



European Academy
of Optometry and Optics

Oral and Poster Presentations

Abstracts

Welcome from the President

Welcome to Copenhagen! I am delighted that you are able to join us here for the Academy's second ever conference.

Over 170 delegates from 23 countries have registered for the two day event. Our broad conference programme features an impressive 32 poster presentations and 15 oral presentations, with keynotes from Professor Bernard Gilmartin (Aston University, UK) and Dr Barbara Ryan (Cardiff University, UK).

Although the Academy is in the very early stages of its development I was delighted to welcome 250 individuals and organisations into membership in our first year. This number exceeded both our targets and expectations and demonstrates the real desire within Europe for an organisation that will promote clinical, educational and scientific excellence that transcends geographical barriers.

This year's programme is structured around, but not limited to, the themes of education and research. We are presenting an ambitious, exciting conference which will explore some of the key issues facing optometry and optics in Europe. I am looking forward to an inspirational event and I look forward to meeting you and discussing these issues in more depth over the course of the weekend.

Dr Feike Grit

A handwritten signature in blue ink, appearing to read 'Feike Grit', with a long horizontal stroke extending from the bottom of the signature.

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At a glance

European Academy Conference Programme - Day 1

European eye care

Clinical

Education

Research

Saturday 15 May		Workshops - TEC Copenhagen			
IDA Conference Centre		TEC 1	TEC 2	TEC 3	TEC 4
08:00	Registration opens				
09:30 - 11:45		Education workshop Managing Clinics in Educational Settings Patrick Richardson	Clinical workshop What is the difference between screening and diagnosis? Trevor Warburton	Communication workshop - a necessity and a success factor in the optometric practice Helmer Schweizer	Clinical workshop Optical Coherence Tomography in practice Nick Rumney
12:00 - 13:00					
13:00 - 13:45		Academy Annual General Meeting (members only)			
14:00 - 14:10		Academy opening address: Dr Feike Grit, President			
14:10 - 15:10		Keynote address: Professor Bernard Gilmartin, Aston University UK - Myopia: prevalence, parameters and prevention			
15:10 - 16:30		Coffee break and review of poster presentations			
16:30 - 17:30		Academic and Research: Steen Aalberg, ABI/TBI induced vision impairments addressed in a multidisciplinary rehabilitation setting; Roger Anderson, Differences in detection and discrimination performance for individual Vanishing Optotype letters in foveal and peripheral vision; Holger Dietze, Precision of subjective, objective and aberrometry-based refraction and its physiological limits; Cornelis Verezen, Fitting new glasses for those with bilateral central absolute scotomas.			
Evening 19:00		Academy Dinner at the Copenhagen Marriott			

European Academy Conference Programme - Day 2

European eye care

Clinical

Education

Research

Sunday 16 May IDA Conference Centre

08:30 - 09:00 **Registration opens**

09:00 - 10:00

Room 1
Academic and Research Session: Genis Cardona, Formative design and use of the Virtual Learning Environment for Blended-learning at the School of Optics and Optometry of Terrassa (Spain); **Frank Eperjesi**, Use of Google as a tool to aid diagnosis by optometry students; **John Lawrenson**, Development of a competency framework for optometrists with a specialist interest in glaucoma; **Joy Myint**, An evaluation of the impact of a post-registration educational course in glaucoma co-management on strategies for optometric clinical decision making.

Room 2

Round Table discussion: A strategy for Optometry Research in Europe'
 Facilitator: **Bernard Gilmartin**

10:00 - 11:00

Academic and Research Session: Ali Bukhamseen, Contact lens fitting in aphakic infants; **Marten Fortuin**, Orthoptic eye exercises; a masked pilot study comparing simple, complex, and control eye exercises; **Giancarlo Montani**, Change of tear film in keratoconus and its management with sodium hyaluronate eye drops; **Daniela Nosch**: Dynamic contour tonometry over a thin daily disposable hydrogel contact lens.

Round Table discussion: Challenges in Assessing Professionals
 Facilitator: **Josephine Mullin**

11:00 - 11:30

Coffee break and review of poster presentations

11:30 - 12:30

Keynote Address 2: Dr Barbara Ryan, Cardiff University UK. Postgraduate education

12:30 - 13:30

Presentations and closing address: Ian P Davies, Attitudes towards eye care across Europe; Hendrik P Derksen, Optometry and bioptic driving in the Netherlands; **Jeffrey Weaver**, Board certification in optometry — the American experience; **Laura Guisasaola**, European University Network on Public Health and Cooperation for Development Visual Health.

13:30 - 13:35

President's closing address

13:35 - 14:30

Lunch reception and networking



With thanks to the Academy's sponsor

About CIBA VISION

CIBA VISION was established to help people enjoy one of life's most precious gifts: healthy vision. It is the eye care unit of Novartis AG (NYSE: NVS), one of the world's leading providers of healthcare solutions.

With worldwide headquarters since 1980 in Atlanta, Georgia, USA, CIBA VISION develops and manufactures contact lenses and lens care products to meet the evolving eye care needs of Eye Care Professionals (ECPs) and their consumers. With CIBA VISION locations in more than 30 countries, and partnerships with local distributors, CIBA VISION's products and services are available in more than 70 countries and serve an estimated 125 million contact lens wearers around the world.

Shared Passion

At the heart of our business is a relentless desire to make a difference in people's lives by improving, protecting and preserving eyesight. This commitment, which requires exceptionally high quality standards and cutting-edge innovation, is best expressed in the CIBA VISION mission statement, "Shared Passion for Healthy Vision and Better Life."

CIBA VISION's partnership with ECPs is very strong as a result of our shared passion for helping people see better and live fuller lives. In addition to delivering products that meet consumer needs, we support our ECP partners with practice management solutions to help them fulfill their professional aspirations. One example is the CIBA VISION Academy for Eyecare Excellence™, a global platform for ECPs that delivers professional education, practice development and support staff to ensure the highest standard of patient care. The Academy for Eyecare Excellence™ includes both clinical and business programs, such as the Management & Business Academy (available in some countries), as well as support staff and student programs.

Healthy Vision

CIBA VISION believes innovation is the key to a better tomorrow in eye care. We are always looking for new materials, technologies and designs to make contact lenses and lens care more effective and simple to use – a relentless quest that has resulted in a number of industry "firsts." CIBA VISION prides itself on being the first company to develop and commercialize silicone hydrogel (SiHy) contact lenses.

Better Life

CIBA VISION develops breakthrough eye care products that meet people's evolving lifestyles. This commitment guides our business strategy, product development and global operations. Our goal is to achieve greater consumer compliance with simplified product offerings that focus on our two strategic brands: DAILIES® and AIR OPTIX® , and Lens Care Products.

A heritage of care

For nearly 30 years, CIBA VISION has been committed to improve people's lives by improving their vision and eye health. Our mission, "Shared Passion for Healthy Vision and Better Life," guides our 5,900 employees and our customers to deliver the dream of healthy vision and better lives today and in the future.

ABI/TBI-Induced Vision Impairments Addressed in a Multidisciplinary Rehabilitation Setting

Presenter: Steen Aalberg, Optometrist, Denmark

Purpose

Optometric private practices experience an increasing number of ABI/TBI-patients seeking help for untreated or ignored vision problems remaining after their injury. In the ongoing quest for optimal treatment for the brain injured patient, a small study was done to:

- Identify vision problems before the patients entered a formal program at an institutional rehabilitation facility.
- Identify remaining vision problems right after completion of the offered rehabilitation program.
- Evaluate if optometric vision training could be helpful improving these patients any further, and if so, were the visual gains likely to be beneficial for the total rehabilitation if implemented at the beginning of the program.

Methods

The study was done at a centre for research and rehabilitation of acquired / traumatic brain injury at the University of Copenhagen. Nine subjects between thirty and fifty years of age, all with a fair probability to rejoin work, were asked, seven of whom agreed to an optometric examination, two were unable to participate and declined. At the initial optometric exam all seven subjects exhibited vision problems. Six out of the seven subjects suffering conditions known to respond well to Vision Therapy (VT). All six were selected and one was rejected due to low expectations from the offered kind of treatment. Thus six subjects were enrolled in the VT program immediately following their rehabilitation program, in which they had undergone individualized neuropsychological treatment including memory and planning strategies, physiotherapy including balance training and speech and language therapy.

The VT-program, consisting of six sessions within six weeks, was done as in-office group training with, whenever possible, two optometrists and no home based training, offering a total of approximately sixteen hours including break time as necessary. Due to limitations in time, equipment and resources, emphasis was put on simple procedures. These procedures addressed balance and vision, eye-hand coordination, eye movement, fixation, vergence and visualization.

Results

At the initial optometric exam all subjects exhibited prevalent vision problems. Six out of the seven subjects suffered conditions known to respond well to Vision Therapy. The identified problems fell in the areas of visual field defects, refractive conditions, eye movement problems, unstable balance, fixation problems, diplopia and binocular visual problems as accommodation- and convergence insufficiency.

There were no significant changes of these problems following the general rehab program, but all subjects, in spite of the shortness of the program, noticed subjective and some measurable improvements related to the VT-program.

They all stated their expectations from the optometric training were met, and felt that VT should be available as a natural part of ABI-rehabilitation.

Conclusion

ABI/TBI patients seem to have an extremely high incidence of vision problems and if left untreated, these may impair optimal rehabilitation. Many of these vision problems are amenable to optometric intervention.

Differences in detection and discrimination performance for individual Vanishing Optotype letters in foveal and peripheral vision

Presenter: Roger Anderson^{1,2}

Co-Authors: Nilpa Shah¹, and Steven C. Dakin¹

¹ NIHR Biomedical Research Centre, Moorfields Eye Hospital and UCL Institute of Ophthalmology, London. ² Vision Science Research Group, School of Biomedical Sciences, University of Ulster at Coleraine, N. Ireland.

Purpose

Vanishing optotype (pseudo-high-pass) letters display the same mean luminance as their surround and thus 'vanish' when the resolution threshold is reached during foveal viewing. Several previous studies have found significant differences between the detection and discrimination of pairs of vanishing optotype letters when viewing peripherally, suggesting that discrimination of these optotypes may be limited by retinal sampling in the periphery. However, under the 2AFC conditions of these studies, where the degree of 'uncertainty' is low, it may be that, while the letter undergoes local aliasing, it remains easily discriminable from its partner. We wished to determine the differences in detection and discrimination for individual letters under conditions of higher 'uncertainty', i.e. with 26 alternatives, to better determine which letters display individual sampling-limited performance.

Methods

We separately measured detection and discrimination performance for 26 different computer-generated vanishing optotypes in both the fovea and at 10 degrees in the horizontal temporal retina. Thresholds were determined for each letter using an ascending method of limits where the subject had to report either the presence of stimulus contrast (for detection) or the actual name of the letter (for discrimination). Three experienced observers took part and refractive error was carefully corrected at each location for each subject before the commencement of each test.

Results

In the fovea, with a few exceptions, thresholds for detection and resolution were closely similar for each letter and the differences in discriminability between letters were smaller than for conventional letters. However, in the periphery, for nearly all letters, the threshold for discrimination was significantly higher than for detection ($p < 0.01$). Detection thresholds showed only moderate differences between letters but discrimination performance varied considerably from letter to letter.

Conclusion

Unlike in foveal vision, most 'vanishing' optotypes display significant differences in their detection and discrimination thresholds in peripheral vision, i.e. do not 'vanish' when the resolution limit is reached. The magnitude of this difference varies from letter to letter but is further evidence for the sampling limited nature of peripheral discrimination for most of these optotypes.

