All in a Year's Work

Phil Gardner BARS Chair

As I write this, voting has just closed in the 2018 BARS Council Elections and a new group of council members will shortly be announced. The British Association of Retinal Screening is entirely dependent on elected volunteers drawn from a range of roles within diabetic eye screening who give up their time free of charge to benefit others working in the field. Screening programmes are under constant pressure to meet their targets and deliver high quality patient care, and people's jobs seem to get busier with each passing year, so against that backdrop I'm always pleasantly surprised – and mightily relieved – to find that there are still individuals who are willing to take on more, and put themselves forward as candidates for BARS Council.

That level of commitment is not something I take for granted, and since becoming Chair in 2016, I've been extremely fortunate to have such an experienced and dedicated team to work with. BARS Council Members are crucial to achieving the association's current goals, and also for suggesting new ones. Our monthly 'R2 or Not?' challenge which has been running for the past year began with a simple suggestion made under 'Any Other Business' at the end of a council meeting! Two months later it was live on the BARS website, and you can read more about that project's success on the opposite page.

Other initiatives, such as the BARS Bursary Scheme which awards free places at our annual conference, are a direct result of council members wanting to help their fellow eye screening professionals and finding a way to turn their ideas into reality. The Diabetic Eye Journal and the annual BARS Conference are two examples of ongoing projects which require year-round collaboration and commitment from many members of council. Work on the next conference begins almost as soon as the previous one ends, and the same is true for each issue of the DEJ!

This year's conference marks one year since the launch of the new-look BARS website, and also one year since we introduced practical workshops to the conference programme. Last year's Slit Lamp Workshops proved extremely popular, and we have worked to expand on that offering this year by providing taster sessions in not one, but three different areas. In addition to slit lamp, delegates will have the opportunity to try their hand at widefield imaging and OCT angiography. These Surveillance Workshops will run concurrently with this year's Programme Management Meeting, allowing those with a less clinical and more managerial focus to take part in a workshop of their own, looking at ways of increasing uptake amongst hard-to-reach patient groups. Administrative and failsafe staff haven't been overlooked either, with another Failsafe Forum due to be held immediately after the conference, giving an opportunity for delegates who work in this area to discuss ideas and share good practice.

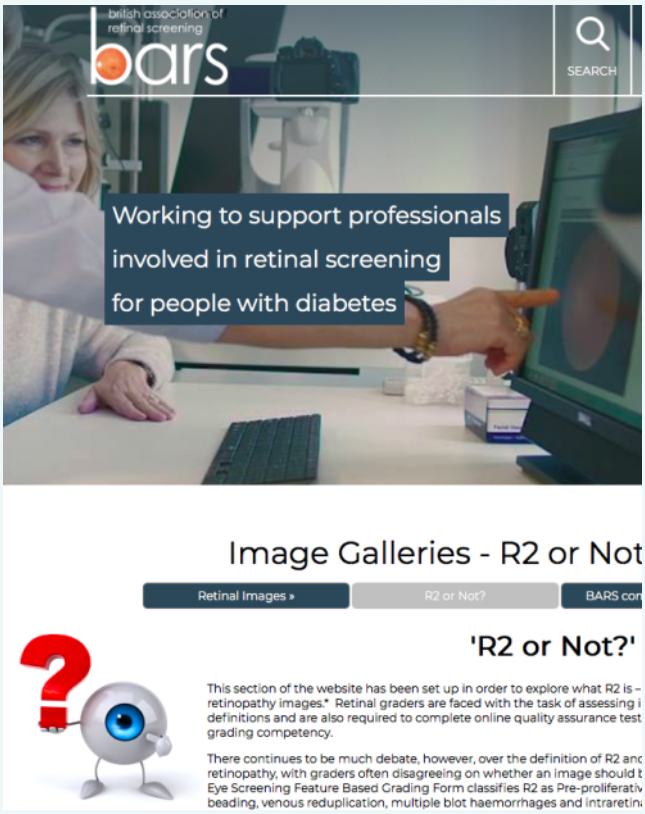
All of this takes a great deal of organising, of course, and over the past year a number of council members have been quietly multi-tasking, working on one or more of the above projects, whilst also contributing to the association's longer term goal of improving education and training for screening staff. This is currently taking a two-pronged approach, with plans in place for an Objective Structured Clinical Examination (OSCE) and associated certification for Slit Lamp Examiners, and an online certification for DESP Administrators. Work has already begun on learning materials for the latter, and I will be updating BARS members on the progress of that project at this year's conference.

That the work described on these three pages – and indeed the very journal you're now reading – has been planned and delivered by a small group of people working voluntarily in their spare time, is no small achievement, and I would like to thank all current members of council for their efforts over the past year, and welcome the newly elected members who will be continuing this valuable work and providing fresh ideas of their own.

The 2018 BARS Council Election was a record-breaker, with more votes cast than ever before, and the results are now available on the BARS website. Visit www.eyescreening.org.uk and choose 'BARS Council Elections' from the main menu.

R2 or Not?

One year ago, BARS launched ‘R2 or Not?’, a monthly online challenge which asked retinal graders to examine three images and state whether or not they would grade each one as R2.



In England, a grade of R2 is defined as pre-proliferative retinopathy with one or more of the following features: venous beading, venous reduplication, multiple blot haemorrhages (MBH) and intraretinal microvascular abnormalities (IRMA). These must be present in addition to at least one microaneurysm or retinal haemorrhage. The national grading scheme differs in Scotland, but the Scottish grade of R3 (‘Referable Background') can broadly be considered the equivalent of an English R2 grade.

In the experience of BARS Council members, the features of R2 frequently cause the most uncertainty amongst trainee retinal graders, and continue to provoke a great deal of debate amongst those who are qualified. We therefore decided to launch ‘R2 or Not?’ with three aims:

- to provide trainees with access to more images of R2, in an effort to help familiarise them with the features of pre-proliferative diabetic retinopathy
- to gauge what level of consensus exists amongst qualified graders, and where any areas of disagreement may lie
- to provide a discussion point for graders at a local level, prompting further debate and shared learning

The intention was to keep the process as simple as possible. Three images are presented on the BARS website each month, and each may be viewed in both colour and red-free, but no image manipulation tools are provided. Those taking part are not asked to give a full disease grade or record which features they think are present; they are simply asked to decide whether each image is ‘R2 or Not?’.

Whilst the English Test and Training system and Scottish EQA system provide a sophisticated method of grader quality assurance, the approach taken by ‘R2 or Not?’ is very different. Most fundamentally, participants already have the answers before they begin! We clearly state that all images are considered to be R2, and simply ask graders if they agree. In this way, ‘R2 or Not?’ does not seek a ‘correct’ answer, it merely asks for an opinion based on how the individual would grade that image. Anonymity allows that answer to be an honest one, free from judgement or any pressure to agree with others. BARS members can view the results of each month’s challenge on the association’s website, and all previous images and results are available. Simply go to the Image Galleries section and choose ‘R2 or Not?’.

The results we’ve seen over the first year have proved very interesting, and serve to highlight the ongoing challenge of gaining consistent agreement in this area of retinal grading. On average, only around 3 out of 4 people agree that any given image is R2 and, perhaps surprisingly, the level of agreement is no higher amongst ROG/L3 graders. Trainee graders understandably seemed to struggle with the identification of IRMA, and amongst qualified graders we saw some widespread disagreement regarding the presence of NVD versus collateral vessels, although that may be due in part to the artificial nature of the challenge which provides no patient history or previous images, and only one photo per eye.

Encouragingly, cases of MBH tended to produce good levels of agreement, and qualified graders appeared to have little trouble with simple cases of IRMA, suggesting that experience is key here, and that access to more images will prove extremely beneficial to trainees. This was the original starting point from which ‘R2 or Not?’ grew, and justifies our decision to undertake the project.

Perhaps most pleasing, however, is the level of participation we've seen over the first year from graders across the country who have no obligation to take part and who do so voluntarily in their own time. More than 130 graders took part in the first challenge, with dozens continuing to do so every month, showing an admirable determination to increase self-learning and contribute to any discussion in order to improve the quality of grading, and ultimately our service to patients. BARS Council would like to thank everyone who has taken part in 'R2 or Not?' over the past year and contributed to its success. The monthly challenge will continue, and we will be looking at ways of improving and expanding 'R2 or Not?' in the future. If you have any suggestions, please e-mail us at webadmin@eyescreening.org.uk

The 18th Annual BARS Conference

27th - 28th September 2018

Marriott Hotel City Centre, Bristol

DIABETES UK
KNOW DIABETES. FIGHT DIABETES.

