WVUK Annual Meeting Programme

Virtual on Zoom; 10th June 2022

10-10.10am: President's welcome

10.10-11am: Rapid Fire Session

11-11.15am: Break

11.15-11.45am: Key Speaker: Clinical

11.45-12.15pm: Key Speaker: Basic Science

12.15-12.30pm: Break

12:30-1.30pm: WVUK Keynote Speaker

1.30-2pm: Break

2-3pm: Poster Session

3-3.15pm: Break

3.15-4.15pm: WVUK 2022 Panel Discussion "Closing the gender attainment gap in Eye Care and Research – where are we?"

4.15-4.30pm: Prize Giving

Accessing the meeting

Main Meeting Webinar link:

https://us02web.zoom.us/j/89323636146?pwd=SGJjSStCZzVmR0VteVc5YUFHMVhHUT09

Webinar ID: 893 2363 6146; Passcode: 895534

Poster Session link:

https://ucl.zoom.us/j/92748934194?pwd=Q2U1QmhKNDRoM0NqanNSdUlWS2FJUT09

To access the posters before and during the meeting

1. Log into the WVUK members area: https://members.womeninvision.co.uk/
2. To find the posters, click on the box: 'WVUK 2022 Annual Meeting Posters'
3. To view the posters, click on individual posts to view the different posters.

10.10-11am: Rapid Fire Session

Moderator: Lindsay Rountree

Exploring digital exclusion for patients using remote consultations at Moorfields Eye Hospital
Amrit Sehmi

Circadian rhythms in diabetic retinopathy
Hanagh Winter

Investigating the lived experience of classification in alpine skiers with a visual impairment
Sara Douglas

Investigating the use of non-viral S/MAR vectors for USH2A gene therapy
Maria Toms

Genotypic and phenotypic spectrum of foveal hypoplasia: a multi-centre study on behalf of the Foveal Development Investigators Group (FDIG)
Helen Kuht

11-11.15am: Break

11.15-11.45 Key Speaker: Clinical Session with Rachel Pilling

Moderator: Lola Solebo

How to Make It Easier: A letter to myself in the past

Prof Rachel Pilling, Professor of Learning Disability and Specials Needs Eye Care University of Bradford, and Consultant Paediatric Ophthalmologist, Bradford Teaching Hospitals NHS Foundation Trust

Professor Pilling has been a consultant paediatric ophthalmologist at BTHFT since 2010 and was appointed as Professor of Special Needs and Learning Disability Eye Care by the University of Bradford in 2020. She has published widely on aspects of eye care for learning disability in particular novel visual assessment tools, special school visual assessment, cataract surgery and diabetic retinal screening in adults with LD. In 2016 she was awarded the Astbury Award in recognition of collaboration in eye care for the Bradford Special School and Learning Disability Visual Assessment.

11.45-12.15pm Key Speaker: Basic Science Session with Majlinda Lako

Moderator: Eleni Beli

Pluripotent Stem Cell-Derived Retinal Organoids to Repair Vision

Prof Majlinda Lako, Professor of Stem Cell Sciences, Newcastle University

Professor Lako graduated in Biochemistry and Genetics from Faculty of Natural Sciences in Tirana, (Albania). For her PhD studies in Human Genetics in 1993 she joined the lab of two world known geneticists, Prof. Tom Strachan and Susan Lindsay, in Newcastle, where she cloned and characterised novel genes involved in development of the brain. These led to a great interest in pluripotent stem cell biology, which she studied at Durham University. In 2003, she established her own research group at Newcastle University's Institute of Genetic Medicine, where she pioneered the establishment of hESCs and hiPSCs and development of robust methods for generation of light responsive retinal organoids for disease modelling, drug discovery and therapeutic applications.

12.15-12.30pm: Break

12:30-1.30pm: KEYNOTE Session with Louisa Wickham

Moderator: Lola Solebo

Clinical Leadership in Medicine – A woman's worth

Louisa Wickham, Consultant Ophthalmologist and MD of Moorfields Eye Hospital NHS Foundation Trust

Louisa Wickham has been a full time consultant at Moorfields since 2009, was appointed Chief Surgeon at Moorfields Eye Hospital in 2019 and then Medical Director in 2020. A dual specialist in Vitreoretinal Surgery and Medical Retinal disorders, Louisa has particular specialist interest in the surgical treatment of diabetic eye disease and has a research degree in the surgical management of retinal detachment and post-operative scarring.

