

12-14 May 2023

Eye Care in the Changing World



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# EUROPEAN ACADEMY OF OPTOMETRY AND OPTICS

## 2023



European Academy of Optometry and Optics



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*This year:*

- DIGITAL OPTOMETRY
- CLINICAL OPTOMETRY
- OPHTHALMIC OPTICS
- HUMANITARIAN OPTOMETRY
- CONTACT LENSES
- EDUCATION IN OPTOMETRY AND OPTICS
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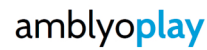
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PROGRAM

PIĄTEK  
12.05.2023

Workshops							
	Poznań University of Medical Science			Adam Mickiewicz University			Conference Hotel
9:00-10:00	Slit lamp basics	Retinoscopy: a useful tool to peripheral refraction examination in myopic children	Ocular motor dysfunction - specificity and management	ABCs of OCT - how to acquire and interpret the test results	Assesment of Visual function in infants	Scleral lens fitting with Profilometry	
10:00-10:30	Andrzej Michalski, Katarzyna Dubas	Maciej Perdziak	Hanna Buczkowska	Gregory Caldwell	Anna Przekoracka-Krawczyk, Alicja Brenk-Krakowska	Telamitsi Kyriakos	#02. Color vision defects and their detection Petr Veselý
10:30-11:00	Break						
11:00-11:30	Slit lamp basics	Retinoscopy: a useful tool to peripheral refraction examination in myopic children	Ocular motor dysfunction - specificity and management	Binocular Indirect Ophthalmoscopy (BIO) - theory and workshop	Assesment of Visual function in infants	Scleral lens fitting with Profilometry	
11:30-12:00	Andrzej Michalski, Katarzyna Dubas	Maciej Perdziak	Hanna Buczkowska	Joseph Pizzimenti	Anna Przekoracka-Krawczyk, Alicja Brenk-Krakowska	Telamitsi Kyriakos	11:15-12:15 How to take a good topography capture Małgorzata Żukowska Swisslens
12:00-12:30							
12:30-13:00							12:45-13:45 Measuring Carotenoid Levels and Macular Pigment in Eye Care Gregory Caldwell
13:00-13:30							

	Plenary room	Parallel room 1
14:00-15:00	Lunch, Posters and Exhibition	
15:00-15:15	Welcome speech (PTOO President / EAOO President)	
15:15-15:30	Special address from Ministry of Health, Poland	
15:30-16:00	<b>Keynote:</b> Innovative enabling technologies in optics, optometry and vision science	Pediatrics & Binocular Vision Rapid Fire Session #61 Pediatrics for the Primary Care Optometrist - Marianne Boltz #05 How to successfully find binocular vision anomalies in young adults - Matic Vogric #55 Subjective evaluation of patient adaptation to progressive ophthalmic lenses with custom and non-custom designs - Salome Pereira #20 State of accommodation of young adults with myopia progression - Alicja Szymańska
16:00-16:30	<b>Matt Jaskulski</b>	
16:30-17:00	Welcome speech EssilorLuxottica Hoya	
17:00-17:30	Coffee Break, Posters and Exhibition	
Technology & Clinical Applications		
17:30-18:00	Digital Optometry <b>Joseph Pizzimenti</b>	#50 Tele-triage system in an optical setting in the Netherlands Betül Tekeli
18:00-18:30		New technologies for macular degeneration management <b>Gregory Caldwell</b>
18:30-19:00	Symposium/Round Table: Technology for eye care Matt Jaskulski Joseph Pizzimenti Jacek Pniewski (Moderator: José M. González Méjome)	Technology Rapid Fire Session #38 Incorporating Artificial Intelligence in eye screening practice of optometrists – new approach to digital assessment of early symptoms of open angle glaucoma - Andrzej Piotrowski #33 Study of fixational eye movements in glaucoma using a super-fast eye tracking system - Aleksandra Gorczyca #23 Assessment of the interactions between the anterior segment of the eye and soft contact lenses as a result of their extended wear - Patryk Młyniuk #39 Repeatability and reproducibility of corneal epithelial thickness mapping with spectral domain optical coherence tomography using Canny Edge segmentation algorithm - Inese Petrovica

**SOBOTA**  
**13.05.2023**

	Plenary room	Parallel room 1	Parallel room 2
Varia			
9:00-10:00	<b>Keynote:</b> Eyecare in the Changing World: Scaling Up for Impact <b>Kovin Naidoo</b>		
10:00-10:30	#21 Influence of binocular vision on academic performance: A multivariate analysis Clara Martinez Perez	SIG - Binocular vision (Moderator: Sonja Zinken)	
10:30-11:00	EssilorLuxottica Educational Lecture: Recent advances in the development of Progressive Addition Lenses - Artificial intelligence behind Varilux XR Sébastien Fricker		
11:00-11:30	Coffee Break, Posters and Exhibition		
Varia 2			
11:30-12:00	Thyroid and eye disease <b>Gregory Caldwell</b>	#29 Burnout in Optometry: Risks and Prevention Jeffrey Weaver	SIG - Contact lenses (Moderator: José M. González-Méijome)
12:00-12:30		#10 Report from the Global Summit on Optometric Education Timothy Wingert	
12:30-13:00	#07 Optic Neuritis: It is more than MS-NMOSD is a sight threatening & life-threatening reality Lorcan Butler		
13:00-13:15	HOYA Educational Lecture: Limitations of randomized controlled trials Bruce JW Evans		
13:15-13:30	HOYA Educational Lecture: MIYOSMART myopia control spectacle lenses in UK children: 12-month outcomes Kathryn Saunders		
13:30-14:30	Lunch, Posters and Exhibition		
Clinical Optometry			
14:30-15:00	<b>Keynote:</b> Nutrition and the eye	CooperVision lecture: Evidence - based treatment of myopia Gabi Steenbekkers	<b>EssilorLuxottica</b> satellite session
15:00-15:30	<b>Gregory Caldwell</b>	Rodenstock lecture: MyCon, the new Rodenstock solution for children with myopia Gregor Esser	
15:30-16:00	Symposium/Round Table: Eyecare in the Changing World: Harnessing our Collective Response (Moderator: Eva Lazuka) Liliana Stankova, EAOO President Matjaž Mihelčič, ECOO President Fiona Anderson, IOA President Dominika Olkowska, PTOO President Susan Cotter, AAO President Kovin Naidoo	Clinical Optometry Rapid Fire Session #41 Can proper nutrition relieve digital eye strain?: Nutrition in digital eye strain - Anna Krašnicka #28 UK Eye care practitioner experiences of using technology to improve medication adherence in glaucoma: A qualitative study using the Theoretical Domains Framework - Deborah Bott #08 Clinical Examination of Papilloedema vs Pseudopapilloedema in 2023- Learning from Diagnostic errors - Lorcan Butler #57 The influence of optometric visuomotor training on soccer skill performance of young soccer players - Luiza Krasucka	<b>HOYA</b> satellite session
16:00-16:30			
16:30-17:00	Coffee Break, Posters and Exhibition		

	Plenary room	Parallel room 1	Parallel room 2
Eye care for all			
17:00-18:00	Clinical Cases in Posterior Segment Imaging <b>Joseph Pizzimenti</b>	<b>American Academy of Optometry - EAOO Joint symposium</b> Pediatric Optometry Susan Cotter / Kathryn Saunders	Contact Lens & Ocular Surface Rapid Fire Session #06 The use of protocols and informed consent for contact lens instructions in the Netherlands and Belgium. - Maurice Heunen #26 Scleral lenses: what did we learn during the last 10 years? - Langis Michaud #42 Optometrist's Approach to Meibomian Gland Dysfunction: Diagnostic Modalities and Patient Care Options - Beata Lewandowska #30 Role of corneal epithelial thickness mapping in monitoring the effects of overnight orthokeratology - Jagoda Rzeszewska-Zamiara
18:00-18:30	Optical performance of new ophthalmic lenses for Myopia Control <b>Matt Jaskulski</b>		SIG - Education ( #19) Active Learning for Educators Sonja Zinken, Dinah Paritzky
18:30-19:00			
EAOO Gala Dinner			

**NIEDZIELA**  
**14.05.2023**

	Plenary room	Parallel room 1
Varia		
9:00-10:00	<b>Keynote:</b> Humanitarian eyecare projects <b>Joseph Pizzimenti</b>	#58 Sensory aniseikonia Matjaž Mihelčič #36 Evaluation of a new care model "Optometry First" to help meet Ophthalmology demand Zoe Richmond
10:00-10:30	#17 HEADACHES: a guide for the optometrist Dinah Paritzky	Visionix lecture Comprehensive optometric examination with Visionix diagnostic station Sylvia Kropacz-Sobkowiak
10:30-11:00	#44 Efficiency of Vision Relaxation in Computer Users Svetlana Semjonova	EAOO Assembly General Meeting (for EAOO members only)
11:00-11:30	Coffee Break, Posters and Exhibition	
11:30-12:00	Coffee Break, Posters and Exhibition	
Myopia Management		
12:00-12:30	#13 Latest Update on Myopia Management Interventions David Berkow	SIG - Myopia management (Moderator: José M. González-Méijome)
12:30-13:00	#25 Myopia management : one child at a time Langis Michaud	
13:00-13:30	#51 Effects of defocus incorporated multiple segments (DIMS) on reading behavior of Caucasian children Giancarlo Montani	Myopia Management Rapid Fire Session #16 A novel tool to monitor myopia control - Birte Graff #11 Peripheral Retina Refraction-Can it Help! - David Berkow #15 Safety of DIMS spectacle lenses in combination with atropine in the combination therapy of myopia progression - Ann-Isabel Mattern #37 The impact of the vergence-accommodation conflict during the 30-minute VR session on the parameters of fusional vergence ranges and phoria - Maciej Dymczyk
13:30-14:00	#31 The relationship between BMI, myopia, premyopia and visual function in 6-7-year-old schoolchildren Siofra Harrington	

# KEY NOTE SPEAKERS ABSTRACTS

## Title: Clinical Cases in Posterior Segment Imaging

Joseph J. Pizzimenti, OD, FAAO  
Professor, Rosenberg School of Optometry at the University of the Incarnate Word  
San Antonio, Texas, USA

### Background

The literature contains numerous articles on the benefits of humanitarian missions as a vehicle for Interprofessional Education and Collaborative Practice. The University of the Incarnate Word Rosenberg School of Optometry has faculty and students participate in multidisciplinary mission trips to numerous underserved areas to increase their cultural sensitivity, experience practicing in an interprofessional manner, encounter ocular conditions that are not prevalent in their home setting, and compare approaches to patient care with those from other training programs.

### Methods

After their trip, students are requested to write a reflection piece on their experience. This is designed to have the student look back on the experience and contemplate how it fits into their other educational experiences. Specifically, they are asked to consider the cultural aspects of the trip, what they learned apart from healthcare, the care they provided and its impact, and the professional and interprofessional experience they had during the trip.

### Results

In addition to the enriching experience of interacting with patients from other cultures and seeing a different set of clinical conditions, students reported favorably on what they were able to assimilate by interacting with health care providers from other programs while providing patient care. They reported a greater understanding of how those services could benefit patients they see in their normal clinical environment. They reported a greater understanding of how these different approaches could benefit patients they see in their normal clinical environment and an appreciation of the people they treated.

### Conclusions

Our experience is similar to that reported elsewhere in that moving the care to an environment in which the clinicians have no familiarity reduces the desire to conduct their practice as usual and opens their professional minds to new approaches. Students and faculty return more open to finding ways to practice collaboratively in a coordinated care model in their home setting and in working to improve healthcare in the country they visited as well as their home country. Professional interactions with those trained in another school allow them to realize that alternatives to their worldview do exist and may prove to be beneficial.

## Title: Nutrition and the Eye

Greg A. Caldwell, OD, FAAO  
Diplomate of the American Board of Optometry (ABO), member of the Optometric Glaucoma Society (OGS), member of the Optometric Wellness and Nutritional Society (OWNS)

Carotenoids are nutrients that have been proven to protect the eye from light damage and several ocular pathologies. Their antioxidative protection is at the molecular level and are most recognized in age related macular degeneration. Many ocular and retinal diseases are linked to low levels of carotenoid levels. However, the retina is a highly metabolic tissue under constant assault. This course will review carotenoids and the comprehensive nutritional antioxidant network needed, how to assess their levels, and identify the patients that would benefit from diet, lifestyle, and macula and full retina supplementation. This course will provide patient cases to the audience. Ocular Nutrition – Tying, Structure, Function, and Molecular All Together in the Changing World Early detection, prevention, and wellness is not only trending but is now expected by our patients. Oxidative stress and damage are the hallmarks of chronic disease which is easily identified with our current and new instruments and technologies. This course will introduce and review concepts of integrative and complementary medicine and provide clinicians with clinical pearls, diagnostic interpretation and approaches, present-day and recently approved nutraceutical and therapeutic opportunities, and guidance on becoming a great Integrative Optometrist.

## **Title: Prescribing for Childhood Hyperopia: Top Tips & Considerations**

Susan Cotter, OD, MS, FFAO  
Southern California College of Optometry, Marshall B Ketchum University  
Kathryn Saunders, PhD, FCOptom  
Centre for Optometry and Vision Science Research, School of Biomedical Sciences, Ulster University

When testing older children and adult patients, optometrists make decisions about the importance of refractive error and the need for spectacle correction based primarily on symptoms and the impact of refractive correction on visual acuity. These parameters are less helpful when testing infants or young children when the visual system is maturing rapidly and there is a risk for the development of strabismus, amblyopia, and other visual anomalies. The magnitude of refractive error is only one consideration when deciding whether to prescribe a refractive correction and how much to prescribe for young children. Other factors, including age, accommodative function, binocular status (eye alignment and stereopsis), behavioral signs or symptoms, and academic performance, are essential components in the eyecare professional's decision-making. In this lecture, we will discuss the 'why,' 'when,' and 'how much' aspects of prescribing for childhood hyperopia and provide evidence-informed 'top tips' that we use in our clinical practice. We will review key objective methods for assessing accommodative function in young patients and how these measures inform our decision-making when managing typically developing hyperopic children and those with developmental disabilities. We will include patient cases for discussion.

## **Title: Innovative enabling technologies in optics, optometry and vision science**

Matt Jaskulski, PhD, DSc  
Clinical research software developer at the Indiana University Clinical Optics Research Lab (IU CORL)

## Eyecare in the Changing World: Scaling Up for Impact

The World Health Assembly Resolutions, The UN Resolutions, The World Report on Vision, and the growing recognition by non-eye care actors of the importance of good vision, have catapulted Refractive Error in particular, and eye care in general, onto the center stage of global health.

Given this context and the growing unmet needs in eye care and the changing ecosystem of optometry and optics the sector must be both receptive and responsive in order to remain relevant.

This lecture will emphasize the latest global evidence on eye health challenges and the global commitments of the public-private sector to make eye care accessible, equitable, affordable, and effective for everyone, everywhere in the world. This lecture will provide an overview of the achievements and evidence of remaining challenges and opportunities for improved eye care worldwide. It will locate Eye health as a global political, health, and development priority and discuss the central role that optometrists and opticians can proactively play within their professional associations, together with other health professions, and with their governments to achieving the scale that is demanded of us.

Key issues to be addressed are:

How do we scale up refractive services to the next level and create access for everyone?

How do we deploy public health strategies to protect our children from the looming myopia crisis?

How do we develop an integrated approach that brings all sectors together to achieve our goal (systems approach)?

How do we mobilise technology to drive this scale without undermining the role of optometrists and opticians or comprising quality?

How every practitioner, in every part of the globe, including in Europe, can become a part of this process to benefit our patients and societies?

## ORAL

### #02 Color vision defects and their detection

#### Authors

Petr Vesely

#### Affiliation/Institution

Department of Optometry and Orthoptics Medical Faculty,  
Masaryk University, Czech Republic

#### Topic

Education

#### Abstract

Workshop presentation - actual revised version

#### Purpose/Topic

In our workshop we would like to introduce algorithm of the ambulant and clinical examination of the color vision. We know that is very important to detect inborn or acquired color vision defect in practice of optometrist and ophthalmologist. We can save the life of the patient in case of presence of some visual pathway meningioma.

#### Methods/Case presentation

We will use basic pseudochromatic plates to screen for the color vision defects. Further we will use Lanthony D-15 test and Farnsworth Munsell 100 Hue test to decide if the color vision is inborn/acquired, shallow/deep and we can also specify defective color/colors. Finally, we will present some clinical cases with different types of color vision defects.

#### Results/Recommendation

After workshop our participant will be able to use different types of color vision tests, distinguishing between inborn/acquired color vision defect and can specify importance and type of color vision defect. We expect till 15 participant per workshop.

### #05 How to successfully find binocular vision anomalies in young adults

#### Authors

Matic Vogrič

#### Affiliation/Institution

Optical Association of Slovenia / Ocesna optika Vogric

#### Topic

Clinical



## Abstract

Covid brought to the kids an increase in screen time and with close work related binocular vision anomalies. Optometrist's main task is to carefully evaluate and assess each individual entering the eye exam room and offer to them (including their parents) a broad range of all possible solutions. To do so we need to do the basic and advanced binocular assessment tests right. The workshop will guide the optometrists how to systematically approach to the binocular vision assessment.

## #06 The use of protocols and informed consent for contact lens instructions in the Netherlands and Belgium.

### Authors

Maurice Heunen\*, Karolien Elving, Carolina Kunnen, Jeanine Lammens, Marianne Lindenberg, Cristian Mertz, Cor Oosting-Klock, Josien Zeeman, Byki Huntjens

\* Lead author

### Affiliation/Institution

Nederlands Contactlens Congres, Veldhoven, The Netherlands

### Topic

Scientific

### Abstract

EAOO 2023 abstract

Scientific or Research-led theme (1.2.1)

350 words max

### Title

The use offrequency of protocol s and informed consent use for contact lens instructions in the Netherlands and Belgium. Maurice Heunen\*, Karolien Elving, Carolina Kunnen, Jeanine Lammens, Marianne Lindenberg, Cristian Mertz, Cor Oosting-Klock, Josien Zeeman, Byki Huntjens

\* Lead author

### Author information

Nederlands Contactlens Congres, Veldhoven, The Netherlands

### Purpose

It has been reported that patient non-compliance with recommended methods of contact lens instructions, wear and care is high. However, it is unclear if this is related to the consistent delivery of the instruction by the eye care practitioner. As part of a larger scale study, we explored the current clinical practice in the Netherlands and Belgium related to the use of written protocols and informed consent for contact lens instructions.