Contact Lens Fitting in Aphakic Infants

Presenter: Dr. Ali A. Bukhamseen

Saad Specialist Hospital, Al-Khobar, Saudi Arabia

Purpose

While the number of paediatric patients requiring cataract surgery with secondary intraocular lens implants continues to increase, the numbers who remain aphakic following surgery is still high, which means they either need a thick spectacle lens or special type of contact lens. This lecture will demonstrate the advantages and disadvantages for each optical device used and to also clarify the fitting techniques which can be used with this section of the population, as well as highlighting the different types of contact lenses for such cases. The overall aim of the presentation is to give over view about this important subject (paediatric aphakia) and how can we help them by contact lens. At the end of the presentation, delegates will be able to understand the alternative managements for paediatric aphakia and why the contact lens considers the best choice for these patients.

Formative design and use of the Virtual Learning Environment for Blended-learning at the School of Optics and Optometry of Terrassa (Spain)

Presenter: Genis Cardona¹

Co-Authors: Rosa Borràs¹, Anna Forés², Albert Sangrà³

¹ Universitat Politècnica de Catalunya

² Universitat de Barcelona

³ Universitat Oberta de Catalunya

Background

The School of Optics and Optometry of Terrassa (EUOOT), as part of the Universitat Politècnica de Catalunya (UPC), implemented a blended-learning modality of the Optics and Optometry Degree during the academic year 2005-2006, starting with a pilot stage. At the moment of writing, this is a pioneer experience in Spain in the field of health sciences and Optometry. After the first four semesters (out of eight) of the academic curriculum were deployed in this modality, we designed an assessment study to identify the strengths and weaknesses of the formative strategies in use in order to draw the appropriate mechanisms to optimize teaching techniques.

Discussion

Several evaluation forms, based on published literature, were employed to determine the teaching techniques and strategies more frequently used in the virtual learning environment (VLE) for each particular subject of the curriculum. Course design and structure (1), type of formative resources (2), training and evaluation activities (3) and use of interaction and collaborative strategies (4) were evaluated. It is worth mentioning that the VLE is the only available teaching and learning support in this modality of studies where student attendance is restricted to the last week of the semester, a very limited time span taking into consideration the practical and clinical nature of Optometry studies. Qualitative data and study characteristics called for the application descriptive statistical techniques.

Conclusions

The formative design which stems from the various VLE teaching strategies was found to excel in course design and structure formal aspects, in the elaboration of text and slides type resources, in the frequent implementation of self-evaluation tasks, which help students to appraise their own academic performance, and in the willingness of some members of the teaching staff to create debate forums. Weak points were identified in the insufficient explanation of the formative goals of resources and materials, in the infrequent student use of debate forums and in the difficulties in the development of activities aiming at fostering autonomous and collaborative learning.

Attitudes towards eye care across Europe

Presenter: Ian P Davies

The Vision Care Institute™ of Johnson & Johnson Medical Ltd

Background

The delivery of eye care across Europe varies significantly by country. Variables include the profession and level of professional qualification of the eye care practitioner (ECP), the level of state reimbursement and the integration between the eye exam itself and the commercialism of any subsequent correction. While the delivery of the eye care varies the epidemiological need for vision correction is relatively similar across Western Europe and little is known about the attitudes of the population towards their eyes and their needs for vision correction.

Research Objectives

To understand the incidence and perceptions of eye examinations in the general population of 4 European countries (France, Italy, Russia and the United Kingdom).

Method

Between April and July 2008 nationally representative cross sectional samples of 500 members of the general public were surveyed on their attitudes to and perceptions of eye care.

Results

The public's rating of their eye health as being either excellent or good varied from 28% in Russia to 46% in the UK. In most cases this rating was in line with their rating of their general health with the exception of the Russian sample of which only 19% rated their general health as good or excellent. The public's rating of their eye health did not seem to correlate with the number having an eye exam which was between 85% and 94%, although in most cases around 75% of the cohort described the examination as being comprehensive, the exception being Russia where only 36% claimed to have had a comprehensive examination. The number of children who were claimed to have had an eye examination varied between 85% in Russia to 53% in the UK.

Conclusions

The mode of delivery of eye care does not appear to be a driver of public perception. Although a reassuringly high sample of adults have had an eye exam the number who have claimed this to be comprehensive, and the wide variation in the number who feel that their children should have an eye exam suggests a wide based need for greater education across all countries sampled.

Optometry and Bioptic driving in the Netherlands

Presenter: Hendrik P. Derksen¹

Co-Authors: Aart C. Kooijman^{1,2,3}, Bart J.M. Melis-Dankers^{3,1}, Eli Pel⁴, Wiebo H. Brouwer^{2,5,6}, Petra Pijnakker³, Geert Van Delden³, Eelko Van Pluuren³, Birgit Van Iddekinge³, Peter Derksen³, Rens B. Busscher⁵, Ruud A. Bredewoud⁷, Jose H.M. Van Rosmalen⁸, Fokke Jan Postema⁹, Irene Wanders³, Jos De Vries⁷, Jaap M.D. Witvliet³

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⁷ Netherlands Bureau of Driving Skills Certificates (CBR), Rijswijk, The Netherlands

⁸ Viziris, Utrecht, The Netherlands

⁹ Ophthalmology Clinic, Isala Klinieken, Zwolle, The Netherlands

Background

In many states of the U.S.A., people with moderately reduced visual acuity (e.g., 20/50 – 20/200) can legally drive with the aid of a small, spectacle-mounted (“bioptic”) telescope. We conducted a demonstration project to assess the viability of implementing bioptic driving in The Netherlands. In this paper we describe the framework of the project from conception through to realization of our primary objective – the introduction of bioptic driving as a legal option for visually impaired people in The Netherlands.

Methods

The project was based on bioptic driving programs in the U.S.A., which were adapted to fit within current driving training and assessment practices in The Netherlands. The project convened a consortium of organizations including the Netherlands Bureau of Driving Skills Certificates (CBR), service organizations for the visually impaired, and research departments at universities investigating driving and vision. All organizations were educated about bioptic driving and participating professionals were trained in their specific aspects of the project. Media publicity led to significant interest and helped recruitment that enabled the screening and selection of potential participants.

Outcomes

The project demonstrated that people with moderately reduced visual acuity can be trained to achieve an adequate level of proficient and safe driving (as assessed by the local official driving licensing professionals) when using a bioptic telescope for the road conditions in the Netherlands. Based on the successful project outcomes, a request was made to the Minister to allow bioptic driving in the Netherlands. This request has been accepted; the legal procedures for implementation are in process.

Precision of Subjective, Objective and Aberrometry-Based Refraction and its Physiological Limits

Presenter: Holger Dietze

Co-Authors: Lars MüllerBeuth University of Applied Sciences, Berlin, Germany

Purpose

To compare the precision of auto-refractometry, subjective refraction and aberrometry-based refraction with respect to physiological limits and technological tolerances for spectacle lenses.

Methods

Refractive error of 50 right eyes (refractive error -6.25D to +4.25D) was determined by two subsequent measurements with each of three different methods (auto-refractometry, Hartmann-Shack aberrometry; subjective refraction). The sphere/cylinder/axis results were Fourier-transformed into spherical equivalent (SE), cylinder power in 0deg (J0) and cylinder power in 45deg (J45), and the repeatability coefficient (Bland-Altman confidence limits) for each of the three methods was calculated. In addition, the results for aberrometry-based refraction were refined by applying a mathematical algorithm to the Zernike-coefficients. A Badal optometer was used to measure subjective tolerance to spherical defocus over artificial pupils of 3, 5 and 7mm diameter, and calculations for obliquely crossed cylinders were performed to simulate subjective tolerance to astigmatic defocus.

Results

Repeatability coefficients for objective, subjective and aberrometry-based refraction are $\pm 0.37D$ (SE); $\pm 0.38D$ (SE) and $\pm 0.57D$ (SE); ± 0.30 (J0); ± 0.22 (J0) and ± 0.21 (J0); $\pm 0.09D$ (J45); $\pm 0.18D$ (J45) and $\pm 0.239D$ (J45). The subjective tolerance to defocus is $0.42D \pm 0.21$ (3mm pupil); $0.33D \pm 0.15$ (5mm pupil) and $0.18D \pm 0.07$ (7mm pupil). It was calculated that the eye can tolerate rotations of an astigmatic correcting lens of 20.5deg (cyl $\pm 0.50D$); 10.2deg (cyl $\pm 1.00D$), and 5.1deg; (cyl $\pm 2.00D$).

Discussion

The precision of subjective refraction can largely be explained by the subjective tolerance to spherical and astigmatic defocus. The precision of objective methods is equal or even worse than the precision of subjective refraction, which can be explained by ocular dynamics and by the size of the pupil. The precision of current methods of refraction corresponds well with current ISO-tolerances for monofocal spectacle lenses.

Conclusion

Subjective refraction can still be considered as the method of choice, even in the presence of sophisticated methods for determining objective refraction. In light of the relatively low precision of aberrometry-based refraction and the comparatively large subjective tolerance to defocus it is unlikely that aberrometry-based customisation of spectacle lenses will benefit the wearer.

Use of Google as a tool to aid diagnosis by optometry students

Presenter: Frank Eperjesi

Co-Authors: Hannah Bartlett, Jon Gibson

Ophthalmic Research Group, Aston University

Purpose

A preliminary search of the literature (PubMed, Medline and Web of Science) revealed a paucity of published work on the topic of using an internet search engine as a learning and teaching tool. Tang and Ng (2006) showed that 58% of medical cases can be diagnosed correctly by experienced medical doctors using carefully selected search terms and Google Web Search. Twisselmann (2006), however, reminds us that 'Google is not set up as a diagnostic decision support system—although it can be a useful aid to differential diagnosis once a diagnosis has been made' and that 'other internet resources exist, for example PubMed and other specialty databases, which might be more specific and useful than Google and of course these sources contain mainly peer reviewed information.' The aim of this study was to determine whether conducting internet searches using Google Web Search aids optometry students in the diagnosis of uncommon ocular conditions.

Method

One of the authors selected uncommon five anterior eye and five posterior eye conditions from standard text books and extracted key information on signs and symptoms. Twelve final year students were recruited after a call for participants was sent by email to all 115 students in this year group. Participants were given written copies of the signs and symptoms, instructed to list three key words and then six were instructed to search Aston-e-Library only (a portal to peer reviewed academic papers on PubMed, Web of Knowledge plus others) for a diagnosis of the first group of five cases and then to use their key words to search Aston-e-Library and Google for a diagnosis of the second group of five cases. The other six students were instructed to search Aston-e-Library and Google for a diagnosis of the first five cases and then Aston e-Library only for the second five cases. The study took place in a dedicated computer lab with two of the authors present throughout. Key words and diagnoses were recorded by each student and collected at the end of the study. Students worked alone and took between two and three hours to complete the task.

Results

Twelve final year optometry students with a mean (\pm) second year percentage mark of 63.34 (\pm 5.32) and range of 50.12 to 75.00 participated. Use of Aston-E-library only led to a correct diagnosis in 16 out of 60 cases and use of Aston e-Library plus Google led to correct diagnosis in 31 out of 60 cases. We found no correlation between mean second year mark and correct diagnosis with Aston e-Library only ($r = 0.149$, $p < 0.05$) or Aston e-Library plus Google ($r = 0.446$, $p < 0.05$).

Conclusion

Google can be used by optometry students as a tool to aid in the diagnosis of uncommon ocular conditions and this is independent of previous academic exam success.

References

- Tang H and Ng JHK (2006). Googling for a diagnosis—use of Google as a diagnostic aid: internet based study *BMJ*. 333: 1143-1145.
Twisselmann B. (2006). Use of Google as a diagnostic aid: summary of other responses. *BMJ*. 333: 1270-1271

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UNESCOVISION. European University Network on Public Health and Cooperation for Development on Visual Health.

Presenter: Laura Guisasola¹

Co-Authors: Ester Guaus², Nuria Tomas²

¹ UNESCO, Spain

² Universitat Politècnica de Catalunya (Spain)

Background

The UNESCO Chair in Visual Health and Development was created in 2002 by a memorandum of understanding with the Technical University of Catalonia and the UNESCO. The Chair's main office is in the School of Optics and Optometry of Terrassa, Barcelona, Spain.