Louisa developed an interest in clinical leadership and management as a trainee leading her to complete an MSc in Health Services Management at London University. She went on to develop her skills further as a Leadership Fellow for the Health Foundation and as a European Leadership Fellow at INSEAD. She has held a number of leadership roles in the NHS and works with the Royal College of Ophthalmologists and Royal Society of Medicine to promote clinical leadership for doctors at all stages of their training. Louisa was appointed National Clinical Director for Ophthalmology this year.

1.30-2pm: Break

2-3pm: Poster Session

Posters:

1. **Mejecase**: When genetic testing reveals a dual diagnosis of two inherited retinal diseases
2. **Dave**: The experiences of AMD patients receiving lifestyle modification advice: a focus group study
3. **Coetzee**: Basic screening tools to improve eye hospital referrals from rural clinics
4. **Krishna**: Nasal Natural Killer/T-cell Lymphoma with Secondary Ocular Involvement: a Diagnostic Challenge
5. **Rathore**: Relationship between socio-economic status and late presentation in glaucoma patients in England
6. **Bott**: Investigating the feasibility and acceptability of using a chatbot to improve adherence to glaucoma medication
7. **Fulcher**: A study of optometric referrals into a specialist macular clinic
8. **Beli**: Mapping the daily rhythmic transcriptome in the diabetic retina

Poster rooms can be found here:
https://ucl.zoom.us/j/92748934194?pwd=Q2U1QmhKNDRoM0NqanNSdUlWS2FJUT09

3-3.15pm: Break

3.15-4.15pm: "Closing the gender attainment gap in Eye Care and Research – where are we?"

Moderator: Rebekka Heitmar

Panel:

Evelyn Mensah, EDI lead for WVUK

Swetha Maddula-Batambuze, EDI lead RCOphth

Gemma Sweeney, Chair of EDI Committee, Huddersfield University

Liz Tomlin, Worshipful Company of Spectacle Makers

Keith Valentine, Fight for Sight CEO

4.15-4.30pm: Prize Presentation

Fight for Sight WVUK Poster Prize 2022 (Certificate & £150)
Fight for Sight WVUK Presentation Prize 2022 (Certificate & £200)

This event is being coordinated by the WVUK Early Career and Research Representatives. For any questions, please contact us on wvuksubmissions@gmail.com.

Follow WVUK on Twitter for regular updates about the seminar series and our other activities.

Rapid Fire abstracts

Title: **Exploring digital exclusion for patients using remote consultations at Moorfields Eye Hospital.**

Authors: Amrit K Sehmi*,[1] Ella Preston,[1] Lucy Smith,[1] Dawn A Sim,[1] Swan Kang,[1] Rashmi G Mathew [1]
[1] Moorfields Eye Hospital, City Road, London UK

Introduction
The use of video consultations was scaled urgently at Moorfields Eye Hospital due the COVID-19 pandemic, and has been sustained within the Trust. Digital exclusion will drive health inequalities in our patients, unless we fully understand it and create solutions to make our services accessible for all.

Aims
To understand the reasons why patients failed to utilise digital services during the pandemic.

Methods
A retrospective analysis of all patient-initiated video consultation cancellations from December 2020 to November 2021 was undertaken. All rebooked appointments were excluded from analysis. Reasons for cancellation were extracted from the Patient Appointment System (PAS) to identify those who were digitally excluded.

Results
Over a 1-year period, 10,457 video consultations were undertaken at Moorfields Eye Hospital. 5% (535) of appointments were cancelled by patients. Of these, 14% (73 patients) were digitally excluded. Digital exclusion was due to 3 main factors; lack of resources (53%), lack of skills (19%), lack of trust in the video consultation model (19%), or a combination of these factors (9%).
Those most digitally excluded were the 70-79 year olds (26%, 19 patients). The least digitally excluded age group were the 20-29 years olds (1%, 1 patient).In terms of sub-speciality, the majority of patients came under the adnexal service (56%), followed by general ophthalmology (29%).

