PhDAY FOO 2021

Programa de Doctorado en Óptica, Optometría y Visión
Facultad de Óptica y Optometría
UNIVERSIDAD COMPLUTENSE DE MADRID

Libro de Actas

5º PhDay – UCM

Facultad de Óptica y Optometría

Madrid, 14 de octubre de 2021

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ÍNDICE

PRÓLOGO

Hemos llegado a la quinta edición de nuestro congreso, el **5º PhDAY-FOO,** organizado por y para los doctorandos de la Facultad de Óptica y Optometría de la Universidad Complutense de Madrid. Se trata de un congreso gratuito en el que estos jóvenes científicos podrán presentar sus investigaciones al resto de sus compañeros predoctorales y a toda la comunidad universitaria que quiera disfrutar de este evento. Apunta en tu agenda: el **14 de octubre de 2021**. En esta ocasión organizaremos un congreso presencial, pero que permitirá acceder y participar como ponentes a través de videoconferencia a los doctorandos con impedimentos justificados para acudir de forma presencial. No obstante, ante la posibilidad de que la pandemia Covid-19 pudiera impedir o dificultar su celebración presencial, haremos los preparativos necesarios para poder pasar a formato virtual si fuera necesario.

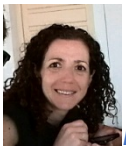
A través de varias sesiones de presentaciones orales y póster, nuestros doctorandos mostrarán la gran diversidad y riqueza de líneas de investigación incluidas en nuestro programa de doctorado. **Se pretende** difundir el trabajo desarrollado por los doctorandos de nuestra Facultad y a la vez contribuir a mejorar sus habilidades comunicadoras como científicos.

Si acabas de matricularte por primera vez en el doctorado no debes faltar a esta jornada pues es una estupenda toma de contacto con la que será tu labor académica-investigadora en los próximos años hasta desembocar en la presentación de tu tesis doctoral. **Y si ya eres un doctorando veterano**, tu mayor experiencia te permitirá disfrutar y apreciar el gran trabajo que hay detrás de los minutos disponibles para cada presentación.

Además de los propios estudiantes de doctorado, serán especialmente invitados los **Estudiantes de Máster** por ser ellos la cantera de futuros doctorandos del multicisciplinar Programa de Doctorado en Óptica, Optometría y Visión. Si eres un estudiante de Máster, en pocos meses te encontrarás con la opción de proseguir tu trayectoria como universitario hasta alcanzar el máximo nivel de estudios y ser Doctor, y esta jornada PhDAY-FOO te puede ayudar a tomar esta decisión.

Profesores y Personal de Administración y Servicios de la Facultad de Óptica y Optometría seréis bienvenidos a este congreso donde podréis conocer de la mano de sus protagonistas la interesante investigación vinculada a nuestro Programa de Doctorado.

Desde el Equipo Decanal de la Facultad de Óptica y Optometría y en particular, desde mi puesto de Vicedecana de Posgrado e Investigación y Coordinadora del Programa de Doctorado, quiero agradecer la buena acogida que esta iniciativa ha tenido entre los doctorandos en las diversas ediciones y en especial, agradecer al Comité Organizador toda su dedicación, ilusión y profesionalidad. Sin todos ellos sería imposible que congreso logre las metas propuestas.



Beatriz Antona Peñalba

Coordinadora del programa de doctorado en Óptica, Optometría y Visión
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AGRADECIMIENTOS

El Comité Organizador quisiera agradecer tanto a la Escuela de Doctorado como a la Facultad de Óptica y Optometría de la Universidad Complutense de Madrid, la oportunidad de realizar parte de la organización de la 5ª Edición del PhDAY FOO – Complutense. Permitiendo de esta forma adquirir nuevas competencias a la hora de participar en esta clase de eventos.

Queríamos agradecer también a todos los compañeros que han participado tanto siendo ponentes como asistentes en esta nueva edición del PhDAY, ya que sin su colaboración todo esto no sería posible. Siendo un congreso hecho por y para los doctorandos. Gracias nuevamente y más en este año que ha sido atípico.

Agradecer también a las empresas colaboradoras por el apoyo ofrecido para llevar a cabo las jornadas PhDAY FOO y a la Asociación de Fotografía de la Facultad por encargarse del reportaje gráfico.

En último lugar, agradecer el esfuerzo de todo el comité científico que ha permitido que todos los trabajos hayan sido valorados de forma objetiva, justa y transparente, dedicando todo su tiempo a evaluar y poder otorgar así los merecidos premios a los pertinentes participantes.

COLABORADORES INSTITUCIONALES

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EMPRESAS COLABORADORAS

PONENCIA INVITADA

“Navegando por Europa en busca de investigación en superficie ocular”

Por: Dr. Alberto Recchioni

En esta charla, el Dr Alberto Recchioni (AR) hablará de su experiencia como estudiante de doctorado y luego como investigador a través de países como España, Alemania y Reino Unido. Tratará algunos ejemplos de las actividades y los estudio llevados a cabo en estos países (sobre todo de UK) y las posibilidades que se han generado a través de *networking*, trabajo en la Salud Publica y practicas relacionadas con los temas de superficie ocular y ojo seco.

Alberto Recchioni *recibió su doctorado con una tesis titulada "Papel de la condición del ojo seco en la cirugía de cataratas y cirugía refractiva" dentro de la Red Europea de Ojo Seco (http://eden-ejd.eu/) (EDEN) MSCA-ITN-2014 Marie Skłodowska-Curie Innovative Training – European Joint Doctorate entre Aston University (Reino Unido) y la Universidad de Valencia (España).*

Actualmente, ocupa el puesto de Research Fellow en el proyecto “Fluid-Gels as Resorbable Protective Dressings for Ocular Surface Disease” en la University of Birmingham; dentro del Institute of Inflammation and Ageing, colabora en un equipo multidisciplinario formado por oftalmólogos, optometristas, científicos biomateriales e ingenieros bioquímicos. Al mismo tiempo, forma parte del equipo clínico multidisciplinario de la clínica Optimising Assessment in Sjögren’s Syndrome (OASIS) en la University Hospitals Birmingham NHS Foundation Trust (UHB).

COMITÉ CIENTÍFICO

Almudena Crooke Alvarez

Licenciado en Farmacia y Bioquímica, y Doctora en Farmacia por la Universidad Complutense de Madrid. Profesora Titular de Universidad de la Facultad de Óptica y Optometría de la Universidad Complutense, donde imparte las asignaturas “Bioquímica del ojo” del Grado en Óptica y Optometría, y “Biomarcadores y Métodos de Diagnóstico para Patologías Oculares” del Máster en Optometría y Visión”. Su actividad investigadora se ha centrado en la búsqueda de biomarcadores y dianas terapéuticas de las enfermedades del ojo asociadas a la edad.

Jesús Carballo Álvarez

Doctor en Óptica, Optometría y Visión por la Universidad Complutense de Madrid (UCM); diplomado en Óptica y Optometría por la UCM y licenciado en Psicología Clínica por la UNED. Actualmente, pertenece al Departamento de Optometría y Visión de la Facultad de Óptica y Optometría de la UCM y al grupo de investigación Visión Aplicada

Su actividad docente, asistencial e investigadora en los últimos años versa principalmente sobre la adaptación de lentes de contacto, córnea irregular, función visual, manejo de miopía y lentes intraoculares multifocales. Es autor de 20 artículos científicos indexados, diverso material docente y varios artículos de libros.

Oscar Gómez Calderón

Licenciado en Ciencias Físicas por la UCM en 1994, y Doctor en Ciencias Físicas por la UCM en 1999 con la tesis titulada “Dinámica espacio-temporal en láseres. Formación de patrones”. Realizó una estancia postdoctoral en la Universidad de Stanford durante 1999 y 2000. Profesor Titular de Universidad de la Facultad de Óptica y Optometría de la UCM desde 2010 donde desarrolla su labor docente e investigadora. Imparte docencia relacionada con el área de óptica, fundamentalmente Óptica Física, y su investigación se encuentra dentro del área de la óptica no lineal.

José Antonio Gómez Pedrero

Licenciado en Ciencias Físicas por la Universidad Complutense en 1994 y Doctor en Ciencias Físicas en 1999 con la tesis titulada "Caracterización de lentes oftálmicas mediante la matriz de potencia dióptica local". Profesor Titular de la Faculta de Óptica y Optometría adscrito a la Sección Departamental de Óptica, donde imparte docencia en las asignaturas "Óptica Oftálmica I","Óptica Oftálmica II" del Grado en Óptica y Optometría y "Procesado de Imágenes" del Máster de Tecnologías Ópticas y de la Imagen. Coautor del libro "Modern Ophthalmic Optics" y miembro del Grupo Complutense de Óptica Aplicada desde 2004.

José Luis Hernández Verdejo

Doctor en Optometría y Visión por la UCM con la tesis titulada “Variación de la Presión Intraocular debida a Maniobras Quirúrgicas Oculares. Un estudio Animal”. Es Profesor Contratado Doctor del Departamento de Optometría y Visión de la Facultad de Óptica y Optometría de la UCM. Su trayectoria de investigación ha estado vinculada al impacto sobre la visión de la enfermedad ocular y la cirugía oftalmológica. Su dedicación docente se centra en baja visión para personas con discapacidad visual. Presenta un claro perfil clínico con extensa experiencia en atención primaria. En la actualidad realiza su investigación como miembro del grupo del “Clinical and Experimental Eye Research Group” con referencia UCM-971009-GR96/20 y sede en la Facultad de Óptica y Optometría de la UCM.

COMITÉ ORGANIZADOR

Irene Martínez Alberquilla

Graduada en Óptica y Optometría y Máster en Optometría y Visión por la Universidad Complutense de Madrid.

Cristina Pastrana Robles

Graduada en Óptica y Optometría y Máster en Optometría y Visión por la Universidad Complutense de Madrid.

PROGRAMA CIENTÍFICO

5ª Edición PhDAY- FACULTAD DE ÓPTICA Y OPTOMETRÍA 2021

14 de octubre de 2021

PROGRAMA CIENTÍFICO
5ª Edición PhDAY- FACULTAD DE ÓPTICA Y OPTOMETRÍA 2021

15:00 – 15:30 h. ***Inauguración*** — **SALÓN DE ACTOS**

- Vicerrector de Estudios: Dr. Victor Briones Dieste
- Director de la EDUCM: Dr. Fernando Gascón Inchausti
- Decana FOO. Dra. Mª Isabel Sánchez Pérez
- Vicedecana de Posgrado e Investigación y Coordinadora del Programa de Doctorado. Dra. Beatriz Antona Peñalba

15:30 – 16:30 h. COMUNICACIONES PRIMERA SESIÓN. ORAL 1

SALÓN DE ACTOS	AULA 16
Óptica y Visión	Optometría y Visión
Coordinan:	Coordinan:
Dra. Almudena Crooke Álvarez	Dr. José Luis Hernández Verdejo
Dr. Óscar Gómez Calderón	Dr. Jesús Carballo Álvarez
Dr. José Antonio Gómez Pedrero	

16:30-17:00 h. COMUNICACIONES SEGUNDA SESIÓN. PÓSTER

HALL DE LA FACULTAD

Óptica, optometría y visión

Coordinan:

Dr. Jesús Carballo Álvarez

Dr. José Antonio Gómez Pedrero

17:00 – 17:30 h. ***Descanso-café***

17:30 – 18:30 h. COMUNICACIONES TERCERA SESIÓN. ORAL 2

SALÓN DE ACTOS	AULA 16
Optometría y Visión	Óptica
Coordinan:	Coordinan:
Dr. José Luis Hernández Verdejo	Dr. Óscar Gómez Calderón
Dra. Almudena Crooke Álvarez	Dr. José Antonio Gómez Pedrero
Dr. Jesús Carballo Álvarez	

18:30 – 18:50 Conferencia invitada — **SALÓN DE ACTOS**

"Navegando por Europa en busca de investigación en superficie ocular"
Dr. Alberto Recchioni

18:50- 19:00 h ***Entrega de Premios y Clausura***

DESGLOSE DEL PROGRAMA

15:00 – 15:30 h. Inauguración PhDay Facultad Óptica y Optometría

SALÓN DE ACTOS

Vicerrectorado de Estudios. Dr. Víctor Briones Dieste
Director de la Escuela de Doctorado UCM: Dr. Fernando Gascón Inchausti
Decana de la Facultad de Óptica y Optometría. Dra. Mª Isabel Sánchez Pérez
Vicedecana de Posgrado e Investigación y Coord. P de Doctorado. Dra. Beatriz Antona Peñalba

15:30 – 16:30 h. COMUNICACIONES PRIMERA SESIÓN. Presentación ORAL 1

SALÓN DE ACTOS. Línea de investigación: Óptica y Visión.