Since then, the UNESCOVISION university network has been created. It started with the development of a new subject for eye health professionals to better understand international visual health programs and their role in running international projects. A training for trainers program involving 48 universities (7 Spanish, 3 European, 22 Latin-American, 3 African and 16 North American) enabled the professors to teach the Visual Health and Development materials. The network has developed educational materials to train optometrists in developing and developed countries and has conducted inter-university research projects.

At the European level, interest on public health in vision care issues has increased. The development of a RESC (Refractive Error Study in Children) protocol represents a first step to standardize methodologies internationally and be able to compile comparable data on refractive error.

Discussion

Even with international participation and recognition of the UNESCOVISION network, an under representation of European Universities has been observed.

Since the creation of the UNESCO Chair and under the Bologna Process, university recognition of Optometry Programs, the number of universities offering Optometry degrees and the content that those programs provide are evolving. This improvement includes the need to train professionals for different levels of competence for public and international visual health.

Even with the increasing interest of public health in vision care issues, no university networks or European projects have been identified.

Conclusions

There is a need to develop an inclusive network of entities with interest in public health and cooperation for development in order to exchange experiences and promote European Research and Educational Projects in Optometry.

Development of a competency framework for optometrists with a specialist interest in glaucoma

Presenter: John G. Lawrenson¹

Co-Authors: Myint, J.¹, Edgar, D.F.¹, Kotecha, A.^{1,2,3}, Crabb, D.P.¹

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² NIHR BMRC for Ophthalmology, Moorfields Eye Hospital NHS Foundation Trust and UCL Institute of Ophthalmology, London

³ Glaucoma Research Unit, Moorfields Eye Hospital, London

Purpose

To develop a competency framework, using a modified Delphi methodology, for optometrists with a specialist interest in glaucoma which would provide a basis for training and accreditation.

Methods

A modified iterative Delphi technique was employed using a 15-member panel consisting almost exclusively of sub-specialist optometrists and ophthalmologists. The first round involved scoring the relevance of a draft series of competencies using a 9-point Likert scale with a free-text option to modify any competency or suggest additional competencies. The revised framework was subjected to a second round of scoring and free-text comment. The Delphi process was followed by a face-to-face structured workshop to debate and agree the final framework. The version of the framework agreed at the workshop was sent out for a 4-month period of external stakeholder validation.

Results

There was a 100% response to round 1 and an 86% response to round 2. All panel members attended the workshop. The final version of the competency framework was well received by stakeholders and contained 19 competencies for the diagnosis of glaucoma and 7 further competencies for monitoring and treatment.

Conclusions

Application of a consensus methodology consisting of a modified Delphi technique allowed the development of a competency framework for glaucoma specialisation by optometrists. This will help to shape the development of a speciality curriculum.

The authors would like to acknowledge all members of the Delphi panel for their input to this project

Change of tear film in keratoconus and its management with sodium hyaluronate eye drops

Presenter: Giancarlo Montani¹

Co-Author: Francesco Romano²

¹ Optometrist FIACLE, University of Salento, Lecce, Italy

² Innovative Solution for Eyes (ISE), Alezio (Lecce), Italy

Purpose

The purpose of this present work is to investigate the difference of tear film NIBUT and the tear meniscus height in keratoconic eye and the possible risk of ocular surface damage. The effect of using an eye drop with sodium hyaluronate on the stability of tear film was investigated.

Methods

Twenty patients, not wearers of contact lenses with monocular keratoconus, were selected to use the fellow eye like control. The tear film stability was checked by means of two non invasive methods (NIBUT): by a Keeler Tearscope™ and by retroillumination.

The results were compared with blink interval to evaluate the risk of surface damage using the Ocular Protection Index (OPI).

Further the height of tear meniscus in both eye was investigated: an image of the inferior tear meniscus (colored with fluorescein) was acquired at 10x magnification. The images were analyzed using an image processing software.

In the second part of the study two drops of AMO Blink Contacts™ (sodium hyaluronate 0,15%) monodose were instilled in the keratoconic eye. The NIBUT was measured after 1, 10 and 20 minutes from the instillation to check the efficacy of sodium hyaluronate on tear film stability.

Results

The data were analyzed by the t test of Student and $P < 0.05$ was considered significant. The following value were measured:

- a NIBUT of 9,817 (SD± 3,77) sec
- a THM 0,244 (SD± 0,051)mm
- an IBI of 5,285 (SD± 0,53) sec.

The ratio between NIBUT and IBI (OPI) was 1,874.

The use of sodium hyaluronate 0,15% eye drops significantly improved the NIBUT 17,5 SD± 3,56 ($P < 0,05$).

No significant variations ($P > 0,05$) about TMH 0,317 (SD±0,168) and IBI 5,325 (SD±0,49) was highlighted.

The increase of NIBUT associated to a not significant variation of IBI caused an increase of OPI to 3,287.

Conclusions

The tear film in keratoconic eyes presents a lower value of NIBUT and OPI compared to the control group but no significative differences are found on the measurements of tear meniscus height. The use of sodium hyaluronate eye drops can increase the NIBUT and the OPI giving a better protection of corneal surface.

An evaluation of the impact of a post-registration educational course in glaucoma co-management on strategies for optometric clinical decision making

Presenter: Joy Myint¹

Co-Authors: David F Edgar¹, Aachal Kotecha^{1,2}, Ian E Murdoch³, John G Lawrenson¹

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Purpose

Under the UK Opticians Act 1989, the General Optical Council is required to establish the competencies which must be demonstrated in order to register as an optometrist. A number of these 'entry-level' competencies relate to the detection and referral of glaucoma. Various post-registration training courses which provide additional training in glaucoma are available, including specialist CPD, bespoke accreditation programmes to enable optometrists to participate in co-management schemes, and specialised university-based postgraduate modules. To our knowledge the impact of these educational interventions on clinical decision making in glaucoma has not previously been formally evaluated.

Methods

Clinical decision making skills were assessed on a cohort (N=53) of postgraduate registered optometrists before and after completing the 3-day MSc module 'Optometric Management of Glaucoma' at City University London. The performance of participants in three tasks was evaluated. The first task was to list five features to be assessed when examining the optic nerve head, the second was to reach a clinical decision on four paper-based clinical management scenarios in glaucoma, and the third was to assess performance on a software program (Discus) that was designed to assess judgment of glaucomatous disc damage. The baseline assessment of performance at the three tasks occurred immediately prior to the glaucoma module, with the second taking place approximately three months later.

Results

Subjects' knowledge of potentially glaucomatous disc features improved, with mean scores increasing from 2.3 (out of 5) prior to the training module to 4.4 post-training. Clinical decision making in the scenarios that tested clinical management also improved, with mean scores increasing from 5.5 (out of 8 where 8 represents perfect agreement with an expert panel) to 5.9.

When assessing optic discs for glaucomatous damage there was an increase in mean 'sensitivity' from 75% to 80% pre- and post-training respectively, coupled with a reduction in 'specificity' from 64% to 55%. Practitioners on average spent longer analysing the discs post-training before reaching a decision, with the average time spent increasing from 7.4 seconds to 10.9 seconds per disc image pre- and post-training respectively.

Conclusions

Additional post-registration training can improve the diagnostic capability of community optometric practitioners in glaucoma.

The authors would like to acknowledge Pfizer UK Ltd for the unrestricted grant in support of this research and Professor David Henson (University of Manchester) for supplying the Discus program

Dynamic Contour Tonometry over a thin daily disposable hydrogel contact lens

Presenter: Daniela Nosch¹

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³ Vedis (Pallas Clinic), Zurich, Switzerland

Purpose

Dynamic Contour Tonometry (DCT) has been shown to deliver accurate and repeatable results for intraocular pressure (IOP) measurement, independent of corneal physical properties such as thickness, curvature and rigidity. The aim of this study was to find out if DCT remains accurate when it is applied on regularly shaped corneas while a thin, daily hydrogel contact lens (CL) is worn.

Methods

This was a prospective, randomised study and included 46 patients (46 right eyes). 26 were female and 20 were male. The age varied from 22 to 66 years (mean: 43.04 ± 12.69). IOP and ocular pulse amplitude (OPA) measurements were taken with and without a daily disposable hydrogel CL (-0.50D, Filcon IV, Sauflon) in situ (using the DCT), while the order of measurement was randomised in order to prevent any possible effect of repeated measurements.

Results

The average value for the IOP measurements without CL was 16.51 ± 3.20 mmHg, and with CL in situ it was 16.10 ± 3.10 mmHg. The mean difference was 0.41 mmHg and not found to be statistically significant ($p=0.074$). The average value for the OPA measurement without CL was 2.20 ± 0.79 mmHg. With CL in situ it was 2.08 ± 0.81 mmHg. This gave a mean difference of 0.11 mmHg and was statistically significant ($p=0.025$). The Bland-Altman-Plot showed a maximum difference in IOP of +2.44 and -2.00 mmHg (CI 0.95). Regarding OPA, the maximum difference was +0.81 and -0.60 mmHg (CI 0.95).

Conclusion

It can be concluded that the presence of a thin hydrogel CL does not affect the accuracy of IOP measurements when the DCT is used. However, the ocular pulse amplitude was measured significantly lower when a contact lens was worn for the measurement. Because the DCT measures IOP independent of corneal physical properties such as thickness, curvature, and rigidity, it should be the subject of future studies to find out if it can also be applied over contact lenses in eyes with keratoconus, PMD or after refractive surgery.

Fitting new glasses for those with bilateral central absolute scotomas

Presenter: Cornelis A. Verezen^{1,2,3}

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² Leiden University, Leiden, The Netherlands

³ Utrecht University, Utrecht, The Netherlands

The large majority of low vision patients suffer from loss of central vision due to macular pathology. A variety of optical low vision aids (LVAs) may be prescribed to optimize the residual visual function, ranging from high power reading glasses and more complex magnifying aids to a closed circuit television. Most patients with central visual field loss will spontaneously develop a form of eccentric fixation, using a peripheral retinal locus as alternative for the damaged macula. In the last ten years, several strategies and training programs were developed, with as goal to develop a stabile fixation for reading with the preferred retinal locus (PRL). Eccentric viewing spectacles (EVS) constitute an alternative approach in visual rehabilitation by facilitating eccentric fixation. EVS spectacles are yoked prism spectacles to correct for abnormal gaze and to reduce neck strain caused by torticollis. EVS assist the patient in maintaining eccentric gaze without adverted gaze, often seen as socially unfavourable and/or distracting in conversation.

The presentation includes a brief explanation of the basic optics of prisms as used in common medical applications of prisms. The principle that prisms have the property to refract light is used to shift the focal point from the fovea to an alternative point in the retina where a patient with central dense scotoma has developed his PRL. The patient no longer needs to adjust the position of his eye and/or head to make effective use of the PRL. The presented technique is in the scope of optometric practice, without the need for additional expensive equipment.

This presentation focuses on the various aspects of the EVS, patient selection as well as fitting technique and training. The principle of normal fixation versus eccentric fixation will be pointed out. History and sceptics will be discussed as well. An outcome of recent literature on this subject is provided, so a thorough discussion of EVS as a novel device for selected low vision patients will be triggered by the presenter.

Myelodysplastic syndrome: effects on the eye

Presenter: Yvonne Helmfrid Agartz

Swedish Centre of Optometry

A case report – before, during and after treatment. Myelodysplastic syndrome, MDS is a rare type of blood cancer that normally debuts in older patients 70+.

This patient was 47 years of age, and experienced her first symptoms in February 2009. The patient saw 2 small glaring scotoms in the right field of vision. This study will follow this case a year during treatment with cytostatics and an unusual SCT (stem cell transplantation) with double cords.

The recovery has gone very well. Documentation has been done several times with funduscameras and the retina has been scanned with OCT twice with interesting results. We can see retinal swelling, hard and soft exsudats, a range of different bleedings, crossfenomens, and a major central macular hemorrhage. All blood has now reabsorbed into the vitreous body but there still remains a small scar.