Conclusion
The reasons for digital exclusion are complex, but need to be understood and addressed, if we are to continue to scale digital services in the health sector without widening health inequalities. Our work identified 3 main factors, with lack of resources being the overarching reason.

Title: **Circadian rhythms in diabetic retinopathy**

Authors: Hanagh Winter*,[1] Thomas Friedel,[1] Josy Augustine,[1] Tim Curtis,[1] Alan Stitt,[1] Eleni Beli [1]
[1] Wellcome-Wolfson Institute for Experimental Medicine, Queen's University Belfast

Introduction
Diabetes disrupts circadian rhythms and circadian disruption in turn plays a role in disease prognosis. Less is known about the role of circadian rhythms in diabetic retinopathy. As an integral part of the pathway via which light entrains the master circadian clock, damage to the retina may have implications for the health of the overall circadian system.

Aims
This study aims to reveal whether changes in the retina due to diabetes might impact activity.

Methods
Circadian outputs were investigated in 6-month-old Ins2AKITA mice (n=8) and C57BL/6J controls (n=4) housed in normal 12L:12D lighting. Wheel running activity was analysed for markers of circadian disruption. Retina function was measured at four time points (≥n=5 mice per timepoint) over the daily cycle using dark-adapted ERG. Flicker ERG was also compared between 6-month-old diabetic (n=6) and control mice (n=9).

Results
Circadian disruption is apparent in diabetic mice, including increased light phase activity (17.3±8.0% vs 9.8±5.6%) and decreased interdaily stability (0.5±0.1 vs 0.8±0.1). Differences in ERG markers are detected in 6-month-old diabetic mice. Further, using JTK_Cycle analysis, we detect rhythmicity in the b-wave amplitude of dark-adapted ERG in wild type mice only ($p=0.02$) that appears to be lost in diabetes ($p=0.50$).

Conclusion
Circadian rhythms in both the master circadian clock and the retina clock are altered in diabetes. Circadian disruption in locomotor activity worsens with disease duration, as exemplified by abnormal light phase activity in 6-month-old diabetic mice. Diabetic mice lack the rhythmicity in ERG b-wave amplitude seen in wild type mice, indicating disruption in the retina clock.

Title: **Investigating the Lived Experience of Classification in Alpine Skiers with a Visual Impairment**

Authors: Sara Douglas*,[1] Paul Kitchin,[2] Kelly Gallagher,[3] Jonathan Jackson,[4] Brendan Barrett,[5] Julie-Anne Little [1]
[1] Centre for Optometry and Vision Science, Biomedical Sciences Research Institute, Ulster University
[2] School of Sport, Ulster University
[3] Para-Olympic athlete: Alpine skiing Gold medallist GB 2014
[4] Principal Optometrist, Belfast Health and Social Care Trust
[5] School of Optometry and Vision Science, Bradford University

Introduction
In visually impaired sport, a classification system exists to determine the level of impairment and group athletes into categories based on their visual acuity and visual field. This brings challenges due to the differing nature of sports and aetiologies of visual impairment. The International Paralympic Committee suggested guidelines for the development of the system acknowledging issues within the current approach. However, there are gaps in research knowledge and a paucity of research that critiques the medical model of thinking that underpins classification. Alpine skiing is a high-intensity sport under conditions of glare. Despite this visual demand, there are few studies focusing on classification in this sport and prioritising the athlete's view.

Aims
This study investigates the lived experience of VI para-alpine skiers using qualitative in-depth techniques.

Methods
The semi-structured interviews probe (i) the skier's understanding and involvement in classification, (ii) the skier's experience and perceptions of the system, (iii) the suitability of the classification criteria, and (iv) to identify issues (if any) within the system and these could be improved. Data collection commenced in July 2021 and is ongoing, with n=5 interviews conducted, out of desired sample size n=10.

Results
Early thematic analysis has revealed findings indicating athletes (i) have concerns with the system, (ii) question the suitability of the visual measurements and (iii) the relevance of testing procedures.

Conclusion
Drawing from the lived experience, this study provides vital information to guide evidence-based research into the changes that are needed in this sport's classification process.