### Method

Dutch-speaking eye care practitioners attending the NCC conference (26 and 27 June 2022) were asked to complete an electronic survey about contact lens instructions including application, removal, and hygiene provided to patients in their own workplace. The survey consisted of 32 mandatory multiple-choice questions, and participants were not able to return to an earlier question.

## Results

Of the 260 participants who completed the survey, 135 (51.9%) were optometrist, 100 (38.5%) were dispensing optician, contact lens specialist, or orthoptist, and 25 (9.6%) were student. The majority (n=234; 90%) worked in a private practice (independent or multiple) while the remaining (n=26; 10%) practiced optometry in a medical setting or industry. Contact lens instructions were provided by the optometrist or contact lens specialist (n=161; 62%), while 99 (38%) reported this was completed by someone else in the practice (dispensing optician, support staff, student). An internal instruction protocol was available in written format (44%), verbal only (48%), or non-existent (8%). During the last 2 years, 81 eye care practitioners (31%) did not amend the protocol, whereas the main reason for any changes were based on further training (44%). Informed consent including risk awareness was implemented at all times (5%), only for children (<18 years; 6%), only for ortho-keratology lenses (40%), or never (49%).

## Conclusions

The majority of Dutch/ Belgium practitioners who fit contact lenses also provide the contact lens instructions. More than half of the practitioners (56%) do not have written instruction protocols in place, which may impact the consistency of contact lens instructions. Half of the practitioners do not provide informed consent including risk awareness, which ultimately may lead to contact lens non-compliance.

## Feedback

Thank you for submitting an Abstract entitled "The use of protocols and informed consent for contact lens instructions in the Netherlands and Belgium" to the European Academy of Optometry and Optics (EAOO) meeting in Poznan, organized in partnership with the Polskie Towarzystwo Optometrii i Optyki (PTOO) Polish Association of Optometrists (PTOO). After evaluation by two independent reviewers, the decision is to REVISE your submission. See the reviewers comments below:

### Reviewer #1:

According to the title this research is about the use of CL instruction. This is a Yes/no question. The conclusion is made on the modality of the way instruction is given and the impact it may have. This impact has not been researched and as such a conclusion can not be given on the results. Also informed consent is something different to cl wear and care instruction. It should be made clear from the conclusion more research is needed to find a possible correlation. Provide further detail on the Purpose/Topic of the Abstract, Rewrite the Conclusions/Recommendations section to be in agreement with the Results presented Thank you for your suggestions. We have amended the title and conclusion to address your concerns.

### Reviewer #2:

It should be extended with information about the newest guidelines/recommendation for contact lenses wearers. Without such educational part of presentation, the outcomes won't be very interesting for optometrists. We agree, but this would be part of the presentation, as there is no space in the abstract to elaborate on this.

## #07 Optic Neuritis: It is more than MS-NMOSD is a sight threatening & life-threatening reality

### Authors

Lorcan Butler

### Affiliation/Institution

The Brain Tumour Charity

### Topic

Education

### Abstract

Lecture presentation listing the signs & symptoms of this condition. Its similarities to Idiopathic Unilateral Optic Neuritis can sometimes lead to a misdiagnosis. In this presentation we look at the similarities and dissimilarities to watch out for to aid the clinician in making the correct differential diagnosis. Getting it wrong can be fatal.

## #08 Clinical Examination of Papilloedema vs Pseudopapilloedema in 2023- Learning from Diagnostic errors

### Authors

Lorcan Butler

### Affiliation/Institution

The Brain Tumour Charity

### Topic

Education

### Abstract

Abstract #08

Thank you for your guidance and your patience. Following your request I am very happy to revise as recommended and gladly add the following for contextual information. This is for EDUCATIONAL purposes. This would be ideal for a 30 minute presentation.

### Methods

Utilising numerous online resources looking at the clinical difficulties encountered with the correct identification of papilloedema from pseudopapilloedema. I have first hand experience of many clinical pearls to utilise as I have given this specific talk 6 times in the UK with 4 ophthalmologists and 2 Neuro-Ophthalmologists. Through their experience and clinical examination methods they were able to discuss the numerous advantages and disadvantages of investigative testing, both invasive and non-invasive, and pass this information on to me. Using sensitivity & specificity as a benchmark they were able to pass on what they individually think was important and what was not. They did not agree on all topics and some had preferences from one to another investigative technique. The subject of Spontaneous Venous Pulsation for example was very contentious with some neuro-ophthalmologists rating it very highly and some discussing that it was a very crude technique that is not diagnostic in any way and of very little value

### Case Presentation

I intend to use 3 cases which are pseudopapilloedema rather than papilloedema but because of their appearance were referred into secondary care. This causes anxiety to the patient and their family. It also puts unnecessary strain on the hospital eye service which has no capacity for False Positive Referrals,

### Actions Taken

Through the evidence base that 90% of the classical phenotype profile are symptomatic and fit a specific age and BMI profile we can very quickly reduce the risk of unnecessary referral for possible invasive Lumbar Puncture and secondary risks that this invasive procedure entail

### Results

Detection of Papilloedema (DOPs) Study 2019 and evidence base from The Optic Disc Drusen Symposium (ODDS) can give us evidence of the characteristic features associated with Optic Nerve Head Drusen and try to reduce the burden as there is evidence that approx. 75% of Suspect Papilloedema referred into secondary ophthalmology are in fact ONHD

### Content

A mixture of multimodal images to include different OCT imaging techniques and discussion of Enhanced Depth Imaging & Fundus Auto-Fluorescence as a primary point of care to reduce diagnostic error into secondary care

## #10 Report from the Global Summit on Optometric Education

### Authors

Timothy A. Wingert, OD, FAAO, FNAP, FEAOO

Melissa Vitek, OD, FAAO, PNAP

### Affiliation/Institution

University of the Incarnate Word; Salus University

### Topic

Education

### Abstract

Educational topic: On October 27, 2019, three organizations, ASCO/AAO/WCO, designed and hosted a Global Optometric Education Summit. This Summit brought together optometrists with three goals: to assemble representatives from optometric academic institutions around the world and identify issues facing optometric education globally; share current best practices in optometric education; and to share ideas on future developments in optometric education.

### Methods

The participants were seated so that each table included at least one participant from each of the WCO representative regions. Following a panel of optometric leaders from around the globe providing content relative to each of the goals, the participants discussed each topic within their groups. The three goals were linked to key objectives that were defined for the participants: share geographically specific challenges facing optometric education, identify synergies in addressing the challenges facing optometric education, share outcome measures for program effectiveness, explore solutions for deficiencies in and/or threats to resources. com-

municate techniques and strategies for faculty recruitment, development and retention, identify and share effective tools to assess student learning, and explore future trends in the optometric profession and how institutions will prepare for important changes. Each of the twelve groups participating identified challenges and opportunities that emerged from their respective discussions. The groups reported out to the larger group in addition to submitting a written summary of their conclusions.

#### Results

During the process of synthesizing the information included in the written reports, several common themes, concerns and potential solutions arose.

#### Conclusion

Many of the issues facing optometric education are shared by other health care professions and not unique to one global region. Utilizing shared efforts and resources, innovative models can confront challenges as they are identified. Increased collaborative efforts to address those challenges will allow for effective implementation synergistic solutions. This will facilitate a unified approach to improved patient outcomes.

## #11 Peripheral Retina Refraction-Can it Help!

#### Authors

Dr. David Berkow

#### Affiliation/Institution

Berkow Optometrists

#### Topic

Clinical

#### Abstract

Clinical Topic/Purpose: Is there a valid reason to conduct a peripheral refraction when examining a myopia child who is at risk of developing myopia progression.

#### Content

Due to the prediction that myopia is becoming an epidemic and that by 2050 1 billion people may have high myopia with all its implications such ocular complications and even vision loss (Holden et al., 2016), Eye-Care Practitioners (ECP) must do everything in their scope of practice to retard myopia progression amongst children who are prone to myopia progression. ECPs who are concerned with myopia progression, are now involved in myopia management. They are aware that the peripheral retina plays an important part in predicting myopia (Hogerheide et al., 1971), detecting myopia, monitoring myopia progression and controlling myopia (Kang & Swarbrick, 2011). Earl Smith, in his experiments, when he ablated the fovea, the emmetropization was not affected (Smith et al., 2007). Verkicharla et al., 2016, revealed a connection between peripheral retinal refraction and relative peripheral eye length. Wallman and Winawer (2004) suggested that the greater number of retinal neurons in the periphery, compared with the central retina, may allow peripheral signals to dominate eye growth. There are many more studies revealing the importance of the peripheral retina in relation to myopia. According to Atchison et al., 2006 the interest in peripheral refraction has increased because of the idea that defocus in the retinal periphery can influence the development of myopia. It has been seen, by researchers, that subjects who were initially slightly hyperopic or emmetropic and

developed myopia in later years, were more hyperopic peripherally than in the central retina (Zhao & Fang, 2020). In this presentation it will be explained how peripheral refraction is conducted, by using an open-field autorefractor (Shin-Nippon NVision K5001 autorefractor). Picture of Shin-Nippon NVision K5001 Open-field Autorefractor (Mallen et al., 2001)

The presentation will illustrate when and why peripheral refraction can assist in deciding which modality to use for myopia management (Damani et al., 2021). The presentation will also explain the difference between Peripheral Myopic Defocus and its implications as well as Peripheral Hyperopic Defocus and its importance. Why is it important to understand peripheral defocus?

#### 1. Orthokeratology

#### 2. Specially designed soft contact lenses for myopia management

#### 3. Specially designed spectacle lenses for myopia management.

“Treatment strategies that ignore the impact of peripheral image quality on ocular growth are less likely to be successful” (Smith 3rd et al., 2005).

#### Actions taken:

The presentation will explain how to measure the peripheral refraction and how to calculate the distance between the LEDs in order to measure the peripheral refraction at the different points on the retina.

A photograph of the 3 fixation targets measuring @0° (fovea), @20° and @30° temporally or nasally from fovea.

#### The calculation of how to construct the target:

For an angle of 20° the distance from the first LED will be 109.2cm. For an angle of 30° the distance from the first LED will be 173.2 cm. The presentation will explain which interventions are based on peripheral retinal defocus. Conclusions/Recommendations: Measuring the refraction across the retina can give a far better picture of the shape of the retina. The change in refraction from the fovea compared to 20° and 30° temporally and nasally can give an indication of the danger in myopic progression for that individual (Zhao & Fang, 2020).

It is important to measure the peripheral refraction because it is an important factor related to refractive error in children. Relative peripheral myopia in hyperopic eyes indicated an oblate shape. Emmetropic eyes were more spherical in shape and relative hyperopia on myopic eyes indicated a prolate shaped eye (longer axial than equatorial diameter) Mutti et al., 2000). An interesting research finding is that accommodation does not have an effect on the peripheral refraction when comparing myopes and emmetropes. Therefore, these results do not support the hypothesis that changing peripheral refraction during near vision tasks influences the development of myopia (Queiros et al., 2021). If possible, one should measure the peripheral refraction before engaging in myopia management.

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## #12 Interprofessional Collaboration on Humanitarian Missions

### Authors

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University of the Incarnate Word

### Topic

Scientific

### Abstract

Purpose: The literature contains numerous articles on the benefits of humanitarian missions as a vehicle for Interprofessional Education and Collaborative Practice. The University of the Incarnate Word Rosenberg School of Optometry has faculty and students participate in multidisciplinary mission trips to numerous underserved areas to increase their cultural sensitivity, experience practicing in an interprofessional manner, encounter ocular conditions that are not prevalent in their home setting, and compare approaches to patient care with those from other training programs.

### Methods

After their trip, students are requested to write a reflection piece on their experience. This is designed to have the student look back on the experience and contemplate how it fits into their other educational experiences. Specifically, they are asked to consider the cultural aspects of the trip, what they learned apart from healthcare, the care they provided and its impact, and the professional and interprofessional experience they had during the trip.

### Results

In addition to the enriching experience of interacting with patients from other cultures and seeing a different set of clinical conditions, students reported favorably on what they were able to assimilate by interacting with health care providers from other programs while providing patient care. They reported a greater understanding of how those services could benefit patients they see in their normal clinical environment. They reported a greater understanding of how these different approaches could benefit patients they see in their normal clinical environment and an appreciation of the people they treated.

### Conclusions

Our experience is similar to that reported elsewhere in that moving the care to an environment in which the clinicians have no familiarity reduces the desire to conduct their practice as usual and opens their professional minds to new approaches. Students and faculty return more open to finding ways to practice collaboratively in a coordinated care model in their home setting and in working to improve healthcare in the country they visited as well as their home country. Professional interactions with those trained in another school allow them to realize that alternatives to their worldview do exist and may prove to be beneficial.

## #13 Latest Update on Myopia Management Interventions

### Authors

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Berkow Optometrists

### Topic

Clinical

### Abstract

Clinical Topic: Title:

Latest Update on Myopia Management Interventions

### Case Presentation

Myopia has become an epidemic and as stated by Holden et al., 2016 that by the year 2050 over one billion people will suffer from high myopia [1]. Myopia management has become an important part of the Eye Care Practitioner's (ECP) daily, in office, protocol [2]. Even if he does not conduct myopia management actively, he must be aware of myopia progression, the dangers of myopia progression and the different interventions available to try to delay myopia progression in order to explain to parents of the myopic child the entire picture [3]. More interventions are becoming available and it is important that the ECP is aware of all the options available and their effectivity. This presentation will cover the following interventions, their mode of action and their evidence-based efficacy.

1. Atropine [4]
2. Orthokeratology [5].
3. MiSight soft contact lenses [6].
4. Extended depth of focus soft contact lenses [7].
5. NaturalVue multifocal soft contact lenses
6. Hoya MyoSmart spectacle lens [8,9]

7. Essilor Stellest spectacle lens [10, 11].
8. DOT spectacle lens manufactured by SightGlass [12].

The above are the interventions that are used in clinical practice.

According to Huang et al., 2016 there are 16 different interventions for myopia management which will be mentioned in the presentation [13].

#### Actions taken

The presentation will be based on the latest literature review of all interventions available (not necessarily in every county), for myopia management. The effectivity of each modality will be emphasized, to illustrate which interventions are more effective than others. The ECP must be aware of all available interventions and he can explain to the parents which interventions are not yet available in his country. He must be up to date as the parents will have read or heard about the treatment modalities.

#### Recommendations/Conclusions:

As can be seen, more and more options are becoming available for myopia management.

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The recommendations will be based on effectivity of the intervention, parents' and child's

preference and lifestyle of the child (i.e. if he swims 3-4 times a week soft lenses would not be a preference).

There are a variety of treatment modalities and more are becoming available.

Therefore, there is no reason not to proceed with myopia management, in the cases of those children detected as having progressing myopia.

It must be emphasized to the ECP how important it is to intervene and treat the myopic children, who are at risk, as early as possible [14,15,16].

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## #15 Safety of DIMS spectacle lenses in combination with atropine in the combination therapy of myopia progression

### Authors

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### Topic

Scientific

### Abstract

Purpose

To evaluate the safety in road traffic when wearing spectacle lenses with Defocus Incorporated Multiple Segments (DIMS) technology in combination with atropine. Both methods are used in myopia management. If one method is not sufficient to receive the treatment goal, clinicians opt for combination therapy. Optical phenomena and side effects of atropine might add up and cause concerns regarding the road safety of children.

## Methods

Distance visual acuity and contrast sensitivity (CS), as well as mesopic glare sensitivity were evaluated, for ethical reasons, in 12 adults (age: 24 to 45; 30.1 ± 5.7 years) that were each individually fitted with DIMS lenses without and with low dose (0.01%) atropine (1-2 hrs after topical instillation). In a preliminary assessment, adult subjects proved to be as least as sensitive to optical phenomena and vision impairment than young children.

## Results

Low dose atropine does not decrease distance visual acuity in the central portion of the DIMS spectacle lens; glare and atropine cause a 0.10 logMAR decrease in visual acuity. With a forced gaze through the DIMS area, atropine without glare decreases distance visual acuity by 0.09 logMAR; with glare, no further decrease in visual acuity is observed with atropine. Contrast sensitivity with DIMS lenses is not changed by atropine. With regard to glare sensitivity, no visual impairment relevant to vision and road safety is found with DIMS lenses; Atropinization has no negative effect on glare sensitivity and all subjects are able to discern a mesopic contrast of 1:2 under glare.

## Conclusion

DIMS lenses do not impact safety in road traffic and do not cause relevant visual impairment, even under the additional influence of 0.01% atropine. DIMS lenses are safe, alone and in combination therapy with low dose atropine.

## #16 A novel tool to monitor myopia control

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### Topic

Education

### Abstract

Clinical topic

There is no consensus on the specific goal of myopia control and on the criteria to monitor therapeutic efficiency in clinical practice.

### Content

We here introduce a novel tool for monitoring myopia control, which is based on periodic axial length measurements and provides an easy-to-use scheme for myopia therapy recommendations. To evaluate myopia progression, the assessment of axial length change is preferable over refractive change. As high axial length is determinant of the risk of myopia-associated eye diseases in adulthood, the primary goal is the reduction of axial length growth. Notably, eyes having axial lengths which are associated with emmetropia in adulthood still show axial growth during childhood. This "physiological axial growth pattern" is underlying any excessive axial length growth in myopic (pediatric) eyes. From data in the literature and from own data, we have developed normative curves which describe the physiological axial length growth as a function of age. We consider the reduction of excessive axial length growth as the primary goal

of myopia control and propose that the return to the physiological axial growth pattern should be considered a therapeutic success in myopia control.

