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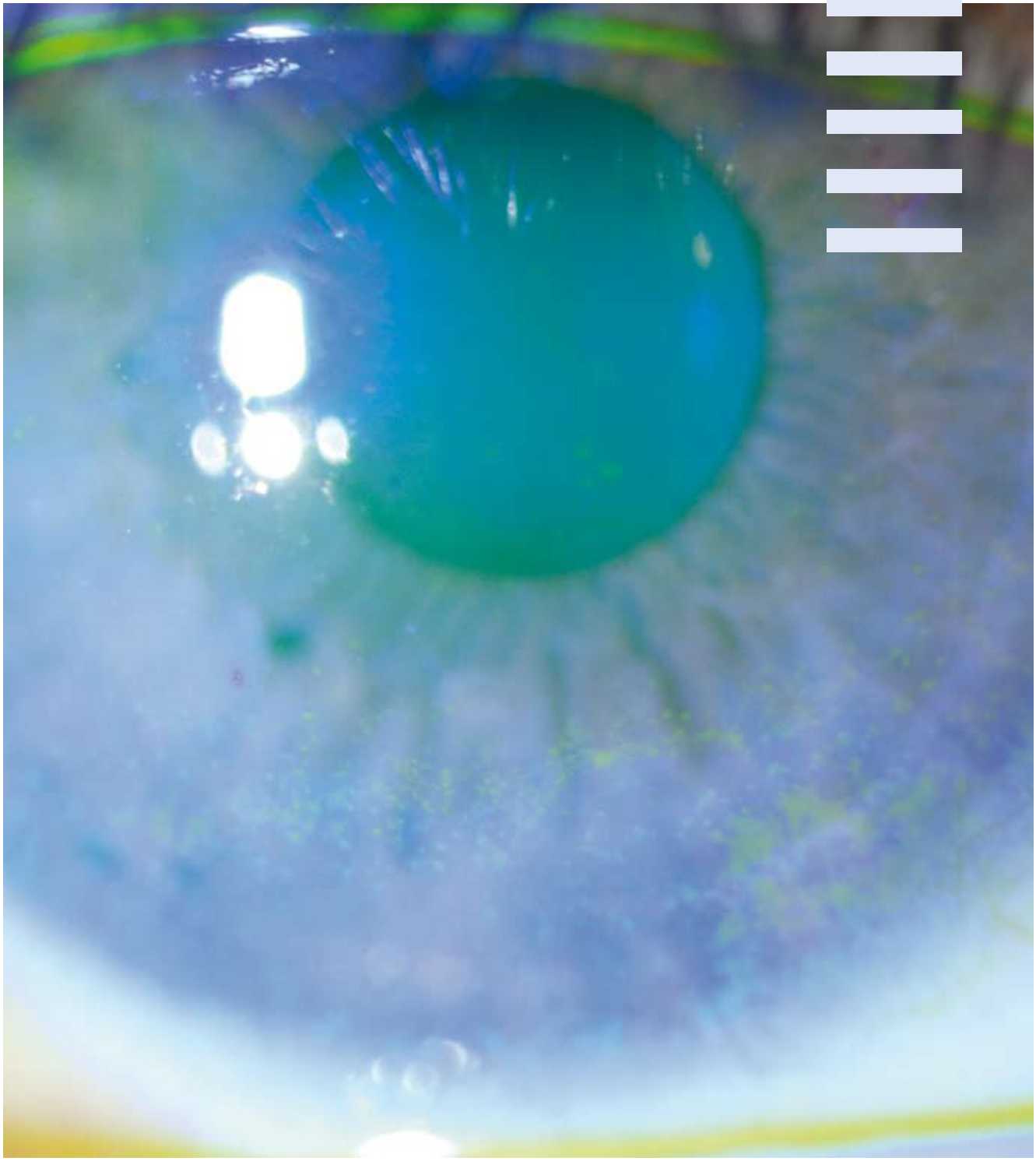
SUPPLEMENT TO AUSTRALIAN OPTOMETRY DECEMBER 2009

HYGIENE and INFECTION CONTROL



- Blepharitis
- Xanthopsia
- Entropion
- Before and after cataract surgery
- Infection control in the practice
- Contact lens solution biocompatibility
- The rub and rinse rule

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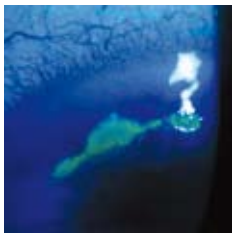
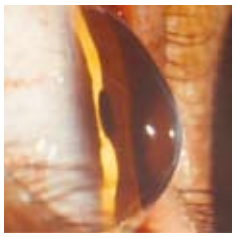
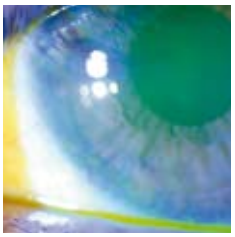
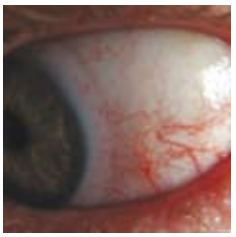


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COVER
Solution-induced corneal staining
Photography: Narelle Hine

Blepharitis in nursing homes

Dr Jeffrey P Gilbard
MD Ophthalmologist

Dr Gilbard was Clinical Assistant Professor, Harvard Medical School; Director, Dry Eye and Ocular Surface Disease Service, Tufts New England Eye Centre; Founder and CEO, Advanced Vision Research Inc; Developer of TheraTears.

He died in August 2009 following an accident while riding his bicycle.

Residents of nursing homes with limited mobility may not have the same access to health care as most of us in the community. Health conditions in these patients, especially those concerning the eyes, can go undetected.

Optometrists can be especially helpful in advising nurses in these facilities on the care and management of patients with blepharitis and dry eye. Patients with chronic eye irritations represent a plethora of conditions but with a directed history and examination they can be assigned a specific diagnosis or diagnoses, and placed on effective treatments.

Dry eye is the most common cause of chronic eye irritation in patients over 50 years of age and is multifactorial in aetiology. Whatever the aetiology, the final common pathway is loss of water from the tear film with an increase in tear film osmolarity.[1] Tears are a salt solution so as an eye becomes dry the tear film becomes too salty. Increased tear film osmolarity causes ocular surface damage and dehydration leading to dry eye symptoms.

Patients with dry eye experience sandy and gritty irritation, dryness, burning or increased awareness of their eyes that gets worse as the day goes on. These patients need to be distinguished from patients with posterior blepharitis or meibomitis in which similar symptoms are worse on eye opening. Dry eye treatment includes strategies to lower tear film osmolarity and treat associated eyelid disease. This condition may be severely disabling in advanced cases.

The other common cause of chronic eye irritation in these patients is blepharitis. Virtually all blepharitis is characterised by bacterial overgrowth on the lid margins.[2] Blepharitis can be divided into two types: posterior blepharitis or meibomitis, and anterior blepharitis.

In posterior blepharitis or meibomitis, the abundant bacteria on the eyelid produce lipases and esterases that hydrolyse meibomian oil and make them proinflammatory.[3,4] The inflammation can spread throughout the lid margin and spill over to involve the ocular surfaces as well. Ultimately, inflammation involving the meibomian gland leads to fibrosis, causing increasing disorganisation and dysfunction of the meibomian glands.

The two most common types of anterior blepharitis are bacterial and seborrhoeic. Bacterial can be accompanied by purulent drainage and crusting on the eyelashes. Seborrhoeic blepharitis is caused by an

What to tell nurses

- Dry eye and blepharitis are conditions that are best managed in conjunction with an optometrist.
- In a nursing home setting, where drops can be difficult to use, omega-3 dietary supplements such as TheraTears Nutrition and warm compress improve outcomes.
- SteriLid is an antibacterial eyelid cleanser for both dry eye and blepharitis that kills both gram positive and gram negative bacteria, including MRSA, making it very useful in a nursing home environment.

Look for these symptoms

- Patients with anterior blepharitis may have crusting at the lashes, reddened or swollen lid margins, loss of lashes and symptoms of burning and itching at the lid margin.
- Patients with posterior blepharitis or meibomitis may have redness of their eyes, and have symptoms of sandy-gritty eye irritation on eye opening with or without eye redness.

Optometrists can offer aged-care nursing home staff members simple advice on detecting and treating blepharitis, which will provide welcome relief for their residents

overgrowth of a yeast called *p. Osome simplevale* and is accompanied by redness and flaking of the skin at the base of the eyelashes.

Treatment tools

The objective of dry eye treatment is to lower or normalise elevated tear film osmolarity. There are several lines of treatment that can be employed effectively.

The first line of treatment is a hypotonic artificial tear called TheraTears. With continued treatment, TheraTears has been shown to produce a progressive normalisation of tear film osmolarity. In addition, by normalising tear film osmolarity and providing a tear-matched electrolyte balance, TheraTears[1] has been shown to restore the natural lubrication of the eye surface by restoring the mucus-producing conjunctival goblet cells that are lost in dry eye.

Dietary omega-3 supplements are especially useful for treating nursing home patients where the instillation of drops can prove challenging. High dietary consumption of omega-3 fatty acids has been found to be associated with a reduced risk of dry eye. TheraTears Nutrition is an omega-3 supplement specifically developed for dry eye treatment. Early evidence suggests that it provides dry eye relief by increasing tear secretion.

Warm compresses are also effective in the treatment of both dry eye and meibomitis to decrease eyelid inflammation, improve the oil layer of the tear film that retards evaporation and minimise dry eye symptoms. Wet a wash cloth with shower temperature warm water and apply the cloth to each eyelid for two to five minutes. Warm compresses are best applied in the morning and around 1 pm to provide thickening of the tear film oil layer throughout the day. Punctal plugs are a useful therapeutic tool if topical drops, omega-3 supplements and warm compresses do not provide adequate relief.

The objective of lid hygiene is to decrease the bacterial overgrowth on the eyelids in dry eye and blepharitis patients. This is difficult to achieve with baby shampoo so an antibacterial eyelid cleanser called SteriLid is recommended for medical lid hygiene in both dry eye and blepharitis patients. Meibomitis, in addition to benefiting from warm compresses and lid hygiene, also benefits from omega-3 supplements and oral doxycycline.

Summary

Patients with dry eye typically complain of sandy-gritty eye irritation that gets worse as the day goes on. Patients with meibomitis typically complain of sandy-gritty eye irritation, with or without eye redness, on eye opening in the morning.

The inflammation of the meibomian glands leads to meibomian gland dysfunction and the development of a second symptom peak late in the day from dry eye secondary to increased tear evaporation.

Dry eye without significant ocular surface inflammation can be treated with hypotonic artificial tears, omega-3 supplements, warm compresses, antibacterial eyelid hygiene and punctal plugs. Meibomitis is commonly treated with omega-3 supplements, warm compresses, oral doxycycline and antibacterial eyelid hygiene.

Handy hints

- If you give nursing staff something that is easy to do and follow, the compliance rate is higher.
- Regularly follow up treatment plans.
- Dry eye treatment: lubricant eye-drops, omega-3 supplement, warm compresses and antibacterial eyelid hygiene.
- Meibomitis treatment: omega-3 supplement, warm compresses, doxycycline, antibacterial eyelid hygiene.
- Anterior blepharitis treatment: antibacterial lid hygiene.

