in India has many similarities to that recommended by the European Diploma of Optometry. The main gaps are in clinical competencies, particularly in Investigative Techniques.

Saturday 18 May 2019  
Open Paper Session 3 – Educational themes, 16:30-17:00

## **A BEGINNERS GUIDE TO GRANT APPLICATIONS: MAKING YOUR RESEARCH UNDERSTANDABLE AND GET THE GRANT!**

Presenter: Dorothy Thompson

### **Authors:**

DOROTHY THOMPSON<sup>1</sup>

### **Affiliation:**

1) Great Ormond Street Hospital for Children NHS Trust

**Key words:** lay paragraphs, public patient involvement (PPI), outcome measures, grant application

**Purpose:** Many grant applications fail because the language is too technical: the requirement to have a “lay description” is typically mandatory. Major funding bodies nowadays insist on public patient involvement (PPI) and doing this well will impress the grant committee and can be essential in swaying the ethics board. All this is worthless unless you are able to disseminate the outcome and impact of your study to the widest audience.

**Methods:** I will explore how, in grant applications, a lay description maps to educational level. I will describe the tools you can use measure the readability of your written descriptions and when lay descriptions will be expected as you plan and execute your research study or audit. I will outline the efforts to standardise outcome measures in optometric and ophthalmic research so that they are translatable across the world. I will consider the importance of outcome in steering the statistics you use and why the context of statistics is essential.

**Results:** A simple tool in word document review can provide an ease of reading score. Aim to reach an average 12-15 year old. Use more full stops for short sentences, use short words with few syllables, and keep sentences active. Qualitative patient reported outcomes can be converted into metrics using validated questionnaires. These are published, and recently visual related quality of life and functional vision scores have become freely available for children. Condition specific research outcomes (e.g., for AMD, Glaucoma, diabetes, glaucoma) are being standardised right now and adopted internationally.

**Recommendations:** Embrace lay descriptions as they will underpin your success. Use every PPI opportunity to describe your work. Use standardised outcome measures to ensure your results will be evidence in systematic reviews. You can use standardised outcome measures to validate new outcome measures that may be more meaningful for your topic. Describe your statistics and impact of your data in contexts that can be understood FIRST time.

Saturday 18 May 2019

Open Paper Session 4 – Rapid Fire, 16:30-18:00

**THE ISNT RULE: DIFFERENCES BETWEEN MERIDIAN-BASED AND QUADRANTS-BASED MEASUREMENT METHODS IN A NORMAL POPULATION**

Presenter: Ivo Soares

**Authors:**

IVO SOARES<sup>1</sup>, SÓNIA PEDRO<sup>1</sup>, VASCO ALMEIDA<sup>1</sup>

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**Key words:** ISNT, RNFL thickness, meridian-based, quadrant-based

**Purpose:** In normal subjects, the neuroretinal rim width is considered to follow a pattern known as ISNT rule. Specifically, the lower width (I) is the widest, followed by the superior width (S), then the nasal width (N), and finally the temporal width (T). Other variants were proposed (IST, IS, and T). The validity of these rules in a normal population exhibits a great variability. Furthermore, two different measuring methods are considered in the literature, designated by meridian-based and quadrants-based (Figure 1). The comparison of these methods was never performed in the same population. This work aims to measure the ISNT rule and its variants using the two methods and compare them with previously published works. The inter-method and RNFL thickness agreement are also analyzed.

**Methods:** Total of 69 digital stereoscopic fundus images from normal subjects were enrolled in this study. All subjects underwent OCT imaging with the peripapillary RNFL circle scan of 3.5mm in diameter. Cup and disc boundaries were labelled for each stereoscopic image by three different observers. The neuroretinal area was divided into meridian-based (F1) and quadrants-based (F2) (Figure 1). The statistical analyses were performed using SPSS software version 20.0. The frequency of the ISNT rule and its variants was analyzed. Kappa statistics was used to evaluate inter-methods and RNFL thickness agreement.

**Results:** For the ISNT rule F1 and F2 are valid for 7.25% and 1.45% of rim assessments respectively, and 50.72% for RNFL measurements. Removal of the nasal component improves the F1 and F2 validity, with 39.13% and 52.17% respectively. The F1 and F2 methods do not have a significant agreement in the ISNT measurement, but have a significant agreement for the IST and IS measurements ( $\kappa=0.512$  and  $\kappa=0.768$  respectively).

**Conclusions:** ISNT rule and its variants measurements exhibit significant differences depending on the method used. The meridian-based method has a higher validity than the quadrants-based method. For the IST and IS rule, there is a significant agreement between the meridian-based and quadrants-based method. Neither the meridian-based or the quadrants-based method has a significant agreement with the RNFL thickness in any of the rules.

Saturday 18 May 2019

Open Paper Session 4 – Rapid Fire, 16:30-18:00

#### **ASSESSMENT OF ISCHEMIC OPTIC NEUROPATHY**

Presenter: Matjaž Mihelčič

#### **Authors:**

MATJAŽ MIHELČIČ<sup>1</sup>

#### **Affiliation:**

1) Optika Mesec 2) University of Velika Gorica 3) Aalen University

**Key words:** Optic Neuropathy, Infrared Pupillography, Visual Fields, Pulfrich

**Case presentation:** 48 years old female presented with slightly disturbing vision in the lower portion of her right visual field, which occurred few days before. Her general health was good and she had unremarkable ocular history. Comprehensive ocular examination was performed, including visual acuity assessment, ocular motility testing, checking pupillary responses and automated static visual fields testing. Colour vision and quadrant-specific red desaturation were assessed as well. Colour vision abnormalities and visual field defects suggested optic nerve disease. This was further supported by positive afferent pupillary defect, positive Pulfrich phenomena and ophthalmoscopic appearance of optic nerve head, which was showing sectorial disc edema.

**Actions taken:** The Patient was referred urgently to the Eye hospital, with tentative diagnosis of anterior optic neuritis of unknown aetiology. After thorough ophthalmological examination, including testing of systemic infectious and inflammatory markers and electro-physiological tests, the diagnosis was Non-Arteritic Anterior Ischemic Optic Neuropathy (NA-AION).

**Conclusions:** Optometrists should be aware of optic nerve diseases which can have insidious onset, but can cause irreversible loss of vision and can also be a sign of severe systemic disease. Beside classical tests, several innovative, non-invasive methods can be used in everyday optometric clinical practice to narrow down the (tentative) diagnosis. In this presentation, infrared pupillometry, quadrant-specific red desaturation and Pulfrich phenomena, as well as OCT imaging will be presented. Recommendations for optometrists and for patients suffering optic neuropathies will be given.

Saturday 18 May 2019

Open Paper Session 4 – Rapid Fire, 16:30-18:00

**EFFECTS OF LED SCREEN ON THE RETINA OF PIGMENTED RATS: STRUCTURAL AND GENETIC ANALYSIS**

Presenter: Celia Sánchez-Ramos

**Authors:**

CELIA SÁNCHEZ-RAMOS<sup>1</sup>, XABIER RODRÍGUEZ-ALONSO<sup>1</sup>, SARA GUTIÉRREZ-JORRÍN<sup>1</sup>, ATOCHA GUEDAN-DURAN<sup>1</sup>, FIVOS PANETSOS<sup>1</sup>, CRISTINA BONNIN-ARIAS<sup>1</sup>

**Affiliation:**

1) Universidad Complutense de Madrid

**Key words:** LED-screen, gene expression, caspasa, photoprotected

**Purpose:** to analyze the structural and gene expression changes of the retina of pigmented rats exposed to LEDs screen of commercial tablets with and without protective filter that absorbs short wavelengths in comparison with control animals (no exposed to the light).

**Methods:** the standard cages were surrounded with 6 tablets. The animals were exposed in cycles of 16/18 hours of light/darkness 3 consecutive months. After the exposure, the animals were sacrificed and their right eyes were fixed, embedded in paraffin and cut to a thickness of 7 microns of on which a Masson trichrome staining was performed. The animal's left eyes were frozen at -80°C for their use in qPCR studies.

**Results:** in the structural analysis was found a reduction of 23,8% in the density of the number of cell nuclei of the outer nuclear layer in rats exposed to unprotected LEDs screen with respect control animals. However, rats exposed to LEDs screen with protective filter did not show significant differences in the structure of the outer nuclear layer of the retina. The comparative analysis of gene expression showed in rats exposed to unprotected LEDs screen a decrease in the expression of antiapoptotic genes and an overexpression of proapoptotic genes (genes of the enzymes caspasa-3 and caspasa-9). MMPs encoding genes are affected (overexpression of MMP-2 and MMP-9). In retinas of rats exposed to LEDs screen of tablets with absorption filter of short wavelengths, the changes in gene expression decrease partially or totally (specific values in table).

**Conclusion:** these changes in the retina of rats showed that exposure to LEDs screen produces damage indicators in the retina. Short wavelength light absorbing filter decrease the nocive effect in the retinal cells produced by LEDs screen.



Saturday 18 May 2019

Open Paper Session 4 – Rapid Fire, 16:30-18:00

### IS PHOTOSTRESS ATTENUATED BY MACULAR PIGMENTS?

Presenter: Silvia Tavazzi

#### Authors:

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**Key words:** Photostress, color, macular pigment, photons.

**Purpose:** To investigate whether the macular pigment (MP) behaves as an optical filter, attenuating photostress by analyses of recovery time at different wavelengths.

**Method:** Thirty-nine subjects (19-28 years) were exposed to 25 s of blue (450 nm) and green (523 nm) LED photostress with a repeated-measures experimental design. Light source irradiance was varied by placing four different neutral-density filters in front of the source. Photostress recovery time (PSRT) required to read correctly a 0.2 logMAR letter after photostress was measured as a function of the level of irradiance. Correlation was studied between PSRT and irradiance. Statistical significance of differences between PSRTs after blue or green photostress was evaluated at  $\text{Log}(\text{irradiance}(\text{quanta s}^{-1} \text{cm}^{-2}))=14$  by Student's t statistics.

**Results:** PSRTs were found linearly correlated to  $\text{Log}(\text{irradiance})$  for both blue and green. At  $\text{Log}(\text{Irradiance}) = 14 \text{ quanta s}^{-1} \text{cm}^{-2}$ , blue and green mean PSRTs resulted different ( $p < 0.001$ ) with  $3.8 \pm 0.8 \text{ s}$  and  $6.7 \pm 1.7 \text{ s}$  respectively. Then, PSRT was calculated again for a fixed level of  $\text{log}(\text{Irradiance}) (14 \text{ quanta s}^{-1} \text{cm}^{-2})$ , after correcting irradiance for the optical absorption of MP resulting  $6.6 \pm 1.5 \text{ s}$  and  $6.7 \pm 1.7 \text{ s}$  for blue and green respectively ( $p > 0.05$ ).

**Conclusions:** MP plays the role of an optical filter attenuating photostress. PSRT was substantially proportional to the number of incident photons corrected for the MP optical absorption regardless of their wavelength (blue or green).

Saturday 18 May 2019

Open Paper Session 4 – Rapid Fire, 16:30-18:00

**EFFECT OF CHANGES IN GRATING DIRECTION AND SPATIAL FREQUENCY AS A MEASURE OF THE SENSITIVITY OF MACULAR FUNCTION – A PILOT STUDY**

Presenter: Ana Amorim-de-Sousa

**Authors:**

ANA AMORIM-DE-SOUSA<sup>1</sup>, RUTE MACEDO-DE-ARAÚJO<sup>1</sup>, ANA FILIPA MOTA<sup>1</sup>, ANDRÉ AMORIM<sup>1</sup>, ANTÓNIO QUEIRÓS<sup>2</sup>, PAULO FERNANDES<sup>2</sup>, JOSÉ MANUEL GONZÁLEZ-MÉIJOME<sup>2</sup>

**Affiliation:**

1) Clinical and Experimental Optometry Research Laboratory (CEORLab), Center of Physics, University of Minho, Braga, Portugal 2) Department of Physics, School of Sciences, University of Minho, Braga, Portugal

**Key words:** electroretinogram, macular function, spatial frequency sensitivity

**Purpose:** To quantify the impact of changes in grating direction and spatial frequency (SF) in functional macular sensitivity.

**Method:** Five young (28.6±7.2years) healthy subjects near emmetropia ( $M_0 = -0.3 \pm 0.72D$ ) participated. The pattern ERG response (PERG) was recorded using the RETI-port/scan21 (Roland Consult, Wiesbaden, Germany) following the ISCEV guidelines. The tests were performed to the right eye using a DTL-plus electrode (Diagnosys LLC, UK) and the pupils were previously fully dilated with 2 drops of 1% phenylephrine. Left eye was occluded. The stimulus was composed by a reversal checkerboard of black and white squares. Five different PERGs evaluations were performed using 4 black-white square gratings (98% contrast) printed on transparent film (horizontal and vertical directions, low (1.2cpd) and high SF (4.8cpd)) and a baseline measurement. N35, P50 and N95 peak times - in milliseconds - and N35-P50 and P50-N95 peak amplitudes – microVolts – were evaluated. The pupil size was controlled during the experiment. The screen luminance was 150.11±1.91LUX at baseline and 122.84±1.23LUX with grating stimuli.

**Results:** The mean pupil size was 7.44±0.57mm during the experiment. All the gratings delayed the peak times N35, P50 and N95 and decreased the amplitude trough peaks N35-P50 and P50-N95, compared to the baseline values. Only the N35 peak time for low SF increased with statistical significance ( $p < 0.045$ , Paired T-test) from baseline, as well as N35-P50 and P50-N95 amplitudes for vertical low SF ( $p < 0.041$ , Paired T-Test). Low SF showed to increase peak times more than high SF, for both horizontal and vertical directions. The same was observed for the decrease of N35-P50 and P50-N95 amplitudes. However, the statistical analysis did not show a significant difference for the comparison between the two SF and directions ( $p > 0.193$ , Paired T-test).

**Conclusion:** Our results suggest that PERG response tend to be more sensitive to gratings of low SF rather than high SF. This can be related with the usual contrast sensitivity function in healthy subjects that tell us that for lower SF the contrast sensitivity is higher. This study suggests that PERG response could be used as an objective measurement of macular sensitivity to spatial frequency but not to orientation changes.

Saturday 18 May 2019

Open Paper Session 4 – Rapid Fire, 16:30-18:00

### LOCAL RETINAL SENSITIVITY TO DIFFERENT GRATING DIRECTION MEASURED WITH MFERG

Presenter: Ana Amorim-de-Sousa

#### Authors:

ANA AMORIM-DE-SOUSA<sup>1</sup>, RUTE MACEDO-DE-ARAÚJO<sup>1</sup>, ANA FILIPA MOTA<sup>1</sup>, ANDRÉ AMORIM<sup>1</sup>, ANTÓNIO QUEIRÓS<sup>2</sup>, PAULO FERNANDES<sup>2</sup>, JOSÉ MANUEL GONZÁLEZ-MÉIJOME<sup>2</sup>

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**Key words:** multifocal electroretinogram, retinal response, grating orientation sensitivity

**Purpose:** To evaluate the functional retinal changes to different grating orientation at different retinal locations.

**Methods:** Five almost emmetropic ( $0.3 \pm 0.72D$ ) subjects ( $28.6 \pm 7.2$  years) participated in this pilot study. Multifocal electroretinogram (mfERG) was recorded using the RETI-port/scan21 (Roland Consult, Germany) following the ISCEV guidelines, to assess localized retinal response. The tests were performed to the right eye with a DTL-plus electrode (Diagnosys LLC, UK) and the pupils were previously fully dilated with 2 drops of 1% phenylephrine. The left eye was occluded. Pupil dilation was controlled during the experiment. The stimulus consisted of 61 hexagonal segments scaled with eccentricity displayed on a monitor at 28cm from the subject. Five mfERG evaluations were performed using 4 black-white square gratings (98% contrast) of different orientation - horizontal, vertical,  $45^\circ$  and  $135^\circ$  - printed on a transparent film ( $SF=1.2$  cpd) and a baseline measurement. N1 and P1 peak-times (ms) and amplitudes ( $\mu V$ ) were evaluated for the total response and along horizontal, vertical, oblique  $45^\circ$  and oblique  $135^\circ$  retinal meridians. The screen luminance was  $150.11 \pm 1.91$  LUX at baseline and  $122.84 \pm 1.23$  LUX with grating films.

**Results:** N1 and P1 peak-times showed no significant differences from baseline mfERG response with any grating orientation ( $p > 0.070$ ). Baseline N1 and P1 amplitudes changed significantly when the retinal response was evaluated with all gratings (differences  $> 60.37 \pm 38.68 \mu V$ ,  $p < 0.044$ ). P1 amplitude of the horizontal retinal meridian showed to be significantly different when induced the vertical and obliques gratings (differences  $> 213.89 \pm 172.64 \mu V$ ,  $p < 0.045$ ). The same was observed for the vertical meridian. However, N1 amplitude of the vertical meridian decreased significantly with the horizontal and obliques gratings (differences  $> 101.71 \pm 69.62 \mu V$ ,  $p < 0.045$ ). N1 and P1 amplitudes of the meridians at  $45^\circ$  and  $135^\circ$  decreased when imposed gratings with the same orientation and with the horizontal and vertical ( $p < 0.036$ ).

**Conclusion:** In this study, the retinal function between meridians changed depending on the orientation of the grating. The results suggest a sensitivity of opposite meridians versus grating's orientation, especially at the horizontal and vertical meridians with the vertical and horizontal grating orientation, respectively. These results suggest that oblique astigmatism generated along the central  $60^\circ$  of the posterior retina influences the response of the retinal cells to resolution stimuli.

Saturday 18 May 2019

Open Paper Session 4 – Rapid Fire, 16:30-18:00

### VARIATION OF RETINAL CELL VIABILITY IN FUNCTION OF THE SPECTRAL COMPOSITION OF LED SCREENS

Presenter: Celia Sánchez-Ramos

#### Authors:

CELIA SÁNCHEZ-RAMOS<sup>1</sup>, SARA GUTIÉRREZ-JORRÍN<sup>1</sup>, XABIER RODRÍGUEZ-ALONSO<sup>1</sup>, ATOCHA GUEDAN-DURAN<sup>1</sup>, FIVOS PANETSOS<sup>1</sup>, CRISTINA BONNIN-ARIAS<sup>1</sup>

#### Affiliation:

1) Universidad Complutense de Madrid

**Key words:** wavelength filtre, LED Light, Cell viability, Apoptosis

#### Purpose:

- Studying the cell viability of the retinal tissue in vitro after exposure to different spectral composition.
- Assessing the DNA damage of the retinal tissue in vitro after exposure to different spectral composition.
- Determining the apoptosis of the retinal tissue in vitro after exposure to different spectral composition.

**Method:** A lighting device comprising six differentiated lighting zones separated off from each other by discriminating barriers. Each one contains a LED with irradiance 5Mw/cm<sup>2</sup> but emitting different spectra composition: Blue (468nm); Green (525nm); Red (616nm); White T<sub>a</sub>=5400°K. Cells were exposed to LED light for 3 light-dark cycles (12 hours/12 hours) with and without the interposition of a blocking element of short wavelengths between 380-500nm. There was a zone not illuminated by LED where the cells not exposed to light which were used as negative control.

**Results:** After an alternating of the 3 light-dark cycles occurs a decrease of the growth of the human retinal pigment epithelial cells and an increase in the number of cells expressing the histone H2AX (DNA damage) and caspase-3 and-7 (apoptosis). In all cases the blocking element exerts a protective effect against the damaging effects of light on the cells. However, does not recognize the problems associated with apoptosis in the range comprised between 500-590nm.

**Conclusions:** The device blocking the short wavelengths between 380-500nm, so is necessary to extend protection to 590nm without distorting the protection in the previous range. It allows increasing further the life of retinal cells, improving user's eye system in short and medium wavelength ranges. A solution is a diopter for blocking wavelengths between 380-590nm wherein the mitochondrial damage is very high, in combination with a diopter with short wavelengths ranging between 380-500nm. Is demonstrated that the reduction of the emission caused by light sources as those incorporated in the mobile devices in the spectrum comprised between the 380-590nm is beneficial. In all the previous embodiments, a second diopter is included for medium wavelengths ranging from 500-590nm reducing the effect of the medium wavelengths in the range of the green which has a very high range of cell death.

Saturday 18 May 2019

Open Paper Session 4 – Rapid Fire, 16:30-18:00

### **EFFECT ON CONTRAST SENSITIVITY OF THE USE OF NRBC PROTECTION EQUIPMENT**

Presenter: Sara Gutiérrez-Jorrín

#### **Authors:**

SARA GUTIÉRREZ-JORRÍN<sup>1</sup>, XABIER RODRÍGUEZ-ALONSO<sup>1</sup>, CRISTINA BONNIN-ARIAS<sup>1</sup>, NAHLA JEMNI-DAMER<sup>1</sup>, FIVOS PANETSOS<sup>1</sup>, CELIA SÁNCHEZ-RAMOS<sup>1</sup>

#### **Affiliation:**

1) Universidad Complutense de Madrid

**Key words:** Contrast sensitivity, protection, equipment

**Purpose:** to evaluate the contrast sensitivity of the participants in rescue processes with the different protective elements that can be used.

**Methods:** 36 subjects of both sexes, members of the SAMUR - MADRID CIVIL PROTECTION team, with an age range of 18-49 years (mean of  $30.8 \pm 8.1$ ) were evaluated. The contrast sensitivity was evaluated in photopic and scotopic conditions using the CSV-1000 test. The subjects were evaluated in five conditions including non-corrected eyes and 4 different NRBC (nuclear, radiological, biological, chemical) protective equipment (mask, mask+green suit, mask+orange suit, mask+blue suit).

**Results:** There is a decrease in contrast sensitivity due to the superposition of transparent surfaces, there being significant differences for the four spatial frequencies analyzed (1.5, 3, 6, 12 cycles per degree) in all equipment and lighting conditions studied.

**Conclusions:** the results reveal a considerable reduction when visual function is valued with mask. There is a worse visual performance when using a green suit over the mask than when using only the mask. With the blue and orange suits, the differences are not significant. The need for the use of protective equipment produces a deficit in vision, specifically in contrast sensitivity that must be taken into account to improve safety and effectiveness of this equipment.

Saturday 18 May 2019

Postural Management and Vision Therapy, 17:45-19:00

**VISION AND POSTURE: THE ROLE OF OPTICIAN OPTOMETRIST**

Presenter: Paolo Patuzzi

**Authors:** PAOLO PATUZZI

**Affiliation:** Albo degli Ottici Optometristi, Head Manager and owner of PDV Retail srl

**Key words:** Vision, posture, postural management

**Summary:** The visual system is necessary for the image recognition and for the postural strategies management in synergy with the other neuromotor organization systems (vestibular, podalic). The optometrist's evaluation of primary visual functions, in particular the relationships between tonic, proximal, fusional and accommodative convergence, are fundamental to investigate the cortical and subcortical visual system influences, in the postural disorganized syndromes. Posturologists need optometric analysis to be able to interpret their clinical and instrumental data in order to provide people with solutions through integrated compensatory and / or corrective strategies.

Through a deepening of the cortical and subcortical centers neurophysiology, we will see which tests and evaluations of the functional state are to be considered important in the ecology of motor and postural management.

Saturday 18 May 2019

Postural Management and Vision Therapy, 17:45-19:00

**EFFECT OF REFRACTION CHANGES ON NEUROMUSCULAR RESPONSE AND RELATED SUBJECTIVE PSYCOPHYSICAL PERCEPTION**

Presenter: Ruggiero Lavermicocca

**Authors:** RUGGIERO LAVERMICOCCA<sup>1</sup>, ALESSANDRA DE LUCA<sup>2</sup>, DALILA LOPARCO<sup>1</sup>

**Affiliation :**

- 1) Albo degli Ottici Optometristi (AdOO)
- 2) Unione Nazionale dei Chinesiologi (UNC)

**Key words:** refraction, neuromuscular response

**Summary:** The first aim of this presentation is to evaluate the effect of a refractive error on the antero-posterior and lateral-lateral postural attitude in people of different age and gender, focusing particularly on the asymmetric postural response. The second purpose is to verify, in people with asymmetric posture, postural changes caused by proper refraction, visual training or both.

The subjective psychophysical perception of the postural changes is evaluated with questionnaires.

These activities are based on an interdisciplinary work, considered from the authors incisive in order to manage visuo-postural problems.

Saturday 18 May 2019

Postural Management and Vision Therapy, 17:45-19:00

### **ICF AND OPTOMETRIC PRACTICE**

Presenter: Paolo Tacconella

**Affiliation:** VisivaMente, association for visual neurosciences, Italy

**Key words:** ICF, bio-psycho-social model, typical/maximum output testing, ecological validity

**Educational topic:** Conceptual systems to approach functional problems evolved from a linear (ICIDH, 1980) to a circular model. The International Classification of Functioning, Disability and Health (ICF) provides a standard language and framework for the description of healthrelated states (W.H.O., 2001). It recognises the role of environmental factors in the creation of disability/disorders, as well as the role of health conditions (Üstün et al., 2003). It conceptualises functioning as a 'dynamic interaction between a person's health condition, personal and environmental factors', a biological, individual and social point of view (biopsychosocial synthesis).

**Content:** Binocular vision can be evaluated in the context of the ICF 'Activities and Participation' level. It can be investigated through two different qualifiers: capacity and performance (Kostanjsek, 2011). The first qualifier describes what people can do (potential functioning) and the second what people actually do (habitual functioning). In the optometric practice, we do not usually differentiate between our maximum output (capacity) from our typical output (performance) binocular testing (Tacconella, 2009). According to the concept of external validity (Schmuckler, 2001), typical output testing has a higher ecological validity and it is therefore more predictive of the actual functioning because it is measured being closer to the person's habitual visual conditions.

**Results:** Ecological validity refers to the functional and predictive relationship between a patient's performance on a particular test or battery and their behaviour at home, work, school, or in the community (Sbordone, 1996; Sbordone & Guilmette, 1999). A question arises: is the ecological validity of standard binocular tests adequate? (Chaytor & Schmitter-Edgecombe, 2003). It will be discuss how this aspects can impact optometric practice and how to modify clinical procedures in order to guarantee an ecological approach (Tacconella, 2008).

**Recommendations:** In accordance to the ICF model (and to better understand the patient's visual needs) we recommend to give a different weight to typical and maximum output testing (Tacconella, 2005). We also suggest to use an ecological approach to binocular testing because it is considered to be a more effective framework for evaluation procedures (Macintyre & Ellaway, 2000; Ketelaar et al., 2001).



Saturday 18 May 2019

Postural Management and Vision Therapy, 17:45-19:00

## **EVIDENCE-BASED VISION THERAPY: THE HARDEST CHALLENGE (AND THE BIGGEST OPPORTUNITY) IN VISION CARE PRACTICE**

Presenter: Giovanni Cavalieri

### **AUTHORS**

GIOVANNI CAVALIERI<sup>1, 2</sup>

### **AFFILIATION**

- 1) Optics and Optometry Doctor
- 2) Vision 4 Perception: Visual NeuroScience Research Team

**Key words:** vision therapy, evidence based, vision care

**Purpose:** Vision Therapy is a sequence of neurosensory and neuromotor activities individually prescribed to develop, rehabilitate and enhance visual skills and processing [1]. It can be performed in both home and office settings, but always under the professional supervision of an optometrist [2] during a variable length period. The Vision Therapy program takes count of normative results of standardized tests, the needs of the patient, and the patient's signs and symptoms [1].

Vision Therapy has several areas of application including accommodation, binocular vision, oculomotricity, control of myopia progression, motion sickness, sport, learning, strabismus and amblyopia [3]: for each of them are designed over the years different procedures aimed at improving visual skills, conventionally considered valid even if they often lack statistical studies that define their effectiveness. This condition has led some colleagues and other professionals to sharply criticize Vision Therapy due to the absence of scientific evidence. Conversely, different research groups have produced scientific studies [3] that can be considered the starting point for an Evidence Based Vision Therapy.

**Results:** In this regard, several studies in scientific literature concerning Vision Therapy application areas, have been examined; overall, results confirm the effectiveness of Vision Therapy both from neurophysiological [6] [10] and behavioral [4] [5] [7] [8] [9] point of view.

**Conclusions:** Although Vision Therapy is practiced from decades, is generally supported by evidence and gives excellent results in vision problems treatment, not all types of approach are properly evidence based, so they need to gain more standardized procedures and protocols/methods based on scientific research.

[1] American Optometric Association Board of Trustees, April 2009

[2] David P. Piñero – Science-based vision therapy, *Journal of Optometry* 2016 Oct-Dec; 9(4): 203–204

[3] B. T. Barrett – A critical evaluation of the evidence supporting the practice of vision therapy, *Ophthalmic Physiol Opt.* 2009 Jan;29(1):4-25.

[4] M. Scheiman et al. - Convergence Insufficiency Treatment Trial Study Group Treatment of accommodative dysfunction in children: results from a randomized clinical trial. *Optom Vis Sci.* 2011; 88:1343–1352

Saturday 18 May 2019

Postural Management and Vision Therapy, 17:45-19:00

## **ACCOMMODATION, PUPILLARY DIAMETER AND VISUAL COHERENCE**

Presenter: Luigi Secli

### **Affiliation:**

1) University of Salento

**Summary:** This presentation will look into two research projects carried out at the University of Salento, which verify how people use their accommodation (lag) in close vision in relation to their pupil diameter; then if the subsystems that allow proximal vision (convergence, accommodation and pupil diameter) are consistent within the accommodative triad. This study was important, as many times, we prescribe with the best of our abilities, with the hope of being able to slow down visual deterioration. Today's society requires us to make the most of the vision (computer, TV, smartphone, etc.), but most of the time we remain disappointed, as visual deterioration goes on.

We have studied the relationship between pupillary diameter and lag, drawing a table that tells us how much accommodation we are using according to the pupil diameter in close reading. Using a sample of 500 people, we then studied, how many had a coherent visual system in the proximal vision.

The data allowed us to create tables that, in a simple and intuitive way, show us once the data of the visual analysis have been taken, if the subjects have a coherent or non-proximal visual system, allowing us to implement the most appropriate strategy to prevent visual deterioration due to the overload of cognitive proximal work.

The increased demand for "attention" to which we are subjected, creates an unbalance between the parasympathetic and sympathetic system that govern just miosis and accommodation and therefore indirectly also the convergence in the accommodative triad.

The ability to understand with extreme precision what kind of lens, prism or visual training treatment we can prescribe to make the visual system coherent up close, can allow us to better help the people who come to us.

Sunday 19 May 2019

Sunday 19 May 2019

Keynote speech, 09:00-10:00

**Title:** Vision and Falls

**By**

**Prof. David Elliott**



David Elliott is the Professor of Clinical Vision Science at the University of Bradford. He is the Editor-in-Chief of the College of Optometrists' research journal *Ophthalmic & Physiological Optics*, editor of the leading textbook *Clinical Procedures in Primary Eye Care* and has written over 100 publications in multi-disciplinary and major optometry, ophthalmology and gait research journals. He has been presented the Glen Fry (2013) and William Feinbloom (2018) awards by the American Academy of Optometry. His research investigates how vision affects everyday life, particularly in older people.

Sunday 19 May 2019

General session, 10:00-10:30

**I CAN'T HEAR YOU WITHOUT MY GLASSES**

Presenter: Karen Sparrow

**Authors:**

KAREN SPARROW<sup>1</sup>

**Affiliation:**

1) Peek Vision

**Significance:** Around one third of people over 65 are affected by disabling hearing loss. This will rise in an aging population and is projected to reach 630 million by 2030. Therefore an increasing number of eye health patients will also have hearing loss. Communicating well with these patients will help to improve examinations and ultimately visual outcomes.

**Purpose:** To explore the challenges of examining a patient with hearing loss and to understand the patient's perspective. To learn some simple techniques to improve patient care for those patients with hearing loss.

**Content:** Those with hearing loss face many challenges in their daily lives. Hearing aids can go some way to improving communication. However they come with limitations and eye care practitioners benefit from an understanding and ability to communicate with this growing cohort. This session will cover common barriers experienced by patients attending an eye examination with hearing loss, the limitations of assistive devices and steps a practitioner can take to help improve the patient experience and ultimately the eye examination outcome. Tips for lip reading and sign language will be covered as well as steps an optical practice can make to support their hearing loss patients.

1. Overview of magnitude and prevalence of hearing loss
2. Discussion on challenges and barriers patients with hearing loss face
3. Practice of simple techniques to communicate better with patients during an eye examination
4. Practice of simple and easy to learn sign language that can be used to assist in the eye examination

Sunday 19 May 2019

General session, 10:30-11:00

### **IMPLEMENTATION OF NEW DIGITAL DEVICES FOR LOW VISION**

Presenter: Matjaž Mihelčič

#### **Authors:**

MATJAŽ MIHELČIČ<sup>1</sup>

#### **Affiliation:**

1) Optika Mesec 2) University of Velika Gorica 3) Aalen University

The breakthrough of digital imaging technologies left no one unaffected, yet the use of this technology is entering the Low vision field at relatively slow pace. Low vision patients are prevalently elderly people, who often resist novelties. It is however just this group of people, who judge the use of digital devices with no technophilic passion, merely on the quality it brings to everyday life. Therefore, the new principles, when tested in the real world, very quickly hit the burdens of usability.

There were several important innovations in the past: the first probably is the possibility to adapt the image size and contrast on digital screens. Then there were digital loupes, with their possibility of freezing the image, inverting the contrast and OCR – reading the text, making it a continuous line. Other digital solutions include enhancing the image (live – from the camera, or movie on the TV) with software, which highlights contours, which are of special importance for the user. With this aspect, the new prototypes of software are able to “decide what is important” and also dynamically, in real time, adapt the graphical manipulation of the image, to make it acceptable for the user. Such software found implication in several VDU devices and Virtual reality glasses, which offer also previously unseen possibilities: to digitally enlarge visual field (in fragments) without distortion and even to compensate for cyclophoria.

For the blind and nearly-blind, there are non-surgical digital solutions: the devices which transfer the digital image, captured with a camera, to alternative senses – to touch via a vibrating matrix put on the skin, or to hearing, using headphones. Although existing for more than a decade, these solutions sometimes interfere with the natural function of senses and are in those cases not accepted.

The novel internet-based platforms for assisting the visually impaired persons, like *Be My Eyes*, use the existing digital imaging infrastructure and engage volunteers to remotely guide such persons in everyday life. The real quality of these applications however is the fact, that not only some objective information about environment is given, but also the “human perspective” is transmitted and hence the social aspect is fulfilled as well.

Sunday 19 May 2019

Public Health Track, 11:30-13:00

**PREPARING FOR THE AGING OF THE POPULATION OF PEOPLE WITH ID/DD. A FOCUS VISION AND RELATED HEALTH ISSUES**

Presenter: Sandra Block

**Authors:**

SANDRA BLOCK<sup>2</sup>, STEFAN SCHWARZ<sup>2</sup>

**Affiliation:**

1) Illinois College of Optometry 2) Special Olympics

**Key words:** intellectual disability, learning disability, aging

**Education Area:** Due to improvements in healthcare, current demographic information projects that adults with intellectual disability (ID) age 60 and over will nearly double by 2030. This mirrors what we are seeing with the general population with increasing life spans and aging of the baby boomers. A description of the changing demographics of people with ID/DD will be presented.

**Discussion:** The aging of the ID/D population brings unique challenges that will need to be faced. Historically, the health providers have looked at the problems from the pediatric approach since the majority of patients accessing care were less than forty years of age. There are many health problems that have emerged in maturing individuals with ID/DD including hearing and vision deficits, cognitive and mental health problems, and an epidemic of chronic diseases associated with aging. Based on our Special Olympics Healthy Athlete screenings, we also find that age-related changes start affecting the IDD population at earlier ages. We want to highlight the more common health problems Related to functional independence and vision health. The program will present a description of the changes in the body in these areas. We will describe the problems their impact on the functioning in daily life.

**Conclusion:** Our goal is to describe the current and projected landscape for those aging with ID/D and present suggestions for prevention, diagnosis, and treatment of health conditions associated with aging. In addition, we will address the importance of caregivers understanding the signs of aging changes and modifications in lifestyle that will improve quality of life and hope to ensure more independence.

Sunday 19 May 2019  
Public Health Track, 11:30-13:00

## **OPTOMETRY'S ROLE IN PUBLIC HEALTH ACROSS THE GLOBE**

Presenter: Jeffrey Weaver

### **Authors:**

JEFFREY L. WEAVER<sup>1</sup>, W. HOWARD MCALISTER<sup>2</sup>

### **Affiliation:**

1) College of Optometry, University of Missouri-St. Louis 2) Rosenberg School of Optometry, University of the Incarnate Word

**Key words:** Public health, Populations, Global

**Educational Topic:** As the size and scope of the profession of optometry grows worldwide, it is important to consider optometry's relationship to the total health care system. The profession plays an important role in Public Health--the health of the population as a whole or as groups--not just providing care to individual patients. The current chair of the American Academy of Optometry's section on Public Health and Environmental Vision will discuss areas where optometry has the greatest impact in public health efforts.