Coordinan: Dra. Almudena Crooke Álvarez; Dr. Óscar Gómez Calderón; Dr. José Antonio Gómez Pedrero

- Characterization of the meibomian glands in patients with allergic conjunctivitis and its relationship with histaminase*. Jimmy Fernando Reyes Domínguez (on-line)*
- Colorimetric quantification of free phosphate in tears of rabbits with induced dry eye. *Carlos Carpena Torres*
- Astigmatism tolerance in a new isofocal intraocular lens. *Lidia María Pérez Sanz*
- Power profile characterisation of 8 soft contact lenses for myopia control. *Julia Bodas Romero*
- Assessing interobserver variability in grading Meibographies using Pult's scale*. Elena Fernández Jiménez*

AULA 16. Línea de investigación: Optometría y Visión.

Coordinan: Dr. José Luis Hernández Verdejo; Dr. Jesús Carballo Álvarez

- Anterior and Posterior Vault Characterization and Evaluation throughout Time in Patients Implanted with Phakic Implantable Collamer Lens for Ametropia Correction. *Jesús Beltrán Murcia.*

- Comparative clinical evaluation of a New Isofocal intraocular lens against Monofocal intraocular lens. *Carla Charbel*
- Effect of different dominant and non-dominant multifocal scleral lens combinations in vision quality. *Ana Privado Aroco*
- Contact lens fitting and tear film affectation through thermal camera assessment. *Elena Durán Prieto*

16:30-17:00 h. COMUNICACIONES SEGUNDA SESIÓN. Presentación PÓSTER. Hall Facultad

Coordinan: Dr. Jesús Carballo Álvarez; Dr. José Antonio Gómez Pedrero

- Pilot study to investigate the effect of orthokeratology contact lenses on rabbit eye (morphology and physiology). *Wael Almalki*
- Development of a protocol for the characterisation of ocular surface microbiota in individuals with dry eye. *Raquel Calderón García*
- Development of chronic intraocular hypertension in the rabbit: Effects of Intra-ocular injection of gold nanoparticles. *Azza Dammak*
- Quantitative and qualitative study of the anterior ocular pole in a population with multiple sclerosis. *Jorge Donís de la Torre*
- Influence of distance and hours of nearwork on accommodative function. A 4-year longitudinal study. *Esther Mármol Errasti*
- Impact of contact lens wear on NLRP3 gene expression: implications for ocular frailty in middle-aged adults. *Irene Martínez Alberquilla*
- Evaluation of retinal vasculature by OCT Angiography in type II diabetes. *Nadia Minguez Caro*
- In vivo study of efficacy of the release of melatoninergic tear secretagogues by contact lenses. *Francisco Javier Navarro Gil*
- Predictive Machine Learning applied to the CISSve Survey. *Carlos Pérez Garmendia*

17:00 – 17:30 h. Descanso.

17:30 – 18:30 h. COMUNICACIONES TERCERA SESIÓN. Presentación ORAL 2

SALÓN DE ACTOS. Línea de investigación: Optometría y visión.

Coordinan: Dr. José Luis Hernández Verdejo; Dra. Almudena Crooke Álvarez; Dr. Jesús Carballo Álvarez

- Effect of the use or artificial tears on the conjunctive for different fixation requirements, in healthy young adults. *Jairo Giovanni Rojas Yepes (on-line)*
- Effect of the elasticity module of soft contact lenses on the morphology and function of the meibomian glands. *Jorge Giovanni Vargas Velasco (on-line)*
- Neuroprotective effects of melatonin in retinal ganglion cells. *Miguel Ángel Fernández Torres*
- Classification of dry eye disease with machine learning techniques. *Elena Diz Arias*

Aula 16. Línea de investigación: Óptica.

Coordinan: Dr. Óscar Gómez Calderón; Dr. José Antonio Gómez Pedrero

- Progressive power lenses assessment using eye tracking technology. *Pablo Concepción Grande*
- Spectral reflectance through hyperspectral imaging (HSI). *Ángela Gómez Manzanares*
- BSSRDF Measurement System. *Pablo Santafé Gabarda*
- Development of near infrared reflectance scale. *Néstor Tejedor Sierra*
- Multifractal and statistical analysis of retinal vasculature. *Asmae Igalla Elyousssfi*

18:30 – 19:00 Conferencia invitada. SALÓN DE ACTOS

Dr. Alberto Recchioni

19:00 h Entrega de Premios y Clausura. SALÓN DE ACTOS

PONENCIAS ORALES

Jesús Beltrán Murcia

Julia Bodas Romero

Carlos Carpena Torres

Carla Charbel

Pablo Concepción

Elena Diz Arias

Elena Durán Prieto

Elena Fernández Jiménez

Miguel Ángel Fernández Torres

Ángela Gómez Manzanares

Asmae Igalla El-youssfi

Lidia María Pérez Sanz

Ana Privado Aroco

Jimmy Fernando Reyes Domínguez

Jairo Giovanni Rojas Yepes

Pablo Santafé Gabarda

Néstor Tejedor Sierra

Jorge Giovanni Vargas Velasco

Anterior and Posterior Vault Characterization and Evaluation throughout Time in Patients Implanted with Phakic Implantable Collamer Lens for Ametropia Correction.

Jesús Beltrán-Murcia OD MSc [1], Vanesa Blázquez-Sánchez OD PhD [1], Jorge A Calvo-Sanz OD PhD[2], Laureano Álvarez-Rementeria MD MSc[3]
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Introduction: The phakic Implantable Collamer Lens- ICL pIOL (Staar Surgical, Monrovia, CA) is a reference technique in refractive surgery for correction of refractive errors such myopia, hyperopia or astigmatism[1]. ICL pIOL is an epicapsular lens which will be located at the eye's posterior chamber behind the iris and upon the human lens. For ICL pIOL implantation it is of great importance the fact of knowing its accurate position inside the posterior chamber in order to learn its relationship with surrounding structures[2] . Therefore, in this work we defined the Anterior Vault (AV) as the distance between pIOL and corneal endothelium. Posterior Vault (PV)is also defined as the distance between pIOL and human lens[3].

Aim: The purpose of the present study is to define AV, measure AV and PV, to study stability of both AV and PV throughout time, get to know the possible existing relationship among them and to evaluate security and safety of ICL pIOL in a 12 months-follow-up once implanted.

Methods: In this retrospective study, eyes that underwent refractive surgery implanted with ICL pIOL were analyzed. 1 month and 1 year Anterior Vault (AV) and Posterior Vault (PV) values were measured with Visante AS-OCT (Carl Zeiss Meditec, Inc., Ireland) postoperatively [figure 1]. All these data obtained were processed and analyzed by using IBM SPSS Statistics V25 Software (IBM, Armonk, New York, USA).

Results: 40 eyes were analyzed. All eyes were operated by the same expert surgeon, L.A.R.C.. 1m and 1y postop AV mean values were 2503.90±279.97 and 2560.40±278.43µm respectively with statistically significant differences ($p<0.05$). A positive correlation of $r=0.885$ with statistical significant ($p<0.001$) was found within both measurements. AV mean increased from 1m to 1y

56.50±134.19µm. 1m and 1y postop PV mean values were 496.63 ± 169.96 and 432.67 ± 162.74µm respectively (statistically significant differences ($p<0.05$)). A positive correlation of $r = 0.862$ (statistical significant $p<0.001$) was found. PV decreased 63,95± 87.80 µm from 1m to 1y. Correlation within AV 1y and PV 1y was negative $r = -0.559$ and statistically significative ($p<0.001$).

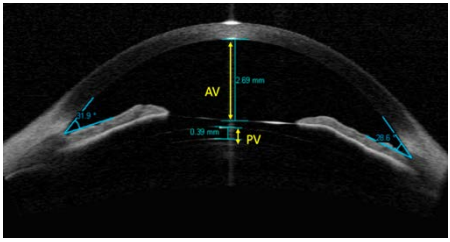

Figure 1: Anterior Segment OCT image showing AV and PV measurement.

Conclusions: AV and PV values show a negative correlation, i.e. they vary in different proportion. This difference among the AV increasing and PV decreasing could be explained by the CLR, pupil dynamics and accommodation effects that affect PV measurements. The AV measurement should be considered more indicative of the correct sizing and positioning of ICL pIOL inside the eye.

Keywords: phakic lens, vault, ICL

References:

[1] Sanders DR, Vukich JA, Doney K, Gaston M: U.S. Food and Drug Administration Clinical Trial of the Implantable Contact Lens, Moderate to high Myopia. J Cataract Refract Surg. 2003:29:1323-1332

[2] Alfonso, J. F., Fernández-Vega, L., Lisa, C., Fernandes, P., González-Meijome, J., & Montés-Micó, R. (2012). Long-term evaluation of the central vault after phakic Collamer® lens (ICL) implantation using OCT. *Graefe's Archive for Clinical and Experimental Ophthalmology*.

[3] Gonzalez-Lopez F, Mompean B, Bilbao-Calabuig R, Vila-Arteaga J, Beltran J, Baviera J. Dynamic Assessment of Light-Induced Vaulting Changes of Implantable Collamer Lens With Central Port by Swept-Source OCT: Pilot Study. Transl Vis Sci Technol. 2018 May 1;7(3):4.

Power profile characterisation of 8 soft contact lenses for myopia control.

Julia Bodas Romero[1], Laura Batres Valderas [1], Ainhoa Conde Rubio [1], Jesús Casas García [1], Gonzalo Carracedo Rodríguez [1]
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Introduction: Due to the myopia increases in recent years, more comfortable, effective and safer options such as soft contact lenses for myopia control are being investigated. Different designs such as dual focus, multifocal design or extended depth of focus (EDOF) lenses are currently being fitted.(1, 2)

Aim: The aim of the study is to characterize the power profile of each of the 8 specific contact lenses for myopia control.

Methods: For the characterisation of the contact lenses, the NIMO TR1504 was used. The instrument is based on a technique based of quantitative deflectometry Schlieren phase change. A reference measurement was taken before each contact lens evaluation. The lenses were placed in the wet-cuvette (a quartz cuvette) with saline solution, and placed in the instrument. Twelve contact lenses of different powers of each design were measured from -0.50 D up to -6.00 D in 0.50 D steps.