Highlights from DUK 2018 Professional Conference in London

The 2018 Diabetes UK Professional Conference took place in London on 14th-16th March this year, with each day featuring a wide range of events and activities including Named Lectures delivered by leading academics, professional interest groups covering different disciplines within diabetes care, plenary sessions and sponsored symposia, plus numerous workshops, abstracts and poster presentations.

This year's Banting Memorial Lecture was delivered by Professor Andrew Hattersley, consultant diabetologist at the Royal Devon and Exeter Hospital, who spoke about ways of improving treatment by defining subtypes of diabetes. He made the point that drugs for Type 2 diabetes can be more or less effective depending on the patient's gender and/or weight, and that using four simple groupings – obese male; obese female; non-obese male; non-obese female – can help to decide the best course of treatment.

The professional interest group for eye specialists was led by Professor Peter Scanlon alongside Bridget Turner from Diabetes UK. Peter gave a national update on diabetic eye screening and Bridget spoke about DUK's Clinical Champions Programme, a two-year leadership development programme which aims to give healthcare professionals the skills and support they need to transform local diabetes care. This was followed by an open discussion with those present giving updates on their particular area of work.

One of the unexpected highlights of the three days was a symposium sponsored by Eli Lilley which looked at ways in which behavioural science can be used to tackle clinical inertia. Crawford Hollingworth, global founder of The Behavioural Architects, gave an entertaining talk entitled 'How Small Changes Can Make a Big Difference' and explained that the way we phrase our written and verbal communications with patients can have a significant impact on how positively they respond. As an example, he said that when patients are told a surgical procedure has a 10% mortality rate, only half will consent to it. If, however, they are told it has a 90% survival rate, more than 4 out of 5 will consent. Understanding how people subconsciously respond to information and tailoring our communications accordingly can therefore have a positive effect on patient engagement and health outcomes.

Among the eye-related research presented at the conference were two studies on the association between retinal vascular traits and diabetic retinopathy, while one poster presentation suggested a possible link between the artificial sweetener sucralose and the progression of proliferative DR. These elements combined to produce a varied and interesting three days covering every aspect of diabetes care.

Next year's conference will take place in Liverpool on **6th – 8th March 2019**. To find out more visit: www.diabetes.org.uk

Crystalline Retinopathies

Tjebo Heeren, MD FEBO, Medical Retina Clinical Research fellow
and
Dr Catherine Egan, Consultant Ophthalmologist and Honorary Senior Clinical Lecturer
at Moorfields Eye Hospital NHS Foundation Trust and UCL Institute of Ophthalmology

Retinal crystals are a rare clinical sign. They can be very subtle and may be missed on retinal examinations and retinal colour photographs. However, careful examination and good photography may identify these lesions. In the context of a diabetic retinopathy screening visit, these crystals can look like retinal exudates and prompt referral for maculopathy. Many of these disorders can be diagnosed in the hospital eye service with additional retinal imaging studies (typically high quality OCT, fluorescein angiography, fundus autofluorescence, confocal blue light reflectance) and careful medical history taking. The following is a brief summary of the more common retinal crystalline retinopathies and their associations and some key publications and websites for further information.

Crystalline Retinopathy	Location of the crystals	Vision Loss	Systemic Associations
MacTel type 2	Macula, inner retina	Yes – later stages with neuroretinal atrophy or subretinal neovascularization	Diabetes mellitus type 2 in 30% Abnormal amino acid metabolism
Tamoxifen retinopathy	Macula, inner retina	Unusual with modern dosage regimens, central vision loss can occur	Treatment with oral tamoxifen for breast cancer prophylaxis
West African crystalline retinopathy	Henle's fibre layer – central fovea	No	Postulated inherited / environmental risk, but unknown
Bietti's crystalline retinopathy	RPE, choroid, outer retina Cornea	Yes	Inherited disease, known mutation
Oxalosis	RPE	Possible with late stage disease	Inherited metabolic disorder, renal disease
Canthaxanthin retinopathy	Inner retina	Rare, reversible if stopped	Use of an oral tanning agent
Cystinosis	All retinal layers Cornea	Yes	Inherited disease, renal disease

MacTel Type 2

Macular telangiectasia Type 2 (MacTel Type 2, or MacTel) is a rare ocular condition first described in 1982.[1]

Our understanding of the disorder has increased significantly since this time, mainly due to the 'MacTel Project', a large, international scientific and clinical collaboration (www.lmri.net). Currently, there are no proven effective therapies for MacTel Type 2, but therapies exist for the late stage complications of the disease – namely intravitreal injections of anti-VEGF (vascular endothelial growth factor) agents for subretinal neovascularization.

A phase 3 clinical trial is currently recruiting patients at Moorfields Eye Hospital and other international clinical sites.

Other Lesions

In this trial, a capsule is implanted into the eye which contains modified retinal pigment epithelium cells which produce and constantly release ciliary neurotrophic factor (CNTF) to slow down progression of neurodegeneration. (Further information can be found on the study website and also on clinicaltrials.gov).

This disorder is of particular interest to graders reviewing diabetic retinopathy images as 30% of people with MacTel have a diagnosis of diabetes mellitus type 2. Patients with MacTel are often misdiagnosed with other common retinal conditions like wet age-related macular degeneration (AMD) and diabetic retinopathy. MacTel characteristic lesions include retinal opacification (a grey appearance to the macula in an oval shape centred on the fovea, approximately 2 disc diameters horizontally and 1.5 disc diameters vertically), perifoveal telangiectatic vessels that leak on fluorescein angiography, right angle vessels and crystalline deposits (**Image 1**). With more advanced disease, retinal pigment epithelial hyperpigmentation occurs (**Image 1B**), quite often along the right-angle vessels – this appears as black intraretinal pigment, usually located temporal to the foveal centre.

Abnormalities are seen on fundus autofluorescence (FAF) imaging, as well as on optical coherence tomography (OCT), where hypo-reflective inner and outer retinal cavities, as well as ellipsoid zone (EZ) or inner segment/outer segment losses, are found.

On FAF imaging a loss of the yellow luteal pigments from the foveal centre can be shown. Less frequently, neovascularization originating from the retinal circulation can occur, forming retinal-choroidal anastomoses. The location of the neovascularization is centred temporal to the fovea in its early stages in most patients, which differentiates these patients from the typical patient with wet AMD, although late stage disease can look very similar.

Crystals are a very characteristic finding in patients with MacTel, but are not found in every patient with the disorder. They are usually small, bright white and highly reflective, often following the nerve fibre layer if there are several. When examined carefully, they have a very different characteristic from retinal exudates.

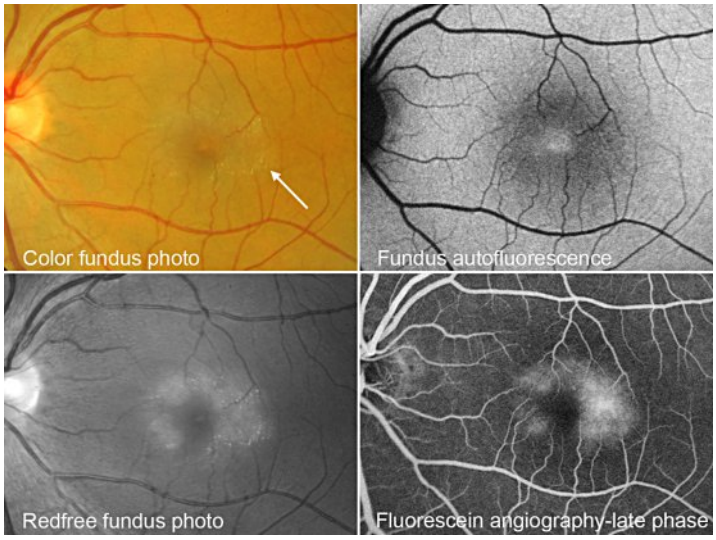


Image 1:

Macular telangiectasia type 2 in different imaging modalities. The arrow points to crystals. Note the 'greying' of the central retina which is most clearly seen in red-free imaging as increased reflectivity. Fundus autofluorescence shows loss of central macular pigment, and fluorescein angiography leakage in the area of greying.