**Discussion:** The World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB) have recognized the need for eye and vision care by their global initiative, Vision 2020: The Right to Sight. Its goal has been to create collaborations of groups involved in eye and vision care and community healthcare activities in an effort to eliminate avoidable impaired vision and blindness. Major priorities include cataract, refractive error, trachoma, onchocerciasis, and childhood blindness. Priorities were selected based on both the burden of vision loss and the ability of healthcare providers to intervene through prevention and treatment. As part of this initiative or other public health efforts, optometry plays a critical role through many functions, including the following:

- Providing vision screening and eye care services.
- Early intervention in children's vision care.
- Detection and management of eye and systemic disease.
- Prevention of eye disease and injury.
- Eye and vision research.
- Teaching eye care personnel.
- Providing care to underserved populations.
- Humanitarian missions building toward sustainable eyecare.
- Cooperation with other healthcare providers in interdisciplinary care.
- Involvement in national advocacy and health policy efforts.

Each of these topics will be discussed in greater detail.

**Conclusion:** Optometry is a strong, dynamic profession that provides quality eye care to patients worldwide. We can be even more effective as a profession if we embrace global public health, doing our part to meet the eye, vision, and health care needs of populations.



Sunday 19 May 2019

Open Paper Session 5: Rapid Fire II, 10:00-11:00

### **IMPROVEMENT OF THE NPC IN SUBJECTS WITH CONVERGENCE INSUFFICIENCY AFTER I.F.S.- EXERCISES**

Presenter: Eva Neuenschwander, Laura Rohrbach

#### **Authors:**

EVA NEUENSCHWANDER<sup>1</sup>, LAURA ROHRBACH<sup>1</sup>

#### **Affiliation:**

1) Institute of Optometry FHNW, Riggenbachstrasse 16, CH-4600 Olten, Switzerland

**Key words:** convergence insufficiency, NPC, I.F.S.-exercises

**Purpose:** Convergence insufficiency is a binocular anomaly which is associated with an increased near point of convergence (NPC), greater exophoria at near than at distance, low AC/A-Ratio and reduced positive fusional vergence (PFV) in people affected. The treatment mostly recommended is visual therapy, such as the I.F.S.-exercises (Institute Free-Space Stereogram Exercises), to improve a persons' ability to converge. The purpose of this study is to evaluate the effectivity of said exercises.

**Methods:** The efficacy of the I.F.S. exercises in subjects with convergence insufficiency is investigated in a randomized-controlled single-blind study with 20 subjects (NPC: >10 cm; age: 18-63 years; verum group: n=10, control group: n=10), who perform a 4-week visual therapy (I.F.S.-exercises or placebo therapy). As the main target of this study, the improvement of the NPC is analysed, together with the PFV, the CISS-score and the Sheard- and Mallett-criteria as secondary outcomes. The statistical analysis is conducted using Microsoft Excel and Rcommander (Rcmdr, version 3.2.2).

**Results:** The statistical analysis ( $\alpha=0.05$ ) of the compiled data reveals a significant improvement of the NPC of the verum group compared to the control group ( $p=0.0008$ ). This is also confirmed by the statistically significant ( $p=0.0002$ ) improvement of the NPC within the verum group only (mean: 8.12 cm, sd 4.37 cm). As a secondary outcome, the PFV also reveals a statistically significant increase, both when comparing the two groups ( $p=0.0013$ ) and within the verum group only ( $p=0.0013$ ), with a mean improvement of 6.4 cm/m (+/- 4.41). Using the CISS-score as an indication, the subjective symptoms show no significant improvement. The analysis of the Sheard- and Mallett-criteria shows similarly insignificant outcomes.

**Conclusion:** The I.F.S.-exercises showed to be challenging for the subjects, nonetheless the interesting and diversified exercises lead to good compliance. Together with the higher amount of time in an extreme-converged posture induced by the exercises, it did result in a significant improvement of the ability to converge and therefore the NPC of the subjects with convergence insufficiency.

Sunday 19 May 2019

Open Paper Session 5: Rapid Fire II, 10:00-11:00

## **AN ITALIAN TRANSLATION AND VALIDATION OF THE RATE OF READING TEST (RRT)**

Presenter: Fabrizio Zeri

### **Authors:**

SILVIA TAVAZZI<sup>1</sup>, MARCO TULLIO PUNZI<sup>1</sup>, LARA COGATO<sup>2</sup>, MARIA DE LUCA<sup>3</sup>, FABRIZIO ZERI<sup>4</sup>

### **Affiliation:**

1) University of Milano Bicocca, Department of Materials Science, Milan, Italy 2) University of Milano Bicocca, Research Centre in Optics and Optometry (COMiB), Milan, Italy 3) Neuropsychology Unit, IRCCS Fondazione Santa Lucia, Rome, Italy 4) Ophthalmic Research Group. School of Life and Health Sciences, Aston University, Birmingham. UK

**Key words:** reading, reading test, reading speed, accuracy

**Purpose:** To develop and validate the Italian version of the Rate of Reading Test (RRT)

**Method:** The same fifteen high frequency Italian words (matched for grammatical class and length in letter to the English version of RRT) were used to generate 30 different 10-line matrixes, according to the design principles of the English RRT. The equivalence amongst the different matrixes, the effect of the order of presentation, and the test-retest reliability were studied. Two groups of 25 and 24 Italian-speaking healthy students (first group 23.0±1.7 yrs, 10 females; second group 24.0±2.0 yrs, 6 females) read the first and the second set of 15 matrixes, respectively. In each group the 15 matrixes were presented to the participants using different sequences (6 different conditions) to control for a possible effect of the order of presentation. Thirteen subjects of the first group were re-tested 2 weeks later.

**Results:** No difference of reading speed and accuracy was found separately among the 15 matrixes of the first ( $F_{1,14}=0.97$ ,  $p=0.48$ ) and the second group ( $F_{1,14}=1.67$ ,  $p=0.06$ ). This confirms a substantial equivalence of reading materials. In both groups, there was a significant effect of the order of presentation on reading speed ( $F_{1,14}=4.94$ ,  $p<0.001$ ) but not on accuracy. More specifically, the first presented matrix was read significantly slower than all of the others (all *paired t-test*,  $p<0.05$ ). This outcome can be explained as a learning effect of the task. Moreover, a slowdown in reading speed has been found for the 8<sup>th</sup> and 9<sup>th</sup> matrix and again for the 12<sup>th</sup> matrix. This latter outcome may be explained as a fatigue effect. Test-retest reliability was good for all the matrixes used (all ICCs between 0.68 and 0.93).

**Conclusions:** The 30 different matrixes of the Italian version of Rate of Reading Test were equivalent with good test-retest reliability. A certain degree of learning effect with the task has been found. This suggests that a familiarization with the test (reading at least one matrix) must be carried out if repeated readings of different matrixes for experimental or clinical purposes are requested.

Sunday 19 May 2019

Open Paper Session 5: Rapid Fire II, 10:00-11:00

**THE PRESENCE OF SENSORY OCULAR DOMINANCE, WITH DIFFERENT LATERALITY BETWEEN THE TWO EYES, AT DISTANCES OF 6M AND 40 CM, IS A PREDICTOR OF SUCCESS IN THE CORRECTION, OF NON-HIGH PRESBYOPIA WITH MONOVISION CONTACT LENSES**

Presenter: Luigi Lupelli

**Authors:** LUIGI LUPELLI<sup>1</sup>

**Affiliation:**

1) University Roma Tre - Roma - Department of Science - Degree course in Optics & Optometry

**Key words:** Contact lens, Ocular dominance, Monovision

**Purpose:** To evaluate if the relationship between sensory ocular dominance for distance (6m) and near (40 cm) in the correction of mild to medium presbyopia with monovision contact lenses (CLs) can be considered as a predictor for success of CL application.

**Methods:** Soft CLs wearers of two different optometric practices, who were motivated to wear CLs for correction of presbyopia, were considered for inclusion over a period of 28 months. Exclusion criteria included a near addition greater than 2.00D, a visual binocular acuity < 0.0 Log Units, a difference in visual acuity between the two eyes greater > 0.08 Log Units, and absence of sensory ocular dominance in at least one of the two distances (6m and 40cm) tested. Two groups of patients were selected: one with sensory ocular dominance with the same laterality (N. 40, mean age 47.6 ys (43-50) for the two distances and the other the other with sensory ocular dominance with different laterality (crossed dominance) at the two distances (N: 36; mean age: 46.9 ys (43-50). For assessment of the dominant eye, each for distance and near, the sensory test of monocular blurring (sph +1,50D) was applied. Subsequently, monovision CLs were fitted. The success rate was evaluated based on patient satisfaction with means of a questionnaire administered two weeks after daily CL wear.

**Results:** 25.0% of the patients in the group with ocular dominance having same laterality a the two fixation distances, were poorly or not at all satisfied. In the group of patients with ocular dominance with different laterality, only 5,5% were little, or not at all satisfied (P< 0.05).

**Conclusion:** The presence of ocular dominance with different laterality (crossed dominance) between RE and LE, at distances of 6m and 40cm represents a predictor of success for the correction of non-high presbyopia with monofocal monovision CLs.

Sunday 19 May 2019

Open Paper Session 5: Rapid Fire II, 10:00-11:00

### **ONE-YEAR RESULTS OF CORNEAL COLLAGEN CROSSLINKING FOR PROGRESSIVE KERATOCONUS: VISUAL ACUITY AND KERATOMETRY CHANGES**

Presenter: Inta Balode

#### **Authors:**

INTA BALODE<sup>1</sup>, JANA GERTNERE<sup>1</sup>, IGORS SOLOMATINS<sup>1</sup>

#### **Affiliation:**

1) Dr Solomatin Eye Center

**Key words:** keratoconus, crosslinking, vision acuity

**Purpose:** To evaluate changes in keratometry ( $K1$ ,  $K2$ ,  $Kmax$  values) during one year after corneal collagen crosslinking (CXL) in patients with keratoconus and analyze associations of these changes with visual acuity.

**Methods:** For this retrospective study we investigated 49 eyes of 42 patients (41 males and 8 females, average age  $29,9 \pm 8,8$  years) with progressive keratoconus (stage I, II, III and IV), which were treated with corneal crosslinking (*Dresden* protocol). Keratometry ( $Kmax$ ,  $K1$ ,  $K2$ ) were examined by corneal topographer *Oculus Pentacam* before and during a 12 months follow-up after crosslinking. Uncorrected (UCVA) and best corrected (BCVA) visual acuity, and cornea keratometry were analyzed.

**Results:** A significant change in corneal readings was observed 1 year after crosslinking ( $p < 0.001$ ):  $Kmax$  decreased from  $52,06 \pm 21,29$  D till  $50,33 \pm 20,70$  D,  $K1$  from  $33,30 \pm 22,92$  D till  $32,24 \pm 22,18$  D, and  $K2$  from  $41,48 \pm 21,33$  D till  $40,41 \pm 20,77$  D. A significant improvement in UCVA and BCVA were noticed 1 year after CXL: 51% participants had UCVA improvement more than 2 *logMAR* lines and 39% participants had BCVA improvement more than 2 *logMAR* lines, ( $p < 0,001$ ). The greatest changes in UCVA were observed in participants with keratoconus stage I, III and III-IV ( $p < 0,05$ ), biggest improvement in BCVA were noticed in participants with keratoconus stage III and III-IV ( $p < 0.01$ ).

**Conclusion:** Corneal crosslinking induces a reduction in corneal volume, which improves uncorrected and best corrected visual acuity.

Sunday 19 May 2019

Open Paper Session 5: Rapid Fire II, 10:00-11:00

### **RELATIONSHIP BETWEEN MEIBOGRAPHY, DRY EYE QUESTIONNAIRE AND DRY EYE DISEASES (DED)**

Presenter: Francesco Cimolato, Pietro Gheller, Luca Stanco

#### **Authors:**

FRANCESCO CIMOLATO<sup>1</sup>, PIETRO GHELLER<sup>1</sup>, LUCA STANCO<sup>1</sup>

#### **Affiliation:**

1) Università degli Studi di Padova – Padua University, Italy

Dry eye disease (DED) is a growing public health concern with a great impact on quality of life. Nevertheless it still remain underestimated and not fully understood. Specific diagnostic and therapeutic targets are currently lacking. DED remain a chronic condition and therapy is all to often palliative. As reported by Georgiev et al. (2017) in the recent years the interest to tear film lipid layer research increased dramatically: approximately 50% of all (>1600) PubMed indexed papers on Meibomian Gland Dysfunction (MGD) and its role on ocular physiology and pathology have been published after 2000. Up to 86% of all DED patients show signs of MGD. Literature needs to be implemented with further studies.

**Purpose:** to study the correlation between lower lids meibomian gland dropout (Meiboscale, Heiko Pult) and the levels identified by two different dry eye questionnaire: OSDI-6 and McMonnies.

**Methods:** 126 eyes of 63 subjects were enrolled. None of them presented glaucoma, ocular infections or underwent ocular surgery during the last year. First, McMonnies (cut off: 0-9 no DED, 9-19 =moderate DED, >19=severe DED) and Ocular Surface Disease Index 6 (OSDI-6) (4 levels: from “no DED” to “severe DED”) score assessments were performed. Second, evaluation of lower eyelid Meibomian glands using a hand held infrared camera (MeCheck, Espansione Marketing SPA) was performed. The Meibomian glands dropout was graded from grade 0 (no loss of Meibomian glands) to grade 4 (severe gland dropout) for each eye (meiboscore). The score associated to each subject is the average between the two eyes. RESULTS: Overall, 49.20 % of subject presented a meiboscore  $\geq 2$  (53.49% of female; 40.00% of male). Each OSDI-6 level shows different mean meiboscore: level 0=1.24 $\pm$ 0.21; level 1=1.85 $\pm$ 0.19; level 2=2.38 $\pm$ 0.30; levels 3 and 4 no subjects). Z-Test: probability of the levels 0-1 to differ ( $p=0.9842$ ), levels 1-2 ( $p=0.8186$ ), levels 2-3 ( $p=0.9987$ ). As regard McMonnies levels, the mean meiboscore were: no DED=1.29 $\pm$ 0.26, moderate DED=1.85 $\pm$ 0.18, severe DED=2.67 $\pm$ 0.73. In this case Z-test was not performed.

**Conclusion:** Overall prevalence of meibomian gland dropout is in accordance with literature, which reported prevalences between 38 and 68%. Higher prevalence in female than male differs from literature. Dry eye questionnaire severity levels reflect meibomian gland dropout scores. In particular, OSDI-6 levels seem to reflect more effectively meibomian gland deterioration.

Sunday 19 May 2019

## Open Paper Session 6: Binocular Vision, 11:30-13:00

### OLD AND NEW TECHNOLOGIES IN EVALUATING STEREO ACUITY

Presenter: Gabriele Esposito, Marta Maffioletti

#### Authors:

GABRIELE ESPOSITO<sup>1</sup>, MARTA MAFFIOLETTI<sup>2</sup>, ALESSIO FACCHIN<sup>3</sup>, SILVIA BONFANTI<sup>4</sup>, ANGELO GARGANTINI<sup>4</sup>, SILVIO MAFFIOLETTI<sup>5</sup>

#### Affiliation:

1) IRSOO, Vinci 2) Humanitas Castelli, Bergamo 3) Università Milano Bicocca 4) Università di Bergamo 5) Università di Torino

**Key words:** Binocular vision, Stereopsis, Stereo Acuity, Digital APP

**Purpose:** Stereopsis is the most complex expression of the binocular visual system, obtained on the basis of visual information deriving from two eyes by individuals with normally developed eye functionality. There are many different ways to test and quantify stereo acuity: traditional paper and new digital applications are both valid ways to test the stereo acuity. The aims of this study is to compare the results obtained using the old gold standard tests and the new Stereoacuity Test App developed by the Faculty of Engineering of the University of Bergamo.

**Methods:** A group of 1542 children (847 males and 695 females), aged between 6 and 14 years old were tested using different tests for the quantification of stereopsis at near. These tests were Lang Test I, Titmus Stereo Test, TNO Test, Weiss EKW test and the new developed Stereoacuity Test App.

**Results:** An one way repeated measure ANOVA showed that four tests (Lang excluded) give different thresholds of stereo acuity ( $p < 0.0001$ ). Post-hoc analyses with Bonferroni correction showed that all test showed different thresholds ( $p < 0.0001$ ). The lower threshold was obtained by Titmus Stereo Test followed by Stereoacuity App, Weiss EKW and TNO.

**Conclusion:** We can conclude that the Lang Stereotest is mainly useful as a screening test that allows to quickly identify serious problems in stereoscopic perception. The high stereoacuity was obtained by Titmus Stereo Test that measure local stereopsis. The other test, based on global stereopsis, showed that the better sensitivity was in order: Stereoacuity App, TNO and Weiss EKW. However, the clinical significance of their value are similar. The new digital test, showed a greater compliance by the child, despite the longer execution time, showing itself in tune with the digital characteristics of today's children.

Sunday 19 May 2019

Open Paper Session 6: Binocular Vision, 11:30-13:00

## **STEREOACUITY EVALUATION IN YOUNG CHILDREN USING FOUR DIFFERENT STEREOTESTS**

Presenter: Wolfgang Cagnolati

### **Authors:**

WOLFGANG CAGNOLATI<sup>1</sup>, JULIA KOESTER<sup>1</sup>, NICOLE RADKE<sup>1</sup>, HOLGER DIETZE<sup>1</sup>

### **Affiliation:**

1) Beuth University of Applied Sciences Berlin, Department of Optometry

**Key words:** stereoacuity, stereotest, screening, children

**Purpose.** The aim of this study was to compare four stereotests and evaluate their testability in children from 0 to 36 months of age and to determine the most appropriate stereotest with the highest testability in different age groups.

**Methods.** Stereopsis testability in healthy eyes of 60 infants and toddlers was determined using the Titmus Fly Test, Lang Test I and II, and the Stereo Smile II Test. The stratified testability and stereoacuity values (three age groups) of all tests were compared to each other and to values from other studies. The testability was determined by investigating how many children in each age group were able to complete the test.

**Results.** Overall, 88 % could be tested with the Stereo Smile II Test, 90 % with Lang Test I, 72 % with Lang Test II and 63 % with the Titmus Fly Test. In children up to 12 months 85 % passed the Stereo Smile II Test, 75 % the Lang Test I, 40 % the Lang Test II and 35 % the Titmus Fly Test. In children from 13 to 24 months 90 % passed the Stereo Smile II Test, 95 % the Lang Test I, 80 % the Lang Test II and 65 % the Titmus Fly Test. In children older than 24 months of age all stereotests showed a testability of  $\geq 90$  %. The established distribution of age and test related stereoacuity values confirmed the correlation between stereoacuity and age and were similar to previous studies.

**Conclusion.** For children up to 12 months of age the Stereo Smile II Test and the Lang Test I were most suitable. Children 13 to 36 months of age should be tested using Stereo Smile II Test or Lang I and Lang II Test. The Titmus Fly Test can be used reliably only in children greater 24 months of age.

Sunday 19 May 2019

Open Paper Session 6: Binocular Vision, 11:30-13:00

### **TRANSCRANIAL MAGNETIC STIMULATION IN ADULTS WITH AMBLYOPIA**

Presenter: Ana Rita Tuna

#### **Authors:**

ANA RITA TUNA<sup>1</sup>, NUNO PINTO<sup>2</sup>, FRANCISCO BRARDO<sup>3</sup>, MARIA VAZ PATO<sup>4</sup>

#### **Affiliation:**

1) Faculty of Health Sciences, University of Beira Interior, Covilhã, Portugal 2) CICS - Health Sciences Research Centre, Faculty of Health Sciences, University of Beira Interior; Dr. Lopes Dias School of Health - Polytechnic Institute of Castelo Branco, Castelo Branco, Portugal 3) Department of Physics – University of Beira Interior, Covilhã, Portugal 4) CICS - Health Sciences Research Centre, Faculty of Health Sciences, University of Beira Interior; Sousa Martins Hospital, Guarda Local Health Unit, Guarda, Portugal

**Key words:** Amblyopia, Transcranial Magnetic Stimulation, Binocular Vision

**Purpose:** The main goal of our study is to assess the effect of Transcranial Magnetic Stimulation (TMS), specifically theta burst stimulation (TBS) in a group of amblyopic volunteers, measuring several visual parameters: visual acuity, suppressive imbalance and stereo-acuity.

**Methods:** Thirteen volunteers aged 19 to 24 years, randomly split in two groups, underwent one session of continuous TBS, stimulating the right occipital lobe. The first group with 8 volunteers was exposed to active stimulation with cTBS and the other group with 5 volunteers was exposed to placebo stimulation.

**Results:** Significant improvements in visual acuity, suppressive imbalance and in stereoacuity were found in the amblyopic eye after cTBS. Average value of amblyopia in visual acuity before stimulation was  $0,32 \pm 0,20$  logMar and after cTBS was  $0,19 \pm 0,17$  logMar. Mean value for the control group before placebo stimulation was  $0,28 \pm 0,17$ ; and after placebo stimulation was  $0,28 \pm 0,16$ . The suppressive imbalance in the group of amblyopes stimulated before cTBS was  $0,26 \pm 0,18$  and after was  $0,12 \pm 0,12$ ; the suppressive imbalance of the control group before the placebo stimulation was  $0,34 \pm 0,37$  and after was  $0,32 \pm 0,40$ .

**Conclusion:** Visual acuity, suppressive imbalance and stereoacuity had significant enhancements compared to baseline after cTBS over the right occipital lobe in a stimulated population.



Sunday 19 May 2019  
Open Paper Session 6: Binocular Vision, 11:30-13:00

## **MAKING BINOCULAR VISION MORE ECOLOGICAL**

Presenter: Paolo Tacconella

**Affiliation:** VisivaMente, association for visual neurosciences, Italy

**Key words:** ICF, bio-psycho-social model, typical/maximum output testing, ecological validity

**Educational topic:** Conceptual systems to approach functional problems evolved from a linear (ICIDH, 1980) to a circular model. The International Classification of Functioning, Disability and Health (ICF) provides a standard language and framework for the description of healthrelated states (W.H.O., 2001). It recognises the role of environmental factors in the creation of disability/disorders, as well as the role of health conditions (Üstün et al., 2003). It conceptualises functioning as a 'dynamic interaction between a person's health condition, personal and environmental factors', a biological, individual and social point of view (biopsycho-social synthesis).

**Content:** Binocular vision can be evaluated in the context of the ICF 'Activities and Participation' level. It can be investigated through two different qualifiers: capacity and performance (Kostanjsek, 2011). The first qualifier describes what people can do (potential functioning) and the second what people actually do (habitual functioning). In the optometric practice, we do not usually differentiate between our maximum output (capacity) from our typical output (performance) binocular testing (Tacconella, 2009). According to the concept of external validity (Schmuckler, 2001), typical output testing has a higher ecological validity and it is therefore more predictive of the actual functioning because it is measured being closer to the person's habitual visual conditions.

**Results:** Ecological validity refers to the functional and predictive relationship between a patient's performance on a particular test or battery and their behaviour at home, work, school, or in the community (Sbordone, 1996; Sbordone & Guilmette, 1999). A question arises: is the ecological validity of standard binocular tests adequate? (Chaytor & Schmitter-Edgecombe, 2003). It will be discuss how this aspects can impact optometric practice and how to modify clinical procedures in order to guarantee an ecological approach (Tacconella, 2008).

**Recommendations:** In accordance to the ICF model (and to better understand the patient's visual needs) we recommend to give a different weight to typical and maximum output testing (Tacconella, 2005). We also suggest to use an ecological approach to binocular testing because it is considered to be a more effective framework for evaluation procedures (Macintyre & Ellaway, 2000; Ketelaar et al., 2001).

Sunday 19 May 2019  
Open Paper Session 6: Binocular Vision, 11:30-13:00

### **THE DYOP: A NEW TEST OF VISUAL ACUITY**

Presenter: Dinah Paritzky

#### **Authors:**

DINAH PARITZKY<sup>1</sup>, NADAV WOLF<sup>1</sup>, INBAR WUNCH<sup>1</sup>, LIAT GANTZ<sup>1</sup>

#### **Affiliation:**

1) Hadassah Academic College

**Key words:** VA, dynamic acuity, Dyop

Optometrists test VA using the Snellen or LogMar charts, which were developed in 1862 and 1976 respectively. The LogMar chart is devoid of many of the problems of the Snellen chart such as non-linear crowding, optotypes of varying difficulty, non-geometrical changes between the lines, and varying number of optotypes per line. However, both charts are limited by the fact that they measure static acuity, whereas everyday tasks involve both moving and static objects. Furthermore, two patients may have the same quantitative VA whilst having different qualitative VA. In addition the end-point is often difficult to ascertain, with a patient able to identify some optotypes on several different lines.

A new type of test for VA has been designed to overcome these problems: The DYOP<sup>®</sup> is a dynamic segmented optotype that can rotate clockwise or anticlockwise. VA threshold is measured by using DYOPs of constant color, contrast, and speed rotation and decreasing the diameter of the DYOPs until the direction of motion can no longer be recognized. This method solves the problems of literacy, memorizing, and crowding, whilst at the same time enabling a more precise endpoint. In addition there is no limit to the number of DYOPs that can be shown for a given line of VA.

**Methods:** VA measurements with the DYOP have been compared with Landolt C, with the DYOP yielding a clearer endpoint. The DYOP is highly correlated with a standard Sloan LogMAR as well as Sloan acuity chart. It has also been found to obtain similar VA scores for the same refraction values when compared with LogMAR E chart in adults. We are currently carrying out a study of the repeatability, reproducibility and speed of exam, and also assessing the subjective experience of the patients.

**Recommendations/Conclusions:** Initial results indicate that the DYOP gives good results for and is well tolerated by patients. Given its advantages over Snellen/LogMAR, the DYOP may be a superior VA test. It is possible that after 150 years the time has come to change how we measure VA in the clinic.

Sunday 19 May 2019

Joint Symposium: AOO and EAEO, 14:00-16:00

**EVOLVING EYE CARE FOR CHILDREN: CURRENT PERSPECTIVES ON VISION SCREENING, AMBLYOPIA TREATMENT & MYOPIA CONTROL**

Presenters:

Susan Cotter, OD, MS, FAAO, FCOVD, Professor of Optometry, Southern California College of Optometry, Marshall B Ketchum University

Bruce Evans PhD, FCOptom, FAAO, FEAOO, FBCLA, Director of Research, Institute of Optometry, London, Visiting Professor, City, University London, Visiting Professor, London South Bank University

Einat Shneor, B.Optom, PhD, FAAO, FEAOO, Senior Lecturer, Department of Optometry, Hadassah Academic College, Jerusalem, Israel

**Symposium Description:** Three Academy fellows share their perspectives regarding three conundrums in contemporary paediatric eye care – vision screening, amblyopia treatment, and myopia control. The current evidence base is used as a platform to discuss new approaches and associated clinical challenges for optometrists who care for children.

**Speaker #1: Einat Shneor**

**Vision Screening** (30 min)

Description: Paediatric vision screening and subsequent management of amblyopia and amblyogenic risk factors are key in preventing vision loss. Barriers in access to eye care as well as evidence-based recommendations for childhood vision screening are discussed.

**Speaker #2: Susan Cotter**

**Amblyopia: Evidence-based Treatment Strategies & Implications for Practice** (30 min)

Description: An overview of the current evidence base for the clinical management of amblyopia is presented. The presentation highlights the results from recent Paediatric Eye Disease Investigator Group (PEDIG) randomized clinical trials and observational studies on amblyopia. An updated evidence-based approach for amblyopia management is provided for the optometrist.

**Speaker #3: Bruce Evans:**

**Myopia Control: The New Frontier for Optometry** (30 min)

Description: The increasing prevalence of myopia has been likened to an epidemic and raises serious health concerns in view of the correlation with pathology. Recent research has improved our understanding of myopia and increasingly optometrists are undertaking myopia control. The lecture will review the evidence and provide practical tips for successful and safe myopia control today.

Sunday 19 May 2019

Optical Concepts Track, 16:30-18:00

**WHEN LIGHT MEETS THE EYE**

Presenter: José M. González-Méijome

**Affiliation:**

1) Clinical & Experimental Optometry Research Lab (CEORLab), center of Physics, University of Minho. Braga (Portugal)

Light interacts with matter in different ways. In partially transparent tissues such the eye, a plethora of phenomena occur that can affect the function and structure of the biological tissues. After interacting with the ocular tissues, light can form images in the retina that need to be transduced into electrical impulses sent to the brain where sight is made conscious. But before that, light interacts with the tear film, cornea pupil edges, crystalline lens and humours resulting in reflection, refraction, transmission, absorption and emission, scattering, dispersion, aberrations, interference and diffraction. Some of those phenomena help the eye to accomplish its function as an image formation organ, others compromise its performance limiting the amount of light reaching the image plane or the quality of the image formed while others are able to damage the eye due to the biological effects of radiation. Still, several of these phenomena such as interference and diffraction are used more and more frequently to produce medical devices for visual correction such as contact lenses or intra-ocular lenses, and ophthalmic instrumentation to examine in detail the ocular structure.

This lecture will review the different optical phenomena that arise when light interacts with the ocular tissues and the clinical implications for ocular examination, diagnosis, visual correction and prevention of ocular disease.

Sunday 19 May 2019  
Optical Concepts Track, 16:30-18:00

## **EVALUATION OF THE VISUAL PERFORMANCE AFTER INTRA-OCULAR LENS IMPLANTATION: METHODOLOGIES AND EXAMPLES**

Presenter: Santiago Escandón-García

### **Authors:**

SANTIAGO ESCANDÓN-GARCÍA<sup>1</sup>

### **Affiliation:**

1) Clinical and Experimental Optometry Research Laboratory, University of Minho, Braga, Portugal

**Key words:** Refractive Surgery, Intraocular Lenses, Visual Performance, Night Vision Disturbances

**Content:** The purpose of this communication is to present from a practical perspective different methods and instruments used to assess the through-focus and visual performance under dim-illumination conditions after intraocular lens implantation (IOL) in the clinical context. The execution of each technique will be explained and examples will be presented so that the clinician can understand what can be expected from different implanted devices in the clinical setting. Special attention will be given to monofocal, bifocal, trifocal and extended depth of focus IOLs of newest generation.

**Results:** The methods discussed in this talk will involve through-focus performance (+1.00 to -3.00 in 0.5 steps) measured under photopic conditions; contrast sensitivity (CS) measured under photopic conditions (85 cd/m<sup>2</sup>) without glare and mesopic conditions (5 cd/m<sup>2</sup>) with intensive glare (28 lux); quantification of light disturbances evaluated under monocular and binocular conditions, and subjective quality of vision. Results are presented to demonstrate that even when distance visual acuity does not change, there might be significant impact in contrast sensitivity and/or objective and subjective night vision performance. The tests and procedures under discussion will be illustrated with examples of the performance expected and measured with them for clear lens and cataract patients, before and after implantation with monofocal, extended depth of focus, bifocal and trifocal IOLs, in the short (1 month) and medium-term (up to 3 and 6 months) after surgery.

**Recommendations:** The use of new tools to evaluate the visual performance under different challenging conditions after refractive surgery is essential to understand the visual performance and eventually the visual complaints of the patient. Of particular relevance is the evaluation of vision at different target distances and the objective and subjective assessment of visual performance under dim-illumination conditions in patients implanted with new IOLs comprising bifocal, trifocal, refractive and diffractive optics that distribute light across different foci, potentially improving intermediate and near vision at the expense of impairing contrast sensitivity or night vision.

Sunday 19 May 2019  
Optical Concepts Track, 16:30-18:00

**SPHERICAL ABERRATION ON OPTOMETRY DATA**

Presenter: Simone Santacatterina, Andrea Pirotta

**Authors:**

SIMONE SANTACATTERINA<sup>1</sup>, ANDREA PIROTTA<sup>1</sup>

**Affiliation:**

1) University of Milan Bicocca

Low order aberrations (myopia, hyperopia, and regular astigmatism) have a greater impact on vision, but high order aberrations also play an important role, especially in patients who are candidates for multifocal lenses. Spherical aberration is included within the high order aberrations, specifically in the group of fourth order aberrations, along with quatrefoil and secondary astigmatism. Spherical aberration generally reduces retinal image contrast and affects visual quality, especially under mesopic conditions. (Guirao A. Optical aberrations of the human cornea as a function of age. *J Opt Soc Am A Opt Image Sci Vis.* 2000;17:1697–702.) As regards presbyopic-correction strategies that use deliberately positive or negative aberrations to increase the depth of focus, we suggest to analyze spherical aberration to decide the best solution to increase the amount of the depth of focus of the eye. Finally how can the depth of focus influence monocular and binocular data such as accommodation and fixation disparity?

In this presentation we will discuss clinical cases and suggest solutions.

Sunday 19 May 2019

Optics track, 18:00-19:00

**NON-TOLERANCE; WHY THINGS GO WRONG**

Presenter: Jonathan Shapiro

**Authors:**

JONATHAN SHAPIRO<sup>1</sup>

**Affiliation:**

1) Hadassah Academic College

**Key words:** Non-tolerance, dispensing errors, pacifying complainers

Patients returning with complaints are an integral part of practice. This can be soul-destroying and damaging to the reputation of the practitioner and practice.

The lecture presents the statistics of non-satisfaction by patients as reported by optometrists and opticians. The lecture looks at prescribing errors, mainly caused by misunderstanding the expectation and/or requirement of the patient.

Changing frame fashions require special understanding of the lens structure. This can often lead to dis-satisfaction by the patient. The visual world is changing as technology and behaviour changes. The practitioner has to be acutely aware how the visual needs vary between patients.

Many patients are reaching an advanced age but still demanding I-Pad vision.

The lecture looks at frame dispensing errors and lens design and production errors. The lecture concludes with recommendations on how to accommodate the non-tolerance, turn a problem to an advantage, show care and preserve the patient's loyalty.

Sunday 19 May 2019  
Optics track, 18:00-19:00

**PAEDIATRIC DISPENSING – THE IMPORTANCE OF APPROPRIATE, WELL-FITTING GLASSES FOR CHILDREN**

Presenter: Jessica Gowing

**Affiliation:** Great Ormond Street Hospital

**Key words:** paediatric dispensing, children, 3D

Children can be prescribed glasses for many reasons: refractive error, photophobia, binocular vision anomalies or for safety to name a few. Poorly fitting glasses can cause a reduction in visual acuity (potentially permanently), discomfort, or in some cases, even disfigurement.

Despite this, how often do we see children come into our practice with glasses that are not fit for purpose? Children do not have scaled down adult faces – they have unique facial characteristics that should be reflected in the choice of frame. In addition, we need to consider other factors such as durability, UV protection and safety. For some paediatric patients, with conditions such as craniosynostosis, venous malformations or microtia, a standard pair of glasses do not provide an adequate fit and specialist modifications are required.

At Great Ormond Street Hospital, we have developed innovative frame fitting techniques for patients with atypical head and facial features. This has improved the comfort, cosmesis and visual prognosis for these patients. We are also currently developing 3D printing of spectacles, designed around a 3D head scan of the patient.

This will allow us to dispense custom made spectacles which take into account the unique head and facial features of some children with craniosynostosis and other conditions which affect the head and skull. Dispensing for children is a highly skilled competency, that requires extremely effective communication, endless patience and a specialist knowledge, but if done well it can be the most rewarding job of all.



Sunday 19 May 2019

Open Paper Session 7: Myopia, 15:00-16:00

**MYOPIC TREND IN REFRACTIVE ERROR AND BIOMETRIC PARAMETERS IN A POPULATION OF YOUNG-ADULTS ENTERING UNIVERSITY IN PORTUGAL BETWEEN 2016 AND 2018**

Presenter: Daniela Lopes Ferreira

**Authors:**

DANIELA LOPES-FERREIRA<sup>1</sup>, RUTE J. MACEDO-DE-ARAÚJO<sup>1</sup>, ANA AMORIM-DE-SOUSA<sup>1</sup>, PAULO FERNANDES<sup>1</sup>, ANA F. MOTA<sup>1</sup>, ANDRÉ AMORIM<sup>1</sup>, MIGUEL FARIA-RIBEIRO<sup>1</sup>, SOFIA PEIXOTO-DE-MATOS<sup>1</sup>, ANA VAZ<sup>1</sup>, ANTÓNIO MIRANDA<sup>1</sup>, JORGE JORGE<sup>1</sup>, ANTÓNIO QUEIRÓS PEREIRA<sup>1</sup>, JOSÉ GONZÁLEZ MÉIJOME<sup>1</sup>

**Affiliation:**

1) CEORLab, Center of Physics, University of Minho, Portugal

**Key words:** myopia; ocular biometry; corneal curvature

**Purpose:** There is an increasing interest to understand the trends in refraction and ocular biometry in the adult population due to the potential increase in risk for ocular disease with increased myopization of the population at younger ages. Considering their age profile (17 to 23 years of age) the new university students are representative of a population that has already developed early-onset myopia or is at risk of developing late-onset myopia. The aim of this study was to evaluate the changes in the distribution of refractive error and biometric parameters in young-adults entering the University of Minho between 2016 and 2018.

