Our Vision

Cambridge Eye Trust Newsletter 2021 Volume 9 issue 1

cambridge eye trust

Our Vision, a newsletter which highlights the research, innovation, educational and patient best care initiatives that the Cambridge Eye Trust is supporting in Cambridge, East Anglia and around the world.

Helping to save sight!

Cambridge Ophthalmic Simulation Centre awakes thanks to the Cambridge Eye Trust

The Covid-19 pandemic has changed the way we shop, school, socialise and do eye surgery. The eye department at Addenbrooke's is much changed since March 2020.

The team has overcome many Covid-19 related challenges including mastering video clinic and virtual teaching. During the peak of the pandemic and lockdown our trainees became medics again overnight and were reassigned to the medical wards. Our patients were advised to stay away and our operating theatres were converted into a surgical assessment unit. Training was put on hold and we are now playing catch-up.

Over the past few years there has been a rapid increase in the number of simulation based models for technical skills training in ophthalmology and a growing consensus about which procedures should be practised in a simulation based environment prior to working with patients. There is a growing body of research which suggests that simulation can contribute to a reduction in real world complications for patients. Simulation of visual impairment can also potentially enable greater empathy for our visually impaired patients. Continued page 2

New Microscopes arriving

Find out more about new doctors who have joined the Addenbrooke's team • Read about the research programs we are supporting • See updates from the clinical teams • And more...

Continued: **Cambridge Ophthalmic Simulation Centre awakes thanks to the Cambridge Eye Trust**

The pandemic temporarily stopped surgical training and has reduced the number of theatre sessions where training can occur. This has left many of us rusty and out of practice and has highlighted the importance of a space to maintain and develop surgical skills. Support from the Cambridge Eye Trust (CET) has allowed the department to equip a new simulation centre for targeted surgical practice. Thanks to the CET we now have three WIFI enabled stereo microscopes to practice microsurgical techniques, practice eyes for retinoscopy and indirect laser and a set of simulation specs which will enable trainees to quickly understand the difficulties faced by people with sight problems when they visit our clinic.

"The new simulation centre is an excellent facility being developed to help train the new generation of eye surgeons. These fantastic resources provide valuable surgical training opportunities even during the challenging times of Covid. We are grateful to have such a resource available to help us practice" Dr Tejal Patel

These complement the Eyesi® virtual reality cataract simulator which the CET previously helped the department to acquire. The trainees are already queuing up to use the EYESI. They have organised a booking system, a naming and logo competition for the simulation facility, an online logbook to monitor its use and are coming up with innovative ways to build practice and simulation into to their training. The donation from the CET has helped to kick-start this development. The Estates department are now planning to upgrade the room to create a first class space to house ophthalmic simulation training for the region's trainees and to help with the comeback from Covid-19. Article by Dr John Somner, who pioneered the initiative.

"Having been at a centre where the nearest simulator was a 4 hour round trip away, it is so valuable having a simulation suite right here for us to train on. It's especially beneficial to more junior trainees at the start of our training especially during the pandemic where surgical training opportunities can be more limited." Twishaa Sheth

Getting to grips with the new equipment.

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Help us to SAVE VISION!

Bringing vision accurately to young patients in their homes

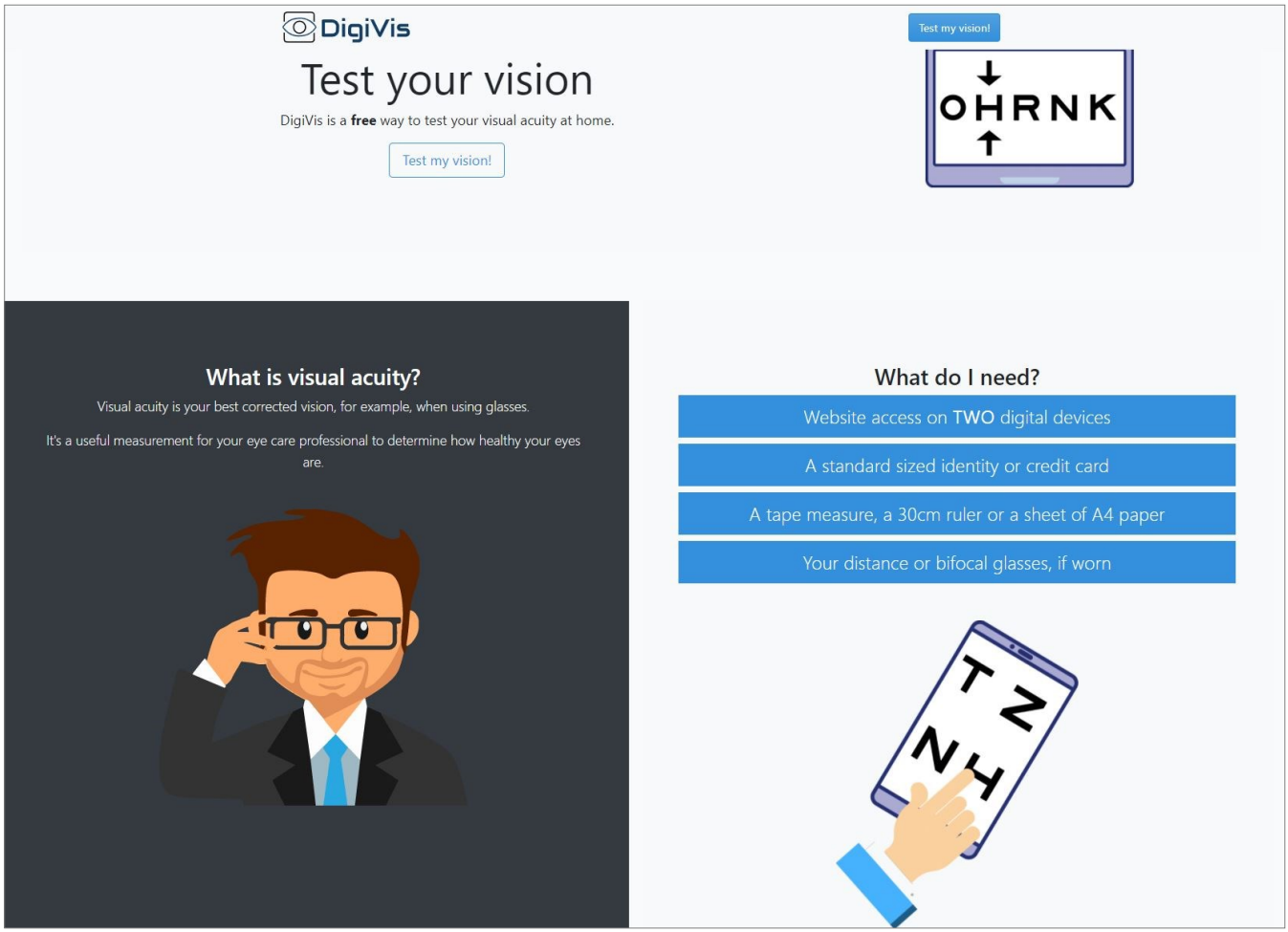
Eye clinics are the busiest in NHS hospitals, comprising 15% of all out-patient attendances, they are renowned for their huge clinic back-logs and waiting time. The Covid crisis has had a heavy impact on ophthalmology services: it has reduced clinic capacity due to need for social distancing, further increasing the back-log and waiting time. Vulnerable patients who need regular vision monitoring have become afraid to attend clinic for risk of infection and more than 700,000 children nationwide have missed school vision screening. These factors increase the risk of preventable visual loss.