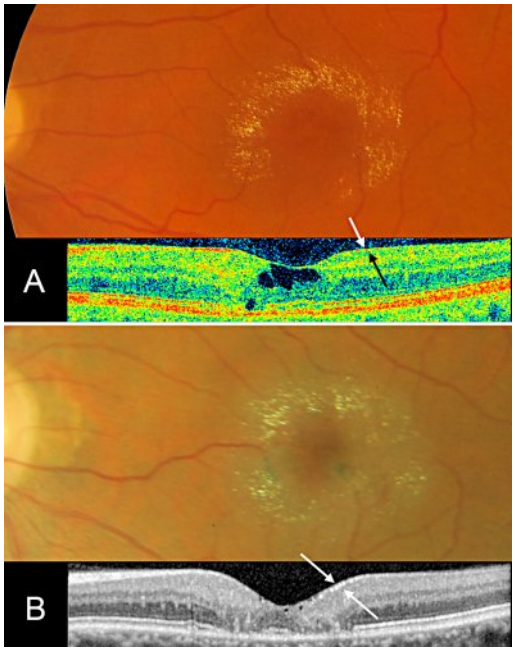


Image 2:

Two eyes with marked intraretinal crystals due to macular telangiectasia type 2 (MacTel). The corresponding OCT is shown below the color fundus photo (CF). The arrows point to crystals, which can be seen in OCT as increased dotted reflectivity in the innermost layer. **Image 2A** shows intraretinal hyporeflective spaces without retinal thickening. Those 'cavities' are neurodegenerative in nature and different from macular edema in diabetes. The images were made with different devices, explaining the different hues in the CF and the different OCT appearance. In **image 2B**, intraretinal pigment can be observed as additional characteristic feature of MacTel.

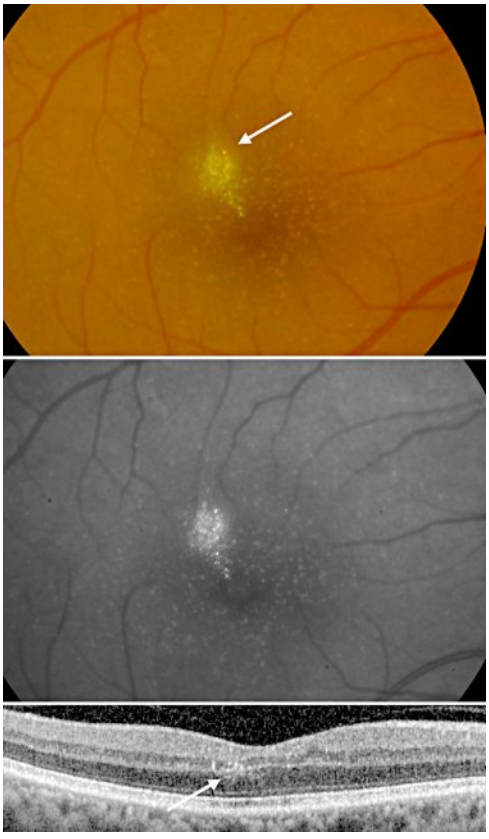
More detailed information about this disease can be found in an open access article in the journal **Progress in Retina and Eye Research** (Macular telangiectasia type 2, Charbel Issa et al.) https://www.sciencedirect.com/science/article/pii/S1350946212000766 or in an open access supplement in the journal Retina (January 2018). https://journals.lww.com/retinajournal/toc/2018/01001

Tamoxifen Retinopathy

Tamoxifen is a selective oestrogen receptor antagonist/modulator commonly used to prevent recurrence of hormone receptor positive breast carcinoma. Very rarely, people receiving long term oral tamoxifen treatment will develop retinal changes and visual symptoms, although this is difficult to predict based on dose or the characteristics of the patient prior to therapy as retinal changes have been described in patients on both low dose and high dose treatment regimens.

The cause of the disease is unknown, but an effect on glutamate metabolism and Muller cell function has been postulated.

Similar changes to MacTel on OCT have been described (cystoid spaces and EZ line loss). Also, inner retinal crystals occur, most visible around the fovea. Once the diagnosis is confirmed, the ophthalmologist will usually discuss a change in medication with the treating oncologist, although this may not reverse the current retinal changes.



West African Crystalline Retinopathy

West African crystalline maculopathy (WACM) describes the presence of yellow-green coloured crystals in the maculae of adults of West African ancestry. This condition was first described by Sarraf et al in 2003,1 based on observations in 6 individuals from the Igbo tribe in Southeast Nigeria. People with this condition are visually asymptomatic and treatment is not required. Various theories for the reason these crystals develop have been proposed, but no definite causal association has yet been confirmed. The crystals can become more obvious in the context of other retinal conditions, like diabetic retinopathy and retinal vein occlusions, particularly when macular oedema develops. The condition is non-progressive, but has only been described in adults. Crystals can be mistaken for retinal exudates in the macula, but they are often less apparent on colour photography than they are on clinical examination with a slit lamp microscope.

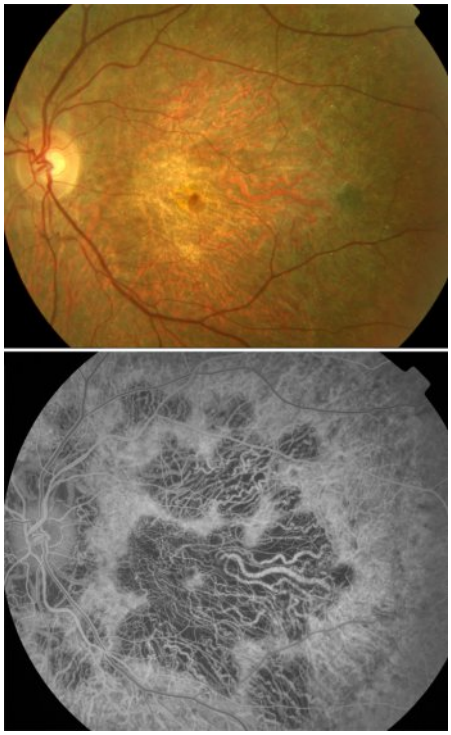
The crystals are found in Henle's fibre layer on high resolution OCT scans, which is the layer in the foveal component of the outer plexiform layer of the retina. It is absent in the peripheral retina, so the crystals are not present in the peripheral retina.

Image 3: West african crystalline retinopathy. Color and redfree fundus photographs (upper panels) show the yellowish crystals in the parafovea of this eye (arrow). The OCT (bottom) shows hyperreflective small dots in the middle retinal layers (arrow).

Bietti's crystalline retinopathy

Bietti's crystalline dystrophy (BCD) is an autosomal recessive, progressive chorioretinal degenerative disease caused by mutations in the CYP4V2 gene, resulting in severe vision loss in most patients. The underlying mechanisms of retinal pigment epithelial (RPE) cell damage are still unclear, but a recent publication in PNAS suggests that RPE degradation and recycling as part of normal cellular remodelling is impaired.

Affected people will present in their early adult life with night vision problems. Corneal crystals may be evident, but are often not seen in patients with very obvious retinal disease. Crystals are small, highly reflective and present throughout the retina, best seen on red free images. Areas of retinal atrophy (nummular pattern) are more apparent on autofluorescence imaging often most obvious in the mid-periphery in earlier phases then progressively affecting the macula and peripheral retina.



OCT imaging shows outer retinal atrophy in the areas of clinical atrophy and the presence of hyper-reflective crystals at the level of the RPE and choroid in some reports. At the later stages of the disease, the crystals become less evident than the atrophic changes.

Image 4:

Bietti's crystalline retinopathy. The color fundus photograph (upper image) of this advanced case of Bietti's dystrophy shows few small crystals as small yellowish dots on the entire posterior pole. Both color photography and Indocyanine green (ICG) angiography (bottom image) show marked chorioretinal atrophy.

Oxalosis

The deposition of oxalate crystals within the retina can be associated with a rare inherited disease affecting renal function. These patients may have normal retinal examinations, but some will develop widespread retinal crystals at the level of the RPE with perifoveal retinal pigment epithelial hyperplasia (black intraretinal pigment) and vision loss. This latter appearance is usually irreversible. Late complications of this stage include subretinal fibrosis. People with the late stage renal disease will usually show signs of retinopathy, particularly if early onset disease.