Results: Out of the 8 designs evaluated, one was a dual focus design, two designs were EDOF, and the remaining five were multifocal designs. Optical zone diameters between 0.93 and 3.69 mm central were obtained. It was observed the highest myopic power and the lowest addition for the dual focus design, while for the EDOF and multifocal designs, the additions were similar.

Conclusions: We evaluated three main soft contact lens designs specific for myopia control (dual focus, EDOF and multifocal design). There are important differences between designs in terms of power profile, showing different optical zone diameters and different peripheral additions. It would be interesting to analyze the effect of the different designs in the visual quality and axial length elongation control.

Keywords: Soft contact lenses, myopia control, power profiles

References:

[1] Anstice NS, Phillips JR. Effect of dual-focus soft contact lens wear on axial myopia progression in children. Ophthalmology. 2011;118(6):1152-61.

[2] Bakaraju RC, Ehrmann K, Ho A. Extended depth of focus contact lenses vs. two commercial multifocals: Part 1. Optical performance evaluation via computed through-focus retinal image quality metrics. J Optom. 2018;11(1):10-20.

Colorimetric quantification of free phosphate in tears of rabbits with induced dry eye.

Carlos Carpena Torres[1,], Fernando Huete Toral[2], Juan Gonzalo Carracedo Rdríguez[1]*
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Introduction: Part of the inorganic phosphate present in the body is the consequence of the nucleotide degradation process [1, 2]. Considering that nucleotides such as diadenosine tetraphosphate (Ap4A), diadenosine pentaphosphate (Ap5A), and adenosine triphosphate (ATP) manifest a higher concentration in tears of dry eye patients, acting as molecular biomarkers [3], it is hypothesized that free phosphate in tears could be a new biomarker easily quantified by colorimetric methods.

Aim: To measure the free phosphate concentration in tears of rabbits with induced dry eye compared with healthy rabbits.

Methods: An experimental, cross-sectional, and randomized study was performed on 10 male New Zealand white rabbits. The rabbits were divided into two groups: dry eye rabbits (n = 5) and healthy rabbits (n = 5). Dry eye was induced by the topical instillation of benzalkonium chloride 0.2%, twice daily, for 5 consecutive days, while the healthy rabbits received topical saline solution as control. One hour after the last instillation, the tear samples were collected by the Schirmer's test for 5 min. After sample processing, the free phosphate concentration was quantified with a commercial Malachite Green kit by measuring the absorbance at 660 nm.

Results: The free phosphate concentration was higher in dry eye rabbits (22.50 ± 14.06 mM) compared with healthy rabbits (18.40 ± 9.35 mM). However, there were no statistically significant differences between both groups (P = 0.452). Besides, there was no correlation between the free phosphate concentration and tear volume in the total sample (r = -0.419, P = 0.066).

Conclusions: Free phosphate is proposed as a possible new molecular biomarker to diagnose dry eye by its colorimetric detection in tears. However,

future clinical studies in dry eye patients are necessary to confirm the current findings.

Keywords: dry eye; phosphate; nucleotides.

References

[1] Fox IH. Metabolic basis for disorders of purine nucleotide degradation. Metabolism 1981;30:616-634.

[2] Yegutkin GG. Adenosine metabolism in the vascular system. Biochem Pharmacol 2021;187:114373.

[3] Carracedo G, Crooke A, Guzman-Aranguez A et al. The role of dinucleoside polyphosphates on the ocular surface and other eye structures. Prog Retin Eye Res 2016;55:182-205.

Comparative clinical evaluation of a New Isofocal intraocular lens against Monofocal intraocular lens.

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Introduction: Cataract, lens opacification, is the common treatable cause of loss vision and blindness worldwide.(1) Opacified lens extraction and intraocular lens (IOL) implantation, are still the main management approach to cataracts. In this term, monofocal IOLs are the most commonly implanted.(2) Given the high demand from patients for spectacle independence, multifocal IOL are becoming more and more used, providing satisfactory far, intermediate and near vision.(2) Their concept is to create lens that provides good vision for different distances, although for this purpose the visual quality may decrease and photopic phenomena may appear when compared to monofocal lenses.(2) The EDOF (Extended Depth of Focus) technology is the most recent, and has been developed with the aim of improving visual quality especially in intermediate vision (2) by creating a single elongated focal point to enhance the depth of focus.(3)

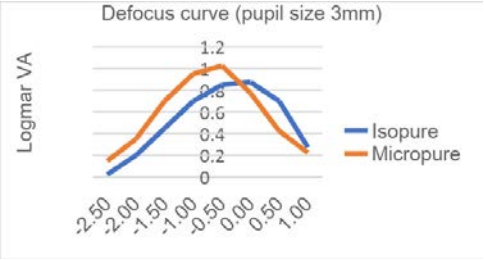
Aim: The aim of the present study is to investigate visual outcomes of an EDOF IOL (Isopure 1.2.3®) in comparison to a monofocal IOL (Micropure 1.2.3®) by the same manufacturer (PhysIOL, Belgium).

Methods: 50 cataract patients were recruited and received bilateral implantation. They are being divided in two groups, one implanted with Isopure 1.2.3, device under investigation and the control group implanted with Micropure 1.2.3, based on 1:1 randomization given by the electronic data capture. Each patient attends a total of maximum 11 visits over 12 months. First, monocular best corrected distance visual acuity (CDVA), under photopic luminance conditions (85 cd/m^2) on the first implanted eye, will be compared between both groups. As secondary study endpoint several parameters will be checked as manifested refraction, monocular and binocular distance corrected intermediate visual acuity (DCIVA), aberrometry outcomes, defocus curve, outcomes of halos and glare simulator, binocular contrast sensitivity under photopic and mesopic conditions (<3cd/m^2) as well as under mesopic conditions with a glare source. Subjective outcomes are obtained by

standardized questionnaires (QoV, PRSIQ, Catquest). Statistically significant difference was set at a level of 0.05.

Results: At the time of writing this abstract, 20 patients completed the 30-60days visit. As predicting result, we found no statistically significant differences for the CDVA, the halometry and the defocus curve (see figure 1), between both groups (P-value>0.05). 9 patients completed the 75-105days visit. As predicting result, we did not find statistically significant differences for the defocus curve with 3 and 4.5mm pupil size. However, a better intermediate vision with Isopure lens for both pupil size (3mm and 4.5mm) was observed.

Conclusions: The preliminary results show that the lens with isofocal design provides better visual outcomes for intermediate distance, conserving a good far distance quality of vision, measurements compared to a monofocal lens.



1Defocus curve comparison for pupil size 3mm.

Keywords:
EDOF extended depth of focus, IOL intraocular lens, Isofocal.

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Progressive power lenses assessment using eye tracking technology.

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Introduction: Presbyopia can be defined as a condition where the accommodation of the eye is insufficient for near vision due to aging(1). Progressive power lenses (PPL) are one of the most common solutions nowadays to correct presbyopia. PPLs are characterized by having a smooth and continue increase of spherical equivalent power from the upper part of the lens to the lower portion. PPLs allows subjects to see clearly at all distances changing the gaze position. Due to this power variation in the vertical axis, appears unwanted astigmatism in the lateral areas of the lens(2). Unwanted astigmatism is perceived as blur, distortion, and swim effect. The relation between clear and blur regions of a PPL is determined by the lens design, which is different depending on the manufacturer. Therefore, the research of new methodologies and knowledge to evaluate the performance of PPLs are especially important for develop new lens designs. Eye tracking technology allows monitoring and recording eye movements using infra-red light, this technology is used in many fields to analyze eye movements such as marketing, driving, or evaluating reading behavior(3). The main goal of this research is to explore the possibilities of this technology to evaluate the performance of PPLs, specially in this work eye-tracking data has been related with the subjective information provided by subjects to determine relationships between characteristics of the eye movements and the PPL user's preference.

Methods: A prospective observational double-mask study was carried out on 38 presbyopic subjects. Tobii-X3-120 (120 Hz) was used to record binocular eye position of subjects when they were reading a text on a computer screen with 2 types of PPL lenses with different power distributions (PPL-soft and PPL-hard) developed ad-hoc for this research. The eye movements parameters analyzed were fixations (number of fixations, complete fixation

time, fixation duration mean) saccades (saccade duration mean and saccade distance mean) and regressions (number of regressions). Eye movements were analyzed for 6 different regions of the computer screen. In addition, an analysis was carried out to find relations between characteristics of the eye movements and the preference for a PPL.

Results: It was found a statistically significant relation between the characteristics of the eye movements and the subjective preference for a PPL design. Subjects that preferred the PPL-soft presented significantly worse eye movement statistics associated with less effective eye movements than those subjects who preferred the PPL-hard who presented significantly better eye movements statistics associated with more effective eye movements.

Conclusions: Eye-tracking technology can be used to compare and quantify the visual performance provided by PPL designs. Results of this research suggest that eye tracking systems could be used as a PPL design recommendation system through the analysis of the subjects' eye movements performance. This data can be applied by optometrists to determine the power distribution of a PPL which can suited better for each subject.

Keywords: Eye-tracking, eye movements performance, progressive power lenses

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Classification of dry eye disease with machine learning techniques.

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Introduction: Dry eye disease (DED) is a multifactorial, chronic and progressive disease that alters the ocular surface and the tear film. Millions of people in the world are affected by DED. Patients suffering from this pathology have a deteriorated quality of life and visual function. [1].

One of the most common types of DED is evaporative dry eye, this is directly related to the function of the Meibomian Glands (MG) [2]. There are different objective and subjective tests that allow its diagnosis and classification. However, there is no ´Gold standard´ test or a definitive consensus among professionals about which is the ideal set of test for its diagnosis.

In recent years, the use of artificial intelligence has represented a great advance in the field of biomedical and health sciences. Being these promising techniques in the prediction of diseases, either based on numerical data or images [3].

Aim: The main objective of this study will be the prediction of the diagnosis of dry eye disease, using objective and subjective indicators, using machine learning models. The secondary objective will be to observe the variation of the diagnosis by adding the parameter of the glandular contrasts of the Meibomian glands and its possible correlation with dry eye disease.

Methods: Relevant clinical tests for the diagnosis of dry eye have been carried out to 45 subjects (15 control, 15 contact lens wearers and 15 with Meibomian gland pathology). Symptomatology tests, ocular surface recognition and MG imaging were performed. The machine learning program will be trained and

verified using the data obtained in these tests. In addition, a new indicator for the diagnosis of DED will be implemented, the MG contrast.

Results: It is expected to obtain a good precision and reliability in the diagnosis when the machine learning program is trained. It must be able through different indicators of dry eye, to provide a specific diagnosis. Glandular contrast can be a potential indicator for the diagnosis of DED.

Conclusions: Machine learning techniques can be advantageous when diagnosing multifactorial pathologies such as dry eye syndrome. Meibomian gland contrast may be a new indicator for your diagnosis.
It is intended to obtain greater precision and consensus among professionals, which will mean an improvement in daily clinical practice.

Keywords: Dry eye disease, Meibomian glands contrast, Machine learning.

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Contact lens fitting and tear film affectation through thermal camera assessment.

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Introduction: The contact lenses fitting is an important issue since contact lens wear affects the tear film and could impair dry eye disease. Contact lens design could affect dry eye due to the different thickness across them as well as its movement on eye. For instance, contact lenses with a multifocal design[1] tend to have variable thicknesses that are different from conventional spherical and toric designs, which can affect comfort [2].

Aim: In this work, 4 different soft contact lens designs with different thickness (spherical, multifocal and two toric) were analysed to evaluate and compare the fitting through tear film stability through the thermal image of the eye, where the lipid layer of the tear appears as dark bands, and its dynamic evolution.