### Results

We have retrospectively analyzed real-life data of more than 20 myopic Caucasian children treated with multi-segment spectacle lenses over a 12-month period (1st year data). The periodically measured axial length growth rates were classified against age-matched normative physiological growth and coded according to a color scheme. This analysis nicely shows good therapeutic efficiency in the majority of cases but also allows to detect children, that should receive an additional treatment.

### Recommendations/Conclusions

Based on this approach, a web-based tool with a graphical user interface was developed to easily obtain practical information about the myopia progression and individual efficiency of the current myopia therapy. Furthermore, it provides an easy-to-use scheme for individual therapy recommendation.

## #17 HEADACHES: a guide for the optometrist

### Authors

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### Topic

Clinical

### Abstract

HEADACHES: a guide for the optometrist

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Clinical topic Headaches

### Content

Almost everyone gets a headache at some point in his or her life Headache, or cephalgia, is among the most common comorbid symptoms that patients name as part of their chief complaints for an eye examination. Sometimes headache is the primary reason for an eye visit. Additionally, young patients are often referred by primary care providers or internists for an eye check when headache is a symptom (Hua 2012). Patients with headaches often seek consultation with optometrists to investigate whether uncorrected refractive error is a contributing factor, and they may be referred by another physician for this reason (Abel 2009).

### Results

Headache is one of the most common symptoms reported by patients consulting optometrists with 8% of young patients seen in an optometric practice reporting this symptom (Barnard and Edgar, 1996). Only a minority of headache sufferers consult their GP, regardless of severity, with optometrists being other important sources of information (Thomas, Boardman and Croft 2016). A headache can be the symptom of many different types of conditions. The International Classification of Headache Disorders (ICHD-3), describes more than 200 disease entities that share headache as a common symptom. Most patients who present to optometrists (90 per-

cent) suffer from a vascular headache, a tension headache, or a mixture of the two. The others have conditions that lead to inflammation, traction or dilatation of pain-sensitive structures of the head and neck (Skorin 1999). Specific eye diseases, such as acute glaucoma or optic neuritis, can cause ocular pain or headache and certain primary headaches often are accompanied by ocular or visual symptoms that range from the oculosympathetic signs of cluster headache to the complex visual phenomena characteristic of migraine aura (Gil-Gouveia 2002)

#### Actions taken

This presentation will discuss those headaches that have an ocular and/or visual component, in order to enable the optometrist to recognize different types of headaches and know when and how to refer or if treatment is an option. Despite the fact that most headaches are benign, there still lies a small risk that the headache is a true emergency, and misdiagnosing or missing a true emergency can lead to a loss of a limb or life (Hua 212) Recommendations: Optometrists represent a potentially important source for headache advice, and, given the high prevalence of the condition, headache sufferers may constitute a significant proportion of their caseload. (Thomas, Boardman and Croft 2016). Therefore, optometrists must be familiar with the different types of headaches that they see in practice.

## #19 Workshop: Active Learning for Educators

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#### Topic

Education

#### Abstract

As far back as the 1940's an educator named Edgar Dale introduced The Cone of Learning, a pyramid that outlines the modalities of active and passive learning. Assessing the efficacy of different teaching strategies is challenging, therefore much of the evidence for the effectiveness of AL is theoretical or anecdotal. However, there is a growing evidence base for the effectiveness of AL (Deslauriers et al., 2019; Freeman et al., 2014) The success of AL is not measured simply in assessment of outcomes but also in the development of skills such as communication skills, interprofessional learning and self-directed learning (Alberti et al., 2021) Some of these skills are not directly assessed during studies but provide important graduate competencies for future employment. Good practice AL strategies aim to engage students in a series of activities which require them to produce observable evidence of their learning. Where possible, these individual and group tasks aim to develop higher order thinking skills. Successful AL should take into consideration context and audience, aims and outcomes, methods and resources, content, evaluation, and assessment and feedback Tomczak, J., & Bel, E. (2021) Designing and planning successful AL can often be challenging, particularly when faced with resistance from students and other stakeholders. The 4 C/ID instructional design model (Frerejean et al., 2019) and programmatic assessment (Torre et al., 2020) are introduced and explained as theoretical framework to enhance and stimulate active learning. Examples are given how to implement these theories, based on experiences from the curriculum development at UAS Utrecht. We have

designed this workshop to enable optometric educators to incorporate AL into their teaching. Please bring your own computer and educational area you want to improve.

## #20 State of accommodation of young adults with myopia progression

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#### Topic

Scientific

#### Abstract

##### Purpose

Myopia is currently one of the most relevant vision problems in the world. The purpose of this study was to evaluate the accommodation parameters among young adults experiencing vision deterioration or myopia progression.

##### Methods

This is a cross-sectional study of a community of selected students and Ph.D. students of the physics department at the University of Warsaw. It was carried-out at the academic training center for optometrists. 31 people (13 men) aged 20–32 years ( $24.3 \pm 3.3$ ) took part in the study. All subjects completed questionnaires concerning the amount of time spent visually working from a short distance on a daily basis. They also answered a variety of questions about their visual demands and lifestyles. All of the participants underwent a comprehensive optometric examination which included: preliminary tests, autorefractometry, non-cycloplegic refraction, binocular vision and accommodative function assessment. Accommodative function assessment consist of monocular and binocular accommodation facility test, amplitude of accommodation measurement, accommodative response evaluation in dynamic retinoscopy. The results were analyzed statistically using Statsoft Statistica software.

##### Results

All patients noticed a deterioration of their distance vision. 16 complained of eye strain and 10 of headaches. Over 60% of the participants spent more than 6 hours a day in front of the computer screen. The increase of refractive error was observed among 27 subjects. Mean spherical equivalent (SE) of right eye in current correction was  $-2.45 \pm 2.04$  D, while mean SE of subjective refraction was  $-2.82 \pm 2.11$  D. The averaged myopia progression was  $-0.37 \pm 0.44$  D. 19 subjects demonstrated accommodative dysfunctions. The myopia progression was  $-0.44 \pm 0.48$  D, and  $-0.26 \pm 0.41$  D for subjects with accommodative dysfunctions and with normal accommodative parameters respectively. Analyzing myopia progression in specific groups, the highest progression was in the group with infacility accommodation and the lowest was in the group with insufficient accommodation.

##### Conclusion

Myopia progression concerns not only children but also young adults. Accommodative dysfunctions may contribute to myopia progression. Prolonged time spent in front of the computer screen every day may also affect the visual system, increasing myopia and causing ailments.

## #21 Influence of binocular vision on academic performance: A multivariate analysis

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### Topic

Scientific

### Abstract

Purpose

This study aims to analyze the influence of binocular vision on academic performance.

### Method

Between October and December 2021, a pilot study has been carried out in 5 schools in the Lisbon region. The study population consisted of children between 6 and 13 years of age. All the subjects passed through an optometric exam based on subjective and objective refraction, cover test, accommodative delay, and stereopsis. In addition, all parents were asked about the academic performance of their children, considering that it was bad when the child failed one or more subjects last year. In the multivariate analysis, the variable of academic performance has been included as a dependent variable. Stereopsis, accommodative delay, and cover test as continuous variables; and color vision and ocular motility as a categorical variables.

### Results

The model was able to explain 3.2% of poor academic performance and classifies 81.7% of cases. The logistic regression model was statistically significant,  $X^2 = 82,549$ ,  $p < 0.001$ . Of the five predictor variables, only the accommodative delay was statistically significant  $p = 0.045$ . Thus, people with an accommodative delay value outside the range of  $+0.25D$  to  $+0.75D$ , present 3.8 times more risk of poor academic performance [95% CI, 1.032-14.457].

### Conclusions

Alterations in binocular vision could impact children's academic performance. So, it is recommended to exam frequently the binocular vision in children

## #23 Assessment of the interactions between the anterior segment of the eye and soft contact lenses as a result of their extended wear

### Authors

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### Topic

Scientific

### Abstract

Purpose

Assessment of changes in the anterior segment of the eye and geometric parameters of soft contact lenses (sCLs) after wearing them in the extended mode using optical coherence tomography (OCT).

### Methods

43 eyes with myopia of  $-3.00 D$  and 22 eyes with hyperopia of  $+3.00 D$  were included in the study. All patients underwent general ophthalmic examination, corneal topography/tomography, corneal thickness measurements and epithelial thickness mapping both before and after wearing sCLs made of senofilcon A for 7 days/6 nights continuously. Using a custom-made swept source optical coherence tomography (SS-OCT), the geometry of the sCLs was measured 3 to 6 minutes after removal.

### Results

As a result of continuous wearing (7 days/6 nights) of negative lens, a decrease in the flat meridian of the cornea, central corneal thickness and spherical aberrations ( $p < 0.05$ ) was observed. In the hyperopic group, a significant decrease in the epithelial thickness up to  $3.19 \mu m$  in the central and paracentral zone of the cornea was observed ( $p < 0.001$ ). The anterior and posterior radius of curvature of the negative lenses decreased in two perpendicular planes by  $0.73 mm$  and  $0.62 mm$  for the anterior curvature and  $0.62 mm$  and  $0.52 mm$  for the posterior curvature, respectively ( $p < 0.001$ ). Whereas as a consequence of wearing positive lenses, a decrease in the sagittal height of the lens was observed ( $p < 0.001$ ).

### Conclusions

The extended wearing (7 days/6 nights) of negative and positive SiH lenses causes a significant change in the epithelial thickness leading to changes in the geometry of the anterior surface of the cornea in patients with hyperopia. As a result of continuous wearing of the sCLs, their slight deformation occurs, which is due to the imitation of the shape of the anterior curvature of the cornea. OCT enables the assessment of the condition of the cornea, taking into account changes caused by wearing sCLs. In addition, it enables measurement of sCLs geometry, ensuring high repeatability of measurements.

## #25 Myopia management : one child at a time

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**Topic**

Scientific

**Abstract**

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**Additional information****Title of the speech**

Myopia management : one child at a time

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**Speech preferences**

Oral

**Keywords**

Myopia customization efficacy high order aberrations Main topic: Scientific or Research-led abstracts: Purpose, Method, Results\*, and Conclusion\*\*

**Content of the abstract:****Purpose**

This lecture aims to demonstrate the importance of customizing myopia management, based on the latest insights about myopia onset and evolution.

**Methods**

Numerous articles have been published recently that have led to a better understanding of the mechanisms leading to the development and evolution of myopia. Although the peripheral defocus theory remains valid, there are other elements that provide insight into the retinal response to optical stimulation. The choroidal response, the increase in blood flow in the deep retina are markers of the effects induced, leading to the remodeling of the sclera, and thus of the resistance of the eye to its elongation.

**Results**

Work done at the University of Montreal shows that retinal symmetry, limited to 20 degrees peri-macular, seems to play a role. More specifically, the area between 10 and 20 degrees is the one that reacts more to optical stimuli, based on electroretinography. Similarly, the greater response in certain quadrants indicates that it is necessary to adapt correction methods to optimize myopic management. It is also becoming increasingly clear that the retinal response is individual and that, therefore, the same management strategy cannot be applied to everyone uniformly. The presence of a dose/response and an individual threshold of reaction to optical stimuli are concepts that are emerging and that support the customization of treatments Discussion: The knowledge of these elements challenges manufacturers as well as practitioners to adapt their methods of myopia control and to adapt them to patients. In orthokeratology, for example, the use of smaller treatment zones and personalized designs via software can optimize results. A decision tree is suggested, taking in account the particularity of each patient.

Treatment goals are set and methods for assessing myopic progression are described. Options for improving treatment efficacy are proposed, including indications for the use of combination approaches.

**Conclusion**

The management of myopia can be very effective if the individual characteristics of the patient are considered and the control methods are adapted accordingly.

## #26 Scleral lenses: what did we learn during the last 10 years?

**Authors**

Dr Langis Michaud OD MS

**Affiliation/Institution**

Université de Montréal

**Topic**

Clinical

**Abstract****Purpose**

To review the indications but also contra-indications of scleral lenses.

**Methods**

Scleral lenses have become a standard of practice to restore vision in patients with irregular corneas or in the treatment of ocular surface disorders. All recognize the benefits associated with scleral lenses, including comfort compared to other modalities. However, research indicates that there remain some limitations to the use of scleral lenses in practice. This lecture proposes a review of the indications and also the cases in which greater caution should be exercised before prescribing scleral lenses. For example, the effect of lenses on intraocular pressure will be reviewed, particularly with respect to their use in glaucoma patients. The question of oxygen transmissibility will also be revisited, in relation to patients with deficient endothelium, and more specifically in cases of corneal graft. Finally, recurring problems with lens handling and debris accumulation in the reservoir will be discussed, as well as visual acuity problems resulting from the presence of higher order aberrations.

**Results**

Fortunately, there are options available now that were not available 10 years ago. The ability to produce quadrant variable geometry lenses, conjunctival measurement technology, and the ability to mold the eye are all avenues that can optimize the use of scleral lenses. Options will be given, illustrated by case reports.

**Conclusion**

Knowing the indications but also the limitations of scleral lens technology and designs helps practitioners to better select products and thus better help the patients who consult them.

## #28 UK Eye care practitioner experiences of using technology to improve medication adherence in glaucoma: A qualitative study using the Theoretical Domains Framework

### Authors

Deborah Bott<sup>1</sup>, Ahalya Subramanian<sup>1</sup>, David Edgar<sup>1</sup>, Pouya Alaghband<sup>2</sup>, John Lawrenson<sup>1</sup>, Peter Campbell<sup>1</sup>

### Affiliation/Institution

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### Topic

Scientific

### Abstract

Title

UK Eye Care Practitioner experiences of using technology to improve medication adherence in glaucoma: A qualitative study using the Theoretical Domains Framework

Authors and affiliations

Deborah Bott <sup>1</sup>, Ahalya Subramanian <sup>1</sup>, David Edgar <sup>1</sup>, Pouya Alaghband <sup>2</sup>, John Lawrenson <sup>1</sup>, Peter Campbell <sup>1</sup>

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<sup>2</sup> Department of Ophthalmology, York and Scarborough Teaching Hospitals NHS Foundation Trust Purpose Adherence to long-term glaucoma medication is poor. <sup>1</sup> Utilising emerging technologies has the potential to help glaucoma patients take their eyedrops correctly. <sup>2,3</sup> The aim of this study was to explore what factors influence eye care practitioner (ECP) management of nonadherence and whether they recommend technology-based interventions, by applying the Theoretical Domains Framework (TDF).

Method

Purposive sampling was employed to conduct one-to-one semi-structured interviews, with UK registered ECPs involved in glaucoma management, using a TDF-based topic guide. The TDF, a validated behavioural framework, provides a comprehensive theory driven basis for identifying determinants of behaviour. <sup>4</sup> It comprises 14 domains, each domain consists of a set of related constructs representing personal, sociocultural and environmental influences on behaviour. First part of interview gathered demographic information, second part related to experiences with eyedrops and last part focussed on views towards using technology. Interview transcripts were analysed using deductive and inductive thematic analysis. Key TDF domains and themes influencing adherence management and technology recommendation, from an ECP perspective, were identified.

Results

Nine ECPs were interviewed: six females, ages ranged from 18-30 years (n=1), 31- 45 years (n=5) and 46-60 years (n=3). Years of experience within glaucoma care ranged from 9 months to 21 years. Initial analysis identified six main TDF domains that influence adherence manage-

ment: (1) knowledge, (2) skills, (3) reinforcement, (4) memory, attention and decision processes, (5) environmental context and resources and (6) behavioural regulation. The main barriers ECPs encountered to adherence were patient forgetfulness, lack of patient knowledge about glaucoma and treatment rationale, side effects from eyedrops, and poor instillation technique. Emerging themes “developing trust”, “non-judgemental approach” and “time constraints” were influential in ECPs identifying nonadherence. The main domain associated with use of technology was “knowledge”. ECPs were not aware such interventions existed. Key themes “accessibility”, “patient familiarity with technology” and “time constraints” were identified as issues in recommending technology.

Conclusion

ECPs in the UK state medication nonadherence remains an ongoing issue and current methods to improve adherence are of limited success. There is a lack of awareness regarding technology-based solutions. Further work is needed on how these solutions could improve adherence and on educating ECPs on their benefits.

Keywords

Glaucoma medication adherence, technology-based interventions, Theoretical Domains Framework, eye care practitioner

References

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## #29 Burnout in Optometry: Risks and Prevention

### Authors

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### Topic

Education

Abstract

Educational topic: “Burnout” has been classified as a true syndrome by the World Health Organization (WHO). The WHO defines burnout as chronic workplace stress, associated with exhaustion, negative attitude about a job with a resultant lower professional efficacy. The COVID-19 pandemic increased attention to burnout, but burnout has been in existence long before the pandemic, especially in individuals employed in the healthcare industry, including optometry. Burnout impacts individuals through both mental and physical health problems and impacts their patients who receive poorer care.

Content

There is evidence that prevalence of burnout among healthcare physicians is twice that of other professions. Nurses have a burnout rate lower than physicians, but it can vary widely by nursing specialty, the work setting and the country. There are fewer data on other medical specialties though there is evidence that higher-status providers (medical physicians, nurse practitioners)

have greater likelihood of work-related stressors that would lead to burnout. But there is a paucity of information on other high-level providers—optometrists, dentists, and podiatrists. A national study is underway in the United States that could serve as a template for optometry in other countries.

#### Results

The issues that contribute to healthcare burnout are grouped into two categories: institutional and individual factors. Institutional components include environment, culture, work schedule and job outlook, while individual/personal factors are general health, work-life balance, and supportive relationships. The highest risks are related to the workplace, especially workload, autonomy, and supervisor support. There is inconsistency among studies as to whether medical specialty has an impact on burnout. Somewhat surprisingly, younger individuals are more likely to suffer burnout than older providers who have been practicing longer.