Canthaxanthin Retinopathy

Canthaxanthin is an oral tanning agent that is not commonly used in the United Kingdom. Used in this manner, it can be the cause of a crystalline retinopathy. This naturally occurring product is also used as a food colouring agent, but is usually not consumed in sufficiently high doses to cause the retinopathy. The peripheral fovea is affected with birefringent or golden crystalline deposits in the inner retina extending up to and beyond the arcades in some of the reported cases. Vision loss has been reported, but patients are usually asymptomatic and the crystals are discovered incidentally during a routine eye examination. The crystals and vision symptoms resolve when canthaxanthin is stopped, but this has been reported to take as long as 20 years.

Cystinosis

Cystinosis is a rare autosomal recessive condition affecting amino acid metabolism. Cystine accumulates within lysosomes throughout many tissues. The infantile form, which causes severe renal problems, is the only form with retinopathy. Vision can be affected. Eye associations include prominent corneal crystals and haze, pigmentary retinopathy, constricted visual fields. The retinal crystals are present throughout all retinal layers on OCT.

References

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3. Rajak, S, et al. Further insight into West African Crystalline Maculopathy. Arch Ophthalmol. 2009;127(7):863-868.

4. Derveaux, T, et al., Detailed clinical phenotyping of oxalate maculopathy in primary hyperoxaluria type 2 and review of the literature, Retina. 2016 Nov;36(11): 2227-2235.

Be in the know – introducing Diabetes UK's new campaign on complications

Every week, diabetes leads to 30 people developing sight loss and over 169 amputations in England, according to data from clinical commissioning groups. Treating diabetes complications accounts for 80% of the NHS spend on the condition. What is more, many of these problems are preventable – which is why Diabetes UK has launched a new campaign focusing on complications. **Dr Susan Aldridge**, Editor of Diabetes Update, the charity's magazine for healthcare professionals. introduces Be in the know and discusses how healthcare professionals can get involved.

Do some diabetes complications arise because the person either didn't – or didn't want to – appreciate the seriousness of their condition, be it Type 1 or Type 2? Are some healthcare professionals and people with diabetes still calling Type 2 'mild' diabetes? We asked people with diabetes to name their top four health concerns. Only 60 per cent with Type 1 and 45 per cent with Type 2 see their condition as a serious/top health concern. This suggests that they don't understand the seriousness of their condition. Healthcare professionals play a key role in challenging the view that diabetes isn't anything to be concerned about.

With your help, we can change people's views on diabetes and help prevent devastating complications. Through explaining the risk of complications to your patients when they attend for their retinal screening appointment, and using our helpful resources, you can work with us to create a world where diabetes can do no harm.

Difficult conversations

Conversations about diabetes complications can be difficult for both patients and healthcare professionals. We spoke to people about this at the Diabetes UK Professional Conference earlier this year and gathered some top tips.

- Work with the patient's agenda – let them take the lead.
- Use language they can easily relate to – ditch the clinical jargon.
- Listen and acknowledge the patient's experience.
- Don't rush things.
- You don't need to have the conversation all at one time – take it in stages.
- See the situation through their eyes.
- Be prepared to learn from your patient.
- Use resources like the 15 Healthcare Essentials checklist.

Lecturing the patient, threatening them, instilling fear – it seems to be generally acknowledged – will not help with 'compliance'. These approaches are more likely to result in denial, guilt, depression and a 'no show' at the next appointment on the part of the patient.

What thoughts go through your mind when you see a patient whose condition is deteriorating?

1. Mrs A's retinal screens have always been clear/stable, so I wonder what's going wrong now? Is something getting in the way of her diabetes management?
2. It's obvious that Mrs A isn't taking her medication or following her diet, so what's the point in talking to her – she's never going to engage.
3. I know Mrs A is worried about going blind, so do I use that to try to persuade her to buck her ideas up?
4. I know Mrs A is worried about going blind, so best play that down so she doesn't panic and disengage.

Can you say or do anything different during a retinal screening appointment that could help the person take their condition seriously – without frightening them off? We are carrying out research among Update readers to find out how they approach the 'seriousness' issue – if you would like to contribute, please go to #BeInTheKnow.

Diabetes UK resources

We have a range of resources that can help you work with people with diabetes to reduce their risk of complications.

1. 15 Healthcare Essentials

Diabetes UK has compiled a list of the checks and services that every person with diabetes should receive, including regular retinal screening. Free copies of the 15 Healthcare Essentials are available to download and can be used as a tool to help patients get the care they need.

2. Information Prescriptions

Information Prescriptions are a personalised single side of A4, which include easy-to-read explanations, clear images and individual goals to help prevent diabetes health complications. They are designed to give people with diabetes the information they need to understand, engage with and improve on their health targets. We have had excellent feedback from healthcare professionals on how this tool is having a real positive impact in diabetes care.

While we don't yet have an Information Prescription on eyes, you may be interested in downloading our Mood Information Prescription. You probably see many patients at their retinal screen who are depressed or anxious. Emotional or psychological problems are experienced by at least four in ten people with diabetes at any one time. This can impact the person's ability and motivation to self-manage and lead to poorer health outcomes – including complications – reduced quality of life and an increase in healthcare costs.

Further information

• Join the debate at #BeInTheKnow. We'd love to hear from you.

• For more on the campaign, go to www.diabetes.org.uk/professionals and select 'Be in the know about complications'

• To read the Diabetes Update special issue on the complications campaign, go to www.diabetes.org.uk/professionals/diabetes-update

'From **Diabetes Balance**, Diabetes UK, Summer 2018'.

MEMBERS

Got a question about treatment, diet or lifestyle? Our team of experts are on hand to help...

Ask THE EXPERTS

Expert team

Dan Howarth
Head of Care
Dan is a diabetes specialist nurse and has had Type 1 since 1992.

Tasha Marsland
Registered dietitian
Tasha has worked at Diabetes UK for 15 years.

Libby Dowling
Paediatric diabetes specialist nurse
Libby has worked for Diabetes UK for 11 years.

Lucy Timthong
Helpline information lead
Lucy ensures the Helpline team know the latest on diabetes.

Write to

'Ask the experts', *Balance*, Diabetes UK, 126 Back Church Lane, London E1 1FH, or email balance@diabetes.org.uk

Helpline

To speak to a trained counsellor, call 0345 123 2399* Monday to Friday, 9am to 6pm, or email helpline@diabetes.org.uk

Can I reduce my risk of further complications?

Q: I've had Type 2 for 15 years and try to eat healthily and exercise. My HbA1c is always in target, apart from five years ago when I had to go on metformin.

It came down again and I haven't needed any further medication. But at my recent retinal screening appointment, I was told I have background retinopathy. What else do I need to do?

Michael, Stockport

Dan says: Maintaining a mostly steady HbA1c - clearly helped by your lifestyle - since diagnosis is fantastic. After 15 years, lots of people with diabetes will have background retinopathy, but it doesn't mean your sight is at imminent risk. Your diagnosis may not change for many years, if at all, but you should continue attending screening so that any progression will be noticed. If you need future treatment, it can be given early to prevent damage to your vision. Maintaining blood sugar levels within target is the best way to reduce the risk of complications, but it doesn't remove the risk completely. Blood pressure plays an important role in retinopathy, so you may need to start blood pressure tablets, even if your blood pressure is in target.

Over time, anyone with diabetes can develop complications, but keeping up your healthy lifestyle will continue to reduce that risk and prevent the existing retinopathy from progressing.

How can I help my wife recover from amputation?

Q: My wife has diabetes, but doesn't see the doctor much and forgets to take her tablets. She recently had sore feet and difficulty walking – her toes were the wrong colour and shape. She was sent straight to the hospital and they took some of her toes off. She may lose some of her foot, too. What if she can't walk when she comes home? Will this happen to her other foot?

Jawed, Leicester

Dan says: I'm so sorry to hear this – it must have been very shocking for you both. Your wife will need some help with walking and if she needs a walking stick or frame, the hospital will make sure she has these before she goes home. She may also be given special shoes to protect her feet and help her balance, and should receive support after she is discharged from hospital.

The best way to help prevent this happening again is for your wife to attend all of her doctor's appointments and remember to take her medication. She should focus on keeping her blood sugar, blood pressure and cholesterol in target and stop smoking if she currently does. The hospital team will support you both through this, but you can call our Helpline to talk about things at any time.