Methods: The thermal imager used is the Flir A325 model. It has been used with a 4X close-up lens, prepared for a working distance of 7.9 mm whose field of view is 6 ° X 4.5 °. (Figure 1). The patient places his eye about 8 mm from the objective with his head resting on a chin rest. Contact lenses used were made of silicone hydrogel material with low coefficient of friction individually manufactured for each patient.

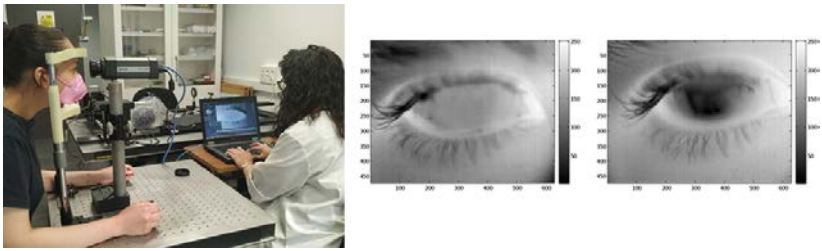

Figure 1: From left to right: experimental set up, thermal image baseline and with contact lens.

Videos were recorded: 1st normal blinking and break up-time tear film without lens; 2nd with lens and 3rd, 5 and 10 minutes after removal. Videos were analysed with MATLAB.

Results: Previous study [3] spherical and multifocal contact lenses were analysed with thermal camera and similar records were found regardless the optical design, but temperature decreased when contact lens was put in due to tear film disruption. After 3 mins removal baseline temperature profile was achieved independently of the design.
In the toric designs, preliminary results show that the thinner the contact lens the less the tear film disruption. Dark zones, meaning less temperature are visible in the thicker part of the toric lenses.
Moreover, the time needed to recover the baseline tear film profile increased up to even 10 minutes in some patients, maybe due to the asymmetry of the design (inhomogeneity of the lenses thickness), even considering the lenses were very stable.

Conclusions: Thermal camera image is a useful tool to evaluate contact lens fitting based on tear film stability, specially when comparing different designs. Temperature decreases regardless lens design maybe due to tear film disruption. In toric contact lenses designs tear film disruption seems to be related to local thickness maybe increasing the baseline tear film profile recovering time. It has to be taken into account that local thickness lens in toric designs is not only affected by stability criteria but also by the prescription. This opens new lines of research as to study interaction between prescription and stability. Another one could be and to study the influence of different contact lens materials.

Keywords: soft toric contact lens, tear film, thermal camera.

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Assessing interobserver variability in grading Meibographies using Pult's scale.

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Introduction: Meibomian glands (MG) are modified sebaceous glands located in the eyelids [1], distributed along the superior and inferior tarsus and are responsible for secreting lipids onto the tear film.
The observation of the gland morphology is key, in daily clinical practice, for the diagnosis of associated pathologies, allowing vision professionals the understanding, diagnosis and the subsequent treatment of these alterations.
The most used technique for the observation of MG is the non-contact meibography with infrared (IR) light.
This imaging technique provides information of the morphologic features of MG. Meibography allows analysis of the percentage of gland loss, in addition to observation of morphological characteristics such as the angle of torsion, thickness, width, length and shape of the glands [2].

In the present study, two different meibographers have been used to obtain the MG images from a normal population. The main difference between these devices has been the light used to visualize the glands. The first instrument used was OCULUS Keratograph 5M™ which incorporates an IR camera to image the Meibomian glands.
The second instrument used has been an experimental device, called Visible Light Non-contact Meibographer (VLNCM) that uses a visible light source combined with a red filter to obtain the MG images.
Seventeen observers, not specialized in this field, were recruited to grade the images using the Pult and Riede Pult 5-degree scale [3].

Aim: The main objective is to assess the variability between observers when rating the images through a standardized scale for the measurement of the Meibomian glands.

Methods: Meibography images were taken in one random eye and in both

eyelids. The superior and inferior tarsus was used to obtain the results. A total of forty images were captured and analysed, twenty per meibographer, ten of each eyelid. The images taken with the two devices were masked and randomized. After this, the meibography images were shown to the seventeen observers to be graded following the indications of the Pult and Riede-Pult scale. A week later, the same procedure was performed, with the images newly randomized. The seventeen observers graded the images again, in the same way as the previous session. Therefore, the gradations were performed twice (Session 1 and Session 2).

Results: The inter-observer variability analysis showed that there was a high discrepancy between observers, when the images were scored using the Pult 5-degrees scale, both for the meiboscores obtained with the K5M and with the VLNCM, for the upper and lower eyelids. This variability is greater for the images of the lower eyelid.

Conclusions:

This variability may be due to the discrete nature of Pult's scale, as the difference between one grade and the next may not be discerned. Moreover, taking into account that the predominant grades in these normal subjects are between 0 and 2, the difference between grade 0 -1 and 1-2 is difficult to discern, and, sometimes, the observer would give an intermediate value between both degrees as valid.

Keywords: Meibomian glands, meibography, meibomian gland dysfunction

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Neuroprotective effects of melatonin in retinal ganglion cells.

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Introduction: Glaucoma is characterized by progressive degeneration of retinal ganglion cells and the optic nerve, resulting in visual field loss [1]. Although the pathogenesis of glaucoma is not fully known, accumulative evidences indicate that oxidative stress and inflammation significantly contribute to the development and progression of this pathology. It has been suggested that activation of NLRP3 (nucleotide binding oligomerization domain leucine-rich repeats containing pyrin domain 3) inflammasome by several factors, including oxidative stress, could play a key role in inflammation and ganglion cell loss associated to glaucoma [2]. NLRP3 inflammasome is an innate immune complex. Once activated, it triggers the cleavage and activation of caspase-1. Activated caspase-1 mediates mature IL-1β secretion and can lead to a process of cell death called pyroptosis. Melatonin is a neurohormone secreted by the pineal gland but it also produced by various ocular structures such as ciliary body, retina and lens [3]. Melatonin can be an effective antioxidant compound acting as a direct and indirect free radical scavenger. Less information exists about its inflammatory properties in the eye and the full range of melatonin actions in retina is still not completely elucidated.

Aim: The purpose of this study was to analyze the potential neuroprotective actions of melatonin on retinal ganglion cells exposed to oxidative stress. This oxidative stress was induced by hydrogen peroxide treatment as well as by irradiation to light emitting diode (LED) blue light. Particularly, the ability of this neurohormone to preserve cell viability and its effect on NLRP3 inflammasome activity were evaluated.

Methods: Retinal ganglion cells R28 were exposed to hydrogen peroxide (400 μM, 600 μM, 700 μM and 800 μM) at different times (2, 4, 6 and 24 hours) or a blue light emitting diode (LED) light with or without melatonin pretreatment. Cell viability under the different experimental conditions was assessed by 3-(4,5-dimethyl-2-thiazolyl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) test. Potential cytotoxicity of melatonin administrated alone at different

concentrations was also tested. Moreover, in order to analyze the NLRP3 activation, NLRP3 and caspase 1 protein levels in total cell lysates were evaluated by western blot.

Results: Hydrogen peroxide treatment induced a remarkable time- and concentration-dependent decrease in R28 cell viability. Similarly, exposure to blue LED light significantly reduced cell viability. In western blot studies, higher levels of NLRP3 and caspase 1 were found in cells exposed to oxidative stress as compared to control (non-treated) cells indicating that oxidative stress stimulated NLRP3 activation. R28 cells only exposed to melatonin did not show any deleterious effect. Melatonin pre-treatment counteracted the cell death induced by oxidative stress conditions. Likewise, melatonin prevented NLRP3 activation since NLRP3 and caspase 1 protein levels returned to values that resemble to those found in control cells.

Conclusions: Hydrogen peroxide and blue LED light challenge reduced R28 cell viability. Since LED light is emerging as a powerful light source, long lasting exposure to LED light needs consideration in relation to retina vulnerability and photochemical damage. Melatonin pre-treatment significantly ameliorated cell damage triggered by oxidative stress and reduced NLRP3 activation. Consequently, this neurohormone could ameliorate pyroptosis process contributing to preserve retinal ganglion cell survival.

Keywords: glaucoma, retina, melatonin.

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Spectral reflectance through hyperspectral imaging (HSI).

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Introduction: Considering the importance of visual analysis when evaluating the condition of a surface, recently, multispectral and hyperspectral images (HSI) are gaining great importance in various fields of research. Some works of art show their deterioration from changes in the pigments that the components, so it is possible through hyperspectral analysis to determine the state of conservation in which an artwork is, or to detect flaws that they are imperceptible to the naked eye.

Aim: A hyperspectral image capture system has been validated obtaining the spectral reflectance parameter of Dalí's artwork: “Two figures” with a precision of the pixel size of the sensor used.

Methods: From the hyperspectral image capture it is possible to obtain the reflectance parameter of a surface. For this, equation (1) applied to each wavelength is used to later form a hyperspectral image cube.

$$\rho_M(x,y) = \rho_{white}(x,y)\frac{I_M(x,y) - I_{darkness}(x,y)}{I_{white}(x,y) - I_{darkness}(x,y)}, \quad (1)$$

where, ρ_M is the reflectance of the sample at each pixel x and y; I_M is the multispectral or hyperspectral image of the sample; I_{white} is the multispectral or hyperspectral image of the white material with the size of the artwork, needed to perform the reflectance calculations. ρ_{blanco} is the reflectance value

of this white material and, finally, $I_{darkness}$ is the dark image, necessary to calibrate the sensors noise.

Results: The spectral reflectance of Dalí's painting "Two Figures" has been obtained with a precision of the pixel size of each sensor for each wavelength, using a hyperspectral camera designed and patented by Complutense University of Madrid (UCM) and the method described above.

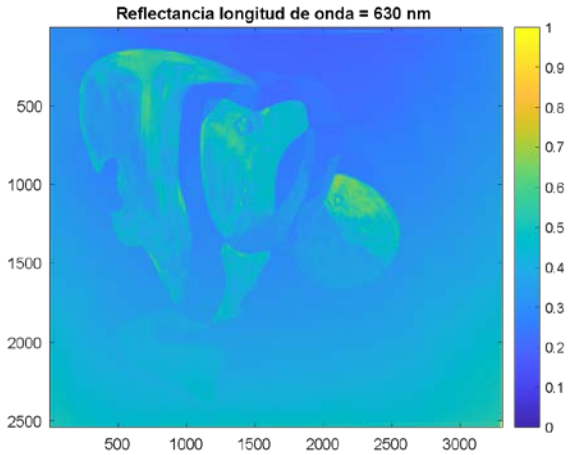

Figure: Reflectance for the 630 nm wavelength of Dalí's painting "Two Figures".

Conclusions: Through the analysis of the hyperspectral image, the reflectance parameter of Dalí's work of art "Two Figures" has been obtained, thus obtaining the necessary information for in the future, being able to project the necessary light information on the work of art and thus restore it virtually.

Keywords: Reflectance, hyperspectral, artwork.

References:

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Multifractal and statistical analysis of retinal vasculature.

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Introduction: The fractal dimension (DF) of retinal vascularization measures the degree of irregularity and complexity of blood vessel with a local exponent that tells us how the vasculature fills the surface of the retina as we examine it at different scales. It is a number, then, that informs us about the self-similarity of "arboreal" structures such as the vasculature [1]. Fractals do not have to be homogeneous, but they can behave differently in different locations, giving rise to the concept of multifractality as the property of a fractal object to have subsets of fractal dimension f (α), where the fractality is scaled with factor α. The curve (α, f (α)) is called the multifractal spectrum and can be used as a biomarker of biological structures [1-2]. Given the sensitivity of these techniques when it comes to characterizing complex geometric structures, it is important to realize how images are captured and processed since this implies that important characteristics are highlighted. In previous studies we have studied the influence of the different methods of image preparation and treatment, and the equipment for acquiring retinal images, on the measurement of the fractal dimension [3]. Likewise, the stability of the probability distributions of the fractal dimension of healthy retinas versus pathological retinas has been examined for a possible fit of the data to known fit models.

