Eyelights

The Newsletter of GLAUCOMA NZ TO SAVE SIGHT

Making a Difference

Glaucoma NZ members have been digging deep in their pockets to make a difference in blindness prevention. The raffle sent out with the November issue of *Eyelights* resulted in a flood of ticket sales and a large number of accompanying donations.

The winner was Pam Cacace of Hastings with ticket No. 3319. Pam is currently enjoying watching her new Panasonic TV and recording her favourite programmes on the matching hard drive DVD recorder. Second prize of a Kenwood food processor went to J Kramer-Walter of Te Puke with Ticket No. 2576. Congratulations to our winners, and thank you to everyone who bought tickets and sent in generous donations.

Professor Charles McGhee announces the raffle winner with GNZ manager Heather Hyland.

There is another way you can make a real difference. Please help to spread the word about glaucoma and the importance of early diagnosis. Glaucoma awareness is not something to think about only in Glaucoma Week. There is an ongoing need for better community understanding about glaucoma, and that people in high risk groups should be having their eyes examined regularly. There are still far too many people seeing ophthalmologists for the first time with considerable visual field loss already – damage that could have been averted.

Does your neighbour or workmate realise that it's wise to visit an optometrist for a glaucoma check at age 45 and every 5 years thereafter? Make sure your own family members know that when someone in the family has glaucoma it's advisable to monitor even sooner and more frequently than that. Publicity campaigns have an important place. But word of mouth is a powerful tool too.

Finally, one crucial contribution you can make to the battle against vision loss is to follow your own treatment faithfully. And keep reading *Eyelights*. We hope you enjoy this issue.

Volume 4, Issue 1

February 2007

Inside this issue:

The Genetic Basis of Glaucoma
Part One of Three

The following article is the first in a series of three articles focusing on genes and genetic research in relationship to glaucoma.

Many characteristics such as height or hair colour are inherited down through the family line via genetic information contained in every cell in your body. In the same way there is also a chance that you may have inherited glaucoma. Research around the world is now clearly establishing the relationship between mutations in certain genes, and the glaucomas.

Every cell in our body contains DNA, which is a bit like a blueprint, or a plan, for every component of our physical appearance and our functioning. It contains over 3 billion "letters", each of which is one of four types (called A, C, G and T) organised in an incredibly complex manner. Every time a cell divides all this information is copied with such exactness that errors are seldom made. Occasionally however, mistakes in this copying process do occur (the equivalent of a "typo") and these mistakes are called mutations.

Glaucoma has a strong hereditary component, with approximately 40% of all individuals reporting a positive family history. We all carry two copies of every gene and in some cases if one copy of the gene has a mistake in it, this is enough to cause the disease. This mechanism is called autosomal dominant inheritance. As we inherit one copy of a gene from each parent, there is therefore a fifty percent chance that an individual could develop glaucoma, if one of their parents has glaucoma. However new mutations can occur spontaneously.

To date three genes have been identified, accounting for less than 12% of Primary Open Angle Glaucoma (POAG), but research suggests at least six other genes contribute. Identification of glaucoma disease genes will contribute to greater understanding of disease development, and therefore prevention.

So how do we know if we have a mistake in our genes that causes eye disease? The first thing is to understand your family history. If you have a relative (parent, grandparent, aunt or uncle, sibling) who is affected with eye disease it is imperative that you have regular eye checks with an optometrist or an ophthalmologist to detect the disease. At present gene testing is only being done on a research basis here in NZ.

The genes and research will be discussed in further issues of *Eyelights*.

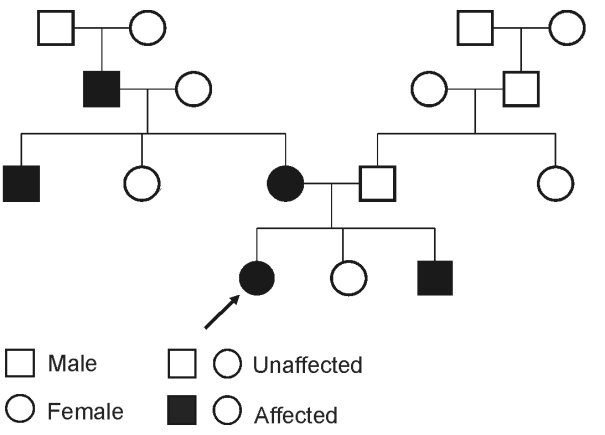


Figure 1: An example of a pedigree (family tree) with Autosomal Dominant Primary Open Angle Glaucoma

The Retina

The Eye Structure That Sees

The retina is a complex multilayered tissue that lines the back of the eye. Its main function is to sense light entering the eye and convert it into electrical impulses. These impulses are then transmitted through the optic nerve to the brain where it is interpreted as images, our vision.