Developmental Eye Movement Test: Gender Norms for Portuguese

Presenter: António Manuel Gonçalves Baptista¹

Co-Authors: Raul Alberto Ribeiro Correia de Sousa², Carla Cristina de Moraes Guerra Casal³, Rui Jorge Ramoa Marques⁴, Carlos Manuel Lima Reis da Silva²

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⁴ Clinical practitioner, Porto, Portugal

Purpose

The aim of this study was to compare the performance between boys and girls on Developmental Eye Movement test (DEM).

Methods

A standard DEM test was administered to 346 boys and 349 girls from the region of Braga, Portugal, from ages 6 to 13, in a period of time ranging from February to April 2009. All subjects meeting the following criteria were included: Public School Classroom attendance, normal near point visual acuity and pass the pre-test. These subjects were distributed per gender in 8 age groups ranging from 6 to 13 years. For these groups, the mean scores and standard deviation for vertical time (VT), adjusted horizontal time (AHT), errors and ratio were computed and then compared using the test.

Results

For the ages compared, it was found differences between gender with statistical significant (t test, $p < 0.03$) only for VT and AHT in the 6-year-old group: mean VT \pm 1SD of 68.15 \pm 2.36 s (N=40) and 76.95 \pm 3.08 s (N=38), respectively for male and female; mean AHT \pm 1SD of 101.8 \pm 3.40 s and 114.5 \pm 4.2 s, respectively for male and female.

Conclusion

Generally, these results showed that performance in DEM test was not gender dependent.

Measurement of Off-axis Refraction with a Commercial Open Field Aberrometer

Presenter: Karthikeyan Baskaran

Co-Authors: Baskar Theagarayan, Staffan Carius, and Jorgen Gustafsson
School of Optometry, Linnaeus University, Kalmar, Sweden 39182

Purpose:

People with central visual field loss (CFL) use their remaining peripheral vision in order to see better when performing various visual related tasks. At large off-axis angles, the eccentric vision can be limited both by the low resolution capacity of the peripheral retina and by the optical aberrations caused due to oblique angles. Previous work has shown that eccentric correction of induced off-axis astigmatism can improve vision in a preferred retinal location (PRL) for people with CFL. However, the eccentric refraction is often difficult to determine with traditional refractive methods. This work therefore shows the use of a commercially available wavefront sensor to measure fast and reliable off-axis refraction. Data on off-axis refraction is also of interest in the field of myopia research.

Methods:

We used the new open-field high-definition complete ophthalmic analysis system, COAS HD -VR, to evaluate off-axis refraction. Using the special Vision Research tool in this system stimulus (fixation objects) can be presented in a large part of the visual field. The instrument can measure out to 40 degrees in the horizontal visual field and 20 degrees in the vertical visual field with a range from sphere +7 D to -17 D. It measures astigmatism up to 10 D. This instrument also allows natural binocular viewing without obstacles. Aberrations of the right eye of 30 emmetropes (24 ± 4 years) were studied. Off-axis refraction and higher order (HO) aberrations were measured in steps of 10° out to ± 30° in the horizontal visual field

Results:

The first data on young emmetropic eyes with this new instrument showed promising results for low (LO) and higher order (HO) aberrations in the peripheral visual field. Of the LO aberrations, astigmatism increased significantly with the off-axis angle, from 0.25 D at 10° Nasal to 1.65 D at 30° Nasal. In the HO aberrations, coma (C13) showed a linear increase across the horizontal visual field ($p < 0.05$)

Conclusions:

The COAS HD-VR shows promising results and good usability for future research in evaluation of off-axis refraction. In future we believe the aberrometer can be used clinically to measure off-axis refractions in low vision patients.

Effect of soft contact lens power on intraocular pressure measurement

Presenter: Linda Byrmo

Co-Authors: Baskar Theagarayan

University of Kalmar, Sweden

Purpose

Tonometer readings are important in the screening for and treatment of glaucoma. But there are situations when the contact lenses can not be removed prior to measurement of intraocular pressure (IOP), e.g. when they are worn for therapeutic effect. Not to remove soft contact lenses when measuring IOP can save time clinically as well. Previous studies have found positive correlations between soft contact lens powers and the value of tonometer readings.

The purpose of this study is to measure the effect of soft contact lens power on intraocular pressure measurement with a non-contact tonometer.

Method and material

Nine subjects with a mean age of 22 years were included in the study. Each subject's right eye was fitted with Focus Dailies soft contact lenses of 13 different powers, ranging from -8.00D to +6.00D. The intraocular pressure was measured with a non-contact tonometer over the cornea and then with the different lenses in situ. The average of three readings was used.

Results

Δ IOP was statistically significant for lens powers of +3.00D or more ($p < 0.05$). The +3.00D lens of this brand has a centre thickness of 0.146 mm. Δ IOP can be given as a function of positive soft contact lens power (x): Δ IOP = 0.6066x - 0.2235, this function is proven reliable when it comes to predicting the outcome of future results.

Conclusion

Non-contact tonometry can be performed over Focus Dailies soft contact lenses, any difference obtained in IOP is negligible as long as the power of the lens is not +3.00D or more, or has got a centre thickness that is 0.146 mm or thicker.

Blended-learning in Optometry: The experience of the School of Optics and Optometry of Terrassa (Spain)

Presenter: Genis Cardona

Co-Authors: Ester Gaus, Nuria Lupon

Universitat Politècnica de Catalunya (Spain)

The expansion in the number of Optometric practices in Spain led to an increase in the annual demand of Registered Optometrists which was superior to the number of students earning their Degrees each academic year. Besides, many Dispensing Opticians working in Optometric practices professed their interest in enrolling in Optometry studies, although time and practical constraints prevented them to. The School of Optics and Optometry of Terrassa (EUOOT), as part of the Universitat Politècnica de Catalunya (UPC), considered the development of blended-learning in Optometry as a top priority to both increase their student population and also to facilitate access to students with work (and often familial) responsibilities.

The implementation of blended-learning in Optometry entailed the redefinition of many education strategies and of the way the curriculum subjects were imparted. Financial support was obtained through the sponsorship of the companies and institutions of the ad hoc EUOOT Board.

The EUOOT is currently offering two different modalities of blended-learning studies. On the first modality students must attend all practical sessions and workshops, but benefit from a specially designed timetable which concentrates them in an eight hour span, once a week. The second modality permits students to attend a reduced number of practical sessions and workshops, while conducting the rest of their practical workload at the Optometric practice which employs them, under the supervision of an Optometrist designed as tutor. Tutors receive frequent instructions and feedback from the teaching staff of the EUOOT.

Lectures are common for both modalities and take advantage of a powerful platform for blended-education, based on the open-source e-learning software Moodle. Resources include slide and multimedia presentations, video lectures, self-evaluation questionnaires, forums and online and offline tasks, among others.

At present, a total of over 100 students are successfully following blended-learning in Optometry courses at the EUOOT, with a clear predominance of the second modality of study.

Optometry and a Ergonomic Solution for dentists in the Netherlands

Presenter: Hendrik P. Derksen¹

Co-Author: J.A.J. Wouters²

¹ Royal Visio National Foundation for the Visually Impaired and Blind

² University Medical Centre Groningen

Many dentists develop physical complaints during their careers, for instance shoulder and neck complaints. In research among Dutch dentists, it was found that 89% of the group observed bend their cervical spines downward much further than the health limit of 25% for static working postures allows. In the period 2005 - 2007 a demonstration study was done by 17 subjects for the question of the use of special spectacles would improve the position of the cervical spine with less flexion. This case reviews a dentist who suffers from shoulder and neck complaints and cervical spine pain. He works with his head bending far more than the healthy limit of 25 degrees for static work postures (ISO standard 11226 The evaluation of Static Work Posture). Other studies show high numbers of disability in dentists, especially for musculoskeletal complaints and loss of functionality.

The main purpose of this case is to prescribe a new pair of glasses with a positive effect on his static body posture especially the neck. This presentation provides an explanation about methods, purpose and results of fitting this particular frame with glasses. The results shows that when the subject looked at the elements studied in the standardised working posture, the eyeball depression (at a cervical spine flexion of 15 and 25°) deviates significantly from 30°, i.e.: is far higher. When the prism spectacles were used, a significantly lower flexion of the cervical spine was displayed with visibility on the treatment areas. At last he was advised by his insurance company to look for another job, to solve his problems. The case intends to give a new look on a group of patients who work on a very close distance by changing their body posture and neck to a level that complaints are common (ISO standard 11226).

To achieve this result we had to work closely with an ergonomic institute Terzet.

Influence of IOL power on visual acuity in patients implanted with aspheric IOL

Presenter: M^a Amparo Díez-Ajenjo^{1,2}

Co-Authors: M^a Carmen García-Domene¹, Jose M^a Artigas Verde², Adelina Felipe Marcet², Cristina Peris Martínez¹, Jose Luis Menezo Rozalen¹

¹ FOM Fundación Oftalmológica del Mediterráneo

² Universidad de Valencia

Purpose

To assess if the improvement on visual quality in patients implanted with intraocular aspherical lens depends on the power of the implanted IOL.

Methods

We evaluated 79 eyes of 53 patients with cataracts. Average age was 71+7 years old. We measured best corrected visual acuity (BCVA) and contrast sensitivity function (CSF) under mesopic (around 3 cd/m²) and photopic (85 cd/m²) illumination conditions with the CSV-1000 test before surgery, one month and three months after the surgery.

We implanted to all patients of the study an IQ sn60wf intraocular lens (Alcon, USA), with an aspherical design. IOL powers used were between 17.0 D and 29.0 D.

Results

To analyze the results, we made four groups according to patients' IOL power (less than 20.0D, 20.0-21.5 D, 22.0-23.5D and more than 24.0D).

BCVA became stable at three months before surgery. This stabilization was more rapidly in patients implanted with highest IOL power group. However, BCVA was obtained with patients with IOL power between 20.0-21.5 D. These improvements were statistically significant ($p < 0.05$) and there was no dependence with the age of the patients.

Best photopic and mesopic CSF was obtained for IOL group of 20.0-21.5 D and 22.0-23.5 D. These improvements were statistically significant ($p < 0.05$) versus the highest IOL power group at middle and high frequencies for both illumination conditions.

Conclusions

Visual quality in patients with an implanted aspheric IOL after cataract surgery depends on the power of the IOL. Aspheric design of the analyzed IOL optimizes the patients' visual quality with IOL powers between 20.0 D and 23.5 D (76 % of the analyzed cases), but it cannot avoid the decrease of patients' visual quality that need IOL powers out of this range (24 % of the cases). This fact might indicate that not compensated aberrations, that they increase when we increase IOL power, affect patients' visual quality. It should consider the minimization of the effect of other aberrations in the IOL to avoid the decrease of the visual quality observed in this study for high IOL power.

Is best corrected visual acuity enough to evaluate vision quality in cataracts?

Presenter: M^a Amparo Díez-Ajenjo^{1,2}

Co-Authors: M^a Carmen García-Domene¹, Adelina Felipe Marcet², Jose M^a Artigas Verde², Cristina Peris Martínez¹, Jose Luis Menezo Rozalen¹

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² Universidad de Valencia

Purpose

To assess which one of two studied parameters (contrast sensitivity function (CSF) and best corrected visual acuity (BCVA)) is better to define patients' visual quality with cortico-nuclear cataract (not subcapsular component), and to analyze if there is some correlation between both parameters.

Methods

We analyzed 74 eyes of patients with ages between 70 and 90 years old. All of them were diagnosed of cortico-nuclear cataract. Cataract classification was based on lens examination at slitlamp according to Lens Opacities Classification System III (LOCSIII). Patients were selected with cortico-nuclear cataract type of grade 2 or superior, because this type is the most common in the Valencian Community.

We measured best BCVA with EDTRS optotypes and CSF under mesopic (around 3 cd/m²) and photopic (85 cd/m²) illumination conditions with the CSV-1000 test. In addition, we extrapolated the best visual acuity of the photopic CSF, to compare this value with measured BCVA.