Aim: The previous studies and considerations show that the preparation of the images before the multifractal analysis involves a previous enhancement or filtering of certain structures, which may be important in the clinical implementation of the method. The main objective of this work is to study the changes that occur in the results starting from retinal images in three RGB channels or in gray scale when the fractal dimension of the morphological segmentation of the retinal vasculature is analyzed, as well as the analysis of the structures selected by these previous filtering methods and their possible extension and improvement (new color systems, principal component analysis-PCA, etc). In addition, the calculation of the multifractal spectrum of the retina is explored as a tool applied to healthy retinas and retinas with glaucoma and diabetic retinopathy.

Methods: A morphological segmentation of the images is carried out after remaining with the image of the green channel of the RGB image of the retina (Figure 1, the most normal option in the literature), and, in a second option, with the previous conversion of the image into RGB grayscale. Using the "Fraclac" plug-in of the ImageJ image processing program, the multifractal analysis of binarized retinal images is performed. MATLAB is also used for the additional statistical study of the images (PCA, etc). A group of 15 healthy retinas is analyzed, 15 with diabetic retinopathy (DR) and 15 with glaucoma (Glauc).

Results and Conclusions: The calculation of the distribution of the DF depends on the previous treatment of the images, highlighting different aspects of the same retinal vasculature (Figure 1). The multifractal spectrum reveals changes in the multifractal part, especially the retinas affected by glaucoma, which could be used as a new biomarker in the early stages of this pathology.

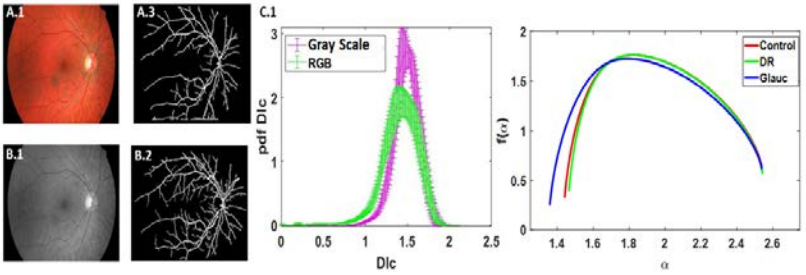

Figure 1: Left, RGB and gray scale images of a healthy retina (A.1, B.1) with vascular segmentation (A.3, B.2). Center, mean probability distribution of the fractal dimension of healthy retinas for both types of segmentation. Right, mean multifractal spectrum for each group of retinas.

Keywords: Fractal dimension, Multifractal spectrum, Morphological segmentation.

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Astigmatism tolerance in a new isofocal intraocular lens.

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Aim: Cataract surgery is one of the surgical procedures with the highest demand, not only for cataract removal but also for the correction of refractive errors. Extended depth-of-focus (EDOF) intraocular lens has been designed to provide continuous range of vision reducing the appearance of visual disturbances [1], due to the control of high order aberrations (HOA).

PhysIOL has developed the Isopure 123 lens, with similar characteristics to the Micropure 123 monofocal lens, but based on a patented Isofocal technology. It has a 100% refractive, aspheric and monofocal optic, and is made of a biocompatible glistening free material.

This lens achieves an elongation of the depth of focus, improving intermediate vision without affecting distant vision and without creating dysphotopic phenomena, inherent in the design of multifocal lenses. [2]

The main objective is to evaluate the tolerance to astigmatism of this new Isofocal intraocular lens and to compare it to the Micropure monofocal lens.

The secondary objectives are to compare the refractive result obtained through different evaluation techniques, both objective and subjective, the characterization of residual astigmatism and the comparison of the visual quality obtained with both models of implanted lenses.

Methods: This is a prospective randomized study of 50 patients that will include those who are going to undergo bilateral cataract surgery.

To compare refractive results, a visit will be assessed 3 months after cataract surgery. It will include manifest refraction, autorefraction and aberrometry with OPD-Scan III, from which the refraction for mesopic and photopic pupillary size diameter will be obtained and refraction from Zernike coefficients.

Tolerance to astigmatism will be studied 9 months after surgery. Cylinder defocus curves will be assessed with CTS system (M&S Technologies) for both positive and negative power 0.25D to 1.50D, 90 and 180 degrees and it will be measured correct distant visual acuity at each step.
Also, both topography with Pentacam and corneal tomography with MS-39 will

be assessed to characterize residual astigmatism after implantation of the lens as well as the visual quality using HD-Analyzer.

All values will be analyzed with SPSS version 25 program and a significance level p-value <0.05 will be considered.

Results: Table 1 shows the first preliminary results of manifest refraction three months after cataract surgery. It has been observed that for both lenses the objective method that most closely approximates manifest refraction is the autorefraction for the same parameters that are shown in the table.

	ISOPURE	MICROPURE
Parameter (D)	Mean ± SD (Range)	Mean ±SD (Range)
SE	-0.05±0.45 (-0.75, 0.75)	-0.05±0.18 (-0.38, 0.13)
J0	-0.02±0.17 (-0.37, 0.19)	-0.12±0.22 (-0.38, 0.35)
J45	-0.03±0.12 (-0.25, 0.16)	0.03±0.18 (-0.38, 0.32)
Sph	0.10±0.39 (-0.50, 0.75)	0.20±0.20 (0.00, 0.50)
Cyl	-0.30±0.28 (-0.75, 0.00)	-0.50±0.33 (-1.00, -0.25)

Table 1. Descriptive statistics for manifest refraction three months after surgery. Cyl = cylinder; J0 = vertical Jackson cross-cylinder; J45 = oblique Jackson cross-cylinder; SE = spherical equivalent; Sph = sphere

Likewise, preliminary results show similar tolerance to astigmatism in both lenses, being slightly higher the Isopure lens for positive powers added on 180 degrees.

Conclusions: First preliminary results based, Isopure lens shows a good astigmatism tolerance, similar to Micropure lens.

Keywords: Isofocal, astigmatism, depth-of-focus

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Effect of different dominant and non-dominant multifocal scleral lens combinations in vision quality.

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Aim: The objective of this study was to evaluate the effect of different combinations of dominant and non-dominant multifocal scleral lenses in vision quality.

Methods: Twenty subjects, 8 females and 12 males and 54.75±3.04 years old (range: 47-60) with regular cornea and presbyopia (1.79±0.37 D.) were recruited to participate in this study. All the participants were voluntarily involved in the study after signing a written consent form, where the purpose and the procedures of the study were explained. All the trials were carried out at the University Clinic of Optometry of the Complutense University of Madrid (Spain). Onefit MED (CooperVision Specialty EyeCare-Blanchard, Sherbrooke, Canada) Multifocal Scleral Lenses were fitted bilaterally. Four multifocal design combinations were studied randomly: Dominant-Dominant (DD); Non Dominant-Dominant (NDD); Dominant-Non Dominant (DND); Non Dominant-Non- Dominant (NDND), being the first lens for the sensorial dominant eye. Subjects wore the lenses for 2 hours and vision quality measurements were performed. Defocus curves under photopic and mesopic conditions, stereopsis, contrast sensitivity curve for different spatial frequencies, subjective vision quality using a Visual Analogue Scale (VAS), and the reading speed with the Develop Eye Movement (DEM) test were assessed. The values analyzed are the means ± SD. $p < 0.05$ was considered statistically significant.

Results: NDND showed the best photopic defocus curve, showing similar visual acuity at far ($p<0.05$; Student t-test for paired samples) but better near visual acuity ($p<0.05$; Student t-test for paired samples) than the other three combinations. However, no differences were found for defocus curve in

mesopic conditions. Stereopsis was statistically better for the NDND combination compared to the DD combination (57.78 ± 39.04 vs. 117.78 ± 178.05, p< 0.05; Student t-test for paired samples). For subjective vision, Participants reported better subjective vision with NDND and NDD combinations compared with DD combination (P<0.05; Student t-test for paired samples). 43.75% of patients preferred NDND combination compared with 18.75% who selected any of the other combinations. No statistical differences between combinations were found for Contrast sensitivity for any spatial frequency neither DEM (P>0.05); Student t- test for paired samples).

Conclusions: In this study, the NDND combination showed the best vision quality compared with other multifocal combinations. Multifocal scleral lenses are a great option for presbyopes.

Characterization of the meibomian glands in patients with allergic conjunctivitis and its relationship with histaminase.

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Introduction: The location of the meibomian glands at the palpebral level and their function lead to their playing an important role in the homeostasis and integrity of the ocular surface, therefore the active secretion of lipids acts as a barrier to prevent the evaporation of the aqueous component tear film. A dysfunction of the meibomian glands generates an affectation in the lubrication and wetting of the ocular surface, resulting in inflammatory responses, which must be treated effectively and immediately. Conditions such as allergic conjunctivitis and tear film alterations present many shared signs and symptoms such as red eye, burning, photophobia, foreign body sensation, itching and decreased quality of vision, the above symptoms are associated with immune activation and to the inflammatory response, in allergic conjunctivitis, an association between tear instability and thinning of the lipid layer has been reported, with no alteration in the result of the Schirmer test.

Aim: To determine the morphology and function of the meibomian glands in patients with allergic conjunctivitis and its relationship with the concentration of histaminase found on the ocular surface.

Methods: A descriptive, prospective, cross-sectional study is proposed in a population of patients diagnosed with allergic conjunctivitis [1] and attending consultations at the Optometry Clinic of the University of La Salle, who will be evaluated for the morphology of the Meibomian glands in addition to tear evaluation using the Oculus Keratograph 5.
All participants will sign a written informed consent after explaining the research and two questionnaires will be applied: Visual Function Questionnaire (VFQ-25) and The Ocular Surface Disease Index (OSDI).
The assessment of patients will comply with the following steps:

The evaluation of the tear film and the function of the meibomian glands will be carried out with the TF Scan module that the Oculus Keratoghraph 5 equipment, the analysis will begin in the right and left eye sequentially applying the following aspects: Meniscometry, NIKBUT, thickness of the lipid layer and dynamics of the tear film.
Subsequently, the analysis of the ocular redness presented by the patient (R Scan module).
Evaluation of the morphology of the Meibomian glands, using the Meibo Scan module.
At the end of the assessment in the Keratograph, using an aberrometer (i profiler by Zeiss) to analyse and quantify the type of aberration according to the Zernike polynomials [2].
Finally, the patients will undergo a non-invasive evaluation of the concentration in the tear film of histaminase and determine its relationship with the alterations or damage of the ocular surface in allergic conjunctivitis [3]. The technique to use is an enzyme-linked immunosorbent assay test (ELISA).
The project will follow the principles of the Declaration of Helsinki, resolution 8430 of the Ministry of Health that regulates research in humans in Colombia and will also be subject to evaluation and approval by the ethics committee of the Faculty of Health Sciences of the La Salle University.

Results: Information pending the progress of the investigation.

Conclusions: Information pending at the end of the investigation.

Keywords: Allergic conjunctivitis, ocular surface, tear film.

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Effect of the use or artificial tears on the conjunctive for different fixation requirements, in healthy young adults.

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Main goal.
To evaluate the characteristics of the tear film and the conjunctiva to the use of artificial tears during the development of different fixation requirements.

