

# Eyelight

The Newsletter of **GLAUCOMA NZ**  
TO SAVE SIGHT

## About Glaucoma New Zealand

2004 promises to be a busy year for Glaucoma NZ. Our web site is now active and we hope you will visit - the address is [www.glaucoma.org.nz](http://www.glaucoma.org.nz). We will be updating the information regularly - we trust you will find it informative and useful.

We have also launched a Professional Learning Package for Optometrists as part of our

aim to inform health professionals on current issues about glaucoma.

We will be continuing our public meeting schedule around the country and will also be setting up support groups where there is a demand.

We look forward to meeting many of our readers during the coming year.

## Public Meetings and Support Groups

We held three more public meetings in November and December last year. Dr Richard Holmes was the guest speaker in Palmerston North, Dr John Beaumont spoke at Taradale in Hawkes Bay, and Dr Mike O'Rourke addressed an attentive audience of 180 in Hamilton. All meetings had enthusiastic question times which carried over into morning tea time.

Local Lions Club members assisted with the refreshments at both Palmerston North and Taradale and we are very grateful for their help.

We now look forward to our 2004 Meetings which will cover more of the South Island and also more of the larger cities in both Islands. Meetings will be advertised on the web page so keep checking for one in your area.

Many of you have said you would like to join a local Glaucoma Support Group. If you would like to participate and/or help organize a group, please contact the GNZ office, phone 09 373 8779, fax 09 373 7947 or email [admin@glaucoma.org.nz](mailto:admin@glaucoma.org.nz)

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## What is Ocular Hypertension?

Ocular hypertension (OHT) means the pressure inside the eye, intraocular pressure (IOP), is elevated above the range considered normal, usually greater than 21mm Hg. However, despite having a high IOP, a person with OHT has a healthy optic nerve with normal vision.

### What Causes OHT?

Anyone can develop OHT, but it is more common in those with family history of OHT or glaucoma, and nearsightedness. However, some people's normal eye pressure is simply higher than average.

### What are the Signs of OHT?

You can't tell if you have OHT, because it is symptomless. This is why it is crucial to have regular eye examinations.

### What are the risks associated with OHT?

Patients diagnosed with OHT have an increased risk of developing glaucoma. If untreated, approximately 10% will develop glaucoma in 5 years. OHT is distinguished from glaucoma in that there are no detectable

changes in vision, no evidence of visual field loss, and no damage to the optic nerve.

### What are the risk factors for developing glaucoma if you have OHT?

1. Older age
2. Higher eye pressures: the higher the pressure in the eye the greater the risk of developing glaucoma.
3. Certain characteristics of the optic nerve: your doctor will be able to determine if these are present.
4. Thinness of the cornea: again, your doctor will be able to examine for this.

### Does OHT require Treatment?

Your eye doctor will closely examine your eyes, discuss the other possible risk factors that may predispose you to glaucoma and then decide whether you personally will benefit from treatment. If it is decided that treatment is necessary, it is most commonly in the form of eye drops. Even if treatment is not necessary, you will need to have eye examinations at recommended intervals.

## Glaucoma Treatments

### Prostaglandin Analogues:

Specific drugs: Xalatan, Travatan

Related drug: Lumigan

The prostaglandin analogues are the newest family of glaucoma medications to be available. They have been in use over approximately 10 years. These eye drops are now the most commonly used drug in the developed world for glaucoma. A recent study has showed that they are the most commonly

used drug in Australia. However, in NZ they are the second most common family of drugs. One reason is that the government has placed restrictions on ophthalmologists prescribing these drugs.

The reason these drugs have gained in popularity so quickly is that research studies have shown that they are the most effective at lowering the pressure in the eye. Also, these drugs have very minimal systemic side-

## Glaucoma Treatments

effects (negative effects of the drugs on parts of the body other than the eye).

The prostaglandin analogues work by increasing the drainage of aqueous fluid out of the eye thereby decreasing the pressure in the eye.

However, the prostaglandin analogues have some very unique side-effect that patients should be aware of.