#### Recommendations

Burnout is a syndrome that disproportionately impacts healthcare providers, including optometrists. Despite the likelihood of burnout in a healthcare career, professional schools do not prepare students for the likelihood of its occurrence. Optometry schools should consider adding to their curriculum information on skills for combatting stress, improving resilience, and preventing burnout. In addition, national associations should consider surveys of optometrists to determine prevalence and risks of burnout unique to the profession in each country.

## #30 Role of corneal epithelial thickness mapping in monitoring the effects of overnight orthokeratology

#### Authors

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#### Topic

Scientific

#### Abstract

##### Purpose

The aim of this study was to investigate the changes of corneal epithelium thickness, their correlation with changes in refraction and the curvature of the anterior surface of the cornea in monitoring the effects following 12 months of overnight orthokeratology (OK).

##### Methods

The study included 71 patients (141 eyes) diagnosed with myopia, and the follow-up period took 13 months. The patients were divided into three groups depending on the spherical equivalent group 1: -0,75 to -3,0Dsph (n =56); group 2: -3,25D to -5,0Dsph (n =64), group 3: -5,25 to -5,75Dsph (n =22). Spectral domain optical coherence tomography (SD-OCT) was conducted to measure the corneal thickness (CET) and stromal thickness (sector- central 2mm, 2-5mm, 5-7mm and 7-9mm) before and after OK lens wear (1month, 6months and 12 months after OK wear). Complete ophthalmic examination was performed including uncorrected visual

acuity (UVA), best corrected visual acuity (BCVA), changes in refraction, maximum (Kmax) and minimum (Kmin) keratometry, corneal epithelial profile and pachymetry and axial length. All measurements were taken before OK application and 1, 6 and 12months after application.

#### Results

Visual acuity and refraction improved significantly for all patient. The mean CET of the center zone (2 mm in diameter) decreased by an average of 19.7% ( $10.87 \pm 2.79 \mu\text{m}$ ) after orthokeratology lens wear. Changes in the thickness of the corneal epithelium in patients under orthokeratological therapy correlate with changes in refraction and changes in the curvature of the anterior surface of the cornea in central 2mm.

#### Conclusions

During orthokeratology therapy a number of eye morphometric parameters change, including keratometry, axial length, corneal thickness and corneal epithelial thickness. Changes in the thickness of the corneal epithelium correlates with changes in refraction and changes in the curvature of the anterior surface of the cornea in the central 2 mm area of the cornea. Overnight OK lenses resulted in differential changes in the thickness profiles like caused the central 2 mm corneal epithelium and stroma thinner while the mid-peripheral epithelium and stroma became thicker.

## #31 The relationship between BMI, myopia, premyopia and visual function in 6-7-year-old schoolchildren

#### Authors

Dr Síofra Harrington & Dr Veronica O'Dwyer

#### Affiliation/Institution

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#### Topic

Scientific

#### Abstract

Purpose: Myopia and childhood obesity are growing health problems, and the adverse effects of obesity on visual function and refractive status in children in Ireland are unknown. This study explored the relationship between body mass index (BMI), refractive error, ocular biometrics and visual function in Irish 6-7-year-olds.

#### Methods

Participants were 728 6-7-year-olds (377 boys (51.8%)) in Irish schools. The examination included logMAR visual acuity (VA) (presenting and pinhole), stereoacuity (TNO stereo-test), cycloplegic autorefractometry (1% cyclopentolate HCL), and ocular biometry (Zeiss IOLMaster), height (cm) and weight (kg). Power vector analyses of Cartesian (J0) and oblique (J45) astigmatism components of refractive, corneal astigmatism.

#### Results

BMI ( $\text{weight}/\text{height}^2$ ) was positively correlated with stereoacuity (arc-secs) ( $r = 0.212, p < 0.001$ ), logMAR VA at 3m ( $r = 0.102, p = 0.006$ ), at 40cm ( $r = 0.110, p = 0.005$ ), pinhole VA ( $r = 0.109, p = 0.003$ ), corneal ( $r = 0.113, p = 0.002$ ) and refractive ( $r = 0.118, p = 0.001$ ) J0 astigmatism, and negatively correlated with anterior chamber depth ( $r = -0.266, p = 0.01$ ). Nineteen per cent

(139 participants) were overweight/obese. Socioeconomic disadvantage (Odds Ratio (OR) = 2.18, 95% confidence intervals (CI):1.50 to 3.18,  $p < 0.001$ ), and non-White ethnicity (OR=2.09, CI:1.25 to 3.49,  $p < 0.001$ ), were associated with overweight/obesity. Controlling for confounders, overweight/obesity was associated with myopia ( $\leq -0.50D$ ) (OR=2.90, CI:1.13 to 8.77,  $p = 0.026$ ), premyopia ( $-0.50D \leq 0.75D$ ) (OR=1.68, CI:1.03 to 2.73,  $p = 0.037$ ), astigmatism ( $\geq 1D$ ) (OR=2.06, CI:1.14 to 3.71,  $p = 0.016$ ), visual impairment (VI) (VA $>0.3\text{LogMAR}$ ) (OR=3.19, CI:1.49 to 6.82,  $p = 0.003$ ), abnormal stereoacuity ( $\geq 240$  arcsecs) (OR=2.96, CI:1.49 to 5.14,  $p < 0.001$ ). Healthy weight was associated (OR=2.84, CI:1.13 to 7.14,  $p = 0.027$ ) with clinical emmetropia ( $>0.75$ ,  $\leq 2.00D$ ).

#### Conclusions

Higher BMI was associated with poorer visual and stereoacuity. Overweight/obese children were three times more likely to be visually impaired or myopic and twice as likely to be premyopic or astigmatic. Emmetropia was associated with a healthy weight. Addressing children's visual issues is essential to preventing obesity. Socioeconomically disadvantaged and ethnic minority children will benefit most from interventions.

## #33 Study of fixational eye movements in glaucoma using a super-fast eye tracking system

#### Authors

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#### Topic

Scientific

#### Abstract

##### Purpose

A growing number of scientific studies indicate that glaucoma is associated not only with loss of retinal ganglion cells but also with degeneration of cortical and subcortical brain structures associated with vision and eye movements (Crossland et al., 2002; McDonald et al., 2022). The effect of glaucoma pathophysiology on eye movements is not well understood, so it is extremely important to be able to quantitatively characterize fine eye movement data collected with a precision device that can easily and inexpensively accelerate its diagnosis. The aim of the study was to determine differences in eye movements in people with glaucoma and healthy subjects, tested using the FreeEye Tracker super-fast eye tracking system.

##### Method

To study eye movements during a 30-second fixation task, we used a prototype device called the FreeEye Tracker (FET), which was designed and assembled in our laboratory (Bartuzel et al., 2020). The unique capability of this device is to provide precise information (with an accuracy of about 1  $\mu\text{m}$  on the retina) on eye movements during the fixation task (and other visual tasks) collected at high frequency (more than 1240 eye position measurements per second). We con-

ducted study on 9 glaucoma patients and 6 healthy people of similar age ( $\pm 65$ ). The subjects' task was to look at a fixation points displayed in the center of the screen for the period of 30 seconds.

#### Results

We reconstructed the eye movement trajectory during the fixation task and calculated the bivariate contour ellipse area (BCEA) parameter as a measure of fixation stability. In healthy group the avg. horizontal axis trajectory length was 71,80° [deg] and BCEA parameter was 0,36°2. In glaucoma patients the avg. horizontal axis trajectory length was 60,91° [deg] and BCEA parameter was 0,19°2. The results of the study indicate that the glaucoma patients had greater fixation stability during the task, and their microsaccades showed smaller deviation from the center of fixation, compared to a healthy person.

#### Conclusion

The results of the study indicate that the device has the potential to differentiate basic eye movement parameters in glaucoma patients and healthy individuals. In the near future, we aim to conduct a study on a larger group of participants and with increased number of visual tasks which participants would perform.

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## #36 Evaluation of a new care model „Optometry First” to help meet Ophthalmology demand

#### Authors

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#### Affiliation/Institution

Local Optical Committee Central Support Unit (LOCSU)

#### Topic

Education

#### Abstract

Educational topic

Transformation. Traditional models for eyecare in England can no longer keep up with demand; broadening the scope of care delivered within optometric practice, utilising the capability already available within practice teams, can release capacity within hospitals for more complex care.

#### Content

In England, Ophthalmology accounts for almost 10% of the NHS backlog, with 1 in every 100 people waiting for a first ophthalmology appointment, often experiencing lengthy waits. Approximately, 30% of patients are discharged following their first attendance indicating low com-

plexity care suitable for optometric management. Following the success of CUES - a COVID-19 response urgent eyecare service delivered from local optometry practices –Bassetlaw were selected to test a new care model, developed by wide stakeholder engagement and promoted by NHS England, "Optometry First". In Bassetlaw, June 2021, capacity pressures within the local Hospital Eye Service were acute with COVID-19 protocols and staff vacancies exacerbating an already difficult situation. 4,378 patients were waiting for a first appointment, with an average wait of 50 weeks. Initiatives aimed to reduce hospital service demand and better understand referral activity with a view to exploring new pathways utilising primary care capacity and capability. An audit of backlogged referrals identified referrals suitable for optometric management. Working within the published Optometry First framework, new pathways were commissioned to start to build a comprehensive optometry service to receive the redirected activity and better manage low risk activity within first contact care.

#### Results

Referrals were redirected for management in primary care optometry, resulting in a reduction in demand for ophthalmology services with a corresponding reduction in waiting times. 56% of paediatric referrals were considered suitable for optometry, with 75% fully managed, whilst 23% of adult referrals were redirected optometry, with 87% fully managed, resulting in a reduction in demand for ophthalmology services.

#### Conclusions

These results confirm that optometry can be utilised to help meet demands in ophthalmology and reduce waiting times. To meet growing demand in England, the transformation of eyecare services must involve managing more patients in primary care, making better use of the available workforce. Referral audit should be a first stage for eyecare transformation.

### #37 The impact of the vergence-accommodation conflict during the 30-minute VR session on the parameters of fusional vergence ranges and phoria.

#### Authors

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#### Topic

Scientific

#### Abstract

Purpose

With the growing popularity of virtual reality (VR), this study examined if 30-minutes of VR exposure might affect phoria, fusional vergence ranges (FVR) or user's subjective symptoms. Turnbull & Phillips haven't found any important changes in distance and near phoria after forty minutes VR exposure. On the other hand Yoon et. al. found growth at distance phoria values however they VR session lasted two hours.

#### Methods

Twenty-six participants were recruited, but only eighteen female, mean age  $22,5 \pm 2,0$ , ranged from 19 to 27 years old participated in the two study sessions, which were separated by at least one week. The 30-minute study sessions differed by the vergence-accommodation conflict (VAC) presented in the VR system (minimal- C1 vs. maximal-C6), with the VAC determined randomly for each participant. The distance and near phoria were examined using Maddox rod, fusional vergence ranges using von Graefe method and subjective symptoms including nausea, oculomotor discomfort and disorientation (N, O and D) with Simulator Sickness Questionnaire. They were measured immediately before (pre-test) and after (post-test) the session. The pre- and post-test outcomes were compared using Anova test.

#### Results

The pre-test near phoria was -2 and did not differ significantly from the -3 after C1 and C6 conditions  $p=0,097$  The subjective nausea grade increased significantly ( $p<0,001$ ) from 12 to 41 after the C1 and from 6 to 23 after C6 conditions, respectively. FVR values did not change in the Post-test in relation to the Pre-test in any of the tested conflict conditions at distance and at near.

#### Conclusion

30-minute VR session did not significantly affect parameters of phoria and FVR regardless of the size of VAC (large or small). Moreover, VAC did not have influence on subjective feeling of user from two out of three categories: oculomotor disorders and disorientation, however it did significantly affect nausea.

### #38 Incorporating Artificial Intelligence in eye screening practice of optometrists – new approach to digital assessment of early symptoms of open angle glaucoma

#### Authors

mgr inż. Andrzej Piotrowski, clinical optometrist, Director of Training Centre in Optometry in Vision Express Sp. z o.o., lecturer in Społeczna Akademia Nauk in Łódź, specialized in DR, AMD, Glaucoma and Cataract early symptoms screening within OPTISCAN project since 2017 in Poland with usage of Artificial Intelligence by Retinalyze System from Denmark, processing circa 300 000 screenings in Poland in 150 stores within 12 months.

#### Affiliation/Institution

Społeczna Akademia Nauk in Łódź

#### Topic

Education

#### Abstract

Subject:

Incorporating Artificial Intelligence in eye screening practice of optometrists – a new approach to a digital assessment of early symptoms of an open angle glaucoma. [educational category]

#### Author

mgr inż. Andrzej Piotrowski, clinical optometrist, director of a Optometry Training Centre in Vision Express Sp. z o.o., lecturer in Społeczna Akademia Nauk in Łódź, specialized in DR, AMD,

Glaucoma and Cataract early symptoms screening within OPTISCAN project since 2017 in Poland with usage of Artificial Intelligence by Retinalyze System from Denmark, processing circa 300 000 screenings per year in Poland.

#### Content

Profession of an optometrist in Poland is still not regulated from a legal side. Still, a number of patients taking benefits of optometrists' profession is increasing due to long queues piling up to ophthalmologists. After a short introduction to the legal status of optometrist's profession, this lecture covers the application examples of Artificial Intelligence in a daily optometrist's service: the patented method of Hemoglobin Measurements of the Optic Nerve Head (ONH). Analysis of most often false positive and false negative results will be discussed in the context of Glaucoma prevalence concerning Polish population based on screenings for 12 months with the application of AI. Potential benefits and possible risks resulting from artificial intelligence use by optometrists will be enlisted referred to the legal restrictions in optometrists profession, introduced in the beginning of a lecture. Optic disc photographs were taken with fundus cameras (Canon CR2 AF i DRS), and the images were analyzed using the Danish artificial intelligence software, which measures the amount of hemoglobin (Hb) in 24 sectors of the optic nerve head (ONH), optic disk area, cup area and cup to disc ratio (C/D). The software also calculates the Glaucoma Discriminant Function (GDF), an index that expresses the chance of the ONH being compatible with glaucoma.

#### Results

9,16% of screened Polish population have been referred to ophthalmologists based on AI screening tool with the „red” result which suggests the higher risk of open angle glaucoma. Out of 225 173 screenings ran within 9 months, 83 304 screenings concerned glaucoma risk assessment, which translates to 41 652 patients, out of which 8 168 persons were referred to a specialist. Without having an automated tool these results would not be achieved and patients would not receive an early eye care support. A combination of artificial intelligence and a competent operator, who know how to operate the system and exclude false positive and false negative results, gives more patients a necessary assistance.

#### Recommendations

Measurements of the optic nerve head hemoglobin concentration demonstrated a good accuracy in differentiating healthy eyes from eyes with mild glaucoma symptoms. Automated tool needs however, a suitably trained operator, such as an optician, an optometrist or a nurse. Using artificial intelligence reduces time of the service per patient down to 3-4 minutes, whereas the initial AI analysis takes no more than 30 second per screening. Excluding false positive and false negative results takes additional tens of seconds up to a few minutes. Capability of right evaluation of results enables widening age recommendations given by creators of the AI system. False positive results are categorized in 5 groups and practical knowledge of classifying them is relatively easy to acquire.

#### Author relations:

Author performs optometric' trainings for the company Vision Express in Poland with the application of Artificial Intelligence by Retinalyze A/S from Denmark, none of which is funding this lecture.

## #39 Repeatability and reproducibility of corneal epithelial thickness mapping with spectral domain optical coherence tomography using Canny Edge segmentation algorithm

#### Authors

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#### Affiliation/Institution

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#### Topic

Scientific

#### Abstract

Repeatability and reproducibility of corneal epithelial thickness mapping with spectral domain optical coherence tomography using Canny Edge segmentation algorithm

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#### Purpose

To evaluate the repeatability and reproducibility of epithelial thickness (ET) mapping obtained by SD-OCT Canny Edge segmentation performed on healthy corneas without surgical experience.

#### Method

In the methodological study, an experienced solo operator using SD-OCT Maestro 3D (Topcon) performed 3 continuous 12-line radial scans of 100 corneas from 100 subjects in 5 age groups (n group = 20): 1) age £ 17 years, 2) age 18 – 29 years, 3) age 30 – 44 years, 4) age 45 – 60 years, and 5) age <sup>3</sup> 60 years. MedCalc<sup>®</sup> vers.20.106. software (MedCalc Software Ltd, Ostend, Belgium) used to evaluate repeatability and reproducibility of ET measurements at central zone and 8 paracentral zones in diameter from 5 to 6 mm. To assess repeatability intra-class correlation coefficient (ICC 1,1), within-case coefficient of variation (wCV) and repeatability coefficient (RC) was calculated. The concordance correlation coefficient (p C) and reproducibility coefficient (RCD) used for evaluation of the ET mapping reproducibility. Repeated measurement ANOVA used to analyse outcome difference depending on age. The study has been conducted at optometry practice Alliance Optikk, Andalsnes, Norway in accordance with the Helsinki Declaration.

#### Results

ET repeatability at central zone was as follows – ICC 1,1 = 0.73, wCV = 3.7% and repeatability coefficient RC = 4.92 mm. At 8 paracentral zones – ICC 1,1 was in the range from 0.26 to 0.41, wCV from 8.2% to 10.9% and RC from 7.89 mm to 9.71 mm. Reproducibility of ET mapping at central zone was p C = 0.73, RCD = 4.95 mm and at paracentral zones p C was from 0.26 to 0.41,

and RCD was from 7.86 mm to 9.62 mm, which comprise 22% to 29% of the layer thickness. According to repeated measures ANOVA there is no difference for ET mapping repeatability (wCV  $p = 0.16$ ) and reproducibility ( $p = 0.24$ ) depending on age.

#### Conclusions

Maestro 3D SD-OCT corneal ET maps would be rather considered as reference than diagnostic tool, as Canny Edge layer segmentation performance is good only in central zone, but repeatability and reproducibility at paracentral zones are insufficient.