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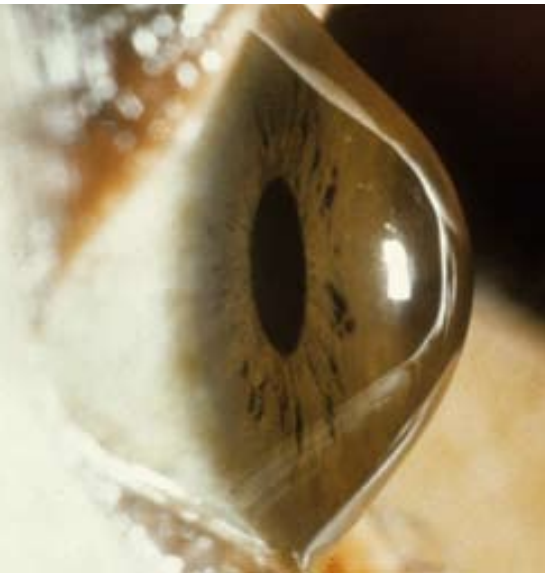
Unravel the mystery

Advances in gene mapping have taken the guess work out of isolating the gene variation that leads to keratoconus



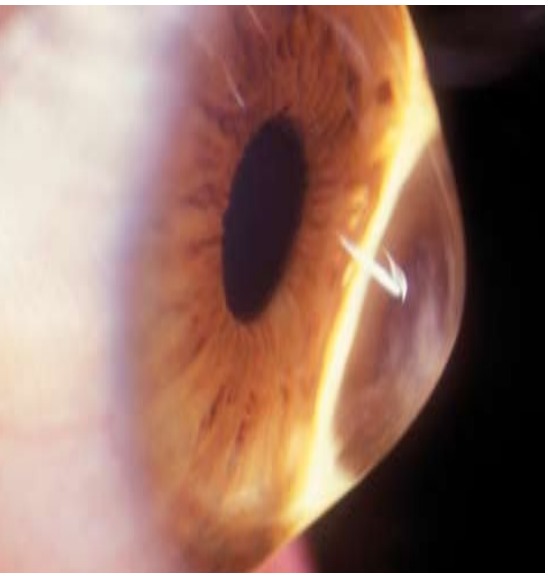


Photo: The Medical Photographic Imaging Centre, Royal Victorian Eye and Ear Hospital

Kathryn Burdon
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Keratoconus is a common disorder that can severely affect vision in working-age individuals. Onset is often in teens or early adulthood. The disease is progressive, often resulting in very poor vision during the most productive years of life. It is characterised by an asymmetrical thinning of the central cornea, causing it to distort, affecting refraction and leading to myopia and irregular astigmatism.[1]

Early management of keratoconus usually involves the use of spectacles or contact lenses to attempt correction of the refractive error. Severe progressive cases often require corneal transplantation. Keratoconus is by far the leading indication for this surgery in Australia, accounting for 31 per cent of grafts performed.[2]

Family trait

Advances have been made in the treatment of keratoconus through improved contact lens technologies, improved corneal graft survival rates and the introduction of new medical treatments such as collagen cross-linking, currently in clinical trials. There is still very little understanding of the aetiology of the disorder and treatments target the result of the disease rather than the cause. One way to further understand many diseases is through investigating the genetics. Keratoconus is considered to be a complex trait, in that it is caused by multiple environmental and genetic factors, probably interacting with each other. Although the majority of cases appear to be sporadic rather than directly inherited, there is a clear genetic component. It is known to be a feature of several genetic disorders, in particular Down's syndrome and Leber's congenital amaurosis where up to 15 per cent and 30 per cent of patients, respectively, display keratoconus. The prevalence in first degree relatives is around 3.3 per cent[3] while in the general population is about one in 2000 (~0.05 per cent).[1]

First reported gene for keratoconus

Through a candidate gene approach (that is, choosing to study a particular gene based on what is known about its function and relationship to other phenotypes), the VSX1 gene was associated with keratoconus. Some studies have found rare mutations in a small number of both familial and sporadic keratoconus patients but other studies have screened large numbers of patients and found no mutations. Although VSX1 probably does play a role in the pathogenesis of the disease, this gene accounts for very little of the burden of keratoconus. The gene itself encodes a protein called Visual System Homeobox 1. This protein has been implicated in craniofacial and ocular development. It is primarily expressed in the inner nuclear layer of the retina, and embryonic craniofacial tissue. It has also been detected in adult cornea, particularly during wound healing.

# of keratoconus

Gene mapping

The genetics of keratoconus has to date, largely been investigated through the use of families (Table). Several reports of large families with autosomal dominant forms of keratoconus have been published. While these families are likely to represent rare highly penetrant forms of the disease, elucidating the genes involved can provide valuable information regarding the molecular pathways that are important in maintaining corneal structure and function. In addition, several genetic regions for keratoconus have been mapped using collections of smaller families, primarily affected sibling pairs. The only region to have been replicated using these linkage based techniques is that on 5q21, identified in a Caucasian family and recently reported in a collection of Italian sibling pairs.

Genetic region	Population	Reference
15q22-q24	Northern Ireland family, also display cataract	4
3p14-q13	Italian family	5
5q21	Caucasian family and Italian sibling	6,7
1p36.23-36.21	pairs and South Australian family, shows linkage to two	
8q13.1-q21.11	independent regions (digenic)	8
13q32	Ecuadorian family	9
16q22-q23	Finland	10
2p24	Europe and West Indies	11
9q34	White and Hispanic	12
5q32-q33, 14q11.2	Italian	7
20q12	Tasmanian	13

Isolating the region

Although these genetic regions likely harbour keratoconus genes, little progress has been made in identifying the specific genes. This is a problem common to most complex traits that have been studied through family based linkage analysis. Linkage analysis is best suited to identifying regions containing a gene of major effect. The subsequent identification of that gene then relies on accurate annotation of all the genes in that linkage region and the resources to study each one until the causative mutation is identified. This approach has worked well for single gene Mendelian disorders (for example congenital cataract), but lacks power for complex diseases where multiple genes of small to moderate effect are likely to be involved.

In general, association studies are a more powerful method for detecting genetic effects in complex disease. Using this methodology, a gene can be identified without actually assessing the 'mutation' or variant that directly causes the disease. This is due to an effect known as linkage disequilibrium where variants that are in close proximity to each other tend to be inherited together throughout human history. Thus, by typing a given genetic variant we can gain information about nearby variants and detect an association even if the variant typed is not the one with the functional effect. Given a large enough patient cohort, very small effects can be detected by genotyping Single Nucleotide Polymorphisms (SNPs) in the gene of interest in patients (cases) and unaffected individuals (controls). The frequency of the SNPs in the two groups is then compared and if this is sufficiently different, the SNP (and thus the gene) is said to be associated. Work then begins to determine which SNP within the gene is the cause. The main problem with the approach is determining which SNPs in which genes to interrogate. This candidate gene approach requires some prior knowledge about the function of the gene and the pathoetiology of the disease in order to select suitable genes for analysis.

Advances in mapping technology

Recent advances in technology for genotyping large numbers of genetic variants have revolutionised the field of genetics and genomics. It is now possible to type in excess of one million SNPs in a patient at one time. This makes it possible to effectively assess the entire genome for association, rather than having to choose individual genes. The 'genome-wide association study' (GWAS) removes the bias of having to guess that a gene could be involved and can lead us straight to the SNPs of interest, regardless of what is known about the gene. The power of the study is directly determined by the number of patients. To identify a gene with a modest effect on disease risk, it may be necessary to recruit upwards of 1,000 patients and a similar number of controls. Although this level of patient recruitment can be achieved over time and by collaboration between researchers, larger effects can often be detected in much smaller cohorts. This methodology is now being applied to almost every common complex disease and is identifying genetic variants that are directly involved in disease processes.

Here at Flinders University in Adelaide, we are conducting a GWAS for keratoconus. This is an ideal disease to study

Continued page 6

Expand your antibiotic arsenal

Off-label uses for approved anti-infectives are gaining popularity in the United States, as new ocular pharmaceuticals hit the market.

One of the latest treatment choices for bacterial conjunctivitis is Besivance (besifloxacin ophthalmic solution 0.6 per cent, Bausch & Lomb), approved by the United States Food and Drug Administration in May.

Besivance is the first chlorinated fluoroquinolone developed solely for ophthalmic use, according to optometrist Dr Paul Karpecki, as reported in *Primary Care Optometry News*.

'That combination of chlorine and fluorine may be why it is so effective as a broad-spectrum fluoroquinolone against not only gram-negative but particularly the more resistant gram-positive pathogens,' Dr Karpecki said. 'We're not seeing any toxicity. It's a mild drop on the eye.'

Dosage is listed as four to 12 hours, so optometrists have some scope in the regimen they prescribe to patients.

'For presurgical prophylaxis we are using it three times daily, for a keratitis we would use it every two hours then four times daily, depending on severity, and for a conjunctivitis perhaps three times or even twice daily,' Dr Karpecki said.

New anti-infective AzaSite (topical azithromycin solution 1%, Inspire Pharmaceuticals) is showing positive results for off-label use for blepharitis. It is approved for bacterial conjunctivitis.

'A lot of that has to do with high concentrations of the azithromycin molecule in the eyelid tissue,' Dr Karpecki said. 'Hot compresses, lid scrubs and omega-3 supplements are effective in maintaining blepharitis patients long-term after they stop initial therapy of topical azithromycin.

Blepharitis is a chronic disease and doctors should consider additional courses of topical azithromycin throughout the year to improve patients' symptoms.

'Restasis (0.05% cyclosporine ophthalmic emulsion, Allergan) may be a consideration long-term for the concurrent dry eyes. For the blepharitis, I have not seen a medication more effective at managing the disease than AzaSite.'

Unravel the mystery of keratoconus

From page 5

in this way as, although there are many hypotheses, the biology of keratoconus is poorly understood.

By identifying genes that are associated with the risk of developing keratoconus we can begin to understand the disease process and to develop screening tools and therapies targeting early stage disease. While it is early days in the analysis several very plausible genes have been highlighted through this approach and are currently being confirmed.

In order to progress this research to the next level, we are keen to hear from anyone who is interested in recruiting keratoconus patients through their clinic. If you are interested in being involved in this project please email me at kathryn.burdon@flinders.edu.au.

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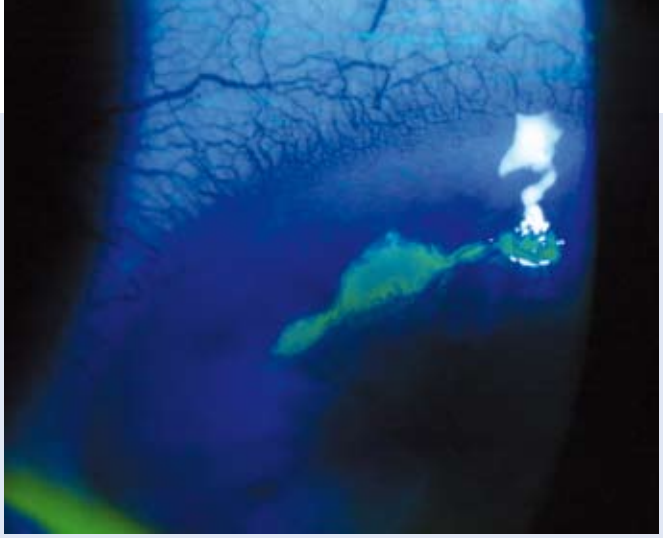

photo clinic

Marginal keratitis

Thomas Brimelow
BAppSc(Optom)
GradCertOcTherap

A 73-year-old female presented with a one-week history of a sore left eye. She complained of a foreign body sensation, mild photophobia and lacrimation. Her vision was unaffected and there was no significant pain or history of trauma.

The examination found a large infiltrate just inside the superior limbus with an overlying smaller epithelial defect. There was no anterior chamber reaction and no sign of exudate. Moderate blepharitis was present.

The lesion was linear in nature but herpes simplex was excluded due to the tapered edges of the lesion, the larger infiltrate and the normal corneal sensitivity. Bacterial keratitis was excluded due to lack of pain, injection, the peripheral location and no anterior chamber reaction.

A diagnosis of marginal keratitis was made. This condition is generally regarded as an immune-inflammatory reaction against staphylococcal exotoxins.[1] The patient was treated initially with Flarex drops every two hours and Chlorsig 0.5% four times daily. The steroids were slowly tapered according to the improvement in signs and symptoms and the prophylactic antibiotic drops discontinued when the lesion re-epithelised. One week later the defect had resolved completely, leaving a small, faint scar.

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Clinical QUIZ

Dr William Trinh
BOptom OD

An 83-year-old Asian male presents to the practice complaining that his eyes are so swollen that he cannot open them in the morning. He reports that he has had an itchy forehead with headache for three days and was given Telfast by his general practitioner on the previous day. He denies any knowledge of previous chicken Pox (Varicellar) infection.

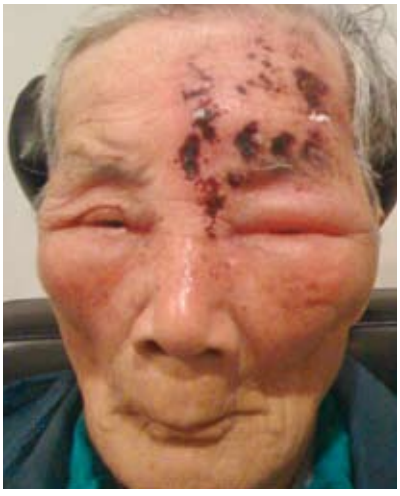
His last eye examination three months ago showed mild cataracts.

Medical history includes type 2 NIDDM and hypertension. His medication includes Diabex, Ramipril and Fosamax. There is no known drug allergy and his family ocular history is unremarkable.

On examination, his unaided vision is 6/12 in each eye. Intraocular pressures are 12 in each eye. He is found to have severe eyelid oedema in the right eye and mild in the left eye. There is a skin rash on the left forehead. There is no Hutchinson sign. Conjuntiva and corneas are clear. There is no corneal fluorescein staining or any evidence of keratitis or iritis. Dilated fundus examination is unremarkable, apart from stable grade 2+ nuclear sclerotic cataracts.