1. Eye colour can become more brown: prostaglandin analogues increase the pigment in the iris so that those eyes with a brownish tint or brown flecks such

as eyes with hazel irises may become more brown. Studies have shown that between 5% and 15% of people who used this medication reported a gradual change in eye color. The change in eye color occurs slowly and may not be noticeable for a considerable time.

2. Eye redness or bloodshot: Often this effect is transitory, fading in 4-6 weeks. However, some people will notice that their eyes are permanently more bloodshot.
3. Stinging: This is an uncommon side-effect.

## How Compliance Can Help Save Your Sight

Compliance is the term for following a medication schedule as prescribed by a doctor. Though it may seem obvious that patients who don't take their medication won't achieve the desired results, it is estimated that up to 25% of glaucoma patients take none of their medication. Another large group of patients use their drops irregularly or do not use them properly.

Reasons drops are not used include.

1. Drops do not seem to provide any immediate noticeable benefit to vision. However, the goal of glaucoma treatment is to prevent further visual loss, not to improve vision immediately.
2. Glaucoma is a chronic disease often requiring many years of treatment, which can be inconvenient and expensive. The result: many patients simply "forget" to take their medication.

3. Side-effects: Many glaucoma medications have side effects that range from unpleasant to disabling.
4. Taking medication incorrectly — too much, too little, at the wrong time, etc. This isn't entirely surprising since many glaucoma regimens are not easy to follow and require multiple medications taken every day at very specific intervals. But when taken improperly the full effect will not be obtained. For example, not waiting at least five minutes between taking different eye drop medications (so that they don't wash each other out of the eye) is a common mistake.

Compliance with your medication regimen is, indeed, critical. After all, the most recent diagnostic and treatment advances are to no benefit if patients are non-compliant. In fact, non-compliance has been suggested by some to be a leading cause of glaucoma blindness.

## The Eye as a Camera

### ***Understanding glaucoma requires a basic understanding of the eye, its various parts, and how it works.***

The eye captures visual information about the world and relays it in the form of nerve impulses to the brain. The brain processes this information into the “pictures” we see.

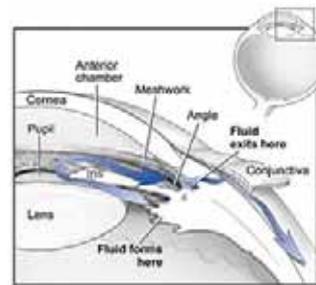
The outer, white layer of the eyeball is the sclera, a tough, leathery protective shell. The front, transparent portion of the shell is the cornea, through which light enters the eye. The cornea is much like the lens of a camera, providing the eye with much of its focusing power.

The coloured portion of the eye is the iris, which functions like the diaphragm of a camera. The iris contains muscles that control the size of the pupil. This regulates the amount of light entering the eye. The pupil constricts in bright light and dilates in dim light, adjusting the amount of light that passes through the pupil to the retina, which is analogous to the camera’s film. The difference between a blue and a brown iris is the amount of pigment in the front portion of the iris.

The anterior chamber, or front compartment of the eye, is filled with a clear watery fluid called aqueous humour. Aqueous humour is continuously secreted by the ciliary body, a tiny gland behind the iris. Aqueous humour provides the structures of the eye with oxygen and vital nutrients. The aqueous humour is also responsible for the pressure (IOP) inside the eye. This pressure is necessary to maintain the shape of the eye.

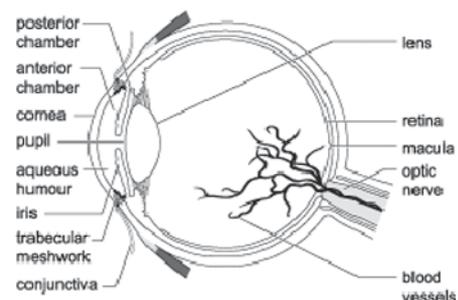
Aqueous fluid then leaves the anterior chamber at the open angle where the cornea and iris meet. When the fluid reaches the

angle, it flows through a spongy meshwork, like a drain, and leaves the eye. The fluid then drains back into the bloodstream. Normally, the amount of fluid produced is balanced by the amount draining away, so the pressure in the eye stays constant.