Results

CSF in photopic conditions was better than in mesopic conditions, but this is only statistical significative at low spatial frequencies (without age dependence). BCVA measured with EDTRS was lower than BCVA obtained from the photopic CSF of every patient. It is due to the fact that the tasks that are realized in every case were different (only detection or detection and recognition). There was no correlation between best VA and the degree of lens opacity.

Conclusions

BCVA is not a good indicative of visual quality that patients with cortico-nuclear cataract. Equal degrees of lens opacity do not make the same decrease of VA. Nevertheless, a measurement of the contrast sensitivity gives a more precise idea of the visual quality of this kind of patients.

Senile miosis and low sensitivities that these patients have may explain why we do not find significant differences for contrast sensitivity at any age in middle and high spatial frequencies when we change lighting condition.

A modification of direction of DEM test shows difference in naming and eye movements

Presenter: Alessio Facchin

Co-Authors: Usuelli A., Prudenzano S., Tavazzi S., Maffioletti S

Corso di Laurea in Ottica e Optometria, Università degli Studi di Milano Bicocca, Milan

Purpose

DEM test is a clinical and screening test used to evaluate the ocular motility skill and naming in developmental age. The test compares vertical small ocular movements in the first part and horizontal large ocular movements in second part. The purpose of this study is assessing the difference, in evaluation of ocular movement, between the different directions of ocular movement: only horizontal, only vertical, or mixed such in DEM test.

Method

157 children from 6 to 14 years old participated to the study. The standard cards of DEM (A, B, C) were used, together with a modified version in which all characteristics of the test were the same but the direction was rotated by 90°. This second version presents a horizontal short condition and a vertical large - spaced condition. These two blocks of conditions were presented counterbalanced to the subjects. The total number of condition was 4 subdivided by direction (horizontal and vertical) and spacing (short and large).

Results

The horizontal short condition time was significantly shorter than vertical short condition time. The vertical spaced condition time was significantly longer than horizontal spaced condition time. These results show that the horizontal ocular movement is always quicker than vertical. A subtractive method permits better to evaluate the time spent to execute the eye movements. The correlation between this method and classical DEM evaluation is found very high.

Conclusion

Globally the horizontal eye movements are faster than vertical. The two conditions used in DEM test are called "naming" and "reading like condition". Based on our results the two conditions differ for crowding and direction, so the proper name was "short vertical" and "large horizontal" conditions because the time spent for the two directions and two crowding was always different. Superior face validity and better results are predicted if the test is performed by using the same direction and subtractive method. Compared to this more precise evaluation, DEM remains a valid test because it shows a precise normative data for clinical use.

An analytical model for the human eye luminous efficiency function grounded on physiological-physical considerations about retinal photoreceptors answer to light stimuli

Presenter: Fabrizio Fontana¹

Co-Authors: Roberto Di Capua², Ciro Costagliola²

¹ Università degli Studi Roma Tre, Rome, Italy

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Purpose

The luminous efficiency function $V(\lambda)$ for the human eye response has been introduced almost one century ago. Nevertheless, despite the potential importance of the knowledge of a defined reference curve, the definition of a reliable and simple analytical model for $V(\lambda)$ still remains an open issue. We suggest a model for the spectral functionality of human retina.

Methods

The starting point of our model lies in the assumption that the spectral response of the human eye retina comes out from the combined action of the different retinal photoreceptors. The luminous efficiency function is expressed as a linear combination of the single spectral responses of the different photoreceptors. Each photoreceptor can be seen as a pixel which, in the ideal case, should react, according to its chemical nature, to a well defined wavelength; but in the real situations many occurrences can participate to broaden the spectral absorption curve around the central characteristic wavelength. We assumed a Gaussian shape (each one having its own central wavelength, amplitude, width) for the line broadening.

Results

A three Gaussians model is able to take into account all the features of the experimental curve proposed for the photopic vision, very well matching it for all the wavelength visible range. The three central wavelengths can be identified with the wavelengths of maximum spectral sensitivity for the three kinds of cones, the so called red (L), green (M) and blue (S) cones. The amplitudes physically represent the energy fraction absorbed by each kind of photoreceptor. The widths can be seen as a consequence of thermal broadening, originated by the thermal motion of the absorbing centers (which is actually described by a Gaussian shape of the spectral line).

Conclusions

Despite the apparent large number of involved parameters, the simplicity of the model gives to it an interpretative strength directly coming from what already known about the human eye. The parameters set characteristic of the fitting procedures proposed with this model can constitute a fingerprint of the eye conditions; moreover, they can provide a quantitative way, rather than a qualitative one, to distinguish and classify them and their acuity.

Epithelial, Bowman's layer, stroma and pachimetry changes with FD - OCT during orthokeratology

Presenter: M. Frisani¹

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³ Dipartimento di Elettronica - Politecnico di Torino, Torino, Italy

Purpose

To describe epithelial, Bowman's layer, stromal and corneal thickness changes induced by overnight orthokeratology.

Methods

This is a case report. The patient (OD -2,25 OS -2,00) was treated with overnight orthokeratology lens, assessed before treatment and during treatment (after 30 consecutive nights of wearing orthokeratology lenses). Epithelial, Bowman's layer, stromal, and whole corneal thickness was measured in vivo by Fourier/Spectral Optical Coherence Tomography (FD-OCT) scanning across the central 6mm meridian of the cornea before and after orthokeratology treatment. Thickness analysis was obtained by a customised software on Matlab platform. Manifest refraction, visual acuity, corneal topography, and eye aberrations were also measured before and after orthokeratology treatment. Thickness changes were correlated with corneal topography changes. The optical effects of these changes were measured with manifest refraction and total eye aberrations changes.

Results

Orthokeratology lenses effectively corrected the patient's myopic ametropia. Corneal topography demonstrated central flattening, an annulus of mid-peripheral steepening and a flattening peripherally annulus in both the eyes. The corneal sublayers thickness was changed in different values from center to periphery. Profile map of the meridian analyzed was calculated displaying corneal sublayers thicknesses changes.

Conclusions

Refractive changes during orthokeratology treatment are mainly induced by changes in epithelial thickness profile. Bowman's layer and stromal changes contribute to small extent.

Optical Quality of Multifocal Intraocular Lenses in air and in a model eye

Presenter: Walter D. Furlan¹

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Purpose

To assess the optical quality of multifocal and monofocal intraocular lenses (IOLs), in a model eye, according to the requirements of the International European Standard EN ISO 11979-9.

Methods

Different refractive IOLs were evaluated using a quadric-wave lateral shearing interferometer. The equipment operates with monochromatic light: (546 nm wavelength). The IOLs tested, provided by AJL Ophthalmic SA, were the following: monofocal IOLs LLHP60125, Y601075, P501200, and prototypes of multifocal MULTIFOCO-A, MULTIFOCO-B, and MULTIFOCO-C. For each IOL the following parameters were measured: the focal length, the paraxial power, the Modulation Transfer Function (MTF), the Point Spread Function (PSF) and the Zernike coefficients for the spherical aberration. According to the European Standard, the MTF was evaluated for the different foci with a variable aperture (3.0 - 5.0 mm). Each sample of the above mentioned models was tested at least 10 times. Statistical analysis was performed using Statistical Product and Service Solutions (SPSS 14.0) for Windows software.

Results

For the monofocal lenses the range power was from 11 D to 21 D and the range for the multifocal was from 11.5 to 22.5D and (add. + 4D). With a 3-mm aperture, the monofocal models had mean MTF values ranging from 47.5% to 60.1% at 100 lp/mm and 71.0% to 75.2% at 50 lp/mm. The multifocal models (far focus) provided statistically significantly lower ($P < .05$) MTF values than the monofocal models at both frequencies ($42.3 \pm 1.2\%$ at 100 lp/mm and $69.8 \pm 1.9\%$ at 50 lp/mm). The Zernike coefficient for spherical aberration range for the monofocal lenses was from 0.14 to 0.51λ . For the multifocal IOL the image quality for the distance vision is satisfactory for 3mm pupil size.

Conclusion

The lateral shearing interferometer technique is capable to measure the optical quality of different types of commercial intraocular lenses. The monofocal IOLs provided better distance images than any multifocal IOL. There is a spread in MTF results among the different lens models. Most of the MTF measurement results could be directly explained by IOL pupil-dependent design.

Unaccommodated Lens Thickness Changes with Age

Presenter: M^aCarmen García-Domene¹

Co-Authors: M^aAmparo Díez-Ajenjo^{1,2}, Jose M^a Artigas Verde², Adelina Felipe Marcet², Cristina Peris¹, Jose Luis Menezo Rozalen¹

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Purpose

There is experimental evidence in the literature that reports age-related changes in the lens thickness, but the kind of relation that exists between both variables is not clear.

In this paper we attempt to clarify whether lens thickness increases linearly up to a certain age and whether it continues to increase thereafter. The possible influence of gender on this increase is also analysed.

Methods

For this purpose, considering that the early age stage has been well studied, we established a thickness versus age comparison, collecting data from a total of 531 eyes of patients (244 men and 287 women) aged between 30 and 99 years.

Biometric measurements were performed with the aid of the OcuScan® (Alcon, USA) echograph, which works with a 10 MHz. frequency probe. The precision of the device is 0.01 mm. It takes ten measurements and it gives the average and the standard deviation always less than 0.1 mm.

After checking the probe and seating the patient, a double collyrium anaesthetic (tetracaine and naphazoline hydrochloride, Lab Alcon) was instilled in the eye to be measured.

In order to achieve a good alignment of the visual axis with the ultrasound beam and to assure the unaccommodated eye, the patient was asked to look at a mark in the distance with one eye, while the biometry was performed in the contralateral eye.

We recorded the following data for all the patients: gender, age, and lens thickness (biometry) with unaccommodated eye.

Based on these data, we investigated what kind of theoretical model is the most suitable to explain lens thickness growth as a function of age range, as well as the gender-related variation of this increase.

Results

We grouped the data in ten-year age ranges because the number of patients and the standard deviation per range was more similar.

In order to check the normality and the homocedasticity of the "lens thickness" variable a Kolmogorov-Smirnov test and Levene's test was carried out.

Student's t-test was used in search of significant differences between two age ranges or between genders.

Our results show that the data on age-related lens thickness growth fit in with a logarithmic function ($R^2 = 0.945$). They also fit correctly if we add data of young people reported by other authors ($R^2 = 0.983$).

Our results analysed by gender show significant differences ($p > 0.05$) in the age ranges of 30/49 and 60/79.

Conclusions

The logarithmic function provides the best fit for our data. Crystalline growth continues throughout life, but after the age of 70, such age-related thickness variations are lower than statistical variability within the same age range.

Regarding gender, our results show significant differences between men and women in the age ranges of 30/49 and 60/79, but not in other ranges and neither when the data of the whole sample is considered, so some doubts remain about the existence of gender-related differences.

Effect of spectral filters in the control of Benign Essential Blepharospasm

Presenter: Natividad Alcón Gargallo^{1,2}

Co-Authors: Consuelo Moreno Llombart¹, Vicente Roda Marzal², Juan A. Burguera Hernandez³, Enrique España Gregori²

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Purpose

Benign Essential Blepharospasm is a facial dystonia characterized by involuntary contraction of the orbicularis oculi. The most obvious symptoms of this disease are dryness, irritation and photophobia or sensitivity to glare.

With this study, we analyze the influence of selective spectral filters on photophobia modulation for these patients.

Methods

Thirty-eight subjects were tested in this study, 28 BEB patients and 10 Controls patients. A device that incorporates a characterized source light, was used to evaluate light sensitivity thresholds. The light, modulate by a rheostat, offer the possibility to increase automatically their intensity from zero to photophobic levels. The luminance of the light source was measured.

Test was performed without spectral filters and then with two spectral filters with different transmission spectral curves: Grey filter (Mean visible transmittance 50%) and FL-X filter (Mean visible transmittance 18%, blocking short wavelengths). Statgraphics 5.1 plus software was used for the statistical analysis, χ^2 test was used to compare light sensitivity with each spectral filter and with no spectral filter.