Visual function assessment is a vital part of any ophthalmic assessment, akin to a blood pressure reading for a cardiologist. This always includes testing the clarity of vision (visual acuity). If there was an accurate way for patients to measure their own visual function in the community, many more consultations could be undertaken by telephone or video, and patients would be able to make an informed choice about the need to attend hospital.

DigiVis is a web-based vision testing software platform which allows anyone with access to internet connected digital devices to test their own vision accurately. It was designed by Louise Allen to be easy to use, with a game-like version to appeal to children. An international patent application has been made for an innovative calibration system. DigiVis has recently been CE marked and is undergoing a formal clinical validation trial at Addenbrooke's and is already been used to inform some paediatric ophthalmology remote consultations. The future goal is to integrate the apps to work in a more joined up way, to enable patients to monitor their own vision, and to integrate with NHS IT systems and electronic patient records.

Miss Louise Allen

Louise is working with Dr Tamsin Holland Brown, to develop a similar software device to enable accurate hearing testing at home. Article by Miss Louise Allen.



Redeployment of Ophthalmology Trainees at CUH during the COVID-19 Pandemic

In response to the COVID-19 pandemic, Cambridge University Hospitals Trust took decisive action to redeploy many specialities, including Ophthalmology, to support the expected surge of patients that would be admitted to hospital for treatment.

We and many other trainees were asked to help in this humanitarian effort to help minimise loss of life caused by this new viral infection. As Ophthalmology is a highly specialised branch of medicine, it may have been many years, or even over a decade, since any of us had treated patients on a general medical ward, let alone COVID-19 positive patients. We faced many challenges in our new roles, finding it necessary to adapt quickly and learn how to diagnose and treat unfamiliar conditions. Thankfully, with the support of our colleagues we were able to collectively do our best for our patients and work through this unprecedented time.

Ade, Jared, Paolo, Simone.- Addenbrooke's Ophthalmology Trainees

***Photograph left to right**: Ade Ljasan, Paolo Scollo, Carl Svasti-Salee, Simone Bruschi, Jared Ching*

"Redeployment to general medicine after years of ophthalmic specialist training has been emotionally turbulent.** Amidst the stress, it has also been heartening to see medics from so many different backgrounds pull together and support one another and humbling that our work has been so appreciated. The future remains very uncertain – ophthalmic practice will be hugely changed by the pandemic – but challenge stimulates change and we have the potential to develop new ways of working to mitigate the effects of COVID and perhaps even improve on the pre-COVID system. **As a profession we face these challenges united, as we have never been before."
Carl Svasti-Salee

Cambridge Ophthalmological Symposium update

Cambridge Eye Trust has been facilitating the Cambridge Ophthalmological Symposium since 1970.

The meeting is now a well established, internationally significant event. It attracts a worldwide audience who discuss and debate the most recent innovations in ophthalmology. Bursaries are offered each year to 2 doctors who would not otherwise been able to participate.

Although the meeting was cancelled in 2020 (as all events were), we kept the 2020 Symposium's topic for 2021. "Vision 2020 in 2030 (plus 1) – The next 10 years". The meeting will be chaired by Prof Rupert Bourne, UK and Prof Hugh Taylor, Australia. The meeting is scheduled to take place 1 - 3 September 2021, St John's College, Cambridge. More information can be found at: www.cambridge-symposium.org.uk

Gene therapy offers hope for a common cause of mitochondrial blindness

Injecting a gene therapy vector into one eye of someone suffering from LHON, the most common cause of mitochondrial blindness, significantly improves vision in both eyes, scientists have found.