Secondary objectives
- Assess the tear film and the conjunctiva, non-invasively.
- Check the presence or absence of ocular symptoms, applying the OSDI questionnaire.
- Determine the influence of artificial tears on the tear film and conjunctiva for different fixation requirements on electronic devices and paper.

Materials and methods
Prospective cross-sectional clinical study in a population of young adults, aged between 19 and 35 years Three evaluations of the tear film and the conjunctiva will be carried out, in three days, with a difference between them of at least 8 days. Each day the participant will have acute exposure to fixation activities. Each day the subjects will answer the OSDI questionnaire (1), and will be evaluated, with the Oculus Keratograph(2).
Two artificial tears of different composition, without preservatives, will be applied, one in the right eye and the other in the left eye and. The behavior of the tear film and the conjunctiva will be observed with the keratograph at different times (10 minutes after the tear is instilled, at one hour, two hours and three hours).

Inclusion criteria
- All those who sign the informed consent of the research.
- Visual acuity, without or with 20/20 optical compensation.

Exclusion criteria
- Systemic disease

- Individuals with ocular and / or systemic pharmacological treatments
- Contact lens wearers
- People operated on by eye surgery
- Pregnant or lactating women
- People with fixation problems

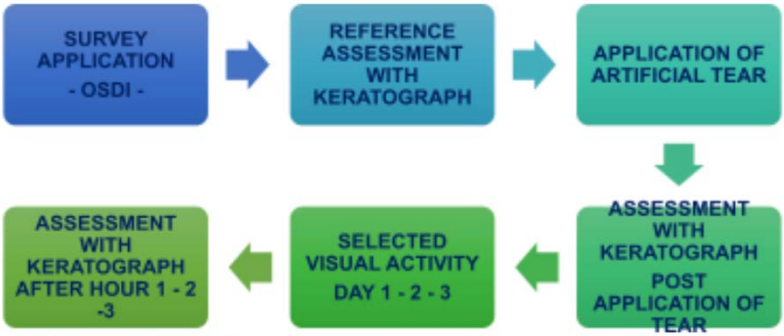

Diagram 1. Description of the process to develop with each participant

Fixation requirements. Tasks to develop Reading (computer and paper), Video game (computer and smartphone), Work (excel and power point).

Environmental parameters. The time of day in which the assessments are made will be considered, as well as the lighting, temperature and atmospheric pressure will be measured.

Keywords: Keratograph**.** artificial tears. Fixation requirements.

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BSSRDF Measurement System.

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Introduction: The study and characterization of appearance has become very important in different industrial areas in the last decades. Color, gloss, translucency and texture must be quantified objectively by measurement scales to provide a complete description of the appearance of an object. These measurement scales rely on the measurement of the reflected and transmitted light by the objects, and its spectral, angular and spatial distributions.

The Bidirectional Scattering-Surface Reflectance Distribution Function (BSSRDF) is the function describing the variation of the radiance of the elementary areas of a surface with respect to the directionally incident radiant flux on that surface [1]. Measurements of the BSSRDF are important for characterizing the translucency of objects and for obtaining those optical parameters affecting volume scattering.

Aim: To date, no traceable measurements of the BSSRDF are available, since, likely due to its technical complexity, no standard measurement procedure has been established. A primary facility for measuring the BSSRDF has been developed at the IO-CSIC and it is based on a gonio-spectrophotometer [2]. This facility has already been tested by measuring the BSSRDF of twelve homogeneous and translucent samples. The aim of this work is to improve the current measuring system and repeat these BSSRDF measures. The obtained results will be useful for transferring the BSSRDF scale to other instruments and, at the same time, for determining the phase function and the scattering coefficient with support of the Radiative Transfer Equation (RTE) [3].

Methods: A sketch of the facility is represented in Fig. 1. It is composed by three subsystems: an irradiating system (with spectral resolution), a sample-positioning system (which consists of a six-axis robot arm) and a detection system (which is a high sensitivity CMOS camera placed on a rotatory platform). This design allows any irradiation and collection direction to be realized.

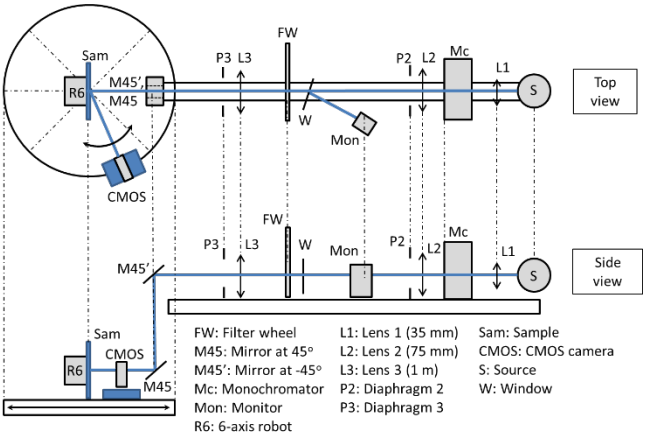

Figure 1: Sketch of the measuring system.

The first step of the improvement of the facility has been the replacement of the detection system (a CCD camera has been replaced by the mentioned CMOS camera). Also, the lighting system has been modified with a new light source and a new optical system configuration.

Results: Some results about the characterization of the whole system will be presented in the conference.

Conclusions: The improvement of the facility will allow us to reduce the uncertainty on the measurement and to get a higher spatial precision on the detection.

Keywords: BSSRDF, scattering, translucency.

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Development of near infrared reflectance scale.

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Introduction: The bidirectional reflectance distribution function (BRDF) relates the radiance at a surface for each direction with the irradiance on it. It provides a complete description of the reflectance of a surface, and allows the reflectance coefficient and the reflectance factor to be computed at any geometry [1].

Aim: Near infrared interval (here defined from around 780 nm to 1700 nm) has become relevant for characterizing reflectance because has interest for different applications in science or industry. Then, we intend to extend the reflectance scale from visible to near infrared interval. For that purpose, we need to develop a reflectance standard.

To develop a reflectance standard on that interval, we need to be able to measure the BRDF of a nearly perfectly reflecting diffuser at the geometry 0º:45º with low uncertainty, without external radiometric references. The BRDF at that geometry will be extended later to other bidirectional geometries [2,3].

Once the reflectance standard is realized, it will be used to obtain a thorough characterization of the reflectance of key materials.

Methods: To conduct our process, we use a system called goniospectrophotometer, that consist in a 3 part system: first one is the optic system that includes all the optics, the monochromator (the wavelength for the experiment was between 900 and 1700 nm) and the light source (LDLS lamp), the second is the positioning system consisting of a robot arm and the movement of the platform that holds the detecting system to give us the capability of adjust the angles of incidence and collection to set the geometries, the last system is formed by two detectors (a spectroradiometer and an InGaS detector) that collects the radiation coming from the sample after reflecting on it.

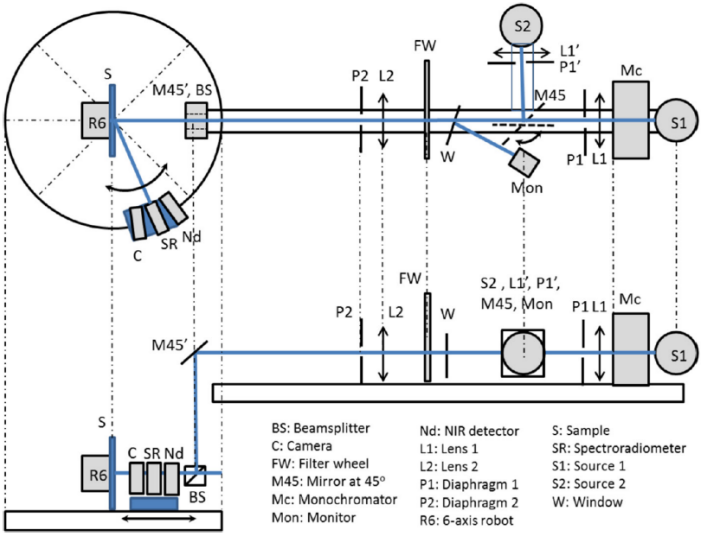

Figure: Goniospectophotometer diagram including the three parts.

Results: There is no data obtained yet. The measurements will be carried out during 2022.

Conclusions: It is important to obtain a reflectance standard in the near infrared and thus be able to subsequently evaluate the reflectance of any sample on that spectrum interval.

Keywords: goniospectophotometer, reflectance, near infrared.

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Effect of the elasticity module of soft contact lenses on the morphology and function of the meibomian glands.

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Main goal:
To characterize the morphology and function of the meibomian glands in participating patients, before and after the adaptation of soft silicone hydrogel contact lenses with different elasticity moduli in patients between 18 and 40 years old who attend the Optometry Clinic from the University of La Salle.

Secondary objectives:
- Characterize the tear film (meniscus height, lipid layer NIKBUT and film dynamics) in participating patients, before and after fitting soft silicone hydrogel contact lenses with two different modulus of elasticity.
- Compare conjunctival redness in participating patients, before and after wearing silicone hydrogel soft contact lenses with different modulus of elasticity.

Materials and methods:
A descriptive observational study is proposed in a population of people over 18 years of age and up to 40 years of age, called young adults. The refraction of the patients may be between +1.00 and -4.00 of spherical power and up to -2.75 the cylinder, in order to be able to preserve symmetry in the thickness of the contact lenses to maintain the modulus of elasticity, this because, the greater the thickness the modulus will increase. (1) Preliminary evaluation: Before fitting contact lenses, it will be verified that patients meet the inclusion criteria, then the following evaluation will be performed in the following order:
1. Evaluation of the tear film with the TF Scan module of the Oculus Keratograph 5 equipment: Tear meniscus height, NIKBUT, lipid layer and film dynamics, to evaluate the function of the Meibomian Glands.
2. Next, eye redness will be evaluated with the R Scan module.
3. Then the morphology of the Meibomian Glands in the upper and lower eyelid; Using the Meibo Scan module, this evaluation will be carried out according to the scale that the Oculus Keratograph 5 has, for classifying the state of the Meibomian glands, with the equipment located in the ocular

surface unit of the Optometry Clinic of the University of La Salle. Two parameters are commonly used to evaluate the function of the meibomian gland: the thickness of the lipid layer and the quality and expressibility of the meibum. To assess the morphology of the meibomian glands, meibography is used to detect the loss and tortuosity of the meibomian glands.
4. The OSDI DEQ survey of the team will be applied to each of the patients before fitting the contact lenses and in each of the controls. (2,3)
They will be fitted with soft silicone hydrogel contact lenses with a high modulus of elasticity (Balaficon A 1.1 MPa) in one eye and a low modulus of elasticity in the other eye (Confilcon A 0.75 MPa). The contact lenses will be used for 1 month, at least 8 hours a day and the measurements will be repeated in the order that they were performed for the first time, the following controls will be at a month, at 3 months and at 6 months.

Inclusion criteria: People over 18 years of age and up to 40 years of age, young adults not wearing contact lenses, without ocular involvement, no dry eye syndrome, no systemic diseases or medications that alter tear secretion.

Exclusion criteria:
- Systemic disease
- Contact lens wearers
- Patients with eyelid alterations in morphology and function.
- Surgery on chalazion eyelids and / or blepharoplasties that may affect the morphophysiology of the Meibomian glands.

Results: It seeks to find the effect of the modulus of elasticity of soft contact lenses on the morphology and function of the meibomian glands, the results will contribute to visual and ocular health professionals and the contact lens industry.