Results

The use of spectral filters modifies light sensitivity in BEB and Control patients.

The use of filters increases the light intensity tolerated by the BEB patients, improvement was statistically significant ($p < 0.05$). For group control the filters applied don't produce statistically significant differences ($p > 0.05$).

Difference, in the improved light sensitivity, in BEB group was observed in function of the filters used. With Grey filter, only 4% of BEB patients tolerated maximum intensity value, for FL-X filter 14%.

Conclusions

The use of spectral filters with selective absorptivity for shorts wavelengths of visible spectrum (less than 550 nm), are effective in reducing the photophobia in BEB patients.

The photophobia symptomatology in BEB patients has a direct relation with the wavelength of visual stimulus. Influence of the stimulus intensity is questionable. Both filters attenuate symptoms, but the efficiency of the FL-X filter was manifest. This fact is in concordance with other studies carry out for several authors.

A new project of work placement for undergraduate optometry students at the School of Optics and Optometry of Terrassa (Spain)

Presenter: Ester Guaus

Co-Authors: Dr Lluïsa Quevedo, José Luís Alvarez, Dr Jesús Armengol, Dr Joan Torrents

Universitat Politècnica de Catalunya (Spain)

Background

The School of Optics and Optometry of Terrassa (EUOOT), belongs to the Universitat Politècnica de Catalunya (UPC) and has been dedicated to higher education and research since 1977. EUOOT offers a BSc in optics and optometry, a MSc in Optometry and Visual Sciences and lifelong learning academic syllabuses. As an important part of the graduates training, work placement into professional world, is a priority. Thus, EUOOT has designed a new project in order to assure the quality of work placement by means of a network of relationships established with prestigious companies of the optical and optometry sector.

Discussion

A work placement guide for companies has been designed which highlights five predetermined working areas: Clinical optometry, Contact lenses, Glasses assembly process, Patient/customer management and Business Management.

The network companies can apply for a “Best work placement” accreditation by submitting a project which emphasizes a minimum of two of the above mentioned areas. Each project must contain the following items: Title, educational aims, methodology, human and material resources, expected results and evaluation system.

Each academic year the EUOOT assesses the company projects and if they suffice in quality, they are accredited with the “Best work placement company” acknowledgement, which is awarded for two years. In case the project is not good enough in any of the areas, a feedback is returned to the company to improve the quality of the projects. The projects are published in the EUOOT website, in order the students apply for them.

The student is double supervised: by a tutor on the company and by a lecturer at EUOOT. When the work placement is over, the EUOOT carries out the assessment through reports of the students and the tutor in the company as well as a personal interview between the student and the lecturer.

Results

Five projects have been recently approved. At this moment the initiative has so far proved very successful among the students. Despite its recent implementation, objective analysis of the general project initial results will be presented in this communication.

The effect of smoothing data on the repeatability of macular pigment optical density measures using the Macular Pigment Screener 9000

Presenter: Olivia Howells

Co-Authors: Frank Eperjesi, Hannah Bartlett
Ophthalmic Research Group, Aston University

Purpose

The Macular Pigment Screener 9000 (MPS) is a desktop device that allows measurement of macular pigment optical density (MPOD) in a clinical context using 'reverse' heterochromatic flicker photometry (van der Veen et al., 2009). Each time the subject responds to flicker, a point is plotted on a graph that should eventually form a V or U-shaped curve with a clearly defined minimum. A less than optimum curve will still generate an MPOD value, however. It is important for practitioners using this instrument to know what constitutes a reliable MPOD measurement. The purpose of this study was therefore to determine: 1) within-session repeatability, and 2) the effect on repeatability of removal or adjustment of less than optimum data, as indicated by the generated curves.

Methods

Healthy volunteers underwent MPOD measurement, alternating between the right and left eye, with three measures per eye. Optimum refractive correction was used where necessary. Participants received instructions and completed a practice session prior to MPOD data being obtained. Smoothing of the data involved removal or adjustment of MPOD values from curves that were deemed to be less than optimal.

Results

Data was obtained from 25 subjects (mean age 29.4 ± 6.9 years). Table 1 shows the coefficients of repeatability (calculated by Bland-Altman analysis) for the various measures, before and after data smoothing. Removal of poor data significantly improved repeatability (paired t-test, $p < 0.032$), as did further data smoothing by adjustment of MPOD values ($p < 0.015$). Removal and adjustment resulted in a highly significant improvement in repeatability ($p < 0.006$).

Table 1. Repeatability of MPOD measurements, before and after data smoothing.

Comparison	Coefficient of repeatability			Number of MPOD values removed for smoothing data	Remainder of MPOD values adjusted for smoothing data
	Original	After removal	After removal & adjusting		
C-only R1 vs. R2	0.13	0.11	0.10	3 (= 3 subjects)	5 (= 4 subjects)
CP R1 vs. R2	0.25	0.16	0.16	11 (=10subjects)	7 (= 7 subjects)
C-only R2 vs. R3	0.11	0.08	0.07	5 (= 5 subjects)	9 (= 7 subjects)
CP R2 vs. R3	0.17	0.15	0.12	7 (= 5 subjects)	17(=15 subjects)
C-only L1 vs. L2	0.08	0.08	0.08	2 (= 2 subjects)	6 (= 5 subjects)
CP L1 vs. L2	0.18	0.15	0.13	6 (= 5 subjects)	18(=16 subjects)
C-only L2 vs. L3	0.09	0.08	0.07	1 (= 1 subjects)	9 (= 8 subjects)
CP L2 vs. L3	0.14	0.13	0.12	4 (= 3 subjects)	18 (=16 subjects)

C-only = central viewing only derived MPOD (peripheral estimate provided by the instrument, based on subject's age).

CP = central and peripheral viewing derived MPOD.

R1, L2, etc. = right eye measure 1, left eye measure 2, etc.

Conclusions

These results emphasize the importance of observing the curves generated by the MPS, in addition to the MPOD value itself. We suggest that for reliable results and in order to recognize a smaller clinically significant change in MPOD from one visit to another, practitioners using the MPS should repeat measurements once, and repeat again if there is a ≥ 0.1 density unit difference between the first and second readings, or if the generated curves are ambiguous in appearance.

Reference

van der Veen, R. L., Berendschot, T. T., Hendrikse, F., Carden, D., Makridaki, M. and Murray, I. J. (2009) A new desktop instrument for measuring macular pigment optical density based on a novel technique for setting flicker thresholds. *Ophthalmic and Physiological Optics*, 29, 127-37.

Portable Wi-Fi enabled device to enhance feedback to students in optometry public clinics

Presenter: Olivia Hunt

Co-Authors: Ashok Chowdhury, Jeff Goodman, Olivia Howells, Amy Whiskens, Tim Hooton, James Wolffsohn

Optometry, Aston University

Background

One of the key ways on which every UK University is assessed each year by its students, is through the National Student Survey. Feedback received during teaching is often the area that students feel least satisfied with. In Optometry public teaching clinics this feedback process is complicated by external issues, with the learning experience of the student competing with the time and communication demands of the patient's clinical care. In addition, dealing with three to four external patients with previously unknown clinical demands is challenging. Each student maintains a patient logbook with anonymous data and written feedback. The consistency of this feedback may be difficult to maintain, compliance by supervisors is variable and the system requires a paper record to be available on demand with no archive of the feedback given to students retained. Logbooks can be mislaid, forgotten or damaged and audit during a clinical cycle is difficult.

Method

Portable Wifi Enabled Devices in the form of the Apple iPod Touch, were used by each supervisor to record individual feedback as the student undertook their clinical assessment of a patient, which was archived and a copy e-mailed directly to each student. Four supervisors either undertook electronic or standard logbook feedback for 6 weeks on 30 students in a cross-over design.

Results

Although there was no difference in student rated promptness or detail of feedback ($p > 0.05$) between electronic and logbook feedback, electronic feedback was rated as easier to read and understand (95.67 ± 6.40 vs 84.30 ± 17.61 ; $p = 0.01$) and was preferred by students (95.17 ± 6.60 vs 86.02 ± 16.11 ; $p = 0.02$).

Conclusions

It would appear that the iPod Touch gives a convenient paperless method of achieving immediate, individual feedback to students. Students appear to like the use of innovative technology to enhance their learning environment

Comparison of coated and uncoated spectacle lenses

Presenter: Lina Karlsson¹

Co-Author: Oskar Johansson²

¹ Optometrist, Sweden

² Kalmar University, Sweden

Background

As a customer in an optician store you have many available coatings for spectacle lenses to choose from. One of those is the anti-reflection (AR) coating. The idea of an anti-reflective coating is to eliminate reflections otherwise present in uncoated lenses. The purpose of this study was to clinically examine if AR-coated lenses could generate better vision compared to uncoated lenses.

Method

Nineteen subjects had two pair of spectacles tried out. The spectacles were identical except that one pair of lenses had an anti-reflective coating applied to the front and back surface. First visual acuity was evaluated with a logMAR-chart. Two different contrast sensitivity tests were performed; the first was the Vistech chart at three meters and the second was the Mars Letter Contrast Sensitivity Test at 50 centimeters. The results were analyzed in Microsoft excel using average values and standard deviation. P-values less than 0,005 were considered statistically significant.

Better visual acuity was obtained with AR-coated lenses under normal room illumination, mainly for the right and left eye separately ($p=0,0004$, $p<0,0001$) but also binocularly, $p<0,004$).

Results

Results from the Vistech chart showed a stable but yet partial significant improvement in contrast sensitivity. Outcome from the Mars Letter Contrast Sensitivity Test did not show any statistically significant difference between the spectacle lenses for neither right eye ($p=0,54$), left eye ($p=1,00$) nor binocularly ($p=0,17$).

Conclusion

In conclusion AR-coated lenses give rise to improved visual qualities considered visual acuity and contrast sensitivity, indoors at distance.

Developmental Eye Movement (DEM) test: validity reassessment in Italian population

Presenter: Silvio Maffioletti¹

Co-Authors: Alessio Facchin², Tony Carnevali³

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³ Tenured Associate Professor and Clinic Director, Southern California College of Optometry, Fullerton, California, USA

Purpose

The aim of this study is to confirm and expand upon the original validity data published in the DEM test manual in the Italian population by using the same measures as in the original study as well as new methods of psychometric and statistical analyses.

Method

Three experimental groups of children, a total of 128 subjects, were evaluated with the DEM test and various psycho-educational tests to assess DEM validity.

Results

The results confirm the suitability of the four types of validity given in the DEM manual in the Italian population. Moreover, by using a construct validity scheme, the results show: a significant evolutionary trend for all variables ($p < 0.001$), a significant internal correlation among all variables ($p < 0.01$), a correlation with reading tests ($p < 0.05$), a significant difference in vertical time ($p < 0.005$) and adjusted horizontal time ($p < 0.05$) in a group of LD children, a convergence validity with a test of visual exploration ($p < 0.01$), a divergence validity with subjective evaluation of ocular movements and the factorial analysis shows saturation to three main factors.

Conclusion

This more extensive evaluation and analyses confirm the validity of the DEM test to assess ocular motility in the developmental age also in the Italian population and permits differentiation of ocular motility and naming problems. The only limitation found is in a precise normative data, at the present available for English and Spanish speaking populations.

Simultaneous objective and subjective evaluation of ocular movement using DEM and Readalyzer

Presenter: Maria Vittoria Manzoli

Co-Authors: A Ravasi, A Facchin, R Pregliasco, S Tavazzi, S Maffioletti

Corso di Laurea in Ottica e Optometria, Università degli Studi di Milano Bicocca, Milan

Purpose

DEM test is a clinical and screening test used to evaluate ocular motility skills and naming in developmental age. The validity of DEM test has been tested with several methods but has never been evaluated with an instrumental registration of ocular movements. The purpose of this study is a comparison between DEM test and ReadAlyzer, that provides an objective assessment of ocular movements.