In a landmark phase 3 clinical trial, the international team, coordinated by Dr Patrick Yu-Wai-Man from the University of Cambridge, successfully treated 37 patients suffering from Leber hereditary optic neuropathy (LHON). Subject to further trials, the treatment could help thousands of people across the world to regain and retain some of their sight.

THE TIMES | Thursday December 10 2020 2GM

Gene therapy offers hope

Rhys Blakely Science Correspondent

A gene therapy for a form of hereditary blindness affecting thousands of young men has yielded positive results at the final stage of trials.

Researchers from the University of Cambridge and the University of Pittsburgh were able to improve the vision of patients suffering from Leber's hereditary optic neuropathy (LHON).

The condition, which affects about 2,000 people in the UK, most often occurs in men aged between 15 and 1 It leads to a severe and rapid deterior tion of sight, sometimes in weeks.

The therapy involved injecting benign modified virus into the eye. carried a "replacement gene" that fectively reversed the effects of a dai aging mutation that causes the death a type of cell needed for vision.

The therapy is now being assessed the EU medical regulator, which is e pected to decide whether it can be us towards the end of next year.

> *Dr Yu-Wai-Man said: **"Saving sight with gene therapy is now a reality.** The treatment has been shown to be safe and we are currently exploring the optimal therapeutic window."*

The study, published in the journal *Science Translational Medicine*, indicates that 78% of treated patients experienced significant visual improvement in both eyes. It suggests that the improvement in vision in untreated eyes could be due to the transfer of viral vector DNA from the injected eye.

LHON affects a specific type of retinal cells, known as retinal ganglion cells, causing optic nerve degeneration and rapidly worsening vision in both eyes. Within a few weeks of disease onset, the vision of most people affected deteriorates to levels at which they are considered legally blind. Visual recovery occurs in less than 20% of cases and few achieve vision better than 6/60 (largest letter on a standard eye chart). LHON affects approximately 1 in 30,000 people, mostly men, with symptoms usually emerging in their 20s and 30s. The majority of patients carry the m.11778G>A mutation in the *MT-ND4* gene. Existing treatment for this blinding optic neuropathy remains limited.

The researchers injected rAAV2/2-*ND4* – a viral vector containing modified cDNA – into the vitreous cavity at the back of one eye of 37 patients who had suffered vision loss for between 6 to 12 months. Their other eye received a sham injection.

International coordinating investigator and neuro-ophthalmologist Dr Yu-Wai-Man, from Cambridge's Department of Clinical Neurosciences, said: "By replacing the defective *MT-ND4* gene, this treatment rescues the retinal ganglion cells from the destructive effects of the m.11778G>A mutation, preserving function and improving the patient's visual prognosis. The outcomes can be life-changing."

Treated eyes showed a mean improvement in best-corrected visual acuity (BCVA) of 15 letters on an ETDRS chart, representing three lines of vision, while a mean improvement of 13 letters was observed in the sham-treated eyes. As some patients were still in the dynamic phase of the disease process upon enrolment, the visual gain from the nadir (worst BCVA for each eye) was even larger, reaching 28.5 letters for the treated eyes and 24.5 letters for sham-treated eyes.

Dr Yu-Wai-Man said: "Saving sight with gene therapy is now a reality. The treatment has been shown to be safe and we are currently exploring the optimal therapeutic window." Article by Dr Yu-Wai-Man.

Mitochondria

Reference: https://stm.sciencemag.org/content/12/573/eaaz7423. Patrick Yu-Wai-Man et al., 'Bilateral Visual Improvement with Unilateral Gene Therapy Injection for Leber Hereditary Optic Neuropathy'; Science Translational Medicine (9 December 2020). DOI: 10.1126/scitranslmed.aaz7423

Dr Patrick Yu-Wai-Man

New appointment in paediatric ophthalmology at Addenbrooke's

Ms Elena Novitskaya

Elena Novitskaya was recently appointed as a consultant in paediatric ophthalmology and strabismus.

She originates from St Petersburg, Russia where she completed her PhD and relocated to the UK in 2006. She completed the postdoctoral research project in Northern Ireland aimed at developing a new diagnostic tool for herpes simplex keratitis. She went on to complete her residency training in Ophthalmology in the East of England Deanery (EoE).

She joined the team of three consultants paediatric ophthalmologists at Addenbrooke's Hospital including Miss Louise Allen, Miss Brinda Muthusamy and Mr John Somner. Her particular subspecialty interests are in the management of paediatric cataracts, retinopathy of prematurity and strabismus.

In her role as a lead for the less than full time training (LTFT) in the EoE Deanery she looks after the interests and professional development of this sub-group of trainees. She is also a member of the EoE Ophthalmology Specialty Training Committee and Board.

Elena is an examiner for the Royal College of Ophthalmologists and is active in organising and participating through examining at regional events aimed at preparing regional trainees for their professional examinations.

Elena believes the regional paediatric ophthalmology service needs to develop firstly through Addenbrookes establishing hub and spoke type relationships with the more peripheral units and secondly by promoting, developing and supporting interested regional trainees to take up this subspecialty.

Update about the Cambridge Eye Trust supported Peter Watson Laser Centre

Laser surgery in ophthalmology has evolved over the last 30 years and is now the preferred method for treating many eye conditions. This technology enables surgeons to operate with greater precision when compared to conventional surgery.