Title: **Investigating the use of non-viral S/MAR vectors for USH2A gene therapy**

Authors: Maria Toms*,[1,2] Lyes Toualbi,[1,2] Patrick Almeida Vingadas,[3] Richard Harbottle,[3] Mariya Moosajee [1,2,4,5]
[1] Development, Ageing and Disease, UCL Institute of Ophthalmology
[2] Ocular Genomics and Therapeutics, The Francis Crick Institute, London
[3] DNA Vector Research, German Cancer Research Center (DKFZ), Heidelberg, Germany
[4] Department of Genetics, Moorfields Eye Hospital NHS Foundation Trust
[5] Great Ormond Street Hospital for Children NHS Foundation Trust, London

Introduction
USH2A mutations are a common cause of autosomal recessive retinitis pigmentosa (RP) and Usher syndrome II, for which there are currently no approved treatments. Gene augmentation is a promising therapeutic strategy for treating retinal diseases, however conventional adeno-associated virus (AAV) vectors cannot accommodate cDNAs exceeding 4.7kb, such as the 15.6kb-long USH2A coding sequence.

Aims
We aimed to use a non-viral gene delivery strategy using episomal DNA plasmid vectors containing a scaffold/matrix attachment region (S/MAR) and the human USH2A cDNA to generate USH2A protein (usherin) expression in human cellular and zebrafish models.

Methods
USH2A-S/MAR vectors were generated by inserting the USH2A coding sequence into the pS/MAR backbone in five cloning steps. HEK293 cells and USH2A-/- patient-derived dermal fibroblasts were transfected using the Neon transfection system. Wild-type and ush2au507 zebrafish were microinjected with USH2A-S/MAR vector at the single-cell stage of development. Expression of GFP and usherin was assessed in both cell lines and zebrafish using qRT-PCR, immunostaining and Western blot analysis. Localisation of Usher II protein adgrv1 was examined in zebrafish photoreceptors.

Results
USH2A-S/MAR vectors were generated, containing a GFP reporter gene and CAG (pS/MAR-CAG-USH2A) or CMV (pS/MAR-CMV-USH2A) promoters, reaching a size of 23kb. The vectors produced persistent transgene expression in patient fibroblasts and zebrafish, with up to 12 months of GFP expression detected in zebrafish retinal photoreceptors. Expression of adgrv1 was restored in pS/MAR-injected ush2au507 photoreceptors.

Conclusion
USH2A-S/MAR vectors generated expression of full-length functional usherin in vivo and in vitro, showing promise as a novel non-viral retinal gene therapy and warranting further translational development.

Title: **Genotypic and Phenotypic Spectrum of Foveal Hypoplasia: A Multi-centre Study on behalf of the Foveal Development Investigators Group (FDIG)**

Authors: Helen J. Kuht*,[1] Gail DE. Maconachie, Jinu Han, Line Kessel, Maria M. Van Genderen, Rebecca J. McLean, Michael Hisaund, Zhanhan Tu, Richard W. Hertle, Karen Gronskov, Dayong Bai, Aihua Wei, Wei Li, Yonghong Jiao, Vasily Smirnov, Jae-Hwan Choi, Martin D. Tobin, Viral Sheth, Ravi Purohit, Basu Dawar, Ayesha Girach, Sasha Strul, Laura May, Fred K. Chen, Rachael C. Heath Jeffery, Abdullah Aamir, Ronaldo Sano, Jing Jin, Brian P. Brooks, Susanne Kohl, Benoit Arveiler, Lluis Montoliu, Elizabeth C. Engle, Frank A. Proudlock, Garima Nishad, Prateek Pani, Girish Varma, Irene Gottlob, Mervyn G. Thomas

[1] Ulverscroft Eye Unit, Dept. of Neuroscience, Psychology and Behaviour, University of Leicester

Introduction

Foveal hypoplasia (FH) is characterised by continuation of inner retinal layers posterior to the foveola and is associated with various disorders including albinism and PAX6, SLC38A8, FRMD7 and AHR variants. To date, it is unclear whether variants of certain genes are associated with worse foveal morphology and prognosis.

Aims

We aimed to perform a multi-centre study characterising the genotypic and phenotypic spectrum of FH in the aforementioned aetiologies.