**Methods:** Between 360 and 400 consecutive volunteers attending the registration at the University of Minho in each year from 2016 till 2018 cohorts (total of 1382) were included in this retrospective analysis. Inclusion criteria were restricted to subjects between 17 and 23 years of age. Non-cycloplegic refractive error was measured with the WAM-5500 open-field autorefractometer while axial length and corneal curvature were measured with IOLMaster optical biometer. Only the data from the left eye in each year was considered for analysis. Comparison between mean values was conducted in SPSS with ANOVA and Bonferroni post-hoc correction.

**Results:** Mean axial length varied between  $23.7 \pm 1.0$ mm in 2016,  $23.8 \pm 1.0$ mm in 2017 and  $23.7 \pm 1.0$ mm in 2018. Spherical equivalent refractive error (M) varied between  $-0.17 \pm 1.6$ D in 2016,  $-0.39 \pm 1.5$ D in 2017 and  $-0.47 \pm 1.5$ D in 2018 (Independent Sample T-Test:  $p < 0.05$ ). Differences in refractive error between right and left eye were 0.16D in 2016, 0.09D in 2017 and 0.01D in 2018. Change in mean spherical equivalent refraction between 2016 and 2018 was statistically significant (ANOVA  $p = 0.020$ ). Mean flat curvature was  $7.90 \pm 0.29$ mm in 2016,  $7.94 \pm 0.28$ mm in 2017 and  $7.89 \pm 0.28$ mm in 2018 (ANOVA  $p = 0.024$ ).

**Conclusion:** The average refractive error and corneal curvature of these 3 samples show that the significant trend in myopic refractive error is associated with a steeper anterior corneal curvature, but not with an increase in average axial length. This 3-year cross-sectional evaluation of the refractive error in university students provides a platform for medium and long-term follow-up of biometric data of students entering higher education in Portugal.

Sunday 19 May 2019  
Open Paper Session 7: Myopia, 15:00-16:00

## **PERIPHERAL REFRACTION CHANGES IN MYOPIA ONSET IN ITALIAN CHILDREN**

Presenter: Maurilia Rotolo

### **Authors:**

MAURILIA ROTOLO<sup>2</sup>, GIANCARLO MONTANI<sup>2</sup>, RAUL MARTIN<sup>1</sup>

### **Affiliation:**

1) Optometry Research Group. IOBA-Eye Institute, University of Valladolid. Valladolid, Spain 2) Corso di Laurea in Ottica ed Optometria. Università del Salento, Lecce LE, Italy 3) Department of Physics TAO, School of Optometry, University of Valladolid. Valladolid, Spain 4) Faculty of Health and Human Sciences, Plymouth University. Plymouth, United Kingdom

**Key words:** myopia, relative peripheral refractive error, axial length

**Purpose:** Peripheral refraction is of paramount importance in myopia onset and progression. However, there is a lack of studies in the Italian population. The purpose of this study was to assess if peripheral refraction characteristics relate to changes in central refraction during 18 months of follow up in a sample of Italian children.

**Methods:** Fifty healthy Italian children at the age of eight years were enrolled for a prospective study with three study visits (baseline, 12 and 18 months of follow up). Non-cycloplegic peripheral refraction at 5° intervals over the central 60° of horizontal visual field was recorded at every study visit during the 18 months' period. Axial length (AL) was also recorded. For statistical analysis (univariate analysis of variance), the eyes were divided in four study groups; non-myopic eyes (nMi), myopic eyes (Mi), eyes who develop myopia (Mf) and eyes who did not develop myopia (nMf).

**Results:** RPR was different in myopic eyes (with hyperopic RPR) to that of emmetropic and hyperopic eyes (with myopic RPR). No statistically significant effect of peripheral refraction ( $P=1.00$ ) and RPR ( $P=0.80$ ) in myopia onset (eyes who develop myopia along the study) was found. However, statistical significant differences between study groups in central and peripheral refraction were found ( $P < 0.01$ ), without statistical changes between visits ( $P=0.92$ ) and visual field angle ( $P=0.83$ ) (Figure 1). A similar trend was found with RPR with statistical significant differences between groups ( $P < 0.01$ ), visits ( $P=0.02$ ) and visual field angle ( $P=0.01$ ). AL increased in all studied groups without statistical significant differences between groups ( $P=0.99$ ).

**Conclusion:** No significant differences between non-myopic, myopic and eyes that develop myopia has found in peripheral refraction or RPR in this sample of Italian children. However, a hyperopic relative peripheral shift change in eyes that developed myopia, was found with differences in RPR between myopic (hyperopic RPR) and hyperopic or emmetropic eyes (with myopic RPR).

Sunday 19 May 2019  
Open Paper Session 7: Myopia, 15:00-16:00

### **PERIPHERAL REFRACTION – YES OR NO!**

Presenter: David Berkow

#### **Authors:**

BERKOW DAVID<sup>1</sup>

#### **Affiliation:**

1) Optometrists

It is predicted that by the year 2050 half of the world's population will be myopic and that nearly one billion will be at a high risk of threatening ocular pathology. The first link between peripheral refraction and myopia, in humans, was found in 1971 by Hoogerheide and his colleagues although this issue was studied even earlier by Earl Smith 3<sup>rd</sup> using monkeys. Eye care practitioners today must not only think in terms of the short-term (i.e. correcting the refractive error with spectacles or contact lenses) but to offer other means of treatment to try to delay the increase in short-sightedness in children.

Therefore we must treat children who are myopic by trying to retard the progression of the myopia. There are a number of treatments, two of which use contact lenses, either soft contact lenses or rigid gas permeable contact lenses. The treatment when using contact lenses is based on defocus at the periphery of the retina. This treatment pattern is named *Myopia Control*.

This presentation will explain in detail what is peripheral defocus, the different types of peripheral defocus, how it applies to the different types of contact lenses and how important this issue is as far as treating myopic children. It will explain why and how myopic defocus can retard the increase in axial length of the eye.

Children who have been detected as having the increased potential of being myopic should be given the option of being treated by means of *myopia control* in order to try to retard the progression and thus trying to avoid the child of being included in the risk group of potentially developing any ocular pathology caused by "high myopia".

Eyecare practitioners must be aware of the fact that there are different ways of treating the myopic child. The final decision on which line of which path to choose will be taken by the parent.

Sunday 19 May 2019

Open Paper Session 8: Myopia, 16:30-18:00

**THE ADDITION POWER OF SOFT CONTACT LENSES FOR MYOPIA CONTROL**

Presenter: Alessandro Fossetti

**Authors:**

ALESSANDRO FOSSETTI<sup>1</sup>

**Affiliation:**

1) Istituto di Ricerca e di Studi in Ottica e Optometria (IRSOO), Vinci, Italy

**Key words:** Myopia control, multifocal soft contact lenses, peripheral retinal defocus

**Purpose:** The evidence that orthokeratology (OK) reduces the elongation of the myopic eyes is supported by many studies<sup>1</sup> and meta-analysis<sup>2</sup> and a controversial hypothesis<sup>3</sup> refer the effect to the peripheral myopic defocus (PMD). Then it would be possible to obtain the same result with a progressive center-distance soft contact lens (SCL) or with SCLs expressly designed to imitate the optical effect of OK on the retina. Indeed both multifocal SCL center-distance and many expressly designed SCLs were able to reduce the progression of myopia compared to spectacle wear. The amount of these reductions is lower than those obtained by orthokeratology. Previous research<sup>5</sup> performed at IRSOO, have shown that multifocal SCLs with additions up to 3.50 D produce a lower PMD than that obtained with OK (fig.1). The aim of this study was to evaluate if it is possible to achieve a PMD similar to that of OK with a SCL with addition > 3.50D

**Method:** PR across the horizontal meridian (in 10 degree steps up to 30 degree, nasal and temporal retina) in three myopic subjects (SER from -2.12D to -5.75D) wearing multifocal SCLs with 4.50D additions was measured and compared with the PR profile obtained after one month of OK treatment.

**Results:** The profiles of central and PR along the horizontal visual field show that multifocal SCL with 4.50D addition produced a PMD comparable to that obtained with the OK treatment (Fig.2).

**Conclusion:** Our work has shown that the peripheral addition of multifocal CL has to be more than 4,00D in order to have a PMD similar to that of OK. Until today to our knowledge no lenses with this amount of peripheral addition have been used to correct children for myopia control purposes. We could argue if the less efficacy of soft CL in comparison with orthokeratology has to be attributed to differences in the amounts of PMD or to the time that this defocus is imposed to the retina, i.e. the wearing time<sup>6</sup>. Another field of research must investigate if the amount of addition has to be tailored or ready-made.

Sunday 19 May 2019  
Open Paper Session 8: Myopia, 16:30-18:00

## **CHANGES IN OCULAR ACCOMMODATION AND ASTIGMATISM DURING NEAR VISION WITH PROTOTYPES OF CONTACT LENSES FOR MYOPIA PROGRESSION CONTROL**

Presenter: Ana Filipa Mota

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**Key words:** accommodation, myopia control, induced astigmatism, near vision

**Purpose:** The primary goal of this study was to evaluate the accommodative response of 3 myopia control (MC) contact lens (CL) prototypes in young-adult myopes, compared to a monofocal control CL. A secondary goal was to assess potential changes in refractive astigmatism for different target vergences with each lens type.

**Methods:** This is an experimental study involving 20 young adult subjects ( $20.95 \pm 1.67$  years), with objective refraction of -1.00D or -2.00D (spherical equivalent), without ocular pathologies, any kind of ocular surgery or accommodative disorder. Vergence of the stimulus was changed between 0.00D (infinity), 1.00D (1meter), 2.00D (50cms), 3.00D (33cms), 4.00D (25cms) and 5.00D (20cms) using a Badal System. These measurements were made monocularly with the contralateral eye occluded to avoid convergence misalignments with the Badal and measurement system. Accommodative response was obtained using an open-field autorefractometer (WAM-5500, Grand Seiko, Japan) with the control and 3 prototypes CL.

**Results:** The change in spherical refractive error measured objectively with the Grand-Seiko at different target vergences induced with the Badal System followed a linear relationship ( $r^2 > 0.98$ ;  $p < 0.05$ ). However, the spherical change was lower than expected by the change in target distance for monofocal control (0.55D at 1 meter to 1.10D at 20cms), prototype 2 (0.07D at 1 meter to 0.65D at 20cms) and prototype 3 (0.32D at 1 meter to 0.61D at 20cms). Surprisingly with prototype 1, the accommodative response was higher than expected at 1 meter (response=1.37D), 50cms (2.11D), 33cms (3.05D) and only slightly lower at 25cms (3.60D) and 20cms (4.76D). The accommodative response was significantly higher for prototype 1 compared with monofocal control lens at all distances (ANOVA test,  $p \leq 0.006$ ) except at 25cms ( $p = 0.109$ ). With prototype 1 and 3, were observed changes in refractive astigmatism (J0 component up to 0.40D). However, these changes were only statistically significant for prototype 3 (Kruskal-Wallis test,  $p < 0.001$ ).

**Conclusion:** The results from this experimental study suggest that prototypes of CL for MC do not affect the accommodative response of young myopic eyes, compared to a monofocal CL. Astigmatism induced at higher accommodative demand by the CL is expected to increase with CL of higher peripheral power gradient.

Sunday 19 May 2019  
Open Paper Session 8: Myopia, 16:30-18:00

### RETINAL ACTIVITY CHANGES WITH 3 PROTOTYPE CONTACT LENSES FOR MYOPIA CONTROL

Presenter: Ana Filipa Mota

#### Authors:

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**Key words:** multifocal electroretinography, myopia control, peripheral vision

**Purpose:** The main goal of this study was to evaluate the influence of 3 myopia control (MC) contact lens (CL) prototypes on the multifocal electroretinogram (mfERG) response, compared to a monofocal control CL in young-adult myopes. Different optical designs are expected to change the retinal activity differently.

**Methods:** The electrophysiological response of the retina was evaluated in 20 young adult subjects (20.95±1.67years), with objective refraction of -1.00D or -2.00D (spherical equivalent), without ocular pathologies or any kind of ocular surgery. The mfERG response was recorded with the RETIport/scan 21 (Roland Consult, Germany) using a DTL electrode and a stimulus pattern of 103 hexagonal segments scaled with eccentricity on a 19inch RGB monitor. The amplitude (nV) and implicit time (ms) of the Negative (N1) and Positive (P1) wave components of the first Kernel response were analyzed in 6 concentric rings (maximum radial eccentricity≈30°) and 4 quadrants. These measurements were made monocularly with contralateral eye occluded.

**Results:** Amplitude of P1 was lower in the prototype lenses compared to monofocal control lens in the central areas, for Ring 1 (prototype 1: 672.37nV; prototype 2: 708.06nV; prototype 3: 686.31nV; control: 721.52nV), Ring 2 (prototype 1: 483.01nV; prototype 2: 483.88nV; prototype 3: 455.53nV; control: 497.08nV) and Ring 3 (prototype 1: 425.04nV; prototype 2: 454.68nV; prototype 3: 420.99nV; control: 456.96nV). The implicit time (IT) of P1 presented lower values compared to the monofocal lens, for Ring 1 (prototype 1: 49.08ms; prototype 2: 48.73ms; prototype 3: 47.05ms; control: 49.67ms), Ring 2 (prototype 1: 45.98ms; prototype 2: 46.82ms; prototype 3: 45.93ms; control: 47.06ms) and Ring 3 (prototype 1: 45.83ms; prototype 2: 46.03; prototype 3: 45.24ms; control: 46.08ms). Regarding amplitude and IT of N1, the behavior was random without a trend being noticed. The values of amplitude and IT of prototypes in four quadrants was identical to monofocal lens.

**Conclusion:** The results from this experimental study suggest that mfERG seems to be able to quantify differences in the retinal response to different optical methods intended for myopia control. ERG results obtained from foveal and parafoveal regions under physiological pupil conditions seem to be particularly sensitive to these interventions.

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Open Paper Session 8: Myopia, 16:30-18:00

### **ORTHOKERATOLOGY: IS THE TREATMENT ZONE DIAMETER PREDICTABLE?**

Presenter: Mirko Chinellato

#### **Authors:**

MIRKO CHINELLATO<sup>1</sup>, CRISTINA CANOVA<sup>2</sup>

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**Key words:** orthokeratology, treatment zone, myopia

**Purpose:** The main purpose of this multicentre retrospective study was to evaluate the relationship between the treatment zone diameter (TXZ) and the central corneal curvature change in a group of subjects under orthokeratology treatment. Additionally to evaluate the relationship between TXZ and other pre-treatment corneal and refractive parameters. The aim of this study was to provide to the clinicians the chance to predict the treatment zone diameter from the main corneal and from the targeted myopia.

**Methods:** 43 randomized eyes of 43 subjects were enrolled in this study. The inclusion criteria were: myopia with to astigmatism up to 1,50D, centered orthokeratology treatment and no complications. All the subjects were fitted using the same geometry of spheric orthokeratology contact lens (OMEGA CL® Herz Submicron Lathing, Catania IT). Main geometrical corneal parameters were measured before and after the treatment using a placido-based corneal topographer (Keratron, Optikon 2000 Rome IT). Pre-treatment refractive data and geometrical lens parameters were registered. Relationship between data were studied by correlation and linear regression (R Software, © R Core Team 2017).

**Results:** No relationship was found between TXZ and variation of best fit sphere value (Spearman's rank correlation coefficient  $\rho=0,20$   $p=0,19$ ), TXZ and pre treatment corneal curvature measured by: simulated K ( $\rho=-0,09$   $p=0,55$ ), apical radius ( $\rho=-0,15$   $p=0,31$ ), best fit sphere ( $\rho=0,18$   $\rho=0,24$ ), TXZ and pre treatment corneal eccentricity ( $\rho=0,01$   $\rho=0,93$ ), TXZ and pre treatment myopia ( $\rho=-0,10$   $p=0,48$ ), TXZ and difference between BOZR of the lens and pre treatment corneal curvature ( $\rho=-0,01$   $p<0,95$ )

**Conclusion:** With reference to the methods applied and the results of this study, it is possible to state that the orthokeratology corneal treatment zone diameter is not predictable from pre main treatment corneal parameters and from the targeted myopia.

Sunday 19 May 2019

Open Paper Session 10, 18:30-19:00

**OCULAR SIDE EFFECTS OF CHEMOTHERAPY – A PERSONAL VIEW**

Presenter: Karen Sparrow

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**Affiliation:**

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**Key words:** Cancer, chemotherapy, ocular side effects

**Purpose:** To describe a case showing insights from the cancer patient who is also an optometrist in order to improve patient communication, support and advice. Whilst literature cites mainly case reports or small group studies (less than 20 patients) studies have shown that ocular side effects of chemotherapy are not uncommon (various prevalence rates ranging from 1-26%), but often infrequently or under-reported. Studies of high dose carboplatin treatment for ovarian cancer show ocular side effects including sore eyes, blurred vision, maculopathy, chorioretinitis and optic neuritis. Paclitaxel dosage has given rise to photopsia, retinopathy and other symptoms. Other ocular side effects can be as an indirect result of hair loss associated with chemotherapy treatment.

**Case report:** A 49-year-old female optometrist was diagnosed with Stage 3c Ovarian Cancer. Prior to treatment she had good visual acuity (R 6/4.8, L 6/7.6), normal ocular health with reported floaters, high myopia and recent onset presbyopia. Other ocular disease or symptoms. She had a hysterectomy followed by 6 cycles of Carboplatin and Paclitaxel chemotherapy, infused over 6 hours on a 3-week repeating cycle. Chemotherapy caused hair-loss including eyebrows and eye lashes, and mild neuropathy.

**Results:** The patient reported ocular symptoms associated with chemotherapy infusion and post-infusion side effects including sub-conjunctival haemorrhage, photopsia, photophobia, eyelid dermatitis, dry eye, watering eyes, blurred vision, increased awareness of floaters, as well as concerns about infection risk with contact lens wear. On examination the patient had negligible change in distance myopia, +0.50D increase in presbyopia, normal fields and intraocular pressures. Trace posterior subcapsular opacities in the left eye but no other ocular changes since examination 17 months prior to chemotherapy treatment.

**Conclusions:** There are limited recent publications showing the ocular side effects of chemotherapy yet optometrists will increasingly examine patients undergoing or recovering from cancer treatment. This case report shows that a number of symptoms can be experienced with chemotherapy treatment and its side effects (such as hair loss), giving the patient additional vision and comfort challenges and concerns during and after treatment.



Sunday 19 May 2019  
Open Paper Session 10, 18:30-19:00

**A REVIEW OF THE VISION PROBLEMS SEEN IN CHILDREN WITH NEURODEVELOPMENTAL PROBLEMS AND PROVIDE CLINICIANS WITH TOOLS TO PROVIDE EYE CARE TO CHILDREN WITH INTELLECTUAL DISABILITY BASED ON THE SPECIAL OLYMPICS LIONS CLUBS INTERNATIONAL OPENING EYES YOUNG ATHLETES PROGRAM (2-7 YEARS OF AGE)**

Presenter: Sandra Block

**Authors:**

SANDRA BLOCK<sup>1</sup>, STEFAN SCHWARZ<sup>2</sup>

**Affiliation:**

1) Illinois College of Optometry 2) Special Olympics

**Key words:** neurodevelopmental, vision, pediatrics

**Clinical topic:** Children with intellectual disability 2-7 years of age have a higher prevalence of vision and eye health problems. Vision issues might be ignored in young children with acute health problems that are urgent. Parents/caregivers and pediatricians need to be educated on the visual problems seen with neurodevelopmental problems including when children should be referred and what a comprehensive exam should include.

**Content:** The lecture will review functional vision problems including uncorrected refractive error, oculomotor deficits, binocular vision problems and the common eye health problems that encountered in the young child. In addition, emphasis will be on discussing the need for a comprehensive exam rather than screening due to attention span, the importance of early care and the value of having a parent in attendance. Tools to be addressed include visual acuity testing, oculomotor, binocularity, stereopsis, color vision, refraction, IOP, and eye health. Techniques will be reviewed for children with limited attend including cover testing, Hirschberg, and Kappa testing. Through the exam discussion, modifications for various levels of cooperation will be discussed along with what tools will serve the clinician in their practice to gather reliable clinical data. The last part of the presentation will be a review of the tools and how to interpret the data in relation to the needs of the patient including an explanation to the parent.

**Actions taken:** The goal is to provide the participant with clinical insight to deliver skills in their practice to children < 8 years of age who have been diagnosed with an intellectual disability. The lecture will focus on nonverbal or objective techniques which provide reliable information for the clinician to properly diagnose and treat these high-risk patients.

**Conclusions:** The participant will learn to prepare for and execute a case history for children with special needs. The participant will leave with the clinical skills to provide care in their practices to this population at high risk for vision problems. Lastly, they will be able to explain the next steps for regular eye care and next steps to the parent or guardian.

Sunday 19 May 2019

Young researchers' session, 16:30-18:00

**EVALUATION OF A NEW VERSION OF THE "BLINK BLINK" COMPUTER PROGRAM TO IMPROVE THE SYMPTOMS OF DRY EYE DURING COMPUTER WORK**

Presenter: Michelle Kaufmann

**Authors:**

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**Key words:** computer vision syndrome, dry eye, double blink, blink blink animation program

**Purpose:** The 'blink blink' animation program was developed to reduce dry eye symptoms causing computer vision syndrome (CVS). In this study, it was applied to induce controlled, double blinks and thus to improve the effectiveness of blinking during prolonged computer work.

**Methods:** This was a prospective, double-blind cross-over study with 30 office workers (11 males; mean age: 31.5 ±10.5 years). By using the animation program with two different settings for animation presentation interval (60 seconds and 300 seconds) during a period of 5 weeks, it was explored whether a subjective and objective improvement of dry eye during computer work could be achieved. Furthermore, the effectiveness of the two program settings were compared with one another. The questionnaire for the Ocular Surface Disease Index (OSDI) was applied as a subjective measure before and after the use of the program. In addition, non-invasive tear film breakup time (NIBUT) measurements were carried out before and after use of the animation program, using the Oculus Keratograph 5M. At the end of the test phase, the participants were given a questionnaire for their subjective evaluation of the animation program.

**Results:** With both program settings of the induced blink frequency (60 seconds and 300 seconds) a subjectively and objectively measurable, significant reduction of the dry eye symptoms during computer work was achieved (for OSDI:  $p = 0.0000018$ , version 60s and  $p = 0.000057$ , version 300s; for NIBUT:  $p = 0.000024$ , version 60s and  $p = 0.001035$ , version 300s). The effectiveness of the animation program was significantly better with the frequency setting of 60 seconds than with the frequency setting of 300 seconds (for OSDI:  $p = 0.0034$  and for NIBUT:  $p = 0.0028$ ).

**Conclusions:** To our best knowledge, this is the first study to show a significant improvement for both, subjective and objective parameters regarding dry eye symptoms when applying the 'blink blink' animation program during prolonged computer work. These effects were more pronounced with the frequency setting of 60 seconds.

Sunday 19 May 2019  
Young researchers session, 16:30-18:00

## **MULTI-CENTRE COMPARISON OF NON-INVASIVE TEAR BREAK-UP TIME (NIBUT) MEASUREMENTS WITH DIFFERENT INSTRUMENTS**

Presenter: Barbara Peter

### **Authors:**

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**Key words:** NIBUT, non-invasive break-up time, dry eyes

**Purpose:** As non-invasive break-up time (NIBUT) is a key metric in demonstrating a loss of homeostasis of the tear film for the diagnosis of dry eye, this study investigated the agreement between four different instruments in the measurement of tear film stability.

**Methods:** 72 subjects (mean  $24.2 \pm 3.62$  years) participated in this prospective cross-sectional study. The investigation took place at three study sites (Aston University, UK; Cologne School of Optometry, GER and School of Optometry, CH), with 24 subjects at each site. Exclusion criteria were contact lens wear and use of eye drops on the day of measurements. NIBUT measurements were carried out with each of Tearscope Plus (Keeler, Windsor, UK), Polaris (bon Optic, Lübeck, GER), Easytear view plus (Easytear, Rovereto, IT) and Keratograph 5M (Oculus Optikgeräte, Wetzlar, GER) three times in random sequence on two separate occasions during a day, separated by  $\geq 2$  hours. The evaluation of the NIBUT measurements of Tearscope, Polaris and Easytear was based on masked video analysis.

**Results:** No statistically significant difference regarding NIBUT measurements between the four instruments (Tearscope plus ( $15.2 \pm 16.2$  s), Polaris ( $14.5 \pm 14.0$  s), Easytear view plus ( $15.0 \pm 15.5$  s) and Keratograph 5M ( $12.9 \pm 6.8$  s) was obtained (Friedman-test;  $p = 0.583$ ). Strong positive linear relationships were observed between the subjective instruments (Tearscope vs Polaris:  $r = 0.890$ ,  $p < 0.0001$ ; Easytear vs Polaris:  $r = 0.786$ ,  $p < 0.0001$ ; Easytear vs Tearscope:  $r = 0.782$ ,  $p < 0.0001$ ). Weaker linear relationships were observed between the objectively assessed Keratograph measurements and the subjective instruments (Tearscope:  $r = 0.662$ ,  $p < 0.0001$ ; Easytear:  $r = 0.611$ ,  $p < 0.0001$ ; Polaris:  $r = 0.6099$ ,  $p < 0.0001$ ).

**Conclusion:** The NIBUT instruments assessed give comparable measurements, demonstrating NIBUT to be a robust measurement of tear film stability.

Sunday 19 May 2019  
Young researchers session, 16:30-18:00

## **INFLUENCE OF CRYOPROTECTANTS ON CORNEAL ENDOTHELIAL CELL DENSITY**

Presenter: Kerstin Eller

### **Authors:**

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### **Affiliation:**

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**Key words:** cornea, endothelium, cryopreservation, cryoprotectants

**Purpose:** With the preservation methods available today, donor corneas can be stored for up to four weeks. Cryopreservation is the only preservation method that offers the prospect of unlimited storage of donor corneas. The aim of this study was to determine the influence of the cryoprotectants required for this on corneal endothelial cell density.

**Methods:** Two groups of paired porcine central corneal discs with a diameter of 8.75 mm were organ cultured for 48 hours at 37°C in MEM. 15 corneas were transferred to a cryoprotectant solution. The maximum concentration of cryoprotectants was 52% ethane diol, 8% glucose and 3% chondroitin sulphate. The corneal discs of the partner eye were not treated and served as a control. After a subsequent organ culture for 48 hours, the endothelium was stained with trypan blue and alizarin red S and examined by light microscopy. The endothelial cell density was determined manually on three different central images. In the follow-up experiment, the treatment protocol was transferred to six pairs of human corneas.

**Results:** The endothelial cell density of porcine corneas treated with cryoprotectants was statistically significantly different from the control group ( $p < 0.001$ ;  $3560 \pm 186$  cells/mm<sup>2</sup> and  $4144 \pm 277$  cells/mm<sup>2</sup>, respectively). The mean cell loss was  $14 \pm 5.5\%$ . The endothelial cell density of human corneas treated with cryoprotectants was also statistically significantly different from the control group ( $p = 0.044$ ;  $1243 \pm 179$  cells/mm<sup>2</sup> and  $1570 \pm 219$  cells/mm<sup>2</sup>, respectively). The mean cell loss was  $19 \pm 15.4\%$ . It should be noted that two corneal pairs showed hardly any cell loss (1% and 4%, respectively), whereas four corneal pairs showed a significantly higher cell loss (44%, 37%, 52% and 41%, respectively).

**Conclusion:** The cell loss caused by the cryoprotectants is potentially compatible with a future clinical application of the method. However, the causes of the widely varying endothelial cell loss in human corneas must first be determined.

Sunday 19 May 2019  
Young researchers session, 16:30-18:00

## **ANALYSIS OF ZETA POTENTIAL OF HUMAN TEAR OF CONTACT LENSES WEARERS AND NON-WEARERS**

Presenter: Sara Colciago

### **Authors:**

SARA COLCIAGO <sup>1</sup>

### **Affiliation:**

1) University of Milano Bicocca

**Key words:** Tears, Zeta Potential, Isoelectric Point, Contact Lenses

**Purpose:** The aim was to compare the human tears between Etafilcon A contact lenses wearers and non-wearers by developing a method of analysis based on measurements of Zeta Potential, the electrostatic properties and stability of human tears.

**Method:** Zeta potential ( $\zeta$ ) as a function of pH was measured by a Zetasizer Nano ZS90 (Malvern Instruments) on different samples. The device used for the measurements is a capillary cell with the electrodes at the ends to which a potential difference is applied. The electrophoretic mobility of the particles is proportional to their velocity due to the applied electric field and Zeta Potential is linearly correlated. The barrier method was developed for the measurement of the isoelectric point (IEP). It is defined as the pH at which  $\zeta$  is zero. The calibration of Zeta Potential method was carried out on bovine serum albumin (BSA) samples diluted in aqueous and saline solution of different pH. Later, the method was applied to compare two groups: tears of 15 non-wearers of CLs ( $T_{NW}$ ) and tears of 10 regular wearers of daily Etafilcon A CLs ( $T_{W\_etaf}$ ). After several preliminary tests the final measurements used for the comparison were obtained by 57  $\mu$ L of mixed tears of different subjects and 85  $\mu$ L of HCl aqueous solution of appropriate pH.

**Results:** Preliminary measurements of BSA showed that the most suitable method was obtained by diluting the sample in aqueous solution. With an error of about 0,05 IEPs were 2,68 for  $T_{NW}$  and 2,94 for  $T_{W\_etaf}$ . Finally it is possible to deduce that a lower H<sup>+</sup> concentration is needed to neutralise the total surface charge of tear components of Etafilcon A wearers compared to  $T_{NW}$ .

**Conclusion:** This study provided an experimental evidence of the difference between the tears of  $T_{NW}$  and  $T_{W\_etaf}$  with the development of a method for the evaluation of the electrostatic properties of human tears. In order to deepen the knowledge on tear properties and the effects of CL worn, this method would be interesting to compare the tears of users of different types of CL materials.

Sunday 19 May 2019  
Young researchers session, 16:30-18:00

### **IMPROVEMENT OF THE NPC IN SUBJECTS WITH CONVERGENCE INSUFFICIENCY AFTER I.F.S.- EXERCISES**

Presenter: Eva Neuenschwander

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**Purpose:** Convergence insufficiency is a binocular anomaly which is associated with an increased near point of convergence (NPC), greater exophoria at near than at distance, low AC/A-Ratio and reduced positive fusional vergence (PFV) in people affected. The treatment mostly recommended is visual therapy, such as the I.F.S.-exercises (Institute Free-Space Stereogram Exercises), to improve a persons\' ability to converge. The purpose of this study is to evaluate the effectivity of said exercises.

**Methods:** The efficacy of the I.F.S. exercises in subjects with convergence insufficiency is investigated in a randomized-controlled single-blind study with 20 subjects (NPC: >10 cm; age: 18-63 years; verum group: n=10, control group: n=10), who perform a 4-week visual therapy (I.F.S.-exercises or placebo therapy). As the main target of this study, the improvement of the NPC is analysed, together with the PFV, the CISS-score and the Sheard- and Mallett-criteria as secondary outcomes. The statistical analysis is conducted using Microsoft Excel and Rcommander (Rcmdr, version 3.2.2).

**Results:** The statistical analysis ( $\alpha=0.05$ ) of the compiled data reveals a significant improvement of the NPC of the verum group compared to the control group ( $p=0.0008$ ). This is also confirmed by the statistically significant ( $p=0.0002$ ) improvement of the NPC within the verum group only (mean: 8.12 cm, sd 4.37 cm). As a secondary outcome, the PFV also reveals a statistically significant increase, both when comparing the two groups ( $p=0.0013$ ) and within the verum group only ( $p=0.0013$ ), with a mean improvement of 6.4 cm/m (+/- 4.41). Using the CISS-score as an indication, the subjective symptoms show no significant improvement. The analysis of the Sheard- and Mallett-criteria shows similarly insignificant outcomes.

**Conclusion:** The I.F.S.-exercises showed to be challenging for the subjects, nonetheless the interesting and diversified exercises lead to good compliance. Together with the higher amount of time in an extreme-converged posture induced by the exercises, it did result in a significant improvement of the ability to converge and therefore the NPC of the subjects with convergence insufficiency.

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Young researchers session, 16:30-18:00

## **GROUP COMPARATIVE OF CHILDREN OF DYSLEXIA AND PHYSIOLOGICAL HEALTHY CHILDREN REGARDING THEIR EYE MOVEMENTS WHILE READING**

Presenter: Laura Stuerzbecher

### **Authors:**

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### **Affiliation:**

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**Key words:** dyslexia, eye movements, reading, control group

**Introduction:** Children of diagnosed dyslexia often show significant reading difficulties while reading. Previous studies pursue the question, to what extent aberration of eye movements while reading could cause the difficulties of children with dyslexia. A possible correlation is still discussed controversially.

**Purpose:** This research investigates the eye movements of children with dyslexia and physiological healthy children while reading. Potential differences in eye movements between both groups as well as a possible correlation between dyslexia and eye movements were analyzed and disputed.

**Material and Methods:** Eye movements of three dyslexic children and seven physiological children were recorded by Tobii EyeX Eyetracker-bar of Firma Visus GmbH, Herrenberg, Germany while reading. Integrated software analyzed the average saccadic length in degree, average fixation duration in ms, the total number of fixations, saccades and regression saccades as well as the reading speed. The reading challenge consisted of a short reading out the test (five single words) to determine the orthographic skill and reading text. This age-related prose text was adapted in the font, font size and length for the second till sixth grades at school. While recording the child read and subsequently answered the comprehensive question, which was asked in advance.

**Results:** It is estimated, that children with diagnosed dyslexia make general more fixations, saccades, as well as regressive saccades, compared to their control group. A total number of 348 fixations were measured in the group of dyslexia of the second grade and 33.6 in the control group. In addition, dyslexia children of the second grade performed 193 saccades and 149 regression saccades. Healthy children processed 24,6 saccades and 3,6 regression saccades. Children of higher grades showed the same tendency. Furthermore, the saccadic lengths of dyslexic children are shorter as well as the fixation duration. Finally, the control group represents, that reading experiences and age improve the eye movement while reading.

**Conclusion:** The tendency of this master thesis confirmed the findings of previous research. Children with dyslexia show significant differences in comparison to healthy children. Measuring eye movements of dyslexic children may improve their diagnostics and therapy.

Sunday 19 May 2019  
Young researchers session, 16:30-18:00

## **INFLUENCE OF HETEROPHORIA ON THE COMPUTER WORK**

Presenter: Nicol Dostálová

### **Authors:**

NICOL DOSTÁLOVÁ<sup>1</sup>, PETR VESELÝ<sup>1</sup>

### **Affiliation:**

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**Purpose:** Heterophoria is a binocular disorder which can cause problems such as headaches, blurred vision or diplopia. Nowadays, they appear mainly while working on the computer. Watching a monitor can cause computer vision syndrome manifesting itself by eye fatigue, blurred vision, or diplopia. Heterophoria may also contribute to these symptoms. The effect of this disorder can be verified by using the eye-tracking method. The objective of this study is to verify the influence of heterophoria on the eye movements duration and velocity after some time of work on a computer.

**Methods:** Every patient completes the reliable CVS questionnaire. Then, measurement proceeds by an examination of visual acuity (with and without correction), objective and subjective refraction. For the heterophoria measurement, von Graefe prism is used to separate the visual perception at distance of 6 m and 70-cm-distance. Then, the eye movement duration and velocity are measured, where patients observe the sequence of dots on the screen (eye-tracking measurement). Patients continue with the strain reading and finally observe the same sequence of dots.

**Results:** In total, 32 patients in the age of  $23.7 \pm 2.6$  years were measured. The orthophoria group consisted of 50% of patients, another 50% of patients were heterophoria patients. For ocular velocity,  $432,1 \pm 128,9$  ms was measured for the heterophoria before and  $468,2 \pm 137,8$  ms after the strain. In this case, T-test ( $p = 0,014$ ) shows a statistically significant difference. The orthophoria group measured  $450.4 \pm 100,2$  ms before and  $498,9 \pm 125,8$  ms after the strain. T-test ( $p = 0,001$ ) shows a statistically significant difference. After comparing the results of both groups after the strain reading, the T-test ( $p = 0,168$ ), shows no statistically significant difference. Values are processed at the reliability level  $p = 0,05$  in MS Excel.