#### Keywords

epithelial thickness mapping, optical coherence tomography, corneal layer segmentation

## #41 Can proper nutrition relieve digital eye strain?: Nutrition in digital eye strain

#### Authors

Anna Kraśnicka

I am a master of optometry with 9 years of experience. Currently, in my job, apart from practice, I am an expert in the development of optometry in our company, which involves training optometrists and taking care of proper practices.

#### Affiliation/Institution

Poland, Poznan: Lynx Optique, Medicover Optyk

#### Topic

Education

#### Abstract

Abstract content:

#### Clinical topic

Nowadays, in optometric practice, it is not difficult to find a patient who excessively uses digital devices during his day. As specialists, we are able to recognize clinical manifestations of digital eye strain. In practice, the management of digital eye strain (DES) includes appropriate correction, blink training, the use of drops, filters, especially a blue light filter, management of accommodative anomalies. And should an optometrist also manage the diet of patient with a DES? In my presentation, based on scientific research, I want to present what micronutrients can affect the alleviation of DES. I will refer to the anti-inflammatory, antioxidant of: omega-3 fatty acids, lutein, anthocyanins and give information on what exactly these ingredients can work in relieving DES and in which food to find them.

#### Content

The beneficial effects of DHA against the underlying mechanisms of dry eye disease are supported by solid scientific evidence. Dry eye syndrome is one of the most common symptoms in DES. Omega-3 reduces the rate of evaporation of tears, increases tear secretion, has a beneficial effect on the meibomian glands, reduces the feeling of dryness 1-3. It is found for example, in fatty sea fish, linseed oil. Glare effects remain a frequently reported symptom of DES and studies indicate that lutein brings significant improvements in visual performance under glare conditions 4-6. In addition, lutein is a natural blue light filter and its amount affects the

density of the macula 5. Lutein is found from kale, spinach or egg yolk. Statistics in adult people indicate that the average daily intake of lutein is 2mg, while about 6 mg gives a positive effect. Reports on the role of anthocyanin in DES indicate a beneficial effect in the function of accommodation, namely anthocyanin can relieve the tonic accommodation of the ciliary muscle caused by near-vision tasks 7-8.

#### Results

1. Diet can have a positive effect in relieving DES symptoms.
2. The effect of omega 3 in relieving dry eye is well documented.
3. Patients after supplementation with Omega 3 indicate a reduction in the feeling of tear dryness, which improves their quality of life
4. Studies indicate that omega-3 facilitates the accumulation of lutein in the blood and macula.
5. Anthocyanin can relieve the tonic accommodation of the ciliary muscle caused by near-vision tasks

#### Conclusion

DES will continue to be a major public health problem. The management of DES in accordance with holistic prevention can be supported by educating the patient about proper nutrition. Each of our patients should know what foods affect the alleviation of DES. Each optometric interview could be varied with questions about the current diet and dietary supplements taken. After a detailed eye examination, refer to the interview and tell what oxidative stress is, what antioxidants are, what nutrients affect the visual system and in what food they are found. Nutrition may contribute to the alleviation of DES and, in combination with proper work ergonomics, improve the quality of functioning of patients with digital devices. Optometrists aware that they should at least minimally manage the diet of every patient who functions in a digital environment.

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## #42 Optometrist's Approach to Meibomian Gland Dysfunction: Diagnostic Modalities and Patient Care Options

### Authors

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### Topic

Clinical

### Abstract

This interactive presentation will focus on the practical approach to clinical recognition of evaporative dry eye caused by meibomian gland dysfunction as well as modern management options for patients affected by the different stages of this condition. It will combine literature-supported current diagnostic modalities and management options with audience-selected current best practices.

- Review of the tear film components
- Review of the anatomy and physiology of the meibomian glands
- What is meibomian gland dysfunction and how it leads to evaporative dry eye?

#### Definition

Current understanding of the pathophysiology

#### Stages

- Clinical protocol for the evaluation of the meibomian glands and the tear film

Pertinent history and risk factor assessment

Questionnaire (OSDI, SPEED)

Vision acuity

Keratometry

Meibography (blink analysis, meibomian gland imaging, tear film thickness, lipid layer thickness; recognition of meibomian gland atrophy, tortuosity, and segmentation)

Biomicroscopy (meibomian gland expressibility, meibum quality)

Vital dyes (sodium fluorescein, lissamine green, rose bengal)

Blink rate

Tear meniscus height

Tear break-up time

Fluorescein disappearance test

Schirmer test

- Patient Care Options

#### General strategies

Home-based management options (lid hygiene; topical lubricating eye drops containing lipids; nutraceuticals such as omega fatty acids, medications such as cyclosporine A, azithromycin, tetracyclines)

Office-based management options (mechanical eyelid debridement; manual meibomian gland expression; thermal pulsation (LipiFlow, iLux, iLux2); targeted heat (TearCare, iLux, MiBo Thermoflo, eyeXpress, Thermal 1-Touch); intense pulsed light therapy (OptiLight))

## #43 Utilization of DIMS Technology in a Caucasian Patient Base of Progressing Myopes

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### Topic

Clinical

### Abstract

The standard of care for young, progressing myopes has shifted rapidly in recent years. It is now widely accepted that a child at risk for fast progressing myopia as a result of axial length growth should receive treatment to slow this growth. The benefit of slowing axial length growth results in short-term quality of life refractive benefits and very importantly lessens the risk of long-term ocular health issues such as glaucoma, maculopathy, cataracts and retinal tears/detachments. In recent years multiple effective treatment options have become available to slow axial length growth. These treatment options have been demonstrated to be effective through multi-year, randomized-controlled trials. Much of the evidence base that has been completed has involved children of an Asian background as this is the ethnicity that has historically been most affected by myopia progression. Currently, there are a limited number of large, long-term studies involving Caucasian children. The DIMS (Defocus Incorporated Multiple Segments) technology has been shown to be effective in a recently completed 2 and 3-year RCT by Carly Lam et al. at the Hong Kong Polytechnic Institute that involved children of Asian background. I have performed a retrospective analysis of the treatment effect for Caucasian patients that have received care at Family Focus Eyecare (Saskatoon, Saskatchewan, Canada), that were prescribed the DIMS technology beginning in June 2020. Data from 70 patients was analyzed that had utilized the lens for 12 months. Data from 40 patients was analyzed that had utilized the lens for 24 months. Patients that were prescribed other myopia interventions along with the DIMS lens were not included in this retrospective analysis. Comparison to a historical, Caucasian population database was utilized to compare the progression of myopia and axial length in the 12 and 24 month groups. The change in axial length and refractive error at 6, 12, 18, and 24 months was analyzed to determine the rate of progression experienced by the children prescribed this treatment. Conclusion – Clinicians can be confident that the DIMS technology is similarly effective in slowing the progression of axial length/myopia progression in both Caucasian and Asian patient bases.

## #44 Efficiency of Vision Relaxation in Computer Users

### Authors

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**Topic**  
Scientific

**Abstract**

**Purpose**  
With the development of new technologies, the number of persons who feels discomfort working with digital devices increases. As a result, the number of asthenopic complaints also increases. Various vision relaxation exercises are mentioned as one of the most effective ways to reduce asthenopic complaints. However, there are limited number of objective data demonstrating changes in visual system as a result of the vision relaxation exercises. The purpose of the study was to evaluate the efficiency of these exercises in computer users.

**Method**  
In the study, all participants were evaluated for clinical, subjective and objective changes before and after 4 weeks: questionnaire to evaluate working habits and everyday activities, full eye and vision examination, accommodation evaluation (PowerRef3) and saccadic movements (EyeLink 1000+). There were three groups of participants: (1) control group – no exercises, (2) training group 1 (vision relaxation training without any devices); (3) training group 2 (vision relaxation training with EyeRoll device).

**Results**  
The results demonstrated several changes: reduction in a set of asthenopic complaints (such as eye and vision discomfort and tearing), improvement of accommodative response and precision of saccades. There were no statistical changes in objective and subjective refraction, visual acuity, and binocular functions of participants in both training groups.

**Conclusion**  
In conclusion, vision relaxation exercises can be applied by computer users to reduce asthenopic complaints, as well as to improve accommodation and eye motility. Despite the widely spread rumours that vision relaxation exercises are a tool to get rid of the glasses, our study proved that these exercises can not reduce refraction and remove the glasses. Thus, we conclude that it is a myth.

## #50 Tele-triage system in an optical setting in the Netherlands

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**Topic**  
Optical

**Abstract**  
Optical topic  
The accessibility of eye care in the Netherlands is under pressure. The waiting lists are growing, where the demand is higher than the supply. An increase in eye diseases is expected due to the aging population. Besides ophthalmologists, there are also other medical professionals like optometrists active in eye care. Most of the optometrists in the Netherlands (45%) are working in an optical setting, but they only see on average 19 patients a week. On average, 75% of the patients have low-complex complaints where only an optometric examination is sufficient. If optometrists would see more patients in the optical setting, this could lead to shorter waiting lists.

**Content**  
A tele-triage system was implemented in 142 optical stores to deploy optometrists in another more efficient way. In the Netherlands, both opticians and optometrists are working in an optical setting. The optician is responsible for the refraction and is not allowed to check on eye health, whereas the optometrist is educated to say something about eye health. With this system, clinical and optical data of the clients were derived in the stores by the optician and sent to a remote optometrist. All the customers visiting the stores for refraction were able to do a remote eye health check. The optometrist examined the data and responded back to the customer. When the optometrists wanted further optometric examination, an extra appointment was made in the store where the optometrist did a live consultation in the store.

**Results**  
In a period of 18 weeks a total of 12064 clients were examined through the tele-triage system. Of these clients 5187 (43%) had no eye diseases, 1327 (11%) had dry eyes, 3016 (25%) had low complex complaints, 1206 (10%) needed additional optometric evaluation and 1206 (10%) were referred to the ophthalmologist.

**Conclusion**  
Tele triage system is scalable and applicable on a large scale. It is highly suitable in an optical setting which provides fewer and targeted referrals, leading to less pressure on the eyecare system. It also helps to bring the optician and the optometrists on to a higher level.

## #51 Effects of defocus incorporated multiple segments (DIMS) on reading behavior of Caucasian children.

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**Topic**  
Scientific

**Abstract**  
Purpose  
The aim of this study was to assess the effects of Defocus Incorporated Multiple Segments ophthalmic (DIMS) lenses on reading behavior through eye movement recordings.

## Methods

Twenty Caucasian children aged 7 to 12 with a corrected monocular distance high contrast VA  $\leq 0,00$  logMar, spherical refractive error between -0,50 and -5,00D, anisometropia  $< 1.00D$  and refractive astigmatism  $< 0,75D$  were selected. To record the reading behavior was used the Clinical Eye Tracker system (Thomson Software Solutions Ltd.) using different targets, with high contrast words presenting 25% crowding and validated to measure the speed and correctness of reading in children (Prove MT-3 Cornoldi), presented on a computer monitor (E27705H, AOC) at a viewing distance of 50 cm to obtain a 0.6 logMAR VA. Reading rate (number of words read per unit time), fixations (the total number of "eye stops" or pause of the eyes during reading) and regressions (fixations that are directed from "right to left" or regressive movements) were measured after two weeks of adaptation of single vision lenses (SVL) and DIMS lenses (MiY-OSMART, Hoya Vision Care) done from the same material and with the same AR treatment. All subjects selected used both lenses in the same frame.

## Results

The subjects enrolled for the study (8M and 12F) presented (mean $\pm$ SD): age  $9.7\pm 1.5$  years with a spherical equivalent of  $-2,00\pm 1,12D$  in REs and  $-2.20\pm 1,09D$  in LEs. The DIMS lenses compared with SVLs induced a significant increase (t-test  $p<0,01$ ) of number of words read in a minute, respectively  $198\pm 63$  w/m vs  $165\pm 43$  w/m and a significant reduction (t-test  $p<0,05$ ) of number of fixations in a minute, respectively  $15,22\pm 4,58$  fix/m vs  $16,91\pm 3,79$  fix/m. No significant differences (t-test  $p=0,33$ ) were found for the number of regressions, respectively  $4,62\pm 1,77$  reg/raw vs  $5\pm 1,21$  reg/raw.

## Conclusions

The results obtained suggest that the children's reading behavior using DIMS lenses may improve compared with SVLs. One possible explanation for our results can be related to the slight reduction of mid-peripheral vision through DIMS lenses compared with SVLs that could force subjects to maintain steadier central fixation. Another possible reason may be related to changes in accommodation stemming from the additional optical power of the lens in periphery.

## #55 Subjective evaluation of patient adaptation to progressive ophthalmic lenses with custom and non-custom designs

### Authors

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### Topic

Scientific

### Abstract

Progressive addition lens intolerance is one of the main concerns in ophthalmic practice. Although half of the reported cases are usually due to incorrect refraction, 1/3 of the adaptation problems are due to errors in measuring and fitting ophthalmic lenses. Recently, however, several companies have developed custom designs and introduced video-based centration systems capable of measuring pupillary distance and all other centration parameters relevant to the fitting of progressive lenses with more advanced designs.

## Purpose

To quantify the subjective evaluation of wearers' adaptation to progressive lenses with custom and non-custom designs with measurements of ocular parameters and physiognomy obtained with Visioffice, Essilor).

## Methods

The subjective assessment of comfort and visual ability, a visual satisfaction questionnaire was obtained in 11 progressive lens wearers with an multiple vertical visual analog scales assessing comfort, subjective visual performance and subjective task performance. Subjective comfort was rated from very uncomfortable to very comfortable and for visual performance and task performance, patients were asked to rate their satisfaction with respect to distance, intermediate, near, and high or low light vision, and daily tasks. After refraction evaluation, the ocular parameters were obtained, and two frames were used, one type per sex. The lenses fitted were of the same range, one personalized and one not, and the subjects masked. The custom lens used was the Varilux Xclusive 4 D whose parameters used for its customization were naso-pupillary distance, mounting height, vertex distance, pantoscopic angle, frame curvature, dominant eye, reading distance and near visual behavior (NVB). The lens without customization (Varilux X Design) the parameters used were naso-pupillary distance and mounting height. In the first phase, they wear the lenses for 3 weeks in all daily tasks, and then they return to deliver the lenses and filled out the questionnaire. After a washout period of 15 days, the subject returned to wear another lens for use for 3 weeks. After this period, they again completed the questionnaire on subjective evaluation.

## Results

There is a significant difference between custom lenses compared to non-custom in the degree of satisfaction with distance vision ( $8,6\pm 1,8$  vs  $5,7\pm 2,3$ ,  $p\leq 0,01$ ); for intermediate vision ( $8,7\pm 1,4$  vs  $4,3\pm 2,0$ ,  $p\leq 0,01$ ) and for near vision ( $9,0\pm 1,7$  vs  $5,4\pm 1,7$ ,  $p\leq 0,01$ ). Regarding comfort, all subjects were significantly more comfortable with custom lenses (mean value  $\geq 9,0$  for all comfort items) compared to non-custom lenses (mean value  $\leq 6,0$  for all comfort items). Regarding visual performance, the lowest score was obtained for intermediate vision ( $8,8\pm 1,1$  for custom and  $4,8\pm 1,7$  for non-custom,  $p\leq 0,01$ ). All the subjects rated taking measurements with the Visioffice as difficult; all of them rated taking measurements with these systems very important ( $9,7\pm 1,5$ ).

## Conclusions

Custom design progressive lens is significantly preferred by users over noncustomized lenses. The way to improve the progressive lens-wearing experience is to customize this type of lens by introducing the wear parameters of the frame, other centration parameters, and actual daily needs.

## #57 The influence of optometric visuomotor training on soccer skill performance of young soccer players.

### Authors

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**Topic**

Scientific

**Abstract**

## Purpose

Soccer is one of the most popular games in the world. Individual performance depends upon technical skills and physical/mental conditions. Visual cues guide movement/development. The aim of this study was to evaluate selected visual functions (including eye-hand coordination, reaction times, and peripheral awareness of visual stimuli) and to verify whether there is a direct link between the visual functions and the achieved level of soccer skills but also to assess the influence of visual-motor training, with the use of the Wayne saccadic fixator (players aged 10-13 years).

## Methods

Thirty-three amateur soccer players (14) experimental and (19) controls participated. Players in the study group participated in once-a-week, 45-minute visual-motor training sessions, using the Wayne saccadic fixator, for 6 consecutive weeks. A complete optometric eye examination/ soccer skills assessment was performed at baseline and after 6 weeks of participation.

## Results

At baseline, the amateur soccer players outperformed their peers (non-trainees) in fourteen visual functions. Seven visual parameters predicted enhanced soccer performance. Visual-motor training with Wayne's saccadic fixator significantly improved the players' ability to control the ball with frequent changes of direction, which was confirmed by the dribbling test.

## Conclusion

The study shows that the proposed vision training regime could be widely implemented as an important element of players' development.

**#58 Sensory aniseikonia****Authors**

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**Topic**

Clinical

**Abstract**

Clinical topic

Sensory aniseikonia

## Content

Aniseikonia is a term describing unequal / incongruent images of both eyes, as represented in visual cortex. The condition usually leads to difficulties with fusion. In optometry, the classical origin of aniseikonia is anisometropia, especially if corrected with glasses. The solution is in using modified spectacle lenses and / or contact lenses. However, there are also various retinal con-

ditions causing stretching or condensing of the photoreceptor layer, resulting in unequal representation of the image sizes or shapes from both eyes. Consequently, fusion is impaired in similar way as in optical aniseikonia and patients experience different types of asthenopia.

## Actions taken

In contrast to optical aniseikonia, the sensory type is not uniform across visual field and is usually focused on the macula region. The reasons for sensory aniseikonia are different retinal conditions, most commonly: epiretinal membrane, retinal detachments and serous detachments. There are several ways of detecting and measuring aniseikonia; the procedures do not differ much in optical vs. sensory-types. The classical polarised tests will be explained in the presentation. The solutions in terms of iseikonic correction of vision will be presented by using case studies. The use of special-design spectacle lenses as well as combination with contact lenses will be presented. The frequent combination with prism correction will be mentioned as well. The prognosis of the specific conditions, also post-surgically, will be discussed.

