What is Tonometry?

Glaucoma is a multifactorial disease, in which Intraocular pressure (IOP) measurement plays an important role in both detection and its management. Accurate and precise measurement of IOP, is therefore fundamental to management of glaucoma.

Tonometry is the diagnostic test that measures IOP. In 1622 Bannister described ‘digital’ tonometry, the use of fingers by the practitioner to feel for the pressure in the eye. In 1862 Von Graefe, a Berlin professor, was the first to design an indentation tonometer for testing eye pressure and reading it off a scale. Presently, there are a variety of methods that can be employed to measure IOPs. Applanation tonometry is the method of measuring IOP with an instrument that indents or flattens the corneal apex. The Goldmann applanation tonometer (GAT) and the Tono-Pen are both examples of applanation tonometry. Other commonly used methods include rebound tonometers (I-care), and the non-contact tonometers (air-puff tonometry). Below is an explanation of the various tonometers that you may commonly encounter at your eye examination.

1. Goldmann tonometry
This involves the use of a prism mounted on the head of the tonometer attached to the slit lamp machine. Utilising cobalt blue filter, the examiner is able to adjust the force applied to the tonometer head via a dial connected to a tension spring. When a specific area on the corneal surface has been flattened, the opposing forces of corneal rigidity and the tear film are roughly approximate and cancel each other out allowing the pressure in the eye to be determined from the force applied. Goldmann tonometry is considered to be the ‘gold standard’ IOP test and is the most widely used method by ophthalmologists. However, there are limitations. These include its invasive nature, which precludes its use in a select number of patients; the need for topical anaesthesia to facilitate its use; and in some eyes, especially those with corneal problems (such as diseases, trauma, haze or corneal opacities), obtaining a measurement can be difficult and challenging which may render the test unreliable. The technique also requires experience and training in order to perform accurately.

2. Tono-pen
A small, handheld and portable applanation tonometer. It provides an IOP readout, the end point of which is not open to interpretation, as compared to the GAT. The results
of the tono-pen are thought to correlate well with the Goldmann tonometer on the whole, although, it does slightly overestimate low IOPs and underestimate high IOPs, and thought to be less accurate than the Goldmann tonometer in normal corneas. However, it can be clinically useful in several clinical settings, such as the determination of IOP in patients with corneal oedema, scarring, or determining IOP in supine position. Similarly to the Goldmann tonometer, it applanates the surface of the eye and hence requires topical anaesthesia, and hence can be poorly tolerated in some patients.

3. Rebound tonometry
Rebound tonometers determine intraocular pressure by bouncing a small plastic tipped metal probe against the cornea. This device uses an induction coil to magnetise the probe and fire it against the cornea. As the probe bounces against the cornea and back into the device, it creates an induction current from which the intraocular pressure is calculated. This device is simple and easy to use. It is also portable and does not require the use of anaesthetic drops. It can be particularly suitable for children and patients unable to co-operate or tolerate the goldmann tonometry. The small probe size of these tonometers can also facilitate its use in eyes with corneal abnormalities and make it easier to measure IOP in eyes after corneal grafts.

4. Non-contact tonometry
Non-contact tonometry (or air-puff tonometry) uses a rapid air pulse to appplanation (flatten) the cornea. Corneal applanation is detected via an electro-optical system and IOP is estimated by detecting the force of the air jet at the instance the cornea is flattened. Historically, non-contact tonometers were not considered to be an accurate way to measure IOP but instead a fast and simple way to screen for high IOP. However, modern non-contact tonometers have been shown to correlate well with Goldmann tonometry measurements and is particularly useful for measuring IOP in children and other non-compliant patient groups given its less invasive nature and use without anaesthesia.

*Dr Kaliopy Matheos is a RANZCO trainee, in her final year of training, having recently completed her part 2 examinations. She is currently the ophthalmology registrar at Tauranga eye clinic.

Figure 2b: Goldmann Tonometer in action
https://www.optometriststudents.com/pearl/how-to-perform-goldmann-applanation-tonometry-on-challenging-patients/

Dietary supplements are not a replacement for a balanced diet. Always read the label, and use as directed. Do not exceed the recommended daily dose. If symptoms persist, see your healthcare professional. Douglas Pharmaceuticals Ltd, Auckland.

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Patrick Gower: GNZ’s new ambassador

Stepping into the media spotlight himself, well-known TV news journalist Patrick Gower dug deep and shared his own personal battle with glaucoma in support of Glaucoma New Zealand’s (GNZ’s) 2018 July Awareness Appeal, ‘Light Up Glaucoma’.

In several media stories and his own YouTube video, Gower told New Zealanders how shocked he was when he was diagnosed with pigmentary glaucoma during a routine eye exam one year ago. “I couldn’t believe it. At age 40, you don’t think you could go blind. It was pretty frightening.”