Thanks to a grant from The Cambridge Eye Trust and a gift left to Addenbrooke's Charity Trust in a Will, in 2019 Addenbrooke's Ophthalmology department was able to purchase the VICTUS femtosecond laser equipment and refurbish a specific room for its use (The Peter G Watson Laser Suite). The Centre has now reached a 1,000-patient treatment milestone and has become the only NHS based eye laser centre in the East of England region for patient referrals to undertake femtolaser assisted corneal surgery for Keratoconus and corneal transplantation. The femto laser service in led by Professor Madhavan Rajan, Consultant eye surgeon at Cambridge University Hospitals.

A different way of supporting us: PayPal Giving Fund and eBay for Charity

eBay for Charity is an easy way for buyers on eBay.co.uk to support their favourite charities. Buyers can shop for items knowing they're supporting a good cause. eBay for Charity donations are administered by PayPal Giving Fund. PayPal Giving Fund distributes donations and Gift Aid to donors' chosen charities, which receive 100% of the funds raised. Visit this site to find out more about how you can support us:

www.charity.ebay.com or click the Donation Account menu button in your eBay account.

Ophthalmology during the COVID-19 pandemic

The COVID-19 pandemic has created challenges never seen before by the NHS. At Addenbrooke's Hospital, the usual routine of outpatient clinics and elective surgery was brought to an abrupt halt in March 2020 as the hospital prepared for an influx of patients seriously ill with COVID-19.

Ophthalmic assessment wearing personal protective equipment (PPE), including slit lamp modification with a plastic breath guard to act as screen between clinician and patient.

The changes in the Department of Ophthalmology were profound. Our ophthalmology trainees were redeployed to support patient care on the medical wards. The remaining medical staff - consultants and specialty doctors - were reconfigured to deliver patient care. The Cambridge Eye Unit (our operating theatre suite) was closed. The Eye Clinics remained open allowing continued treatment of the more urgent patients, including running our Emergency Eye Care service.

Everyone rapidly became accustomed to working in a very different way. Personal protective equipment (PPE) was the 'new normal', including breath guards being fitted to slit lamps since we work in close proximity to patients. The waiting areas in our busy Eye Clinics became eerily quiet with reconfigured seating to enforce social distancing. Patients were reviewed virtually whenever possible to minimise hospital attendances.

As the lockdown restrictions started to ease in May, the department adapted to the 'new normal' enabling as many patients as possible to be treated within the required constraints. The Eye Clinics were adapted so that patients with more routine problems could start to be seen again as face-to-face consultations. Diagnostic hubs were introduced so that appropriate patients could be reviewed by virtual consultations instead.

Elective surgery was restarted for ophthalmology at the Spire Cambridge Lea Hospital. A national contract was already in place with the independent sector enabling support for NHS hospitals during the COVID-19 pandemic. It did, however, prove to be a challenging period of time for the department trying to treat patients in two hospitals located on opposite sides of Cambridge.

A sense of normality was finally restored in the department later in the summer when ophthalmology trainees returned in August followed by the Cambridge Eye Unit reopening in September. We worked hard to start tackling the significant backlog of patients awaiting outpatient care and elective surgery, including the adoption of innovative approaches to maximise our capacity.

Reconfigured waiting area in one section of the Eye Clinic to allow social distancing for patients.

Unfortunately, as I write this article in January 2021, the department is facing further challenges following the introduction of another national lockdown. The Cambridge Eye Unit has had to close again in order to release theatre staff to treat an increasing number of inpatients with COVID-19. But we're in a much stronger position to deliver our outpatient services now having adapted to the constraints of providing ophthalmic care during a pandemic. Article by Mr Douglas Newman.

Mr Douglas Newman

Vitreoretinal Research Group identify novel genetic causes for Stickler syndrome

Bone morphogenetic protein 4 (BMP4) loss-of-function variant associated with autosomal dominant Stickler syndrome and renal dysplasia.

Stickler syndrome is a genetic disorder that can lead to joint problems, hearing difficulties and carries a high risk of blindness from retinal detachment. The Vitreoretinal Service at Addenbrookes provides the NHS England National Diagnostic Service. Genes encoding various collagen types are usually responsible, but some families have no causal variant identified. The team investigated a variant in the gene encoding growth factor BMP4 in a family with Stickler syndrome with associated renal dysplasia. A novel heterozygous BMP4 variant causing a premature stop codon, c. 130G>T, p.(Gly44Ter), which segregated with clinical features of Stickler syndrome in multiple family members, was identified. No variant affecting gene function was detected in any of the other genes known to cause Sticker syndrome. The BMP4 gene is a growth factor known to contribute to eye development in animals, and gene variants in humans have been linked to both microphthalmia (small eyes) and anophthalmia (absent eyes). The variant identified by the group further demonstrates the importance of BMP4 in eye development. This is the first report in the world of a BMP4 DNA variant causing Stickler syndrome.