The lens behind the iris is transparent like the cornea. The lens adjusts its shape and thickness to focus the image onto the retina. When we read, the eye accommodates to refocus a near image. The lens enlarges throughout life as it produces new cells. The ability to accommodate decreases steadily throughout life. Presbyopia occurs when there is not enough accommodative power remaining to read without glasses, usually in the early 40s. The lens is held in place by the zonules, which are analogous to the ropes holding a hammock in place.

After passing through the lens, the light reaches the retina. The retina then delivers electrical signals to the optic nerve. The optic nerve is made up of over one million nerve cells. The optic nerve carries visual information to the brain. The brain processes these signals into a “picture”, or visual image.



## Understanding Our Vision

### Screening for glaucoma

Because the majority of glaucoma does not have any symptoms, screening tests are important to detect glaucoma before there is significant loss of vision. An optometrist does these during a vision test. Ideally, everyone over 40 should have their eyes checked for glaucoma every two years. People aged 40 or over who have a family history of glaucoma should be especially vigilant.

There are three types of simple, painless tests used for glaucoma screening:

- ❖ Examination of the back of the eye using a special microscope (ophthalmoscope). Damage to the optic nerve can be seen at the back of the eye.
- ❖ Measurement of the internal pressure of the eye (tonometry). This is done with a device that blows a small puff of air onto the eyeball.
- ❖ Measurement of the field of vision, by showing a sequence of spots of lights and asking which can be seen.

People who are found to have glaucoma can be referred to a specialist eye doctor (an ophthalmologist) for assessment and treatment.

### Tonometry

Tonometry is the technique for measuring the IOP. There are several different types of tonometers that you may encounter. The Goldmann Applanation Tonometer (GAT) is the instrument most often used by ophthalmologists. The eye is anaesthetised with eye drops along with a yellow vegetable based dye called Fluorescein. The patient is seated at an instrument called a 'slit-lamp'. A plastic prism is then lightly placed on the cornea. With the aid of blue light and the GAT, the pressure is recorded. In air tonometry a puff of air is blown onto the cornea to take the measurement. Since this instrument does not come in direct contact with the cornea, no anaesthetic eye drops are required.

## Cataract and Glaucoma

A cataract is an opacification of the lens so that vision decreases and cannot be improved by new spectacles. When the cataract is sufficiently dense to interfere with one's activities, surgery becomes necessary.

Both cataracts and glaucoma can be a natural part of the aging process. Many people over 60 may have both. Otherwise, the two are not normally associated. The exceptions are where specific causes such as trauma and steroids which lead to both glaucoma and

cataract. While glaucoma is most often a problem with drainage, a cataract is a clouding of the eye's lens allowing less light to pass through.

Both cataracts and glaucoma are serious conditions that can cause you to lose vision. However, loss of vision due to cataracts can be reversed with surgery. Loss of vision from glaucoma is, as yet, irreversible.

## Focus on Research

### The Search is On: Myocilin - TIGR

One technique for identifying faulty genes is called “linkage analysis”. This involves looking for common features of genes in those affected with glaucoma. These are features present in people with glaucoma but not in their unaffected relatives. It would be easy if that feature were something as obvious as eye colour. Unfortunately, it’s not that simple, so more complex approaches are being studied.

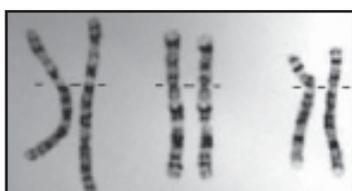
Linkage analysis was the method used to find the TIGR/myocilin gene. Dr Wallace Alward, at the University of Iowa was involved in treating a young man in his 30’s with glaucoma. Multiple members of this patient’s family were also affected with glaucoma. Dr. Alward and his colleagues studied the patient’s family and were able to make the connection between glaucoma and an area of the chromosome called chromosome 1. It took six years to find that connection.