GNZ chair and well-known champion of glaucoma awareness, Professor Helen Danesh-Meyer, said the charity was honored to have Patrick Gower as an ambassador.

“When diagnosed, and quickly understanding how lucky he was to have picked up his glaucoma early, Gower asked his ophthalmologist what he could do to help promote awareness about glaucoma and how he could assist GNZ, said Prof Danesh-Meyer.”

“Patrick is highly respected by New Zealanders and the impact of someone like him working to promote the mission of GNZ – to prevent blindness from glaucoma – is immense. His energy and passion for GNZ is extraordinary and he is committed to sharing his experience in the hope that increased public awareness will help prevent blindness.”

Gower’s regular check-ups were due to a previous detached retina. “Thanks to that bad luck with my eyes, it meant I was more vigilant about my eye health and so my glaucoma was picked up at the earliest possible point,” he said. After diagnosis, Gower immediately underwent laser surgery on both eyes. The surgery relieved the pressure but he still has to use eye drops, twice a day, for the rest of his life to keep pressures down. But the treatment has successfully halted the disease’s progression and he has no problems with his sight as a result, he said.

Please visit our “Whats Happening” page on our website for more information.

Annual Appeal – Thank You!

This year Glaucoma NZ had over 130 participants raising awareness and vital sight saving funds to help GNZ continue their sight saving work to prevent unnecessary blindness from glaucoma. Thank you especially to our members who donated towards the campaign – without you we wouldn’t be able to continue what we do. Thank you for partnering with us to save sight.
Glaucoma: How to Save Your Sight

“With this book we wish to enlighten our readers and provide quality information to minimise visual disability from glaucoma,” Professor Ivan Goldberg.

Purchasing the newly released ‘Glaucoma: How to save your sight’ book will be a valuable resource for yourself and your friends and family in further understanding glaucoma. Also 50% of the book sale price will go to help Glaucoma New Zealand continue their sight saving work.

To purchase your copy please go to www.glaucoma.org.nz/booksale. Alternatively you can call us on 0800 452 826 or email us at info@glaucoma.org.nz

Glaucome Public Meetings for 2018

Public meetings provide awareness and education on glaucoma not just for you but also your friends and family – so please extend the invitation. We have the following up and coming meetings booked:

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<tr>
<th>Date</th>
<th>Location</th>
<th>Guest Speaker</th>
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<tr>
<td>Sat 6 Oct</td>
<td>Commodore Airport Hotel, 449 Memorial Ave, Burnside, Christchurch</td>
<td>Dr Allan Simpson</td>
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<td>10am</td>
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<tr>
<td>Sun 7 Oct</td>
<td>Trailways Hotel Rivers Conference Room, 66 Trafalgar Street, Nelson</td>
<td>Richard Newson</td>
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<td>10am</td>
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<tr>
<td>Sat 10 Nov</td>
<td>East Bay Reap, Whakaari Room 21 Pyne Street, Whakatane</td>
<td>Dr Andrew Thompson</td>
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An invitation will be sent out closer to the time of the event or visit www.glaucoma.org.nz to keep up with any updates.

Help Us Save Paper!

We now have the option of sending our newsletter to you via email. If you would prefer your newsletter via email please let us know by emailing us at info@glaucoma.org.nz or phoning us on 0800 452 826 and providing us with your full name and email address.
Glaucoma and Cataract

Both cataracts and glaucoma become more common with increasing age. Many people over 60 may have both.

- A cataract is an eye condition where cloudiness, or opacity in the lens (behind the iris), blocks or changes the entry of light, affecting vision.

- Glaucoma is a group of eye diseases that gradually steals sight without warning and often without symptoms. Vision loss is caused by damage to the optic nerve at the back of the eye.

Cataracts and glaucoma are both serious conditions that can cause you to lose vision. Loss of vision due to cataracts can be reversed with surgery. Loss of vision from glaucoma is irreversible.

Are those with glaucoma at higher risk of developing cataracts?
Those with glaucoma are usually not at higher risk of developing cataracts. There are exceptions, including those who have glaucoma due to secondary causes such as eye inflammation, eye trauma, or steroid medication use. Also at higher risk are those with developmental conditions, such as congenital rubella which can cause glaucoma and cataract, or sometimes both. Both eye conditions are also more common with age, which is why many who have one disease may develop the other.

Can surgery restore vision loss from a cataract?
Unlike vision loss from glaucoma, cataract-associated vision loss can often be regained. In cataract surgery, the cloudy lens of the eye is removed and replaced with a clear plastic lens called an intraocular lens implant. The natural lens is surrounded by a capsule which holds it in place.