Conclusions sensory aniseikonia is not a rare condition and in times of widespread OCT use, the conditions causing it can be much more easily detected. Still, measuring the image sizes and correcting for it, is one of the core competencies for optometry. By quantifying the retinal traction we can add valuable data to the retinal specialist and help patients. Through engagement in retinal sensory matters, optometrists can add a new approach to the structure – function aspect of the central retina.

**#60 Caring for Children with Down Syndrome****Authors**

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**Topic**

Clinical

**Abstract**

This course provides an overview of what optometrists should know when providing eye care to children with Down Syndrome (Trisomy 21). Background information is presented regarding the genetics of the condition as well as common clinical features associated with this syndrome. The most effective eye exam techniques to assess visual acuity, binocular vision and ocular health are reviewed. A significant portion of the course highlights prevalent eye findings or conditions found in those with Down Syndrome. The course concludes with a discussion of helpful community resources to share with a patient's family.

## #61 Pediatrics for the Primary Care Optometrist

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### Topic

Clinical

### Abstract

This course provides a comprehensive review of the basics of pediatric optometry for primary care practitioners. A significant portion of the course highlights the necessary "tools of the trade" and best examination techniques for infants and preschool children. This is done via a step by step approach through the elements of a complete examination. Recommendations for appropriate prescribing of glasses for infants and preschoolers are also presented. The course concludes with a brief overview of the most common types of strabismus and amblyopia.

## POSTERS

## #01 Evaluation of Clinically Centered Microbiology and Immunology Coursework on Student Perceptions and Learning Outcomes

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### Topic

Education

### Abstract

Educational Topic: By designing a curriculum highly focused on ocular Microbiology and Immunology, and utilizing an interprofessional education component that utilized optometric clinicians and case-based learning, learning outcomes, as well as student interest in the course, would increase.

### Content

For beginning health professions learners, it is difficult to connect fundamental science constructs in Microbiology and Immunology to clinical scenarios. These challenges can be overcome through thoughtful linkage of fundamental and clinical concepts, which is the basis for vertical integration of curriculum. While many studies have shown the usefulness and effectiveness of vertical integration in health professions, very few have examined curricular integration modifications in optometric education. Therefore, we focused on vertical integration within a single, first-semester course for the first-year optometry students. An interdisciplinary curriculum taught by microbiologists, immunologists, and clinical optometric faculty was designed that intentionally focused on ocular manifestations of infections and immune responses and integrated clinical cases into the didactic lectures. The learning outcomes and student interest were evaluated using a mixed-methods design utilizing survey and summative assessment data.

### Results

Students voluntarily returned the pre and post surveys in large numbers. With the inclusion of clinical integration, there was an increase in student perceptions of the relevance of the course to their future career and in understanding of the course material. There was a positive correlation between performance on clinically based exam questions and overall performance in the course. Future studies should be multi-institutional, longitudinal, and consider different clinically based integrations, such as team-based learning, problem-based learning, and others.

## Conclusions

An interdisciplinary curriculum was designed that successfully increased learning outcomes as well as student interest in the subject matter. The positive relationship between clinical and foundational curriculum integration with increased enjoyment and success in a fundamentals microbiology and immunology course could serve as a model for other institutions.

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## #03 Evaluation of the endothelial layer of the cornea in contact lens wearers using an endothelial microscope

### Authors

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### Topic

Scientific

### Abstract

#### Purpose

The aim of our study was to demonstrate the difference in endothelial cell density (CD) between a group of contact lens users (hard contact lenses - TKC, hybrid contact lenses - HKC, soft contact lenses - MKC) with keratoconus and non-contact lens users (without keratoconus).

#### Methods

In our study, we had data from 96 probands. Their average age was 40.5 +/- 14.05 years. For the purposes of our study, we worked with each eye separately with each eye (n = 192). Keratoconus (research group) was diagnosed in 97 eyes. The mean age of the patients in the research group was 41.9 +/- 10.6 years. Keratoconus was not diagnosed in the remaining 95 eyes (control group).

#### Results

The average number of endothelial cells in the research group was 2607.11 +/- 298.45 cells per mm<sup>2</sup>. The average number of endothelial cells in the control group was 2831.94 +/- 523.51 cells per mm<sup>2</sup>. We tested these two variables using a T-test, which showed a statistically significant difference (p < 0.001).

#### Conclusion

From our results we can conclude that there is a difference in the number of endothelial cells (CD) between patients without keratoconus and keratoconus. Furthermore, the loss of CD with age is similar in patients with keratoconus and without keratoconus.

## #04 Ocular lens density in patients with type 1 diabetes mellitus

### Authors

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### Topic

Scientific

### Abstract

Introduction: The research discusses the problem of type 1 diabetes mellitus and its impact on the ocular lens density.

#### Purpose

Objective measurement of the ocular lens density offers early detection of pathological changes in the lens structure, the possibility of monitoring the changes in the lens transparency in the time and evaluation of the possible increase in the lens density values. The main objectives of the research are as follows: (1) to measure the ocular lens density values for both eyes in the study (probands with type 1 diabetes mellitus) and control (probands without type 1 diabetes mellitus) groups, (2) to make statistical analysis of lens densitometry values for both research groups, (3) to determine the statistical deviation in the lens density values between research groups.

#### Methods

A total of 40 probands (80 eyes) participated in the study and were divided into 2 research groups. The research is devoted to the measurement of the ocular lens density by using Pentacam HR in samples from the experimental and control group of patients. Glycosylated haemoglobin levels and duration of type 1 diabetes mellitus were recorded for subsequent statistical analysis. Average lens density values from Scheimpflug analysis were recorded for each eye separately. The examinations were always performed in the same room and at the same time interval of the day (7.30 am-11.00 am). In the study were established 3 hypotheses.

#### Results

Patients with type 1 diabetes mellitus have higher values of ocular lens density compared to control subjects (p < 0.001), for each eye separately. The duration of type 1 diabetes mellitus and glycosylated haemoglobin levels have a positive but weak impact on ocular lens density values (r = 0.2, r = 0.19, r = 0.15, r = 0.07).

#### Conclusion

The type 1 diabetes mellitus significantly contributes to the increase in the ocular lens densitometry values in patients affected by this disease. There is a strong statistical dependency between ocular lens density value and diabetes mellitus type 1 compared to healthy subjects. Correlation between glycosylated haemoglobin levels and diabetes mellitus type 1 as well as the correlation between the duration of disease and diabetes mellitus type 1 is poor. It is necessary to increase the number of probands to achieve more strong results for second and third hypothesis of research.

## #09 Precise Empirical Scleral contact lens fitting designing utilizing Profilometry

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### Topic

Clinical

### Abstract

Clinical topic

Over the last decade, scleral lenses have seen a large progression in the design based on better knowledge of the scleral shape. One of these new developments is the ability to design empirical Scleral contact lens fitting method. This sophisticated method will help to reduce the chair time and higher first fitting success. In Cyprus are many post-LASIK eyes showing ectasias.

### Case presentation

For this fitting case a trial scleral Zenlens has been used for determine the power of the sclera lens as well as an Eaglet Eye profilometer measurement. The 3D Digital Scan was used to design a freeform lens SLC ADAPTA (MEDLAC Italian Lab). After the initial fit, maximum two refits have been done. A 58-year-old female with previous history of refractive surgery for myopia larger than -20.00DS, referred through an ophthalmologist for specialty contact lenses. Her unaided visual acuity for OD is 1/10 (logMAR1.0). Already used glasses OD +3.00-1.25\*97 OS 0.00-1.00\*63. Best corrected visual acuity for OD 6/10 (logMAR0.5) OS cannot be determine due to the fresh one month vitrectomy for treatment of macular hole and left ptosis. Both eyes had cataract operation in the past. Patient had a marked left esotropia with left hypotropia measuring 55ΔBO and 12ΔR/L. A freeform lens was selected while the 3D scan revealed an irregular scleral pattern.

### Conclusion

Empirical contact lens fitting has number of advantages. Patients report to have a greater satisfaction with their visit due to the reduced chair time and higher first fit success. Profilometry assists designing Empirical freeform Scleral contact lenses fitting precisely and it may help to reduce chair time and refits, with happy patients.

## #14 The effect of smoking on the corneal endothelium

### Authors

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### Topic

Clinical

### Abstract

This study deals with the effect of smoking on the corneal endothelium. The research is also based on the results of the Effects of chronic smoking on central corneal thickness, endothelial cell, and dry eye parameters study by Department of Ophthalmology, Kanuni Sultan Suleyman Research and Training Hospital, Istanbul, Turkey among others. Although this study did not prove faster decrease of endothelial cells, a change in cells morphology in smokers endothelium was found to occur. Research participants in our study will be divided into two groups - one of smokers and one of non-smokers. All of them aged thirty to fifty years. Each of them will fill out a questionnaire about their lifestyle including information about how long and how much they smoke. The research will be carried out using endothelial microscope and a slit lamp and will take place at St. Anneš University Hospital Brno. The cell density, morphology and endothelial cell size will be compared between smokers and non-smokers. The first goal of this work is to demonstrate that the number of endothelial cells of regular smokers decreases faster than the number of cells of non-smokers in the same age group. The second goal of this work is to demonstrate that the duration of use of tobacco products is directly proportional to the decrease in the number of endothelial cells.

## #18 Causes of the difference between the magnitude of the AC/A ratio determined by the gradient method and the heterophoric method

### Authors

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### Topic

Clinical

### Abstract

Causes of the difference between the magnitude of the AC/A ratio determined by the gradient method and the heterophoric method

### Abstract

The study verifies the claim that the heterophoric method has higher values than the other method. The goal of the study is also to find out what causes this difference. According to „Clinical Management of Binocular Vision“ (Scheiman, Wick; 2014) the cause is proximal vergence and lag of accommodation. The measurements will take place at Oční centrum Visual in Kroměříž. The resulting group of probands will be selected based on the appropriate amplitude of accommodation. To verify the reasons for the unequal values of the gradient and heterophoric methods, a test will be presented with a conspicuous and inconspicuous stimulus during the measurement of near heterophoria, and will also be either held at a certain distance by the patients themselves or held for them. Heterophoria measurements will be performed by both direct and indirect methods. To ensure the same distance acuity throughout the test, a line to determine heterophoria and a changing stimulus of accommodation will be projected at the same time, which the patients will have to read continuously. According to the study „The Normal Accommodative Convergence/Accommodation (AC/A) Ratio“ (Murray, Newsham; 2018), the results for

the heterophoric method are significantly higher (6/1 pD/D) than for the gradient method (2/1 pD/D; 1/1 pD/D). The reason given is the unknown amount of proximal vergence, which is not taken into account in the calculation of the AC/A ratio in the heterophoric method. In another study „Validity of Clinical Measures of the AC/A Ratio“ (Bhoola, Atchison, Bruce; 1994), the difference in values is not so great – the AC/A ratio is  $3,49 \pm 2,17$  pD/D for the gradient method and  $5,81 \pm 1,03$  pD/D for the heterophoric method. The cause given is the same as the first study. We expect to achieve similar results.

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## #22 Bacterial contamination of spectacle frames

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### Topic

Optical

### Abstract

This study deals with microbial contamination of spectacle frames. The first hypothesis of the study is that patients over 50 years of age will have higher contamination of frames than patients under 50 years of age. The second hypothesis is that the highest contamination will be in the beam area and at the side ends, and the third hypothesis is that metal frames will be more contaminated than plastic frames. The research will be conducted at the Institute of Microbiology at St. Anne's University Hospital in Brno. I will use a questionnaire for the research, which will consist of questions concerning the cleaning of spectacles and the general care of spectacle frames. From the questionnaire I will evaluate the patients' data. After completing the questionnaire, I will print the patients' frames on blood agar. After culturing the samples, I will evaluate what bacteria or fungi will be present on the frames. I anticipate that staphylococci will be the main bacteria present on the rims. The research is based on and the following studies: Site-specific molecular analysis of bacteriota on worn glasses. This study is from 2020, the authors are Birgit Fritz, Melanie März, SeverinWei1, SiegfriedWahl, Focke Ziemssen & Markus Egert. The research was conducted at Furtwangen University in Germany. Samples from 30 frames were included in the study. The study resulted in 19 bacterial strains - Actinobacteria (64%), Proteobacteria (22%), Firmicutes (7%) and Bacteroidetes (5%). The predominant bacteria were mainly of human origin from skin and epithelium and potential pathogens. The second study on which my research is based is: A view to a kill? - Ambient bacterial load of spectacle frames and lenses and evaluation of different cleaning methods A 2018 study. The authors of this study

are Birgit Fritz, Melanie März, SeverinWei1, SiegfriedWahl, Focke Ziemssen & Markus Egert. The study was conducted at Furtwangen University in Germany. Samples were from 21 frames - 11 spectacles worn in the university setting and 10 spectacles worn in a nursing facility. All of the spectacles were contaminated with bacteria, mainly from human skin, and all were found on the saddles and tips of the spectacle frames. The bacteria could be assigned to 10 genera, with staphylococcus - S.epidermidis being the most common.

## #27 Impact of keratoconus alteration on glaucoma screening

### Authors

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### Topic

Scientific

### Abstract

Purpose: To determine the impact of keratoconic alterations on corneal biomechanics on glaucoma screening outcomes based on measurements made with ORA and Corvis ST.

### Methods

Orange Data Mining software was used to create Naïve Bayes (NB) and Logistic Regression (LR) supervised machine learning models from ORA and Corvis ST IOP and corneal biomechanical measurements made in 552 eyes: 258 healthy, 90 primary open angle glaucoma (POAG), 47 ocular hypertension (OHT) and 19 normal tension glaucoma (NTG). Cross validation revealed the performance of each model based on the area under the receiver-operating characteristic curves (AUROC). Each model was used to classify a new dataset of 157 eyes without glaucoma; 79 of which had keratoconus. Chi-square was used to determine whether keratoconus led to statistically significant misclassifications of glaucoma.

### Results

The Corvis ST LR model (AUROC = 0.819) outperformed the others (whose AUROC values ranged from 0.774 to 0.727). This model showed a statistically significant fall (Chi-square = 9.87, df = 1, p=0.002) in the percentage of correctly classified non glaucomatous eyes with (78.2%) compared to without (96.2%) keratoconus. The other models consistently showed the same trend.

### Conclusions

These findings suggest that keratoconic alterations to corneal biomechanical properties may confound glaucoma screening, if exclusively based on corneal biomechanics and IOP, potentially increasing false positives.

## #32 Refractive outcomes after cataract surgery

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### Topic

Scientific

### Abstract

#### Purpose

Cataract outcomes vary depending on the cataract type, surgeon skills and surgery type. In our research we investigated how the spherical and cylindrical components change after cataract surgery depending on the cataract type and pre-surgery refraction.

#### Method

In our research we investigated 780 eyes (mean age  $64 \pm 15$  years) which were divided depending on their cataract type: nuclear ( $n = 303$ ), cortical ( $n = 287$ ) and posterior subcapsular (PSC) ( $n = 190$ ). Patients were examined 2 weeks before and 2 weeks after the cataract surgery. Visual acuity was measured in the far distance with the Snellen E chart (decimal units) and the subjective refraction was measured by an optometrist. The results were analysed with Student's t-test.

#### Results

After the cataract surgery, visual acuity in the far distance improved by more than 2 lines for 47% nuclear, 42% cortical and 48% posterior subcapsular patients. Mean spherical component after the surgery for nuclear group was  $-0.4 \text{ D} \pm 1.3 \text{ D}$ , cortical  $0.0 \pm 0.9 \text{ D}$ , PSC  $-0.2 \pm 0.4 \text{ D}$ . Mean cylindrical component was: nuclear  $-0.8 \text{ D} \pm 0.9 \text{ D}$ ; cortical  $-0.9 \pm 0.9 \text{ D}$ ; PSC  $-1.2 \pm 0.2 \text{ D}$ . After the surgery 35% of cortical patients had myopic refraction, 50% for nuclear, and 31% for PSC.

#### Conclusions

After the cataract surgery patients with nuclear cataract have the biggest spherical and cylinder components, and 50% of nuclear cataracts patients have myopic refraction.

## #35 The Effect of Stress on Accommodative Facility Score Among University Students

### Authors

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### Topic

Scientific

### Abstract

#### Title

The Impact of Ocular Fatigue on the Accommodative Facility Score

#### Conference

The European Academy of Optometry and Optics (EAOO)

#### Background and Purpose

Previous studies show that ocular fatigue can negatively affect the ability to focus on objects at different distances (i.e., the accommodation system) (Borsting et al., 2007; Zheng et al., 2021). However, the relationship between fatigue and the ability of the eye to change focus on objects at a fixed distance, i.e., the clinical measure of accommodative facility (AF), is poorly understood. This longitudinal study examined the impact of ocular fatigue (using the Convergence Insufficiency Symptoms Survey [CISS] questionnaire (Rouse et al., 2009)) on AF in a group of ocularly healthy university students across an academic year.

#### Methods

Our longitudinal study investigated the relationship between ocular fatigue and accommodative facility in a sample of 2<sup>nd</sup>-year undergraduate optometry students. The sample consisted of 55 participants aged 21 to 35 years. The CISS (cut-off=21;  $\geq 21$  symptomatic,  $< 21$  asymptomatic) was an independent measure administered to assess ocular fatigue, and accommodative facility was assessed binocularly using  $\pm 2.00$  dioptre sphere (DS) lenses at 40 cm. Changes in ocular fatigue scores (FS) and the number of cycles (NoC) over the academic year were analysed using a repeated measures t-test. Pearson's correlation coefficient was used to specify the strength and direction of the linear relationship between the two variables.

