

# Eyelights



The Newsletter of Glaucoma NZ  
Volume 5 | Issue 2 | June 2008

## Inside:

Risk Factor Assessment

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Your Eye Examination Pt 2

Your Optic Disc

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## GNZ and the Community



Glaucoma NZ's mission is to eliminate glaucoma blindness from our community. Individuals are at different stages in their understanding or experience of glaucoma. Consider these profiles:

### The totally unaware

People who are totally unaware about eye health often have never had an eye examination. Glaucoma NZ reaches out to the unaware person through community-wide awareness programmes and through work places and organisations.

### The concerned person

The person concerned about their general health will seek routine check ups. They are in essence asking "What may kill me, Doc? What may harm me?" In eye health that translates to cancer kills you, glaucoma blinds you! Glaucoma NZ holds that eye health must be considered whenever someone requests a routine general health check.

### The at risk person

The person at risk for the development of glaucoma has identifiable risk factors or markers but has not yet developed established glaucoma. They need to understand their at-risk status and their need for regular examinations.

### The person with glaucoma but no symptoms

A diagnosis of glaucoma requires assessment of damage to the optic disc with related visual field loss. So the '45 + 5 Glaucoma Eye Examination' has a dual role: the detection of risk factors and the detection of established glaucoma. Early intervention will dramatically reduce glaucoma blindness.

### The person with glaucoma with symptoms

People with symptoms due to glaucoma fall into two groups: those with advanced visual loss from glaucoma that has been present for a long time, and those with acute symptoms due to angle closure or recent onset of secondary glaucoma.

Glaucoma NZ actively seeks the best possible outcome for all of these groups. But it is the first group - the totally unaware - that Glaucoma NZ especially targets in awareness campaigns.

## The '45 Plus 5' Glaucoma Eye Examination

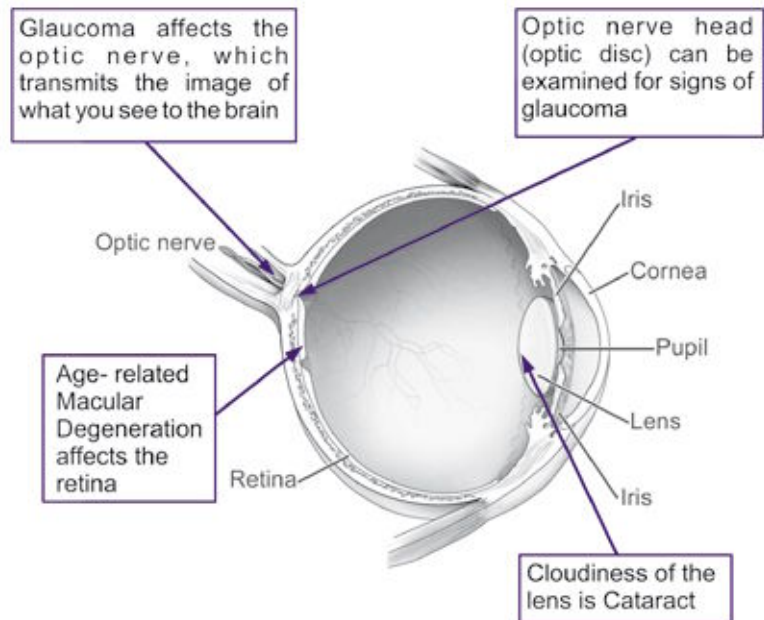
**Glaucoma NZ** recommends that everyone has an eye examination by the age of 45, every 5 years after that until age 60, and three-yearly after age 60.

Those with risk factors for glaucoma should be examined sooner and more frequently.

Your eye care practitioner will assess your level of risk and advise how often you should be examined.