What are your diagnosis and management?

Answer page 27



Day 1

Cardiac drug can xanthopsia

Investigating a patient's medical history unearthed the ocular side-effects of digoxin, a drug used widely in the treatment of heart conditions

Case report

JF is a 63-year-old patient who recently presented with a complaint of 'sunny vision'.

This woman was a regular patient at the clinic and had a history of bilateral uncomplicated cataract surgery. At her previous visit her vision had been 6/6 uncorrected in each eye and her examination had always been otherwise normal. On this occasion her acuity had dropped slightly to 6/7.5 in each eye with no other change in clinical examination. When questioned further about the 'sunny vision', she described her vision as having a yellow tinge with bothersome light sensitivity. Ishihara colour vision testing revealed three errors that suggested mild red-green and tritan defects.

A full medical history revealed that she had been started on a tablet for a fast pulse within the previous six months. She could not remember the name but I confirmed with her GP that it was digoxin.

Digoxin ordigitalis is a purified cardiac glycoside extracted from the digitalis plant, the best known being the beautiful but poisonous Foxglove (Figure 1). The digitalis plant obtains its name because of its shape, which fits easily over a human finger or digit.

Digoxin is widely used in the treatment of various heart conditions—atrial fibrillation, atrial flutter and sometimes heart failure. Digoxin is commonly marketed under the trade names Lanoxin or Digitek. It is also available as a 50 µg/mL oral solution and 250 µg/mL or 500 µg/mL injectable solution. The half-life is about 36 hours and it is given once daily, usually in 125 µg or 250 µg dosing. Therapeutic levels are loosely defined between serum concentrations of 0.5 and 2 nanograms/ml, above which is considered toxic. Interestingly, it was one of the first recorded agents used in modern therapeutics with English records dating back to the 1700s but there are earlier records of its use as a herbal medicine.

Like all drugs, digoxin may have an effect on your physiology. Generally drugs have a number of effects, often dose dependent, one or more of which may be harnessed for therapeutic purposes. The less desirable effects, which do not generally provide therapeutic benefit, may be thought of as side-effects or adverse effects.

The main therapeutic effects of digoxin are on the heart whereas the side-effects are mostly extracardiac. Cardiac effects include a decrease of conduction of electrical impulses through the AV node (antiarrhythmic) and an increase of force of contraction via inhibition of the Na^+/K^+ (Sodium/Potassium) ATPase pump in the membranes of heart cells. The former treats atrial fibrillation or flutter and the latter heart failure.

Digoxin has a narrow therapeutic index therefore side-effects are common. As digoxin competes with K^+ ions for the binding site on the Na^+/K^+ ATPase pump, patients with low K^+ levels are more likely to experience side-effects. The more common side-effects include nausea, vomiting, diarrhoea, dizziness, agitation, depression and visual disturbances.

Visual disturbances comprise xanthopsia or 'yellow vision' as well as halos and photophobia. Xanthopsia can also occasionally be experienced as greenish rather than yellow vision. Patients with xanthopsia describe their vision as bathed in yellow light or yellow blotches in their view. The visual disturbances may be experienced within the therapeutic range of digoxin but are more commonly a sign of drug toxicity. A complaint of xanthopsia needs to be investigated in terms of drug levels and blood K^+ levels. There is widespread speculation that digitalis toxicity was responsible for predominantly yellow paintings produced by the late Dutch artist Vincent Van Gogh (Figure 2).

It turned out that JF was describing xanthopsia. She was referred back to her GP for investigation and dose monitoring. Her digoxin levels were not within toxic range

lead to

Dr Abi Tenen
Ophthalmologist, Cataract and Refractive Surgery

and her K^+ levels were normal. As the digoxin was successfully controlling her atrial fibrillation, she was scheduled for further monitoring before deciding whether to modify her medication. It was decided that if xanthopsia was concerning her, despite successful control of her atrial fibrillation, then her digoxin would be ceased. Her xanthopsia would then be most likely to resolve, but there was also a chance it would resolve on the current dose regimen.

Figure 1. The potent Foxglove plant from which digitalis is extracted

Figure 2. Painting from Vincent Van Gogh's 'yellow phase', thought to be influenced by digitalis toxicity

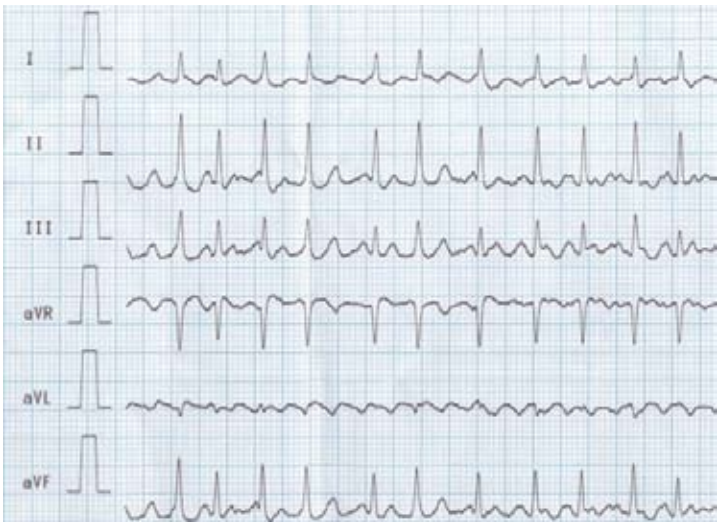


Figure 3. Electrocardiogram demonstrating the cardiac arrythmia atrial fibrillation, often treated with digoxin

Topical medication after cataract

Risks associated with cataract surgery such as vision loss, ocular inflammation and raised IOP can be managed with the right combination of medications

The use of topical medication around the time of cataract surgery is designed to reduce the risk of infection and complications arising from post-operative inflammation such as cystoid macular oedema.

Topical medication is now commonly used for several days prior to the operation, immediately on completion of the operation and for several weeks after the operation.

The exact medication and administration regime varies considerably between individual surgeons although they are broadly similar.

The rationale for the use of topical medication around the time of cataract surgery is performed on the basis of a mixture of good randomised controlled trials, standard practice and first principles. The exact drop regime varies slightly from surgeon to surgeon and individual patients may require a slightly different regime depending on past history, concurrent ocular conditions and individual response to surgery.

Pre-operative medication

Two types of medication are frequently used pre-operatively with cataract surgery, non-steroidal anti-inflammatories agents (NSAIA), usually ketoralac (Acular); and an antibiotic, usually a fluoroquinolone such as ciprofloxacin (Ciloxan).

> **The application of one drop of topical brimonidine (Alphagan) at the end of the operation has been shown to significantly reduce the risk of a pressure rise in the early post-operative course.**

The topical NSAIA ketoralac (Acular) is typically administered x4 daily for three days prior to surgery and for several weeks following surgery to reduce the risk of post-operative cystoid macular oedema (CMO). The benefit of Acular in reducing the incidence of CMO has been demonstrated in a number of well-designed, prospective, randomised controlled studies that have shown it reduces the risk of vision loss from CMO as well as macular thickening post-operatively.[1] I use it as standard treatment for all patients but it is probably of particular benefit in patients predisposed to macular oedema such as those with diabetes, as well as patients with uveitis, previous vitreoretinal surgery and vascular occlusion.

Topical antibiotics are also used by some surgeons pre-operatively, typically x4 daily for three days prior to the procedure. Their use is especially common in some countries, especially the USA. They are specifically used in an effort to reduce the incidence of post-operative endophthalmitis. There are many retrospective reports of their use but the only large prospective study that compared their use to that of intracameral antibiotics at the end of the operation found them to be of no benefit. They remain of unproven benefit in the prevention of endophthalmitis.[2]

Intraoperative medication

Cataract surgery is now commonly performed with topical anaesthetic, typically amethacaine drops combined with direct infusion of the anaesthetic lignocaine directly into the anterior chamber (intracameral) at the start of the operation.

Two classes of topical medication are commonly used at the end of the surgery, antibiotics and IOP lowering agents.

In an effort to reduce the risk of endophthalmitis, antibiotics have been administered at the end of the operation for many years,

before and surgery

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topically as drops or ointment, as a subconjunctival injection, in the infusion fluid or more recently directly into the anterior chamber, intracameral. Several recent studies have demonstrated the efficacy of intracameral antibiotics in dramatically reducing the risk of post-operative endophthalmitis by about six-fold.[2] This appears to be both a safe and the most effective way of delivering the antibiotic. The largest study used the cephalosporin antibiotic ceftriaxone. This antibiotic is not available for injection in Australia; we commonly use cefazoline, which has also been shown to similarly reduce the incidence of endophthalmitis.[3]

A rise in IOP post-operatively is common, especially in patients with pre-existing glaucoma or ocular hypertension. It is also more common when certain retentive viscoelastics are used. Viscoelastics are viscous gel-like agents used during the operation to both maintain the anterior chamber and protect intraocular structures. The application of one drop of topical brimonidine (Alphagan) at the end of the operation has been shown to significantly reduce the risk of a pressure rise in the early post-operative course.[4]

Post-operative medication

Post-operatively, patients are usually treated with a combination of anti-inflammatory agents and antibiotics. While in some countries the latest, broad spectrum fluoroquinoles are used, in Australia we mainly use topical chloramphenicol (Chlorsig). The concern is that such widespread use of fluoroquinoles could lead to the development of resistance and that they are best kept in reserve for treatment rather than prophylaxis. They are typically used x4 daily for one week then ceased.

Both ketoralac (Acular) and a topical corticosteroid such as prednisolone acetate (Prednefrin Forte, which also includes a low concentration of the vasoconstrictor phenylephrine), dexamethasone (Maxidex) or fluoromethalone acetate (Flarex) are also typically used post-operatively. They are both typically used x4 daily for one week then reduced to x2 daily for two weeks and then ceased. The length of use may be increased if there is a history of intraocular inflammation or if the individual patient has more post-operative inflammation than usual.

Generic name	Trade name	Class	Treatment regime
PRE-OPERATIVE			
Ketoralac	Acular	NSAIA	x4 daily for 3 days prior to surgery
INTRAOPERATIVE			
Amethacaine		anaesthetic	prior to operation
Lignocaine		anaesthetic	intracameral* at start of operation
Cephazoline	Kefzol	antibiotic	intracameral* at end of operation
Brimonidine	Alphagan	IOP lowering	one stat at end of operation
POST-OPERATIVE			
Chloramphenical	Chlorsig	antibiotic	x4 daily for 1 week
Prednisonole	Pred Forte	anti-inflammatory	x4 daily for 1 week then x2 daily for 2 weeks
Ketoralac	Acular	NSAIA	x4 daily for 1 week then x2 daily for 2 weeks

* intracameral: injected directly into the anterior chamber

Ocular medication with cataract surgery

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Contact lenses and

A balanced solution

When microbes invade the tear film, the immune system often overreacts with an oversupply of proteins that can cause problems if they are not removed promptly from the surface of a lens

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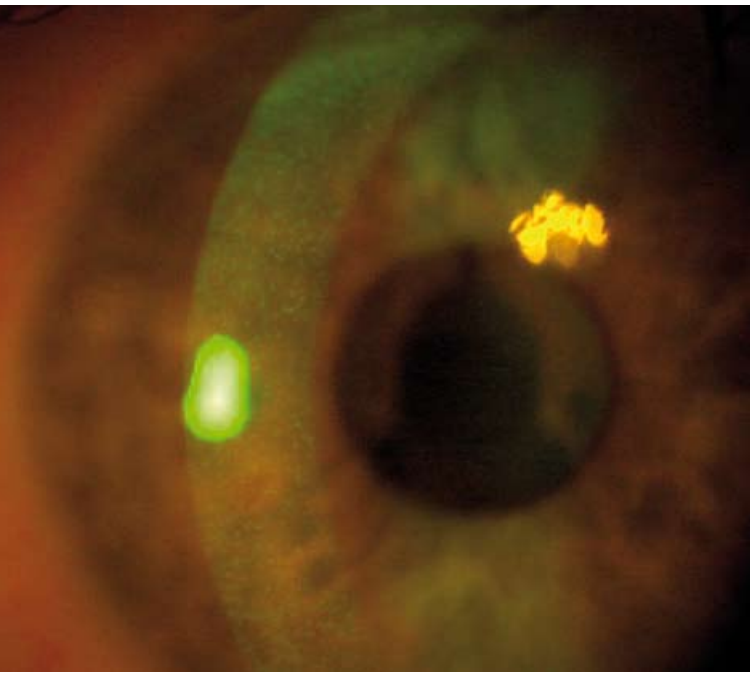
There are many factors that contribute to successful contact lens wear but perhaps one of the most important is the way the anterior surface of the lens interacts with the tear film. You also have to consider the dynamics of the upper lid sliding down over the surface of the lens about 10 times a minute. It is important to remember that when a lens is not in place on the surface of the eye, there is often little or no sensation.