#### Results

All 55 participants completed the study. At the beginning of the academic year, there was a statistically insignificant negative correlation between FS and NoC ( $r=-0.148$ ,  $p=0.282$ ), which rose to significance by the end of the year ( $r=-0.321$ ,  $p=0.036$ ). There was a significant increase in the FS (from 14.92 to 16.80) and NoC (from 7.86 to 9.89) over the academic year ( $p=0.021$ ,  $p=0.007$ , respectively).

#### Conclusion

The study found that ocular fatigue is inversely proportional to accommodative facility, and this effect became more pronounced at the end of the academic year. Yet we observe an increase in accommodative facility and fatigue symptoms by the end of the academic year, suggesting a positive correlation. These seemingly contradictory findings highlight the importance of carefully investigating and addressing the impact of fatigue on the accommodation mechanism.

## #40 Effect of sleep deprivation on accommodation facility

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## Topic

Scientific

## Abstract

Effect of sleep deprivation on accommodation facility

### Purpose

Sleep deprivation (SD) affect central nervous system, including visual processing. Several recent studies showed that SD may increase sympathetic innervation which could affect accommodation system. Thus, the aim of this work was to determine the effect of 24-hour sleep deprivation on accommodation facility (AF).

### Methods

Nine healthy young volunteers (eight females) were recruited. They were questioned about their usual sleep-wake behavior and only subjects with normal sleep habits were included. Age of volunteers ranged from 22 to 26 (mean  $\pm$  SEM: 22,6  $\pm$  0,69). All subjects had a Snellen visual acuity of 0,9 or better and normal binocular vision. In addition, subjects with a history of neurological, psychiatric or ophthalmologic diseases which may affect accommodation function were excluded. The duration of sleep deprivation was 24 hours and subjects were not allowed to ingest caffeine or alcohol during experimental night. Accommodation facility was assessed under binocular conditions using  $\pm$  2.00 lenses at 40 cm for one minute before and after sleep deprivation phase.

### Results

The present study showed significant impairing effect of sleep deprivation on accommodation facility. Statistical significance was assessed using the paired sample t-test. Mean accommodation facility (AF) before and after sleep deprivation was 12,6 (SEM: 1,86) and 10,1 (SEM: 1,42), respectively. Mean difference related to AF before and after SD was -2,55 (SEM: 0,85) and was statistically significant ( $p = 0,02$ ).

### Conclusions

The present study showed that sleep deprivation and abnormal sleep habits may affect accommodation facility. After one night of sleep deprivation, accommodation facility was significantly worse. Thus, subjects sleep – wake behavior may significantly affect visual function and should be considered in everyday optometric practice. Further studies on a larger group of subjects are necessary to evaluate the influence of SD on accommodation and other visual functions.

## #45 Google search data predicts patient and public participation in pediatric optometric research

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## Topic

Scientific

## Abstract

Purpose

Determine the priorities and public perception of pediatric optometry, by searching for data on Google.

### Methods

Exploring Google Trends has been used to collect data on weekly Google searches for the keywords "pediatric optometry" worldwide, between the years 2015 and 2022. Also, the online search query tool ("AnswerThePublic.com") to explore Google public searches in the country with the greatest interest in this field of research.

### Results

The country with the most interest in pediatric optometry was the United States, and in December 2019 it was the period of time with the highest number of searches. Worldwide, the topics related to the search in pediatric optometry were: medical prescription, refraction and binoculars. In the United States, the most frequently asked questions were: "are there pediatric optometrists", "best pediatric optometrist" and "what is pediatric optometry". The most used prepositions in the search were: "pediatric optometrist for special needs", "pediatric optometry near me" and "pediatric optometry and vision care"; and the most used comparisons were: "pediatric optometrist vs ophthalmologist", "pediatric and optometrist" and "pediatric and optometrist".

### Conclusions

Tracking Google search and identifying its source can help predict and identify the importance of pediatric optometry in society.

## #46 Adaptive control processes in the accommodative-vergence system related to the vergence prism adaptation.

### Authors

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Anna Przekoracka-Krawczyk 1

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## Topic

Scientific

## Abstract

Title

Adaptive control processes in the accommodative-vergence system related to the vergence prism adaptation.

### Authors

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## Abstract

### Purpose

The visual system like other biological systems, adapts as a result of the action various stimuli. One of the most important adaptive process in visual system is vergence adaptation (VA) mechanism which allows individual to keep both eyes on an object while maintaining a single clear image without much effort. So far, the VA process is not fully understood. VA mechanism can be examined using prism inserted in front of the eye. The aim of the current study was to examine whether changes in phoria position of the eyes after adaptation to the prism, occurs on the level of tonic tension (muscle tonic adaptation) or in the vergence-accommodation system. Prism adaptation effect (PAE) was a percentage calculation of how much adaptation at a specific distance affects to phoria value that was measured at a different distance. (e.g. in the II block, the adaptation effect was reflected in the percentage change of phoria to near).

### Methods

20 healthy adults participated in the study (age: 18-30 years). Each subjects passed two experimental blocks: I - adaptation to prisms at near distance and II - adaptation to prisms at far, when viewing a film presented on the laptop. Phoria was measured in both far (4 meters) and near (40 cm) distances before and after 30 minutes of wearing goggles with 4 BO prism in front of each eye. Maddox rotary prism was used to measure phoria before and after adaptation.

### Results

Results showed that VA in the I block was 70% and in II block was 90%. It mean VA was higher at far distance than at near distance. This difference was statistically significant ( $p < 0.001$ ). Insignificant interaction between block and PAE ( $p = 0.514$ ) shows that phoria position changes independent on the distance.

### Conclusion

In conclusion, we found that changes in phoria related to VA process were located mainly in the tonic tension system of oculomotor muscles which leads to reduced vergence effort during visual work. In practice, this observation suggests that training vergence range at one distance should affect changes in the whole vergence system. What can be observed during measurements phorie at other distances.

### Answer to Reviewer #1

Phoria measurement method was written in the abstract. The explanation of choosing this method will be described in the poster, because abstract has a limited number of word and there was no place to describe it in details.

### Answer to Reviewer #2

Conclusions were changed according to the reviewer's comments.

If after 30 minutes of adaptation have reached 90% of VA in tonic tension system, you can expect that a longer time will lead to 100% VA.

Phoria measurement method was written in the abstract.

We did measurement fusional reserve change after adaptation. There were no visual training, so we did not expect any changes in fusional reserve.

## #47 Ocular biometry in elderly Iranian population

### Authors

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### Topic

Scientific

### Abstract

#### Purpose

To determine the distribution of ocular biometry in elderly population.

#### Methods

In a cross-sectional study, multi-stage cluster sampling was performed in Tehran, the capital of Iran. After selecting the samples, participants underwent ophthalmic examinations including visual acuity, refraction, anterior and posterior segment examination using slit-lamp biomicroscopy as well as corneal imaging by Pentacam AXL.

#### Results

This report analyzed 644 eyes of 415 individuals after applying the inclusion and exclusion criteria. Of these, 236 (56.9%) were females. The mean age of participants was  $66.36 \pm 4.70$  years (range: 60 to 79 years). Mean and standard deviation of axial length, central corneal thickness, mean keratometry, anterior chamber depth, lens thickness and corneal diameter were  $23.11 \pm 0.82$  mm,  $527.25 \pm 31.99$  mic,  $43.54 \pm 1.47$  D,  $2.63 \pm 0.33$  mm,  $4.29 \pm 0.27$  mm and  $11.79 \pm 0.47$  mm of the subjects, respectively. After adjusting for sex, the mean keratometry and lens thickness have a positive association with age, and axial length, anterior chamber depth, and corneal diameter have a negative association with age.

#### Conclusions

The results of this study showed the distribution of biometric components in elderly people. This results indicated that the axial length decreased and the cornea became steeper in elderly. Paying attention to these findings is especially important in calculating the power of the intra-ocular lens in cataract surgery.

## #49 Optometry scientific research during the last 10 years in Europe

### Authors

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### Topic

Scientific

### Abstract

**Purpose** Analyze the countries, institutions, authors, and research areas with the most scientific interest across Europe in the last ten years in the optometry field.

### Methods

A search was made in the Web of Science database, using the search term "Optometry", selecting all the fields and selection as a filter the affiliation in a European country. The time interval was between 2012 and 2022. Authors were included in the analysis if they had an h-index > 10 and were affiliated with European institutions. Authors were classified by h-index, number of publications, and number of citations.

### Results

Worldwide, the first publication in the field of optometry was in 1953. Thus, the total number of publications was 48,910, 25,721 published in the last 10 years, and 8,308 in Europe. In Europe, the top three categories with optometry publications were ophthalmology (n=7,660), neurology (n=970), and psychology (n=740). In the years 2021 and 2020, the number of publications was 1,159 and 1,104, respectively. The three authors with the highest number of publications are Ursula Schmidt Erfurth (n=218), David P. Crab (n=175), and Jose M. Gonzalez Meijome (n=120). However, the three institutions with the highest number of publications were the University of Manchester (n=1,181), the University of London (n=908), and Cardiff University (n=847). Regarding countries, England (n=1,647) and Spain (n=1,563) lead the list of countries researching about optometry in Europe, where 99.8% of the publications were in English.

### Conclusions

This study has demonstrated the increase in research in optometry carried out in European institutions. Thus, half of the papers were published in the last 10 years. In addition, there is a growing number of authors who publish in high-impact journals and with great contributions in this field. England and Spain lead the research in Optometry in Europe.

## #52 The effect of monthly disposable soft contact lenses on retinal straylight

### Authors

Gatis Ikaunieks, Inese Petrovica and Gunta Krūmina

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### Topic

Scientific

### Abstract

The effect of monthly disposable soft contact lenses on retinal straylight Gatis Ikaunieks, Inese Petrovica and Gunta Krūmina University of Latvia, Faculty of Physics, Mathematics and Optometry, Department of Optometry and Vision Science, Riga, Latvia

### Abstract

#### Purpose

to determine changes in optical quality for monthly disposable soft contact lenses (SCL) wearers with new and monthly worn SCL.

#### Methods

To assess optical quality for SCL wearers, a retinal straylight was measured using a straylight meter (C-Quant, Oculus). The 33 monthly disposable silicone hydrogel contact lenses wearers (average age  $22 \pm 1.3$  [SD] years) were enrolled in the study. SCL were used on daily wear mode and were removed during sleep. Due to restriction in time the measurements were first made with monthly worn SCL, which were put in no more than 4 hours ago. Then subject removed old lenses and put in new SCL. After 15 min. adaptation time straylight measurements were taken with new SCL. At least three straylight measurements were performed in each condition. Among all subjects the questionnaire concerning vision complaints, contact lens material (lotrafilcon B or comfilcon A) was conducted. The Kolmogorov-Smirnov test of normality was used to determine the distribution of data groups. Average values between the data groups were compared using a one-tailed dependent samples t-test. Results: The decimal logarithm of the straylight parameter  $\log(s)$  was significantly increased with monthly worn SCL ( $M = 0.97$ ,  $SD = 0.17$ ) compared to brand-new SCL ( $M = 0.86$ ,  $SD = 0.15$ ),  $t(32) = 1.69$ ,  $p < 0.001$ . The average increase in retinal straylight after one month of SCL wear was  $\log(s) = 0.11 \pm 0.08$  [SD]. Such increase in  $s$  could produce perceivable decrease in vision quality. Questionnaire showed that 35% of participants distinguished decrease in visual quality after one month of contact lens wear. There were no significant differences in retinal straylight between the measurements obtained with lotrafilcon B and comfilcon A contact lenses ( $p > 0.05$ ).

#### Conclusion

Results showed that monthly disposable soft contact lenses could reduce visual quality when scheduled replacement time has been reached.

#### Key words

Retinal straylight, soft contact lenses, quality of vision

## #53 Effect of different spectacle lenses with multiple small peripheral optical elements on intraocular straylight.

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**Topic**  
Scientific

**Abstract**

**Purpose**

The aim of this study was to assess the effect of different spectacle lenses for myopia control containing multiple small peripheral optical elements on intraocular straylight.

**Methods**

The intraocular straylight was measured using a straylight meter (C-Quant; Oculus GmbH, Wetzlar, Germany) in 24 eyes of subjects with age between 9 and 13 years emmetropic or with myopic refractive error <2.00D and refractive astigmatism <0,75D. The measurements were obtained using spectacle lenses with peripheral highly aspherical lenslets (HALT) and spectacle lenses with peripheral defocus incorporated multiple segments (DIMS). Each lens design tested was mounted into a metal trial lens ring considering two different configurations: the first one with central clear zone centered and the second one with the treatment zone centered to maximize the effect of peripheral optical elements. During the measurements the trial lenses were inserted in the instrument lens holder positioned at 20mm from the corneal apex.

**Results**

Considering the configuration with clear zone centered the DIMS lenses compared with HALT lenses presented no significant differences (t-test  $p=0,86$ ) with an interocular straylight value respectively of  $0.975 \pm 0.096$  (log s) and  $0.971 \pm 0.084$  (log s). Considering the configuration with treatment zone centered the DIMS lenses compared with HALT lenses induced a statistically significant lower interocular straylight (t-test  $p=0,01$ ) with a value respectively of  $0.995 \pm 0.106$  (log s) and  $1.075 \pm 0.104$  (log s).

**Conclusions**

Intraocular straylight is the known source of disability glare that reduces the visual performance and visibility. From our results the two lenses tested with the clear zone centered presented a similar effect. Considering the results obtained by measuring the intraocular straylight through the treatment area, the two lenses tested presented small differences although statistically significant. Further studies are needed to show whether the differences found can be associated with clinically significant variations of visual performance.

## #54 Plus/minus two may not be the optimal flippers for accommodative facility.

**Authors**

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**Topic**  
Scientific

**Abstract**

**Introduction**

Accommodative facility (AF: the ability of the accommodative system to respond accurately and repeatedly to changes in accommodative demand) has long been used as a clinical measure of the responsiveness of the accommodation mechanism, often when a reduced amplitude of accommodation cannot adequately explain a patient's symptoms. The accommodative demand can be changed via the use of flippers with positive and/or negative spheres and the number of cycles completed by the subject in a given time-frame is counted. Different authors have used different values of sphere power, with a tendency towards  $\pm 2.00$ DS with a fixation target at 40cm. However, there is no evidence that this combination is optimal. The purpose of this study was to investigate the performance of a range of power combinations to establish if  $\pm 2.00$ DS is ideal.

**Methods**

58 undergraduates (age 21  $\pm 2.47$  years) were recruited from an optometry degree course. With distance refractive correction in place and a fixed viewing distance of 40cm, AF was measured with sphere combinations from  $+2.50/-1.50$  to  $-1.50/-5.50$ . All flippers had a total power difference of 4.00DS and all measurements were binocular. The number of cycles (NoC) completed within one minute were counted and a one-minute rest was given between measurements. Flippers were presented in a random order.

**Results**

Ten subjects who scored zero on the  $\pm 2.00$ DS combination were excluded from the analysis. The remaining 48 showed an average maximal performance with the  $+1,50/-2,50$ DS combination, reducing slightly either side of this peak value, and reducing further with the more extreme combinations. Some recorded zero for the more extreme combinations, presumably because tonic accommodation prevented relaxation down to zero with the  $+2,50/-1,50$ DS combination, or found the total demand of 7.50 for the  $-5,50$  limb of the  $-1,50/-5,50$ DS combination too much.

**Conclusion**

For this young-adult age group,  $+1,50/-2,50$ DS may be a more appropriate flipper combination than the more traditional  $\pm 2,00$ DS for assessing accommodative facility. This may be due to a relatively high level of tonic accommodation expected in this age group. Other combinations may be appropriate for other age groups.

## #56 Comparison of Monocular Interpupillary Distance Measurement in Children

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**Topic**  
Scientific

## Abstract

### Purpose

To compare the Welch-Allyn VS100 Spot infrared vision screener (VS100) to four commonly used methods of measuring interpupillary distance (IPD) in a cohort of children

### Methods

The average of four measurements of IPD were measured in children (n=56) aged 5-15years (mean10.15±2.65years) with the VS100, pupil distance ruler (PD Ruler), pupilometer, iPad based Essilor Eye Ruler 2 (iPad), and Grand Seiko WAM-5500 open field autorefractor (WAM) prior to the dispensing of corrective spectacles. A Repeated measures ANOVA was carried out to determine whether there were statistically significant differences in IPD measurement between the VS100 and four different devices. Bland-Altman plots were used to evaluate the agreement between test instruments. The limits of agreement (LOA) were calculated as the mean difference between 2 measurements ±1.96 times the standard deviation of the difference. The r-values between instruments were obtained using Pearson correlation.

### Results

Repeated measures ANOVA with Greenhouse-Geisser correction determined that monocular IPD measurement for the right eye(RE) (F(3.383,186.082)=38.647,p<.05). VS100 was statistically significantly larger than the pupilometer(0.898(95%CI 0.572 to 1.224)mm,p<.05), WAM(0.677(95%CI 0.247to 1.107)mm,p<.05) PD Ruler(0.706(95%CI 0.324 to 1.088) mm,p<.05), but smaller than the iPad(-0.489(95%CI -0.895 to -0.82)mm,p<.05). No statistically significant differences in LE IPD (F(3.383,186.082)=38.647,p<.05) between the VS100 and pupilometer(-0.053(95%CI -0.477 to 0.371)mm,p=1.000), PD Ruler(-0.19(95%CI -0.492 to 0.453)mm,p=1.000). VS100 measurements for the LE were statistically significantly bigger than the iPad(1.363(95%CI 0.932 to -1.794)mm,p<.05) and WAM(0.677(95%CI 0.247to 1.107)mm,p<.05). Strongly positive Pearson correlations were found for both RE and LE between the VS100 and PD Ruler(RE r(54)=.884,p<.01, LE r(54)=.815,p<.01), pupilometer(RE r(54)=.917,p<.01, LE r(54)=.855,p<.01), iPad(RE r(54)=.881,p<.01, LE r(54)=.848,p<.01) and WAM(RE r(54)=.851,p<.01, LE r(54)=.851,p<.01).