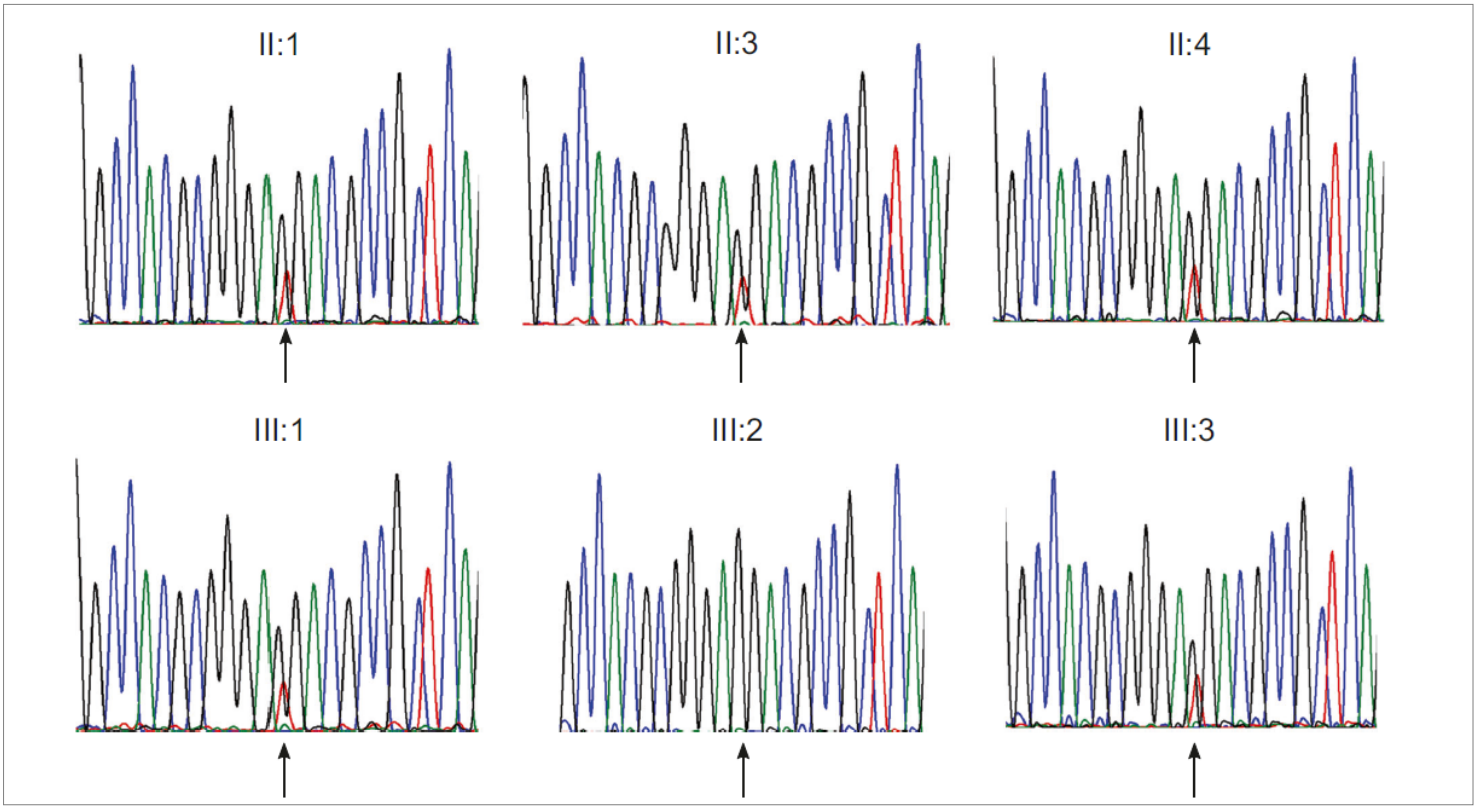


Figure above. Sequencing chromographs for testing family members. Chromographs demonstration a heterozygous G>T BMP4 substitution (arrowed) in affected family members, with no substitution (arrowed) in unaffected family member (III:2) *Nixon et al (2019) Eur J Hum Genet. 27(3):369-377*

Inherited and de novo biallelic pathogenic variants in COL11A1 result in type 2 Stickler syndrome with severe hearing loss

Type 2 Stickler syndrome is usually a dominant disorder resulting from pathogenic variants in one of the genes for type XI collagen. Typical molecular changes result in either substitution of an obligate glycine within the Gly-Xaa-Yaa amino acid sequence repeat region of the molecule, mRNA missplicing or deletions or duplications that typically leaves the message in-frame. C*ontinued on next page...*

Vitreoretinal Research Group identify novel genetic causes for Stickler syndrome

… continued: Fibrochondrogenesis is also a genetic disorder of type XI collagen, but here disease associated variants are recessive and the condition is very severe- usually lethal in infancy. A family with type 2 Stickler syndrome and unusually severe hearing loss were referred to the national service and were identified to carry both a de novo in frame deletion in one gene copy but also a second inherited variant in their other Stickler gene, affecting normal splicing of one of the coding exons only expressed in the ear. This highly novel finding illustrates how specific changes in variably expressed (tissue specific) parts of a gene can result in very different consequences and demonstrates how phenotypes from de novo pathogenic variants on one gene can be modified by inherited recessive variants on the other copy. *Nixon et al (2020) Mol Genet Genomic Med. In press*

Studies on the use of Polydimethylsiloxone (liquid silicone) for retinal detachment repair

In collaboration with the Department of Chemical Engineering (Professor Ian Wilson) the Vitreoretinal Research Group are investigating the mechanisms involved in the emulsification of silicone oil in the human eye. Silicone oil is used for the repair of particularly complex retinal detachments and was pioneered in Addenbrookes by John Scott some 50yrs ago. The project initially studied the bulk emulsification of the silicone oil at the interface between the oil and the aqueous phase, in a 3D model of the eye. Figure 1 shows a photograph of the eye model, a laboratory round-bottom flask filled with saline and silicone oil tamponade (viscosity 1 Pa s).