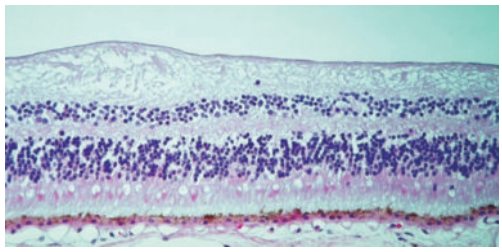
The ten layers of the retina

The retina contains 10 layers.
Outermost is the pigment epithelium, a single layer of pigmented cells which serves many supportive roles to the rest of the retina. The essential roles are nutrition, removal of waste products of cellular metabolism, providing a heat-sink for light absorption and maintaining a recycling process of chemicals essential to the retina. The pigmented layer of cells in therefore involve in vitamin A metabolism, thermal and chemical regulation and maintaining a healthy photoreceptor layer. The rest of the retina, collectively referred to as the neural retina contains this photoreceptor layer, cellular (or nuclear) layers, plexiform layers and a nerve fibre layer.

The photoreceptors are specialised light sensitive cells. There are two main types, rods and cones. There are approximately 120 million rods and 6 million cones in each eye. The highest concentration rods are located around the periphery of the retina. They are particularly sensitive to dim light and movement. The highest concentration of cones is in the centre of the retina, the macula. They are particularly sensitive to bright light and can detect colour. The cones are required for seeing fine detail.

Once activated the photoreceptors transmit electrical impulses from the retina to the brain along the optic nerve. The beginning of the optic nerve is connected to the back of the eye near the macula. There are no photoreceptors there, so this area is a blind spot. All mammals have a blind spot.

What is happening to the electrical signal as it passes from the outer photoreceptor layer to the inner ganglion cell layer? The inner nuclear layer is the cell bodies of other cells in the retina called bipolar cells. These connect the outer and inner layers. There are also others cells that allow retinal cells to “talk” to each other. Combined they all provide a structure that closely functions like the micro-chip in a computer: reorganizing electrical data into meaningful signals for transmission to the brain.



A histology section through the retina that shows the layers of cells and cell fibres.

The ganglion cell layer provides the nerve fibres that make up the optic nerve. Future Eyelights will inform you about this amazing cell and how its function in sickness and health can be measured today and in the future.

From outer to inner:

1. Pigment epithelium
2. Photoreceptor layer
3. Outer limiting membrane
4. Outer nuclear layer
5. Outer plexiform layer
6. Inner nuclear layer
7. Inner plexiform layer
8. Ganglion cell layer
9. Nerve fibre layer
10. Internal limiting membrane

Classification of the Glaucomas

Recent issues of *Eyelights* have introduced to you the classification of "open angle" and "closed angle" glaucoma. The angle referred to is the angle that exists between the base of the iris and the back of the cornea or window of the eye. This angle can be seen in an eye examination.

The importance of this basic division in classifying the glaucomas is that they have very different presentations and treatments. Open angle glaucoma is associated with an insidious-onset slowly progressive glaucoma that often goes unrecognised without an eye examination until substantial damage has occurred. Angle closure glaucoma, however, often but not always presents with a rapid elevation in eye pressure associated with severe pain, redness of the eye and blurred vision with halos that may all develop within a few hours.

Usually in open angle glaucoma there is no apparent "cause" and it is called primary. The mechanism for the raised eye pressure is a blockage to the finer structure, trabecular meshwork within the angle without the iris base occluding the angle. In angle closure glaucoma the mechanism is entirely different. The iris base occludes the angle because there is a build up of fluid behind the iris. When this is entirely due to the anatomy of the eye it has been called primary angle closure. This is usually associated with significant long sightedness that creates a blockage to aqueous flow at the pupil.

"Secondary" glaucoma is a classification traditionally used for both open angle and closed angle glaucoma when the cause can be identified.

The glaucoma is secondary to another pathology that is present in the eye or its environs. The importance of identifying "secondary" forms of glaucoma is that treatment should be focused on the identified cause in addition to standard management of the raised eye pressure. Secondary glaucomas are not common but identifying them is very important for the best management of the glaucoma.

Recognised causes of glaucoma include developmental abnormalities of the angle and adjacent tissues, abnormalities that develop in other eye structures such as the cornea, iris, lens or retina. Raised eye pressure may be associated with a number of different pathological processes including inflammation, scarring after eye trauma, eye haemorrhage, tumours within the eye and ischemia in the retina following a blockage to blood vessels in the retina.