During cataract surgery, an opening is created in the front part of the capsule so the surgeon can remove the lens, but the back layer of the capsule, known as the posterior capsule, is left intact to help stabilize the lens.

In some patients, after a period of time following the cataract surgery, the posterior capsule can slowly thicken and cloud vision. A laser procedure called a capsulotomy can open this membrane, restoring vision without surgery.

When is cataract surgery needed?
Cataract surgery is suggested when a person’s vision has declined to the point where it interferes with their usual daily tasks.

How will cataract surgery affect the glaucoma?
Cataract surgery can cause a change in eye pressure. This change may be short-term or permanent. In general, it is not possible to predict whether the eye pressure will rise, fall or stay the same after cataract surgery.

However, most people have slightly lower eye pressure following cataract surgery. This is often not permanent and the pressure may increase again after the surgery. Sharp increases in eye pressure immediately after the surgery are called ‘pressure spikes’ and sometimes occur in patients 1-2 days after cataract surgery. Often these pressure spikes are short-term and can be treated with medication. Sometimes your doctor may give you a tablet or some eye drops to use following surgery to prevent these pressure spikes.

If both glaucoma surgery and cataract surgery are needed, can the two procedures be combined?
The first priority is to control the glaucoma. A person may have a glaucoma procedure followed by cataract surgery, or have both surgeries done at the same time. The specific approach will depend on the medical needs of the person with glaucoma.

Is there a need to change glaucoma medication after cataract surgery?
In many patients after cataract surgery, your doctor may reassess the glaucoma drops that are prescribed. In some instances, glaucoma drops can be decreased, while other times, there may be the need for more intensive glaucoma treatment. This should be discussed with your doctor.
Eyedrop Aids

Using eye drops can be a challenge for many patients young or old. AutoDrop® and AutoSqueeze™ have been developed to make self-administration as simple as possible – helping to improve patient compliance and reducing reliance on others to help with this task. Many patients who use eye drops have other conditions that affect their dexterity and ability to squeeze small eye drop bottles.

AutoDrop® and AutoSqueeze™ are re-usable and provide a cost effective solution for simple eye drop application.

Both products can be purchased from Eye Care Solutions online at www.eyecaresolutions.co.nz or by phoning 09 274 5972.

Support Groups

We have received feedback that the groups have provided “a place to ask questions in a non-judgemental environment” and “I learn more about glaucoma and get to hear from others who are experiencing the same challenges of living with this eye disease”. For any queries please contact us at info@glaucoma.org.nz or call us on 0800 452 826.
Icare HOME

- World’s most advanced self-monitoring device for intra-ocular pressure and glaucoma

The IcareHOME tonometer is designed for glaucoma patients, or at-risk individuals who require regular monitoring of intra-ocular pressure, to use at home.

The Icare HOME is a non-invasive tool for measuring and recording pressure fluctuations outside of the clinic. You can download the recorded measurements to monitor and record changes in your condition, between consultations with your provider.

As a patient, you can easily be taught to self-measure, it’s simple to use, without the need for special drops or puffs of air.

The EasyPos guidance positioning feature ensures correct positioning every time.

Icare HOME uses disposable probes which are safe, comfortable and sanitary.

Talk to your eyecare provider now, to find out whether Icare HOME can help with your condition.

For more information:
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**YES! I would like to help Glaucoma NZ save sight**

Title  □ Mr  □ Mrs  □ Ms  □ Miss  □ Other

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GLAUCOMA NZ

Department of Ophthalmology

The University of Auckland

Private Bag 92019

Auckland 1142, New Zealand

Donations over $5 are tax deductible.

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**Your donation will save sight!**

It is now estimated that 115,000 Kiwis have glaucoma, but only half know it. Without diagnosis and treatment, there are 57,000 people - in families and communities around the country - who could lose their sight.

Our aim is to raise a further $30,000 to be able to engage a Community Eye Health Educator in the new year to work across New Zealand to increase awareness of glaucoma, develop resources and manage support groups for those with glaucoma.

Please consider making a donation towards this endeavour to eliminate blindness from glaucoma. Whatever you can contribute will make a difference.

We simply can’t do what we do without you! Together, we can light the way to a future where unnecessary blindness from glaucoma is eliminated.

**Bequests**

Have you thought about leaving a gift to support the future work of GNZ and its aim to reduce the incidence and impact of glaucoma in New Zealand?

Contact us to find out more on info@glaucoma.org.nz or call 0800 452 826

Content in ‘Eyelights’ is intended to help readers understand glaucoma. Every effort is made to ensure the accuracy of this information. This information is not a substitute for the advice and recommendations of health professionals. Always consult a health professional prior to any decision regarding your eyes or other health concerns.