The drive among researchers, academics and clinicians is to emulate the sensation of having no lens on the eye at all and to try to copy the characteristics of the surface of the eye onto the surface of the contact lens. When a lens surface has these properties it is referred to as being 'biomimetic'.

The human body's immune system is being continually challenged; this takes place all over the body, including the eye. When an antigen enters the tear film, the body responds in a variety of ways, depending on the challenge to the host. If the antigen is a particle of dust, the eye will become hyperaemic, but no more than that. On the other hand, if a microbe invades the tear film, the immune system responds immediately. This innate system causes a number of proteins to be released, mainly from the complementary system. Additionally, antimicrobial proteins such as lysozyme, lactoferin and lipocalins are also released into the tear film.

Within a short time, the other arm of the immune system kicks in and the acquired responses come into play. Even more proteins are released, which have been programmed to fight specific microbes. These latter proteins are called immunoglobulins and are found in both infection and, more importantly, allergy. With infection the immunoglobulin Secretory IgA binds to bacteria and prevents bacterial adherence to the corneal epithelium. Tear IgG can also neutralise some viruses and bind bacteria. More commonly the human immune system overreacts and has a disproportionate or exaggerated response; this is what we see in allergy. The allergic eye when exposed to the pre-exposed antigen will release large amounts of immunoglobulin IgE, as well as other mediators to be found in the tear film such as histamine bradykinins.



Punctate staining

inflamed corneas

to removing proteins and lipids

A soft contact lens placed in this environment will most likely become coated with proteins. All it takes is a minor subclinical infection or an allergic response to trigger the immune system into making more proteins to be secreted into the tear film, and eventually they will find their way to the lens surface.

Lens surfaces can attract large amounts of proteins such as lysozyme in just a few hours, but the important factor is not the amount of protein on the lens but the state of the lens. With time, proteins change in their chemical nature and bind to the lens surface very tenaciously. This lens surface, with a covering of denatured proteins, will present a very difficult surface to wet, and clinically the patient will present with reduced wearing times and discomfort.

Clinical implications and rub-n-rinse

Once proteins and lipids are deposited on the surface of the lens, they need to be removed, otherwise the patient may trigger their immune system and develop a papillary conjunctivitis. We have known for many years the importance of removing proteins from the surface of the lens before they denature. Patients want ease of use and supplying them with a chemistry set of solutions is not helping them. The drive for many years has been away from hydrogen peroxide (H_2O_2) based solutions towards multipurpose solutions, of which there is now a large choice.

More recently the solution manufacturers have introduced the option in which the patient can eliminate the rub-n-rinse step. This unfortunate omission is responsible for many of the solution complications we see today. Although the packaging tells patients to always rinse their lenses, many do not and the lens goes straight from the eye into the case. As expected, proteins and lipids build up on the surface, reducing wearing times and increasing levels of bulbar hyperaemia. In the case of silicone hydrogels, the preservatives can adhere to the surface lipids, which would not have been the case had the patient rubbed the surface and then rinsed off the residual lipids.

Solution debate

In 2002 a landmark study appeared in *Optometry and Vision Science*. Researcher Lyndon Jones and his colleagues[1] had noticed an association between balafilcon A lenses and certain PHMB-containing multipurpose care systems. They found that 37 per cent of patients using PHMB-based systems showed the classic solution based punctate staining (Figure left). They noted that the majority of patients were asymptomatic and if no fluorescein had been installed, it would have been likely that the staining would have been overlooked.

For years the debate raged on the clinical relevance of this solution-related staining and compatibility with certain silicone-hydrogel lenses. To help differentiate between certain solutions and different lenses Andrasko[2] developed the staining grid. This proved very controversial and some solution manufacturers challenged the very accuracy of the grid.

The increased use of silicone hydrogels with their higher oxygen permeability meant patients were wearing their lenses longer and even slept in them. Researchers began to notice a greater incidence of corneal inflammatory events (CIE), particularly with these lenses and the multipurpose care solutions. Papas[3] and colleagues at the Institute of Eye Research in Australia showed that solution toxicity may increase the likelihood of CIEs. As a result, some markets have seen a resurgence of H_2O_2 based solutions and even a move away from two-weekly or monthly lenses and towards one-day disposability.

It is inevitable that the anterior surface of any soft lens, including a silicone hydrogel, will become coated with proteins and lipids. It is now evident that the solution and lens combinations that worked with the old hydrogel lenses cannot automatically be used on the new silicone hydrogels. It is also incumbent on the contact lens industry to develop multipurpose solutions that are toxic to the opportunist microbe but not detrimental to the corneal surface. Practitioners need to be cautious about their choice of multipurpose solutions and silicone hydrogel lenses, and be vigilant for CIEs.

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SYSTANE® ULTRA: DESIGNED TO DELIVER THE ULTIMATE IN COMFORT AND PROTECTION

Victor L. Perez, MD

Recent advances in the understanding of dry eye disease have led to the recognition that ocular surface inflammation is a consequence and contributor to the pathogenic process.[1] Presence of a stable tear film able to protect the compromised ocular surface is essential for interrupting the vicious cycle of events that perpetuates ocular surface damage. Systane® Ultra Lubricant Eye Drops (Alcon Laboratories) represents a unique new artificial tear product that may help to achieve this goal.

Systane® Ultra is comprised of ingredients with proven activity in the management of dry eye disease. In addition, it has been formulated with a novel intelligent delivery system, which provides comfort upon instillation, enhanced tear film integrity, and lasting symptomatic relief.

DELIVERING OPTIMIZED VISCOSITY

The loosely structured network of borate and hydroxypropyl (HP)-Guar helps form the foundation for Systane® Ultra. It attaches to damaged areas of epithelium and retains the active demulcents, polyethylene glycol 400 and propylene glycol, on the eye. This platform, which is also found in original Systane® Lubricant Eye Drops (Alcon Laboratories), has been shown in multiple clinical studies to stabilize the tear film and improve the signs and symptoms of dry eye disease.[2-4]

However, unlike original Systane®, Systane® Ultra is an advanced formulation developed to have dynamic viscoelastic characteristics. Systane® Ultra was created with a unique intelligent delivery system that allows for optimal viscosity and comfort upon instillation and then to enhance its lubricating and protective qualities on the eye (Figure 1). With these properties, Systane® Ultra offers patients the desired characteristics of both a drop and a gel.

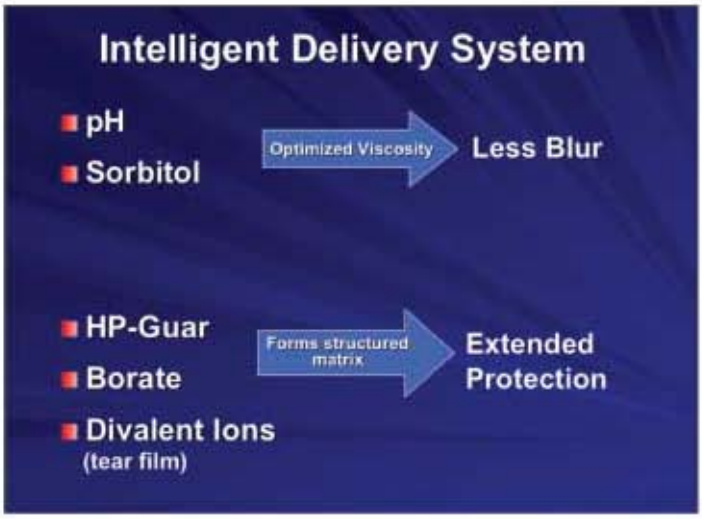


Figure 1. The intelligent delivery system in Systane® Ultra Lubricant Eye Drops (Alcon Laboratories) allows for viscosity adjustment first to optimize upon instillation and comfort and then to enhance the lubrication and protective properties on the eye.

The intelligent delivery system in Systane® Ultra uses ingredients and components in the tear microenvironment to optimize product viscosity and elasticity (viscoelasticity) via a multiphase mechanism of action (Figure 2). The extensive cross-linking between HP-Guar and borate is a key factor governing this adaptive viscoelasticity. To achieve a loosely cross-linked, low-viscosity network in the bottle, Systane® Ultra is formulated at a pH of 7.9 and contains sorbitol, which competes with HP-Guar for bonding to borate.

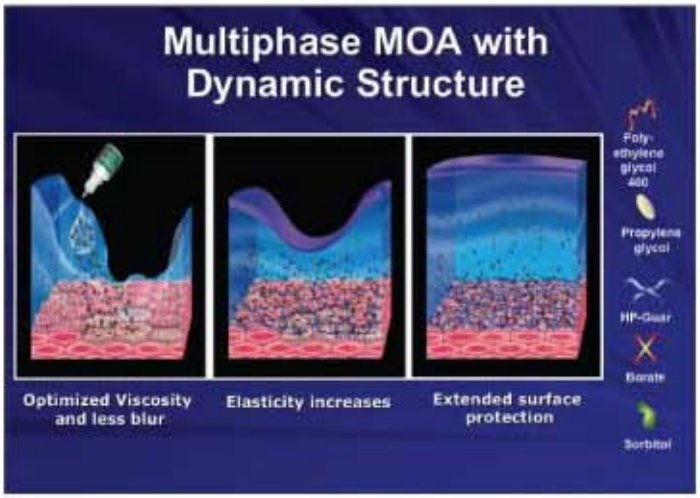
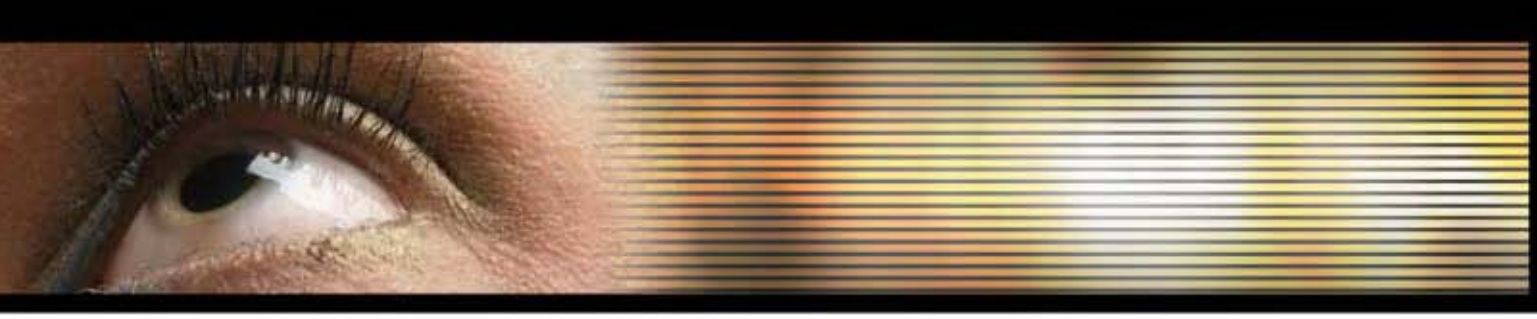


Figure 2. The intelligent delivery system in Systane® Ultra Lubricant Eye Drops (Alcon Laboratories) uses new formulation ingredients and components in the tear microenvironment to optimize product viscosity and elasticity via a multiphase mechanism of action.

The viscosity of Systane® Ultra is further optimized upon instillation. This change occurs first as the result of shear stress from drop release through the bottle tip, and second, it is also promoted by mechanical forces of the blinking lid and the slightly lower pH of the tear film. With its low viscosity, the instilled drop of Systane® Ultra avoids vision-disturbing blur and spreads rapidly over the ocular surface, forming a consistent and soothing layer. Comfort on instillation is further enhanced since the pH of Systane® Ultra (7.9) is close to that of the tear film in most dry eye patients.[5]

The viscoelastic nature of Systane® Ultra changes on the eye as the chemistry of the ocular surface microenvironment promotes stronger cross-linking between borate and HP-Guar. As sorbitol is diluted from the tear film, divalent ions found in natural tears (magnesium and calcium) promote the stronger cross-linking, thereby increasing borate availability and enabling more extensive bonding between HP-Guar and borate. The higher pH of the tear film in dry eye patients (~7.8) further enhances bonding of borate to HP-Guar. The resultant structured network at the ocular surface becomes more elastic and adheres to areas of damaged epithelium. The end result is retention of the active demulcents on the ocular surface, thus serving as a liquid bandage to provide long-lasting lubrication and extended protection. Because of its increased elasticity, Systane® Ultra

Sponsored by Alcon®



conforms to the ocular surface and responds to the shear-thinning activity of the blinking lid for ongoing comfort.