**Conclusion:** After the strain, the eye movements are slower in both groups. Compared with the orthophoria group, heterophoria has no effect on the eye movement duration and velocity.



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Young researchers session, 16:30-18:00

## **SYSTEMATIZATION AND VALIDATION OF THE DIGITAL UNIVERSAL ANOMALOSCOPE BY JOOS**

Presenter: Emanuele Käser

### **Authors:**

MARIA SEHMISCH<sup>1</sup>, EMANUELE KÄSER<sup>1</sup>

### **Affiliation:**

1) Institute of Optometry, FHNW Olten, Switzerland

**Key words:** color vision, color vision deficiency, Anomaloscope

**Purpose:** The aim of this study was to develop and validate a new digital colour vision test: the 'Olten Digital Colour Test.'

**Methods:** A digital test strategy, based on the principle of the anomaloscope, was developed for an efficient colour vision evaluation. A total of 25 subjects participated, of whom 21 had normal colour vision and four were congenitally colour vision deficient (deuteranomalous). The differences in colour vision perception were explored by monocularly presenting semi-quadrants of different colour hues and saturation levels, whereby the software algorithm calculated occurring colour vision deficiencies based on the subjects' answers (equal vs. different colour perception for the semiquadrants). The following scale was developed for severity: a range of 2.76 - 7.18 for normal colour vision and larger than 7.18 for colour deficiency. A second scale rates the type of colour vision deficiency: a range of 0.0 - 0.3 for deuteranomaly, a range of 0.6 - 1.0 for protanomaly, and a value of < -1.0 corresponds to tritanomaly.

**Results:** The difference in colour perception between persons with normal colour vision and those with colour vision deficiency was confirmed ( $p < 0.001$ ), by identification of its type and severity. In the group of persons with a normal colour perception, a mean value of  $3.41 \pm 0.52$  was obtained. The range of the severity for the colour vision deficient subjects was 7.18-14.33 (8 eyes), indicating more variability.

**Conclusion:** The developed algorithm delivered meaningful results regarding colour perceptions of the subjects. A differentiation between normal colour vision and colour deficiency could be shown. In addition, the variation in perception between subjects with normal colour vision could be evaluated.

Sunday 19 May 2019

Open Paper Session 9: Contact Lens, 18:00-19:00

**HOW CONTROVERSIAL IS A SCLERAL LENS?**

Presenter: Daddi Fadel

**Authors:** DADDI FADEL<sup>1</sup>

**Affiliation:**

1) DOptom, FSLs

The outcomes of the last international survey showed that the gas permeable (GP) contact lens market has surprisingly continued to grow over the past few years. It appears to be the benefit especially from advances in scleral lens designs and applications, the increasing interest in myopia control in general, and ongoing improvements in multifocal and hybrid designs. It is encouraging to see that 95% of the responding to the survey fit GP lenses in their practice, and 79% fit scleral lenses. However, some features regarding scleral lens wear still represent controversy. Few issues are the key, one still oxygen delivery to the cornea, others are: intraocular pressure increase, the back surface toricity question: should all scleral lenses have a back toricity (or variations on that)?, reduced endothelial cell density, fitting normal corneas.

All these issues will be discussed based on scientific evidence and referring to peer-review literature trying to identify whether and when scleral lens wear can still be considered a controversy.

Sunday 19 May 2019  
Open Paper Session 9: Contact Lens, 18:00-19:00

## **VISUAL ACUITY, SYMPTOMATOLOGY OUTCOMES AND OCULAR SURFACE RESPONSE TO SCLERAL LENS WEAR OVER A 1-YEAR FOLLOW-UP PERIOD**

Presenter: Rute Macedo-de-Araujo

### **Authors:**

RUTE J. MACEDO-DE-ARAÚJO<sup>1</sup>, EEF VAN DER WORP<sup>2</sup>, JOSÉ M. GONZÁLEZ-MÉIJOME<sup>1</sup>

### **Affiliation:**

1) Clinical & Experimental Optometry Research Lab (CEORLab), center of Physics, University of Minho. Braga (Portugal) 2) Eye Contact Lens Research & Education, Amsterdam (The Netherlands)

**Key words:** Scleral lens fitting, visual acuity, ocular health

**Purpose:** To report the ocular surface response to scleral lens wear, as well as visual acuity and symptomatology over a 12-month follow-up period.

**Methods:** Sixty-nine subjects completed a 12-month follow-up period wearing scleral lenses. Subjects were divided into two groups: 55 subjects with Irregular Cornea (ICGroup) and 14 subjects with Regular Cornea and high refractive errors (RCGroup). Subjects attended several appointments during the 12-month period: Baseline, Lens Dispense Visit (LDV), 1-month, 3-months, 6-months and 12-months. High and Low contrast visual acuity (HCVA and LCVA) were measured with ETDRS in logMAR scale with habitual correction (HC) best spectacle correction (BSC) at Baseline and with scleral lens at every follow-up visit. Symptoms were assessed with Ocular Surface Disease Index (OSDI) at Baseline with HC and at all the follow-up visits with scleral lens. Bulbar and limbal hyperemia and conjunctival and corneal staining were assessed with slit lamp and graded with the CCLRU grading scales.

**Results:** There were statistical significant improvements in HCVA with scleral lenses when compared to HC and BSC in ICGroup ( $+0.08 \pm 0.14$  vs  $+0.35 \pm 0.33$  and  $+0.29 \pm 0.26$ ,  $p < 0.001$ ) and RCGroup ( $+0.10 \pm 0.23$  vs  $+0.17 \pm 0.23$  and  $+0.12 \pm 0.23$ ,  $p < 0.05$ ) and also in LCVA ( $+0.35 \pm 0.17$  vs  $+0.61 \pm 0.34$  and  $+0.58 \pm 0.27$  in ICGroup;  $p < 0.001$ , and  $+0.28 \pm 0.23$  vs  $+0.34 \pm 0.23$  and  $+0.30 \pm 0.23$  in RCGroup;  $p < 0.05$ ). Both HCVA and LCVA remained stable during the entire follow-up period ( $p > 0.05$ ). There was a statistical significant decrease ( $p < 0.05$ ) in the OSDI scores between Baseline (symptoms with HC,  $47 \pm 22$  in ICGroup and  $27 \pm 16$  in RCGroup) and 1-month visit (with scleral lens,  $24 \pm 15$  in ICGroup and  $17 \pm 14$  in RCGroup), without statistical significant between the follow-up assessments. Regarding the average bulbar and limbal hyperemia, average corneal staining relating to type, depth and extent, and conjunctival staining there were statistical significant differences between all visits ( $p < 0.001$ , Friedman test) – showing an increase between baseline and follow-up appointments ( $p < 0.001$ , Wilcoxon).

**Conclusions:** The improvements in visual acuity and symptomatology promoted by scleral lenses remained stable over the 12-month follow-up period in both groups. There were increases in bulbar and limbal hyperemia and conjunctival and corneal staining with scleral lenses with respect to baseline assessments.

Sunday 19 May 2019  
Open Paper Session 9: Contact Lens, 18:00-19:00

### **SOLVING THE TRAGEDY OF CONTACT LENS DROP-OUTS**

Presenter: David Berkow

#### **Authors:**

DAVID BERKOW<sup>1</sup>

#### **Affiliation:**

1) Berkow-Optometrists

**Key words:** C/Lens dropouts, reasons, how to reduce numbers of dropouts

Contact lens discomfort can eventually lead to discontinuation of contact lens wear. Permanent contact lens dropouts range from 12% to 43%. A dropout rate of 16% means that 1 in 6 patients cease contact lens wear. This has a great economic impact on the practice. We, as eye-care practitioners need to wake up and see what we can do to reduce this phenomenon.

This presentation will explain the most common reasons that contact lens wearers stop wearing their lenses and how to deal with them. It will explain the contact lens discomfort classification as described by Nichols et al., 2013. The presentation will emphasize and explain the different categories that cause contact lens drop out (e.g. eye related, lens related, patient related problems, misjudgment on the part of the practitioner and lack of availability of the required product) and will also explain what to check prior to the fitting process in order to predict the chances that there could be problems when wearing contact lenses. These may be solved in advance (e.g. ocular surface disease, dry-eyes due to aqueous deficient reasons or perhaps evaporative reasons, systemic diseases, hormonal changes, toxic drugs, preservatives and systemic drugs).

The presentation will explain which tests to conduct to check tear film dysfunction and how to evaluate the ocular surface. It will go through the different steps to take in order to reduce the drop-out tragedy. What question to ask, what not to ask or say, to think out of the box and find different solutions to the problem.

Sunday 19 May 2019  
Open Paper Session 9: Contact Lens, 18:00-19:00

## **RETINAL ELECTRICAL ACTIVITY CHANGES IN THE SHORT-TERM AND MID-TERM WEAR OF MULTIFOCAL CONTACT LENSES**

Presenter: Paulo Fernandes

### **Authors:**

PAULO FERNANDES<sup>2</sup>, CESARINA FERREIRA<sup>1</sup>, JOANA DOMINGUES<sup>1</sup>, ANDRE AMORIM<sup>1</sup>, MIGUEL F. RIBEIRO<sup>1</sup>, JOSÉ MANUEL GONZÁLEZ-MÉIJOME<sup>2</sup>

### **Affiliation:**

1) Clinical and Experimental Optometry Research Laboratory (CEORLab), Center of Physics (CFUM), University of Minho, Braga, Portugal 2) Department of Physics, University of Minho, Braga, Portugal

**Key words:** Multifocal Electroretinogram, Multifocal contact lenses, Presbyopia, Retinal activity

**Purpose:** Assess the short-term effect of different multifocal contact lens (MFCL) on the geographical retinal activity of young healthy subjects. A secondary goal was to evaluate the changes in the retinal activity of presbyopic patients fitted with MFCL over a period of 15 days of wear.

**Methods:** Ten emmetropic eyes from young subjects were enrolled in a short-term Experiment (Exp.#1) involving different multifocal CLs by young-adults under dilated pupil conditions for a period of 1 hour. In Exp.#2 five presbyopic subjects (51- 54 years) were enrolled to wear MFCL during 15 days. Multifocal electroretinography (mfERG) was recorded using the RETI-port/scan21 (Roland Consult) following ISCEV guidelines. The tests were performed monocularly using a DTL-plus electrode. The stimulus array consisted of 103 hexagonal elements scaled with eccentricity, temporally modulated between black (2 cd/m<sup>2</sup>) and white (~200 cd/m<sup>2</sup>) at the frequency of 60 Hz according to a pseudorandom binary m-sequence. Conventional mfERG N1 and P1 responses were evaluated in different retinal regions under different conditions: 1-naked eye; 2- center-distance MFCL (Add=1.50 and Add=2.50), 3- center-near MFCL (Add=1.50 and Add= 2.50)

**Results:** In Exp.#1, center-distance MFCL (low and high Add) and low Add center-near MFCL showed similar behavior: a significant reduction for N1 amplitude in all retinal regions ( $p < 0.001$ ) while for P1 amplitude a significant reduction is observed in more peripheral regions ( $p < 0.005$ , ring 3 to 6). Similar behavior for implicit time with a significant delay in both N1 and P1 wave components. Center-near MFCL with high Add showed opposite behavior: significant decrease in time for both N1 and P1 ( $p < 0.005$ ). In Exp.#2, the mean responses in mfERG wave components have similar behavior on the two days evaluated (day one and day fifteen), in eyes adapted with monofocal CL and MFCL with center-distance design, while center-near MFCL showed a delayed implicit time on the day 1 that tends to recover to baseline values after 15 days of MFCL wear.

**Conclusions:** A significant reduction in amplitude and delay in time of the mfERG response with MFCL is observed particularly with center-near design. The recovery observed in implicit time in some subjects after 15 days of MFCL wear suggests an adaptation of the retina to this multifocal effect but this requires further investigation.

Monday 20 May 2019

Monday 20 May 2019

Keynote speech, 09:00-10:00

**Title:** Uberisation of the eyecare profession

By

**Jean-Philippe Sayag**



Born in 1971 in Nantes of parents entrepreneurs, He obtained his baccalaureate in 1989 at the bilingual active school. In 1991, he stopped the scientific preparation for engineering studies and headed for a business school. He joined the ISG or graduated in 1994. He discovered at the New York Vision Expo 1994 the problem of selecting glasses for the nearsighted and decided to create Acep during the last year of study to make the first Selfies machine: "Opticvideo 4". Key milestones:

1996 creation of Acep USA then of Acep Spain  
1998 launch of the first measurement column  
2011 Launch of the first iPads applications  
2015 Aquisition of augmented reality company : Total immersion

Today Acep has more than 38,000 licenses and the undisputed leader of PD measurement on tablet and augmented reality. The company exports more than 70% of its sales. Most of the Lens manufacturer & chain stores like Lenscrafters or Specsavers have been working with Acep. Optical stores need new and exciting ways to engage the modern consumer. Smart Mirror is the optical industry's expert in providing effective digital technologies to redefine the eyewear shopping experience. We offer online to in-store experiences such as Virtual Try-on, Lens Simulator, Digital Centration, Frame Advisor, interactive kiosks and more. Our augmented and virtual reality applications will help your patient's see and understand eyewear possibilities.

Chain stores and ECP all over the world have been using our technology to bring the customer journey to the next level.

Podium discussion on the impact of digital change on our profession, 10:00-11:00

**DIGITAL CHANGE – OPPORTUNITY OR CHALLENGE?**

Presenter: Nicholas Rumney, Professor Clinical Optometry, University of Manchester; Chairman, BBR Optometry

**Key words:** digital change, technology, profession

**Summary:** The optometric profession is confronted with many disruptions and innovative technologies, such as automation of professional testing and measurement, telemedicine, spectacle and contact lens online sale, 3D printing, etc.

Flexibility, agility and a clear profile will be key to survive in this fast-changing world.

This presentation will discuss the benefits of implementing innovative technology, data analytics from management software and social media to thrive, whilst considering data protection and security.



Monday 20 May 2019

General session, 11:30-13:00

**INTERPROFESSIONAL/ MULTI-DISCIPLINAR (EYE) CARE FOR OLDER PEOPLE WITH DEMENTIA**

Presenter: Mirjam van Tilborg

**Authors:**

MIRJAM VAN TILBORG<sup>2</sup> , SIGRID VORRICK<sup>2</sup>

**Affiliation:**

1) UAS Utrecht 2) Research Centre for Healthy and Sustainable Living , Faculty Technology for Healthcare Innovations

**Key words:** Eye care, fall prevention, dementia, care-takers

**Purpose:** This presentation will show an outline of the (eye) care needed in Europe for older people with dementia. In Europe communities, policies support people to live longer at home. In 2017, nearly one fifth (19 %) of the EU population was aged 65 and more. Expected that aged 80 years or above in Europe is projected to more than double between 2017 and 2080, from 5.5 % to 12.7 %. The number of people living with dementia in Western Europe is projected to increase from 7.5m in 2015 to 14.3m by 2050. Meaning that the care needs to be adjusted and more complex care is being given locally. Interprofessional communication and cooperation will be crucial to enable this. It is extremely important to address concerns and identify risks in the daily life of the person with dementia. Accidents and injuries due to falls are a key concern for all professionals. The literature shows that the risk of falls and low visual acuity are associated. However, these studies have not focussed on functional visual acuity (FVA), which reflects an individual's performance in relation to certain daily activities involving visual tasks. The visual environments encountered, and the daily visual activities undertaken are rarely replicated in the research settings in which data is gathered. Meaning that the optometric routine maybe needs to be adjusted for people with dementia. We have to consider that older people with dementia are performing daily tasks without the use of the best correction, by lacking eye healthcare.

**Recommendation:** Interprofessional cooperation with other professionals in the field will address all the different aspects to support people with dementia to live longer at home. A multidisciplinary approach will mean that engineers, occupational therapists, and other health care professionals need to be educated as well as architects and designers. As research shows that older adults live longer at home when they are visually safe and have less risk of falls, eye care professionals need to be part of the multidisciplinary team of care.

Monday 20 May 2019  
General session, 11:30-13:00

**MTBI – CAN IT BE REHABILITATED? A FEW CASE ANALYSES**

Presenter: Esther Han

**Authors:**

JOSEPH HALLAK<sup>1</sup>, JEFFREY BECKER<sup>2</sup>

**Affiliation:**

1) JOSEPH HALLAK OD, PHD 2) Pennsylvania Neuro Rehabilitation Center

**Key words:** traumatic brain injury, multidisciplinary rehabilitation, optometric rehabilitation

We will discuss the mTBI issue. We will present the prominent symptoms. Methods of remediation and rehabilitation will be presented with a few cases in point. The lecture is based on a few articles published earlier this year and a presentation later this year.

Monday 20 May 2019  
General session, 11:30-13:00

### **ACROMEGALY – A CASE PRESENTATION**

Presenter: Brett G. Bence OD, FAAO

A 68-year-old diabetic Hispanic patient presents with reduced vision and increased light sensitivity. Her diabetes was controlled with an HbA1C of 7.5. Her examination showed vision of 20/60 OD and 20/25 OS. She had significant 3+ nuclear sclerosis (NS) cataract OD and 2+ NS OS, IOP of 32mmHg OD and 25mmHg OS, disc cupping of 0.9 OD and 0.35 OS, and no diabetic retinopathy. Gonioscopy demonstrated narrow angles OD>OS. Interestingly, she showed features of a prognathic jaw, large hands and feet, coarse facial features, and a slightly humped back.

Visual fields were severely restricted in the right eye and reduced by a mild-to-moderate level in the left eye with early indication of relative temporal quadrant reduction that honored the vertical midline. Laboratory findings determined elevated growth hormone of 14.7ng/ml compared to a reference range (RR) of 0-6.0ng/ml. Insulin-like growth factor was also elevated at 662ng/ml compared to RR of 69-200ng/ml. Neuroimaging showed a pituitary macroadenoma of the Sella turcica compressing the optic chiasm.

Her working diagnosis included dense nuclear cataract OD>OS, mixed mechanism glaucoma OD with both narrow angle and open angle glaucoma features, ocular hypertension OS, diabetes mellitus w/o diabetic retinopathy, and acromegaly.

**Actions taken:** She was placed on topical aqueous suppressant glaucoma medications, referred for cataract and narrow angle glaucoma consultation, and obtained a neuroradiology scan with contrast. Ultimately, she had combined cataract and glaucoma tube implant surgery OD. Once stable following surgery, she was referred to a neuro-surgeon for consultation which led to a tumor debulking procedure.

**Recommendations / Conclusions:** This patient presents with multiple ocular diseases. Visual fields suggest glaucoma and cataract as primary features in visual field loss. However, overproduction of growth hormone in adults can lead to acromegaly and clinical detection if the clinician recognizes the physical features. We review these physical features, laboratory analysis, and neuroimaging results in this clinical case report.

Monday 20 May 2019  
General session, 11:30-13:00

**PSYCHOLOGICAL FACTORS IN REHABILITATION OPTOMETRY**

Presenter: Bennett McAllister

**Authors:**

BENNETT MCALLISTER<sup>1</sup>

**Affiliation:**

1) Western University of Health Sciences, College of Optometry

This lecture is intended for the primary care practitioner or seasoned rehabilitation optometrist wanting to understand more about the special psychological and social issues distinctly affecting patients with vision impairment as well as potential interventions and referral options to maximize their patient's quality of life. Five main areas will be explored as they relate to successful vision rehabilitation: (1) Theories of Personality, (2) Inner patient motivations in seeking care (3) Bridging the gap between C.P. Snow's Two Cultures of Humanities and Science (4) Grief Processing and Acceptance Trajectory and (5) Multiple Intelligences impact.

**Learning Objectives:**

At the conclusion of this course, the participant will be expected to be able to:

1. Discuss the three major psychological theories of behavior
2. Identify the real reason motivating patients to seek vision care to direct their exam
3. Compare the Two Cultures of C. P. Snow as related to low vision rehabilitation
4. List the Kubler-Ross steps of grieving loss on the Acceptance Trajectory
5. Enumerate Gardner's concept of Multiple Intelligences as relating to "Success"

Monday 20 May 2019

## Open Paper Session 11: Binocular Vision, 11:30-13:00

### SHORT TERM RELIABILITY AND COMPARISONS OF THREE PHORIA TESTS

Presenter: Alessio Facchin

**Authors:**

ALESSIO FACCHIN<sup>1</sup>, SILVIO MAFFIOLETTI<sup>1</sup>

**Affiliation:**

1) IRSOO, Institute of Research and Studies in Optics and Optometry, Vinci, Italy 2) Department of Psychology, university of Milano Bicocca, Milano, Italy 3) Degree Course in Optics and Optometry, University of Torino, Italy

**Key words:** clinical measurements, phoria, binocular vision, agreement

**Purpose:** Phoria measurements are part of routine binocular vision examination. Different studies have compared different methods of phoria measurement using the average of three measurements. In standard clinic assessment this procedure is time consuming and its real usefulness is debated. Our aim was to assess the short term within-session reliability and comparison between three phoria tests.

**Method:** Participants included 277 subjects with normal binocular vision (with cover test) from 20 to 80 years old recruited in 6 optometric clinics. Participants were refractive correct for far and near vision. Phoria was measured with 3 methods: Von Graefe (VG), Maddox Rod (MR) and modified Thorington (MT) procedure. Each test was repeated 3 times within each session of measurement. Test order was divided across participants.

**Results:** At distance VG showed high value of exophoria (mean = -0.58) compared to other tests (MR = -0.15; MT = -0.12;  $p < 0.0001$ ) and only VG showed a drift in reduction of exophoria between measurements ( $p < 0.05$ ). At near, there was no difference between measurements but VG showed more exo values (mean = -2.78) than MR (-1.92) and MT (-1.57;  $p < 0.0001$ ). Bland-Altman analysis showed that the best agreement between tests was among MR and MT.

**Conclusion:** In comparing tests, there was a great agreement between MR and MT tests. Conversely, VG showed a drift of measurements at far and general more exo- values, a condition that supported more diagnosis of convergence insufficiency. Since the agreement within measurements was high, the clinical phoria measurements can be performed only one time.

Monday 20 May 2019  
Open Paper Session 11: Binocular Vision, 11:30-13:00

### **MANAGEMENT OF DIVERGENCE ANOMALIES**

Presenter: Christine Allison

#### **Authors:**

CHRISTINE ALLISON<sup>1</sup>

#### **Affiliation:**

1) Illinois College of Optometry

**Key words:** divergence insufficiency, divergence excess, prism, vision therapy

There are 2 main types of Divergence Anomalies; Divergence Insufficiency (DI), and Divergence Excess (DE). Both are considered rare conditions with a prevalence of 0.1%-0.7% for DI, and 0.8% for DE. Divergence insufficiency is defined as esophoria greater at distance than near with reduced negative fusional vergence and reduced distance vergence facility. Divergence excess is defined as exophoria at distance greater than near with a high AC/A ratio, suppression in the distance, and reduced negative fusional vergence.

**Content/Case Presentation:** This lecture will present signs and symptoms of these conditions, as well as pertinent testing to determine the correct diagnosis. Pseudo-divergence excess needs to be diagnosed and managed differently than true DE. Testing and treatment options will be addressed in this lecture, as well as multiple case presentations of patients who have been successfully treated with these conditions.

**Actions Taken:** Management of these patients using prisms, lenses, surgery, and vision therapy will be addressed. Also, overall patient prognosis dependent on size of deviation, and particular patient demographics will be presented.

**Conclusions:** In our clinic there seems to be an increase in patients with divergence anomalies, particularly those with DE. Understanding the symptoms, diagnosis, and management options for these patients is of utmost importance for proper treatment. Optometrists need to be prepared to manage these patients in the most appropriate way to help them reduce their symptoms and function normally.

Monday 20 May 2019  
Open Paper Session 11: Binocular Vision, 11:30-13:00

**UP AND OVER: MANAGEMENT OF PATIENTS WITH VERTICAL DEVIATIONS**

Presenter: Christine Allison

**Authors:**

CHRISTINE ALLISON<sup>1</sup>

**Affiliation:**

1) Illinois College of Optometry

**Key words:** Hypertropia, prism, associate phoria

Patients exhibiting vertical deviations exhibit a misalignment of their eyes in a vertical direction. One eye may be higher or lower than the other eye. This is a relatively rare condition occurring in approximately 2 % of children. Often these vertical misalignments are relatively small and not apparent during regular observation of the patient. Patients with vertical deviations are often symptomatic but uncertain of the cause of their complaints. Small vertical deviations are often associated with problems with near work such as fatigue, diplopia, and generalized visual stress.

**Content/Case Presentation:** This lecture will present symptoms of vertical deviations, as well as pertinent testing to determine the correct diagnosis. Small amounts of hypertropia can be easily missed with tests such as the cover test, often due to subtle head turns or tilts. Testing with the Maddox Rod, supra and infra vergences, suppression testing, as well as finding the associated phoria point will be imperative to managing these patients. Case presentations of patients successfully managed with hypertropia/hypotropia will be discussed during this lecture.

**Actions Taken:** The management of patients with vertical deviations using using prisms, lenses, and vision therapy will be addressed. Often small amounts of prism on top of the patient's glasses (whether Fresnel or ground in prism) will make a huge impact on their symptomatology.

**Conclusions:** The diagnosis and management of patients with vertical deviations is an important part of the binocular vision work-up during a comprehensive eye exam. These patients can be easily overlooked and their symptoms mismanaged if we do not investigate thoroughly. Successful management of these patients is an important aspect of optometric care that can easily be added to any practice.

Monday 20 May 2019

Open Paper Session 11: Binocular Vision, 11:30-13:00

### **OPTOMETRIC VISUAL TRAINING BETWEEN OLD AND NEW CONTRIBUTIONS IN LEARNING DISORDERS**

Presenters: Brigida Domenico, Ficco Letizia

**Authors:**

BRIGIDA DOMENICO <sup>1</sup>, FICCO LETIZIA <sup>2</sup>

**Affiliation:**

1) Ottico – Optometrista – Psicologo J. - Vision Trainer, 2) Ortottista Assistente di Oftalmologia – Ottico – Optometrista – Riabilitazione Visiva

**Key words:** Learning Disorder - DSA - Visual Training Optometry - dyslexia - dysgraphia - visuopercezione - visual skills-saccades – fixations

After a quick overview on definitions and new research related to the etiology of Specific Learning Disorders, Visual Training Optometry will be considered as a possible and effective tool to reduce difficulties especially in dyslexia and dysgraphia. The international bibliography is increasingly controversial, now polarized on two divided fronts: among those who consider the VT and those who consider it essential to be useless and ineffective even beyond the certified situations of true DSA.

In the second part will be exposed methodologies little impact and very effective for the acquisition, through visual analysis, all the elements sufficient to validate and propose a valid visual training. An analysis that starts from the classic refraction up to the evaluation of visuo-motor and visual-perceptive abilities. More innovative, standardized and computerized methodologies will also be considered, which will certainly integrate the final evaluation (assessment).

The last part will show "report case" in which the VT has proved to be a valid contribution for the reduction of learning difficulties in children with DSA, improving the relationship in reading / writing and giving them help to deal with more force the biggest challenge of their life: their ... growth!



Monday 20 May 2019

Open Paper Session 12: Educational Themes, 16:30-17:45

**INTRODUCING MINI PROJECTS FOR STUDENTS FROM THEIR FIRST DAY IN OPTOMETRY**

Presenter: Ellen Svarverud

**Authors:**

ELLEN SVARVERUD<sup>1</sup>, ELISE DEES KREKLING<sup>1</sup>, VIBEKE SUNDLING<sup>1</sup>

**Affiliation:**

1) University of South-Eastern Norway, National Centre for Optics, Vision and Eye Care

**Key words:** Education, mini project

**Content:** In their first year, Norwegian optometry students undertake a range of basic science courses to prepare for optometry courses. Feedback from students implies they struggle to understand the relevance of these courses and that optometry as a profession appears vague. Hence, a mini project was developed to introduce the students to the foundation for optometry based on theoretical thinking in their first week at the university. The students worked with optometry related topics in groups of 6-7 people under the supervision of faculty and senior students for four days. The project period was structured and included lectures, group work, and discussion workshops. During group work, the students worked freely and without academic stringency. The two main topics for the project were axial and refractive properties of the eye, and retinal structures and their basic functions.

**Results:** Two cohorts of students, class of 2017 and 2018, participated voluntarily in the mini project. A total of 150 students (80%) participated through the whole project. Biometric data (IOLMaster 700) and retinal images (Canon CR-2 Plus AF or Nidek AFC-330) were obtained for both eyes for all students. The students signed a confidentiality agreement, and they gained access to their own data. All groups developed simple research questions based on the two topics, and gathered and assessed relevant information to support their questions. On the final day, they presented their work in an open poster session. The student responses were generally good; they found the topics to be interesting and enjoyed working with fellow students and faculty. Both the more senior students and faculty found it stimulating to provide supervision and facilitate the students' reflections.

**Recommendations/Conclusions:** A mini optometry-related project in the first weeks of the education is valuable to give the students insight in optometry, as well as to promote collaborative learning and familiarity with senior students and faculty. The informal way of learning gives the students the opportunity to learn about the eye and vision without the pressure of grades and makes a context for the basic science topics.

Monday 20 May 2019

Open Paper Session 12: Educational Themes, 16:30-17:45

**A PILOT STUDY INVESTIGATING THE DIFFERENCES IN FEEDBACK PROVIDED BY STANDARDISED PATIENTS COMPARED TO THAT PROVIDED BY VISITING CLINICAL TUTORS FOR FINAL YEAR UNDERGRADUATE OPTOMETRISTS**

Presenter: Rakhee Shah

**Authors:**

RAKHEE SHAH<sup>1</sup>, IRENE CTORI<sup>1</sup>, PAM PARKER<sup>1</sup>

**Affiliation:**

1) City, University of London, UK

**Key words:** standardised patients, communication, feedback, teaching

**Educational Topic/Area:** A practitioner's ability to articulate clinical findings and management to patients through effective communication is a vital skill in all healthcare professions and strongly contributes to overall patient satisfaction. The use of standardised patients (SPs) in education, training, and assessment of healthcare practitioners has been recognised for over 50 years. Unannounced SPs have proven successful in measuring the quality of clinical care within optometry for qualified optometrists. We investigated the potential use of SPs in undergraduate optometry training.

**Content:** Final year undergraduate optometry students examine members of the public during primary care clinics whilst being observed by visiting clinical tutors (VCTs). Upon completion of the examination, students receive individualised feedback from the VCT with details on areas for improvement, including their communication. In this pilot study, feedback on students' communication provided by SPs was compared to that provided by VCTs. Two SPs received intensive training on all elements of the eye examination to enable accurate reporting of the content of the eye examination including communication skills. The SPs provided objective patient-centred feedback on their examination through completion of a pre-designed checklist for each encounter. SPs presented unannounced (incognito) as patients seeking routine eye examinations.

**Results:** Qualitative thematic analysis has been performed on twenty sets of feedback (ten each from SPs and VCTs). Five overarching themes emerged through analysis of feedback around communication. SPs and VCTs mostly agreed and commented positively on the students' professionalism (polite and able to put patient at ease). SPs commented positively on whether the student introduced themselves. Both groups commented on the student's ability to understand and address the reason for attendance (SPs more so than the VCTs), use of technical language and the students' body language (eye contact during the examination). The SPs generally provided more detailed subjective feedback around the emerging themes on communication when compared to the VCTs.

**Recommendations/Conclusions:** Performing eye examinations on unannounced SPs who provide individualised feedback on the students' ability to articulate clinical findings and future management in a patient friendly manner during the final year of undergraduate training can provide an additional training and assessment resource.

Monday 20 May 2019  
Open Paper Session 12: Educational Themes, 16:30-17:45

### **CULTURAL COMPETENCE FOR OPTOMETRY STUDENTS**

Presenter: Dinah Paritzky

#### **Authors:**

DINAH PARITZKY<sup>1</sup>, ELLEN SVARVERUD<sup>2</sup>, RIMA SHABANI<sup>1</sup>, ARIELA GORDON-SHAAG<sup>1</sup>

#### **Affiliation:**

1) Hadassah Academic College 2) University of South Eastern Norway

**Key words:** Cultural Competence, Optometry Students

**Content:** By 2050, approximately 40 million immigrants will live in the European Union. Cultural competence (CC) involves understanding and appropriately responding to the cultural variables and diversity in any interaction, and CC healthcare results in better patient outcomes. Nevertheless, the healthcare systems in most European countries and Israel are still relatively unprepared for giving care to culturally diverse populations. Furthermore, few optometry departments train their students in CC. The Optometry department at Hadassah Academic College (HAC) has a diverse student and patient population, and a workshop in CC was developed with learning outcomes of improving knowledge, attitudes and skills in CC. The workshop uses a combination of informative slides, games, videos and discussions. Emphasis is placed on the importance of CC in optometric practice by the use of role play. An Erasmus+ mobility grant supported HAC faculty travel to City University, London (CUL) and University of South-Eastern Norway (USN) where the workshop was given to optometry students. A Likert scale questionnaire assessed their subjective impression of the impact of the workshop.

**Results:** At USN, 33 second year students participated in a lecture followed by workshops in small groups, and 21 filled out evaluations of the workshop. In terms of attitude, 76% agreed or strongly agreed that they were more aware of their attitude towards different cultures after this workshop. In terms of knowledge and skills, 90% agreed or strongly agreed with statements regarding learning about cultural differences during the workshop and feeling better prepared for upcoming cross cultural encounters in clinic.

The workshop at CUL was held with a group of 20 second year students and 12 responded to the questionnaire. Of these, 58% agreed or strongly agreed that the workshop helped both their attitude and knowledge, while 50% agreed that it helped their skills.

**Recommendations/Conclusions:** The workshop was valuable for the students' awareness of their CC attitude, knowledge and skills. Research is needed to see how this awareness can be retained and improved over time, and to what extent it impacts on clinic practice.

Monday 20 May 2019  
Open Paper Session 12: Educational Themes, 16:30-17:45

## **THE ROLE OF REFLECTIVE PRACTICE IN ITALIAN ACADEMIC EDUCATION**

Presenter: Alfredo Desiato

### **Authors:**

ALFREDO DESIATO<sup>1</sup>

### **Affiliation:**

1) Roma Tre University, Rome, Italy

**Key words:** Reflective practice, Reflective writing, Role of reflection in education

A major goal of the academic education in optometry certainly is to ensure the proper competencies to provide good practice, but also to provide an apparatus able to support and ameliorate the level of professionalism in the field. In different countries, the role of reflective practice in Optometry is well-established and suggested as a tool for maintaining and developing professional capabilities. In order to guarantee a proficiency level in self-reflection activities, it is crucial that academic formation provides theoretical background and infield application opportunities for Optometry students. In Italy, the current lack of practice recommendations, as expression of the evidence-based optometry, has led to an unavoidable heterogeneity of approaches in the delineations of the programs of the different academic courses, in both the structures, the contents and the teaching methods.

**Results/Discussion** For a better understanding of the up-to-date Italian educational framework in optometry, there will be presented the results of a survey performed during the current academic year among the educators, focused on the teaching methods and, in particular, the distribution and the use of Reflective practice instruments in the Italian universities. In addition, it will be presented the impact of the perceived quality of teaching reported by a group of students experiencing the different teaching approaches.

**Recommendations/Conclusions** The implementation of reflective practice, as well as the use of case report for educational purposes, in academic education seems to be a promising window of opportunity in the development of Italian optometric education and professionalism.

**References** Professionalism in optometry. The College of Optometrists. 2014 Code of conduct for optometrists. Optometry Board of Australia. Accessed Online 2018 Reflective practice as a method of learning in medical education: history and review of literature. Gokul J. Jorweka. 2017 Reflective practice in health care and how to reflect effectively. Kiron Koshy et al. 2017 Reflective Practice in Education and Training. Jodi Roffey-Barentsen & Richard Malthouse. 2013 Reflective Practice in Educational Research. Linda Evans. 2002

Monday 20 May 2019  
Open Paper Session 12: Educational Themes, 16:30-17:45

## TEACHING EMPATHY BY SIMULATED PRACTICE IN OPTOMETRY: THE TESPO PROJECT

Presenter: Dr. Irene Ctori

### Authors:

IRENE CTORI<sup>1</sup>, FARAH MOHAMED<sup>1</sup>, AHALYA SUBRAMANIAN<sup>1</sup>, ANDREA OSKIS<sup>2</sup>, PETER JONES<sup>1</sup>

### Affiliation:

1) City, University of London 2) Middlesex University, London

**Key words:** empathy, optometry education, visual impairment

**Purpose:** Empathy is an important factor in patient-practitioner relationships. There is growing recognition that this should be taught at undergraduate level. The aim of the study was to measure final year undergraduate optometry student empathy levels and assess impact of three teaching interventions: Simulation Spectacles; novel Virtual Reality (VR) sight loss simulation; traditional written text information.