Methods

Patients with known genetic associations with FH and nystagmus (n=575) were identified from 10 centres from 8 countries (75.6%) or extracted from publicly available datasets from previous literature (24.4%). A genetic diagnosis was confirmed by sequence analysis. Optical coherence tomography of the fovea was obtained in all subjects to identify grade of FH and presence or absence of photoreceptor specialisation (PRS+ vs PRS-).

Results

The most common aetiology for FH was albinism (66.1%), followed by PAX6 (22.8%), SLC38A8 (7.1%) and FRMD7 (3.7%) variants. AHR variants were rare (0.4%). There was a significant difference in the spectrum of FH grades based on molecular diagnosis ($X^2=57.6$, $p<0.0001$). All SLC38A8 cases were PRS- ($p=0.003$), while all FRMD7 cases were PRS+ ($p<0.0001$). There was a significant difference ($p<0.0001$) in visual acuity between FRMD7 variants compared to other diagnoses.

Conclusion

Our data suggests arrested retinal development occurs earlier in SLC38A8 and AHR variants and much later in FRMD7 variants. The defined time-period of foveal developmental arrest for albinism and PAX6 variants demonstrates variability. Our findings provide mechanistic insight into disorders associated with FH and have significant prognostic and diagnostic value.

Poster abstracts

Title: **When genetic testing reveals a dual diagnosis of two inherited retinal diseases**

Authors: Cécile Méjécase*,[1,2] Mariya Moosajee [1-4]
[1] UCL Institute of Ophthalmology, London
[2] The Francis Crick Institute, London
[3] Moorfields Eye Hospital NHS Foundation Trust, London
[4] Great Ormond Street Hospital for Children NHS Foundation Trust, London

Introduction
Inherited retinal diseases (IRDs) are clinically and genetically heterogenous with more than 350 genes reported to be associated with these conditions.

Aims
An 8-year-old boy from Poland experiences nyctalopia, myopia and early-onset retinal degeneration. Genetic testing was performed to identify a potential disease-causing variant(s) associated with his disease.

Methods
A targeted retinal gene panel of 176 genes known to cause IRDs was sequenced by the Genomic Diagnostic Laboratory in Manchester Centre for Genomic Medicine and variants were filtered following the best practice guidelines of the Association for Clinical Genetic Sciences (ACGS). Parents were segregated accordingly.

Results
Genetic diagnosis reported a homozygous nonsense variant in RPE65, c.304G>T p.(Glu102*) and compound heterozygous variants in ABCA4, c.5882G>A p.(Gly1961Glu) and c.5196+1056A>G p.(Met1733Valfs*2). ABCA4 and RPE65 are both involved in visual cycle, however, variants in RPE65 lead to a rod-cone dystrophy while ABCA4 variants are associated with macular dystrophy. In this patient, absence of RPE65 halts the visual cycle after the all-trans-retinol conversion into all-trans-retinyl esther by LRAT, prior to ABCA4 action, hence masking the macular phenotype.

Conclusion
Voretigene neparvovec treatment provides a functional copy of RPE65 in patients with biallelic RPE65-retinopathy. However, for patients with RPE65 and ABCA4 disease-causing variants, gene therapy may reveal the suppressed ABCA4 phenotype. A complete genetic analysis must be performed for patients and not just single gene screening for eligibility, in order to plan the best treatment pathway for the individual. Specific consideration should be given to consanguineous families where multiple pathogenic variants may be found in combination.

Title: **The experiences of AMD patients receiving lifestyle modification advice: a focus group study**

Authors: Sonali Dave*,[1] Tamsin Callaghan,[1] Alison Binns,[1] Valldeflors Vinuela-Navarro [2]
[1] City university of London
[2] Aston University, Birmingham

Introduction
Age related Macular Degeneration (AMD) is the leading cause of irreversible blindness globally in people over 60 and there is currently no treatment. However, research shows that certain lifestyle modifications may slow down AMD progression such as stopping smoking, changing diet and vitamin supplementation. Therefore, practitioners are recommended to advise patients with AMD about these lifestyle changes. However, research shows that this advice is not consistently followed.

Aims
To carry out a series of focus groups with AMD patients, to understand their experiences, views and opinions of receiving lifestyle advice and advice provision.