LABORATORY-BASED EVIDENCE

Experiments conducted to investigate the lubricating qualities of Systane® Ultra showed its superiority compared with other commercially available artificial tears and saline control.[6,7] This research used an experimental model created by researchers at the State University of New York at Buffalo Industry/University Center for Biosurfaces to quantify friction generated when two opposing tissues are articulated against each other with different artificial tear products placed in the tissue-to-tissue interface.[8] The frictional forces generated are recorded as the coefficient of friction. A lower coefficient of friction reflects higher lubricity of the artificial tear in the interface.

In an experiment, Systane® Ultra was compared with saline and five other commercially available artificial tear products, Optive™ Lubricant Eye Drops (Allergan), Refresh Liquigel® Lubricant Eye Drops (Allergan), GenTeal® (Novartis), Refresh Tears® (Allergan), and Soothe® XP Emollient (Lubricant) Eye Drops (Bausch & Lomb). The results showed Systane® Ultra had a mean coefficient of friction that was at least 2.5-fold lower and significantly different compared with saline ($P \leq .0001$), and all of the artificial tear products that were included as comparators ($P < .006$) indicating better lubricating properties (Figure 3).

Figure 3. Comparison of lubricity of marketed artificial tears. The mean ± SD coefficient of friction of Systane® Ultra was significantly less (better) compared to saline and all of the other artificial tear products.

Results of a separate study confirmed that Systane® Ultra had significantly greater lubricity compared with saline control.[7] In addition, Systane® Ultra maintained its lubricating and protecting qualities after the interface was rinsed multiple times with saline, indicating its potential to provide extended protection during clinical use.

The results of these bench studies are consistent with our initial clinical observations of the behavior of Systane® Ultra. Our research involves use of high-resolution optical coherence tomography (OCT) for *in vivo* ocular surface imaging. Although the research is still under way, the preliminarily findings demonstrate impressive spreading ability and persistence of Systane® Ultra on the surface of the eye.

CONCLUSION

Artificial tears have long been a cornerstone in the management of dry eye disease. Increased viscosity has been sought as a desired characteristic for increasing contact time on the eye and has been the basis for choosing high-molecular-weight cellulose derivatives as lubricants in some artificial tears. However, use of these agents results in thick, gel-like products that can have poor patient acceptance as a result of caking and blurring.[9]

Systane® Ultra Lubricant Eye Drops is a new product that is formulated to provide dynamic viscoelastic properties, resulting in increased comfort on instillation as well as extended ocular surface protection. Both laboratory studies investigating the performance of Systane® Ultra as well as initial clinical observations indicate that Systane® Ultra represents a highly innovative way to deliver a soothing and protective shield to the eye. Its unique intelligent delivery system and mechanism of action may also help focus researchers' attention on ocular surface chemistry and interactions. As a result, Systane® Ultra may have additional value for opening the door to new ways of thinking about the etiology and management of dry eye disease.

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Rubbing beats rinsing for silicone

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MOptom PhD

How are silicone hydrogel materials different from conventional hydrogel in terms of bacterial adhesion? Appropriate and effective contact lens disinfection in the daily care of silicone hydrogel lenses is fundamental to their safe use but do the contact lens care products available on the market provide sufficient disinfection? Is 'rub' the definite answer?

Silicone hydrogel accounts for 47 per cent of new soft lens fittings in Australia, according to the International Contact Lens Prescribing 2008 report, yet extended wear remains an infrequently prescribed modality, accounting for only six to seven per cent of fittings.[1] Based on this report, it would appear that many optometrists are fitting their patients with silicone hydrogel lenses for daily wear.

Microbial interactions with silicone hydrogel

Silicone hydrogel has the advantage of high oxygen transmissibility but the disadvantage of increased lens surface hydrophobicity. To overcome lens surface hydrophobicity, techniques incorporating plasma into the surface of the lens are used. In lotrafilcon A and B, lenses are permanently modified in a gas plasma-reactive chamber to create a continuous hydrophilic surface. In balafilcon A, lenses are treated in a gas plasma-reactive chamber, which transform the silicone components on the lenses surface into hydrophilic silicate compounds, resulting in the formation of 'silicate islands'. Between these silicate islands are hydrophobic areas. Galyfilcon A and senofilcon A incorporate a moisture-rich internal wetting agent to make the surface more hydrophilic.[2]

Because silicone hydrogel material is more hydrophobic than conventional hydrogel, bacterial binding is more prevalent.[2,3] Studies show that adhesion of bacteria to silicone hydrogel is significantly higher than that of conventional hydrogel lenses.[2,4,5] Willcox et al demonstrated that Pseudomonas aeruginosa and Aeromonas hydrophilia adhere in larger numbers to balafilcon A than to hydrogel lenses like etafilcon A.[5] Other researchers showed that lotrafilcon material is prone to the adhesion of Pseudomonas and Staphylococcus species.[2,4] One explanation is that surface-treated silicone hydrogels like balafilcon A and lotrafilcon A have surface hydrophobicity higher than that of conventional hydrogel lenses and non-surface-treated silicone hydrogel lenses such as galyfilcon A.[2] Another possibility is that surface-treated silicone hydrogel lenses usually have higher lens oxygen transmissibility, which may also promote bacterial binding.[4]

Previously reported outbreaks of microbial keratitis due to *Fusarium* and *Acanthamoeba* highlighted the potential risks of infection associated with contact lens wear. Beattie et al demonstrated that *Acanthamoeba* castellanii trophozoites have a higher affinity for surface-treated silicone hydrogel lenses (lotrafilcon A) compared with conventional hydrogel lenses (etafilcon A) and suggested that silicone hydrogel wear could be at a greater risk of promoting *Acanthamoeba* infection.[6] Ahearn et al showed that attachment and penetration of unworn lenses by Fusarium occurs sooner and to a greater extent with surface-treated silicone hydrogel lenses (lotrafilcon A and balafilcon A) than with hydrogel lenses (etafilcon A).[7]

Bacterial and *Acanthamoeba* adhesion to contact lenses is strongly related to protein adsorption on the lens surface. Tear film proteins and mucins formed on the lens surface in contact lens wear may alter surface properties like hydrophobicity and induce specific interactions between tear molecules and microbial cell receptors. Willcox et al found that for most material-strain combinations, there are increases in adhesion to worn lenses or no differences in adhesion

or soaking hydrogels

between worn and unworn lenses.[5] Worn lenses adsorb tear film components, and bacteria is able to grow on those proteins that are adsorbed to a lens surface.

Santos et al found that, in some cases, worn silicone hydrogel materials are less prone to bacterial adhesion than worn conventional hydrogel lenses because the orientation of the hydrophilic regions of adsorbed molecules to the outer environment may render the lens surface of the silicone hydrogel less hydrophobic.[8] Other researchers found no marked difference in bacterial adhesion between worn and unworn silicone hydrogel lenses.[9]

Rub versus no rub

If silicone hydrogel is prone to bacterial, fungal and *Acanthamoeba* adhesion, do the commercially available 'no rub' products provide sufficient protection for silicone hydrogel wearers?

Bacteria like *Pseudomonas aeruginosa*, *Staphylococcus marcescens* and *Staphylococcus aureus* can form bacterial biofilms on silicone hydrogel lenses. These bacterial biofilms are microbial communities that adhere to the lens surface and contain an extracellular matrix of polymeric substances. Szczotka-Flynn et al found that these bacterial biofilms forming on the silicone hydrogel lens surface (lotrafilcon A) are resistant to multipurpose contact lens care solutions even if the lenses are rinsed with saline before soaking.[10]

On the other hand, Kilvington and Lonnen demonstrated significant differences in efficacy against bacteria, fungi and Acanthamoeba between multipurpose contact lens care solutions when tested according to the manufacturers' recommended protocols.[11] A 'rub and rinse' formulation, such as Complete Easy Rub MPS (Abbott Medical Optics Inc), gives satisfactory results for bacteria, fungi and both *Acanthamoeba trophozoites* and cysts with both lotrafilcon B and senofilcon A lenses. In contrast, a 'no rub but rinse' formulation, such as Opti-free RepleniSH solution (Alcon Laboratories), is effective against bacteria and *Fusarium* solani but not against Candida albicans with both lotrafilcon B and senofilcon A lenses. It also fails on *Acanthamoeba* trophozites and cysts with lotrafilcon B and *Acanthamoeba* cysts with senofilcon A.

Further evidence from Zhang et al showed that rinsing of a silicone hydrogel contact lens alone will not consistently remove fungal surface deposits as efficiently as a rub and rinse process for silicone hydrogel lenses. In this study, all test silicone lenses yielded recoverable fungi, even after vigorous multipurpose solution treatment, over a 28-day period when a rub-rinse regimen was not applied.[12]

The answer is definite. The use of a manual rubbing step is more effective than rinsing or soaking alone in removing pathogenic microbes from silicone hydrogel lenses. Although silicone hydrogel lenses tend to attract more micro-organisms to the lens surface, an extra rub-step may provide greater protection to silicone hydrogel wearers by reducing the number of potentially pathogenic micro-organisms introduced to the eye.

Hydrogen peroxide as an alternative

Hydrogen peroxide is the gold standard of contact lens care. It provides powerful disinfection and may be more effective for silicone hydrogel lenses, which have the potential for greater adherence of micro-organisms. A hydrogen peroxide system with a timed-release neutralising tablet has proven to be the most effective system against tap-water and clinical strains of *Acanthamoeba*.[13] The timed-release neutralising tablet delays the neutralisation process, allowing longer exposure to peroxide and hence increasing the disinfection efficacy against micro-organisms. Another advantage is that hydrogen peroxide can virtually eliminate solution-induced corneal staining found in some combinations of multipurpose solutions and silicone hydrogel lenses.[14]

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Use sanitising gels with care when handling contacts

Can residue of alcohol-based sanitising gel on your hands lead to ocular irritation after handling contact lenses? **Gary Oshry** investigates

Like all optometrists Adam Kelly (Lismore NSW) knows that contact lenses should be handled with clean, washed and dried hands. To ensure he meets the hygiene standards when treating contact lens patients Kelly keeps an alcohol-based hand sanitiser in each of his consulting rooms and another at the front desk.

Hand-washing is the single most important step in preventing the spread of infection in the health-care setting[1]. Kelly says that he prefers using a sanitiser gel because continual exposure to soap-based products with water leaves his hands dry and chapped. Using a sanitiser gel instead of water and soap also ensures that his hands are completely dry at all times–wet hands are more likely than dirty hands to carry germs.

Problems may arise when using an alcohol-based sanitiser if the evaporative alcohol is transferred from the hand to a contact lens, causing an irritation to the eye. Kelly recommends using the Aqium hand sanitiser and every fourth time a soap-base Dettol hand wash to reduce the residue.

'The consequences beyond an irritated eye are minimal but it is, nonetheless, uncomfortable for the contact lens wearer,' says chief scientific officer at the Institute for Eye Research, Mark Willcox.

'It is most important that you use a sanitiser with over 60 per cent alcohol content needed to effect disinfection,' he says. 'Be wary of some of the home-brand sanitisers, which have less than the required alcohol content. I also recommend that you try a few brands to see which one leaves less of a residue on your fingers.'

Not using the hand sanitiser correctly may increase the risk of causing eye irritation from remaining bacterial and viral material. When washing with soap and water, hands are dried thoroughly with a lint-free tissue or disposable towel to remove infectious agents. When using hand sanitisers you air dry, so the towel drying process is not performed. Often there are no instructions on the bottle stating how best to rub hands afterwards to remove remaining organic material. According to Willcox, the eye is not very reactive to dead bugs but there is always the danger that large quantities of dead bugs on the fingers can cause an irritation in the eye.

According to the *Infection control guidelines for optometry* 2007,[1] alcohol-based antiseptics that contain isopropanol, ethanol, n-propanol or a combination of two agents are an effective form of hand hygiene but care must be taken to remove visible dirt before use. They recommend that hand sanitiser be used only in cases of emer-

Characteristic	Soap	Medicated soap	Alcohol compound
Removal of debris	Yes	Yes	Yes
Killing of transient bacteria *in vitro*	Good	Very good	Excellent
Elimination of bacteria *in vivo*	Good	Good	Excellent
Estimated time for procedure	1–2 min	1–2 min	30 sec
Cost	Very low	Low	Very low
Working possible during procedure	No	No	Yes, in part
Risk for recontamination by water/tap	Yes	Yes	No
Risk for contamination of soap/hand rub	Yes	Yes	No
Accessibility	Limited by sinks	Limited by sinks	No
Location	At sink	At sink	Anywhere, at bedside and/or door
Compliance > 40%	Rare	Rare	Likely, promising but limited data
Towel needed to dry hands	Yes	Yes	No
Side-effects on skin	Very rare	Rare	Very rare
Maintenance cost (water, heat, plumbing)	Moderate	Moderate	Low
Flammable	No	No	Yes, risk depends on flash point of product

Comparison of hand washing agents and alcohol-compound hand rubs

Table: Leo Hartley

Recommended procedures for hand-washing

- To decrease the risk of dermatitis, avoid using hot water.
- It is preferable to use liquid hand-wash dispensers with disposable cartridges and disposable dispensing nozzles.
- Rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers.
- Dry thoroughly with disposable towel, patting hands dry to minimise chapping. Do not use multiple-use cloth towels or hand-dryers.
- Use disposable towel to turn off tap, if elbow or foot controls not available.
- Cover cuts and abrasions with water-resistant occlusive dressings or use surgical gloves.
- Keep fingernails clean and short; do not wear artificial nails.
- Use non-perfumed, hypoallergenic hand creams to avoid cracking of skin and dermatitis.