Keywords: Tear film. Meibomiam glands. Keratograph.

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PONENCIAS EN PÓSTER

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Pilot study to investigate the effect of orthokeratology contact lenses on rabbit eye (morphology and physiology)

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Introduction: Myopia is a refractive defect that affects 22% of the world population (1). By 2050, it is estimated that this number will reach 50% due to changes in life style (1). This study aims to investigate physiological events to develop and to optimise new treatments for the better control of the myopia and thus reduce its negative impact on the eye health of people.

Aim: To investigate the physiological events in the growth of the eye in order to develop and optimize new treatments that allow more effective control of the progression of myopia and thus reduce its negative impact on eye health.

Methods: Three Rabbits were used to study the effect of orthokeratology contact lenses. The measurements were made before, during, and after the fitting of the Ortho-K lenses (2 h and one night and 7 days). The Ortho-K was put on the left eye and the right eye was used as a control. The curvature of the cornea was measured by topography and the measurements of the cornea was sent to the lens manufacturer. The measurements of the cornea were with Target power 3.00 D, Total Diameter 11mm, back optical zone 6 mm. The lenses were received from the company 3 weeks after the measurements. Two rabbits died before the lenses arrived. Only one rabbit was used for the experiment.
The Ortho-K lens was fit on the left eye of the rabbit. The lens was removed after two hours, and the curvature of the cornea was measured by topography. The lens was fitted again for overnight and removed next morning to carry out topography of the cornea. Later on, the lens was fit every night for 7 days and removed every morning for 7 days to carry out the topographic measurements of the cornea. The rabbit was sacrificed, and the eyes were removed. The eyes were fixed in paraformaldehyde soon after the removal from the rabbit. The cornea was removed from the eye and processed for the electron microscope (2).

Results

Topographic results:

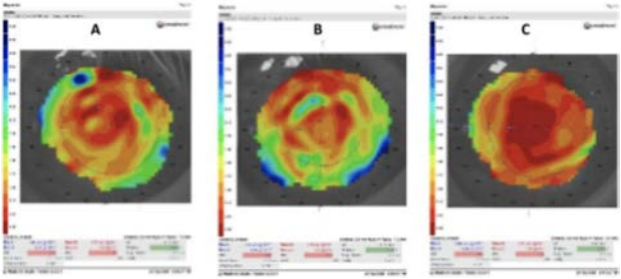

Figure 1: Topographic picture of the rabbit cornea; A) before fitting lens; B) 2 hours fitting Ortho-K lens; C: one night fitting Ortho-K lens

Table 1: Topographic measurements of the rabbit eye:

Duration	**Flat K (mm)**	**Steep K (mm)**	**K (mm)**
Before fitting Ortho-K lens	6.66	6.41	0.25
2 hrs after the lens fitting	7.89	6.89	0.19
One night after the lens fitting	7.12	7.02	0.10

Microscopy of cornea

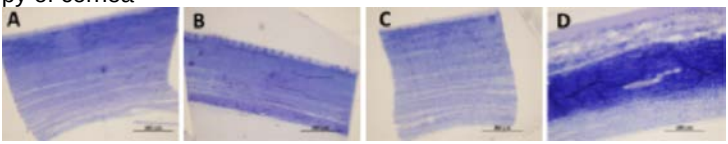

Figure 2: A) Control central cornea (5.3 mm thick), B) Control peripheral cornea (5.7 mm thick), C) Ortho-K central cornea (5.5 mm thick), D) Ortho-K peripheral cornea (5,89 mm thick)

Conclusion

1- The topographic measurements showed that the changes in the steepness of the cornea after fitting Ortho-k lens.

2- Light microscopy showed the changes in the structure of periphery of the cornea after fitting Ortho-k lens.

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Development of a protocol for the characterisation of ocular surface microbiota in individuals with dry eye.

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Introduction: Dry eye syndrome is a multifactorial disease that causes discomfort and alterations of the ocular surface. This disease is becoming increasingly common, affecting up to 30% of the population. It is usually caused by poor tear production or rapid tear evaporation, but can often be associated with other eye disorders such as meibomian gland dysfunction or blepharitis.[1] The ocular microbiota is mainly located in the conjunctiva. It has now been shown that the microbial community present in the conjunctiva is sparse and not very diverse. The most common microorganisms identified in the human conjunctiva are *Staphylococcus, Streptococcus* and *Corynebacterium* species, among other genera. To know of the ocular microbiota in individuals with dry eye could help to improve treatment of this syndrome. However, there are no standardised methods for their characterisation and microbiological analysis.[2][3[

Aim: The aim of the study was to develop an efficient method for the characterisation of the ocular surface microbiome in individuals with dry eye.

Methods: A clinical assessment was performed using the slit lamp. The participants' ocular surface was examined for possible alterations by means of various diagnostic tests, such as conjunctival staining. In addition, samples were taken from different areas of the ocular surface and viable microorganisms were isolated and counted from these areas by surface seeding on blood agar plates. Microbiological cultures were carried out under aerobic and anaerobic conditions at 37°C for 48-96 hours.

Results: First, subjects with dry eye and control individuals were selected according to diagnostic tests measuring tear quality and quantity, as well as the ocular symptomatology of these participants. A greater number of viable microorganisms were isolated from the lower bulbar conjunctiva, from the bulbar conjunctiva area where subjects had staining and from the upper tarsal conjunctiva than from other areas of the ocular surface tested. A higher number of colony forming units per millilitre (CFU/mL) and microbial diversity was also identified under anaerobic conditions than under aerobic conditions. By applying gentle mechanical agitation to the ocular sample collection material, a higher number of CFU/mL was recovered from the ocular sample than without agitation or with aggressive mechanical agitation.

Conclusions: A protocol for characterising the ocular microbiome in individuals with dry eye has been developed that allows a broader view of the viable microorganisms colonising the ocular surface. This may be useful in identifying future biomarkers related to dry eye syndrome.

Keywords: Dry eye syndrome, bacteria, ocular microbiota.

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Development of chronic intraocular hypertension in the rabbit: Effects of Intra-ocular injection of gold nanoparticles.

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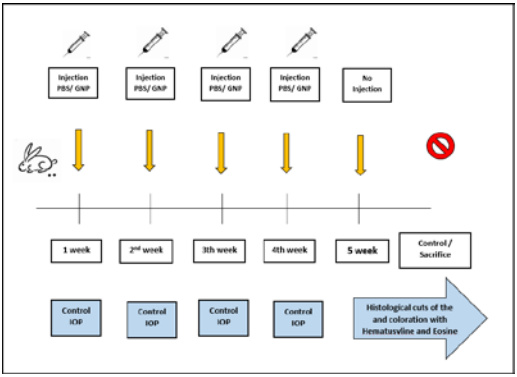
Aim: The present experiments are designed to develop a rabbit model of chronic intraocular hypertension with characteristics similar to human chronic glaucoma by making multiple intraocular hypertension injections of 80 nM gold nanoparticle (GNP).

Methods:
Design of Rabbit Glaucoma Model:

Four weekly Injection of Goldnanoparticules (GNP) in 5 rabbits (2 controls and 3 rabbits' models) anesthetised with ketamine hydrochloride (50mg/Kg) and Xylazine hydrochloride (0.25 mg/Kg) administered intraperitoneally.The IOP was measured weekly



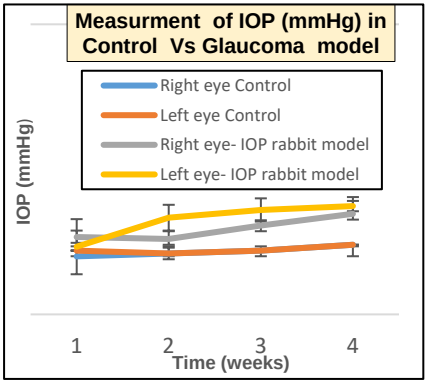
Weekly extraction of Aqueous Humour from rabbits: 100 µl of AH was extracted and analysed to measure the level of Osteopontine (Biomarker in Glaucoma). After the extraction, the solution of GNP (10µL of GNP + 90µl of PBS) was injected in both eyes of rabbit model and the solution of 100µL of PBS in controls rabbits.

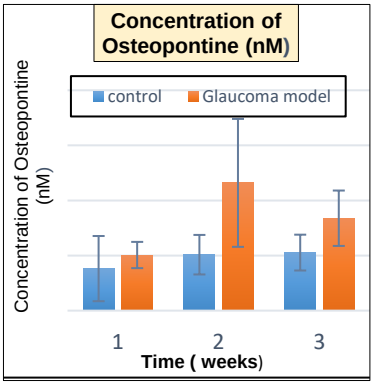
Measure of the IOP: IOP was measured by Tono Vet contact tonometer.

Measure of the concentration of biomarkers in animal and human sample:

Biomarker	Methodology (HPLC)
Osteopontine (OPN) [1]	Quantitative measurement of OPN in AH: Column C18 Mobile phase:0.1 %TFA (80% A) and 60%ACN in 0.1% TFA (20%B),40°C, Flow: **0.3ml/min**, Volume:**10µl**. Detection: **214nm**

Results:





Conclusions: The increase of the IOP in rabbit model was obtained with rabbit model comparing to control rabbits. This model seems to mimic the pathology of Glaucoma; In addition, There is a difference between the 2 groups , in the level of Osteopontine (OPN) which is a relevant biomarker of Glaucoma.

Keywords: IOP, Animal model, Glaucoma.

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Quantitative and qualitative study of the anterior ocular pole in a population with multiple sclerosis.

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Introduction: Multiple sclerosis (MS) is a neurological disorder characterized by demyelination and neurodegeneration of the Central Nervous System (CNS). A partial or total limitation of the visual function and its impact on quality of life has been described (1). Despite the wide variety of studies on the visual system in MS, there is little evidence on the changes that occur at the level of the ocular surface and in the pupil.

Aim: To describe the pupil dynamics and the tear film quality on a MS patients' group. To find disease-related changes when compared to a control group. To find correlations between specific changes and filiation data such as duration of the disease, drug treatments, disease subtype or history of ocular involvement (optic neuritis).

Methods: This is a case-control study. This study will be performed thanks to volunteers who will be contacted in different associations of MS patients in Madrid. The participation of patients suffering from MS (case group) will be requested. A group of healthy patients matched in age and sex with the group of patients suffering from MS (control group) will be recruited. The participating associations will set up a physical space at their headquarters to develop the study. The investigators will install all the necessary materials in the space designated for this purpose. Tear film and pupil characteristics will be analyzed with the Keratograph 5M® (Oculus, Germany). The tear film volume will be assessed through the tear meniscus height (TMH). The tear film stability will be evaluated through the non-invasive break-up time (NIBUT). The tear film quality will be evaluated through the interference patterns of the lipid layer. The degree of ocular redness and Meibomian glands dysfunction

will be rated. Dry-eye related quality of life will be measured with the OSDI questionnaire (Ocular Surface and Disease Index®) (2). Regarding pupil dynamics, time latency, maximum and minimum achieved diameters and contraction and dilation times and speeds will be assessed (3). Correlations between tear film and pupil study variables and filiation data will be analyzed (duration of the disease, MS subtype, pharmacological treatment, history of MS-related ocular conditions).

Results: No results available. Period of measurements is due to start in October 2021.

Conclusions: Not determined.

Keywords: multiple sclerosis, dry eye, pupillometry

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Influence of distance and hours of nearwork on accommodative function. A 4-year longitudinal study.

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Introduction: Nowadays mobiles, tablets and computers mostly occupy young people's leisure time. One of the main consequences of this lifestyle could be the increase in accommodative anomalies that cause a large amount of asthenopic symptoms, as well as concentration and academic performance problems [1,2].