Methods
Focus groups were carried out on 6 people with AMD. Participants were asked a set of 13 questions about their experiences and opinions with receiving lifestyle advice. Focus group conversations were analysed and key themes were identified using NVivo 12.

Results
From the focus group conversations, a total of 10 themes were identified. The most commonly discussed themes were 'Advice', 'Communication' and 'health-care professionals'. 5 of 6 participants had received advice about diet, but felt uninformed about how to implement it. 4/6 participants were given written advice, but overall satisfaction with the written materials was low. Participants also felt there wasn't enough time to ask questions during appointments and there was a lack of communication and consistency between health care professionals.

Conclusion
Despite recommendations about giving information and advice about the modifiable risk factors of AMD progression, the focus groups emphasised that the guidelines are still not being followed and patients feel like they are still not being listened to.

Title: **Basic screening tools to improve eye hospital referrals from rural clinics**

Authors: Lauren Coetzee*,[1,2] Aneli Mans,[3] Heleen Human,[3] Megan Janse van Rensburg,[3] Ninke Swart,[3] Thana Burger [3]
[1] Department of Optometry and Vision Sciences, University of Huddersfield
[2] Division of Health Sciences Education, University of the Free State, South Africa
[3] Department of Optometry, University of the Free State, South Africa

Introduction
Cataracts are a common sight threatening condition, and likewise uncorrected refractive error. This leads to over-referral and delayed treatment times, when patients are referred from rural clinics to Eye clinics.

Aims
Screening methods of pinhole, red reflex and visual acuity (VA), were used to determine the accuracy of the existing referral system to an Eye Clinic, based on the similarity of identifying cataracts when compared to the identification of a cataract by an ophthalmologist.

Methods
Seventy-three randomly selected patients aged 25 to 92, at a cataract clinic were screened. These patients were referred to an ophthalmology clinic for undiagnosed conditions causing decreased vision from various external clinics and hospitals. The screening tests were undertaken. An ophthalmologist thereafter assessed the patient for the diagnoses.

Results
VA improved in 37.16% of all eyes using the pinhole VA test, indicating a refractive error. Of the 25 participants without a red reflex, cataracts were accurately detected in 18 (72%). Red reflex using +10.00 dioptre was more accurate in correctly predicting the absence, rather than the presence, of a cataract (79.17% vs. 69.44%), with a sensitivity of 0.833 and specificity of 0.633.

Conclusion
Red reflex test using the +10.00 dioptre setting was more successful in screening for cataracts. The absence of a cataract coupled with no improvement of pinhole VA test indicated an urgent referral to an ophthalmologist. Using these two tests in conjunction may improve the referral system and decrease the time taken for a patient to be attended to by the most appropriate eye care professional.

Title: **Nasal Natural Killer/T-cell Lymphoma with secondary ocular involvement: a diagnostic challenge**

Authors: Yamini Krishna*,[1] Clara McAvoy,[2] Lakshmi Venkatraman,[3] Heinrich Heimann,[4] Sarah E Coupland [1]
[1] Department of Cellular Pathology, Royal Liverpool University Hospital
[2] Ophthalmology, Belfast Health and Social Care Trust
[3] Department of Cellular Pathology, Belfast Health and Social Care Trust
[4] Liverpool Ocular Oncology Centre, Royal Liverpool University Hospital

Introduction
Natural-killer/T-cell lymphomas (NKTL) are exceptionally rare, highly aggressive lymphomas with a poor prognosis. NKTLs typically involve the nasal cavity but can lead to ocular complications.

Case report
A 75-year-old male presented with a 1-year history of left vision loss and painless floaters. There was no history of trauma. His previous history included hypertension, Barrett's and coeliac disease. On examination: vision in the left eye (LE) was hand-movements; there were cells in the anterior chamber and a dense vitritis with no fundal view. The RE was normal. Left eye cataract-removal with vitrectomy was performed and a vitreous sample sent, which was non-diagnostic on cytology but EBV+ on PCR. CT chest/abdomen/pelvis and MRI brain/orbits revealed no significant abnormality. The LE became blind, painful and was enucleated. Macroscopic examination revealed grey/white retinal areas, which histomorphologically showed extensive epiretinal membranes with entrapped residual retinal outer nuclear cells and focally necrotic retina with chronic inflammation, comprising mixed B-and T-cells with macrophages. Special-stains were negative. IgH-PCR was polyclonal. Later the patient developed subretinal spots in his RE with drop in vision and biopsy of a PET-positive ethmoidal lesion was diagnosed as NKTL. Deeper levels of the LE enucleation revealed a focus of T-cells (CD3+; CD56+; GranzymeB+) with a high Ki67, and TCR-PCR was monoclonal. The patient was treated with right intravitreal methotrexate and received systemic chemo-radiotherapy.