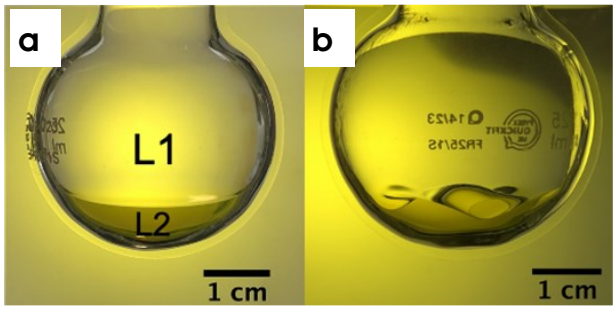


Figure 1. Photograph of a 25-ml round-bottom flask filled with 91 vol.% silicone oil (L1) and 9 vol.% TX-100 in saline (L2), (a) at rest, (b) under saccadic motion of amplitude 36°, angular velocity 800°/s and latency time 23 ms.

Chemical surfactant, TX-100, has been added to saline to lower the interfacial tension between oil and saline. Experimental and numerical results demonstrated that the stresses generated at the oil-aqueous fluid-fluid interface could generate waves (see Figure 1. (b)) but did not create droplets.

We are currently investigating a surface emulsification hypothesis, where droplets are generated via instabilities of the fluid-fluid interface at the retinal wall. Figure 2 shows a metal slide dipped into a bath of two immiscible liquids (saline and oil). A pattern of parallel lines (scratches) has been created on the metal slide surface. The experiment consists of moving the metal slide up and down so that the interface between saline and oil moves across the pattern. We are studying the deformation of the interface and investigating if the defect on the metal substrate can lead to droplet formation. Article by Mr Martin Snead. Visit: www.vitreoretinalservice.org. for more information about the team's work.

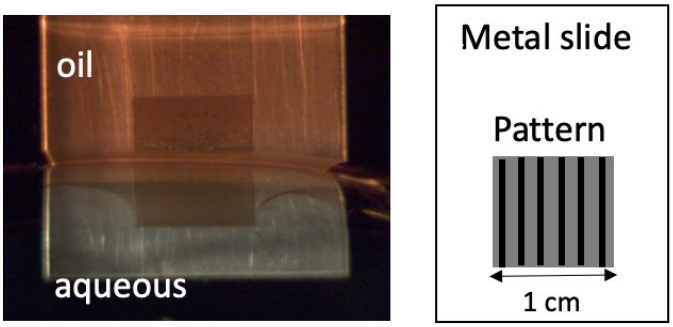


Figure 2. Photograph and schematic representation of a metal slide dipped into a bath of two immiscible liquid: aqueous solution of TX-100 in saline (transparent) and silicone oil (dyed in red). A topographical pattern consisting of parallel lines has been created on the metal slide surface using laser.

Wang et al (2020) Acta Ophthalmol. In press. https://onlinelibrary.wiley.com/doi/10.1111/aos.14539

New appointment in glaucoma

Stelios Georgoulas was appointed in September 2019 as a glaucoma consultant at Cambridge University Hospitals, replacing Professor Keith Martin's clinical role. He leads the newly set-up glaucoma outreach at the Vision and Eye Research Centre at Anglia Ruskin University.

He has 15 years' experience in ophthalmology and he provides the full range of glaucoma and cataract surgeries, including trabeculectomies and aqueous shunt operations with antimetabolites as well as laser treatments for decreasing eye pressure and the new micro invasive glaucoma procedures.

Stelios qualified in 2004 and started his ophthalmology career doing research at the New York Eye and Ear Infirmary. His interest in glaucoma surgery led him to win a scholarship with which he undertook a PhD in wound healing after glaucoma surgery (2006-2009) at the University College London School of Pharmacy, UCL Institute of Ophthalmology and Moorfields Eye Hospital. He has presented his research in international conferences and he has authored 8 book chapters in major glaucoma publications. He was accepted to the North London Ophthalmology training programme, where he completed his training. During his training he spent 3 years in the world-renowned Moorfields Eye Hospital as specialist registrar and 2 years at the Imperial College London Hospitals. Subsequently, he spent 1 year as a glaucoma fellow at St Thomas Hospital in London, followed by 2 years in a paediatric and adult glaucoma fellowship at Moorfields Eye Hospital, London.

Stelios is also very interested in the field of innovation and management. He has completed a Masters in Management and Governance at the London School of Economics with Distinction and underwent executive education training in Finance and Accounting at the London Business School. He has authored a book chapter in the internationally renowned Handbook of Corporate Entrepreneurship and he is passionate in using his managerial skills in improving the organisations he is working in.

Stelios Georgoulas

Vision Excellence Award 2020 - Winner, Professor Rupert Bourne

The International Agency for the Prevention of Blindness (IAPB) has awarded Professor Rupert Bourne the prestigious Vision Excellence Award.

Since 2007, Professor Bourne has led the Vision Loss Expert Group (VLEG), which now includes more than 100 ophthalmic and optometric epidemiologists from across the World. Throughout the VISION 2020 period, VLEG has been the principal epidemiology group for the publication of global, regional and country-level prevalence estimates of vision impairment and blindness. These have been published in The Lancet and other high impact journals between 2015-2020. Prof Bourne's collaborative research with the World Health Organisation has provided the 2015 prevalence data that underpins the WHOs World Report on Vision (2019), resulting in him serving on WHO's Technical Advisory Group for 'Development of a Package of Eye Care Interventions'.

Professor Bourne's leadership of the Vision Loss Expert Group (VLEG) throughout VISION 2020 has raised awareness of the prevalence of eye diseases globally and has provided a consistent starting point for health agencies (e.g. WHO, UN), governments and international charities to compare, plan, justify and monitor eye-health interventions.