● For more on the 15 Healthcare Essentials, the care you need when you have diabetes, go to www.diabetes.org.uk/bal-know-15

PLEASE NOTE: The experts can't take phone calls.
*Calls may be recorded for training and quality purposes.

An assessment of whether the retinal vasculature and the presence of retinal vessel damage can offer a prognostic indicator of cerebrovascular events such as strokes when examined using digital retinal photography: a literature review.

Luke Rollin, Screening and Immunisation Manager, NHS England North (Yorkshire & the Humber), Public Health England

Introduction

Strokes remain a major cause of morbidity and mortality and many risk factors are well established, including age, gender, ethnicity, socio economic deprivation, smoking habits, hypertension, diabetes, high cholesterol, being overweight, and lack of exercise[1, 2].

Hypertension is perhaps the biggest modifiable risk factor for stroke[3] with many estimates suggesting stroke risk to be higher by a factor of four in those individuals considered to be hypertensive[2]. It has been established that tackling hypertension and its multifactorial causes can lead to a significant reduction in stroke incidence, as well as in stroke mortality[4, 5], and it is important to target interventions at those individuals identified as at risk of stroke.

Despite risk factors being well established it is not possible to definitively predict which individuals will suffer a stroke, particularly in younger populations. Examination of the microvasculature of the brain may provide a better indicator but this would be both invasive and harmful to the individual or, in the case of magnetic resonance imaging (MRI), impractical and expensive.

With the retina and the brain being physiologically similar it may be possible to examine the retina to identify the early signs of vascular dysfunction which may offer a prognostic indicator for the likelihood of stroke. Examination of the retinal vasculature is relatively simple and non-invasive and is in use on a large scale in England with a well-established national screening programme for the detection of diabetic retinopathy. The evidence-base supports the use of digital retinal photography as an accurate method of identifying retinal vascular pathology.[6, 7, 8, 9, 10, 11, 12]

This project applied a systematic database search to existing literature to determine if a link could be shown between retinal microvascular abnormalities and increased stroke incidence.

Search Strategy and Selection Criteria

Information for this review was obtained by searching the Medline, Pubmed, Embase and BioMed Central databases using the search terms ‘stroke’, ‘cerebrovascular event’, ‘retinal vessels’, ‘retinal artery’, ‘retinal diseases’, ‘retinopathy’, ‘retinal photography’, ‘photography’, and ‘ophthalmic imaging’ in various combinations. From the articles identified the following inclusion and exclusion criteria was applied:

Table 1: Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
Primary research	Primary research that was unrelated to the study question being answered; systematic reviews; editorial articles; letters.
Study population did not have pre-existing stroke.	Study population had pre-existing stroke.
Population followed up over 4 years or more.	Population followed up for less than four years.
Large study population	Small study population
Published in English	Published in language other than English.
Study in humans	Study in animals
Participants not specifically diabetic	All participants diabetic

Results

Altogether the database searches identified eight studies which were deemed suitable for inclusion in the final analysis (**table 2**). It is important to note that a number of papers included in this final analysis were part of much larger studies.

These larger studies are: the Atherosclerosis Risk in Communities (ARIC) Study; the Singapore Malay Eye Study (SiMES); the Multi Ethnic Study of Atherosclerosis (MESA); the Beaver Dam Eye Study (BDES); the Blue Mountains Eye Study (BMES); and the Cardiovascular Health Study (CHS).

Table 2: List of papers included in final analysis

Authors	Year	Study Title	Participants	Type of study	Journal
[11]Cheung CY Tay WT Ikram MK Ong YT De Silva DA Chow KY Wong TY	2013	Retinal microvascular changes and risk of stroke: the Singapore Malay Eye Study.	3189	Cohort	Stroke
[12]Cooper LS Wong TY Klein R Sharrett AR Bryan RN Hubbard LD Couper DJ Heiss G Sorlie PD	2006	Retinal microvascular abnormalities and MRI-defined subclinical cerebral infarction: the Atherosclerosis Risk in Communities Study.	1,684	Cohort	European Heart Journal
[13]Kawasaki R Xie J Cheung N Lamoureux E Klein R Klein BE Cotch MF Sharrett AR Shea S Wong TY	2012	Retinal microvascular signs and risk of stroke: the Multi-Ethnic Study of Atherosclerosis (MESA).	4,849	Cohort	Stroke
[14]Klein R Klein BE Moss SE Meuer SM	2003	Retinal emboli and cardiovascular disease: the Beaver Dam Eye Study.	4926	Cohort	Transactions of the American Ophthalmological Society
[15]Mitchell P Wang J Wong T Smith W Klein R Leeder S	2005	Retinal microvascular signs and risk of stroke and stroke mortality	3654	Cohort	Neurology
[16]Wong TY Kamineni A Klein R Sharrett AR Klein BE Siscovick DS Cushman M Duncan BB	2006	Quantitative retinal venular caliber and risk of cardiovascular disease in older persons: the cardiovascular health study.	1992	Cohort	Archives of Internal Medicine
[17]Wong TY Klein R Couper DJ Cooper LS Shahar E Hubbard LD Wofford MR Sharrett AR	2001	Retinal microvascular abnormalities and incident stroke: the Atherosclerosis Risk in Communities Study.	10,358	Cohort	The Lancet
[18]Wong TY Klein R Sharrett AR Couper DJ Klein BE Liao DP Hubbard LD Mosley TH	2002	Cerebral white matter lesions, retinopathy, and incident clinical stroke. (Uses ARIC Study)	1684	Cohort	Journal of the American Medical Association

The eight studies identified by the literature review show a relationship between various retinal features and stroke incidence. These were: retinal vessel calibre; arterial emboli; retinopathy (including microaneurysms and retinal haemorrhages). Relative risk ratios are summarised in **table 3**.

Analysis of results

Arterial Emboli

Arterial emboli are small deposits that travel down the retinal arteries until such a point that the vessel width becomes sufficiently narrow to prevent further passage. The embolus then becomes lodged and can restrict blood flow to the portion of the vessel downstream which can cause ischaemia and tissue damage.

Klein et al. were the only ones to investigate a link between arterial emboli and stroke incidence. They produced a large, prospective, population-based cohort study which appears to show that there is a correlation between retinal arterial emboli and risk of stroke. Almost 5000 participants were included who underwent 30 degree stereoscopic retinal photography at baseline. These images were assessed using standardised protocols and the participants were followed up over a ten year period. The results show that those with retinal arterial emboli present at baseline suffered 16.8 stroke deaths per 1000 patient-years over the follow up period compared to 3 stroke deaths per 1000 patient-years in those with no emboli present at baseline ($P<0.001$). When adjusted for systemic factors, those with retinal emboli at baseline showed a relative risk of being 2.4 (CI, 1.16-4.99) times more likely to have stroke listed on their death certificate than those without.

Retinopathy

Retinopathy occurs when the retinal vessels leak fluid into the surrounding retinal tissue. This can be due to a number of factors but usually involves increased permeability and a breakdown of the blood-retinal barrier. This often occurs in individuals with diabetes, or as a result of hypertensive damage to the vessel structure. Weakened vessels can form small microaneurysms in the earliest stages of retinopathy, followed by small flame shaped haemorrhages in the upper layers of the retina. If retinopathy progresses deeper blot haemorrhages will form in the photoreceptor layer of the retina and these may become more widespread, with ischaemia and neovascularisation occurring in the later stages.

A number of studies investigated the relationship between retinopathy and incident stroke. Kawasaki et al. and Cheung et al. both demonstrated a positive relationship between the presence of retinopathy and an increased incidence of stroke in non-diabetic individuals. Both studies recruited a large number of participants who underwent fundus photography and were then followed up over a number of years. Kawasaki et al. showed that participants with any level of retinopathy at baseline had a relative risk of being 2.96 (95% CI, 1.50-5.84) times more likely to have suffered a stroke during the six-year follow up period than those with none at baseline; Cheung et al. showed study participants with any level of retinopathy at baseline were shown to have a relative risk of being 2.90 (95% CI, 1.61-5.24) times more likely to have suffered a stroke during the follow up period.