## For New Readers

Welcome to everyone who has joined Glaucoma NZ since the last issue of Eyelights! Here are some basic facts about glaucoma:



- Current treatments for glaucoma all aim to lower eye pressure.
- The most common form of glaucoma treatment is medication by eye drops. Laser treatments, surgery or tablets are appropriate in some cases.
- Eye drops can have a range of side effects.
- Eye drops must be used daily. If you are having trouble remembering your drops or getting the drops in you should discuss this with your eye specialist.
- A family history of glaucoma increases the risk for glaucoma. Tell your family members this, and suggest they have an eye examination.
- Glaucoma NZ is a charitable trust which receives no government funding. It relies solely on donations, sponsorship, grants and fundraising.

**Please send feedback and suggestions for Eyelights to the editor, Heather Hyland. Questions for publication in Eyelights are welcomed.**

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## Your Questions

### About Risk Factors ...

**I just want to know if I have glaucoma or not! What's the point of the emphasis on "risk factors"?**

It's all about preventing irreversible loss of vision before it happens. When you ask whether or not you have glaucoma you are expressing concern about your eyes. What you need to know is not only whether there is definite glaucoma with optic nerve damage and visual disability, but whether you may have early glaucoma, or in fact have a high risk profile for developing glaucoma.

Glaucoma NZ promotes understanding of the risk factors or markers for glaucoma in its educational programmes to optometrists, general practitioners and ophthalmic nurses and technicians.

**So what are the risk factors or markers for developing glaucoma?**

There are two groups of risk factors: those you can know of without an eye examination and those that require an eye examination.

The first group includes a family history of glaucoma, steroid use, eye injuries, and significant long or short sightedness. The second group includes the major risk factor of raised eye pressure, as well as corneal thickness, the state of the optic disc and the presence of eye diseases or structural abnormalities. (Refer p4-5 for more detail)

**What is the difference between a high risk profile and early detection of glaucoma?**

Identifying risk factors leads to an individual risk profile: the possibility of your eyes developing glaucoma compared to an individual who has no risk factors. The risk factor profile may lead to a decision for your eye care practitioner to implement glaucoma treatment even though you do not have glaucoma because the risk profile is so high, or your risk profile may justify more frequent eye examinations and proceeding to additional tests to detect early glaucoma.

You have glaucoma when your optic nerve has glaucoma damage that is both progressive and also affects your visual field. Earliest detection of glaucoma damage focuses on the assessment of the optic nerve head (optic disc) and the visual field.

### ...and more

**I read that lying face down increases eye pressure. Is it better to sleep flat on your back than on your side?**

The simple answer is that science does not know for sure. Whether the optic disc is in a safer state in one position compared to another is a balance between the effect on eye pressure and the effect on blood flow to the optic disc. It is unlikely that there would be any difference between sleeping flat on your back or on your side.

**What sports are good or not so good for people with glaucoma? I like swimming and cycling.**

High performance sports people create many vascular changes in their bodies. If you have extensive glaucomatous damage, limiting excessive activity may be beneficial. Sports that may cause trauma to the eyes should be avoided.

**Does crying increase eye pressure?**

No. But forceful eyelid closure will substantially increase eye pressure for the period of time involved.

**What unit of measurement is used when recording eye pressure?**

Eye pressure measurements are expressed in millimetres of mercury: mm Hg.

## Assess Your Risk Factors For Glaucoma

*“Am I going to go blind, Doctor?” “I won’t get glaucoma, will I, Doc?” “Should my children have an eye examination?”*

*To answer these questions honestly a practitioner needs to evaluate your risk factor profile for developing glaucoma as well as examining your eyes for other diseases that may not have symptoms. Let’s discuss the risk factors or markers for glaucoma that we can identify:*

### Family history

The family history is a very important risk factor that is easily identified. Having a first degree relative with primary open angle glaucoma increases your risk by 2-3 times the normal. If you have a sibling with primary open angle glaucoma then the risk is even higher. Genetic studies are beginning to identify particular sub groups of individuals with glaucoma. It is potentially possible in the decades ahead that there will be a genetic profile that identifies your intrinsic risk of developing glaucoma. For the present if you have glaucoma then your siblings should most certainly have an eye examination and your first degree relatives should also be encouraged to, particularly if they are over 40 years of age.