**Methods:** 44 final year optometry students took part and were invited to 'experience' vision loss caused by age-related macular degeneration (AMD). Students were randomly allocated to one of three groups:

(i) 'Simulation spectacles' (with 'blacked' out lenses) (n=18); (ii) VR simulation of central vision loss: using the Fove0 VR headset with integrated eye-tracking for simulating gaze-contingent central scotomas to look at pre-recorded environments, computer-generated environments (VR), and real-time data from a front-facing camera (Augmented Reality) (n=18); (iii) Control group: written-text description of AMD (n=8). Students completed the Jefferson Scale of Physician Empathy (JSPE) pre- and postintervention. Understanding of visual function related quality of life in visually impaired patients was also evaluated pre- and post- intervention by use of the National Eye Institute Visual function questionnaire (NEI VFQ-25). Students completed the questionnaire based on how they perceived an elderly patient suffering from advanced bilateral AMD would answer. Their answers were scored against published data from real patients (Orr et al., 2011). The project received ethical approval (Local Research Ethics Committee) and adhered to tenets of the Helsinki Declaration.

**Results:** While empathy scores increased pre- (simulation specs: 101.2±16.0; VR: 108.0±14.1; control 108.3±12.9) to post-intervention (simulation specs: 103.1±15.4; VR: 111.4±11.6; control 109.6±16.4), this was not statistically significant in any group (p>0.05). Students largely overestimated the impact of bilateral AMD on visual function, with pre-intervention NEI VFQ-25 overall composite scores of 36.0±14.5 (simulation specs); 30.9±15.3 (VR); 37.0±14.2 (controls) and post-intervention scores of 37.0±21.3 (simulation specs); 36.0±11.6 (VR); 54.4±13.2 (controls) compared to 72.7±19.7 (Orr et al., 2011) (p<0.001).

**Conclusions:** Our final year students have high levels of empathy that did not increase following an intervention activity. However, they tended to overestimate the impact of bilateral AMD on visual function. Further work is needed to identify appropriate teaching tools to improve students' awareness of the impact of visual impairment on patients' every day lives.

## Poster sessions

Session 1: Saturday 18 May 11:30-13:00

Poster display 1: **GREEN OPTICS – CROATIAN PILOT PROJECT FOR BETTER ENVIRONMENT**

Presenter: Dorotea Prguda

**Authors:**

DOROTEA PRGUDA<sup>1</sup>, SANJA KALAMBURA<sup>1</sup>

**Affiliation:**

1) University of Applied Sciences Velika Gorica

**Key words:** Green, optics, environment, recycle

**Purpose** The aim of this research and pilot project was to launch a system of proper disposal and recycle of materials in the world of optics and optometry in Croatia.

**Methods** Several scientific methods were used: inductive and deductive, analysis and synthesis, statistical and methods of interviewing.

**Results:** Green optic project was held in two phases. First we provide research on 467 students from different study programs at University X. Results show that 21% of 100 students use contact lenses in daily life, 52% are female and 48% male; 72% are in age range between 20 and 25 years. In terms of contact lenses type, 43% buy monthly contact lenses and 39% daily. 100% of examinees on question what they do with lenses and lens accessories after usage responded with same answer: throw them in unsorted trash. The monthly contact lens user spends 12 pairs of contact lenses, including packaging, and plastic bottles with cleaning and storage solution, which is 549 grams of polymer waste per year per person. That would be 57 tons of polymer waste per year in Croatia. This results were a reason to start up with "Green optics" project. Project will include at least 50 optic stores in the City of X and Y. At the beginning of the project, two-hour seminars would be held to inform optometrists about project's goals and how to handle waste materials. Then we would start with setting up the collection box and to share the info leaflets. Parallel activity in the project itself would be educating and informing citizens about the project and animating the project through different media types through guest lectures. In the full paper we will present our preliminary results.

**Conclusions** Optometrists are important in educating clients. For successful recycling, first step is proper separate collection and our proposal is to prepare good pilot program on every EU country level to show that optometrist also take care for environment.

Poster display 2: **THE PERCEPTION OF COLOR TESTING IN EARLY DETECTION OF THE MACULAR DISEASES**

Presenter: Petr Veselý

**Authors:**

LUCIE PATOČKOVÁ<sup>1</sup>, PETR VESELÝ<sup>1</sup>

**Affiliation:**

1) Masaryk University, Faculty of Medicine, Department of Optometry and Orthoptics

**Key words:** AMD, macula, maculopathy, colors

Age-Related Degeneration (AMD) and diabetic retinopathy, affect primary vision because of macular involvement. In developed countries AMD is the leading cause of practical blindness. Diabetic retinopathy is the leading cause of complete blindness. Color perception test is performed on the experimental and control group. The experimental group, which has diagnosed a disease affecting the macula, and a control group without diagnosed eye disease. First time is measured the visual acuity of subjects with the correction and then is conducted Lanthony D-15 Standard test and Lanthony D-15 desaturated test. Testing is done monocular. In conclusion is detected density of eye lens by Pentacam because of the exclusion of subjects with a high degree of cataracts Subsequently is evaluated statistically average value of the angle (confusion angle), TES (total error score), S-index (selectivity index), C-index (index confusion) and FTS with standard and desaturated test. The results are compared between the two groups in order to determine whether there is a statistically significant difference.

First results show a statistically significant difference in the average TES (t-test;  $p < 0.01$ ), C-index (t-test;  $p < 0.01$ ) and FTS (t-test;  $p < 0.01$ ) for left and for right eye.

There is statistically significant difference between both groups.

Poster display 3: **OPEN YOUR EYES: AN OPTICAL STRATEGY TO IMPROVE OPHTHALMIC PUBLIC HEALTH**

Presenter: Ioannis-Nikolaos Psaltis

**Authors:**

IOANNIS-NIKOLAOS PSALTIS<sup>1</sup> , ATHANASIOS CHALIDIAS<sup>1</sup> , LYDIA VASILOPOULOU<sup>1</sup> , OLYMPIA NTOURMA<sup>1</sup> , ALEXIA FLEMOTOMOU<sup>1</sup> , PARASKEVI TSIRMPA<sup>1</sup> , OLGA PETROVA<sup>1</sup>

**Affiliation:**

1) GREEK ASSOCIATION OF OPTICIANS AND OPTOMETRISTS

**Key words:** Humanitarian aid, prevention program, patient education

**Content:** A humanitarian aid program was assembled by the Greek Association of Opticians and Optometrists aiming to provide free comprehensive eye exams and eyeglasses to eligible low-income and uninsured people. Started in 2015 and recruiting more than 60 volunteers in recent years, the program positively impacted the life of vulnerable social groups and immigrant populations. Screening, examination and dispensing sessions were scheduled in many cultural centers across Athens, after residents between ages 16-80 were invited to participate. Screening included stations for visual acuity and rapid retinoscopy. Objective refraction included the use of an autorefractor keratometer, followed by the subjective refraction with test lens kits and retinoscopy. The ophthalmic equipment, the frames and the ophthalmic lenses were donated by various local optical stores and Greek wholesale companies. In addition three different optical laboratories volunteered to cut and fit for free the ophthalmic lenses to the frames that each patient chose in the end of each day. Volunteers were recruited from local optical stores and optometry students from the Technological Institute of Athens were offered to participate as part of their practice, under the supervision of their professors who also participated.

**Results:** The number of people that received public service by this program reached over one thousand two hundred till today. Of these, all that required received spectacles. Fifty five patients were referred to an ophthalmologist. Surprisingly, a large number of patients never had an eye exam before ( 110, age range 22-64) or had to test their vision for more over than 4 years (208, age range 34-80). Spherical equivalent ranged between -12.40 and - 1.60D.

**Conclusions:** Even if in our days an eye care exam is considered to be a privilege for most of us, many patients still face the the lack of health insurance coverage and even the understanding about the need for routine exams. Therefore, strategies to improve access to vision care must be followed including prevention public programs, voluntary service programs and also education about the importance of routine eye care exams.



Poster display 4: **THE EFFECT OF ATTACHMENT STYLE ON VISION RELATED QUALITY OF LIFE AND VISUAL FUNCTION IN VISUALLY IMPAIRED INDIVIDUALS**

Presenter: Dr Irene Ctori

**Authors:**

IRENE CTORI<sup>1</sup>, SALMA AHMAD<sup>1</sup>, AHALYA SUBRAMANIAN<sup>1</sup>, ANDREA OSKIS<sup>2</sup>

**Affiliation:**

1) City, University of London 2) Middlesex University, London

**Key words:** attachment style, vision related quality of life, visual impairment

**PURPOSE:** Using the attachment theory framework approach and considering personality type may allow insight as to how social and psychological factors interact to impact vision related quality of life (QoL). We investigated the effect of attachment style on visual function quality of life (VFQoL) of visually impaired individuals.

**METHODS:** Volunteers were recruited from the University visual impairment clinic and local charities (e.g. Macular Society, Nystagmus Network). 38 visually impaired individuals (15 females, 23 males;  $51.8 \pm 16.0$  years) took part in the study. Visual function measures included distance and near visual acuity (VA), contrast sensitivity, reading speed and microperimetry. All participants completed: The 25-item National Eye Institute Visual Functioning Questionnaire-25 (NEI-VFQ 25); The Experiences in Close Relationships–Relationships Structures questionnaire; The Ten-Item Personality Inventory questionnaire. Data analysis was conducted to determine any correlation between visual function, VFQoL and attachment related avoidance and anxiety, and personality type. The project received ethical approval (Local Research Ethics Committee) and adhered to tenets of the Helsinki Declaration.

**RESULTS:** Presenting conditions included rod-cone dystrophy (n=10), nystagmus (n=9) and glaucoma (n=7). Mean binocular distance VA was  $0.96 \pm 0.39$  logMAR. We report a statistically significant negative correlation between the NEI-VFQ-25 composite score ( $45.5 \pm 14.7$ ) and attachment related anxiety ( $r = -0.358$ ,  $p = 0.03$ ). The latter correlation still held when controlling for participants with 'good' (better than 1.00 logMAR) or 'bad' (worse than 1.00 logMAR) binocular distance VA ( $r = -0.436$ ,  $p = 0.008$ ). Despite the number of conditions and age range, these were not significantly correlated with any variable of interest in the current study. There were no statistically significant correlations with personality type.

**CONCLUSION:** Attachment related anxiety should be taken into account when managing a visually impaired individual. Lower levels of VFQoL are associated with higher levels of attachment related anxiety. This relationship warrants further investigation and has implications in considering improved access to support services for visually impaired individuals, as well as self-management of their condition.

Poster display 5: **THE IMPACTS OF LACK OF INFORMATION FOR THE IMPORTANCE OF EYE-HEALTH IN ATHENS**

Presenter: Lydia Vasilopoulou

**Authors:**

LYDIA VASILOPOULOU<sup>1</sup>, OLYMPIA NTOURMA<sup>1</sup>, THANASIS CHALIDIAS<sup>1</sup>

**Affiliation:**

1) OPTI-EXPERTS COMPANY

**Key words:** eye-health, Athens, non-prescription glasses

**Purpose:** The basic idea of this scientific research is to prove that most of the residents of Athens, capital of Greece, are not mindful with their annual appointment with their optometrist for their general optometric examination and they find solutions for their refraction problems to non-prescription glasses, without being aware of the disadvantages such kind of glasses may have.

**Method:** 2000 patients who came to our company ( from 04/03/2015 to 04/03/2018 ) with complaints for their ocular health ( regarding refraction problems ) were examined according to the following basic examination protocol.

1. Presenting problem /chief complaint ( duration and frequency ) .
2. General health and ocular history (Last visit to optometrist, known pathological eye-problems, known pathological general health-problems, use of eye-medications, use of general-medications, use or non use and what kind of glasses (non-prescription glasses, prescription far/near sighted/multifocal glasses), previous prescription of glasses, use of computer, have/have not health insurance ) .
3. Keratometry
4. Objective refraction with keratorefractometer KR-9200
5. Subjective refraction using fogging method and trial lens set
6. Near testing using trial lens set

All patients were aware that the data will be used for this scientific research and participate voluntarily. All the procedures were conducted in compliance with the Greek legislation.

**Results:** As we were expecting, most of the patients don't visit their optometrist or ophthalmologist annually and as a result we have great percentage of use of non prescription glasses, minimum percentage of use of multifocal glasses and great percentage of people that have cataract and don't even know how to deal with it.

**Conclusion:** Unfortunately most of residents of Athens despite the public health insurance they have ( that provides the opportunity for annual optometric examination as well as the privilege for prescription glasses ), they don't follow the annual optometric examination. We the optometrists should consider the reasons why this is happening and make greater effort to educate and inform people for the importance of eye-health perhaps by creating a compulsory eye-health lesson at public schools.

Poster display 6: **ACCOMODATION, PUPILLARY DIAMETER AND VISUAL COHERENCE**

Presenter: Luigi Seclì

**Authors:**

LUIGI SECLÌ<sup>1</sup>, MARCO SECLÌ<sup>1</sup>, CLAUDIA PANICO<sup>1</sup>

**Affiliation:**

1) University of Salento

**Key words:** Accomodation, pupillary diameter, accommodative triad, visual coherence

**Purpose:** improve the prescription studying:

- The accommodative triad.
- The relationship between accommodative lag and pupillary diameter.

**Method:**

1) In the first research we did a visual analysis of 443 people with an average age of 25 years and we collected the data:

- of the foria taken with cover test,
- of the accommodative amplitude N.P.A (near point of accommodation) taken with push-up method,
- of the accommodative lag taken with dynamic retinoscopy,
- of the pupillary diameter measured with a slit-lamp.

2) In the second research we studied the relationship between the accommodation lag with the dynamic retinoscopy distant 40 cm and the pupillary diameter measured with the slit-lamp .

In both searches the amount of light was the same.

**Results:** By the comparison of all the data we verified:

- 1) In the study of accommodative triad (near foria, accommodative lag, papillary diameter) that 64% of the sample is not included in expected values;
- 2) that the relation between pupillary diameter and accommodative lag is proportional and it can be expressed with a graph.

Pupillary diameter Accommodative lag

5,5 mm +0.75 dt

4,0 mm +1.25 dt

3,0 mm +1.75 dt

**Conclusion:** Considering the percentage of people who don't have a coherent visual system, we believe it is appropriate to take more consideration of all these studies to prescribe in a more efficient manner.

Poster display 7: **RELATIONSHIP BETWEEN AIR POLLUTION AND URGENT CARE CENTERS VISITS FOR CONJUNCTIVITIS IN JERUSALEM**

Presenter: Einat Shneor

**Authors:**

EINAT SHNEOR<sup>1</sup>, MIECZYŚLAW SZYSZKOWICZ<sup>2</sup>, DEENA ZIMMERMAN<sup>3</sup>, GEULA SHERF<sup>4</sup>, ALEXANDER FOXMAN<sup>1</sup>, HADAS SHOCHAT<sup>1</sup>, ARIELA GORDON-SHAAG<sup>1</sup>

**Affiliation:**

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**Key words:** Conjunctivitis, Urgent Care Centers, Air pollution

**Purpose:** The conjunctiva may be vulnerable to environmental pollution. Several studies have shown associations between air pollution and emergency department (ED) visits for conjunctivitis. They found that exposure to pollutants such as O<sub>3</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, PM<sub>10</sub> increases the risk of conjunctivitis visits at ED. However, most cases of conjunctivitis are likely to be treated in the community at regular clinics or at Urgent Care Centers (UCC). The purpose of this study was to examine the associations between UCC visits for conjunctivitis and ambient air pollution levels in the Jerusalem area, Israel.

**Method:** This anonymous retrospective study was approved by the institutional ethics committee and included UCC visits with the diagnosis of conjunctivitis in Jerusalem, for the period 1/01/2008-31/01/2018. Daily average levels of wind speed and direction, temperature, relative humidity, CO, SO<sub>2</sub>, NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> and of O<sub>3</sub>, were obtained from continuous monitoring stations. A time-stratified case-crossover method was used to estimate the associations between visits for conjunctivitis and exposure to air pollutants. Modeling was performed feeding into the models the pollution variables and meteorological factors lagged by the same number of days, from 0 to 10 days. In addition, the model considers holidays and weekends, and the number of days from the time of exposure to arrival to UCC. Descriptive statistics and correlation coefficients were obtained.

**Results:** During the study period, 15,599 subjects were diagnosed with conjunctivitis, of which 8,002 (51%) were men. One third (29.0%) of the subjects were younger than five. The model showed the following pollutants positively correlated ( $p < 0.05$ ) with conjunctivitis: NO<sub>2</sub> lagged 8-9 days, NO<sub>x</sub> lagged 5, 7, 8 and 9 days, NO lagged 5 and 9 days and PM<sub>2.5</sub> lagged at 9 days. A negative correlation ( $p < 0.05$ ) was observed for NO<sub>x</sub>, O<sub>3</sub> and CO lagged, 3, 5 and 7 days, respectively.

**Conclusion:** The findings of this study suggest that there are associations between levels of air pollution and UCC visits for conjunctivitis, with different temporal trends for each ambient air pollutant. On certain days exposure to pollution is a risk factor and on other it is protective.

## Session 2: Saturday 18 May 15:00-16:00

### Poster display 1: **EYE AND HAND DOMINANCE IN GOLF**

Presenter: Peter Allen

#### **Authors:**

PETER ALLEN<sup>1</sup>, DAVID MANN<sup>2</sup>, OLIVER RUNSWICK<sup>3</sup>, SHIVRAJ MANN<sup>1</sup>, ALAN FLETCHER<sup>4</sup>

#### **Affiliation:**

1) Anglia Ruskin University 2) Vrije Universiteit Amsterdam 3) University of Chichester 4) Girton Golf Club

**Key words:** Eye dominance, Hand dominance, Expertise

**Purpose:** The role of eye and hand dominance in the development of sporting expertise has received considerable attention in the literature. Mann, Runswick & Allen (2016) found that professional cricket batsmen were 7.1 times more likely to adopt a reversed stance (i.e. a right-handed athlete playing in a left-handed style and vice versa) than inexperienced batsmen. This was independent of the position of the dominant eye and whether the player batted right- or left-handed. The purpose of this study was to investigate whether eye and hand dominance are related to expertise in golf.

**Methods:** One hundred and fifty golfers with handicaps participated in the study. The participants were divided into groups according to the five established categories of handicap (category 1 = handicap of 5 or less, including professional golfers; category 2 = handicap of 6-12 inclusive; category 3 = handicap of 13-20 inclusive; category 4 = handicap of 21-28 inclusive; category 5 = handicap of 29-36 inclusive). Eye dominance was determined using a modified version of the Porta test, hand dominance using the Edinburgh Handedness Inventory Form, and the golfing stance (R or L handed) was recorded.

**Results:** The professional (category 1) golfers were 21.5 times more likely to play in a reversed stance than players in higher handicap categories ( $\chi^2 = 24.6$ ,  $p = .000059$ ; odds ratio = 21.5, 95% CI = 4.3-107.9). Having aligned dominance (e.g. left eye dominant and left handed stance) or crossed dominance (e.g. left eye dominant and right handed stance) was not related to the ability of the players tested. The professional (category 1) group were no more likely to be crossed than players in higher handicap categories ( $\chi^2 = 1.713$ ,  $p = .191$ ; odds ratio = 1.6, 95% CI = 0.6-4.3).

**Conclusion:** Professional golfers are more likely to play golf in a stance opposite to what would be traditionally expected based on their hand dominance. Playing with a 'reversed' stance may provide an advantage by positioning the dominant hand at the top of the grip, and cannot be explained by the position of the dominant eye.

Poster display 2: **FUSIONAL VERGENCES AND THEIR RELATIONSHIP WITH NEAR WORK TIME AND DISTANCE IN A CHILDREN AND YOUNG ADULTS CATALAN POPULATION**

Presenter: Marc Argiles Sans

**Authors:**

MARC ARGILÉS SANS<sup>1</sup>, SÍLVIA ARTECHE FERNÁNDEZ<sup>1</sup>, NÚRIA BALDRICH ROURE<sup>1</sup>, ANNA MESTRE CASANOVAS<sup>1</sup>, MARTA PRAT CARRIÓ<sup>1</sup>, BERNAT SUNYER GRAU<sup>1</sup>, GEMMA VIERA SEGURA<sup>1</sup>

**Affiliation:**

1) Catalan Association of Optometry and Vision Therapy

**Key words:** fusional range vergence, near distance, near work time

**Purpose:** To determine the characteristics of positive and negative fusional vergences in Catalan children and young adult population, and to investigate the relationship between these parameters and the time spent on near work, childbirth's nature, near work distance and dyslexia.

**Methods:** In this cross-sectional, multi-centre study, 126 patients of ages ranging 6 to 24 years old were examined and split into two different groups, one comprising participants from 6 to 11 years old and the other from 11 to 24 years old. Testing and questioning methods were unified for all centres participating in the study. All participants underwent positive and negative fusional vergences (PFV and NFV, respectively) testing using a prism bar and a 0.8 near and far VA stimulus. Moreover, patients (or their parents) were asked about the daily amount of time spent on near work, the nature of their birth (whether natural or artificially induced) and dyslexia diagnose. Furthermore, near working distance was determined by observing the patient write in a standardized task.

**Results:** A statistically significant association was found between positive fusional vergence recovery values and the amount of time spent on near work. The greater the amount of time spent on near work activities the lesser the recovery value in positive fusional vergence. This association was found in both the children's group (6 to 11 years old) and the young adult's group (11 to 24 years old). No association was found between fusional vergences and near work distance, nor between fusional vergences and the nature of the birthing, dyslexia diagnose or the presence of reading difficulties.

**Conclusion:** A relationship exists between the amount of time dedicated to near work tasks and the positive fusional vergences so that the greater the amount of time spent, the lower the recovery time in positive fusional vergences. This relationship emphasizes the importance of testing for recovery values in fusional vergences assessment. Further studies with a wider and more controlled sample are needed to verify these results.

Poster display 3: **SPECIAL OLYMPICS - OPENING EYES IN THE CZECH REPUBLIC**

Presenter: Pavel Beneš

**Authors:**

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**Key words:** mental disability, athlete, vision

**Purpose:** Preventive eye screening program called Opening Eyes was held in the Czech Republic during events of Special Olympics where the screening of visual functions in athletes with mental disabilities was performed. In total we screened over 600 individuals during 3 events.

**Methods:** Visual acuity was tested on optotypes with LEA symbols, at the beginning of the test the examiner agreed with the subject how to name the symbols in order to unify mutual communication. An important component of correct visual functions is the appropriate recognition of visible spectrum colors – color vision, with Pediatric Pseudochromatic Color Vision plates. Due to mentally handicapped athletes, testing was done on cards with colored Lea symbols. Similarly followed the testing of spatial vision – stereopsis, with the Smile test (PASS) cards. Objective refraction was measured by autorefractometer, also slit lamp for anterior eye health was used.

**Results:** Overall, our preventive health vision care program visited 699 subjects (n = 699), of which 552 were athletes and 147 unified partners. Thus, the group consists of 378 men and 321 women, ie. 186 eyes, Individuals were with an average age of 37.9 years±15.4 years (min. 8 years, max. 89 years, median 38 years). Very important was presence of volunteers from students of optometry and orthoptics. This experience is very helpful for their professional practice.

**Conclusion:** The results suggest that such screening is needed, especially when performed on a regular basis, where the same individuals are tested to monitor the status and possible changes in their visual functions. With the opportunity to offer athletes new dioptric spectacles, we will enhance their self-esteem and commitment to other tournaments.

Poster display 4: **EFFECT OF PHYSICAL ACTIVITY IN THE VISUAL SYSTEM OF FOOTBALL PLAYERS**

Presenter: Jorge Jorge

**Authors:**

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**Key words:** Refractive error, Accommodation, athlete, physical training

existence of considerable changes in the athletes' visual abilities after the sportive training.

**Methods:** Twenty-two Portuguese first league soccer players aged from 19 to 34 years (mean,  $24.7 \pm 3.98$  years) were evaluated. The objective refraction was measured with use of an autorefractometer (Shin-Nippon, Tokyo, Japan). The phoria were measured for near and distance vision using the Thorington test. The Randot Stereo Test was used to evaluate the stereopsis at near vision. The accommodative flexibility was measured for near vision using the  $\pm 2.00$  flippers. The visual reaction time was measured with the IOS app sports vision reaction time. The sensory and motor reaction time was assessed. All tests were performed before and immediately after a soccer practice. The training was considered by the technical staff as being of moderate intensity.

**Results:** Statistically significant differences were observed, after the sportive training, for stereopsis in near vision ( $-0,11 \pm 0,21 \log(\text{arcseg})$ ) ( $p=0,024$ ), for accommodative facility in near vision ( $0,43 \pm 0,60 \text{ cpm}$ ) ( $p=0,007$ ), for sensory visual reaction time ( $-0,022 \pm 0,034 \text{ s}$ ) ( $p=0,009$ ) and total visual reaction time ( $-0,023 \pm 0,038 \text{ s}$ ) ( $p=0,014$ ). Statistically significant differences were found for the variation of the visual abilities, between players with homonymous dominance and crossed dominance, considering the eye-foot relationship, for the total visual reaction time ( $p=0,045$ ). No statistically significant differences were found for the relation between the variation of the visual abilities and the position that the players occupy in the field. No correlation was observed between the sportive performance and the variation of the visual capacities.

**Conclusions:** A tendency for the improvement of some visual abilities, after the sportive training, was observed for near vision stereopsis, for near vision accommodative facility, for the sensory visual reaction time and for the total visual reaction time. Based on the Yerkes-Dodson law and in the variation of the stamina levels, the way the alterations are processed may be related to individual characteristics and vary from athlete to athlete.



Poster display 5: **COMPARISON OF SELF-REPORT QUESTIONNAIRE ON DRY EYE WITH CLINICAL TEST RESULTS: CROSS SECTIONAL STUDY**

Presenter: Einat Schneor

**Authors:**

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**Key words:** Dry Eye Syndrome, OSDI

**Purpose:** Dry Eye Syndrome (DES) is a common complaint in ophthalmology and is defined as a chronic and progressive multifactorial disorder of the ocular surface, which results in symptoms of discomfort and visual disturbance and potential damage to the ocular surface (McDonald et al., 2015). In this cross-sectional study, we examined the correlation between self-reported dry eyes symptoms to the objective tests results in DES cases vs. controls, in contact lens (CL) wearers vs. non-CL wearers (N-CL), and in post refractive surgery (P-RS) vs non-refractive surgery (N-RS) subjects.

**Methods:** 88 healthy subjects (64 females, 44 DES cases, 44 age-and-sex matched controls) with age range of 18-34, (mean age of  $23.97 \pm 3.36$  years) were included in this study. One eye of each participant was tested, using TBUT and Ocular Surface Disease Index (OSDI) questionnaire. Dry eye cases were diagnosed by TBUT test less than 5 sec and/or OSDI score  $>25$  points. Analysis was performed using Pearson's correlations and Independent Samples T-test.

**Results:** Mean TBUT result was higher on controls than DES cases ( $7.57 \pm 2.34$  vs.  $3.14 \pm 0.90$  respectively;  $p < 0.001$ ), and OSDI score was higher on DES cases vs. controls ( $28.76 \pm 4.52$  vs.  $8.41 \pm 6.51$  respectively;  $p < 0.001$ ). A medium and negative correlation between TBUT and OSDI among DES cases and controls ( $r = -0.62$ ;  $p < 0.001$ ) was found. There was no statistically significant difference in TBUT between CL and N-CL wearers ( $p = 0.53$ ). Due to low number of patients after refractive surgery (N=4) and CL wearers (N= 22), no correlation was found between signs and symptoms in these groups.

**Conclusions:** OSDI questionnaire is not interchangeable to TBUT test on DES and NON-DES patients, implying there is not much of association between signs of dry eyes and the reported symptoms measuring by these two tests.

Poster display 6: **REFRACTIVE AND OCULAR FINDINGS IN INDIVIDUALS WITH TYPE-A VS. TYPE-B BEHAVIOR PATTERNS**

Presenter: Ravid Doron

**Authors:**

RAVID DORON<sup>1</sup>, EINAT SHNEOR<sup>1</sup>, RIVKAH LENDER<sup>1</sup>, DEVORA KURLAND<sup>1</sup>, HADAS BEN ELI<sup>1</sup>

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**Key words:** Type-A, Type-B, FCC, MEM

**Purpose:** The Type-A personality theory was developed in the 1950s as a chronic heart disease risk factor and has been associated with heightened muscle tension (Chen and Coorough, 1986), increased sympathetic nervous system activity (Lee and Watanuke, 2007) and different ocular findings (e.g. Bubella et al., 2014). This study compares accommodative lag and pupil size among individuals displaying Type-A vs. Type-B behavior patterns (TABP/TBBP).

**Methods:** Healthy subjects with 6/6 distance visual acuity (Snellen), J1+ near visual acuity (Jaeger), 40SOA (PH Randot Test) and 8 CPM (BAF) participated in the study. Subjects answered the Bortner Type-A questionnaire (Cooper, 2013) in order to be classified by behavior pattern. Accommodative lag was measured with FCC and MEM. Pupil size was measured on an enlarged photograph of the eye with a ruler held underneath, taken in consistent lighting conditions (10 lux). Multiple non-paired t-tests were performed on the results of the right eye to compare the mean results of the two behavior pattern groups.

**Results:** 60 female subjects (36 TABP, 24 TBBP), ages 18 to 35 (mean age 22.88±3.92 years), participated in this study. TBBP individuals had a significantly lower accommodative lag in FCC ( $p>0.04$ ). However, no statistically significant difference between TABP and TBBP subjects was found in pupil size ( $p=0.90$ ) or MEM ( $p=0.36$ ).

**Conclusions:** TABP has higher accommodative lag in FCC compared to TBBP. Previous studies show that FCC and MEM are not interchangeable tests (Locke & Somers, 1989), and this study indicates that the difference may be attributed to the subjective component in FCC which allows it to be influenced by behavior pattern.

Poster display 7: **EVALUATION OF OCT MEASUREMENTS IN ORDER TO DETECT AXONAL DAMAGE IN PATIENTS WITH MULTIPLE SCLEROSIS**

Presenter: Inmaculada Bueno Gimeno

**Authors:**

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**Key words:** retinal nerve fiber layer, multiple sclerosis, axonal damage

**Purpose:** Evaluate if optical coherence tomography (OCT), can detect Axonal damage in patients with Multiple Sclerosis (MS), analysing the retinal nerve fiber layer (RNFL), ganglion cell layer and macular thicknesses. Compare the thicknesses of the retinal nerve fiber layer, macular and ganglion cells of patients with Multiple Sclerosis versus a control group.

**Methods:** 49 subjects affected by Multiple Sclerosis and 14 healthy subjects were evaluated in the ophthalmology service of the University and Polytechnic Hospital La Fe (Valencia, Spain). All the participants took part in the study voluntarily and underwent a complete optometry and ophthalmological examination. Retinal nerve fiber layer, ganglion cells and macular thicknesses were evaluated by OCT (Cirrus HD-OCT Carl Zeiss Meditec, version 9.0.0.281). The study was conducted following the Declaration of Helsinki. Statistical analysis was carried out with SPSS (version 22.00).

**Results:** The study was carried out on 49 patients affected by MS (98 eyes), and 14 healthy patients as a control group (24 eyes), with a mean age ( $\pm$ SD) of  $46.59\pm 10.28$  (ranging from 29 to 62 years old) and mean ( $\pm$ SD) spherical equivalent of  $-0.50\pm 1.88$ . No statistically significant differences were found between the two groups with respect to age ( $p>0.05$ ). The Ganglion Cell layer thickness was statistically lower in the MS group ( $73.23\pm 13.36\ \mu\text{m}$ ;  $p< 0.001$ ), compared to the control group ( $82.25\pm 4.56\ \mu\text{m}$ ;  $p< 0.001$ ). For RNFL, significant differences were only found in the temporal quadrant ( $55.84\pm 11.90\ \mu\text{m}$ , compared to  $66.95\pm 10.06\ \mu\text{m}$ ;  $p< 0.001$ ).

**Conclusions:** Analysis of the retinal nerve fiber layer is a biomarker of the progressive axonal degeneration that occurs in MS, and it is useful for assessing the progression of the disease and the effectiveness of treatments in the protection of axonal degeneration.

Poster display 8: **CHANGES IN SPATIAL RESOLUTION AND STEREOACUITY DUE TO THE USE OF NRBC PROTECTIVE EQUIPMENT**

Presenter: Cristina Bonnin-Arias

**Authors:**

CRISTINA BONNIN-ARIAS<sup>1</sup>, SARA GUTIERREZ-JORRÍN<sup>1</sup>, XABIER RODRIGUEZ-ALONSO<sup>1</sup>, ATOCHA GUEDAN-DURAN<sup>1</sup>, MARIA JESÚS PEREZ-CARRASCO<sup>1</sup>, CELIA SÁNCHEZ-RAMOS<sup>1</sup>

**Affiliation:**

1) Universidad Complutense de Madrid

**Key words:** Spatial resolution, stereoacuity, protective equipment

**Purpose:** to evaluate the spatial resolution and stereoacuity of the participants in rescue processes with the different protective elements that can be used.

**Methods:** 36 subjects of both sexes, members of the SAMUR - MADRID CIVIL PROTECTION team, with an age range of 18-49 years (mean of  $30.8 \pm 8.1$ ) were evaluated. spatial resolution and stereoacuity were evaluated in photopic and scotopic conditions using the ETDRS and Titmus test. The subjects were evaluated in five conditions including naked eye and 4 different NRBC (nuclear, radiological, biological, chemical) protective equipment (mask, mask+green suit, mask+orange suit, mask+blue suit).

**Results:** The ability to discern details when performing the evaluation with and without mask does not present significant differences, however, if the results obtained without mask and with the suits are compared, the differences are significant both in photopic and scotopic conditions. Regarding stereopsis, both in scotopic and photopic conditions, there are significant differences when comparing the different characteristics, except with and without mask, and the orange suit with blue suit.

**Conclusions:** the results reveal a considerable reduction when visual function is valued with mask. There is a worse visual performance when using a green suit over the mask than when using only the mask. With the blue and orange suits, the differences are not significant. The need for the use of protective equipment produces a deficit in vision, specifically in contrast sensitivity that must be considered to improve safety and effectiveness of this equipment.

Poster display 9: **STABILITY EVALUATION OF THE PHYSICOCHEMICAL PROPERTIES OF CLEANING AND DISINFECTION SOLUTIONS**

Presenter: Madalena Lira

**Authors:**

MADALENA LIRA<sup>1</sup>, RUI OLIVEIRA<sup>1</sup>, GABRIELA BOTELHO<sup>2</sup>

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**Key words:** cleaning and disinfecting solutions, physicochemical properties, Stability, contact lenses

**Purpose:** To evaluate changes in physicochemical properties such as pH, refractive index (RI), Surface Tension (ST) and chloride content (CT) of the contact lenses (CL) cleaning and disinfection solutions along 4 months after opening.

**Methods:** Five solutions were studied: OptifreePureMoist® (Alcon), RenuMultiPlus® and Biotrue™ (Bausch & Lomb), SoloCareAqua® (Menicon), and AOSeptPlus® (Alcon Laboratories). Samples of one bottle of each solution was evaluated initially and after 2, 4, 6, 8, 12 and 16 weeks after opening at a constant temperature of 20°C. The following instruments were used: pH- pH211 Microprocessor (Hanna Instruments); RI: digital refractometer CLR12-70 (Index Instruments); CT: potentiometric technique (Hanna Instruments-8417); ST: torsion balance (White Electrical Instrument).

**Results:** In all properties-solutions combinations 6 measurements were carried out each week and the average obtained was compared with the initial values. Differences were considered statistically significant when  $p < 0.05$ .

**pH:** OptiFree registered values between 7.83 and 7.90, Renu between 7.33 and 7.41, Biotrue between 7.43 and 7.57 and Solocare between 7.12 and 7.21. Aosept had a minimum of 6.58 and a maximum of 6.63. Some of the solutions showed statistically significant differences only in some weeks while Solocare and Aosept registered statistically significant differences in all weeks.

**CT:** OptiFree recorded values between 0.0013 and 0.0024, Renu between 0.0071 and 0.0092. Biotrue showed values between 0.067 and 0.0122, Solocare from 0.0004 to 0.0007 and Aosept between 0.0087 and 0.0147. Some of the systems showed statistically significant differences in some weeks.