Adapted from the Infection Control Guidelines for Optometry 2007

gency, when water-washing facilities are inadequate or if you have an allergy.

Should you be advising contact lens patients to wash and dry before handling contact lenses? Perhaps so but the *Guidelines for Safe and Effective Use of Contact Lenses*[2] state that a contact lens wearer is most at risk when on vacation. During camping trips or while commuting for extended periods, for example, is when most patients will be tempted to use alcohol-based sanitisers.

Offering a word of caution may be a more appropriate tack. Willcox says practitioners should advise their contact lens patients that following instructions will minimise the risks of irritation and if they buy a product that does cause irritation, try a different brand.

1. Lakkis C, Lian K, Napper G, Kiely P. Infection control guidelines for optometrists. *Clin Exp Optom* 2007; 90: 6: 434-444.
2. Guidelines developed at the Asia Pacific Contact Lens Care Summit 2007; http://www.ier.org.au/pdf/apac_guidelines.pdf.

Explain to patients why eye-drops sting

A level of toxicity is necessary for eye-drops to be effective so patients need to be assured that the stinging sensation means the eye-drops are working, says **Helen Carter**

Eye-drops can sting and there is not much optometrists can do about it, says New South Wales optometrist and research pharmacologist Dr Philip Anderton. Altering a pharmaceutical preparation in an attempt to reduce the stinging sensation will often render the drug ineffective, and it is an offence to alter a Therapeutic Drugs Administration-authorised drug preparation for use in optometry, he said.

'Some say warning patients about the stinging sensation is a good idea while others say you shouldn't because it makes them worry,' said Anderton.

'I think the best option is to be honest. When instilling a local anaesthetic such as Benoxinate Minims for tonometry I say "These drops may sting a little but they are an anaesthetic so the mild sting will go away quickly".'

Reassuring patients that the stinging sensation means the drops are working can also help. Anderton says some patients are more sensitive to these sensations and generally to having anything done to their eyes.

Director of professional training for Bausch and Lomb, Asia, Osbert Chan said it is not uncommon for patients to report a stinging sensation with local anaesthetic eye-drops.

'Warning the patient of the possible stinging sensation would be helpful,' he said. 'Since this is a professional product used only by qualified practitioners, I think the optometrist can make a judgment on what warning to give or whether a warning is required.'

Anderton says there are non-stinging eye-drops, such as lubricants. 'It all depends on the vehicle—what the active ingredient is dissolved or emulsified in; the chemical buffer which keeps the pH constant, and the active ingredient,' Anderton said.

Each drug requires a certain pH to enter the eye. Any preparation buffered to physiological pH of 7.4 and reasonably isotonic, such as isotonic sterile saline, should not sting. When pH deviates from normal physiological pH of 7.4, it can become acidic or basic and stimulate pain receptors in the cornea and conjunctiva, he said.

'Many active agents, such as Benoxinate local anaesthetic Minims, need a pH different from 7.4 to work properly and enter the tissues, so they are stored in a vehicle that is buffered to an appropriate pH. For Benoxinate Minims the vehicle is water and diluted hydrochloric acid. The cornea doesn't like it when you hit it with that preparation,' Anderton said. 'The acidity and volume of drops are too small to cause damage, but the drops still sting momentarily.'

There may be agents other than buffers that could also make drops sting. Anderton said it would be too difficult and the cost benefit would not be acceptable for pharmaceutical companies to formulate non-stinging eye-drops.

Chan said he is not aware of any research by Bausch and Lomb to reduce the stinging sensation of its Minims Benoxinate product Oxybuprocaine.

Practice hygiene and an everyday

Practice hygiene and infection control procedures are becoming increasingly important for the profession as more optometrists gain therapeutic endorsement.

New swine 'flu guidelines[1] for optometrists and recommendations for health workers to be vaccinated are a timely reminder for optometrists to review general infection control.

The odds of contracting or transmitting an infectious disease while practising may be small but it does happen; there was a case of an Australian optometrist who contracted hepatitis C while at work. Medical literature shows eye-care practitioners are in a high risk category for contracting and transmitting hepatitis B, which is in all body fluids including tears.

According to the *Infection Control Guidelines for Optometrists 2007*,[2] communicable diseases that could be encountered in optometric practice include HIV, tuberculosis, herpes, 'flu, hepatitis C, measles, mumps, rubella, chickenpox, shingles, glandular fever, impetigo, infectious conjunctivitis and keratoconjunctivitis, adenovirus 8 and Cruetzfeldt-Jakob disease.

Optometrists may be exposed through blood, tears or mucous membranes when removing foreign bodies or eyelashes, assessing patients with ocular trauma, conjunctivitis, microbial keratitis or incontinence, contact lens fitting, or during expression of glands and cysts.

Nasty diseases can be transmitted between patient and practitioner so be vigilant about infection control. **Helen Carter** reports

infection control are responsibility

The guidelines recommend reducing risk by using single-use instruments and equipment, reprocessing reused items, following routine standard infection control precautions and adopting more rigorous procedures for infected or immuno-suppressed patients. Always adhere to the manufacturers' instructions on cleaning and disinfection of ophthalmic instruments before and after use.

Avant Law's national manager of medico-legal advisory services, Andrew Took, says patients who contract an infection post-consultation will sometimes make a claim or complaint against the practice, alleging that infection was caused by inadequate infection control. Defence of such a claim or complaint is problematic without evidence of appropriate infection control procedures being followed at the practice, he says.

Immunisation is another protective measure. Consider vaccination against influenza, hepatitis A and B, and measles, mumps and rubella. Swine 'flu guidelines say that although basic infection control will reduce the spread of infection in practices, it is preferable for patients with 'flu-like symptoms to reschedule or for a mask to be worn by both patient and practitioner.

The association's practice standards[3] recommend that practitioners follow manufacturers' instructions in terms of usage, dosage and storage of pharmaceuticals and contact lens solutions, as multi-dose bottles have an increased risk of contamination after opening. Standards recommend that equipment is regularly cleaned, calibrated, tested and maintained and documented in a policy and procedures manual, and staff are trained in infection control, especially contagious ocular conditions.

Daily consulting room hygiene includes cleaning bench tops and sinks, covering equipment, damp mopping floors and walls, and wiping keyboards. In addition, there should be a hand-basin in every consulting room as well as paper towels or skin disinfection products wherever contact lenses are inserted.

The *Infection Control in the Health Care Setting* guidelines[4] state that hand-washing is the most important measure in preventing the spread of infection. These and optometry guidelines recommend hand-washing before and after significant patient contact and activities likely to cause contamination. Alcohol hand hygiene formulations are most effective, followed by chlorhexidine, iodophors then triclosan products.[2] Use plain soap or waterless alcohol-based hand rubs and gels only when there is insufficient time or inadequate washing facilities, or in the case of allergies.

Gloves are recommended when there is a risk of exposure to blood or body substances, and protective eyewear and masks if there is potential for splattering of blood or body substances, or airborne infection.

Mitcham, VIC, optometrist Tony Gibson, who works at the Royal Melbourne Hospital, says therapeutically endorsed optometrists are slightly more aware of infection control.

Gibson has abandoned bottled saline in favour of individual sterile saline and uses alcohol wipes on equipment between patients. He says optometrists should ask if patients have infectious diseases, perhaps on the enrolment form. 'We don't do really invasive stuff unless there is a foreign body removal, [in which case] we wear gloves and follow proper disposal protocol,' he says.

Queensland optometrist Leo Hartley says studying medicine has brought home to him the importance of infection control, especially hand hygiene. He says that many hospital-acquired infections are due to health workers' unclean hands.

Hartley says Australian guidelines say alcohol hand-rubs are not gold standard but more recent *American Centre of Disease Control Prevention* guidelines suggest they are acceptable if hands are not soiled. 'Alcohol rubs are fine between patients and it's OK to use them three or four times; then you should wash hands with soap and water, especially when handling contact lenses. Alcohol gels can leave a residue on your hands, which may get into the patient's eyes,' Hartley says.

He recommends wiping chin and hand rests and refractor head frames with alcohol wipes after each consultation, and wearing gloves when looking under lids.

Association national board deputy chairman, Tasmanian optometrist Micheal Knipe, says infection control is important and needs constant reinforcement. 'Infection control is highlighted as part of the therapeutic endorsement course but it should be equally important to all optometrists, regardless of whether they are therapeutically endorsed,' he says.

'Basic hand-washing is a fundamental measure, not only between patients but sometimes during the consultation, as is the use of disinfectant wipes and alcohol-based antibacterial hand-washes. Convenient hand-basin facilities promote frequent hand-washing.'

Knipe says optometrists should ask and be aware of their patients' general health, including infectious diseases. Good infection control includes practice staff, and keeping the practice clean with all flat surfaces disinfected and alcohol-based antibacterial hand-wash for staff and patients, he says. Knipe's practice also offers to pay annual 'flu vaccination costs for staff members.

1. Influenza A (H1N1) and infection control guidelines for optometrists. *Clin Exper Optom*, published online September 22, 2009.
2. Infection control guidelines for optometrists 2007. *Clin Exp Optom* 2007; 90: 6: 434-444.
3. OAA Practice Standards, 2nd edition. November 2007, www.optometrists.asn.au.
4. Australian Department of Health and Ageing. Infection control guidelines for the prevention of transmission of infectious diseases in the health care setting, January 2004, www.health.gov.au.

Three ways to tackle biocompatibility

Ian G Sim
BOptom

Your job includes continually monitoring tear film integrity, contact lens suitability and lens care system interaction in the contact lens wearer

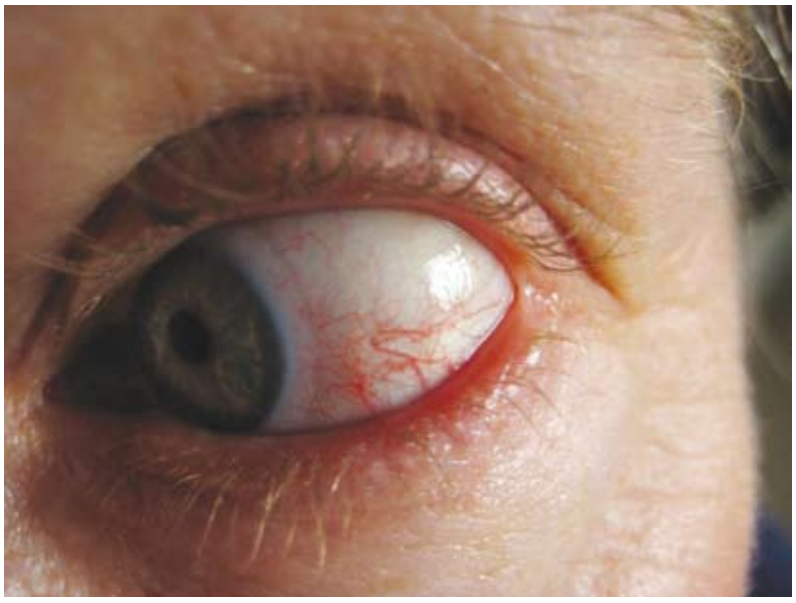
Contact lenses are intimately related to biology, physiology and pharmacology. Looking at the interface between the eye and contact lens from this perspective helps us understand how these seemingly separate topics are interrelated.

Tear film

First, there is the underlying tear layer and anterior ocular surface, its biochemistry and physiology. In many cases meibomian gland dysfunction (MGD), particularly of the inferior lid margin, can hinder contact lens comfort. Lid scrubs using heat combined with mechanical actions, pinching lid margins, lid care, Sterilid, antibiotics and flaxseed oils can manage the condition although patient compliance is always a variable factor.

The superior palpebral conjunctiva and its leading edge (the lid wiper epitheliopathy as described by Korb), lid texture with giant papillary conjunctivitis (GPC), and associated dermatological and systemic conditions can also affect tear film integrity—note the atopic disease profile in keratoconus.