Purpose: The aim of this study was to analyze the influence of the number of hours and distances used in near vision tasks (NVT) on accommodative function in a sample of students of 2nd year of ESO and to evaluate the changes that occur in these parameters in a period of four years, when these students were in 2nd year of high school, with the increase of academic requirement.

Material and Methods: The subjects participating in the study were 43 students, 25 females and 18 males. All of them participated in two visual exams. The first exam was carried out when the students were in the 2nd year of ESO. The second exam was carried out when these students were in the 2nd year of high school.
The patients completed a questionnaire that included questions about the number of hours per week dedicated, during their free time, to perform NVT.
The working distance used to carry out three close-up activities (reading, writing and using the mobile phone) was recorded.
In order to evaluate the accommodative function, the following measurements were taken: Accommodative Amplitude (AA), Accommodative Response (AR) using MEM and FCC, Monocular and Binocular Accommodative Facility (MAF & BAF) and Positive and Negative Relative Accommodation (PRA &NRA) [3].
To evaluate the influence of number of hours and distances of NVT on accommodative parameters (AR, MAF, BAF, PRA and NRA), the sample was divided in two groups: VDN (subjects who presented values within the norm) and VFNEA (subjects who presented values outside the norm with suspected accommodative excess). Differences in hours and distances used on NVT

between the groups were studied in the first and in the second examination. Data analysis was performed with the SPSS statistical program. The results were considered statistically significant when the P value was less than 0.05.

Results: The students in the sample spent a large part of their time outside of school, on near vision tasks and they increased considerably in 2nd year of high school compared to 2nd year of ESO. The mean value went from 32.69 ± 11.71h to 44.58 ± 12.96h per week. The "working distance" used for the three tasks evaluated also increased in the 2nd year of high school regarding the first measurements.
About the accommodative parameters, mean values of RA, MAF, FAB and NRA were found below the norm in the first and in the second measurements performed, but the differences were more significant when the students were in the 2nd year of highschool and they spent more time on NVT. When dividing the sample in two groups, it was found that students in the VFNEA group presented more hours of work on near vision than students in VDN group. Again, the differences were more significant when the students were in 2nd year of high school. For the working distance parameter there were no differences between groups.

Conclusions: The results of our work suggest that it is the number of hours in NVT and not the distances used, the parameter that has the greatest influence on the anomalies of the accommodative system. The students who dedicate more hours of work in near vision, present a greater tendency towards accommodative excess. Differences were more significant in the 2nd year of high school when the academic demand increased.

Key Words: "visual symptomatology", "accommodative anomalies", "academic achievement"

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Impact of contact lens wear on NLRP3 gene expression: implications for ocular frailty in middle-aged adults.

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Introduction: The inflammatory process plays a crucial role in frailty syndrome, which can appear in middle age and is associated with a poor health outcome [1,2]. Consequently, gerontologists recommend screening inflammatory biomarkers in middle-aged adults to detect frailty and, therefore, prevent chronic diseases and mortality. [1,2] External factors, such as contact lens (CL) wear, could be a risk factor for frailty because they can generate and extend the inflammatory process [3].

Aim: To analyse the effect of long-term CL wear on mRNA level of genes linked to inflammation (IL-6, NLRP3, NK1R, CD73, MUC16 and TRPV1 genes) in conjunctival cells of middle-aged individuals, by quantitative PCR.

Methods: 12 non-contact lens wearers (NCLW) and 14 contact lens wearers (CLW) with a CL wearing routine of 8 h per day for at least 1 year were enrolled in the study. Evaluation of ocular symptoms and assessment of the ocular surface integrity included the Ocular Surface Disease Index (OSDI) questionnaire, tear meniscus height (TMH), first/average non-invasive tear breakup time (NIKBUT first/avg), bulbar redness (BR) and corneal/conjunctival staining. Evaluation of the molecular impact of CL included analysis of conjunctival specimens obtained by impression cytology with the EYEPRIM device (OPIA Technologies, Paris, France).

Results: Middle-aged CLW presented a significant increase of NLRP3 and MUC16 mRNA level as well as a decrease of CD73 mRNA level, in comparison with NCLW. Additionally, we checked for a potential correlation between these transcript levels and clinical changes of the participants' ocular

surface. Unlike molecular analysis, clinical examination fails to detect inflammation in CLW.

Conclusions: These data suggest that long-term contact lens wear could trigger an inflammatory response in middle age orchestrated by NLRP3 inflammasome and modulated by CD73 and MUC16 proteins. Further studies are needed to confirm our gene expression findings at the protein level as well as to investigate the potential role of long-term CL wear in the onset of ocular frailty.

Keywords: Ocular frailty, inflammaging, inflammasome.

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Evaluation of retinal vasculature by OCT Angiography in type II diabetes.

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Introduction: Diabetic retinopathy (DR) is the main microvascular complication affecting the eye caused by diabetes mellitus (DM).(1)
Fluorescein angiography is the gold standard diagnostic tool to evaluate retinal vascularization. It is an invasive technique that requiere injection of an intravenous dye in order to visualize retinal vascular blood flow.(2)
Optical coherence angiography (OCTA) is a new non-invasive diagnostic tool that offers quantitatively evaluation of both retinal vascular blood flow and whole retinal vasculature.(3)

Aim: To analyze comparatively different retinal vasculature parameters by OCTA in diabetic patients with mild DR, diabetic patients without DR and healthy controls.

Methods: Cross-sectional comparative study beetween 3 diagnostic groups. We calculated sample size considering the differences between groups previously reported by other authors. A sample of 60 patients for each group was obtained.
We analyzed systemic variables as glycosylated hemoglobin (Hb1Ac), time since diabetes onset, type of DM treatment, presence of arterial hypertension, dyslipidemia or other current diseases.
We performed OCTA (Carl Zeiss Cirrus 5000) image acquisition with 3x3mm and 6x6mm macular cube angiography protocol and 4,5x4,5mm optic disc angiography. To evaluate the choroid 5 high-definition lines with enhanced depth imaging (EDI) technology were performed. We analyzed the foveal avascular zone (FAZ), vessel density (VD), acircularity index (AI), fractal dimension (FD) and vessel diameter index (VDI).

Results: Results pending of data analysis.

Conclusions: Conclusions pendinf of data analysis and interpretation.

Keywords: Optical coherence angiography, diabetes mellitus, diabetic retinopathy.

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In vivo study of efficacy of the release of melatoninergic tear secretagogues by contact lenses.

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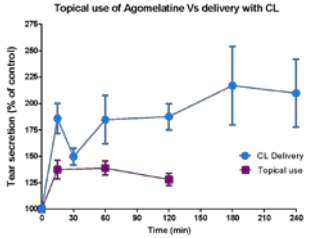
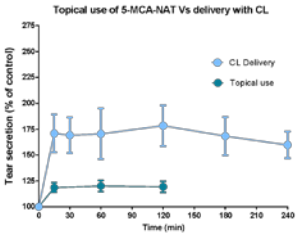
Introduction: Many studies describe the advantages and efficacy of the use of contact lens (CL) for the release of drugs on the ocular surface compared to topical use [1], therefore it has been proposed as an excellent method for drug delivery in the treatment of different ocular pathologies and particularly dry eye [2]. Melatonin analogs have recently been described to increase tear secretion and have been proposed as a therapeutic alternative in the treatment of dry eye with tear deficit [3].

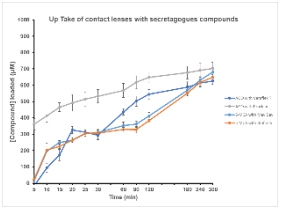
Aim: To verify and evaluate the tear secretagogue effect of the melatonin analogues Agomelatine (AG) and 5-MCA-NAT (5M) delivered through contact lenses of different materials, against topical use in the New Zealand rabbit animal model.

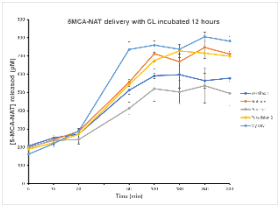
Materials and Methods: Male New Zealand rabbits weighing 3 to 4 kg were placed in individual cages with free access to food and water and were subjected to regular light/dark cycles (12 hours) following ARVO guidelines for animal experimentation. Different CL materials were tested Stemfilcon-A (MyDay®), Comfilcon-A (Biofinity®), Balafilcon-A (PureVision2®) Poly-HEMA (Veraflex T®), and Omafilcon-B (Proclear®) (n=6 by material of Pw = ±2.00 and 0.00 D). AG and 5M dilutions were prepared in [1 mM] saline containing 1% DMSO for the incubation / release and CL loading tests. For animal testing for both topical use (n=24 eyes) and delivery (n=12 eyes) with CL the secretagogues were formulated at [100 µM]. The CL loaded concentration of compounds and their release in a saline medium (1 ml) after 12 hours of incubation were carried out by spectrophotometry (Power Wave XS2 - Biotek) at absorption peaks of λ = 275 nm for AG and λ = 230 nm for 5M. Tear secretion was measured with the Schirmer test, using Whatman nº 51 paper strips placed in the inferior lid margin of the eye for 5 minutes. Tear secretion was measured as the length (in millimeters) of the strip wetted by the tears.

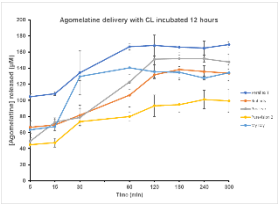
Results: The significant increase in tear secretion versus control (100%) of topical use of AG (138.9% ± 6.5% SEM, P < 0.001, t-Student) and 5M (120.0 ± 5, 3% SEM (P < 0.05, t-Student), increases significantly and is prolonged in time with the release of secretagogues with CL with values reaching 216.9 ± 37.03% SEM (P <0.001, t-Student) with AG and 178.4 ± 19.71% SEM (P <0.001, t-Student) (Figures 1 and 2)











Conclusions: The study shows that the release of melatoninergic secretagogues by CL increases tear secretion in the rabbit model between 78% and 117% in a sustained manner for 4 hours. It also shows that hydrogel PolyHEMA materials have a higher affinity and a better load / delivery ratio for AG, contrary to what happens with 5M, whose ratio and affinity is higher for silicon hydrogel materials (Stenfilcon A) (Figures 3,4 and 5).

Keywords: Contact lenses, Drug delivery, Melatonin analogs.

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Predictive Machine Learning applied to the CISSve Survey.

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Introduction: CISS-v15 (Convergence Insufficiency symptom survey) [1,2] is the most accepted survey to detect and measure close vision problems. Recently, our team has been working on the adaptation to Spanish of CISS-v15 [3] and its validation, in order to provide a reliable tool to measure these symptoms to Spanish speaker professionals. As an outcome, CISSve (Spanish version of CISS). The current work analyzes the behavior of the CISSve items through ML technics inputting the data captured through surveys during the study

Aim: The target of this work is the analysis of the behaviour of the CISSve items and the proposal of trained models to predict symptomatology based on ML technics**.** This contribution implements an algorithm suitable to be used to automatically discriminate the patients with potential binocular dysfunctions

Methods: Use of the data captured through surveys during the study to adapt the CISS-15 into CISSve. Use of machine learning techniques implemented with python and other open source ML tools

Results: 1) Artificial intelligence models to identify patients with likely binocular dysfunctions. 2) Performance analysis of the different models.

Conclusions: The use of historical data and machine learning technics, can help professionals to predict likely binocular problems in patients

Keywords: Machine Learning, Prediction, CISSve

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