Raised eye pressures due to inflammation will often settle with control of the inflammatory process within the eye. Raised eye pressure associated with steroid treatments will often settle on withdrawal of steroids. However, raised eye pressure from scarring following blunt trauma to the eye or associated with ischemia usually requires intensive medical and surgical treatment to keep the eye pressure normal.

Secondary glaucomas are a mixed bag, where each particular cause of a raised eye pressure is a separate clinical condition requiring a different approach. Glaucoma NZ Fact Sheet handouts about pigmentary glaucoma and pseudoexfoliation syndrome, both common forms of "secondary" glaucoma, are available from your eye clinic.

Moving House?

Don't forget to include Glaucoma NZ when you are doing your change of address cards. Remember, we have no way of knowing your new address if you don't tell us!

Cycling for GNZ

The team from 'The Eye Specialists', Whangarei were amongst those who rode in the recent Lake Taupo Cycle Challenge to raise funds for Glaucoma NZ. Here is Nurse Anne Evans' personal account:

In August it was mentioned that it would be a great idea for as many of us as possible to enter the Lake Taupo Cycle Challenge and raise money for Glaucoma NZ. It seemed a simple enough task… like riding a bike … you never forget! Yeah *right*!

It was thirty years since most of our ageing bodies had seen a bike, so the challenge did not come easy for any of us. Over the next few months we would learn how to ride a bike, change gears, tyres, and use front brakes!

Well it's all over and what a great event. We all did really good times despite head winds, and we all feel very proud of ourselves. For me, with the increased exercise, I no longer need inhalers and feel so much healthier.

Maree Fisher, Geoff Wallace and Anne Evans


Andrea Hale ready for the big event. .

In addition to the money we raised for Glaucoma NZ through sponsorship we were able to donate money from a raffle of items kindly donated by Vince Stead at Kamo Super Liquor, from which we raised about $200.

All of us who entered are a lot better for having done it and know we can take on any challenge given to us.

Quiz - Who's Who

Are you clear about the terminology for eye care professionals? Test yourself by completing the definitions below. Answers appear on p7.

1. Someone trained to identify, measure and correct vision problems due to refractive errors, and to detect signs of eye disease.
2. An eye therapist, trained in the assessment and rehabilitation of abnormal movements or co-ordination of the eyes, ("squints" or correctly called strabismus)
3. A medically qualified doctor specially trained and registered to provide medical and surgical care of eye disease
4. A nurse with training and expertise in caring for people with eye disorders
5. An expert in the science of making and fitting of spectacles

Zeiss Sponsorship for Glaucoma NZ

The sharp-eyed reader may have noticed changes amongst the sponsors' logos on the front cover. Glaucoma NZ is delighted to welcome Carl Zeiss NZ Ltd as a sponsor. Zeiss joins GNZ's other sponsors Pfizer (Principal Sponsor), Alcon and Allergan, to support the trust's activities. Carl Zeiss have a long history of providing high quality equipment for the detection and management of glaucoma.

Protecting Your Eyes From the Sun

Ultraviolet (UV) radiation from the sun can damage your eyes as well as your skin. Strong sunlight can burn the corneas and conjunctivas of your eyes. In addition, long-term exposure to UV radiation can contribute to eye disease, especially cataracts, eyelid skin cancers and possibly macula degeneration. Choosing sunglasses that provide UV protection is very important.

Ultraviolet light has a very short wavelength, close to blue light, which has higher energy than longer wavelengths on the other end of the visible light spectrum where light is red. The atmosphere and particularly ozone block this short wavelength light from reaching us. In New Zealand we are less effectively protected due to the ozone hole above us.

Some studies indicate that 80% of sun damage can occur during the first 18 years of life. The lens of a child's eye is clear until about 10 years of age. The clearness of the lens allows greater sun penetration and thus greater damage, than occurs after 10 years of age, when the lens begins to become cloudy.

For this reason, young children are especially vulnerable to the impact of sun-induced eye changes. If we can protect the lens from additional sunlight damage early on, it may protect against the formation of cataracts, skin cancer and other eye diseases such as macula degeneration, when these children become adults.

For most of you reading this the best time to protect yourself from the sun - as a child - will be long past, but it is never too late to prevent more UV damage. Possibly more important is to teach sun eye protection to your children and grandchildren!

Choosing Sunglasses

When choosing sunglasses, you have a wide array of options. Here are some tips on what to look for:

UV Block. Ideally, sunglasses should block the two components of UV radiation — UVB and UVA — by 99 percent and 95 percent respectively. Remember untreated plastic lenses do not adequately block UV radiation even if they are dark lenses. When buying sunglasses always check that they do block UV light.