Four earlier papers support the results of these studies. Cooper et al., Mitchell et al., Wong et al. (2001) and Wong et al. (2002) found a positive link between retinopathy and incident stroke. Cooper et al. showed a relative risk increase of 4.04 (95% CI, 2.21-7.41) in a prospective cohort study of 1,684 participants. Wong et al. (2001) demonstrated that, once adjusted for a number of factors including age, race, gender, smoking and diabetes status, those with any retinopathy present at baseline had a relative risk of being 2.46 (95% CI, 1.59-4.20) times more likely to have experienced a stroke than those with no retinopathy. These findings were supported by further research by Wong et al. in 2002. On this occasion, the presence of retinopathy was shown to increase stroke incidence by a factor of 4.9 (95% CI, 2.0-11.9). Mitchell et al. reported a similar relationship between retinopathy and stroke events (relative risk increase of 1.7 [95% CI, 1.0-2.8]).

Retinal Vessel Calibre

Microvascular disease in cerebral vessels has been linked to an increased incidence of stroke presentations. Microvascular disease affects vessel structure and can cause blood vessel width to increase.

In 4169 non-diabetic participants Kawasaki et al. found that those individuals with central retinal venules of over 223 microns in diameter at baseline showed a relative risk of being 2.16 (95% CI, 0.76-6.18) times more likely more likely to suffer a stroke over the follow up period. These findings are supported by Wong et al. (2006) in a study of 1992 participants aged between 69 and 97 in the United States showing that larger vessel calibre was associated with a relative risk increase of 2.2 (95% CI, 1.1-3.7) of suffering a stroke over the five year follow up period.

Table 3: Relative risk estimates

Study	n	Outcome	Emboli	Retinopathy (95% CI)	Calibre
Cheung et al.	3280	Stroke		2.90 (1.61-5.24)	
Cooper et al.	1684	Cerebral infarct		4.04 (2.21-7.41)	
Kawasaki et al.	4169	Stroke		2.96 (1.50-5.84)	2.16 (0.76-6.18)
Klein et al.	4926	Stroke	2.4 (1.16-4.99)		
Mitchell et al.	3654	Stroke		1.7 (1.00-2.80)	
Wong et al. (2001)	10358	Stroke		2.58 (1.59-4.20)	
Wong et al. (2002)	1684	Stroke		4.90 (2.00-11.90)	
Wong et al. (2006)	1992	Stroke			2.2 (1.1-3.7)

Discussion and recommendations

Overall it would appear that the presence of arterial emboli, retinopathy and vessel calibre can act as a way of identifying those at increased risk of stroke. This should be considered in context however. Hypertension is the number one risk factor for stroke, in the main because the condition has a harmful effect on the microcirculation of the body which can lead to increased susceptibility to haemorrhagic stroke. Hypertension is also a contributory factor in the development of retinopathy and it is important to consider the implications of this when evaluating the evidence identified in the literature review. All the papers included in the final analysis adjusted for this in their results but many recognised that the confounding effect of hypertension on the findings may not have been wholly negated. It is also important to note that, because strokes are relatively rare in the population as a whole, even large study populations see a relatively low incidence of stroke and this places limits on the accuracy of the risk estimates.

Using retinal imaging to categorise stroke risk may have value in that it gives the clinician a tangible and visible 'result' to show the patient. Encouraging lifestyle changes in patients with hypertension can be challenging as the patient, to all intents and purposes, feels 'well' and may not be sufficiently motivated to make the changes required. Blood pressure readings will not always be understood by the patient and they do not physically demonstrate any evidence of harm. On the other hand, patients often show great interest in their own retinal images, and retinopathy in particular can be very noticeable and often visually dramatic. Retinal images may provide clinicians with a tool to illustrate to the patient that their blood pressure is causing them noticeable harm, or that they are at increased risk of stroke, and have the potential to be used during consultations with patients identified as at risk. This 'shock value' may prove more effective in engendering behavioural change than advice alone.

Providing such an indication to the patient of increased stroke risk could also have an impact on stroke mortality. If individuals are made aware of their at-risk status and given appropriate advice on the early symptoms of a stroke they will be in a position where, if symptoms such as numbness, mild paralysis, aphasia, or sensory defect are experienced, they are more likely to recognise the signs of a potential stroke and may seek treatment more quickly. Retinal imaging also has the potential to identify at risk individuals who exhibit no risk factors for stroke who would normally remain unidentified as at risk.

Often, patients with hypertension will be totally unaware they have elevated blood pressure and will not exhibit any noticeable symptoms. High blood pressure is often diagnosed during routine checks with the GP and many patients will not visit their GP on a regular basis and their hypertension will remain undiagnosed. In such cases it is worth considering the value of the retinal image as a means of identifying patients with poor blood pressure control and increased stroke risk opportunistically. For example, many high street optometrists offer retinal photography as part of the standard annual NHS sight test and this may offer a means of reaching those undiagnosed hypertensive patients who are unknown to the GP, identifying stroke risk, and providing a route for referral for intervention and treatment. It is also common for the retina to be examined during ophthalmology consultations. Many older patients will have contact with an ophthalmologist for procedures such a cataract extraction or glaucoma treatment and including a routine assessment of the retina as part of these procedures would enable identification of at risk individuals, many of whom may be unaware of their at-risk status. Such identification and risk stratification strategies would be more effective if supplemented by public health initiatives designed to help support lifestyle changes, both for at-risk patients and to reduce the numbers falling into the at-risk category.

It cannot be ignored that all eight studies included in the final analysis are conducted with non-UK populations. All other factors aside, this makes it extremely difficult to be sure of how applicable the results would be to the UK. For example, UK populations in general will have a different ethnicity profile to the SiMES study group and they may experience different lifestyle factors to those in the BDES. All these factors will have an effect on hypertension, weight, lifestyle, and smoking habits, which will in turn affect stroke incidence and the prevalence of retinal pathology.

Recommendations for further study would focus on multi-centre, multi-ethnic cohort studies in a large UK study population, with follow up of ten or more years from baseline. This long period of follow up would allow for a larger stroke incidence which may negate some of the problems around the precision of risk estimates identified previously. In future studies it would be advantageous to differentiate between stoke subtype when recording outcomes, as the majority of the current research does not differentiate between ischaemic and haemorrhagic stroke. Hypertension is associated with haemorrhagic stroke and may lead to poorer outcomes[19]. Intuitively one may consider that retinopathy signs such as haemorrhages and microaneurysms may be higher in those individuals with hypertension and they may in turn have a higher incidence of haemorrhagic rather than ischaemic stroke. In contrast, ischaemic strokes are caused by blockages in cranial arteries and so one may consider that those individuals with arterial emboli present may have a higher rate of ischaemic stroke. Analysing stroke sub-types separately may provide greater insight and increase the precision of risk stratification.

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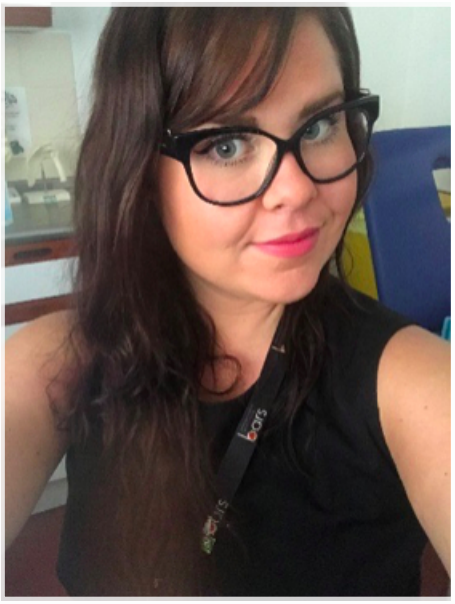
Screeners in Diabetic Eye Careers

Nadine Rash

Screener/Grader and Health Diploma Assessor
BARS Council Member
Health Intelligence (East Anglian Diabetic Eye Screening Programme)



Q: How did you become a Screener/Grader?

A: When asked what brought me to this career, I have a very simple answer, sheer luck. I have always had a love for science and diagnostics, and one day I found myself scouring through NHS jobs and a Screener/Grader position caught my eye. I was lucky to be supported by a fabulous team in Croydon, and in a very small amount of time I got to learn a lot about the world of eye screening.