**TS:** OptiFree recorded values between 0.0391 and 0.0400, Renu between 0.0457 and 0.0478, Biotrue between 0.0439 and 0.0470 and SoloCare between 0.0436 and 0.0458. AoseptPlus ranged between 0.0443 and 0.0488. The systems showed statistically significant differences in some weeks.

**IR:** OptiFree obtained a minimum of 1.3371 and a maximum of 1.3377. Renu recorded values between 1.3358 and 1.3365, Biotrue between 1.3354 and 1.3363, SoloCare between 1.3398 and 1.3406 and Aosept between 1.3362 and 1.3373. No statistically significant differences were obtained in this property.

**Conclusion:** The CL disinfection solutions differ in certain physicochemical properties as expected, as they also differ in their composition. The chloride content is the property that most differs between the solutions. Throughout the study small oscillations were observed in almost all the properties that, although the differences were statistically significant, may not have clinical impact since these are similar to the initial values. The refractive index was the only property that remained stable over time for all solutions.

Poster display 10: **IS THERE A PROFESSIONAL BIAS IN DRY EYE SEVERITY SELF-ASSESSMENT?**

Presenter: Marko Toth

**Authors:**

MARKO TOTH<sup>1</sup>, SONJA DRUGOVIĆ<sup>1</sup>

**Affiliation:**

1) University of Applied Sciences Velika Gorica

**Key words:** dry eye disease, professional bias, self-assessment, OSDI

**Purpose:** The aim of this research was to examine whether optometry students were more prone to detect and report more severe dry eye symptoms by self-assessment than the other students. Since optometry students are more familiar with the dry eye disease and more focused on the eye and vision symptoms than the general population, we expected them to detect more dry eye symptoms and to proclaim them more severe than the control group of students.

**Methods:** Two group of students self-assessed the symptoms of dry eye by completing the Ocular Surface Disease Index (OSDI) together with their socio-demographics. The biased group consisted of optometry students (n=57) and was compared to the control group (n=67) of students of different study programs (mostly Aircraft Maintenance and Crisis Management)

**Results:** First, the OSDI scores were computed. Then we compared the optometry and control group according to socio-demographics (gender and age) and OSDI score. There were no statistically significant differences in the socio-demographic characteristics between these two groups of students, what justified their further comparison with regard to dry eye symptoms. The t-test showed no significant differences in dry eye severity between the two groups according to the OSDI composite score ( $t(122)=1.93$ ,  $p>.05$ ,  $d= .35$ ), but revealed significant differences in some particular item responses (grittiness, eye pain, blurred or poor vision and difficulty with reading).

**Conclusion:** There is some professional bias among optometry students in the self-assessment of the severity of dry eye symptoms when it comes to assessing particular symptoms, but not in general. The optometry students are less prone to pronounce some of the symptoms as severe, especially those related to refraction and those which can be corrected, such as blurred and poor vision. Although this professional bias is not as expected, it is still not advisable to include the optometry students as participants in the dry eye subjective symptoms studies.

### Session 3: Saturday 18 May 17:00-18:15

#### Poster display 1: **COMPUTER-BASED ASSESSMENT OF VISUAL ACUITY: COMPARISON OF DIFFERENT PSYCHOMETRIC PROCEDURES**

Presenter: Laura Boccardo

#### **Authors:**

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#### **Affiliation:**

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**Key words:** Visual Acuity, QUEST, Computerized Optotypes

**Purpose:** A quick and examiner-independent visual acuity (VA) assessment test would be desirable for clinical studies. Vision Chart (CSO, Florence, Italy) is a computerised device for VA measurements that allows different methods of presentation of optotypes: EDTRS-chart- like presentation, single-row and single-letter presentation. Letters change randomly, they can be presented manually or by an automated procedure based on QUEST method. QUEST is an adaptive psychometric procedure in which letter sizes are selected to be as close to the current estimate of threshold size as possible.

**Methods:** The purpose of our study was to validate the QUEST procedure in Vision Chart, comparing with standard manual procedures of presentation of optotypes (EDTRS-chart-like and single-letter). Fifty eyes from 50 subjects (mean age 22, range 18-33) were tested, with a refractive error between 1.125 D and -8.125 D (median 0.00 D). Exclusion criteria were the presence of ocular pathology, amblyopia, and toric contact lens wear. VA was assessed by Vision Chart, using three methods of presentation in a random sequence: manual chart (subjects must read the central row of a table of 5 rows, made of 5 letters each) (MC), manual single letter (5 presentations for each dimension) (MSL), and QUEST single letter (QSL). Mean VA was  $-0,15 \pm 0,1$  LogMAR for MC,  $-0,16 \pm 0,1$  LogMAR for MSL, and  $-0,18 \pm 0,1$  LogMAR for QSL. Mean differences were statistically significant ( $P < 0,05$ ), but clinically irrelevant. Bland-Altman graphs show a bias equal to  $-0,007 \pm 0,037$  LogMAR between MC and MSL,  $-0,017 \pm 0,075$  LogMAR between MSL and QSL; and  $-0,025 \pm 0,09$  LogMAR between MC and QSL. Differences between the three methods are very small, not greater than one or two letters.

**Results:** QUEST, carried out with the Vision Chart, proved to be effective in reproducing the same results as the ones obtained by an operator performing standard manual procedure for VA assessment. This could be useful to compare measures taken in different settings and to eliminate the variability given by different operators.

Poster display 2: **IS PRECISE COLOUR SPECIFICATION NEEDED FOR VISUAL STRESS?**

Presenter: Miriam Conway

**Authors:**

MIRIAM CONWAY<sup>1</sup>, CATHERINE SUTTLE<sup>1</sup>

**Affiliation:**

1) City, University of London

**Key words:** Visual stress, colour, reading difficulties, randomised control trial

**Purpose:** Patients with reading difficulties including visual stress are sometimes prescribed coloured overlays or colour-tinted spectacle lenses in order to make reading more comfortable. This is a controlled study with a double-blind arm to test whether colour needs to be precisely specified.

**Methods:** Patients over 7 years of age with visual stress were invited to participate. They chose a coloured overlay with sustained benefit and used this as part of visual stress diagnosis. Subsequently, the intuitive colorimeter identified the exact chromaticity of lenses that were most beneficial (optimal tint) and the nearest chromaticity that produced visual distortions (control tint). One pair of tinted spectacles was worn by the patient for a period of one month, followed by the second pair for another month. The order in which the tints were worn was randomised and double masked. The Wilkins Rate of Reading was assessed in each condition: no tint, overlay, optimal tint and control tint.

**Results:** Twenty two participants (average age 27.96; years SD 14.85) completed the study. A one-way repeated measures ANOVA revealed a significant difference between reading speed and the different forms of treatment Wilks' Lambda = 0.36,  $F(3,19) = 11.18$ ,  $p < 0.001$ , multivariate partial eta squared = 0.64. Post hoc analysis with Bonferroni correction revealed that the reading speed with no tint (average = 122 words/minute) was significantly lower than overlay (136 words/minute), optimal (136 words/minute) or control tint respectively (141 words/minute), but reading speed did not differ between the tints (overlay, optimal and control tint;  $p > 0.05$ ).

**Conclusion:** Our findings confirm that people with visual stress read more quickly when viewing through colour. However, we find that reading speed is similarly improved with overlays, precision tinted lenses or a control tint. These findings raise questions about whether it is a placebo effect and if not about the need for precision tinting in visual stress.



Poster display 3: **PHOTOPIC AND MESOPIC VISUAL ACUITY IN WELDERS: COMPARISON BETWEEN CONVENTIONAL AND NEW PROTECTIVE FILTERS**

Presenter: Cristina Bonnin-Arias

**Authors:**

CRISTINA BONNIN-ARIAS<sup>1</sup> , XABIER RODRIGUEZ-ALONSO<sup>1</sup> , SARA GUTIERREZ-JORRIN<sup>1</sup> , NAHLA JEMNI-DAMER<sup>1</sup> , VICTORIA AGUIRRE-VILACORO<sup>1</sup> , CELIA SÁNCHEZ-RAMOS<sup>1</sup>

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**Key words:** Visual Acuity, Photopic, Mesopic, protective filter

**Purpose:** High electromagnetic radiation levels emitted during welding can have harmful effects on ocular structures, that can potentially seriously and irreversibly compromise vision. However, welders are generally reluctant to their use as they darken excessively, thus preventing good vision of the working field, which impedes correct work execution and increases the risk of burning their hands. The objective of this research is to evaluate the influence on far and near visual acuity of a standard ocular protective filter homologated for oxy-acetylene welding and that of a new ocular protective filter.

**Method:** This is a controlled, cross-over and random study, which included 60 volunteers aged 18 to 65 years, with a far monocular visual acuity of, at least, 20/20 (1.0 decimal scale). Visual acuity was assessed with the ETDRS (Precision Vision, USA) test for far vision (FVA) to 4 meters and near vision (NVA) to 40 cm, under different ambient illumination conditions: photopic (100 cd/m<sup>2</sup>) and mesopic (1 cd/m<sup>2</sup>).

**Results:** Binocular FAV and NVA values from under photopic and mesopic lighting conditions, with the interposition of the conventional filter and the new filter. The differences indicate the improvement obtained with the new filter compared to the conventional filter. \*  $p < 0.05$

**Conclusion:** In comparison to the standard filter, the new ocular protective filter produce statistically significantly improve FVA and NVA evaluated under both lighting conditions thus possibly enhancing systematic use of filters throughout welders' working activities.

Poster display 4: **THE LINK BETWEEN STRABISMUS AND FOOT POSTURE**

Presenter: Rachel Eichler

**Authors:**

RACHEL EICHLER<sup>1</sup>, MIRIAM ELBAZ<sup>1</sup>, SEPHORA KONIEG<sup>1</sup>, EINAT SHNEOR<sup>1</sup>, RAVID DORON<sup>1</sup>

**Affiliation:**

1) Hadassah Academic College

**Key words:** strabismus, foot posture

**Purpose:** Strabismus is defined as a misalignment of the visual axes when the eyes fixate on the same point (Bateman, 2014; Roberts et al., 1978; Przekoracka et al., 2014). Studies have shown that strabismus also affects balance (Roll et al., 1988; Przekoracka et al., 2014) and strategies of walking (April et al., 2014). The ability to walk and to stand is due to pronated and supinated movements (Cote et al., 2005). The aim of this study is to explore the possible link between different types of strabismus and normal eye position to foot postures.

**Methods:** Healthy subjects, with or without binocular vision problems participated in the study. An ocular dominance test (Hole in the card test), monocular and binocular visual acuity (Snellen at distance), cover uncover and alternating cover test with prism bar in sitting and standing position, fusional vergence ranges (prism bar base-in and base-out), Worth 4 dot (distance), stereopsis (Randot) and evaluations of static foot posture were performed. Results were analyzed applying the Pearson correlation test.

**Results:** 24 females ages 18-35 ( $22.37 \pm 1.82$  years) participated in the study (5 exotropes, 6 orthophores, and 13 exophores). 16 subjects participated in the podiatrist's examination. No correlation was found between different types of foot postures and different types of strabismus ( $r=0.59$ ).

**Conclusion:** No correlation was found between the different types of strabismus and normal eye position to different foot postures. We can't deduce a clear conclusion because of the small cohort of each sub-group.

Poster display 5: **CLINICAL COMPETENCY OUTCOMES OF PATIENT-CENTERED SUPPLEMENTAL EDUCATION FOR FINNISH STUDENTS STUDYING IN THE UNITED STATES**

Presenter: Robert Andersson

**Authors:**

ROBERT ANDERSSON<sup>1</sup>, MELISSA VITEK<sup>1</sup>

**Affiliation:**

1) Salus University

**Key words:** salus university, university collaboration, supplemental education, patient-centered education

**Purpose:** Salus University provides students enrolled in Oulu University of Applied Sciences (OU) optometry program a patient-centered education that supplements Oulu's curriculum. Students participating in the two-week supplemental program at Salus University are completing their final year of Oulu's BSc degree program. This survey study includes the statistical analysis of sixteen Oulu University students participating in the Salus University supplemental program who were willing to participate in the survey study. Participation was completely voluntary, and a consent statement was presented to each participating student. Responses were completely anonymous, and the institutional review board (IRB) at Salus University approved the study as an IRB exempt research project. The survey study includes data collected by a clinical instructor in the supplemental program in addition to student self-assessment data.

**Results:** Results were used to measure clinical skills proficiency of the students in the program before and after the patient care sessions. According to the student responses, there was a statistically significant improvement in all clinical skill competency areas at the end of the patient care sessions. According to the lead clinical instructor data, there was a statistically significant improvements in all clinical skill competency areas, except those that were related to examination/technical skills relative to both the anterior and posterior segment assessment. Students evaluated their following clinical skills higher compared to the clinical instructor: examination/technical skills: anterior segment assessment (pre and post); correlating data: knowledgebase (pre), and assessing data: formulating diagnoses (pre). The clinical instructor evaluated the following clinical skill higher than compared to the students: examination/technical skills: posterior segment assessment (post). Although the students evaluated their clinical skills higher compared to the clinical instructor in the pre-evaluation, there was very little variation in the post-evaluation.

**Conclusions:** The survey study indicates that the combination of intensive lecture and hands-on clinical education produces favorable learning outcomes for the students participating in this supplemental program. Data collection on the future student cohorts will provide more valuable information on consistent patterns of clinical skills improvement. Furthermore, more comprehensive data collection should be conducted in order to monitor the education's effects on the patient population in Finland and beyond.

Poster display 6: **HUMANITARIAN MISSIONS AS A HIGH-IMPACT EDUCATIONAL PRACTICE**

Presenter: Timothy A Wingert

**Authors:**

TIMOTHY WINGERT<sup>1</sup>, WILLIAM MILLER<sup>1</sup>, RUSSELL COATES<sup>1</sup>

**Affiliation:**

1) University of the Incarnate Word Rosenberg School of Optometry

**Purpose:** The literature contains numerous articles on the benefits of humanitarian missions as a vehicle for Interprofessional Education and Collaborative Practice. These mission trips also exhibit many high impact educational practices that have been shown to be beneficial for college students from many backgrounds. The University has faculty and students participate in multidisciplinary mission trips to numerous underserved areas. While rotating through areas in which care is provided within their specialty area, additional time is provided for students from the optometry program and their faculty to rotate through the services of the other health care programs and assist with duties they are able to perform.

**Results:** After their trip, students are requested to write a reflection piece on their experience. This is designed to have the student look back on the experience and contemplate how it fits into their other educational experiences. In particular, they are asked to consider the cultural aspects of the trip, the care they provided and its impact, and the interprofessional experience they had during the trip. In addition to the enriching experience of interacting with patients from other cultures and seeing a different set of clinical conditions, students reported favorably on what they were able to assimilate by interacting with other health care providers while providing patient care. They reported a greater understanding of how those services could benefit patients they see in their normal clinical environment. They also reported an appreciation of the people they treated and what they learned from their patients on the mission.

**Conclusions:** Our experience has been similar to that reported elsewhere in that moving the care to an environment in which the clinicians have no familiarity reduces the desire to conduct their practice as usual and opens their professional minds to finding ways to cooperate. Students and faculty return more open to finding ways to practice collaboratively with other health care providers in a coordinated care model in their customary clinical duties and in working to improve healthcare in the country they visited as well as their home country.

Poster display 7: **DIFFERENCES IN VISUAL PERCEPTION SKILLS AND EYE MOVEMENTS IN CHILDREN WITH AND WITHOUT READING PROBLEMS**

Presenter: Anna Mestre Casanovas

**Authors:**

ANNA MESTRE CASANOVAS<sup>1</sup>, MONTSE AUGÉ SERRA<sup>1</sup>, MARC ARGILÉS SANS<sup>1</sup>

**Affiliation:**

1) POLYTECHNIC UNIVERSITY OF CATALONIA

**Key words:** Reading problems, visual perception, eye movements, dyslexia

**Purpose:** The aim of this study was to observe if there are any differences in eye movements and visual perception skills between a group of students with and without reading problems.

**Methods:** The current investigation involved a total sample of 218 students of 5th and 6th grade of Primary school and 1st and 2nd grade of ESO (Basic Education in Spain, which corresponds to 11 and 12 years). We collected the data in four different schools in different cities, Sant Joan Despí, Sabadell and Rubí (Spain). We administered the Test of Visual Perception Skills (TVPS), the Developmental Eye Movements Test (DEM) among different reading and writing speed test. Two different groups (A and B) with and without reading problems were compared.

**Results:** The results show that there are significant differences between the two groups. Statistical differences were found in 7 sub-test of visual perceptual abilities and Vertical and Horizontal Time in DEM test. The group with reading problems (B) mean were Visual Discrimination 33.64%, Visual Memory 28.03%, Visual Spatial 48.94%, Visual Constancy 31.55%, Visual Sequential Memory 29.41%, Figure Ground 48.88% and Visual Closure 36.61%. In normal reading conditions (A group) mean of each sub-test were Visual Discrimination 51.57 %, Visual Memory 49.23%, Visual Spatial 64.91%, Visual Constancy 57.73%, Visual Sequential Memory 49.86%, Figure Ground 70.97% and Visual Closure 68.84%. Vertical and horizontal median percentile time at DEM test in the reading problems group (B) was 32.95% and 20.08%, whereas the normal reading group (A) was 62.76% and 57.53%. To ensure the homogeneity for the sample we conducted the Levene test for equal variances.

**Conclusion:** Students with learning problems show deficits in visual perceptual abilities and ocular motility evaluated with TVPS and DEM test compared to a group of normal students. The evidence suggests the importance to evaluate these optometric abilities in presence of reading problems. More accurate analysis has to be conducted in order to see the benefits of the treatment of these abilities in reading performance.

## Session 4: Sunday 19 May 10:00 – 11:00

### Poster display 1: **ANTERIOR SEGMENT BIOMETRY AND THEIR CORRELATION WITH CORNEAL BIOMECHANICS IN CAUCASIAN CHILDREN**

Presenter: Inmaculada Bueno Gimeno

#### **Authors:**

INMACULADA BUENO GIMENO<sup>1</sup> , NOELIA MARTÍNEZ-ALBERT<sup>1</sup> , ENRIQUE ESPAÑA GREGORI<sup>2</sup> , ANDRÉS GENÉ-SAMPEDRO<sup>1</sup>

#### **Affiliation:**

1) Department of Optics and Optometry and Vision Sciences. University of Valencia, Spain 2) Department of Surgery. University of Valencia, Spain. University Hospital La Fe, Spain.

**Key words:** corneal biomechanics, Ocular Response Analyzer, anterior ocular segment, children.

**Purpose:** To evaluate the relationship between the corneal biomechanics and the anterior ocular segment in Caucasian children.

**Methods:** A sample of 293 eyes from 293 healthy children aged between 6 to 17 years were assessed. Corneal biomechanical properties (CBPs) were evaluated with Ocular Response Analyzer, axial length (AL) with IOLMaster and anterior ocular segment with Pentacam. The anterior segment parameters obtained were the following: central corneal thickness (CCT), corneal volume (CV), anterior chamber depth (ACD), anterior chamber volume (ACV) and mean anterior and posterior keratometry. Multiple linear regression models were constructed to assess the association between CBPs with anterior segment parameters. A p-value less than 0.05 was defined as statistically significant in all analyses.

**Results:** The mean corneal hysteresis (CH) and corneal resistance factor (CRF) were  $12.12 \pm 1.71$  and  $12.30 \pm 1.89$  mmHg, respectively. Multiple linear regression showed that CH and CRF were associated negatively with AL in both models, and positively with CCT and CV in the first and second model, respectively. Meanwhile ACD, ACV or mean keratometry did not correlated with CH and CRF. Moreover, when CCT was in the model, it explained more variability for both CH (22.1%) and CRF (30.9%) than when CV was included (16.2% for CH and 16.5% for CRF).

**Conclusions:** CH and CRF were associated positively with CCT and CV, and negatively with AL in healthy Caucasian children. Moreover, corneal parameters were the most contributory variables to CH and CRF changes.

**Acknowledgments:** Authors acknowledge financial support from an 'Atracció de Talent' research scholarship UV-INV-PREDOC16F1-385061 (University of Valencia) awarded to Noelia Martínez.

Poster display 2: **CHANGES IN MYOPIA PREVALENCE AMONG YOUNG CHILDREN IN 10 YEARS**

Presenter: Jorge Jorge

**Authors:**

JORGE JORGE<sup>1</sup>, SARA FERREIRA<sup>1</sup>, LUIS MONTEIRO<sup>2</sup>

**Affiliation:**

1) CEORLab-Clinical and Experimental Optometry Research Lab, Center of Physics, School of Science, University of Minho 2) Private Practice- Paredes de Coura

**Key words:** myopia, refractive error, prevalence, children

**Purpose:** The aim of this study is to compare the changes in myopia prevalence among Portuguese young children in 2007 and 2017 at a kindergarten school.

**Methods:** The refractive status of young children of Paredes de Coura kindergarten, were measured in 2017. Refractive error was measured with Plusoptix A12 (Plusoptix GmbH, Nuremberg, Germany) without cycloplegic. In 2007 the plusoptix power refractor II was used. The data were compared with those obtained from a similar cohort of 81 children of the same city in 2007. For statistical purposes refractive error was defined as M, J0 and J45 as proposed by Thibos. Myopia was defined as a mean spherical equivalent (M) of  $<-0.50D$  and Hyperopia  $>+0.50$ .

**Results:** In 2017, 105 children's were assessed (50.4% are male) with a mean age (mean $\pm$ SD) of  $4.1 \pm 0.8$  years (ranging from 3 to 5 years). The mean refractive error M (spherical equivalent) was  $+0.57 \pm 1.09D$ ; the astigmatism component J0 was  $0.23 \pm 0.44D$  and J45 was  $+0.02 \pm 0.25D$ . In 2007, 81 children's were assessed (54.3% are male) with a mean age (mean $\pm$ SD) of  $4.2 \pm 0.8$  years (ranging from 3 to 5 years), the mean refractive error M (spherical equivalent) was  $+0.28 \pm 0.29D$ ; the astigmatism component J0 was  $-0.06 \pm 0.23D$  and J45 was  $-0.01 \pm 0.12D$ . For children aged 3 years in 2007 the prevalence of emmetropia was 64.7% and 35.3% of hyperopia. 63.6% of children who were 3 years old in 2017 were emmetropes and 36.4% hyperopes. The 4-year-old children in 2007 had a prevalence of emmetropia of 88.9% and 11.1% of hyperopia. 6.5% of children who were 4 years old in 2017 were myopic, 29.0% were emmetropes and 64.5% were hyperopes. For children 5 years of age in 2007 the prevalence of emmetropia was 83.8% and 16.2% of hyperopia. 7.3% of children who were 5 years old in 2017 were myopic, 48.8% were emmetropes and 43.9% were hyperopes. For the entire population evaluated in 2007 the prevalence of emmetropia was 81.5% and 18.5% of hyperopia. 4.8% of children who participated in the study in 2017 were myopic, 47.6% were emmetropes and 47.6% were hyperopes. The differences between emmetropia prevalence was statistically significant ( $p < 0.001$ ).

**Conclusions:** In 10 years, the prevalence of myopia among children with age between 3 and 5 years rose from 0% to 4.8%. The increased prevalence of myopia in this age population should be investigated in future studies.

Poster display 3: **THE PREVALENCE AND COMPLIANCE OF CONTACT LENS USE IN GREECE**

Presenter: Dimitra Makrynioti

**Authors:**

DIMITRA MAKRYNIOTI<sup>1</sup> , ANDREAS ANDRIKOPOULOS<sup>2</sup> , FOTEINI GRIVOKOSTOPOULOU<sup>2</sup> , CONSTANTINOS KOUTSOJANNIS<sup>2</sup> , GIANNIS PSALTIS<sup>2</sup>

**Affiliation:**

1) School of Health and Caring Professions - Department of Optics & Optometry, Western Greece University of Applied Sciences (T.E.I. of Western Greece) (Aigio), Aigio, Greece 2) Laboratory of Health Physics, Western Greece University of Applied Sciences (T.E.I. of Western Greece), Greece

**Key words:** Contact lenses, compliance, prevalence

**Purpose:** To estimate the prevalence of contact lens (CL) use among the Greek population, to investigate compliance with CL use regarding hygiene practises and to assess the skills, habits and behavior of Greek CL users.

**Methods:** In this cross-sectional study, 240 contact lens users answered a specially modified, self-administered questionnaire that was completed anonymously. Amongst others, demographic data of the participants, type of CL they prefer to wear, habitual use of contact lenses (CLs) and hygienic practises followed were analyzed.

**Results:** 28% of the participants were male and 72% female ( $p > 0.05$ ). The majority of the users were fitted with conventional hydrogel lenses (59%), while 33% were fitted with silicone hydrogels and 8% with rigid CLs (Graph 1). 86.6% of CL users specified that they clean their CLs with brand lens solutions, while 13.4% of them admitted using tap water instead. Statistical analysis revealed that the majority of CL users do clean their hands before touching their CLs while 0.8% admitted no cleaning whatsoever. Sleeping in CLs was also recorded, showing surprisingly that the 62.5% tend to sleep with their CLs in, while only 20.8% remove their lenses before going to bed. From a habit perspective, 35.8% always swim with their CLs on, and 17.5% rarely do that, while only 24.6% never do that (Table 1).

Additionally, 42% of CL users tend to wear their lenses from 8 to 12 hours a day, 31% for more than 12 hours a day and only 27% less than 8 hours a day (Graph 2).

**Conclusion:** Noncompliance with the CL protocol was common among users in our study for whom encouraging to adopt a healthy CL wear and care habit should be a priority. Inadequate lens care, poor hygiene and extended CL wear are behaviors that call for increased awareness programmes and targeted compliance education in order to avoid eye health complications.

**Acknowledgements:** This work would not have been possible without the voluntary work of the author team in its entirety. Thank you.



Poster display 4: **MTBI – CAN IT BE REHABILITATED? A FEW CASE ANALYSES**

Presenter: Esther Han

**Authors:**

JOSEPH HALLAK<sup>1</sup>, JEFFREY BECKER<sup>2</sup>

**Affiliation:**

1) JOSEPH HALLAK OD, PHD 2) Pennsylvania Neuro Rehabilitation Center

**Key words:** traumatic brain injury, multidisciplinary rehabilitation, optometric rehabilitation

We will discuss the mTBI issue. We will present the prominent symptoms. Methods of remediation and rehabilitation will be presented with a few cases in point. The poster is based on a few articles published earlier this year and a presentation later this year.

Poster display 5: **COMPARISON OF NON-INVASIVE TEAR BREAK UP TIME MEASURED WITH CORNEAL TOPOGRAPHER: MANUAL VS AUTOMATIC**

Presenter: Madalena Lira

**Authors:**

MADALENA LIRA<sup>1</sup>, CELESTE LAGO<sup>1</sup>

**Affiliation:**

1) Center of Physics, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal

**Key words:** tear film, non-invasive break up time, corneal topography

**Purpose:** The objective of this work was to evaluate non-invasively the stability of the tear film based on parameters obtained through corneal topography and compare the values obtained automatically with those measured by the videos observation.

**Methods:** The Medmont E-300 corneal topographer (Medmont Pty.,Ltd, Melbourne, Australia) was used for the measurement using a tear film analysis software that provides automatically a lacrimal surface quality evaluation and the non-invasive beak-up time (NIBUT). This equipment allows an analysis of the stability of the tear film with an acquisition of images every 0.25 seconds resulting in a video with colored lacrimal film maps and lacrimal quality evaluation indexes. Participants were instructed to focus on the central fixation target, gently blink twice and then to suppress blinking during the capture period. The NIBUT was obtained in two ways: manually after analysis of the recorded videos and counting the time from the last blink to the first break and automatically provided directly by the corneal topographer software. Three measurements were performed and the mean was calculated.

**Results:** Thirty six subjects, 6 (17%) males and 30 (83%) females with a mean age of  $26 \pm 7.04$  years participated in this study. The mean automatic NIBUT value of  $4.00 \pm 2.65$  seconds with a minimum value of 2.3 seconds and a maximum of 13.8 seconds was recorded. Regarding the manual NIBUT, the mean values recorded were statistically and clinically significant higher than the automatic values with an average of  $8.64 \pm 4.02$  seconds with a minimum value of 3.3 seconds and a maximum of 15 seconds. The measurement diameter used (7 mm) may be one of the most reasonable explanations for NIBUT differences since more peripheral ruptures are observed with less clarity which makes it difficult for the observer to detect tear rupture.

**Conclusion:** The results show that the TRLNI measured automatically using the corneal topographer are lower than those measured manually ( $p < 0.001$ ) being much lower than the reference values for this parameter. The professionals should take this into account when using this new methodology to characterize the lacrimal film.

Poster display 6: **COLLABORATION IN VOSH INTERNATIONAL HUMANITARIAN MISSIONS**

Presenter: W. Howard McAlister

**Authors:**

W. HOWARD MCALISTER<sup>1</sup> , JEFFREY L. WEAVER<sup>2</sup> , NIAL FARNON<sup>3</sup>

**Affiliation:**

1) Rosenberg School of Optometry, University of the Incarnate Word 2) College of Optometry, University of Missouri - St. Louis 3) Optometry Unit, University of the West Indies

**Key words:** Humanitarian, Education, International

**Purpose:** Volunteer Optometric Services to Humanity International (VOSH-I) is a non-sectarian, apolitical non-governmental organization whose mission is "to bring vision to every person on the planet". A new project--Moving Others to VOSH Excellence (MOVE)--strives to make humanitarian mission trips more impactful by partnering domestic and international optometrists and optometry students. A local branch of VOSH and a Student VOSH University are early participants in MOVE, partnering with another SVOSH University on a week-long mission to Trinidad and Tobago.

**Discussion:** A team travelled to Trinidad and, alongside 30 students, delivered care to underserved areas of the population. Patients received comprehensive eyecare including detailed medical history, blood pressure and blood glucose testing, refraction, binocular vision assessment, intraocular pressure measurement and ocular health assessment. Nearly 200 patients were examined in three remote locations. Consistent with World Health Organization data that uncorrected refractive error is the most common cause of vision impairment worldwide, the most common diagnosis from this mission was refractive error. The vast majority of those diagnosed were fit with pre-made spectacles brought from the U.S. Patients with significant amounts of astigmatism had to be referred for accurate correction. Those diagnosed with eye or systemic disease, as well as complicated refractive error and binocular vision conditions, were referred to the appropriate healthcare provider.

**Conclusions:** The collaboration of U.S. optometrists, U.S. students and international optometry students on a humanitarian eyecare mission adds value, providing opportunity for clinical education and greater understanding of international differences. Based on this experience, the affiliated universities plan to further advance their relationship with the school in Trinidad & Tobago.

Poster display 7: **CHANGES IN VISUAL ACUITY AND CORNEAL TOPOGRAPHY FOLLOWING INTRASTROMAL CORNEAL SEGMENT IMPLANTATION**

Presenter: Varvara Kuple

**Authors:**

VARVARA KUPLE<sup>1</sup>, JANA GERTNERE<sup>1</sup>, IGORS SOLOMATINS<sup>1</sup>

**Affiliation:**

1) Dr Solomatin Eye Center

**Key words:** keratoconus, intrastromal corneal ring segments, vision acuity

**Purpose:** The aim of the study was to evaluate the changes in vision acuity and corneal topography in patients with keratoconus following implantation of intrastromal corneal ring segments (ICRS).

**Method:** The study was performed at Eye Center X by analysing the results of operations as recorded in the patient cards. In total, the postoperative data of 30 eyes have been reviewed.

**Results:** All the study subjects showed improvements in vision acuity and in keratoconus-specific parameters.

**Conclusion:** Implantation of ICRS is an effective procedure. The operation results are not dependent on the location of keratoconus maximal ectasia apex.

Poster display 8: **OPTOMETRY EDUCATION AND PREVENTIVE EYE CARE FOR DRIVERS**

Presenter: Marcela Domnik

**Authors:**

MARCELA DOMNIK<sup>1</sup> , SONJA DRUGOVIĆ<sup>1</sup>

**Affiliation:**

1) University of Applied Sciences Velika Gorica

**Key words:** drivers, preventive, education

**Purpose:** The aim of this pilot project is to build system in Croatia to make people aware of importance of preventive visual care and to strengthen the role of the optometrists in that education.

**Methods:** Several scientific methods were used such as: methods of interviewing, inductive and deductive methods, analysis and statistical method.

**Results:** Students of the University performed vision screening for drivers in collaboration with a commercial company in Croatia and Ministry of Internal Affairs of Croatia. The aim of this pilot project is to build system in Croatia to make people aware of importance of preventive visual care and to strengthen the role of the optometrists in that education. Periodic eye and vision examinations are an important part of preventive healthcare, especially for drivers. Many eye and vision problems have no obvious signs or symptoms, so people are often not aware that a problem exists and they are potential threat for society. Early diagnosis and treatment of eye and vision problems can help in preventing loss of vision. During vision screening, students asked questions about previous eye exam, subjective quality of their vision and do they have any vision aids. They also determine the binocular visual acuity. In order to get driving license in Croatia, drivers need to have minimum 6/12 vision according to Snellen chart. Students have done 43 vision screening. There were 33 male and 10 female examined. 19 examined drivers were on eye exam in period more than 2 years, 24 examined drivers went to eye exam in period of 2 years. The results of examination indicate that 12% of drivers have visual acuity less than 6/12 and that is worryingly.

**Conclusion:** The results obtained in this pilot project, show high need for educating citizens of importance of preventive eye examination, especially for drivers. The first step in solving these problems is for conducting regular screenings vision. For that purpose it is important to develop a comprehensive national screening program and allow optometrists to do screening.

Poster display 9: **THE IMPACT OF OPTICAL COHERENCE TOMOGRAPHY ON CLINICAL DECISIONS WITH COMMUNITY OPTOMETRISTS**

Presenter: Anish Jindal

**Authors:**

ANISH JINDAL<sup>1</sup>, IRENE CTORI<sup>1</sup>, JOHN LAWRENSEN<sup>1</sup>

**Affiliation:**

1) City, University of London

**Key words:** OCT, optometrists, diagnostic accuracy

**Purpose:** In recent years, there has been widespread investment in imaging technologies by community optometrists in the UK, most notably optical coherence tomography (OCT). There is accumulating evidence that OCT in specialist settings can facilitate the diagnosis of glaucoma and retinal disease, however the impact of this technology on clinical decision-making by community optometrists in primary eye care is currently unclear.

**Methods:** A group of community optometrists (n=50) initially completed a standardised training package on OCT interpretation followed by a computer-based assessment featuring 52 clinical vignettes, containing images of healthy (n=16) or diseased discs or fundi (n=36). Each vignette featured either a single fundus/disc photographic image, or a combination of a fundus/disc image with the corresponding OCT scan. For each case, the optometrist selected their diagnosis from a pull-down list and their confidence in their decision using a 10-point Likert scale. Pairwise statistical comparisons of the fundus image alone and fundus image/OCT combination were calculated.

**Results:** The median period the optometrists had been qualified was 10 years (interquartile range (IQR) 4-19 years). The mean percentage of correct diagnoses using fundus imaging alone was 61.6% (95% CI 58.9%-64.4%) and for the combination of fundus image/OCT was 79.8% (95% CI 77.4%-82.1%). The median false negative rate with fundus alone was 19.2% (IQR 11.5%-23.1%) reducing to 7.7% (IQR 3.8%-11.5%) with the combination. Median confidence scores for fundus imaging alone was 8.00 (IQR 7.00-8.00) and 8.25 (IQR 8.00-9.00) for the combination. Improvements in performance and confidence were statistically significant ( $p < 0.0001$ ).

**Conclusion:** The results from this study suggest that OCT in combination with fundus imaging improves optometrist's diagnostic performance and confidence when compared to fundus imaging alone. These initial results suggest that OCT provides valuable additional information that could augment case finding for glaucoma and retinal disease; however further research is needed to assess its performance in a routine clinical practice setting.

Poster display 10: **DIGITAL EYESTRAIN IN POPULATION OF YOUNG SUBJECTS**

Presenter: Petr Veselý

**Authors:**

PETR VESELÝ<sup>2</sup>, LUBOMÍR HANÁK<sup>1</sup>, PAVEL BENEŠ<sup>2</sup>

**Affiliation:**

1) Department of Eye Diseases and Optometry, St. Anne's University Hospital, Pekařská 53, 656 91 Brno. Head: MUDr. Lubomír Hanák, MBA. 2) Department of Optometry and Orthoptics, Medical faculty, Masaryk University, Kamenice 5, 625 00 Brno. Head: Mgr. Pavel Beneš, Ph.D.

**Key words:** Digital eyestrain syndrome, accommodative and vergence facility, addition, relieving prism

**Purpose:** The main goal of our study was to prove short-term objective influence of near addition and relieving prism on accommodative and vergence facility in group of young healthy persons.