These anterior eye properties should be closely inspected prior to contact lens fitting and then monitored at regular intervals. Many patients who cease wearing contact lenses cite discomfort as the determining factor, which may be due to the practitioner neglecting to monitor these properties.



Lens materials

Second, there are the contact lens materials themselves. Even with rigid gas permeable (RGP) materials there are biocompatibility issues. There is a case of a long-standing RGP wearer changing to a highly permeable hard lens for better physiology, only to present with allergic symptoms and reduced wearing time and tolerance. Following the change to care products by the same manufacturer, there was no improvement in superficial punctuate keratitis. This condition was resolved immediately when the patient reverted to the original RGP material and care routine.

Silicone hydrogels have been mistakenly proposed by some as the answer to most contact lens issues. There have been numerous examples of intolerance to silicone hydrogels (Figure) that have been resolved by the patient returning to ordinary hydrogels. Just a few minutes exposure to a new silicone hydrogel lens can spark hyperaemia and temporal bulbar oedema, as is evident by the impingement of the lens edge. Changing solutions and wearing patterns often fails to resolve the complications because the issue is in the lens material—despite polymer chemists attempting to cover or encapsulate the silicone and despite manufacturers' assurances otherwise.

Sensitivities can also be caused by an immune system response to chemicals used in lens tints, even after considerable time of successful wear. Dot-printed coloured contact lenses create front surface friction,

particularly if worn for long periods.

Material characteristics such as modulus, charted by contact lens manufacturers, do little to explain the interaction of upper lid traction over the anterior surface of the contact lens. We recognise the different feel in material characteristics, yet are unable to quantify the actions that result from the friction created. Perhaps the friction on the leading edge of the upper lid margin and the whole superior lid plate plays a vital role in the incidence of GPC, in conjunction with the chemical reactions of denatured protein. Ten years after the introduction of silicone hydrogel, we still have little understanding of the differences between hydrogel and silicone hydrogel GPC.

Lens solutions

The contact lens solution industry has its own vested interests. When reading literature on the interactions of solutions and contact lenses, keep the principal sponsors' credits in mind.

Even the humble saline solution can be problematic. The most readily available saline solutions need to be stored in the refrigerator after opening. This rings warning bells and spells potential complications. In hindsight, given the recalls experienced in recent years and with the benefit of more detailed analysis of corneal reactions with multipurpose solutions at very high magnification, it seems that all such solutions pose problems.

Practitioners need to evaluate the risks against the 'convenience'. For most of my contact lens patients I have favoured prescribing hydrogen peroxide in its various evolutionary forms. Nothing beats the resultant unpreserved saline residual after neutralisation, as well as the potency of disinfection and other oxidising properties.

Lubrication has become a common form of supplementary contact lens management. Apart from unit dose, some of the newer and smarter lubricants have their preservatives released on exposure to light and from my experience seem effective in avoiding the problems that accompany preservatives.

Although regular soft contact lens prescribing has been simplified, it is clinically necessary to do a full tear film and anterior surface work-up prior to prescribing, and offer the patient ongoing advice on tear film integrity, contact lens material suitability, preferred care systems and how determinants interact to enhance contact lens comfort. Advice should be made without assumptions on the basis of individual patient profiles.

'Practitioner only' disinfectant for RGP lenses

Mark Whibley
Menicon Australia

For many years contact lens practitioners have struggled to find a convenient and safe method of sterilising their RGP diagnostic lenses and with the increased awareness of orthokeratology, this problem has been exacerbated.

MeniLab 0.5% is a dedicated 'practitioner only' disinfecting solution for all types of RGP lens and is now available in Australia, having gained TGA approval. It was developed and produced in Europe by Menicon pharma, the care solutions arm of Menicon Co Ltd.

MeniLab was developed specifically to disinfect RGP trial lenses against bacteria, yeasts and moulds, viruses, amoeba and unconventional transmissible agents. It also has a cleaning effect on any type of RGP material.

Using active chlorine, MeniLab is effective after five minutes of treatment.

A major feature of this solution is that the trial lens can be disinfected and stored wet for future use without touching the lens, thus eliminating the chance of infecting the lens following disinfection.

In addition, the lens storage vial is disinfected simultaneously.

Here is the method of use:

- following use, rub/rinse the trial lens to remove surface debris
- insert the trial lens into the lens storage vial holder
- empty any remaining storage solution from the lens storage vial
- fill the lens storage vial with MeniLab solution
- screw the lid holding the lens into the base of the storage vial, which has been filled with MeniLab and soak for five minutes to disinfect
- unscrew the lid and empty the MeniLab from the vial
- rinse the lens and inside the storage vial with MeniCare Plus solution, touching only the outside of the lens vial lid and base
- fill the lens vial base with MeniCare Plus solution and screw the cap to the base
- the lens is disinfected and ready for the next patient trial
- rinse the lens with MeniCare Plus prior to insertion.

MeniLab provides a safe, easy method of disinfecting all practice trial RGP lenses of any material or design, including ortho-K lenses.

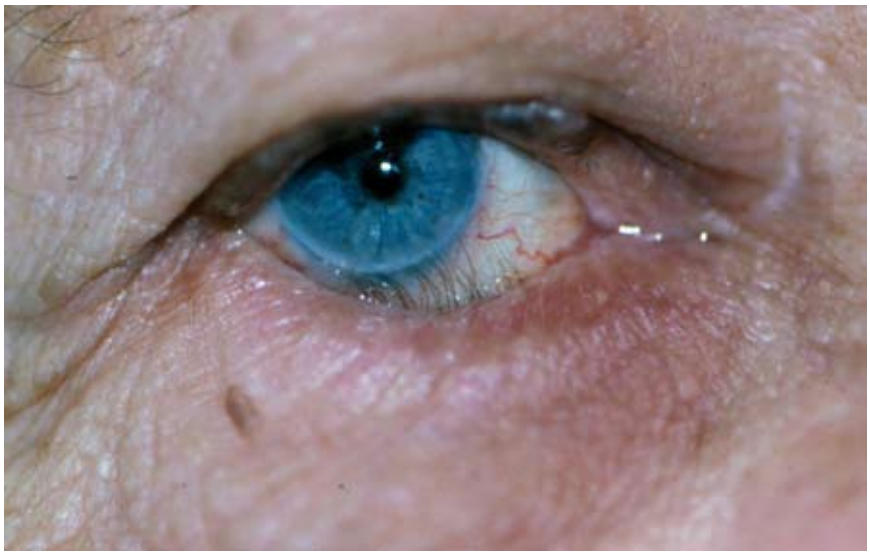
Botulinum toxin to treat

Dr Nathan Lighthizer
OD
Dr Leonid Skorin Jr
OD DO FAAO FAOCO

A patient presented with symptoms of redness, irritation and tearing that had been present for the previous three months. An eye examination revealed entropion with secondary trichiasis. The examination results are reviewed here, followed by a brief overview of the types of entropion and their aetiologies, and finally, signs, symptoms and treatment options are discussed for entropion.

Case report

A 94-year-old man presented with a three-month history of redness, irritation and tearing in his right eye. The symptoms were described as constant with minimal to no relief seen during the previous three months. An anterior segment examination revealed 1-2+ conjunctival chemosis and injection along with 2+ superficial punctate keratopathy (SPK) secondary to trichiasis caused by the entropion of the right lower lid. Examination of the left eye revealed a clear conjunctiva and cornea.



The patient was diagnosed with chronic involutional (senile) entropion of the right lower lid. Surgical correction of the entropion was declined by the patient. Instead the patient chose Botox (botulinum toxin type A, Allergan Inc) injections for temporary relief. An injection of 2.5 units (0.1 cc) was given along the medial, central and lateral aspects of the right lower lid for a total of 7.5 units over the entire lower lid.

The patient returned three months later, stating that the redness, irritation and tearing had significantly decreased after the Botox injections. However, over the previous two weeks he had noticed a slight increase in symptoms in the right eye. An anterior segment examination revealed trace 1+ conjunctival chemosis and injection with a clear cornea in the right eye. The left eye's anterior segment examination remained normal. A second round of Botox injections was given in the same amount and location as the first set of injections.

The patient returned again three months later, reporting a sequence of events identical to those of the previous visit. A third round of Botox injections was given in the same amount and location as the first two. The patient elected to schedule surgery for a right lower lid entropion repair in three months instead of continuing the repeated injections.

entropion

Entropion is a condition in which the eyelid margin turns inward against the globe.[1,2] This inversion of the eyelid margin may affect either eyelid, although the lower eyelid is more frequently affected.[2,3] It may be unilateral or bilateral, and is classified as congenital, spastic, cicatricial or involutional (senile).

Congenital entropion is very rare and results from the improper development of the retractor aponeurosis insertion into the lower border of the tarsal plate. Congenital entropion must be distinguished from the more common epiblepharon in which there is no in-turning of the eyelid margin. With epiblepharon the pretarsal orbicularis muscle and overlying skin ride above the lid margin to form a horizontal fold of tissue, which allows the eyelashes to assume a vertical position and rub against the eyeball.[2,4]

Spastic entropion is usually due to ocular inflammation or irritation. It is most frequently seen following intraocular surgery in a patient who had unrecognised involutional eyelid changes pre-operatively. Spastic entropion needs to be differentiated from benign essential blepharospasm.[2,4]

Cicatricial entropion results from a shortening or loss of the conjunctiva and posterior lamella of the eyelid. A variety of conditions may lead to cicatricial entropion including autoimmune (cicatricial pemphigoid), inflammatory (Stevens-Johnson syndrome), infectious (trachoma, herpes zoster), surgical (enucleation, ptosis) and traumatic (thermal or chemical burns, scarring).[2,4]

Involutional entropion is the most common cause of entropion in elderly patients. It affects mainly the lower eyelid because the upper lid has a wider tarsal plate and is more stable. Ageing changes create a relative excess of skin and anterior lamellae of the eyelid. This causes overriding of the preseptal orbicularis muscle over the pretarsal muscle during lid closure, which tends to move the lower border of the tarsal plate away from the globe and the upper border towards the globe.[1,2] Persistent rubbing by in-turned eyelashes against the conjunctiva and cornea leads to conjunctival chemosis and injection, SPK and potentially corneal ulceration.

Most patients with entropion exhibit symptoms such as tearing, irritation, foreign body sensation and red eye. Signs seen on slitlamp examination include an in-turned eyelid margin, horizontal lid laxity, overriding preseptal orbicularis, conjunctival injection, trichiasis, SPK, pannus and corneal ulceration.[2,3] Physical testing of the involved eyelid includes pulling the eyelid away from the globe to test for lid tone (snap-back test). A poor eyelid tone indicates horizontal lid laxity. The inferior fornix is also unusually deep and the lid may be easily pulled away from the globe.

Superior migration of the preseptal orbicularis is detected by observation of the preseptal orbicularis as the patient squeezes his or her eyes closed after the entropic lid has been placed in its normal position (orbicularis override test).[4,5] Digital eversion at the inferior border of the tarsus can help distinguish involutional from cicatricial entropion (involutional rotates, cicatricial does not).[2,3]

Correction of the entropion is essential as persistent entropion will compromise corneal integrity, which can cause vision loss. Immediate relief can be provided by inserting a soft contact lens in the eye to provide a barrier between the in-turned eyelashes and the cornea. Taping the misdirected eyelashes is another temporary means of removing the offending lashes from the cornea. Topical lubricating ointments or epilation of eyelashes that are rubbing against the globe can also give temporary but immediate relief.

Botox injections are a viable option in patients with entropion who are either poor surgical candidates or who are unwilling to undergo surgical repair. The use of Botox for entropion relief is an off-label use. Botox is injected into the orbicularis muscle and works by weakening the protractors of the eyelid. The injections start to take effect after 24 to 48 hours, with the maximal effect seen by day seven. The effectiveness of the Botox injections tends to last three to four months, with the entropion often returning after the injections wear off.

Early reports suggested using 15-20 units of Botox into the preseptal orbicularis muscle of the lower lid.[6-8] As seen in the case report, effectiveness has been shown with as little as 7.5 units total injected into the preseptal orbicularis muscle of the lower lid. Starting with three 2.5 unit equidistant injections and increasing the dosage if ineffective has proven to be a reasonable guideline to follow. Although rare, side-effects of Botox injections include ptosis, inability to close the eye, dry eye, and local bruising or discomfort.[9]

Entropion is a common condition associated with ageing that involves the in-turning of eyelashes that are directed against the globe, which can cause corneal insult. Symptoms include irritation, tearing and red eye. Temporary treatment options include bandage contact lenses, taping the lashes away from the eye and Botox injections. To achieve a long-lasting correction, surgery is the best option.

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News briefs

Adverse medication events increase

A rise in the incidence of adverse drug events in Australia has prompted calls for further research to identify problem drugs and drug combinations.