### Refractive error

If you have hypermetropia (long sightedness) then your glasses will have lenses that are thicker in the centre and thinner at the edge. When you look through the glasses things are larger than what they really are and someone looking at your eyes sees you to have bigger eyes also. Long sightedness relates to a short eye which will often have a shallow anterior chamber and with age predispose to angle closure glaucoma. It is important to identify this risk factor, as angle closure glaucoma may present acutely with very, very severe pain or it may develop slowly with extensive damage before detection.

Myopia (short sightedness) is where the unaided eye can see clearest up close but has blurred distance vision. The myopic eye is longer and the back part of the eye is stretched out often affecting the tissues around the optic nerve head. Primary open angle glaucoma can be more difficult to detect in its early stages in eyes with myopia and there is debate as to the risk associated with myopia. But the important and practical message is that patients with myopia should have careful optic disc assessment for glaucoma, particularly with increasing years.





### Eye injuries

Eye injuries are either “penetrating” where the eye is cut for example with windscreen injuries, or “blunt” as occurs when the eye is hit by a golf ball, tennis ball or a fist. The blunt injuries are particularly harmful to the drainage channels. A high pressure may result either acutely soon after the time of the injury or many years later with the development of scarring of the drainage channels. If you have had a significant eye injury in the past you should have your eye pressure monitored. Traumatic glaucoma can be more difficult to treat than other forms of glaucoma and often requires glaucoma surgery.

### Eye pressure

Most readers of Eyalights will be well aware that eye pressure is a very important risk factor for developing glaucoma. In addition it is one of the most treatable risk factors. However, only two out of three patients with primary open angle glaucoma will have an “abnormal” eye pressure: i.e. one that is above 21mmHg. One in three patients will have what is considered a normal eye pressure. This is partly because eye pressure varies during the day and during the year and may be measured at a time that it is lower than usual. But also it demonstrates that there is risk to the optic nerve that is not related to eye pressure.

Some eyes with glaucoma never have an abnormal eye pressure. We call that “normal tension glaucoma”. Eyes that have an abnormal eye pressure but do not have glaucoma are said to have ocular hypertension (OHT).

### Central corneal thickness

A large glaucoma study looking at ocular hypertension found that the corneal thickness is a risk factor. It is a risk because a cornea that is thin means the eye pressure is incorrectly read as being lower than what it really is. However, even adjusting for this measurement error there is a strong opinion that thin corneas indicate weak tissues at the back of the eye and greater susceptibility for glaucoma damage. The thickness of your cornea is entirely genetically determined.

### Eye disease

There are a number of eye diseases and disorders of eye structure that lead to glaucoma. Structural abnormalities often lead to glaucoma in infancy. Disorders with pigment released from the iris can lead to glaucoma often in young adult males with mild degrees of myopia. Abnormal peeling of the membranes inside your eyes leads to a condition called pseudoexfoliation and glaucoma and cataracts. Then there are vascular and inflammatory diseases in the eye some of which will relate to general health problems. Neovascular glaucoma is a term used when there are numerous new vessels developed within the eye in response to vascular injury.

### Optic disc structure

An important component of an eye examination is assessing the appearance of the optic disc. (See p8) Optic discs come in a variety of sizes from small to large but they all have a similar number of nerve fibres (1.2 million). Large optic discs therefore have a space in the middle called the optic cup that small optic discs will not have. In glaucoma the optic cup enlarges as the nerve fibres die off. A diagnosis of glaucoma requires an abnormality of the optic disc that has developed over time. A once only examination of the optic disc cannot always be certain that the optic disc is normal or abnormal. Glaucoma NZ promotes careful examination of the optic disc in all its educational programmes.

**Losing your driver's licence can be a life-changing result of glaucoma detected too late.**

**One of our members contributed this article about driving. Luckily his story has a happier outcome.**



## **Glaucoma and Driving**

Glaucoma, they say, is a sneaky disease. I am just grateful that I drive a car and had cataracts.