My programme manager, Rose Duggan, and my mentors, Amanda Hobbs and Mumina Khatun, were a wealth of knowledge and shaped the career I have today. My grading ability went through leaps and bounds and I was lucky to have them to ask questions to (and they will tell you, there was LOTS of questions). We shan't talk about the time I wanted to send a patient to eye casualty for having myelinated nerve fibres (excited 21-year-old me thought I made the most incredible find). We had close ties to our eye clinic and I was able to sit in on medical retina clinics, perform some OCTs with the orthoptists and produce some in depth audits on several processes within the clinics to improve care. Our clinical lead, Mr Eoin O'Sullivan, not only taught us about ophthalmics and the world of Neuro Ophthalmology; but several years later he also saved my life when I was diagnosed with Intra-cranial hypertension. I'll always have a soft spot for my first ever screening job.

Q: Do you think there is much career progression in screening?

A: Career progression in screening is quite a sore subject for lots of screeners. The BARS council asked our members about their chances of career progression, and the results were depressing to say the least. With the introduction of cameras that pretty much screen the patient without fingers to hold eye lids open, and automated graded software looming in the future, it is believable that lots of us feel we have reached the glass ceiling. I think this was part of the reason I ran to be elected for the BARS council. Not only do I keep up with current standards and educate myself as much as possible (as to not look like the idiot of the association!) but I feel like it lets me influence and encourage others to keep on learning and keep on striving to improve. Most of you do not know that I do the statistics for the "R2 or not?" section of the website, and its so nice to see comments and discussions about whether an eye has pre-proliferative pathology or not. Its taught me a great deal since doing it, and I hope others would be encouraged to take part too. Grading knowledge really does come with continually training and learning. If I'm unsure of a condition, I will learn about it. This helps my grading ability but also my little spongy mind which absorbs most things I tell it, so Its great for teaching others!

The most rewarding part of the senior screener job, to me, is that of being an assessor. The last year of adapting to the new Health Screening Diploma has been a very stressful and hair pulling time, but also the most rewarding. I am still learning about the ever-changing world of screening and marking my learners work has encouraged me to learn what they are. Seeing my learners reaching milestones and the sheer excitement they get when their percentage bar increases (I'm looking at you Kerri!) makes the hard work worth it. I was doubtful as to whether the HSD would work, but I have come around to how it benefits new screeners. If anyone who feels like they have achieved all they can in screening, it really might be worth looking into becoming an assessor. It almost feels like my "giving back" to the service and imparting some of the wealth of knowledge I've gained onto new fresh brains! The team at Gloucester were like little diploma angels when I was completing my assessor's qualification, and I would highly recommend them (like they don't have enough work to do already!)

Q: Where do you see screening in 10 years' time?

A: With the introduction of automation, I see myself supervising a little robot who is grading 100 images per second. In all seriousness, I guess this is how things will go. I like the idea of artificial intelligence aiding us in diagnostics, especially for overly stretched and under funded services who might not have the resources of an experienced grading team. I do think the NHS would be very wary of it though, the idea of no human intervention might not be possible, and I can imagine senior graders would still need to finalise the little robots grading results. I've heard the sensitivity of the most current software is about 86%, so I'm not in fear of it yet as mine is much higher. Tee hee. In the very near future I can see most Hospital Eye Services utilising retinal images in conjunction with OCTs. I know lots do already, but it just seems to be the most natural progression and the best way to save a lot of money.

Q: What has been the highlight of your career?

A: I can't pinpoint one thing. I had a really tough couple of years in London with a variety of personal and health issues, so decided to take my screening career away from the busy streets of central London and into an optometrist practice in leafy Kent. Working with some of the most intelligent people I have ever met in my life, my knowledge of eyes kept improving. If anyone ever gets the chance to work in an Optom practice, or even to sit in on clinics, I would highly recommend it. Its nice to learn about eye conditions, but actually seeing them is something else. The first time I saw a tiny slither of orange retina through a volk lens, after a very patient optom sat with watery eyes whilst I perfected my SLB technique, was a wonderful feeling. My ability to ROG grade confidently, was down to this extra learning I think.

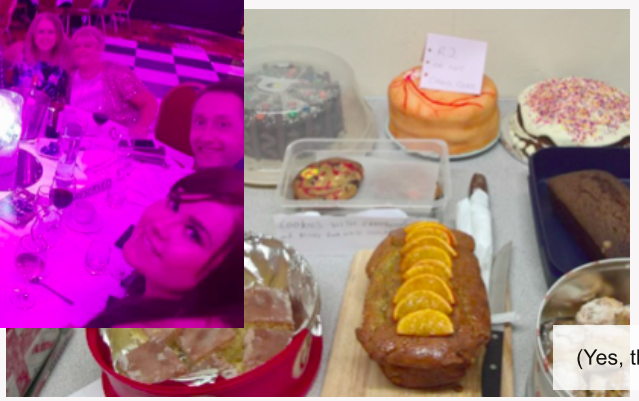
Joining the BARS council made me feel like I'd found a little group of people where I belonged. The first ever meeting, I was so nervous, and felt like a fraud amongst some of the most qualified people in our field. However, seeing as they are the friendliest bunch of beautiful minds, I was soon giving my ideas and having them being well received. I also found that I have a group of drinking buddies for life (Phil, I promise I will not drink the night before we chair on Friday morning in Bristol) and a bunch of friends who I respect and feel lucky to know.

The happiness I experienced here put my work-life balance into perspective. I have a type A personality and will constantly try and learn, fidget and work hard. But this is not always the most conducive way of living. I made the decision to move out of London and back to the beautiful green pastures of the Suffolk Countryside, or back home. My new career brought me into the East Anglian Diabetic Eye Screening Programme (or EADESP to save all those letters). I think we all see London as the gold standard in screening, or at least I did, but the sheer surprise I had when I become part of this incredible and brilliantly functioning service still warms my heart. With a patient cohort rivalling that of very busy London trusts, and spanning huge rural areas, it is by no means an easy task, but this service lives up to all the demands and surpasses them. Our recent EQA reflects this, and the teams from EADESP and Health Intelligence should be so very proud.

One of my favourite parts of coming home, was the new clinics. The locals, who I always felt I was one of them (I was born in Cambridge..) often ask me where in Australia I'm from or if I just asked them if they wanted an Ice Cream? Eye Screen…Ice Cream….. I think my Suffolk accent needs work. No matter where my career takes me, I will always love being in clinic.

They also have the best MDTs you will ever go to. Great East Anglian Bake off? Debbie Jones, Team Leader for West Norfolk, would put Mary Berry out of business.

Q: And the future…?



A: With my new relaxed life, I've decided to just let new challenges transpire. Who knows, I could be babysitting my new grading robot in ten years' time or working out how to grade over a VPN from South Africa when my other half drags me back to his home country. I'll have to run that past my Programme Manager; Alison Quantrill is it ok to work from 6000 miles away? I promise I'll come to our 2 monthly MDTs, if Debbie remembers to bring the cake.

(Yes, that is a fully anatomically correct retina in the back)

Review of **Glaucoma Symposium 2018**

Nadine Rash
from Radisson Blu - Stansted Airport

Working in diabetic eye screening was never just about looking for diabetic eye disease. 10 years ago, when I began grading photographs of retinas, it was drummed into my brain the importance of looking for other eye diseases. Or in the words of the old City and Guilds Diploma, “opportunistic identification”. I think it is very important for graders to keep up their knowledge of other eye conditions, as well as ensuring they get those high 90’s on the monthly TATs!