Conclusion
The case highlights the diagnostic difficulty of this tumour given its rarity, rapid progression and ability to mimic other disorders. A multidisciplinary approach is required to optimally manage ocular and systemic manifestations.

Title: **Relationship between socio-economic status and late presentation in glaucoma patients in England**

Authors: Mehal Rathore*,[1] Giovanni Montesano,[1] Peter Reddingius,[1] Pete R Jones,[1] David Crabb [1]
[1] Division of Optometry and Vision Sciences, City, University of London

Introduction
Glaucoma is a multifactorial eye condition involving the optic nerve causing irreversible blindness. Late presentation of glaucoma is one of the biggest limitations hindering early treatment. Index of mean deprivation is a relative measure of deprivation the socio-economic status of people living in the UK.

Aims
To find a relationship between socio-economic status with the time of presentation in glaucoma patients.

Methods
Retrospective data from 639962 glaucoma patients (age 70±14 years, 53% female) was collected from eye hospitals in England. Index of mean deprivation (IMD) scores and deciles were calculated from the pseudo-anonymised data facilitated by the Electronic medical record system (Medisoft EMR System). IMD scores were used to classify the population into "deciles" based on the gov.uk criteria. Glaucoma was defined using a surrogate measure of -2 dB and a mean deviation probability of less than 5 percent at the baseline visual field visit and following visit on the Humphrey visual field analyser using the SITA Standard 24-2 algorithm. MD of < -12dB was considered to be advanced glaucoma. The data analysis was performed using Microsoft Excel and R programming language.

Results
The most deprived decile (Decile 1, n = 2725) were most likely to present to the clinic at a later stage (n= 490, 20.0%) when compared to the least deprived decile (Decile 10, n = 1445, 14.0%). 16.07% (n = 20278) presented with advanced glaucoma at the base line visit.

Conclusion
Late presentation of glaucoma is associated with the socio-economic status of a person in England.

Title: **Investigating the feasibility and acceptability of using a chatbot to improve adherence to glaucoma medication**

Authors: Deborah Bott*,[1] Peter Campbell,[1] Ahalya Subramanian,[1] David Edgar,[1] John Lawrenson, Pouya Alaghband [2]
[1] Division of Optometry and Visual Sciences, City, University of London
[2] York Teaching Hospital NHS Foundation Trust

Introduction
Glaucoma is frequently treated with lifelong daily eyedrops. Eyedrop non-compliance is a global issue and can hasten vision loss. In 2013, the UK Sight Loss and Vision Priority Setting Partnership established key priorities for glaucoma research, one being to investigate the link between treatment adherence and glaucoma progression and how adherence can be improved. Chatbots, a modern type of software technology, are used in healthcare to aid medication taking. However, there is a lack of evidence investigating potential benefits in glaucoma.

Aims
Assess feasibility and acceptability of a chatbot to improve glaucoma medication adherence.

Methods
A systematic review identifying modifiable determinants of adherence behaviour is underway. A scoping literature review will identify what types of technology have been used to improve medication adherence. A survey of glaucoma patients and eyecare professionals will be conducted to understand opinions and knowledge surrounding technology to improve adherence. Using this information, a suitable chatbot will be identified with PPI. A RCT will investigate its effectiveness in improving glaucoma medication adherence. Sixty glaucoma patients will be randomised into two groups, fast-track (receive chatbot at start of 24 week study) or delayed intervention (receive chatbot after 12 weeks). Subjective and objective adherence measures will be analysed. Chatbot acceptability and feasibility will be investigated via post-study semi-structured interviews.