If you want to find out about eyesight, there is no better place than behind the wheel.

First the outline of distant cars began to look hazy. Sunshine started to seem too bright. One of our local crossings is shadowy, and people in dark clothing began to merge into the background. After a while, I could no longer read number plates not very far away.

I was not conscious of being dangerous, but my wife said I was driving badly.

Then there were other things. When I shut my left eye, there was a semi-circular black crescent which took up almost 10 per cent of the vision field. When I looked at lights on the hill, there was a sort of rainbow circle around them.

So I had my cataracts fixed and suddenly everything looked marvellous. Colours sprang out at me, I could see individual leaves on trees across the road, driving was good again. Except that black crescent did not go away.

The wise man who did the cataracts had no doubts. It was glaucoma. I thought of my family history and arrived at an uncle who was almost blind and kept complaining the doctors could not cure him. He was exactly the sort of man who would not seek help until it was too late. A son-in-law who went driving with him said he had never been more terrified in his life.

So what about driving with glaucoma? I asked an expert.

He said, "We are not aware of gaps in our peripheral vision because our brain convinces us we see everything as clearly as possible. Your brain produces a picture filling in the details and gaps so your conscious mind is presented with a view of what is around you. Your uncle probably thought he was seeing the same picture his son-in-law saw out the car window - but not so.

"The visual field is the entire area the eye can see and in glaucoma this area is reduced so your brain has less information available to produce the picture of what is around you to drive safely. A visual field can be described as an island of vision in a sea of darkness. If you have a reduced field of vision then there will be more darkness and you will not be aware of things on or beside the road that you cannot see. Not too serious if it is a tree, but may be tragic if it is a child on a bicycle!



He added, "Vision is vitally important for driving safely and legally."

All of which may seem to invite questions. Is that vision test for the over 80's licence really likely to discover all, or most, of our advanced cases of glaucoma? Would my aged and much loved, uncle have gone almost blind if he had been tested by an expert years earlier? How many of our drivers don't know they have glaucoma, or that their brains – trying to be helpful – will fill in blank spots in their vision?

Meanwhile, my black crescent has stopped growing, under treatment, although it will never go away. And, in a strange way, I feel grateful for the cataracts. My visit to the ophthalmologist brought to light a sneaky thing far more serious to myself and other people on the roads.

*Brian (Christchurch)*



## Glaucoma and the Law

The law is very specific about the details of vision required to drive.

The limit of central vision to drive a car is 6/12 which is seeing at 6 metres what a normal eye would see at 12 metres. In other words, to drive you only need vision half as good as normal.

The required field of vision set down by the LTSA (Land Transport Safety Authority) is 140 degrees of horizontal field with both eyes open and no patches of vision missing within 20 degrees of the centre of vision.

This is quite generous, as normally with both eyes open a person's field of vision is about 180 degrees and involves more than just the horizontal band. One eye on its own has a field from 90 degrees towards the ear and 60 degrees towards the nose, being 150 degrees in total, with much more area above and below the horizontal. This is why one eyed people can drive and referee rugby!

In glaucoma much of the loss of vision is at the top and bottom parts of the field and this does not matter so much for driving as it is more important for driving to have vision in the horizontal area.

When an optometrist or ophthalmologist is determining fitness to drive the way a field test is done is very important. The field test to legally drive is not the same as the field tests done to diagnose and check on glaucoma.

The law requires a specific field test done with both eyes open, either manually or with a computerized field analyzer. This test is much easier than the usual field tests for abnormalities of eye and brain.

The usual glaucoma field tests are trying to measure very fine details of vision and to identify dull patches which are not required to be tested to determine ability to drive. (See the next issue of *Eyelights* for more about visual field testing.)

Some people can have severe glaucoma but still have enough visual field to satisfy the LTSA.

## Your Glaucoma Eye Examination: Part 2

### Your Optic Disc

In the last issue of Eyelights we discussed the significance of eye pressure measurement in glaucoma care. This time we look at the importance of examining the optic disc.