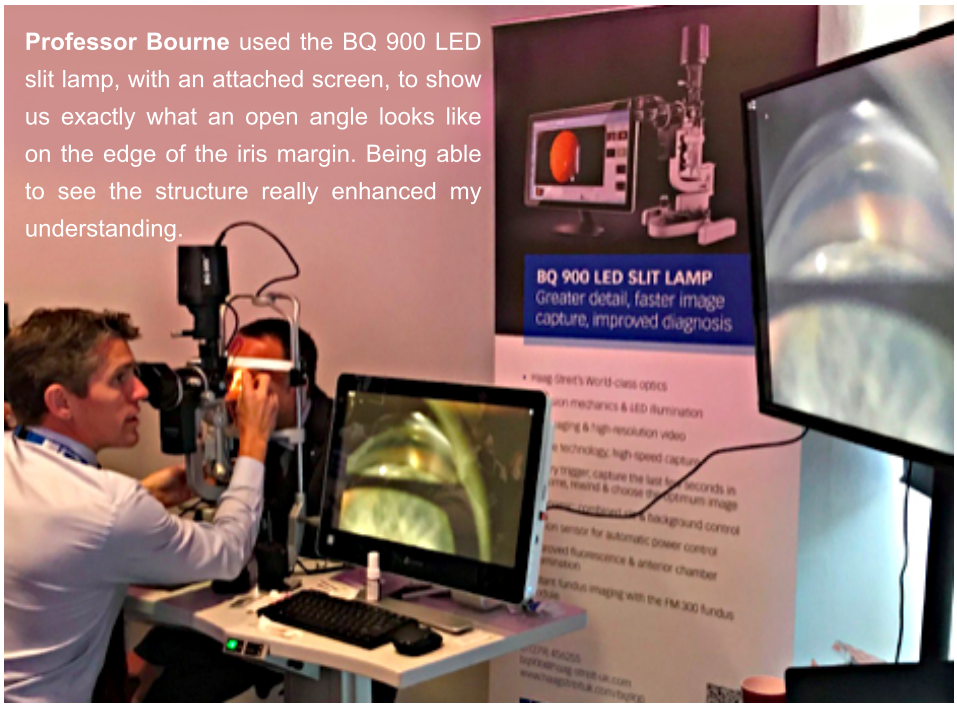
I was lucky to be invited along to Haag-Streit’s Glaucoma Symposium this year, a funded place given to me as a BARS council member. The day gave me an in-depth insight into what exactly happens in the ever-expanding world of glaucoma. For me, it was also the chance to see into the clinics where our patients may end up when we refer for “cupped discs” or “optic disc haems”, along with the incredible amount of technology used in order to ascertain the levels of damage which assist in the diagnosis.

The day started with a welcome from Professor Rupert Bourne, Professor of Ophthalmology at Anglia Ruskin and Consultant Ophthalmic Surgeon from Cambridge University Hospital. My worries about understanding the subject matter was soon resolved, as Professor Bourne spoke clearly and explained all aspects of his teaching thoroughly, addressing the vast multi-disciplinary team in the room. He stated that of all glaucoma patients, only 12% are known and 78% remain undiagnosed. This shows the impact of the diabetic eye screening service, where our patients are given a brilliant resource in the form of a simple test. He also linked the similarities of our screening service with the fact that many hospital eye clinics are now using a virtual clinic set up, rather like the digital surveillance pathway. This involves ocular imaging over a period of time and multiple patients reviewed by a glaucoma specialist, saving time and money for over stretched NHS eye services.


(**Professor Bourne** Lecturing)

Another similarity are the holistic methods used, and the emphasis of shared care between Optometrists, nurses, GPs and the diabetic eye screening service. One of the simplest ways to ensure a patient manages their glaucoma is good drop instillation technique, which we would find such a simple task, but often patients struggle with dexterity or ability to get the drop in the eye! I often tell my patients the easiest way to put drops in their eyes, and by doing so, Professor Bourne tells us this could help a vast number of patients.

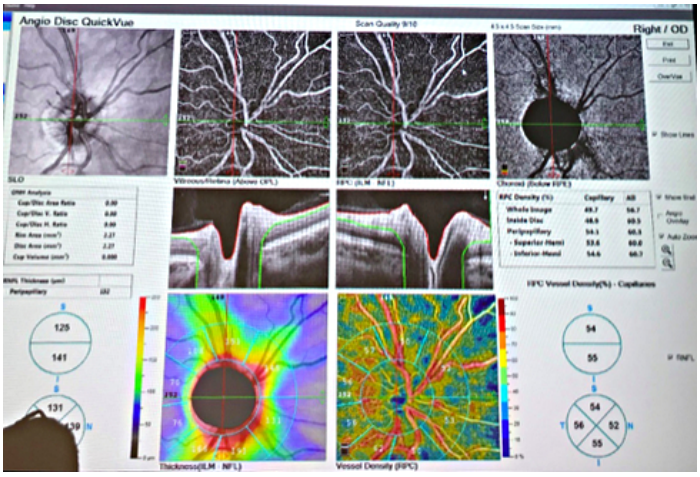
The second talk was about something we have all been wary of in our clinics, primary angle closure glaucoma, by Dr Rizwana Siddiqi PhD. She explained how they use imaging techniques, ultrasound and biomicroscopy in order to measure the angle in the eye. Interestingly, she explained they when the pupil is dilated in patients whom have not been diagnosed or treated for angle closure, the mechanism of dilation causes water to be lost in the aqueous and how this can cause a considerable pressure to build up. Knowing that lots of people may still be undiagnosed makes the need for us to be vigilant in screening even more, ensuring our patients get their drop leaflet and are made aware of the importance of possible side effects. Along with this talk, Haag Streit are brilliant at the hands on aspect of their events. From someone who has only ever done 3 or 4 visual field tests in my life, it was a real joy to see how these machines worked and the clinical data we can achieve from them.



Professor Bourne used the BQ 900 LED slit lamp, with an attached screen, to show us exactly what an open angle looks like on the edge of the iris margin. Being able to see the structure really enhanced my understanding.

I put my hand to laser (pretending to perform an iridotomy on a target!), had an in-depth look at the amazing Octopus Visual field machine, with its ability to perform personalised tests on patients to show the extent of visual field loss and had an OCT-A scan of my own eye. Brian Bussey, UK Area Manager for the South East, performed the incredibly quick and non-invasive test on my eyes. This test truly shows the development of ophthalmic imaging and how research and development has produced a test that is far more patient friendly and simple to perform.

The evidence of OCT-A use in Glaucoma was discussed by Mr Andrew Tatham, Consultant Ophthalmologist at the Princess Alexandra Eye Hospital in Edinburgh. In theory, the vessel density in patients with glaucoma is lower than patients without. They also recorded capillary dropout, loss of blood vessels in the nerve fibre layer(NFL) and ganglion loss. This can be seen when we take retinal photographs in the form of the wedge-shaped defect on the NFL. If the patient is not known to a glaucoma service, or regularly dodged optometrist appointments, then this pathology could be picked up in screening and referred. Quite an “eye opening” (pun intended) fact was that patients with diabetes have a higher risk of developing glaucoma. This is due to the vascular theory, we see retinal nerve fibre layer haemorrhages and disc haemorrhages when the blood supply to the optic nerve and trabecular meshwork is reduced due to hyperglycaemia. Studies show that the calibre of the retinal vasculature in diabetic eye screening images can show a decline in the patient’s glaucoma.



(**the OCT - A** of my own optic discs)

Rebecca Turner, Nurse Consultant at the Oxford Eye Hospital, followed on with a *“nod to the humble slit lamp”*. In her words, which brought a collective chuckle to the room, she describes a simple SLB test to be the “Gucci handbag of Glaucoma”. The importance of using this relatively simple test in a world of new and exciting imaging techniques. She explained her methods, where she checks IOP measurement using tonometry and follows this with an optic nerve assessment. She looks for disc pallor, cupping, the cup disc ratio and asymmetry. The sources of error also being discussed, such as a thick cornea or poor technique, with the corneal thickness masking an accurate IOP reading.

Gus Gazzard, the key note speaker from Moorfields and UCL, gave a captivating talk about Argon Laser Trabeculoplasty (ALT) versus Selective Laser Trabeculoplasty (SLT). This shows how advances in glaucoma treatment are constantly being evaluated and improve upon. ALT which was often the most common way of treating glaucoma, by making the little hole we see on the anterior images we take, did not come without its risks. It can cause an initial pressure spike, cause anterior synechiae, uveitis and he stated it currently had a 32% success rate. SLT, as it makes more than one hole over a small area, reduces these risks.

I left the conference on a new high and felt like I had learned a multitude of new things that I could bring back to my own grading job. By encouraging graders to learn about conditions that aren't just diabetic related could really improve patient care as a whole. I'd highly recommend anyone attend days like this If they are given the chance!

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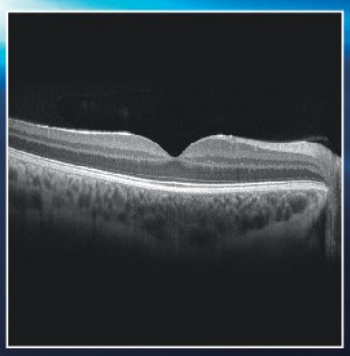

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Topcon (Great Britain) Medical Limited
t: 01635 551120
e: medical@topcon.co.uk
w: topcon-medical.co.uk

Topcon Ireland
t: +353 1 897 5900
e: medical@topcon.ie
w: topcon-medical.ie