Results
Progress to Date
Systematic review protocol – underway, with registration in progress.
Glaucoma UK article – published, generating awareness.

Conclusion
These research findings will ultimately benefit glaucoma patients, providing evidence for future randomised trials into the usefulness of chatbots to improve glaucoma medication adherence.

Title: **A study of optometric referrals into a specialist macular clinic**

Authors: Corinne Fulcher*,[1,2] Sridevi Rajasekaran,[2] Chris Davey [3]
[1] University of Huddersfield
[2] Bradford Royal Infirmary
[3] University of Bradford

Introduction
The neovascular form of age-related macular degeneration (nAMD) can have devastating consequences on vision, and NICE guidelines recommend treatment within 14 days of referral. A nAMD 'fast-track' form is available to speed up referral and is commonly used amongst primary care optometrists. Macular services often rely on the content of referral letters to triage patients.

Aims
This study examined the quality and appropriateness of optometry macular referrals to determine if improvements can be made, and look at potential impact on the hospital service.

Methods
394 referrals into the Bradford Macular Centre were retrospectively analysed. Patient and referring optometrist demographics were extracted, and accuracy of diagnosis, time to first appointment and use of the fast-track form were examined. The impact of COVID19 was additionally considered.

Results
Most referrals were for suspected nAMD (65.0%) followed by non-specific maculopathy (16.0%). Accuracy of diagnosis was poorest for nAMD (~39% accuracy) with dry AMD being the top reason for misdiagnosis. 254 referrals used a nAMD fast-track form, of which 9.8% were for non-AMD pathology. Legibility of referrals was consistently above 93% with 98.7% reporting vision for the affected eye. Average time to first appointment was 28.4 days before COVID19, with 20.2% of suspected nAMD patients seen within 14 days. This significantly increased to 37.8 days ($p<0.001$) during the pandemic with 5.1% seen in the suggested timeframe.

Conclusion
Training to aid differentiation between dry and nAMD could help improve accuracy of optometric referrals, which may then reduce burden on the hospital and increase the number of nAMD patients seen within 14 days.

Title: **Mapping the daily rhythmic transcriptome in the diabetic retina**

Authors: Eleni Beli*,[1] Ryan Silk,[2] Hanagh R Winter,[1] Vijay Tiwari,[1,2] David Simpson,[1,2] Alan Stitt [1]
[1] Wellcome Wolfson Institute of Experimental Medicine, Queen's University Belfast
[2] Bioinformatics & Computational Genomics, Queen's University Belfast

Introduction
The eye is an organ attuned to function around the light/dark cycle. Its circadian system fine-tunes this process. Diabetes emerges as a disease that disrupts the overall circadian rhythms

Aims
In this study we asked how diabetes affects these daily rhythms in the mouse retina.

Methods
Healthy control and Ins2Akita/J diabetic mice were kept under a physiological 12h:12h light-dark cycle until 4 months of age. Retinas were collected from 4-5 mice every 4 hrs around the day/night cycle. Deep mRNA sequencing was conducted and transcripts were identified. Computational approaches were used for detection of rhythmicity (empirical JTK_Cycle, emp $p<0.05$, FC > 1.2), acrophase prediction (Harmonic Regression with a set period of 24 hrs and normalization set to false), differential rhythmic patterns (DORD analysis BH corrected $p < 0.05$), phase set enrichment analysis (PSEA, BH corrected p-value < 0.01) and upstream regulator predictions (IPA, $p<0.05$).

Results
Almost 10% of the retinal transcriptome was identified as rhythmic with a clear 12hr axis of transcriptional activity, peaking at midday and midnight. Although the 12-hour transcriptional axis is retained in the diabetic retina, it was phase advanced by approximately 1-3 hours, however individual genes were phase advanced by up to 10 hours. Interestingly, only mild changes in the circadian rhythms were observed, as those were entrained by the light cycle. A shift in oxidative phosphorylation and HIF1A and NUPR1 were identified as the major upstream regulators for the phase shifts.

Conclusion
To our knowledge this is the first study mapping the effects of diabetes in the rhythmic output in the retina. A metabolic shift with an entrained clock within the diabetic retina is possible to create an internal jet lag that contributes to neurodegeneration in diabetic retinopathy.