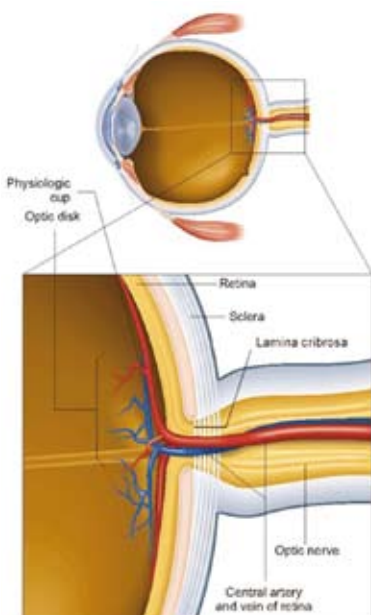
#### What is the optic disc?

The optic disc or optic nerve head is the portion of the optic nerve which can be seen on examination of your eye.

The optic nerve begins in the eye and is composed of 1,200,000 tiny nerve fibres that send signals from the eye to the brain. It is these nerve fibres that can be seen, almost end-on, within the eye.

Each nerve fibre receives visual signals from a certain area of retina and thus represents an area of your field of vision.

The typical optic disc is a circular structure where the nerve fibres exit the eye. The optic disc is, on average, only 1.5 mm in diameter. The disc area is larger than the area taken up by the nerve fibres leaving the eye, so a small area of the central optic disc is left “unfilled” forming a small depression, called the cup.



The blood supply of the optic nerve is through tiny blood vessels that surround and penetrate into the optic nerve, supplying the nerve and optic disc with blood, nutrients and oxygen.

#### What happens in glaucoma?

Glaucoma causes damage to the nerve fibres and although the exact mechanism is still unknown, there are two main theories that may explain glaucoma damage.

The mechanical theory proposes it is the effect of eye pressure that damages the nerve fibres. It is thought that the nerve fibres are compressed at their exit point and continued, long-term damage causes the nerve fibres to atrophy or slowly die.

The vascular or “blood flow” theory proposes that the pressure of the eye has an effect on blood flow to the optic nerve. If the nerve fibres are starved of blood, nutrients and oxygen, then they undergo atrophy.

The loss of nerve fibres means that there will be a corresponding loss or defect in the visual field and a “blind spot” may be detected on visual field testing.

At the present time, treatment of glaucoma is dependant on reducing eye pressure, to prevent further loss of the remaining nerve fibres.

#### How is the optic disc examined?

Eye care practitioners use special instruments to look at the back of your eye – a slit lamp or an ophthalmoscope. They are able to assess the health of your optic nerve by looking at the cup, colour and contour of your optic disc.

The size of the optic cup compared to the size of the disc is expressed as a cup-to-disc ratio (C-D ratio). There can be a wide range of “normal” C-D ratios. The cup can be circular or slightly ovoid in appearance.





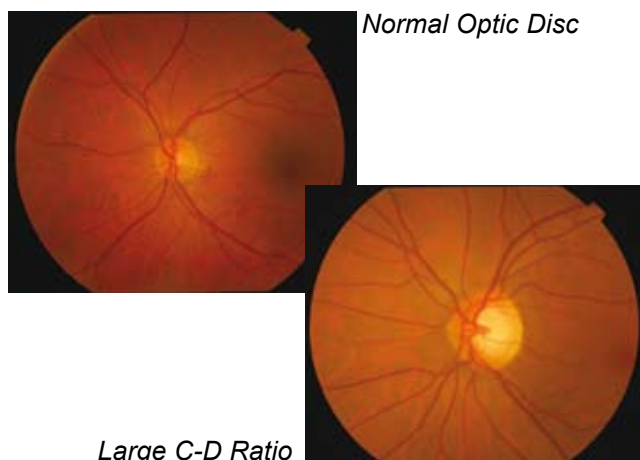
The colour of the nerve fibres is assessed. They are normally an orange-yellow colour, with the cup appearing more yellow-white.