Extract from full article, with kind permission from IAPB: https://www.iapb.org/connect/members/vision-excellence-awards/vision-excellence-awards-rupert-bourne.

IAPB - https://www.iapb.org

A £ 1.37 million MRC award to develop a pre-medicated synthetic human corneal equivalent to treat corneal blindness

Corneal disease is a major cause of blindness worldwide and transplantation with a human donor cornea remains the main clinical line of therapy. However, the demand for corneal donation outpaces the supply, leading to delayed visual rehabilitation for several hundreds of patients worldwide who are awaiting corneal transplantation. Furthermore, conventional corneal transplants has a high risk of failure in patients with severe ocular surface disease and vascularised cornea often necessitating repeated transplant procedures without much visual success.

Prof Madhavan Rajan says *"...combined diagnosis and therapeutic approach will enable disease monitoring and treatment to severe corneal scarring disorders for the first time ..."*

A recent UK graft registry assessment showed up to 50% of patients requiring a full thickness corneal transplant (PK) had such high-risk characteristics with poor prognosis with conventional corneal transplantation. A synthetic cornea could offer the necessary solution for these patients and remains an unmet need in this field. In response to our project grant application in March 2020, the Medical Research Council (MRC) awarded a £1.37m for this project as a career development grant to Dr Hirak K Patra, University of Cambridge and University college London in collaboration with Prof Madhavan Rajan at Addenbrooke's Hospital and Anglia Ruskin University, Cambridge to develop a Assisted Regeneration Artificial Cornea (ARCs) which will mimic biological properties of the human cornea and have additional function as a mediated device with theranostic potential. Overseas collaboration with University of Montreal, Canada and Harvard, United States, would bring international expertise to our project. This combined diagnosis and therapeutic approach will enable disease monitoring and treatment to severe corneal scarring disorders for the first time and promises to address the unmet need in the field for artificial cornea. Article by Prof Madhavan Rajan.

Dr Hirak K Patra, University of Cambridge and University College London and Prof Madhavan Rajan Addenbrooke's Hospital and Anglia Ruskin University.

Cambridge Eye Research Centre (CERC) still strong and growing despite the pandemic

Much of the clinical research at CERC (based at Addenbrooke's) involves clinical trials that are on the NIHR Portfolio. The National Institute for Health Research (NIHR) is the research 'arm' of the NHS and there is an obligation on the part of the NHS to integrate research into clinical practice.

Many patients were enrolled in 17 research studies when the pandemic became known in January 2020. The March lockdown resulted in a national 'pause' for most of the national portfolio of studies across all specialties, however, in Ophthalmology several studies continued despite the lockdown, in particular those interventional studies involving sight-saving treatments such as those for wet age-related macular degeneration.

This work would not be possible without the support of the whole Ophthalmology department and ops managers who firmly believe in integrating research into clinical care at Addenbrookes.

We look forward to a busy 2021!

By August, the NIHR launched a RESTART, which involved the sponsor, funder and chief investigator of each study agreeing centrally that the study could continue, yet renewed activity depended on local arrangements at each Trust. There was and still is wide disparity across the country in terms of progress with restarting studies because of redeployment of research staff, often to vaccine studies. However, the R&D department at Addenbrookes were relatively quick to respond to requests to restart Ophthalmology studies. Our Senior Clinical Trials Coordinator, Paula Turnbull has worked tirelessly to seek the authorisations to enable this. By December, 10 of our studies were active again, with 8 new studies in a process of set-up. We also support 24 clinical trials from other specialities (eg. cancer, rheumatology) around the trust, who could not run the trials without our support.

Our Director, Prof Rupert Bourne, is also the National Specialty lead for Ophthalmology for the NIHR Clinical Research Network. He has been involved in coordinating the national NIHR response to the COVID crisis and also in the committee on Aerosol Generating Procedures. He chairs the Ophthalmology Specialty Group who were quick to restart studies where possible and deliver information to local sites and their investigators. They also released a video for patients involved in or interested in becoming involved in research at this challenging time. The link to this video is as follows: https://youtu.be/ES_8oYWYvnE.

We remind patients and their carers who may be readers, that they should feel free to ask about clinical research that they may be eligible for, when visiting the out-patients department. Information about all clinical trials on the NIHR portfolio is searchable on the Be Part of Research website (bepartofresearch.nihr.ac.uk).

We would like to thank all members of the research team that include research optometrists (Poonam Shah, Jane Kean, Anneka Ali) and research nurses (Alison Gregory, Junyan Zhang) and administrators (Sharon Springdal). Additionally we are grateful to the Principal Investigators for ongoing Ophthalmology studies (R Bourne, D Newman, J Sharp, P Alexander, L Sullivan, G Clare, E Damato, B Muthusamy, L Allen, M Rajan, H Shahid) for their drive and enthusiasm to offer a range of clinical research studies to our patients. This work would not be possible without the support of the whole Ophthalmology department and ops managers who firmly believe in integrating research into clinical care at Addenbrookes. We look forward to a busy 2021!

Article by Prof Rupert Bourne.

Prof Rupert Bourne

Cambridge Eye Trust Research Grants - Continuing to support advances in ophthalmic research at Addenbrooke's

Each year Cambridge Eye Trust pledges thousands of pounds to eye research programs and projects led by ophthalmology research and clinical teams based in Cambridge.

Grants offered by Charities such as ours is extremely important. Sadly the NHS and Hospital Trusts have insufficient budgets to fund many initiatives which help save sight. Cambridge Eye Trust and other similar organisations step in to assist those with a passion for ophthalmic science uncover pioneering, worldwide firsts in our important field of medicine.