**Methods:** We had in total 37 subjects in our study. The 1<sup>st</sup> group contained 37 subjects with average age 23 years without important eye pathology. The 2<sup>nd</sup> group contained 8 subjects with the same average age without important eye pathology. In the 1<sup>st</sup> group of subjects, we measured binocular accommodative facility (BAF) and binocular vergence facility (BVF) with and without addition 1 D and with and without relieving prism 2 pD BO at working distance 45 cm. In the 2<sup>nd</sup> group, we evaluated BAF, BVF and standardized questionnaire (Computer Vision Syndrome Questionnaire – CVS-Q) during usage of two types of soft contact lenses.

**Results:** In the 1<sup>st</sup> group of subjects, we measured these values: BAF without addition = 12.78 cpm, BAF with addition = 11.57 cpm, BVF without prism = 12.32 cpm, BVF with prism = 11.59 cpm. In the 2<sup>nd</sup> group of subjects, we measured with contact lens type 1 these values: BAF = 12.13 cpm, BVF = 13.63 cpm and questionnaire score 9.43 points. With contact lens type 2 we measured BAF = 11.75 cpm, BVF = 11.63 cpm and questionnaire score 12.86 points. We proved statistically important difference between two variables only in the 1<sup>st</sup> group between BAF with and without addition ( $p=0.004$ ) and BVF with and without relieving prism ( $p=0.047$ ).

**Conclusion:** In conclusion, we found statistically important decrease in variable BAF and BVF with usage of addition and relieving prism. We found that neither addition nor prism have positive influence on increase of BAF and BVF. Subjects in 2<sup>nd</sup> group had higher BAF and BVF values with both types of contact lenses in comparison with natural values. We found that with contact lens type 1 (with addition) subjects had higher BAF and BVF values in comparison with contact lens type 2 (aspheric). Subjects with contact lens type 1 had also lower (better) questionnaire score, i.e. 9.43 versus 12.86 point.

## Session 5: Sunday 19 May 12:00-13:00

Poster display 1: **ARE SPACEFLIGHTS SAFE? PHYSIOLOGICAL MANIFESTATION ASSOCIATED WITH SPACEFLIGHT**

Presenter: Andrea Altieri

### **Authors:**

ANDREA ALTIERI<sup>1</sup>

### **Affiliation:**

1) Aston University

**Key words:** Astronauts, spaceflights, ophthalmic changes

**Purpose:** A number of astronauts develop neuro-ocular structural and functional changes during prolonged periods of spaceflight that may lead to additional neurologic and ocular consequences upon return to Earth.

The results of ocular testing show that a number of crewmembers experience visual performance fall like: hyperopic shift, cotton-wool spots, choroidal folds, optic disc edema, optic nerve sheath distention, and posterior globe flattening with varying degrees of severity and permanence. These changes are observed now because the long duration space flight inside the International Space station. These changes define what have been called "Spaceflight Associated Neuro-ocular Syndrome (SANS)".

**Method:** Biomechanical changes models. The models (nested logistic regressions) assess the single and joined contribution of several factors in predicting the ophthalmic outcomes. The best model prediction is obtained adding at the age at launch and the number of days in space, genetics factors and B-vitamin nutritional status.

**Results:** The presence of gene variants in the coding of the 1-carbon metabolic pathway enzymes (used in the building blocks synthesis of DNA and RNA) lead to localized tissue insufficiency of B vitamins in microgravity. Oxidative stress in combination with other physiologic influences and/or environmental conditions, contribute to a multiple-hit effect that results in endothelial dysfunction and leakage of blood vessels. Subsequent edema upon arachnoid villi reduces efflux of CSF. The increased pressure in the subarachnoid space around the optic nerve exerts pressure on the posterior globe resulting in its flattening causing the described ophthalmic changes.

**Conclusion:** This syndrome, SANS, remains under intensive study by NASA, and a single unifying predominant mechanism has yet to be proven. Understanding and possibly treating SANS with specific preflight, inflight, or post-flight countermeasures may be necessary as the United States prepares for a return to even longer-duration space flight missions, including return trips to the International Space Station, the moon, or the asteroid belt or a future human mission to Mars.



Poster display 2: **SOCIAL JUSTICE AND SERVICE LEARNING: THE COMPLEXITIES OF EXPANDING OPTOMETRY SERVICES INTO RURAL AREAS WITHIN THE SOUTH AFRICAN CONTEXT**

Presenter: Diane van Staden

**Authors:**

DIANE VAN STADEN<sup>1</sup>

**Affiliation:**

1) University of KwaZulu Natal

**Key words:** service learning, social justice, optometry

**Purpose:** The profession of optometry in South Africa has historically had a private sector bias both in training and practice. Until recently, optometry services did not form part of health services offered at public health facilities. Following the University's collaboration with the KwaZulu Natal Department of Health, optometry students are now being trained within a community-based, primary healthcare model through a revised Decentralised Clinical Training (DCT) strategy at public health facilities. The move is largely aimed at fostering context-appropriate training and broader graduate competency development suited to the South Africa's public health sector reality, where the majority of the population lives in rural areas and is dependent on public health services. This service learning opportunity therefore in principle, supports access to health services for underprivileged communities.

**Methods:** The research forms part of a larger project on decentralised clinical training within health sciences which will follow a descriptive, case study approach using the University's Discipline of Optometry experience in expanding access to eye health through this service learning model. Qualitative data will be collected via key informant interviews and observation methodologies and thematically analysed within an interpretive paradigm.

**Results:** Public sector facilities in rural areas are ill-equipped to deliver comprehensive primary eye care, with infrastructure and equipment being the main challenges affecting this service learning model, apart from the lack of human resources for optometry services in many outlying areas. Additionally, the non-strategic placement of professional optometrists within public health districts or facilities makes it difficult to ensure equitable access to services for all underprivileged communities, and negatively impacts the quality of the service learning experience.

**Recommendations:** While there are definite benefits to adopting a socially accountable model of training and practice in optometry within South Africa, the systemic and structural health system constraints may pose a threat to the ultimate achievement of the training objective, as well as the noble ideal of creating access to optometry services for the majority of underprivileged South African communities in the short term.

Poster display 3: **RECOGNISING THE THREAT OF VISION CHANGES AMONGST PEOPLE LIVING WITH HIV**  
Presenter: Alvin Munsamy

**Authors:**

ALVIN MUNSAMY<sup>1</sup>

**Affiliation:**

1) University of KwaZulu-Natal

**Key words:** HIV, retinal nerve fibre layer, psychophysical visual function, visual electrophysiology

**Purpose:** The aim of this review was to retrospectively examine the impact of the human immunodeficiency virus (HIV) together with the combination antiretroviral therapy (cART) medication in the eyes of people living with HIV (PLHIV) until such time a vaccine is found to help guard against the burden of blindness in PLHIV.

**Methods:** The study is as a thematic review investigating the integrity of the retinal nerve fibre layer (RNFL) and visual function in PLHIV without CMV retinitis. Databases such as PubMed; Google scholar and EBSCOHOST was utilised to search for RNFL and HIV; HIV and automated perimetry; HIV and contrast sensitivity; HIV and color vision and HIV and electrophysiology for the search period until August 2018. Statistically significant observations ( $p < 0.05$ ) for RNFL thickness; perimetric indices; contrast sensitivity scores; total error scores for colour vision and the amplitude and latent periods of the pattern visual evoked potential (PVEP) and pattern electroretinogram (PERG) comprised the review.

**Results:** Studies agreed that the mean para-papillary (pp) RNFL thickness was reduced including thinning in superior and inferior ppRNFL thickness. Studies on visual function evaluation showed transient PVEP and PERG both had reduced amplitudes and delayed latent periods. Reduced mean deviations by at least 2db in the central 24 degree of the visual field as well as reduced pattern standard deviation and positive glaucoma hemifield test with concurrent thinning of ppRNFL was observed. Contrast sensitivity using the Peli-Robson showed a score of less than  $\log 1.5$ ; and color vision showed higher mean square root of total error scores of above 8 on Farnsworth-Munsell 100 hue test. All these were observed at CD4 count less than 200 cells/mm<sup>3</sup> in PLHIV with no retinitis on cART. PLHIV with no retinitis on cART showed reduction in RNFL thickness and visual function.

**Conclusion:** Visual function appears to be a threat in PLHIV without retinitis who are on cART. Fortunately these may not translate into quality of life changes in the short term. Despite this, the review advocates for the UNAIDS 90-90-90 goal as it shows sub-clinical changes in retinal structure and visual function as more PLHIV who test positive must be treated.

Poster display 4: **MANAGING MINOR EYE CONDITIONS IN THE COMMUNITY INSTEAD OF THE HOSPITAL**

Presenter: Josephine Evans

**Authors:**

JOSEPHINE EVANS<sup>1</sup>

**Affiliation:**

1) Linklaters Optometrists

**Key words:** Minor Eye Conditions, optometrists, emergency, triaging

**Case Presentation:** The Minor Eye Conditions (MECS) referral pathway was initiated in the UK in response to a rise in demand for emergency care. It is a novel strategy for providing specialist eye care to patients in the community. Hospital eye services are overburdened with patients, a proportion of whom have conditions that can be managed in the community by optometrists. Patients seen under MECS may originate from general practitioner physicians (GPs), converted from eye examinations, referred by other optometrists or be 'walk-ins'- those presenting with ocular symptoms. Only MECS accredited optometrists, who have undergone several distance-learning modules and an OSCE-style examination can examine patients. Examples of patients seen in this pathway include those with vision loss, ocular pain, red or dry eyes, flashes and floaters, visual field defects, glaucoma referral refinement, and cataract referrals. Community practices are paid an enhanced fee, which is invariably less than the cost to the NHS of an appointment at the hospital with an ophthalmologist.

**Actions Taken:** Three cases will be discussed illustrating patients with emergency conditions who were successfully managed in community practice.

1) Corneal foreign body

- Successful removal, treatment and review in optometric practice

2) Suspect papilledema

- A GP referral to a MECS optometrist following symptoms of headaches and ophthalmoscopy

3) Narrow anterior chamber angles

- From another optometrist concerned about the risk of angle closure

This service has an array of benefits for all participants. Hospitals experience reduced waiting times; more detailed referrals enabling appropriate triaging; fewer trivial and more serious conditions. For community optometrists our role and interest is enhanced; it opens scope for further qualifications; clinical care is extended; job satisfaction is improved with more varied workdays. From a patient perspective, less time is spent in clinic, examinations occur in local, comfortable environments and they receive continuity of care with their optometrist.

**Recommendations/Conclusions**

- MECS is an efficient, effective and frugal model
- Benefits reach patients, hospital and community optometrists
- Financially beneficial to practice owners and the NHS
- The expertise required is within grasp of the typical optometrist

Poster display 5: **IMPROVING VISUAL SKILLS BY COMBINING AUDITORY STIMULATION AND VISION THERAPY**  
Presenter: Marta Fransoy Bel

**Authors:**

MARTA FRANSOY BEL<sup>1</sup> , JÉNNIFER JIMÉNEZ PALMA<sup>1</sup> , MARIA IMMACULADA GÁLVEZ CARRILLO<sup>1</sup> , MARC ARGILÉS SANS<sup>1</sup>

**Affiliation:**

1) UNIVERSITAT POLITÈCNICA DE CATALUNYA, DEPARTAMENT D'ÒPTICA I OPTOMETRIA DE TERRASSA

**Key words:** Vision therapy, Auditory stimulation, visual perceptual skills

**Purpose:** The aim of this study is to determine the improvement in visual perception skills and ocular movements with a specific auditory stimulation program. We sought to show the relationship and interaction between the magnocellular and parvocellular visual paths and vestibular-auditory paths, and its potential use to improve visual abilities such as perception and eye movements, giving a potential tool to complement vision therapy.

**Methods:** In this study, a total sample of 13 participants (6 to 12 years old, mean age: 7.30 years) were recruited for this study. The inclusion criteria were age 6 to 12 years old, we administered the Developmental Eye Movement Test (DEM), Test of Visual Perceptual Skills (TVPS), Visual Aural Digit Span (VADS), Test of Auditory-Visual Integration test (AVIT), Visual-motor Integration Test (VMI), reading performance test in Catalan language (TALEC), Wold visual-motor test and vision binocular and accommodative examination. Inclusion criteria were to fail in one of the screening tests. Following consent and screening, eligible participants were randomly assigned to one of two intervention groups: (1) auditory stimulation program (n=6) following a vision therapy; and a second group (2) vision therapy group (n=7). The vision therapy program intervention consisted of 6 sessions (1 hour) every 15 days. We compared the performance in every test before and after the intervention.

**Results:** Size of effects were calculated using Cohen's-d and compared with 1999 Gilmore's meta-analysis, obtaining consistent values. Improvement in TVPS percentile was seen using the Mann-Whitney test. Visual Constancy ( $p=0.029$ ) and Visual Figure-Ground ( $p=0.015$ ) improved more in the group (1). We not observed any significant changes ( $p=0.41$ ) in ocular movements scores (DEM test) between group (1) and (2).

**Conclusion:** Our study supports the importance of the relationship in visual-auditory paths and the re-education programs such as Tomatis to treat visual perception skills. This study poses the possibility to integrate these auditory treatments in vision therapy in a new and promising framework to reduce learning problems in school. Future directions studying the importance of auditory stimulation will provide a new approach to understand how we use our visual system and how we can manage leaning problems.

Poster display 6: **SPONTANEOUS WORKING DISTANCE OF PRIMARY SCHOOL CHILDREN USING A DIGITAL DEVICE**  
Presenter: Paolo Tacconella

**Authors:**

PAOLO TACCONELLA<sup>1</sup>, RICCARDO CERVIO<sup>2</sup>, BARBERIS GERMANO<sup>2</sup>

**Affiliation:**

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**Key words:** spontaneous working distance, stature, digital device, Harmon distance

**Purpose:** near visual activities are rarely conducted at 40 cm during childhood; nevertheless, research has paid little attention to the observation of spontaneous working distance, especially in visual activities involving digital devices. The aim of this study is to evaluate spontaneous reading-writing distance using a digital device (cell phone) in a north-western Italian primary school.

**Method:** a primary school group of students (1st to 5th grade) was involved in this study. 25 out of the 211 children involved (11.84%) did not pass the study inclusion criteria. 26% of 1<sup>st</sup> and 2<sup>nd</sup> graders and 15% of 3<sup>rd</sup> graders were not able to perform the task with a digital device. The remaining children have constituted the experimental group (N = 172; Age range 6-12). Each subject has been invited to write and send a text message with a cell phone. Distances were measured using a special board, on which concentric circumferences spaced 1 cm apart allowed the observer to detect the working distance without getting close to the child. Finally, Harmon distance was recorded for each subject.

**Results:** The mean reading-writing distance using a digital device was 21.54 cm ( $\pm 3.10$ ). First graders showed the closest distance (18.07 cm;  $\pm 5.44$ ), and the fifth graders showing the longest (26.55 cm;  $\pm 6.11$ ). The mean Harmon distance – still considered by some optometrists as a “gold standard” – was 28.67 cm ( $\pm 2.21$ ).

**Conclusion:** The spontaneous digital working distance of Italian primary school was lower than the Harmon distance and significantly lower than the canonical 40 cm. In agreement with Rosenfield *et al.*, (2001), we recommend using 25 cm as the standard distance for the optometric examination in children, which appeared to be more appropriate to investigate the true working distance of primary school children.

Poster display 7: **MERIDIONAL ACTIVITY OF THE MYOPIC RETINA WITH DIFFERENT CONTACT LENS DESIGNS**

Presenter: António Queirós Pereira

**Authors:**

ANTÓNIO QUEIRÓS PEREIRA<sup>1</sup>, ANA MOTA<sup>2</sup>, ANA AMORIM-DE-SOUSA<sup>2</sup>, ANDRÉ AMORIM<sup>2</sup>, PAULO FERNANDES<sup>1</sup>, JOSÉ MANUEL GONZÁLEZ-MÉIJOME<sup>1</sup>

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**Key words:** myopia control, peripheral vision, electroretinogram

**Purpose:** Different myopia control optical devices in the form of contact lenses induce significant amounts of myopic astigmatism, what might alter the electrical activity of the retina when the image is formed under such conditions at different eccentricities. The main purpose of this study was to measure the retinal activity along the horizontal and vertical retinal meridian when using special contact lens designs for myopia control compared to a monofocal contact lens.

**Methods:** The study involved 20 myopic subjects with a mean spherical equivalent refraction of  $-1.51 \pm 0.46$ D and astigmatism below 1.00D. The multifocal electroretinogram (mfERG) was used to measure the retinal activity with a pseudo-random stimulation paradigm in a 19' inches calibrated LCD screen at 28 cms from the eye using DTL electrodes to selectively record the electrical activity across 61 hexagonal areas of the retina comprising a region within  $60^\circ$  of the posterior pole. The data was extracted selectively from hexagonal areas along the horizontal and vertical meridian and averaged by the whole meridian or inspected selectively for nasal and temporal and superior or inferior areas. Statistical analysis was conducted using SPSS (IBM, IL) to compare means between contact lens devices and Bonferroni correction was applied to determine the pair-wise comparisons between them. The peripheral refraction along the horizontal meridian was also measured to control the effect expected for these lenses within the 60 degrees of the visual field and retinal field.

**Results:** The average amplitude for N1 were  $188 \pm 86$ nV in meridian horizontal and  $158 \pm 79$ nV in vertical for the control monofocal contact lens,  $180 \pm 81$ nV and  $162 \pm 85$ nV for prototype 1,  $182 \pm 105$ nV and  $171 \pm 82$ nV for prototype 2 and  $177 \pm 83$ nV and  $166 \pm 93$ nV for prototype 3 respectively ( $p > 0.05$ ). The average amplitude for P1 were  $511 \pm 178$ nV in meridian horizontal and  $457 \pm 165$ nV in vertical for the control monofocal contact lens,  $502 \pm 210$ nV and  $443 \pm 196$ nV for prototype 1,  $507 \pm 203$ nV and  $477 \pm 176$ nV for prototype 2 and  $482 \pm 181$ nV and  $463 \pm 157$ nV for prototype 3 respectively ( $p > 0.05$ ). No differences were significant between control and lens prototype for any parameter.

**Conclusions:** There were no differences between the horizontal and vertical meridian in the activity recorded with the special designs compared to the control lens.

Poster display 8: **SCLERAL LENS FITTING SUCCESS: DROPOUT RATE, HABITS OF WEARERS AND HANDLING LEARNING CURVE FROM THE WEARER PERSPECTIVE**

Presenter: Rute J. Macedo de Araújo

**Authors:**

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**Key words:** Scleral lens, dropout rate, handling, scleral lens fitting

**Purpose:** Report the dropout rate of scleral lens wear and respective reasons, and the handling learning curve from the wearer perspective.

**Methods:** Ninety-five patients were consecutively screened to be enrolled in a clinical trial involving scleral lens fitting. Subjects were divided into two groups: ICGroup including 71 subjects with Irregular Cornea and RCGroup including 24 subjects with high refractive errors but Regular Cornea. Subjects attended several visits during the 12-month follow-up period: Baseline, Lens Dispense Visit (LDV), 1-month, 3-months, 6-months and 12-months. The number and reasons for dropouts were noted. At LDV, the mean time required to correctly apply the lens for the first time was assessed. At the subsequent follow-up visits, subjects answered a questionnaire regarding the number of days/week and hours/day of lens wear, as well as the number of attempts to correctly apply and remove the lenses.

**Results:** Sixty nine subjects successfully completed the 12-month period. Twenty-six subjects (16 from ICGroup, 10 from RCGroup) discontinued at different points over the 12-month, without reported adverse events: 35% discontinued due to handling issues, 19% due to discomfort. The other 46% were never dispensed, underwent surgery or were lost to follow-up. There were no statistical significant differences between subjects who discontinued and who continued in the study regarding age, gender and baseline symptoms. 36.2% of the subjects required <15 min to correctly apply the lens at LDV, however 13% (9% of ICGroup and 29% of RCGroup) required >60min. Subjects that wore spectacles, soft lens or had no prescription prior enrolling the study were those that required more time. The number of hours/day and days/week of lens wear had a statistical significant increase over the follow-up time (7.7h to 9.7h and 5.2days to 5.7days). The number of attempts to correctly apply and remove the lenses decreased significantly over time ( $p < 0.05$ ).

**Conclusions:** A 28% dropout rate was seen in this study (23% in ICGroup and 41% in RCGroup), being handling and comfort the main reasons for discontinuation. Handling of these devices could be an initial limitation, but it improves significantly and rapidly overtime accompanied by a significant increase in the wearing time.

Poster display 9: **INFLUENCE OF LENS MANUFACTURING ERRORS IN WEARER SATISFACTION**

Presenter: Amelia González

**Authors:**

AMELIA GONZÁLEZ<sup>1</sup>, MARTA ÁLVAREZ<sup>1</sup>, MELISA S SUBERO<sup>1</sup>, EVA CHAMORRO<sup>1</sup>, JOSÉ MIGUEL CLEVA<sup>1</sup>, JOSÉ ALONSO<sup>1</sup>

**Affiliation:**

1) Indizen Optical Technologies S.L

**Key words:** Free-form, manufacturing process, progressive power lenses, user satisfaction

**Purpose:** Shaping and engraving of free-form lenses should be accurate processes that deliver the right curvature at the expected position for any given sight direction. Any error occurring during manufacturing may directly affect the visual performance of the user. The standard quality control performed by practitioner is usually restricted to reference points (DRP&NRP). Other points will not usually be detected. The goal of this study is to analyze the influence of induced manufacturing errors in the subjective satisfaction.

**Method:** Two curvature errors, that typically occur when the generator is not well calibrated or the parameter feeding *macro* is not optimal, were deliberately produced under controlled circumstances: 1) Bump in curvature at the center of the lens (DE=Dot error, Power=0.33±0.29D, Extension=4.3±2.8mm) and 2) Curvature ring (RE=Ring Error, Diameter=22.6±7.7mm, CurvatureDeviation=0.14±0.07D). Still, lenses produced were within tolerance, according to ISO8980-2. Thirty-six presbyopic subjects (Age=58±4) with experience using progressive addition lenses, participated in this double-mask trial, comparing the same lens design without errors (WO) and with error; Nineteen subjects in subgroup DE and seventeen in subgroup RE. Subjects were asked to score (scale 1-5) the lens WO and with DE or RE at different visual tasks, both on first impressions and after seven days of use. All subjects were asked to select a preferred lens. Statistical analysis was performed using Statgraphics Centurion XVI.II.

**Results:** WO lenses received statistical better score than DE subgroup for overall vision (WO=4.7±0.6, DE=4.3±0.5, p=0.03) and for intermediate vision (WO=4.2±0.7, DE=3.7±0.8, p=0.04). After 7 days of use, RE subgroup found statistically worse scores than WO lenses when using electronic devices (WO=4.5±0.7, RE=4.0±0.9, p=0.03), for distance vision (WO=4.7±0.5, RE=4.2±0.8, p=0.01) and for overall vision (WO=4.7±0.6, RE=4.1±0.8, p=0.02). WO lenses were significantly preferred by 58% of the DE subgroup (p=0.05) and by 88% RE subgroup (p=0.00).

**Conclusion:** The quality and reliability of the surfacing process of free-form lenses critically affect user satisfaction. Adaptation is more difficult with lenses having certain types of errors that are quite common in free-form labs. Peripheral and central errors have a different effect on user satisfaction. While central errors have a bigger effect in the first impressions, ring-like errors have more impact in the long term.



## Session 6: Sunday 19 May 16:30 – 17:30

### Poster display 1: **IT WORKERS AND COMPUTER VISION SYNDROME**

Presenter: Xabier Rodríguez-Alonso

#### **Authors:**

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#### **Affiliation:**

1) Universidad Complutense de Madrid

**Key words:** LED-screens, Computer Vision Syndrome, IT workers, signs and symptoms

**Purpose:** To identify the most frequent signs and symptoms associated with the use of LED-screen devices in the adult population of working age.

**Method:** 45 workers (both sexes) from different departments of a service company aged between 26 and 53 years (average age 37 +/- 6 years) were randomly selected. They were given a questionnaire, developed by the investigation group to detect symptoms due to continued use of LED-screens after a working day, asking about each of them (ocular fatigue, blurred vision, headaches, etc) with a yes or no question and a frequency score. This questionnaire also included questions about personal data (age, gender, digital devices used and frequency and duration of exposure to these devices). All the devices whose effects were analyzed were composed by LED-screens, being laptops the most used devices. This kind of screen (not only LED but OLED and similarly constructed screens) produces a higher amount of blue light than CRT or LCD screens used in other studies, which can result in a different eye response.

**Results:** The most frequent symptoms in workers with LED-screens are ocular fatigue (61%), blurred vision (55%), headache (53%), itching (50%), redness (41%), eye irritation (50%) and glare (41%).

**Conclusions:** Ocular and mental fatigue as well as eye and head aches are the most disabling risks for workers as they reduce their efficiency and even force them to interrupt their work.

Poster display 2: **CONTROL OF CENTRAL SUPPRESSION IN RELATIVE ACCOMMODATION TESTING**

Presenter: Paolo Tacconella

**Authors:**

PAOLO TACCONELLA<sup>1</sup>, ANNA TIMOSSÌ<sup>2</sup>

**Affiliation:**

1) VisivaMente, association for visual neurosciences, Italy 2) Turin University, CdL in Optics and Optometry, Italy

**Key words:** Relative accommodation test, central suppression, digitally polarized letters

**Purpose:** to determinate if the classic relative accommodation (RA) test measures what it claims to measure and to compare it with an experimental method (using a tablet with goggle-free polarized letters), designed to check for central suppression.

**Method:** a group of young adults were involved in this study (N = 100; Age 22 ±3; range 18-34; gender: F= 55%). 84% of them were unfamiliar with the RA test. Negative first and then positive RA was measured at near. All the testing was performed three times by the same examiner using a phoropter. Data were analyzed by evaluating the strength of the relationship between the two series of data (Spearman's rho) and the level of agreement between them (Wilcoxon test).

**Results:** The percentage of subjects who suppressed during the tests was remarkable: up to 30% in PRA and up to 22% in NRA. The comparison within the suppressor subgroups between classic and experimental method highlights a high correlation for PRA (rho = 0.75) and a low correlation for NRA (rho = 0.34). The level of agreement (Wilcoxon) between those data is low for PRA (p-value 0.21) and NRA (p-value 0.44). In both cases, the results are not significant at  $p \leq 0.01$ .

**Conclusion:** the percentage of suppressing subjects in RA is lower than in fusional vergence tests (Tacconella & Bonafede, 2017) but still very high (about one out of four). Central suppression control results to be a very important issue in the RA procedure. Standard RA test is blind to central suppression and it does not seem to be a valid measure of accommodation free of association from vergence. The implementation of a polarized target in the RA testing to detect central suppression is highly recommended.

Poster display 3: **MANAGING AN EXTREME CONE USING CORNEO-SCLERAL LENSES WITH SPECIAL DESIGN FEATURES**

Presenter: Eleni Poulere

**Authors:**

ELENI POULERE<sup>1</sup>, SOTIRIS PLAINIS<sup>2</sup>

**Affiliation:**

1) Contact-lenses.gr, Heraklion, Crete, Greece 2) 2 Laboratory of Vision and Optics, School of Medicine, University of Crete, Greece

**Key words:** keratoconus, contact lens, corneo-scleral

**Clinical topic:** Managing a patient with extreme keratoconus in both eyes, previously treated with a 25mm PMMA scleral lens.

**Content or case presentation:** A 67-year old male with extreme nipple keratoconus in both eyes visited our clinical practice in September 2017. His average corneal radius of curvature 3.85 mm and 4.05 mm in RE and LE, respectively, corresponding to an average corneal power of 87.3 D and 82.2 D. His corneal thickness was 173 $\mu$ m (RE) and 277 $\mu$ m in the thinnest locations. The patient had been wearing a 25mm PMMA scleral (haptic) lens for more than four decades, but he has been experiencing extensive lens "deposits," limiting his wearing time to three to four hours per day, limiting his visual acuity due to veiling glare and blur. His cornea, though, was still healthy, achieving a corrected decimal VA of about 0.6 in the RE and 0.5 in the LE, during the limited period of wear.

**Actions taken:** Patient was first fitted in both eyes with corneal RGP lenses, specially designed for nipple cones (Rose K2 NC, Menicon SAS), but lenses were not stable on the eyes and feeling was very uncomfortable, even when using a piggyback. He was then fitted with corneoscleral lenses (Rose K2 XL, Menicon SAS) in Menicon Z material (Dk 163) and after configuring special design features, like peripheral edge lift (EL), final lenses were:

**RE** RoseK2 XL 14.60 Diam, 6.00 BC, -15.75 D, steepened EL

**LE** RoseK2 XL 15.00 Diam, 6.10 BC, -13.50 D, flattened EL ([+1.50@270°](#)/ +1.0@other quadrants)

Decimal VA was 0.8 in the RE and 0.5 in the LE, while time of lens wear increased to more than 14 hours per day.

**Conclusions:** The key to success with this patient was the ability to configure edge lift independently of the central fit, achieving good vision for day-long wear, improving vision and comfort over the previous modality. Understanding the special design features available for the ROSE K2 XL can optimize fitting in such extreme cases of keratoconus.

Poster display 4: **A NEW SUBJECTIVE REFRACTION METHODOLOGY**

Presenter: Gildas Marin

**Authors:**

MARTHA HERNANDEZ<sup>1</sup>, ADELE LONGO<sup>2</sup>, GILDAS MARIN<sup>1</sup>

**Affiliation:**

1) Essilor International, R&D Vision Sciences, France 2) Essilor Instruments, R&D, France

**Key words:** subjective refraction, phoropter, refraction methodology

**Purpose:** To develop a subjective refraction assessed with a new phoropter using a new lens module with 0.01D steps for sphere and cylinder, 1° for axis, and a new methodology.

**Methods:** The continuously variable lens module of the new phoropter instrument uses a motorized deformable lens technology (fluidic lens with elastic membrane) for sphere associated with two motorized cylindrical lenses controlled in rotation by steps of 0.1° allowing any cylindrical combination. The thicknesses between the lenses are taken into account to adjust precisely the power of each lens to get the correct global vertex power. A self-adapting staircase procedure that measure (and auto-adjust the steps to) individual subject sensitivity has been developed. To limit the number of repetitions, an original procedure inspired from a combination of adaptive and probabilistic procedure has been set that evaluate the probability of certitude of subject answers. Such procedure is more efficient and more comfortable for participants if “don’t know” responses are allowed. An insensitive zone is measured, limited by the 2 bounds for which probability of certitude is below 50%. The sensitivity of the subject is then defined to be the half of the final estimated insensitive zone (figure 1). A Jackson Cross Cylinder procedure following power vector components-like is used to evaluate accurately the astigmatism. Alternating the 2 components at each trial allows following the shortest path closely. We have also developed new “fog” and “defog” methods that are shortest and easier to understand by patients. These new methods are based on acuity steps rather than dioptric variations. The new fog is based on the disappearance of a Vanish letter. The new defog is estimating the defocus from the measured visual acuity and a relation law between visual performance and defocus based on various laws from the literature.

**Results:** Depending on the settings of the algorithms, it can lead into faster or more precise refraction.

**Conclusion:** The new refraction methodology, associated to the new lens module is original and associates standard refraction practice to psychophysics methodology, with self-adapting steps to the refracted subject sensitivity that is estimated.

Poster display 5: **FIVE RECENT FINDINGS FROM OPTOMETRY DOCTORATES THAT EVERY OPTOMETRIST SHOULD KNOW**

Presenter: Bruce Evans

**Authors:**

BRUCE EVANS<sup>1</sup>, PETER CAMPBELL<sup>4</sup>, ADRIAN CHORLEY<sup>2</sup>, LOUISE GOW<sup>2</sup>, PAUL GRACE<sup>2</sup>, CLAUDIA ASHLEIGH<sup>2</sup>, TONY REDMOND<sup>3</sup>, RISHI AGARWAL<sup>3</sup>, MARTIN BENWELL<sup>5</sup>, DAVID EDGAR<sup>4</sup>, JUDITH MORRIS<sup>1</sup>

**Affiliation:**

1) Institute of Optometry 2) London South Bank University 3) Cardiff University 4) City, University London 5) Exeter University

**Key words:** professional doctorate, clinical research, gonioscopy, UV

**Purpose:** The Institute of Optometry in London runs, jointly with London South Bank University, a professional doctorate in optometry. In recent years, 9 of these Dr Optometry degrees have been awarded (and one that transferred to a PhD). This presentation briefly summarises the first 5 theses to highlight (a) important findings relevant to practising optometrists and (b) research designs that are amenable to projects by practising clinicians.

**Methods:**

- 1 Author 2 assessed optometrist's skills at gonioscopy and compared methods of assessing anterior chamber angle.
- 2 Author 3 investigated in-flight UV and blue light exposure and the ocular protection of pilots.
- 3 Author 4 qualitative research assessed the attitude of autistic children to eye examinations.
4. Author 5 used an RCT to investigate a new educational tool for improving optometrists' skills at OCT diagnosis.
5. Author 6's RCT compared two monthly soft multifocal contact lenses.

**Results:**

- 1 Optometrists can become skilled at gonioscopy. Although OCT instruments can be used to assess anterior chamber angle, Van Herick's method is slightly more repeatable.
- 2 Some aircraft windshields do not block UV, and pilots do not know which windshields are safe. Community optometrists should advise UV protection for all pilots.
- 3 Children with autism find the eye examination particularly challenging. Preparing the child and the parent for the eye examination will be helpful. Presenting equipment as "gadgets" makes tests more acceptable to many autistic children.
- 4 An OCT online interactive training algorithm (OCTAID) is more successful at training OCT skills than conventional approaches.
- 5 Two modern soft multifocal contact lenses achieve high and comparable rates of acceptance. Some patients prefer one make to another, but one make is not consistently superior.

**Conclusions**

Everyday optometric activities often lack a sound evidence-base (Evans & Rowe, 2018, *Optometry in Practice*) and there is a need for a greater engagement with clinical research by community optometrists. Full-time PhD programmes are beyond the reach of many optometrists and part-time professional doctorates are an accessible route for advancement of the individual and the profession.

Poster display 6: **THE EFFECTS OF LONG HOURS OF COMPUTER WORK ON ACCOMMODATION IN ADULTS**  
Presenter: Rachel Eichler

**Authors:**

RACHEL EICHLER<sup>1</sup>, MALKI EPSTEIN<sup>1</sup>, BATSHEVA GOLDBERG<sup>1</sup>, EINAT SHNEOR<sup>1</sup>

**Affiliation:**

1) Hadassah Academic College

**Key words:** accommodation, computer work

**Purpose:** There is conflicting evidence on the effect of computer work on accommodation (e.g Rosenfield, 2011; Watten et al., 1994). Several studies argue that it leads to over accommodation (Shntakumari et al., 2014) while others to under accommodation (Watten et al., 1994). In this research, we tested the change in the amplitude and flexibility of accommodation as well as subjective complaints in subjects who work many vs. a few hours on a computer.

**Methods:** Healthy subjects, with a minimum distance visual acuity of 6/12 (Snellen chart) and a minimum near visual acuity of Jaeger 1 were recruited to participate in this study. Subjects were divided into two groups, those who spend more than ten hours per day in front of a computer (HCOM) and those with less than three hours of computer work per day (LCOM). Visual acuity (VA, distance and near) and an over refraction was performed. The Push Up (PU) Amplitude of Accommodation test as well as the Monocular Accommodative Facility test (MAF) were performed three times on each participant in a random order. In addition, subjects completed the Convergence Insufficiency Symptom Survey (CISS). The results of the clinical tests and CISS questionnaire were compared between the groups with the U-Whitney-Mann test.

**Results:** 30 subjects (9 men, aged range of 18-27 years, average age of  $22.13 \pm 1.88$  years) participated in this study. HCOM group (5 subjects) displayed a higher amplitude (PU) than the LCOM group ( $0.90 \text{ D} \pm 9.09$ ;  $2.43 \pm 11.11$ ,  $p < 0.03$  respectively). No difference was found between the two groups in the MAF and in CISS questionnaire.

**Conclusions:** The amount of accommodation was higher in subjects who work many hours in front of a computer, compared to subjects who work a few hours in front of a computer. The study should be continued with an increased cohort of HCOM so that clinical recommendations can be made.