Method

111 children from 6 to 14 years participated to the study. We made in order two evaluations. The first was an assessment of ocular motility skills using standard DEM procedure and ReadAlyzer test to compare the two methods. The second evaluation was a contemporaneous evaluation of C card of DEM test with ReadAlyzer and behavioral evaluation of time and errors. To obtain this parallel evaluation, the C card was incorporated in ReadAlyzer program.

Results

The correlation between the standard DEM test and "Number" test of Readalyzer was low and not significant. The correlation between the sum of fixations and regressions obtained by ReadAlyzer during the execution of the C card of DEM test and the adjusted horizontal time of DEM was 0.69 ($p < 0.001$). The test-retest evaluation of adjusted horizontal time of DEM shows a very high correlation 0.95 ($p < 0.0001$) and no significant difference in mean.

Conclusion

The convergence validity of DEM test is high if evaluated with the same stimuli. These results confirm the validity of DEM test to evaluate ocular motility in the developmental age. If we compare DEM test to the objective ocular motility assessment with ReadAlyzer, the correlation between the two tests decreases because the stimuli used by the two tests are different and require different skills. Finally, the repeatability of horizontal time of DEM test is very high.

Effects of Ageing and Glaucoma on Chromatic Sensitivity

Presenter: Mireia Pacheco-Cutillas¹

Co-Authors: John L Barbur², David F Edgar²

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² Applied Vision Research Centre, City University, London, UK

Purpose

Loss of visual sensitivity in glaucoma has long been recognised. However, it remains to be established whether assessment of visual function in glaucoma can be made more sensitive and / or specific by the selective isolation of different stimulus attributes. Similarly, several visual functions are significantly affected by the ageing process.

We have investigated how glaucomatous damage and ageing affect the processing of red-green and blue-yellow colour contrast signals and whether preferential damage occurs to any of these mechanisms.

Methods

Chromatic sensitivity was measured using the CAD test (i.e., a Colour Assessment & Diagnosis program) that employs isoluminant, moving, colour-defined stimuli buried in dynamic luminance contrast (LC) noise. This technique isolates the use of colour signals without reducing chromatic sensitivity. Colour contrast thresholds along the R/G and B/Y mechanisms were measured for foveal and 7 deg eccentricities. Findings in patients with primary open angle glaucoma (POAG), a group of age-matched normal and younger age subjects were compared.

Results

The rate of increase, as a function of age, in chromatic thresholds (along R/G and B/Y mechanisms) showed an accelerated fashion from the 5th-6th decade onwards. In spite of the initial, more rapid increase along the B/Y colour opponent system (particularly for foveal thresholds), there were no significant differences between the rate of ageing for R/G and B/Y mechanisms. The largest age-related loss of chromatic sensitivity occurs in the lower hemifield for the B/Y mechanism. The R/G and B/Y chromatic thresholds increased significantly in the glaucoma group. The relative R/G versus B/Y chromatic loss was shown to depend on the severity of glaucomatous damage. B/Y sensitivity showed the greatest loss in early glaucoma subjects. R/G thresholds, on the other hand, increased at a faster rate and showed a better correlation with severity of visual field loss.

Conclusions

Ageing affected significantly both chromatic (R/G and B/Y) mechanisms. Primary Open Angle Glaucoma was shown to affect the relative R/G versus B/Y chromatic loss depending on the severity of damage.

The practical relevance Prolong and oblong contact lens geometries for Keratocone and refractive surgeries cases

Presenter: Gustav E. Poeltner

University for Applied Science in Velika Gorice, Croatia

Purpose

Fitting of special contact lens geometries for Keratocone and after refractive surgeries, with a simulation software and practice experience.

Methods

Different special geometries of contact lenses will be presented.

Results

The statistics of the fitted contact lens types for Keratocone and refractive surgeries will be showed.

Conclusion

In the past the fitting of Keratocone contact lenses was a high challenge for every contact lens specialist. Additional the eyes after refractive surgeries becomes more and more. Because of the oblong meridians and the high toricities this Corneas are special challenges. In this speech solutions for this kind of special lenses will be discussed.

The Impact of Soft Contact Lens Wear on Ocular Signs with Increasing Experience

Presenter: Heiko Pult^{1,2}

Co-Authors: Paul J Murphy¹, Christine Purslow¹

¹ School of Optometry and Vision Sciences, Contact Lens and Anterior Eye Research (CLAER) Unit, Cardiff University, Wales, UK

² Optometry and Vision Research, Weinheim, Germany

Purpose

To investigate differences in the ocular signs, hyperaemia, staining, lid-parallel conjunctival folds (LIPCOF) and lid-wiper epitheliopathy (LWE), between three subject groups: non-contact lens wearers (Non-CLW), new CLW (New-CLW) and experienced CLW (Exp-CLW).

Method

Retrospective audit of patient records from Horst Riede GmbH, Weinheim, Germany for three groups was performed to facilitate cross-comparison of LIPCOF, LWE, bulbar and limbal hyperaemia and corneal staining, analyzed using Mann Whitney U-Test. Groups: Non-CLW (mean age=31.3; M/F=16/23), New-CLW (mean age=31.0; M/F=25/40; SiHy/Hyd 32/33), Exp CLW (mean age=32.1; M/F=23/38; SiH/Hyd=15/46).

Results

Nasal LIPCOF was similar in all groups ($p \geq 0.528$). Temporal LIPCOF appeared increased in experienced lens wearers ($p < 0.005$), but not in New-CLW ($p = 0.104$). LWE grade was significantly increased amongst lens wearers (Non-CLW/New-CLW: $p = 0.004$; New-CLW/EXP-CLW: $p < 0.01$; Non-CLW/Exp-CLW: $p < 0.001$). Levels of bulbar and limbal hyperaemia were similar between Non-CLW and New-CLW ($p = 0.903$ and $p = 0.379$ respectively), but Exp-CLW showed increased bulbar hyperaemia compared to Non-CLW and New-CLW ($p < 0.05$), and increased limbal hyperaemia compared to Non-CLW ($p < 0.05$). Differences in limbal hyperaemia amongst experienced SiHy lens wearers were similar to Non-CLW ($p = 0.590$). Levels of corneal staining were significantly increased amongst lens wearers ($p < 0.01$), but similar between New-CLW and Exp-CLW ($p = 0.15$). The power calculation of the completed study resulted in a power of > 0.89 .

Conclusion

While LWE and corneal staining increase in initial CLW, nasal LIPCOF appears unaltered and temporal LIPCOF only increases with longer experience of lens wear. Longer experiences in CLW are also related to significant increase of ocular hyperaemia; however, in silicone hydrogels limbal hyperaemia is not significant different to normal individuals. LWE and staining might be the first indicators of changes to the ocular surface due to contact lenses.

Evaluation of an early diagnostic tool for cardiovascular disease, “EvoCare-Screening”, for its utility and practicality in a dispensing opticians shop

Author: Alexander Ritsche¹²

Presenter: Hans-Jürgen Grein

¹ Optometrist, Germany

² University of Applied Sciences of Luebeck, Germany

Purpose

Within a study, the early diagnostic tool for cardiovascular disease, “EvoCare-Screening” was evaluated for its utility and practicality in a dispensing opticians shop. In addition, the image quality and usability of four different fundus cameras were examined and compared.

Subjects and methods

The retinas of 221 volunteers, age range 27 to 67, were photographed with the nonmydriatic fundus camera Topcon NW 200, and the artery to vein ratio and typical vascular changes were teleconsiliaricly evaluated. The subjects’ feedback was documented in a questionnaire. 62 selected subjects were additionally photographed with the Kowa Nonmyd 7, Canon CD-DGi and Zeiss Visucam cameras.

Results

99 percent of the subjects considered EvoCare-Screening as a reasonable tool for health care. 97 percent would recommend it to friends and relations. 85 percent reported that they themselves would be prepared to cover costs of up to 35 Euros. 80 percent of the interviewees said that EvoCare-Screening in a dispensing opticians shop makes good sense. 97 percent of the participants rated the ophthalmic optician’s explanation as “good” or “very good”. In the comparative trial of the different cameras, the Topcon NW 200 was rated best in terms of image quality and handling, followed by the Canon CD-DGi, Kowa Nonmyd 7 and Zeiss Visucam.

Conclusions

The subjects’ response was for the most part positive. The screening can be integrated easily into the optical company’s operations with little effort and at relatively low expense. A high-quality image of the retina can be achieved easily with a state-of-the-art fundus camera from non medical staff.

Ocular Emergency; personal experience of a central retinal artery occlusion

Presenter: Nicholas Rumney¹

Co-Author: Austen Edward Rumney (deceased 2008)

¹ BBR Optometry, Hereford, UK

On Christmas Day 2003 and one hour before the family was due to eat, my father, a 76 year old retired optometrist with type II diabetes, suffered a right eye central retinal artery occlusion resulting in total loss of vision in the right eye. Loss of vision from a central scotoma through an altitudinal field defect to complete loss was described. Prompt recognition, immediate first aid and subsequent emergency hospital ophthalmology attendance resulted in restoration and partial restoration of vision within 8 hours. Complete visual recovery was established and measured 24 hours later. Subsequent follow-up showed no adverse long-term visual deficit and no systemic vascular consequence. This paper discusses CRAO and its risk factors in the context of a genuine ophthalmic emergency and details emergency procedures and suggests appropriate follow-up. Differential diagnosis and alternative care pathways for amaurosis fugax is described.

Driven to Distraction- Low Vision Driving

Presenter: Nicholas Rumney

BBR Optometry, Hereford UK

All jurisdictions granting a form of licence enabling a citizen to drive impose minimal visual standards. This paper reviews the background to establishing such standards and their validity and describes how one jurisdiction (the Driving and Vehicle Licensing Agency, UK) ensures such standards are maintained. The author will describe the optometric parameters of the visual standards and how they are measured as well as illustrating the experience of 5 years as an accredited DVLA optometric test centre.

The presentation also discusses the implications of pupil dilation and driving, frequently an issue in primary and secondary care.

Failing vision due to disease or the aging process may threaten the citizen holding a driving licence and there are various jurisdictions (e.g. the USA) where driving may be maintained by virtue of different and innovative optical strategies (BiOptic telescopes). The conclusion to the paper is a summary of BiOptic design and a discussion on their fitting and functional use.

Visual disorders to postural interferences in their children in scholastic age from 6 to 10 years

Presenter: Luigi Secli

Co-Author: Vincenzo Martella

Salento University, Italy

Purpose

The epidemiological origin, wants to currently know the incidence of the visual disorders, in the scholastic population in the elementary ones and the possible correlations with postural problems.

To analyze the possible correlation among disturbs postural and visual troubles to build programs of scholastic rehabilitation (physiological, cognitive, behavioral) suitable to the use.

Methods

The search is developed in the provinces of Lecce and Brindisi, from around thirty elements among Optic-Optometrist and students, 900 children of inclusive age have been examined between the 6 and the 10 years.

900 cards of visual screening are been compiled that have allowed to notice besides the data refractive and subjective of their children also different data on the binocular equilibrium, the ocular motility, the fusion, the stereopsis, the foria and other aspects of the visual efficiency.

Besides they have been effected around 3600 postural surveys through picture, 1800 for the reading and 1800 for the writing.

The job of survey of the data in the schools that have collaborated with us is initiated in October 2007 and you is finished in March 2008.

Results

The epidemiological results tell us that the visual and postural situation of our children is not at all good, the data confirms the functional theories of the visual deterioration and that the bad posture negatively influences the visual apparatus.