One such funded program taking place in the Centre for Brain Repair, is collectively called 'Enhancement of Optic Nerve Regeneration by modulation of Integrins.' The program's aims are to understand the roles of genes in the cause, diagnosis and treatment of several eye conditions. The Trust's financial support has helped to part-fund a PhD student and visiting researcher who perform in-life-testing of the protrudin protein to identify the mechanisms behind axon regeneration. In addition long-term pledged research funding from Cambridge Eye Trust means the teams at the Centre can continue conducting their important research projects. These studies include:

- The neuroprotective effects of novel gene therapies for glaucoma.
- The work has shown that the administration of gene therapy using a virus infection to transfer the gene results in an anti-viral response that may limit the effectiveness of repeated administration of the same virus. This is important to understand as we plan the most effective treatment strategies using gene therapy to treat blinding eye diseases.
- Regeneration of a diseased or injured optic nerve. Two important papers outlining how two proteins, (protrudin and PI3K delta) can protect and repair retinal ganglion cell neurons and their axons in the optic nerve have already been published.
- The development of gene therapies to deliver proteins and machinery to the axon growth cone of the nerve cell.
- Investigate ways to increase transport both in aged and injured nerve cells.
- Aqueous outflow from the eye using haemoglobin imaging, which can be used in the clinic to assess operations for glaucoma such as laser trabeculoplasty, in which a measurable change in outflow has been demonstrated. The study has also led to a collaboration with Sydney Eye Hospital who have adopted this technique to guide surgical intervention and assess efficacy.
- Viral gene therapy to enhance optic nerve axonal transport in two neuro degenerative disease models, a model of Alzheimer's disease and an experimental glaucoma model with functional recovery. This treatment strategy may have a role in novel therapeutic treatment strategies for glaucoma and Alzheimer's disease.
- Specific gene deletion in an effort to understand ways of enhancing optic nerve regeneration after injury, with the aim of restoring vision that has been lost. Gene deletion can promote anterograde optic nerve axonal transport and stimulate nerve regeneration following injury in glaucoma.

We wish the teams every success in achieving their scientific milestones and keeping Cambridge at the forefront of ophthalmic innovation.

About us

The **Cambridge Eye Trust** was initiated in 1970 by a number of consultants in Cambridge who believed that they had an opportunity to improve eye care through:

- Funding ophthalmic research programmes without the need to rely on other sources, thus expediting discovery.
- Specific financial support of the Professor of Ophthalmology at Cambridge University by providing departmental grants.
- Giving doctors from worldwide destinations (through the Cambridge Ophthalmological Symposium) an opportunity to learn from, and discuss medical innovation with those at the peak of their research or clinical field.

Why consider supporting eye care?

It would not be an understatement to say that having sight is one of most important senses a person has. That the loss of sight can have a real detrimental impact on that person and their family. While failing sight does comes with age, there are millions of children and adults who are affected early by poor sight or blindness. Why? Because their condition is picked up too late, the cause of the condition is not known about or a successful treatment is not available. Our fundamental aim, in some small way is to be a catalyst for ophthalmic treatment progression.

www.cambridgeeyetrust.org.uk

cambridge eye trust

Help us to SAVE VISION!

Perhaps remember us in your Will

Making a Will is an important part of planning for the future. After you have provided for loved ones, you may then consider including Cambridge Eye Trust as a beneficiary.

Many local people support Cambridge Eye Trust through legacies. Legacies, large and small, have contributed significantly towards our aim to save sight. By leaving a legacy, your gift enables us to fund research into eye disease and offer eye clinics the opportunity to purchase new state-of-the-art equipment.

It is one way of making a positive difference to so many future generations.

Meet our Trustees

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A big thank you to our donors

A big thank you from us to all our supporters who have donated to the Cambridge Eye Trust. We hope you can see from the articles that the funds raised are really making a difference locally and internationally. You have enabled us to support research, innovation, education and clinical best practice in ophthalmology, which will save sight.

Like to make a donation to the Cambridge Eye Trust?

Would you like to help us by making a donation to the Cambridge Eye Trust?

We are always grateful for any donations big or small, they will help us continue towards our vision, to save sight.

If you would like to make a donation there are 3 ways to do so:

1. Sending a cheque made payable to 'Cambridge Eye Trust' to: Mr Nicholas Sarkies, Chairman Cambridge Eye Trust, Wistow, The Green, Hilton, Huntingdon, Cambridgeshire, PE28 9NB
2. Paying directly into the Trust's bank account: CAF Bank, Account number: 00021024, Sort code: 40-52-40. The reference, your name
3. By visiting our website at www.cambridgeeyetrust.org.uk where donations can be made online at the click of a button.

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making donations go further

If you are a UK taxpayer then the Cambridge Eye Trust can increase your donation be an extra £0.25 for every £1.00 you donate by claiming Gift Aid from HM Revenue & Customs at no extra cost to you.

DONATION FORM

I want to support research to save sight and I am making a donation of £_____

Please treat as Gift Aid my donation and any donations I make in the future or have made in the past 4 years to the Cambridge Eye Trust, which is registered as a Charity no. 265140. *(please tick)* ☐

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ADDRESS: Cambridge Eye Trust: C/O Mr Nicholas Sarkies, Chairman Cambridge Eye Trust, Wistow, The Green, Hilton, Huntingdon, Cambridgeshire, PE28 9NB. General email enquires to Louise Richards, CET Assistant: louise@healthology.eu

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