Later, a group led by Dr Polansky, in San Francisco identified the TIGR protein in the trabecular meshwork of the eye. The TIGR protein was located in the area of chromosome 1 where the Iowa group had been investigating. Armed with this information, they were able to zero in on the TIGR protein. They demonstrated that small changes in the DNA sequence (mutations) in this gene, now known as the myocilin gene, cause glaucoma.

They found that myocilin mutations cause most forms of juvenile glaucoma and about 3 to 5 percent of adult-onset glaucoma. Dr. Alward says, “Discoveries such as myocilin are important pieces of a very large puzzle. Each piece takes us part of the way towards an understanding of the normal development and function of the eye and also towards an understanding of what goes wrong to cause glaucoma.”

## Genes and Glaucoma

The study of genes, and the role they play in disease, is an area of great interest for glaucoma. Exciting discoveries in recent years have lead to a surge of research into the function of the genes associated with glaucoma. By learning more about genetics, in disease as well as health, we can better understand the disease process.



### Finding the Right Genes

Each of our cells is composed of 23 pairs of chromosomes. These chromosomes are composed of deoxyribonucleic acid, better known as DNA. DNA is the plan of the basic building blocks of our body. As is true with fingerprints, each one of us has DNA unique to us. Scientists look for various “genetic markers” whose location along the chromosome is known. These markers are specific DNA sequences that can be measured in the laboratory.

## Glaucoma and Lifestyle : What's true. What's not.

### Bilberry

Bilberry is an extract of the European blueberry. It is most often advertised as an antioxidant eye health supplement that advocates claim can protect and strengthen the capillary walls of the eyes, and thus is especially effective in protecting against glaucoma, cataracts, and macular degeneration. There is some data indicating that bilberry may improve night vision and recovery time from glare, but there is no evidence that it is effective in the treatment or prevention of glaucoma.

### Yoga and Recreational Body Inversion

The long-term effects of repeatedly assuming a head-down or inverted position on the optic nerve head (the nerve that carries visual images to the brain) have not been adequately demonstrated, but due to the potential for increased IOP, people with glaucoma should be careful about these kinds of exercises.

Glaucoma patients should let their doctors know if yoga shoulder and headstands or any other recreational body inversion exercises that result in head-down or inverted postures over extended periods of time are part of their exercise routines.

### Physical Exercise

There is some evidence suggesting that regular exercise can reduce eye pressure on its own, and can also have a positive impact on other glaucoma risk factors including diabetes and high blood pressure.

In a recent study, people with glaucoma who exercised regularly for three months reduced their IOPs an average of 20%. These people rode stationary bikes 4 times per week for 40 minutes. Measurable improvements in eye pressure and physical conditioning were seen at the end of three months. These beneficial effects were maintained by continuing to exercise at least three times per week; lowered IOP was lost if exercise was stopped for more than two weeks.



Regular exercise may be a useful addition to the prevention of visual loss from glaucoma, but only your eye doctor can assess the effects of exercise on your eye pressure. Some forms of glaucoma (such as closed-angle) are not responsive to the effects of exercise, and other forms of glaucoma (for example, pigmentary glaucoma) may actually develop a temporary increase in IOP after vigorous exercise. And remember - exercise cannot replace medications or doctor visits!

## Contact Us with Your Questions & Comments

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Donations of \$5.00 or more are tax deductible

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I would like information on leaving a bequest for Glaucoma NZ

## How Do Eye Drops Work?

The analogy to the drainage of fluid out of the eye to a sink is a useful one. In a normal eye, the tap is always on and the drain is always open. In open-angle glaucoma, although the tap is still on (that is the same amount of fluid is still produced), the pipes underneath the sink get clogged. When this happens, aqueous fluid cannot leave the eye as fast as it produced, causing the fluid to back up.



Since the eye is a closed compartment, the “sink” can’t overflow. Instead, the backed up fluid causes increased pressure to build up within the eye. This increased pressure puts stress on the optic nerve at the back of the eye and may result in damage and death of the optic nerve cells. This, in turn, may result in damage to vision.

Eye drops work by one of two mechanisms:

1. They turn down the tap, that is they decrease the production of fluid
2. They open the drain and improve outflow of fluid.

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