The contour of the optic disc is determined by the evenness or regularity of nerve fibres around the cup.

### What optic disc appearances would suggest glaucoma?

As the nerve fibres are damaged and their supportive tissues atrophy, there will be fewer of them at the optic disc. Eye care practitioners are looking for evidence of this loss of nerve tissue when examining your optic disc. They will also want to know if there is a corresponding loss in your visual field.

With less nerve tissue taking up less room at the optic disc, the cup appears larger. Thus, a large C-D ratio is suggestive of glaucoma.



As the nerve fibres atrophy, the colour of the optic disc appears less orange. This would be noted as a yellowing of the disc or pallor. However, glaucoma is not the only cause of nerve pallor.

Damage to the nerve fibres is seldom equally distributed. Often, glaucoma damage is seen earlier at the upper and lower borders of the nerve, rather than the sides. This localised loss of nerve fibres leads to a thinning of the rim, and is referred to as “notching”.

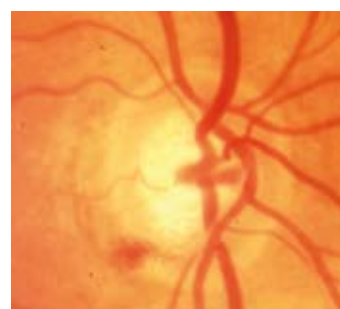
Notching of a disc usually results in an arc-shaped blind spot. If this is severe or large you may notice it yourself even without a visual field test. Scans using modern technologies such as an “OCT” may also show thinning of the nerve fibres.

Glaucoma is a chronic (long term) disease, so a diagnosis of glaucoma is usually made if there is documented proof of:

- Increase in the C-D ratio and, to a lesser extent, pallor.
- The appearance of a notch.

In order to see these potentially slow changes, your eye care practitioner will compare the current appearance of your optic disc to previously recorded diagrams or “stereophotographs” (that give a 3D view). Once again, modern scans are also being used to help in the detection of these changes.

Small bleeds of the optic disc are also an indicator of glaucoma damage. The appearance of a disc haemorrhage usually indicates active damage is occurring.



Next time you have an eye examination don't be afraid to ask your eye care practitioner what they observe about your optic discs and whether there are changes.

**In the next issue of Eyelights the third instalment of this series will cover testing of the visual field.**

## Public Meetings

Five glaucoma information meetings have been held so far this year. Further meetings are being planned. If you are a member of Glaucoma NZ you will receive an invitation card in the mail when there is to be a meeting in your area. The special focus of the 2008 Power Point slide presentation is glaucoma research. As always the presentation also covers important basic information about glaucoma.

A new venture for 2008 is the locally sponsored public meeting, where someone in a local community offers to organise, advertise and host a meeting. We are grateful to our first three meeting sponsors: Optik Eyecare (Pukekohe), Martin and Lobb Optometrists (Invercargill) and EyeviewOptometry (Invercargill).

Expressions of interest in sponsoring a meeting are welcome – even from clubs or businesses outside the eye health sector. Glaucoma NZ arranges the speaker and provides support. Please contact us if you are interested.



## Glaucoma NZ News

### Charity Regatta

Glaucoma NZ received a donation of \$10,000 at the Rotary Club of East Coast Bays' Charity Regatta held on Friday March 7th. This is an annual fundraising event which involves months of work by Rotary Club members.

27 boats took to the water for a day's sailing. The yachts were crewed by teams of business people and guests. Glaucoma NZ manager Heather Hyland and trustee Gordon Sanderson were lucky enough to be guests on board the ketch Kastaway. Two 1.5 hour races were separated by lunch at sea, and the day concluded with dinner, raffles and an auction.

The giant cheque was received on behalf of Glaucoma NZ by Gordon Sanderson, who thanked the Rotary Club members for their tremendous support.