### Conclusions

The VS100 demonstrated strongly significant positive correlation with the other measurement methods tested and can measure binocular IPD comparably accurately, but generally overestimates IPD measurements. These differences, although statistically significant, are small and would be clinically acceptable in lower amounts of refractive error. This could indicate the practicality of the VS100 as a method of measuring IPD in children under age 16, and highlights potential use as a dispensing aid, allowing the dispenser a greater working distance and not invading the child's personal space.

## #59 Is there a relationship between refractive errors and headaches?

### Authors

Bc. Veronika Koňářiková, doc. Mgr. Pavel Beneš, Ph.D.

### Affiliation/Institution

Department of Optometry and Orthoptics, Faculty of Medicine, Masaryk University, Brno

## Topic

Optical

## Abstract

EAOO 2023

Is there a relationship between refractive errors and headaches?

Bc. Veronika Koňářiková, doc. Mgr. Pavel Beneš, Ph.D.

Department of Optometry and Orthoptics, Faculty of Medicine, Masaryk University, Brno

### Key words

Refractive errors, headache, MIDAS questionnaire, astigmatism, anisometropia

## Abstract

### Introduction

The research focuses on the refractive errors and their possible relationship with headache. In this study, I work with clients who have a refractive error that is poorly or not at all corrected and have presenting headaches. The aim of the study is to find out whether using the correct correction leads to a reduction in the frequency of difficulties. These subjects were also predicted to have astigmatism ≥0,5 D, as well as an unequal refractive error between the right and left eye, called anisometropia ≥0,75D.

### Material and methods

The study has so far involved 27 individuals with an average age of 26,0 years. The correction is actively used by all 27 out of the total number and the results are known so far in 19 probands, mainly because of the 3-month adaptation to the correction, when only after this time it is possible to obtain an objective assessment of the effect of the correction.

### Results

The above assumptions regarding the implementation of the correct correction and its effect on the frequency and intensity of headache was confirmed in the given group of probands. The incidence decreased in all clients and there was an average improvement of 51,5±5,5 %. In the case of the issue of headache intensity, 11 out of 19 patients (58%) experienced an improvement of 24,6±2,4 %. The second part of the research focuses on the evaluation of the refractive error. Correction of astigmatism that takes values higher than or equal to 0,5 D is present in 14 clients (52%). Finally, assessment of the difference in correction - anisometropia takes values higher than or equal to 0,75 D is present in 5 individuals out of 27 (18,5%).

### Conclusion

The knowledge regarding the effect of correction on the frequency and intensity of headaches may have a great impact on the treatment of pain, which I communicate in neurologists' outpatient clinics. Pain intensity is always a very subjective feeling and is recorded by MIDAS questionnaire. Patients usually come to the optometrists saying they need correction at distance or near. It is only at the anamnestic collection that we see the reporting of difficulties including frequent headaches and because of that the proper communication between patient and optometrist is essential.

## #62 Eye-tracker as an element of improving the didactic offer for Optometry students

### Authors

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### Affiliation/Institution

1: Department of Optics and Photonics, Faculty of Fundamental Problems of Technology, Wrocław University of Science and Technology (WrUST); 2: Department of Architecture Conservation and Restoration of Cultural Landscape, Faculty of Architecture, WrUST; 3: Department of Materials and Building Processes Engineering, Faculty of Civil Engineering, WrUST; 4: Faculty of Painting, The Eugeniusz Geppert Academy of Art and Design; 5: Faculty of Civil Engineering, WrUST; 6: Faculty of Fundamental Problems of Technology, WrUST

### Topic

Education

### Abstract

Educational topic or area Graduates of optometry must know the mechanisms of eye functioning and be able to recognize whether they run without interference. A significant part of subjective diagnostic tests gives a result based on the patient's response to certain commands: reading letters, indicating in which case the patient sees better, etc. Some tests require subtle differentiation, and the examiner often has no possibility of objective verification. A better chance of spotting small differences is learning based on tracking the patient's gaze by the device.

### Content

The establishment of the Laboratory of Eye-tracking „LET's GO”, which will be established as an inter-faculty unit at the Wrocław University of Science and Technology (WrUST), will allow the use of eye-trackers in teaching and research. Eye-tracking observation of eye movements extends the scope of information obtained regarding the physiological functions of the eye. With the use of eye tracker (ET), it is possible to notice the characteristics of the eye movements, which were not visible during the standard observation of the patient's behavior.

### Results

In the coming academic year, an eye-tracking laboratory will be set up at WrUST, which will be equipped with stationary and mobile eye-trackers. Students will expand the scope of information obtained regarding the physiological functions of the eye.

### Recommendations

The project of the Laboratory of Eye-Tracking Gives the Opportunity (LET's GO) to increase the competence of students of ophthalmic and optometry. The use of various types of eye-trackers makes it possible to verify the results of optometric tests and extend diagnostics in many areas related to vision. The possibility of using ET as a supplement to courses on the issues of Vision Therapy, neurophysiology, diagnostic tests will perfectly complement the knowledge and skills of our students. A graduate equipped with the skills to operate and use this type of devices will have significant potential for better diagnostics in the field of many vision-related disorders.

## #63 Symptoms and reduction of visual function in women with ovarian cancer undergoing chemotherapy – case study.

### Authors

Katarzyna Dubas, PhD  
Hanna Buczkowska, PhD  
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### Topic

Clinical

### Abstract

Abstract Clinical topic - Poster presentation  
Symptoms and reduction of visual function in women with ovarian cancer undergoing chemotherapy – case study.

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Ovarian cancer is the most frequent cause of deaths from among gynecologic cancers. The disease development is asymptomatic and is usually diagnosed at advanced, incurable stages. Treatment of newly diagnosed ovarian cancer is combined management including surgical treatment and chemotherapy. The side-effects of anticancer chemotherapy remain a major source of concern for clinicians. Eye and vision problems are common side effects of ovarian cancer chemotherapy and may significantly reduce the quality of life of the treated patients.

### Case presentation

Here we present two cases of patients who experienced symptoms and reduction of visual function after chemotherapy. 37-year-old female patients were admitted to the hospital of Poznan University of Medical Sciences due to ovarian cancer. First woman received one cycles of chemotherapy with Paclitaxel + Carboplatin, the second one received 6 cycles with Paclitaxel + Cisplatin, with good clinical response. After chemotherapy both of them experienced/noticed blur vision, difficulty with reading, problems with concentration, discomfort and feeling tension in their eyes. The first patient treated for ovarian cancer had visual acuity to the distance RE 20/15 and LE 20/15 without correction; far and near phoria measurement were: 2Δ esophoria and 8Δ esophoria; base-in step vergence test to the near was below the norm; near point of

convergence was 6/10 cm; pursuit and saccadic eye movements were correct. The amplitude of accommodation and MEM were less than expected in this patient. The second woman had visual acuity to the distance RE 20/15 and LE 20/15 (in eyeglasses prescription RE -4.00 D and LE -4.00D); far and near phoria were respectively 6Δ and 12Δ exophoria; base-out step vergence test to the near was below the norm; near point of convergence was 9/12 cm; pursuit and saccadic eye movements were correct. The amplitude of accommodation and MEM were less than expected in this patient, this indicate pseudo-insufficiency convergence.

#### Actions taken

In order to alleviate the symptoms, eyeglass correction with relaxation lenses and vision therapy were recommended.

#### Conclusions

It is very important to recognize potentially severe side effects of chemotherapy before irreversible damage occurs. Sustaining good quality of life for cancer patients requires comprehensive eye care and a multidisciplinary approach.

## #64 Optical characterization of modern ophthalmic lenses with micrometer accuracy using a fiber Hartmann-Shack sensor

#### Authors

Justyna Kiermasz, Rafał Kasztelanic, Jacek Pniewski\*

#### Affiliation/Institution

Faculty of Physics, University of Warsaw, Pasteura 5, 02-03 Warsaw

#### Topic

Optical

#### Abstract

Optical characterization of modern ophthalmic lenses with micrometer accuracy using a fiber Hartmann-Shack sensor

Justyna Kiermasz, Rafał Kasztelanic, Jacek Pniewski\*

Faculty of Physics, University of Warsaw, Pasteura 5, 02-03 Warsaw, Poland

#### ABSTRACT

##### Purpose

Modern ophthalmic lenses are getting increasingly complicated, e.g., various types of progressive lenses or defocus incorporated multiple segments (DIMS) lenses. In such cases, for the optical characterization, wavefront measurements are applied using Hartmann-Shack sensors (HSSs), but their sizes are a few millimeters, while the progression of optical power can reach a few diopters at this distance, and DIMS segments are smaller. Our goal is to build a proof-of-concept prototype of a micrometer-scale sensor built on a developed fiber-based HSS.

##### Method

We use one of the world's smallest HSS, developed previously by our group (Kasztelanic et al., DOI: 10.1364/OE.25.001680). It consists of an array of 633 gradient-index lenses, packed in a hexagonal array of size  $356 \mu\text{m} \times 485 \mu\text{m}$ , where each lens have a  $17.9 \mu\text{m}$  diameter, and

the thickness of the HSS is  $200 \mu\text{m}$  (Fig.1a). The lenses are fabricated using a stack-and-draw technology, used mostly for optical fiber development. In the prototype setup, light in form of a plane wave is transmitted through a test lens, incidents onto the HSS, and the output plane of the sensor is imaged onto a CCD camera (Fig. 1b). The distortion of a wavefront is calculated based on foci shifts, and then the test lens is moved using a motorized precise xyz stage in such a way that the neighboring areas partially overlap.

Fig. 1. (a) Scanning Electron Microscope image of the HSS. (b) A view of the prototype setup: 1. diode laser (635 nm), 2. diffuser to lower time coherence. 3. test lens, 4. HSS mounted on a support, 5. Objective, 6. CCD matrix.

#### Results

The results are analyzed using Zernike polynomials wavefront representation, where the distributions of Zernike coefficients are plotted over the test area of the lens. A sample reconstructed wavefront and selected Zernike coefficients for an area at the top of one DIMS segment are shown in Fig. 2.

Fig. 2. (a) A reconstructed wavefront of the test lens, covering a few segments of a DIMS lens. (b) Zernike coefficients calculated for an area at the top of a segment (arbitrary units on the vertical scale).

#### Conclusions

The proposed HSS can detect wavefront distortions on a micrometer scale. The possibility of scanning and rotating the HSS or a lens allows for precise analysis of complicated optical functions of modern lenses. The proposed setup can be used in quality control and for the development of lens constructions that allow for full individualization of the optical correction.

#### Keywords

ophthalmic lenses, Hartmann-Shack sensor, aberrations, measurement

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## #65 Case studies – prosthetic contact lenses

### Authors

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### Affiliation/Institution

### Topic

Clinical

### Abstract

Case studies – prosthetic contact lenses

Authors: Beneš Pavel, Veselý Petr, Záděrová Petra, Synek Svatopluk

Affiliation: Department of Optometry and Orthoptics, Faculty of Medicine, Masaryk University, Brno, Czech Republic

### Educational area

Prosthetic or soft colored contact lenses have cosmetic, therapeutic and psychological benefits for wearers. One of the most rewarding opportunities in any practice is the ability to change a person's life. In addition to improving cosmetic appearance, the lenses can also help block light and eliminate uncomfortable visual disturbances such as light sensitivity and double vision. Prosthetic or soft colored contact lenses help wearers who have disfigured eyes resulting from trauma or congenital abnormalities. A soft prosthetic lens is designed to cover the disfigured eye in order to hide the abnormality. Various techniques are used to help mask the underlying problem and match the color of the normal eye. A soft prosthetic or colored cosmetic lens consists of a contact lens material that overlaps the eye to conceal the disfigurement. Various colored contact lenses designs can help mask the underlying problem and match the eye coloring to the normal eye. These lenses have both cosmetic and especially psychological benefits for wearers.

### Content

The aim of the poster is to present a few case studies of prosthetic contact lens fitting in wearer with phthisis bulbi and another in wearer after trauma (see pictures). We always recommend try to fit this kind of special contact lenses to improve wearers' personal life.

### Results

As we can see on the pictures, prosthetic lenses must cover the entire cornea or defect that should be hidden. Very important is a proper and adequate function of anterior segment under the fitted lens.

### Recommendations

There are many options how we as an optometrists can help to our wearers with their abnormal eye conditions. Prosthetic lenses are medical devices that every eye care practitioner have to understand to choose and recommend the best suitable type and color for each individual.

## WORKSHOP



### Poznań University of Medical Science (PUMS)

**9:00-10:30**

#### „Slit lamp basics“

The workshop is intended for optometrists and covers slit lamp techniques. Attendants will have possibility to practice entire examination of the anterior segment of the eye containing different illumination techniques, e.g. slit illumination or retroillumination. Sample photographs of typical pathologies will be presented.

Andrzej Michalski PhD

Katarzyna Dubas PhD

**11:00-12:30**

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Andrzej Michalski PhD

Katarzyna Dubas PhD

**9:00-10:30**

#### „Retinoscopy: a useful tool to peripheral refraction examination in myopic children“

Reliable, noninvasive, inexpensive and easy to implement methods of peripheral refraction examination are vital since most of the current strategies for myopia control are based on peripheral hyperopic defocus modification. Retinoscopy may be a useful tool for peripheral refraction examination both in adults and pediatric population. Although, peripheral retinoscopy is a challenging procedure, during the workshops we will try to examine at least 20° nasal and temporal peripheral refraction to show how it may change in myopic eyes.

Maciej Perdziak PhD

**11:00-12:30**

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Maciej Perdziak PhD

**9:00-10:30**

#### „Ocular motor dysfunction - specificity and management“

During the workshop, issues related to the types and specificity of oculomotor dysfunction will be presented. Participants will have the opportunity to practice selected methods of examining eye movements and selected oculomotor training technique. In addition, the workshop will



provide time for discussion and exchange of experience regarding clinical observation and dealing with eye movement issues in children.

Hanna Buczkowska PhD

#### **11:00-12:30**

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Hanna Buczkowska PhD

## **Adam Mickiewicz University (UAM)**



#### **9:00-10:30**

##### **„ABCs of OCT - how to acquire and interpret the test results“**

This session aims to explore the basics of OCT to help detect and identify abnormalities. The attendees will be introduced to the different types of OCT scans/protocols available and their interpretation while considering potential pitfalls and limitations. Using case examples, we will discuss the choice of scan type and how to use the visual and numerical outcome data and its use for clinical assessment and follow up.

Gregory Caldwell OD

#### **11:00-12:30**

##### **„Binocular Indirect Ophthalmoscopy (BIO) - theory and workshop“**

The binocular indirect ophthalmoscope (BIO) is an important diagnostic tool for assessing posterior segment eye diseases. The BIO, in contrast to the view achievable with the more commonly available direct ophthalmoscope, offers a wide stereoscopic view of the retina, often despite hazy media

Joseph Pizzimenti OD

#### **9:00-10:30**

##### **„Assessment of Visual function in infants“**

Appropriate visual assessments help identify children who may benefit from early interventions to correct or improve vision. It is crucial to examine the infants properly, therefore this workshop aims to present and practice basic paediatric eye exam technics.

Prof. Anna Przekoracka-Krawczyk PhD, DSc

Alicja Brenk-Krakowska, MSc.

#### **11:00-12:30**

##### **„Assessment of Visual function in small children (age 1-5)“**

Appropriate visual assessments help identify small children who may benefit from early interventions to correct or improve vision. It is crucial to examine the infants properly, therefore this workshop aims to present and practice basic paediatric eye exam technics.

Prof. Anna Przekoracka-Krawczyk PhD, DSc

Monika Kwaśniewska PhD

#### **9:00-10:30**

##### **„Scleral lens fitting with Profilometry“**

Over the last decade, scleral lenses have seen a large progression in the design based on better knowledge of the scleral shape. One of these new developments is the ability to design empirical scleral contact lenses. This method will help to reduce the chair time and reduce the number of refits. Profilometry assists designing Scleral contact lenses fitting precisely and it may help to reduce chair time and refits, with happy patients.

Telamitsi Kyriakos

#### **11:00-12:30**

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Telamitsi Kyriakos

## **Conference Hotel**

#### **10:00-11:00**

##### **„Color vision defects and their detection“**

In our workshop we would like to introduce algorithm of the ambulant and clinical examination of the color vision. We know that is very important to detect inborn or acquired color vision defect in practice of optometrist and ophthalmologist. After workshop our participant will be able to use different types of color vision tests, distinguishing between inborn/acquired color vision defect and can specify importance and type of color vision defect.

Petr Veselý

Maks. 10 osób

#### **11:15-12:15**

##### **„How to take a good topography capture“**

If you take your baseline topography properly, then everything else will be easier and smoother. If your initial capture is taken badly, then the further ortho-k treatment will become harder. A high-quality map is critical for ortho-k treatment. Luckily, attaining good topography images is not that hard skill to learn.

Msc Małgorzata Żukowska, Swisslens

Maks. 25 osób

#### **12:30-13:30**

##### **„Measuring Carotenoid Levels and Macular Pigment in Eye Care“**

There is increasing evidence that the macular pigment carotenoids, lutein and zeaxanthin, may play an important role in the prevention of age-related macular degeneration, cataract, and other blinding disorders. Measuring the carotenoid levels can personalize the dosage of supplementary nutrients.

Gregory Caldwell OD

Maks. 10 osób

# SPIS TREŚCI

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**11 - 14.05.2023**

**KONFERENCJA Eye Care in the Changing World**

**Novotel Poznań Centrum**

pl. Andersa 1, 61-894 POZNAŃ

**12.05.2023**

**WORKSHOPS**

**Uniwersytet im. Adama Mickiewicza**

ul. Wieniawskiego 1, 61-712 Poznań

**Uniwersytet Medyczny im. Karola Marcinkowskiego**

ul. Fredry 10, 61-701 Poznań

# EAOO 2023 Conference Floor Plan Map