Blue-blocking plastic lenses. (Yellow lenses) Often promoted for sun protection, blue-blocking lenses also block red, amber and blue light — which makes it difficult to discriminate traffic light colours. Blue-blocking lenses fail the guidelines established by the American National Standards Institute.

Polarized lenses. Although polarized lenses protect against glare, they don't meet the criteria for UV protection unless they have additional UV-blocking material in the lenses. Polarized lenses are best for reducing glare but can cause distortion of light when looking through a partially polarized window or car windscreen. This gives darker patches in the plastic or glass you are looking through and can be annoying.

Photochromic lenses. (These change how dark they are depending on the light.) This type of lens protects the eyes from glare, sun and UV radiation while also maintaining vision. Also, photochromic lenses do not distort colour.

Polycarbonate lenses (plastic). A wise choice for children and athletes, polycarbonate lenses shield the eyes from UV radiation as well as protect the eyes against impact injuries that may be sustained during play and sports. Glass lenses do not scratch as easily but can be dangerous if shattered.

Lens Colour. This is much less important than you may have realised. Blue lenses are best avoided as they let through the short wavelengths that you want to protect yourself from. Brown and grey shades are usually best, but much depends on personal choice when it comes to colour. Unusual colours such as green and red lenses just look silly (in this author's opinion!) and do not offer any advantages. In addition standard, clear glasses can also be treated with a material that absorbs UV radiation. UV protection can be obtained for most rigid contact lenses and many soft contact lenses.

Quiz Answers

1. Optometrist
2. Orthoptist
3. Ophthalmologist
4. Ophthalmic Nurse
5. Dispensing Optician

Additional tips for protecting your eyes in the sun include:

- Wearing a wide brimmed hat is a big advantage for sun protection and reducing glare.
- Choose sunglasses that fit close to your face or have wraparound frames. This helps reduce glare and protects your eyes and skin from scattered light.
- Fit-over sun glasses protect from light coming from the side and allow you to wear prescription glasses at the same time.

Expensive glasses are not necessarily any better than cheaper ones that have UV protection. Much of the cost of glasses is in the frames, which usually outlast the lenses, which tend to become scratched and damaged before the frames break. Designer and fashion frames involve huge added costs for the brand name, which may impress your friends but does not add to the eye protection.

The best sun glasses are always the ones you actually wear!

Optometrists Study with Glaucoma NZ

Glaucoma NZ has provided professional education through web based learning for the past three years. Our aim has been to foster a keen interest in and in-depth knowledge of glaucoma from eye care practitioners, to address the importance of earlier detection, appropriate monitoring and the best management.

Through professional education Glaucoma NZ furthers our endeavours to eliminate the visual disability in our community from this common eye disease.

The Glaucoma NZ educational package covers a wide range of clinical topics as well as Glaucoma Updates. The updates analyse scientific publications that highlight important issues in glaucoma. Optometrists who complete the course, including passing an examination run by Glaucoma NZ, receive Continuing Professional Development credits from their authorising body.

Glaucoma NZ is pleased to be able to inform you of those who were successful in 2006. Congratulations to them all, and a special thank you to all those optometrists who supported Glaucoma NZ throughout the year.

YES, I would like to help GLAUCOMA NZ TO SAVE SIGHT

☐ I would like to become a member of Glaucoma NZ at no cost

☐ I would like to donate $_____

I enclose my cheque for $_____ made payable to Glaucoma NZ,
or please debit my

○ Visa ○ Amex ○ Mastercard Name on Card_____

Card No _____ Expiry ___/___ Signature _____

Address_____

_____Phone No _____

Donations of $5.00 or more are tax deductible

☐ I would like information on leaving a bequest for Glaucoma NZ

Forthcoming Meetings

February 24	**Hamilton** 10am Bryant Education Centre, Waikato Hospital
March 9	**Dunedin** 10am Hutton Theatre, Otago Museum, 419 Great King St
March 14	**Oamaru** 7pm Lindis Room, Brydone Hotel, 115 Thames St
March 17	**Timaru** 10am Red Cross Hall, 18 Bank St

Contact Us with Your Questions and Comments

Heather Hyland is Glaucoma NZ's Administrative Manager and Editor of Eyelights.

She would welcome feedback.

Glaucoma New Zealand
Department of Ophthalmology
The University of Auckland
Private Bag 92019
Auckland 1, New Zealand

Telephone: 09 373 8779
Facsimile: 09 373 7947

www.glaucoma.org.nz

Email: info@glaucoma.org.nz

The Trustees and Sponsors of GLAUCOMA NZ TO SAVE SIGHT

We would like to thank our Principal Sponsor
Pfizer

and our Free Membership Sponsors

Alcon, Allergan and Zeiss

Auditor WHK Gosling Chapman, Takapuna