*GNZ Trustee Gordon Sanderson accepts the cheque from East Coast Bays Rotary Club President Barry McLean.*

## Awareness on the Web

June is the month we focus hard on glaucoma awareness. The Glaucoma NZ website is a great way to spread the word. Do you have a website, or work for someone who does? Does your club or association have a website? Please consider adding a link to [www.glaucoma.org.nz](http://www.glaucoma.org.nz) on your site as a way to help more people know about glaucoma. If you are willing to do this please contact us.

## Rotary Award

Glaucoma NZ Trustee, Associate Professor Helen Danesh-Meyer, has been awarded a Paul Harris Fellowship by the Rotary Club of East Coast Bays. This prestigious award named after the founder of Rotary was presented to Helen for her outstanding contribution to the community.

## Have Your Say

*From time to time Eyelights will publish pieces which express an opinion or provoke thought on an issue. You are welcome to submit a piece of around 300 words.*

*Our first contributor, 'Dr Verily Low Pressure', reflects on glaucoma and the concept of disability. For a person with glaucoma, visual disability is perceived when it is just about too late. From that point on glaucoma is highly likely to be the main disability in life for that person. Modern glaucoma medications are very effective but the challenge is detecting glaucoma early when progressive damage is most likely to be prevented.*

Recently I attended an international meeting in Queenstown of the Glaucoma Research Society involving a select group of the world's foremost glaucoma experts. Well, it was great to renew friendships with glaucomaphiles from around the world. But if you are not one, then you might find the content and pace of the proceedings tedious:

"We don't know enough about the impact of glaucoma on the lives of our patients."

"You can count fractured hips, fractured wrists and car accidents. Do these statistics shed any light?"

"No, it's just not convincing."

Ask a glaucoma patient if he has a problem and the answer is "No!" But the moment his vision fails, fails in the centre, the reaction suddenly changes polarity.

Fresh from the Research meeting and eager to learn from a real patient I ask a retired American gentleman who likes to spend the warm months in Godzone with his wife. He has already lost sight in one eye from glaucoma, he reads without difficulty (and drives!) with the other eye. There is hardly any recognisable nerve tissue at the optic disc of his remaining good eye.

"Do you reckon you have got a problem with what you can see, Bob? How does your glaucoma affect you?"

"No, I'm fine... I can see just fine."

"Wow, but Bob your glaucoma is a hair's breadth away from being as bad as it can get!"

"No, I haven't noticed him bumping into things and he is a really careful driver", confirms Hazel.

And this is what the Research Society needed figuring out. Glaucoma patients don't perceive problems until they lose sight - until right at the end. Just like the 'blind spot' that we all have, the mind paints the world in. Studies of 'Quality of Life' ask 'How many years of life you would trade for so much return of side vision?'

Answer: None of you want to trade any life for this disability until it has finally blinded you.

Our tests, whether of eye pressure or even of the visual field itself measure the amount of nerve damage that may be present in glaucoma. What would be ideal would be a way to measure the rate of loss of nerves and be able to extrapolate to the disability that glaucoma will have on a person's life, over their whole life! It raises the question as to what effort, what cost, what inconvenience from glaucoma care is acceptable to prevent visual disability during a lifetime.

### Moving House?

Don't forget to let Glaucoma NZ know your new address.

## Public Meetings 2008

At the time of going to press the following glaucoma information presentations had been confirmed. Come along and see a new slide presentation and learn more about glaucoma. There will be time for questions and a cup of tea will be served at the conclusion of each meeting. Admission is free and all are welcome.

<b>Saturday June 7th</b>	<b>Christchurch</b> 10am Burnside High School Greers Road, Christchurch
<b>Saturday June 21st</b>	<b>Auckland</b> 10am NZICA Centre 27 Ohinerau St, Greenlane

Meetings are also being planned for Taupo, Hawke's Bay, Dunedin, North Shore and Wellington, and possibly for Whangarei, West Auckland, Nelson and Rotorua.

## I would like to help

- I would like to become a member of Glaucoma NZ at no cost
- I would like to donate \$\_\_\_\_\_ (Optional)

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

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