25% of the scholastic population have a compensation with glasses, but at least 63% would need a support of glasses. The middle distance of fixation in the reading is lower than 12 cm around in comparison to the distance of Harmon, and this distance subsequently goes down in the writing to 14 cm. around. Resulted statistic gotten by the analysis of the cards notice that is as few more than a bystander the 38% of their children introduces regular ocular movements with suitable performance, and 50% have a good saccadic. The data of the near fories is those made a will with the cover test that those with the test of Howel, confirm the theories on the due functional disorders to the proximal visual stress, in fact he passes from

the 60% of their children to 6 years that are exoforia from next to 40% to 10 years. Looking at the averages is seen that how much his/her children grow anymore more they tilt the head in before, the totality of their children to a posture of the head in the incorrect writing and reading ,in fact it is well of the 97% of the champion it has an inclination of the most greater head of the ideal 25°,besides he passes from the 34° of the first elementary to the 46° of the fifth grade. The totality of the champion has a taking of the incorrect pen.

More other data they are present in the search but for an abstract these quoted I think is enough.

Conclusions

From an early age some children have developed some abnormal motor schemes, this concerns both reading and writing. This is an important piece of information from a preventative perspective – helping to ensure the consistency of practise. This data should inform the development of the motor scheme for the smallest babies.

New logarithmic units for visual angle, contrast and functional visual field

Presenter: Ignaz Alois Stütz¹

Co-Author: Peter Gumpelmayer²

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Last year Peter Gumpelmayer presented the "4 Pillar Model for Low Vision Rehabilitation in Upper Austria" at the foundation congress of the EAEO in Lausanne. To get a good view about the visual performance in case of our Low Vision Clients I developed new units for representative and reproducible documentation.

The result is: 4 units for practitioners, however only 2 of them are really new, the others are useful and efficient short-writing.

Part A (new): the SI-unit for plane angle is Radiant [rad] . Like the dB used in audiometric documentation I did the same mathematic operation, called it "deziRadiant [dR]" and the work-out is fine. The features: integer figures, logarithmic steps, easily transformable in reality and back, useful for angular size, resolving power, retinal image size, nonius angle, stereoscopic angle and plane angle limits of visual field (see Part D).

Part B (new): the same logarithmic operation on contrast-relation is called "deziContrast [dC]". The base is weaver Michelson (gratings) nor Weber (optotypes) but practically the illuminance of the visual field. You easily get integer figures in logarithmic steps for contrast threshold (around 20dC) and, from -3dC to -10dC and above, exact definition for negative presentation or central glare .

Part C (practice): a useful definition is to write both units in combination: dCR - If not documented generally and if you alter the luminance during measurement you have to add L [cd/m²] - so you get the triple: dCR(L)

Part D (practice): the SI-unit for solid angle is Steradian [sr]. If you have measured the borders of visual field in dR-units you can calculate the whole solid angle on paper and you get the functional visual field in respect of contrast and luminance: dCsr(L) corresponding very well to performance or problems in every day life.

The result is: now we have exactly defined units for a reproduceable documentation, – developed for the tasks of Low Vision Specialists. But surprisingly I had to consider, that it works quite well in every optometric dimension!

Competency based education, teach the teacher, student and preceptor at the rotation place

Presenter: Mirjam van Tilborg¹

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Purpose

The curriculum of the optometry school, university of applied science HU , Utrecht the Netherlands is shifted the education to competency-based outcomes of learning. It was a challenge to adapt a meaningful assessment of learner competence . We adapt the Dreyfus Model, a framework for assessing skills acquisition that describes developmental stages beginning with novice and progressing through advanced beginner, competent, proficient, expert, and at the end master. For the optometry education our Bachelor education will end with the expert level. Many educators have adopted this model in the healthcare. In the literature the limitation of this model is discussed by the interpretation and behavior of the “experts” in the field and at the education. The faculty and or trainers at the rotation places had to become more familiar with these frameworks to let the translation from theme based education to competency based education become naturally. The HU started a didactic training for the faculty as well as the trainers at the rotationplaces to become familiar with the new education format. The faculty started to incorporate higher-level learning activities and assessment processes into their curriculum. The Faculty was quite familiar with and often more comfortable with lectures and written tests. But in rewriting the new curriculum the faculty wrote themselves action/experiential/case-based learning and reflective self, peer, and expert assessment in the third year. Also the faculty had to implement the amount of 14 teaching time hours per group of 25 students per 1 European credit point. A result of that is that the faculty has an understanding in developing and utilizing these teaching methods and that they can choose by rewriting, the time they want to spend on assessments, development of teaching material and evaluation. In the third year the focus of the faculty was that knowledge transfer to the practice, the internal clinic in the third year. The students had previous problems to implement the theory into the practice

Methods

Digital evaluation forms the students had to fill in, after the education block was ended, were assessed. As well as the oral interview with the students the previous year's pass rate was assessed with the outcome of the test which had the same knowledge base this study year.

Results

The student evaluation report about the new curriculum of the first block of the 3th year was highly marked on the question if the education is important for the scope of practice as an optometrist, the students rated the new education as more time consuming and more difficult than previous years. The passing rate at the internal clinic as well as the case based testvision test was better than in previous years. The outcome of the new curriculum was promising for the future, keeping in mind that we have to make a good balance between the study hours the weaker student has to work per week.

Conclusion

Published contact angle measurements need to be interpreted with caution.

The University Vision Center: trying to combine vision care with excellence in optometric education and research

Presenter: Núria Tomás

Co-Authors: Joan Gispets, Mireia Pacheco-Cutillas, Joan Carles Ondategui
Universitat Politècnica de Catalunya, Spain

Background

Since 1993 the curriculum to obtain the degree of optics and optometry in Spain includes clinical practice. The School of Optics and Optometry of Terrassa (EUOOT), pursuing to offer to the students the best training, runs a vision care clinic open to the public named University Vision Centre (CUV).

In this work, the authors explain how the University Vision Centre is organised to achieve its mission: to become a reference centre in vision care, pursuing the university excellence in teaching and research.

The Centre is organised in ten speciality units: general eye care, low vision, contact lenses, infant vision, vision and learning, visual therapy, refractive surgery, complementary exams, optical dispensing and ophthalmology. A lecturer from the Optics and Optometry department, specialist in the area, is responsible for each unit.

Discussion

During 2009 up to 2500 patients received eye care in the CUV, coming from several sources and in different modalities:

- People coming from the social services are provided with full service: vision care, spectacles and glasses. Agreements with the social services of 28 city councils allows the CUV to attend low income citizens, being the spectacles and glasses provided, with no cost, by 5 optical companies.
- University and external community are provided with vision care but not with spectacles or glasses.

Patients are attended, either by students supervised by academic staff or by an academic with students attending to the visit. Patients have a choice when booking the appointment and pay a fee when seen by a lecturer but not for the visits made by the students. These fees are useful in contributing to the financial support of the clinics.

Both, undergraduate and postgraduate students work in the clinics. Continuing education courses and activities are also organised through the year making the most of the CUV's clinical facilities.

Cycloplegia in children - necessary or not?

Presenter: Emma Eriksson Törnsgö¹

Co-Author: Jörgen Gustafsson²

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Purpose

The development of vision is of great importance for a child, since its future vision is dependent on the ultimate correction from the very beginning. Today, cycloplegics is in common use when a child's correction is to be estimated, which can often be stressful and uncomfortable for the child. Furthermore, an autorefractor is not always the best instrument for refraction, certainly not concerning children, why a method that neither includes cycloplegia nor automated technology, would contribute a great deal to the world of optometry.

The aim of this study was to examine what difference an alternative method for refraction on children, would give to the one in common use in Sweden today, and to evaluate whether cycloplegics is necessary or not. Furthermore, the study wished to highlight the importance of accommodative control while refraction on children is taking place.

Methods

In this study, a total of 26 children aged 4-8 years, were examined with Mohindra-retinoscopy, with an autorefractor before cycloplegia, and with an autorefractor after cycloplegia. The cycloplegics used was Cyclopentolate 1%. The refractive values from each method was converted to spherical equivalents, which then were analyzed and compared to one another.

Results

The results suggests that the mean of refraction in autorefractor after cycloplegia (+1.425 D) was higher than the mean of both Mohindra-retinoscopy (+0.879 D) and refraction in autorefractor before cycloplegia (+0.071 D). Although, the mean difference between cycloplegic refraction and Mohindra-retinoscopy, becomes almost zero (0.046 D), after a "cut" of -0.5 D is done to the cycloplegic values, due to a compensation for the tonic accommodation.

Conclusions

Many factors show that Mohindra-retinoscopy gives similar refractive values compared to the ones from an autorefractor with cycloplegia, why optometrists could embrace this method and use it whenever cycloplegia is not necessary. Thereto is to be pointed out the questionable autorefractor, why Mohindra-retinoscopy should serve as an alternative.

Board Certification in Optometry— the American Experience

Presenter: Jeffrey L. Weaver

Executive Director, American Board of Optometry

Background

Optometric leaders in the United States have been contemplating the issues of ongoing competence and board certification for at least 40 years. In 2009, stakeholder organizations formed the American Board of Optometry to provide a process for voluntary board certification in optometry.

Discussion

In the United States, Optometry is the only doctoral-level independent healthcare profession with prescriptive authority that has not developed a board certification process for general practice. The process and term “Board Certification” are well understood, because it is the model used by medicine, so there was pressure to develop a board certification process for optometry.

In light of the history and recent developments in healthcare reform, the leaders of six allied organizations formed a joint project team to “Develop and propose an attainable, credible and defensible model for Board Certification in Optometry and maintenance of certification for adoption by the profession...”

The joint project team’s model was deliberated by the profession, and accepted by the majority to move forward. The 6-member American Board of Optometry (ABO) was incorporated on October 14, 2009, as a mutual benefit non-profit corporation “to establish and oversee a process for board certification of optometry and to engage in activities related or incidental thereto.”

The ABO has refined the joint project team’s proposed model. Qualified optometrists may apply for board certification as of April, 2010. The computer-based patient assessment and management examination will be available to those who have completed the initial requirements by the first quarter of 2011.

Upon successful completion of the Board Certification Examination, the American Board of Optometry will confer Board Certified status to the optometrist for a period of 10 years. Board Certification can be renewed only through the American Board of Optometry Maintenance of Certification (MOC) process. The MOC process assures that an optometrist is committed to lifelong learning and competence in clinical optometric practice.

Conclusions

After years of debate, American Optometry has entered an era of board certification. This process should assure quality of optometric care to the public. It may be a model to be considered by the profession worldwide.

Is there a relationship between ocular dominance and reading performance?

Presenter: Fabrizio Zeri^{1,2}

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Purpose

There are contrasting findings about the relationship between eye dominance and reading. Instability of the reference dominance was hypothesised to be involved in reading difficulty (Stein e Fowler, 1982) but several authors rebutted this (Evans et al., 1994). The controversy may be due to the different types of dominance tested, the use of different tests and scoring methods, and to the enrolment of different populations of readers. The aim of this study was: to evaluate the equivalence among different tests of dominance (and their repeatability); to evaluate different computing methods of dominance score; to investigate the relationships between ocular dominance, general visual abilities, and reading performance.

Methods

The sample comprised 40 participants (22 males and 18 females; mean age 20.0, SD=2.5). The main optometric measures were collected. Reading speed and accuracy were measured during reading of a passage. Ocular dominance was measured through two sighting and four motor tests (including the Dunlop test and modified versions). Dominance was determined using different computing methods (relative and absolute scores, dichotomic scores).

Results

Both sighting and motor tests proved repeatable (Spearman correlation coefficient between odd and even trials for each test resulted significant; $p < 0,05$). A Friedman Anova showed that motor tests were equivalent when dominance was measured through relative scores (a measure representing sidedness), but not through absolute scores (a measure representing only the stability of dominance). Correlations among tests were significant only in the case of relative scores. A few optometric variables correlated with some dominance measure, but there was not a systematic pattern. There wasn't any correlation between reading performance and ocular dominance.

Conclusions

The repeatability of sighting and motor test is good. However, if one is interested in reliably assessing stability of dominance (regardless of sidedness), care should be taken in choosing among motor tests, as the analyses on absolute scores showed that there is no equivalence among them. There is no evidence of any relationship between stability of dominance (independent of test and scoring method adopted) and reading performance.



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