Poster display 7: **PUPIL SIZE MEASUREMENT AND INTERCHANGEABILITY BETWEEN INSTRUMENTS**

Presenter: Ana R. Vaz

**Authors:**

ANA R. VAZ<sup>1</sup>, ANTÓNIO QUEIRÓS PEREIRA<sup>1</sup>, JOSÉ GONZÁLEZ MÉIJOME<sup>1</sup>

**Affiliation:**

1) CEORLab, Center of Physics, University of Minho, 4710-057 Braga, Portugal

**Key words:** pupil size; infrared pupilometer; photopic; mesopic.

**Purpose:** Accurate measurements under different conditions of environmental light are not easily obtained in the clinical setting. The present study aims to measure the pupil size using a corneal topographer and an aberrometer and compare the values against those obtained with an infrared pupilometer under different lighting conditions.

**Methods:** Fifteen adult subjects, with age between 20 and 40 years ( $33\pm 7$ ), 9 female and 6 male volunteers were recruited in this study. Pupil size was measured with an infrared (IR) pupilometer (Procyon) under mesopic, scotopic and external environmental light after a period of 5 minutes of adaptation to each environment. Aberrometer (IRx3, ImaginEyes, France) and Corneal Topographer (Medmont E300, Australia) were used for measurements in the clinic under normal and dark environmental lighting. Statistical analysis was conducted using a paired-sample T-test using SPSS v25 (IBM, IL). Only one eye from each subject was randomly chosen for statistical analysis. For control purposes, luminance in the ocular plane was measured with a lux meter (Minolta T10, Japan).

**Results:** Average mesopic IR pupilometry was  $5.47\pm 0.75$  mm and scotopic IR pupil size was  $6.03\pm 0.78$  mm. IR pupilometry under outside conditions (at 700 lux) was  $3.03\pm 0.43$  mm. Pupil size with the aberrometer with the lights turned on (illuminated) in the examination room (at 55 lux) was  $4.60\pm 0.84$  mm and with the room, lights turned off (at 0.19 lux) was  $6.03\pm 0.78$  mm. Corneal topography pupil size in the illuminated room (at 20 lux) and darkened room (at 11 lux) was  $3.73\pm 0.95$  mm and  $3.83\pm 0.93$  mm, respectively. Aberrometer pupilometry under darkened room vs scotopic IR pupilometry (T-test;  $p=0.592$ ) as well as outside IR measurements vs topography pupilometry (T-test;  $p=0.180$ ) were comparable. All the other comparisons showed a statistically significant difference between methods ( $p<0.05$ )

**Conclusion:** A small pupil with small inter-subject variability was observed under outside conditions. Pupil size doubles on average when changing from outdoor to indoor mesopic conditions. Pupil size obtained with the corneal topographer presented smaller and more variable values but less sensitive to environmental lighting while aberrometer measurements were more sensitive to environmental lighting. Pupil size measurements between clinical instruments cannot be used interchangeably.

Poster display 8: **EDGE THICKNESS REDUCTION IN NEGATIVE LARGE-FIELD FREE-FORM LENTICULARS**

Presenter: Marta Álvarez

**Authors:**

MARTA ÁLVAREZ<sup>1</sup>, MELISA S SUBERO<sup>1</sup>, PABLO CONCEPCIÓN<sup>1</sup>, EVA CHAMORRO<sup>1</sup>, JOSÉ MIGUEL CLEVA<sup>1</sup>, JOSÉ ALONSO<sup>1</sup>

**Affiliation:**

1) Indizen Optical Technologies S.L

**Key words:** Free-form, lenticularization, thickness edge, high myopia

**Purpose:** Lenticularization is a well-known method used to reduce the maximum thickness of spectacle lenses at the expense of reducing the field of view. Free-form technology allows for the use of parametrizable lenticularization algorithms. The goal of this study is to quantify the edge thickness (ET) reduction and manufacturing prescription range (MR) across a wide range of myopic prescriptions.

**Method:** We describe a numerical study in which we compare ET and MR for two sets of lenses optimized for the position of use, base=4, spherical prescription=-12 to 0D: 1)Standard free-form full-field optimized lenses (SFF), 2)Lenticular free-form lenses optimized within a 70° field of view, then lenticularized outside this optical region (LFF). Analysis was done for lens materials  $n=1.5, 1.6, 1.67$  and  $1.74$ . Individual parameters were set as HBOX=50mm, VBOX=35mm, DBL=18mm, PANTO=5°, ZTILT=5°, IPD=30mm, SEGHT=22mm and ERCD=27mm. The frame subtend angles of 37°(nasal) and 47°(temporal). So, the non-optical regions of LFF subtend angles of 2°(nasal) and 12°(temporal). ET calculations were done using the software FreeFormDesigner (IOT, Spain). MR is defined as the strongest negative prescription that can be manufactured from a given a semifinished blank with a fixed base curve and a minimum lens diameter determined by frame size and pupil positions before the lens edge thickness exceeds that of the blank. Descriptive statistical analysis from numerical data, percentages, and graphics are presented based on 384 ET data.

**Results:** Data from this study quantifies the ET reduction achieved by the tested lenticular design for each myopic prescription (figure1). Particular ET values are given in Table I for prescription=-6D. MR is provided assuming a semifinished blank center thickness of 8 mm showing ET reductions of 17-21% with negligible reduction of the field of view. Higher reductions are yet achieved with larger prescription values. This reduction of ET warrants an MRIncrease=1.75D ( $n=1.5$ ) and MRIncrease=2.25D ( $n=1.74$ ).

**Conclusion:** Large-field lenticularization can be used to achieve up to 25% reduction of ET in negative prescriptions with negligible loss of field of view. This reduction in thickness allows for an extension of about 2D in the MR associated with a typical base 4 blank.



Poster display 9: **LENS CORE RADIUS OF CURVATURE**

Presenter: Stefano Giovanzana

**Authors:**

STEFANO GIOVANZANA<sup>1</sup>

**Affiliation:**

1) Studio Optometrico Giovanzana, Milano, Italy

**Key words:** lens paradox, gradient-index lenses (GRIN), physiological optics

**Purpose:** The present work analyses real data from Pierscionek *et al.* study, in which they capture lens image using the Talbot X-ray interferometry. For the aim of this work, only the curvature of the core is analyzed.

**Method:** The images corresponding to the lens of 16, 35, 40, 57 and 62 years old person are taken. The core layer was isolated using a Canny filter and a quadratic curve was fitted to the core shape. From this equation, it is possible to calculate the radius of curvature  $r$  and the conic constant  $q$  for every lens core.

**Results:** Except from the 35 years old data that it seems to be an outlier, there is an increase of the lens core radius of curvature during age. This is promising because as it was seen from a previous works in the literature only if there is an increase of the internal curvature of the lens during age there is the wanted counteract effect of the lens paradox.

**Conclusion:** GRIN lens model alone cannot counteract the lens paradox, as shown by other authors internal curvature modification could be called to fully counteract it. As shown in a previous work the internal curvature structure could be modeled with different power laws, which according to calculated lens core radius of curvature are able to fix the lens paradox. In the present work, analyzing real lenses image we found that the data analyzed seem to lay on the lines of the power law 5 plot.

Poster display 10: **BENEFITS AND REFLECTIONS REGARDING THE DEVELOPMENT AND IMPLEMENTATION OF AN OPTOMETRIC PHYSICS MODULE FOR THE FOUNDATION YEAR OPTOMETRY COURSE AT CITY, UNIVERSITY OF LONDON**

Presenter: Benjamin Evans

**Authors:**

BENJAMIN EVANS<sup>1</sup>, MARISA RODRIGUEZ-CARMONA<sup>1</sup>

**Affiliation:**

1) City, University of London

**Key words:** Foundation year, Undergraduate teaching

**Educational area:** Widening participation with the introduction of a foundation year programme.

**Content:** Optometry courses in the UK have traditionally been Bachelor-level degrees (BSc) delivered for school-leavers with science A-levels or graduate entry programmes for graduates with science degrees. These entrance criteria ensure similar levels of knowledge between all students entering an optometry course, allowing reasonably straightforward curriculum planning. The challenge of these entry criteria is that not all students with the aptitude and desire to study optometry have the necessary science qualifications, often as a result of the secondary school that they attended, or other factors outside of their control. This challenge is recognised in the UK, and internationally, with a drive to widen access to students from non-traditional backgrounds. Clearly these students still require a solid foundation in the sciences before joining a Bachelor's level degree. One approach is to offer a foundation course. These courses aim to enable students, who would otherwise be turned away due to lack of pre-defined prior knowledge in key subject areas, to study optometry and to become qualified optometrists. The benefits of this to the profession as a whole are clear.

**Discussion:** A significant dilemma in providing foundation courses is that these students have a diverse range of abilities, scientific knowledge and life experience - what should be taught, and how? Using the example of a foundation course in Optometric Physics, the educational and practical issues involved are explored. Aiming to provide individualised support and personalised teaching, effective interventions included a formal learning needs assessment that assisted the students in gauging their starting level (and tutors to plan their teaching), regular formative assessments to allow the students to monitor their progress and an instructional methodology adapted from a problem based learning approach, enabling students to learn collaboratively, gaining from each other's diverse backgrounds.

**Recommendations:** We will present the choices made in the development and implementation of an Optometric Physics module for the foundation year optometry course at City, University of London. The pedagogical justification of these choices will be outlined, together with some personal and candid reflections of the challenges that remain.

Session 7: Sunday 19 May 18:00-19:00

Poster display 1: **SYMPTOMATOLOGY ASSOCIATED BY USE OF COMPUTERS IN UNIVERSITY STUDENTS**

Presenter: Sara Gutiérrez-Jorrín

**Authors:**

SARA GUTIÉRREZ-JORRÍN<sup>1</sup> , XABIER RODRÍGUEZ-ALONSO<sup>1</sup> , CRISTINA BONNIN-ARIAS<sup>1</sup> , MARÍA JESÚS PÉREZ-CARRASCO<sup>1</sup> , FIVOS PANETSOS<sup>1</sup> , CELIA SÁNCHEZ-RAMOS<sup>1</sup>

**Affiliation:**

1) Universidad Complutense de Madrid

**Key words:** LED-screens, Computer vision syndrome, signs and symptoms, university students

**Purpose:** to detect the most frequent signs and symptoms in young university students associated to the use of devices with LED screens, through questionnaires.

**Method:** 122 university students of both sexes (mean age  $22 \pm 0.2$  years) were evaluated regarding the frequency and intensity of signs and symptoms associated with the computer vision syndrome (CVS) that they present after continued use of LED-screen displays. For this purpose, a questionnaire has been used based on surveys validated by other researchers, adapted to our environment. The questionnaire used in this study was divided in four sections. In the first one, the personal data of the subjects (name, age, sex ...) was collected as well as the rate of usage of digital devices. In the second section, subjective questions in regards to visual fatigue were asked, such as pain, eyes burning or itching, back pain, dry eyes or blurred vision and the frequency and duration of these symptoms. In the third section, refraction and optical correction were gathered. Finally, in the fourth one, questions about the study environment of the subject (lighting type, workplace situation, characteristics of the most used electronic devices and glare factors) were asked, being yes or no the possible answers.

**Results:** among the most frequent symptoms and signs are eyestrain 69%, eye irritation 67%, headache 52%, red eye 43% and blurred vision 40%. Others are eye strain 19%, burning eyes 18%, watery eyes 38%, eye pain 30%, and fatigue 30%. However, when they were consulted as to whether this symptomatology prevents them from continuing to use device screens after their study time, they state that they do not present any inconvenience to use devices in their leisure time.

**Conclusion:** The study shows a massive expression in young people of the symptoms and signs associated with CVS by the continued use of LED screens, the greater the longer the using time.

Poster display 2: **TRENDS IN SWEDISH CONTACT LENS PRESCRIBING 2017**

Presenter: Oskar Johansson

**Authors:**

OSKAR JOHANSSON<sup>1</sup> , PHILIP MORGAN<sup>2</sup> , PETER GIEROW<sup>1</sup>

**Affiliation:**

1) Linnaeus University 2) University of Manchester

**Key words:** Contact lens, fitting, lens type

**Purpose:** The purpose was to evaluate the trends of contact lens prescribing among Swedish optometrists in 2017.

**Methods:** A standardized survey form developed by Morgan et al. was distributed to Swedish optometrists using their professional organizations, optometry chains, direct email, and by hand directly. They were asked to fill out the form for the next ten contact lens patients after receiving the survey. Information was collected regarding the day of fitting, age, sex, lens material, design, frequency of replacement, wear frequency, modality and type of care system. A weighting system is employed to account for the volume of activity undertaken by the respondents, calculated by the time period required to achieve 10 fits. All the forms and data were analyzed at the University of Manchester.

**Results:** 57 forms were returned, including 562 fits. The mean age of the patients was 37 yrs, and 65 % were female. 83 % were fitted for full-time wear and 27 % were managed as new fits. Soft contact lenses is the most fitted modality and represents 97.8 % of all new fits and 93.6 % of all refits. Rigid contact lens fits represents therefore in grand total 5.3 % with 2.2 % of the new fits and 6.4 % of the refits. About two-thirds of soft lenses prescribed were silicone hydrogels. Of the different designs, spherical lenses were most widely fitted, with toric lenses on at least one eye coming right after. Extended wear accounts for 10.6 % of the fittings. Multi-purpose solutions were the most popular regimen prescribed at 99.4 %.

**Conclusions:** When compared with data from Norway and Denmark, it is evident that daily disposables are more popular in these countries (74 %), whereas in Sweden it is monthly replacements (58 %). Otherwise, the results are similar to what has been reported from other parts of the world.

Poster display 3: **LEVEL OF AVERSION TO LIGHT OF LED-SCREENS ACCORDING TO THE INTEREST OF VISUAL INFORMATION**

Presenter: Xabier Rodríguez-Alonso

**Authors:**

XABIER RODRÍGUEZ-ALONSO<sup>1</sup> , SARA GUTIÉRREZ-JORRÍN<sup>1</sup> , CRISTINA BONNIN-ARIAS<sup>1</sup> , NAHLA JEMNI-DAMER<sup>1</sup> , FIVOS PANETSOS<sup>1</sup> , CELIA SÁNCHEZ-RAMOS<sup>1</sup>

**Affiliation:**

1) Universidad Complutense de Madrid

**Key words:** LED displays, signs and symptoms, aversion to light.

**Purpose:** To evaluate the effect of visual information during the visualization of LED displays on the fatigue symptoms.

**Method:** The study was performed with 30 people of both sexes (gender balanced), aged between 21 and 50 years (mean of 30 +/- 8 years). After an adaptation to the ambient light (100cd / m<sup>2</sup>), they were requested to read a coherent text (except from a novel) on a tablet located at 40 cm for 15 minutes while gradually increasing the intensity of the LED display. At the end of the task they were asked about their visual fatigue, level of discomfort and comprehension of the text.

Then, three different tests were presented: coherent text, stripes and dots randomly presented. Each minute the observer scored from 1 to 10 the level of eye fatigue in order to assess the effect of visual stimuli on fatigue symptoms. Between one presentation and the next one, the subjects had a 5 minute rest. Finally, a questionnaire about the symptoms experienced was handed.

**Results:** During the 15 minutes of coherent reading the individuals did not detect the increase of the brightness of the screen. With the test text-stripes-points it was detected that the visual fatigue increased with time, being the annoyances at the end of the test up to 4 times stronger than at the beginning. Women are twice as sensitive to light as men (women: 4.24 / men: 2.13).

**Conclusions:** The interest that the visual stimuli cause in the observer can desensitize with respect to the excess light emitted by the LED screens. The tolerance of the visual system of young people cancels the aversion to the excess of light emitted by screens although it does not eliminate the appearance of symptoms and visual signs after the continued use of screens.

Poster display 6: **SAGITTAL HEIGHT DIFFERENCES OF DISPOSABLE SOFT CONTACT LENSES**

Presenter: Claudio Iovine

**Authors:**

CLAUDIO IOVINE<sup>1</sup>, ANTONIO PAPAGNI<sup>2</sup>, STEFANO GIOVANZANA<sup>3</sup>

**Affiliation:**

1) Università degli Studi Milano-Bicocca, Milano, Italy 2) Dipartimento di Scienze dei Materiali 3) Studio Optometrico Giovanzana, Milano, Italy

**Key words:** soft contact lenses, sagittal height, lens fitting, comfort.

**Purpose:** The aim of this study is to measure the sagittal height of a selection of different commercially available disposable soft contact lenses (CLs), and to check via a suitable questionnaire if CL wearers are able to distinguish between CLs of different sagittal height.

**Method:** The sagittal height (SAG) of thirteen different type of lenses was measured: Proclear 1–Day (*pro*), Miru 1Day (*mir*), Dailies AquaComfort Plus (*com*), Biotrue Oneday (*bio*), SofLens Daily Disposable (*sof*); 1–Day Acuvue Moist (*moi*), Freshlook (*fre*); Air Optix Aqua (*air*), 1–Day–Acuvue Trueye (*tru*), Acuvue Oasys 1–Day (*oas*), Dailies Total1 (*tot*), Clariti 1 Day (*cla*), MyDay (*myd*). Three different CLs were evaluated for each type of CL using a homemade instrument that was previously tested.

After the SAG was measured, a double blind experiment was set up. It was fitted a lens in the right eye and one lens in the left eye dividing 25 people (age  $22 \pm 2$ ) into three groups: A. same CLs, B. different brand CLs but equal SAG, C. different brand CLs and different SAG. Lenses were fitted continuously for 8 hours and then a questionnaire was proposed.

**Results:** The majority of CLs were spherical lenses except *tot* and *cla*, with a deviation against spherical calculated SAG (SAG\_SF) of 75  $\mu\text{m}$  and 31  $\mu\text{m}$  respectively.

It was found that the following groups of lenses had the same SAG: *cla*, *pro* ( $3661 \pm 16 \mu\text{m}$ ), *mir*, *air*, *bio*, *sof* ( $3744 \pm 4 \mu\text{m}$ ), *tot*, *moi*, *tru* ( $3830 \pm 4 \mu\text{m}$ ), *oas*, *myd* ( $3908 \pm 4 \mu\text{m}$ ).

In the double blind experiment, the 80% of CL wearers and the optometrist were able to identify that they were using CLs of the same SAG (group A and B). Only the 50% of CL wearers were able to identify that they were using different SAG CLs (group C) against the 70% of the optometrist.

**Conclusion:** CLs can be divided into four groups of different SAG. A trained optometrist is able to check different behaviors of different SAG CLs; only 50% of CL wearer are able to distinguish between different SAG CLs.

Poster display 7: **INFLUENCE OF ETHANOL ON CONTRAST AND GLARE SENSITIVITY**

Presenter: Bjoern Meyer, Benjamin Schlay

**Authors:**

BJOERN MEYER<sup>1</sup>, BENJAMIN SCHLAY<sup>1</sup>

**Affiliation:**

1) Beuth University of Applied Sciences

**Key words:** ethanol, contrast, glare

**Purpose:** The German Ophthalmological Society (DOG) has made recommendations and set limits for photopic and mesopic contrast vision while driving. Studies have shown that contrast vision is impaired by the influence of alcohol. The study aims to examine whether the recommendations for photopic and mesopic contrast vision can be met under the legally permitted blood-alcohol concentration of 0.49 ‰.

**Methods:** The visual acuity as well as photopic and mesopic contrast vision in 43 subjects (28±4 of age) was measured before and after the intake of alcohol using a *Binoptometer 4P* (Oculus, Wetzlar). Mesopic contrast vision was examined both with and without glare. A Landolt ring was used as optotype for taking all measurements. Using the pupillometry software of the *Keratograph 5M* (Oculus, Wetzlar), the pupil size of the right eye was measured with and without glare before and after the consumption of alcohol.

**Results:** Under the influence of ethanol (0,50±0,028 ‰) a significant decrease of visual acuity (-0,15±0,085 logMAR) could be observed when compared to the measurements taken before alcohol consumption (-0,18±0,096 logMAR) (p=0,003). Photopic contrast vision decreased significantly under the influence of alcohol (1,12±0,172 logKE<sub>Weber</sub>) compared to measurements before the intake of alcohol (1,19±0,160 logKE<sub>Weber</sub>) (p=0,002). After the intake of ethanol, the pupil diameter decreased significantly, on average from 6.29 mm to 6.13 mm without glare and from 2.78 mm to 2.67 mm with glare (p=0.007; p<0.001). No significant observations could be made in the measurement of mesopic contrast vision with and without glare under the influence of ethanol (p=0.257; p=0.083).

**Conclusions:** The extent of the visual functions examined is low and therefore not clinically relevant. In principle, the recommendations of the DOG can be maintained for the collective investigated in this study while complying with the permitted legal blood-alcohol concentration.

Poster display 8: **EFFECTS OF A CHANGE OF THE DIRECTION OF VIEW TO NEAR UNCORRECTED VISUAL ACUITY FOLLOWING IMPLANTATION OF MONOFOCAL IOL**

Presenter: Marketa Zakova

**Authors:**

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**Affiliation:**

1) Czech Technical University in Prague, Czech Republic 2) Ophthalmology Clinic JL FBME CTU in Prague, Czech Republic

**Key words:** near visual acuity, cataract surgery, monofocal intraocular lenses

**Purpose:** The purpose of the study was to evaluate the effect of change in direction of view of the eye on the postoperative near visual acuity in patients with monofocal intraocular lenses (IOL).

**Methods:** 121 eyes were included in this study, on which conventional cataract surgery with implantation of a monofocal lens had been carried out previously. Postoperative examination of near visual acuity was performed at two different positions of the eye at a constant distance of the reading table, with the assumption of improving visual acuity when looking perpendicularly to the plane of the floor. The mutual relation of the postoperative parameters (central keratometry -  $K_c$  and keratometry in the visual axis -  $K_{VA}$ , anterior chamber depth - ACD) for the single axial length ranges was determined using the correlation coefficients.

**Results:** With vertical eye position (the visual axis of the eye perpendicularly to the floor), the uncorrected visual acuity following implantation of the monofocal lens was higher or equal compared to the horizontal position of the eye (i.e. with the visual axis of the eye parallel to the floor). The mean visual acuity at horizontal eye position was 0.508 according to Jaeger's tables ( $p < 0.001$ ). During the vertical eye position, the average value was 0.555 ( $p < 0.001$ ). A weak relationship was found between the postoperative parameters ( $K_c$ ,  $K_{VA}$ , ACD) and subsequent near visual acuity. Different dependence was found after categorizing the group according to the eye axial length.

**Conclusions:** Near visual acuity in the eyes with implanted monofocal lens for emmetropy to distance achieved higher values during vertical vs. horizontal position of the eyes. Neither of the observed parameters ( $K_c$ ,  $K_{VA}$ , ACD) can be unambiguously determined as decisive for the assumption of the described feature.



Poster display 10: **DOES AN IPAD VERSION OF THE MALLETT FIXATION DISPARITY TEST GIVE EQUIVALENT RESULTS TO THE CONVENTIONAL VERSION?**

Presenter: Ketan R Parmar

**Authors:**

KETAN R PARMAR<sup>1</sup>, CHRISTINE DICKINSON<sup>1</sup>, BRUCE JW EVANS<sup>2</sup>

**Affiliation:**

1) The University of Manchester, Manchester UK 2) Institute of Optometry, London UK

**Key words:** fixation disparity, associated phoria, aligning prism, Mallett unit

**Purpose:** Various instruments have been developed for clinicians to measure aligning prism, the prism that eliminates a fixation disparity (associated phoria). This includes the well-known Mallett unit and more recently developed Thomson Vision Toolbox on the iPad. With no previous research investigating the agreement between these two instruments, practitioners may question if they can be used interchangeably.

**Methods:** 80 participants underwent near vision testing with both the Mallett unit and Thomson fixation disparity tests in a random order. Data were analysed in four ways to investigate the agreement of the results from both instruments.

**Results:** Most participants reported no fixation disparity (horizontally 46.25%, vertically 82.5%), or non-significant aligning prism (horizontally 70%, vertically 97.5%), on both instruments. The iPad revealed a larger range of aligning prism results horizontally, from 6D base out to 15D base in; the Mallett unit produced a larger range of results vertically, from 1D base up to 3.5D base down. More participants required a significant aligning prism on the Mallett unit, both horizontally and vertically. Wilcoxon signed rank analysis found no statistical significance in any difference in aligning prism ( $p=0.357$  horizontally,  $p=0.236$  vertically), but 95% limits of agreement (horizontally +2.5 to -4.0, vertically +0.5 to -1.0) revealed clinically significant variability between the instruments.

**Conclusion:** Although the measured differences between the instruments are statistically insignificant, clinically they are unacceptable, therefore the instruments should not be used interchangeably. Previous research indicates that the Mallett unit performs reasonably well at detecting symptomatic individuals and determining a prismatic correction that is likely to be helpful. Further research is required to determine the performance of the iPad test in these functions.

Workshops

Saturday 18 May, 11:30-13:00

## **NOT A DRY EYE IN THE HOUSE – PUTTING DEWSII INTO PRACTICE**

Presenters: Catherine Porter/Claire Mallon

### **Authors:**

CLAIRE MALLON<sup>1</sup>, CATHERINE PORTER<sup>1</sup>

### **Affiliation:**

1) University of Manchester

**Key words:** Dry eye, DEWS II

**Summary:** Practitioners are increasingly expected to manage patients presenting with symptoms of dry eye, however, with an ever-increasing catalogue of available options, choosing the most appropriate product can prove difficult. This workshop will help the practitioner understand the findings of the recent DEWS II report and select management strategies in a more targeted and effective manner, enabling them to manage dry eye disease more effectively.

Delegates will leave with:

1. An understanding of the spectrum of dry eye disease
2. An understanding of the importance of patient education in relation to both diagnosis and management of the condition
3. An ability to manage dry eye disease in a more targeted and effective manner in line with current best practice

There will be a brief overview of the aetiology of dry eye, it will focus on the options currently available for Step 1 management and treatment of DED as laid out in the TFOS DEWS II report.

This workshop will consider the following:

- Risk factors
- Causes of evaporative dry eye
- Lid hygiene
- Ocular lubricants
- Dietary advice
- What do you use? When? Why?
- Ease of use for the patient and the impact on compliance

After a short introductory presentation, delegates will work in small groups discussing the advantages and disadvantages of the various products currently available to eye care practitioners. Products from various manufacturers will be available to directly compare and contrast.

Delegates will be asked to consider the following for each product group:

- Key ingredients
- Target area
- Ease of use

Products will be categorised as follows:

- Lid hygiene: foams, washes, lid scrubs and wipes
- Ocular lubricants: eye drops, gels and ointments
- Dietary advice, supplementation and medication as well as contraindications

At the end, a spokesperson for each group will relay that group's thoughts back to audience.

Saturday 18 May, 11:30-13:00

**INTERPRETATION AND DOCUMENTATION OF FUNDUS CAMERA IMAGES**

Presenter: Holger Dietze

**Authors:**

HOLGER DIETZE<sup>1</sup>

**Affiliation:**

1) Beuth University of Applied Sciences

**Key words:** Fundus camera, imaging, ophthalmoscopy

**Summary:** The participant will be introduced to the principles for interpreting fundus camera images of normal and abnormal eyes. The participant will learn common signs and variants of normal and abnormal fundi as well as common techniques and abbreviations for the corresponding record keeping. In the hands-on part, the participant will be asked to investigate and explain a series of fundus images of normal and abnormal conditions, and to document the findings. Emphasis will be put on the assessment of the optic nerve head and the macula.

**Skills to be developed:** the ability to systematically interpret fundus camera images; the ability to keep comprehensible records.

**Learning Objectives:** Basic skills to evaluate and document fundus images. Basic skills to differentiate abnormal from normal eyes.

**Level of practice:** students, beginners.

Saturday 18 May, 11:30-13:00

**NOT JUST THE EYES – A UNIFIED STRATEGY TO DEVELOP A MANAGEMENT PLAN FOR A VISUALLY IMPAIRED PATIENT**

Presenter: Bill Harvey

**Authors:**

BILL HARVEY<sup>1</sup>

**Affiliation:**

1) Optician Journal

**Summary:** With increasing life expectancy and demands upon hospital-based eye services, community and primary care optometrists are more than ever in demand to undertake low vision assessment and provide help for those with sight loss. Historically, this has focused very much on identifying a patient's needs, calculating what sort of optical help (magnification, contrast enhancement and so on) might be beneficial, and then dispensing a variety of low vision aids. Such an approach has its limitations by being solely focused on one area of the patient's well-being.

Recently, research has identified a number of areas where a more generalised approach might be more appropriate. The strong association with mental health and depression has been highlighted by studies such as the DEPVIT trial from Cardiff University and a better understanding of patient adaptation to sight loss has been offered by research such as the Charles Bonnett MRI studies at the Royal Marsden Hospital in London and the work being undertaken into preferred retinal locus identification at Nottingham University. Furthermore, the need for good relationships with allied health professionals has been underlined, for example by a study from Glasgow Caledonian University underlying the likelihood of co-morbidity in the visually impaired population and by the increased skill set of professionals such as rehabilitation workers, sensory and stroke team workers, IT support workers, social services and medics.

In this session, delegates will be shown an animated video for each of four patients and be presented with their essential notes. Each patient has a specific care theme as follows;

- Primarily optical assistance
- AMD adaptational help
- Electronic, smart phone/tablet app and computer adaptation help
- Mobility and depression help

Delegates will be presented with the profile for each patient and a management plan template. They will then be given time in discussion to come up with some management options before the speaker takes them through what actually was done and give each delegate a copy of the final management plan.

UK-specific services will not be required knowledge, but instead a focus in the summing up will be on the nature of what such services may offer and might offer for any delegate in their own clinical practice area.

**Objectives:** This session offers the delegate an opportunity to, as part of a group, discuss the various challenges each of four patients may have and develop a management strategy that may help to address them. The overall objective of the session is to develop a care strategy that is not merely focused on optical help and instead to consider the wider range of impacts that need resolving for common sight loss causes such as AMD and stroke.

Saturday 18 May, 11:30-13:00

## **EVIDENCE BASED CLINICAL DECISION-MAKING IN THE OPTOMETRIC CARE OF PATIENTS WITH GLAUCOMA**

Presenter: Melissa Vitek

### **Authors:**

MELISSA VITEK<sup>1</sup>

### **Affiliation:**

1) Salus University

**Key words:** Evidence Based Clinical Decision-Making, Answerable Clinical Question, Critical Appraisal, Glaucoma

**Summary:** While most healthcare providers embrace the belief that evidence-based clinical decision-making leads to better patient outcomes, many, including optometrists, provide care that lags behind the current scientific literature. This is due to a variety of reasons, including lack of training. Many practitioners do not know where to find the answer to a particular clinical question. Furthermore, critically appraising an article may seem daunting to many clinicians who either haven't been trained on how to go about doing so or haven't taken the time to hone the skills they acquired on this topic during their optometry degree program. Finally, many optometrists may not be aware of how to effectively apply the information found in the current scientific literature to a specific patient.

This hands-on workshop will provide optometrists with the opportunity to work in small groups to acquire and/or refine their evidence based clinical decision-making skill set. A scenario describing a patient with glaucoma will be provided and each group will be asked to formulate and categorize an answerable clinical question related to that patient scenario. A specific article will then be provided to each group and they will work through the critical appraisal of that article. Critical appraisal results will be shared with the large group for discussion. Finally, the results of that article will be applied to the patient scenario. Small groups will, once again, share their work with the large group for discussion. The emphasis will be on defining the elements of the art of practicing evidence based clinical-decision making that are defined in black and white and which elements need to be adjusted based upon the clinical question and/or patient care scenario for which they apply.

Healthcare is one of the most dynamic professions, and copious resources are expended annually on scientific research. New interventions are constantly being developed and evaluated through research. As practitioners are increasingly being asked to justify the rationale behind their clinical decisions, having a working knowledge of the current scientific literature and its application in patient care delivery will play an increasingly important role in the training and continuing education of optometrists at all stages of their careers.

Saturday 18 May, 11:30-13:00

**ORTHOKERATOLOGY IN CLINICAL PRACTICE: NOT ONLY MYOPIA**

Presenter: Antonio Calossi

**Authors:**

ANTONIO CALOSSI<sup>1</sup>

**Affiliation:**

1) University of Florence

**Key words:** myopia, hyperopia, astigmatism, presbyopia

**Summary:** This workshop focuses on orthokeratology and how it fits into practice today. There is evidence that orthokeratology is an effective treatment for low to moderate myopia. With overnight wear of modern contact lenses for orthokeratology, usually changes are very rapid: already after few nights of wearing we observe a significant improvement of unaided vision and, in most cases, the final result can be achieved with only one pair of lenses, in a period of time between one and two weeks. The most challenging cases are those with higher amount of myopia, astigmatism, and hyperopia. Treatment of high myopia is possible, but it induces a large amount of spherical aberration. Treatment of astigmatism is achievable in selected cases with toric or dual toric lenses. Treatment of hyperopia and presbyopia through corneal steepening is also achievable. Nowadays orthokeratology may be an effective procedure to treat a large spread of refractive errors.

The workshop will offer insight into the importance of appropriate patient selection. The various pre-fit procedures and analysis will be discussed along with the initial lens selection and evaluation. Emphasis will be placed on the post-wear analysis, which includes the corneal topography, corneal wave-front analysis, and video slit lamp documentation. The follow-up and problem solving will also be reviewed.

Attendees will also have the opportunity in the course to evaluate cases both pre-fit and post-wear.

Saturday 18 May, 11:30-13:00

**BIOPTIC TELESCOPE PRESCRIBING WORKSHOP**

Presenter: Henry A. Greene

**Authors:**

HENRY GREENE<sup>1</sup>

**Affiliation:**

1) OCUTECH

**Key words:** Low Vision Bioptics Telescopes

**Summary:** Bioptic telescopes are miniature optical devices mounted toward the top of eyeglasses which allow the user to alternate attention between their normal vision and the magnified view of the telescope. They allow the visually impaired to improve distance vision for a range of distance and midrange visual activities including driving (where allowed).

Clinical factors including visual acuity, response to magnification, central scotomas, contrast sensitivity and ocular dominance can impact the individual response to bioptic telescopes and help determine the prognosis for successful acceptance of the device as well as inform the appropriate choice of device.

Bioptic telescopes should be selected to address the visual needs of the user and be prescribed and fit in such a way as to maximize their functionality. Clinical practice should include management of patient's and family's expectations and training to maximize the patient's adaptation to the device.

This workshop will present the clinical, technical and practical aspects of prescribing bioptic telescopes.

Saturday 18 May, 15:00-16:00

**DIFFERENT CORNEA PROFILE? KEEP CALM AND FIT SPECIALTY SOFT LENS**

Presenter: Maria Giulia Muzzi

**Authors:**

MARIA GIULIA MUZZI <sup>1</sup>, RICCARDO GIULIANELLI <sup>1</sup>

**Affiliation:**

1) Occhio x Occhio srl

**Key words:** Keratoconus, Post-surgery cornea, RGP lens, soft lens

**Summary:** The purpose of this poster is to report two cases of irregular cornea fitted with a customized Rose K2 Soft Toric for the treatment of ocular and visual complications when it is impossible to fit rigid gas permeable lenses, corneal and scleral. A 25-year old Caucasian man presents bilateral keratoconus, it was not immediately diagnose due to the different keratoconus's growth and stadium. He uses only glasses with acceptable vision. At the beginning, he was fitted with a Rose K2 NC in the right eye and Rose K2 in the left eye with good results in term of fitting, ocular health, visual acuity and comfort. The continuum growth and variation of the corneal shape caused central staining near the apex and a reduction of wearing time. He was very enthusiastic in using contact lens because his vision was better than the glasses for this reason we refit him with a Rose K2 Soft Toric. The second patient, a 45-year old Caucasian man presents post-surgery cornea, operated three times only in the left eye. First two operations were PRK 20 and 25 years ago and at the age of 43 years old, he was operated of cataract. These three operations caused double vision and a very flat cornea especially near the limbus, approximately at 270°. Because he needs the lens only in one eye he was fitted with a Rose K2 Soft. The lens fluted initially and the vision was difficult to assess. Lens was then reordered with a periphery more closed (EL -1.00). The patient noted a better comfort and the vision was improved because central thickness was increased in order to compensate double vision. Some fitting needs other solutions like soft contact lenses for irregular cornea to improve comfort, vision and ocular healthy; it is also important that the lens's productions provide custom options.



Saturday 18 May, 16:30-17:45

**TRAINING OF FUSION WITH DIFFERENT METHODS**

Presenter: Petr Veselý

**Authors**

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**Key words:** fusion, anaglyph, vectogram, eccentric circles

Fusion is very important reflex for binocular vision. It develops in 6th month after the birth. Thanks to effective fusion we can see one simple binocular image without diplopia. Patients with ineffective fusion have problem during their everyday life.

During the workshop we will firstly define fusion and its types. Further we will measure fusion reserves with prism bars. After that we will examine and train fusion with different methods e.g. vectograms, tranaglyphs or eccentric circles.

After this workshop, participants will be able to explain what the fusion is and how to measure it. Further, participants will examine and train their fusion with different methods.