General practitioners are spending significantly more time managing adverse effects of medical agents than they were 10 years ago, despite an overall drop in the management rate of other injuries.

One in 10 patients has experienced an adverse drug event in the past six months, according to a report[1] examining the changes in the activities of general practitioners in 1998-2008.

The report used data from the Bettering the Evaluation and Care of Health program, which collects details for about 100,000 encounters between GPs and patients.

Findings showed people aged 45 years and older, children aged one to four years, and female patients were more likely to experience an adverse drug event. In patients aged 15 to 24 years, females suffered 92 per cent of all adverse effects of a medical agent. Associate Professor Helena Britt, who co-authored the report, said the high rate of female patients experiencing adverse drug events related to adverse effects from the contraceptive pill. Older patients were at an increased risk due to polypharmacy, she said.

1. Fahridin S. Injury. In: Britt H, Miller GC, eds. General Practice in Australia, Health Priorities and Policies 1998 to 2008. General practice series no. 24. Cat. no. GEP 24. Canberra: Australian Institute of Health and Welfare, 2009.

'Rub and rinse' labelling

Labelling on contact lens solutions should specifically instruct consumers to 'rub and rinse' their lenses to avoid bacterial or fungal eye infections and improve safety.

This is one of the recommendations put forward by the United States Food and Drug Administration (FDA) in an industry guidance document, due for release next year.

The FDA likened the 'rub and rinse' method of contact lens cleaning to washing your hands, saying it contributed to better lens hygiene and safety.

The FDA document recommends including discard dates on all contact lens solution labels, in addition to the usual expiration date. Its recommendations apply to multipurpose contact lens care products that can be used to clean, disinfect and rinse contact lenses.

Riboflavin and UV collagen crosslinking

A case report[1] involving an infectious keratitis patient has highlighted the efficacy of riboflavin and ultraviolet collagen crosslinking in treating the disease.

A 25-year-old female contact lens wearer was diagnosed with unilateral severe keratitis with unclear pathogenesis. Best corrected visual acuity at presentation was 6/300.

A four-millimetre, annular, semi-opaque infiltrate was found on the paracentral parts of the cornea in the left eye.

The patient underwent treatment with broad-spectrum antibiotics also covering *Acanthamoeba*. During the first month of treatment, the keratitis advanced and corneal thickness diminished, and treatment with riboflavin and UV collagen crosslinking commenced.

The crosslinking therapy triggered a rapid decrease in pain and necrotic material and repair of the cornea began within days. The wound had healed completely after two months; after nine months of treatment, best corrected visual acuity was 20/30.

1. Moren H, Malmsjo M, Mortensen J, Ohrstrom A. Riboflavin and ultraviolet A collagen crosslinking of the cornea for the treatment of keratitis. *Cornea* 2009. http://journals.lww.com/corneajrnl/Abstract/publishahead/Riboflavin_and_Ultraviolet_A_Collagen_Crosslinking.99826.aspx (published online)

Drug-eluting lenses in 15 US states

North Dakota and Connecticut have joined 13 other states in the USA in legalising the sale of drug-eluting contact lenses, pending the commercial availability of the technology.

Previously optometrists in these states were able to sell contact lenses but could not dispense medications from their practice. Because pharmacies do not sell contact lenses, patients were left in a position that if an optometrist were to prescribe them contact lenses impregnated with a therapeutic agent, the patient would not be able to obtain them.

The legislative changes addressing the distribution problem will take effect on 1 January 2010.

Possible applications for drug-eluting contact lenses include drug delivery for conditions such as glaucoma, allergy, dry eye and infection, and will particularly benefit those who may have difficulty instilling the drops. To date there are no FDA-approved products on the market.

PCON Supersite, October 2009

Cataracts link to beta blockers

Users of oral or topical beta blockers are at increased risk of developing cataracts.

A study[1] using data from the Blue Mountains Eye Study found patients who took beta blockers and ACE inhibitors were 61 per cent and 54 per cent, respectively, more likely to have cataract surgery or develop nuclear cataract. No other antihypertensive medications were found to predict incident cataract or cataract surgery. Study authors said further research was required to confirm the understanding of their findings.

1. *Br J Ophthalmol* 2009; 93: 1210-1214

Prostate drug affects dilation

Patients undergoing eye surgery must advise practitioners if they are taking the prostate drug Flomaxtra.

Flomaxtra is a prolonged release tablet containing the active ingredient tamsulosin hydrochloride that blocks alpha receptors in the muscle of the prostate gland. This information may be important to surgeons because its relaxant properties can cause pupils to dilate poorly and irises to become floppy, creating problems during cataract surgery and other eye procedures. Optometrists are encouraged to question patients on all their medications prior to surgical referral.

photo clinic

Narelle Hine
DipAppSc(Optom) MSc
DCLP FAAO

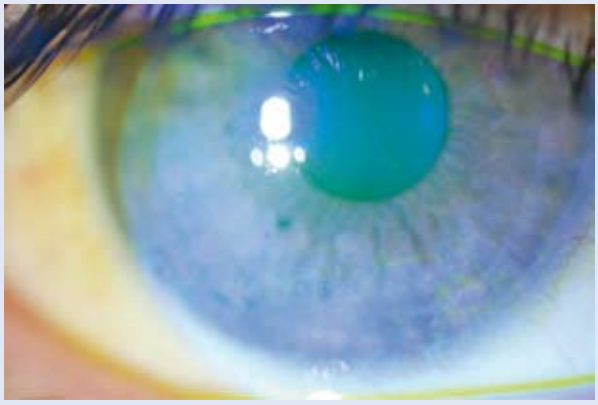
Contact lens and MPS incompatible

JN, a young, male, long-term Acuvue 2 (Optifree) wearer, presents with irritation and grade 1 punctate staining after ad hoc overnight wear and is upgraded to two-weekly disposable silicone hydrogel lenses.

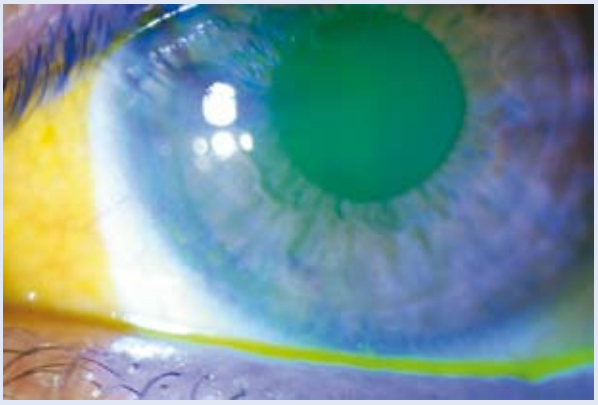
The patient is fitted with CooperVision Avaira -2.00 in the RE and Johnson & Johnson Oasys -2.50 in the LE. He cleans and disinfects his lenses with Optifree multipurpose solution.

After two days of silicone hydrogel wear, patient comfort is only R 7/10 L 8/10. Both eyes show mild conjunctival hyperaemia with grade 2 extent of limbal and inferior-central corneal punctate fluorescein staining in the RE and grade 1 in the LE. Both patterns of injury are consistent with solution-induced corneal staining. The disappointed patient is given three days of daily disposable use to resolve the epithelial toxicity response then is refitted with fresh comfort-preferred lenses (Oasys) and swaps to AOSept hydrogen peroxide disinfection.

After one week of wear, both eyes are white and free of keratitis, confirming the diagnosis of patient sensitivity to Optifree. The observed difference in toxicity response between the eyes can be ascribed to the difference in polymer properties of the two silicone hydrogel lenses, such as pore size and ability of each lens to absorb and then release the MPS chemical compounds onto the eye's surface.



Solution induced corneal staining with Avaira



Solution induced corneal staining with Oasys

Clinical QUIZ

Answer

Herpes zoster without ophthalmicus

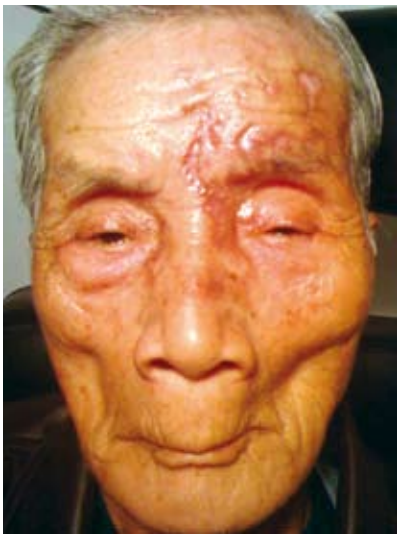
Management

The patient is referred back to his GP for HZV treatment. Telfast is discontinued and Valtrex 1000 mg po tid is initiated for seven days.

On one-day follow-up, eyelid oedema is almost resolved. There are no signs of keratitis or iritis. The patient is prescribed Chlorsig ointment tid to apply to the skin rash to prevent secondary bacterial infection, with warm compresses.

On one-week follow-up, eyelid oedema has completely resolved and the skin rash has reduced significantly. The patient is advised to continue warm compresses and apply chlorsig ointment tid.

On one-month follow-up, skin rash from HZV has completely resolved with scars.



One-month follow-up

Take the first step to

Making a commitment to a postgraduate optical therapeutics course is a tall order but optometrists see it as the path to progress. **Jennifer Greive** reports

For those keen to embark on therapeutics in 2010, there is still time to enrol.

The University of Melbourne (UM) will offer its Postgraduate Certificate in Ocular Therapeutics from February next year and is accepting late applications until 18 December. The Queensland University of Technology (QUT) and University of New South Wales (UNSW) courses usually do not start until July or August.

Each course is undertaken part-time over one year and comprises two subjects: one didactic and the other practical. They are available to registered optometrists who hold a four-year Bachelor's degree in optometry or an equivalent qualification.

Candidates must fulfil all requirements of the didactic subject before they can embark on clinical placements. This involves attending classes over three or four weekends and sitting for a written examination.

The didactic subject covers biomedical foundations, including pharmacology, toxicology and ocular drug formations; ocular pathophysiology, immunobiology and microbiology; anterior eye disorders, glaucoma, iritis and uveitis; shared care, management of cataract, post-surgical management, and the legal and administrative requirements of prescribing therapeutics.

Optometrists are then required to complete 50 hours of clinical placement under the supervision of an approved therapeutic prescriber. The placements are designed to provide experience in examining and diagnosing the major conditions of the cornea, conjunctiva and adnexae. They also allow optometrists to work with other health professionals.

The University of Melbourne

Victoria Division advises its members to act now if they want to study therapeutics at The University of Melbourne. The course did not run in 2009 and it will be offered in 2010 only if a minimum of 35 students enrol.

Kirsty Machon, Victoria Division policy manager, says optometrists should not delay their decision to become endorsed because without sufficient enrolments there is no guarantee that the course will run each year.

More than 400 therapeutically-endorsed optometrists are registered with the Optometrists Registration Board of Victoria. Others are considering therapeutic endorsement—about 37 attended a 'Thinking Therapeutics' information seminar at Victoria Division in July.

Jacquie Burnheim, manager of the Department of Optometry and Vision Science at UM, says the therapeutic course predominately attracts Victorian candidates, although it is open to optometrists from all over Australia.

Burnheim says she cannot confirm whether the course will run in 2010 until all applications have been received.

If the course is offered next year, the didactic subject will be delivered in intensive block format on Fridays after 3 pm and on weekends.

Provisional dates for 2010 are 5-7 and 12-14 February, and 5-7 and 12-14 March. Students' clinical skills are assessed once the lectures are completed, after which students sit two written examinations, usually in April.

The university provides some placements at the Royal Victorian Eye and Ear Hospital but students are required to secure an additional 35 hours of placements in private practices.

Course fee information for the Postgraduate Certificate in Ocular Therapeutics at UM will not be available until it is confirmed that the course will run in 2010.

therapeutic endorsement

Queensland University of Technology

Fifty students have enrolled in the Graduate Certificate in Ocular Therapeutics at QUT this year, a substantial increase from the usual number of 40.

The course starts in the second semester, with the didactic component running over three four-day weekends in August and September.

All students are required to attend these classes, but interstate students may sit the three-hour multiple-choice question examination in their home state. The examination is usually held in November.

Like the course at UM, the clinical placement subject is assessed with three case reports and an oral examination. Students at QUT must present a case to their peers and complete all clinical hours and case reports prior to the examination.

The university provides hand-out materials in folders and advice on supporting materials, such as books and journals.

Peter Hendicott, acting head of the QUT School of Optometry, says the course caters for interstate optometrists and typically enrols practitioners from all areas. 'In 2009, 15 of the 50 students are from outside Queensland and two are from New Zealand,' he said. 'Of the remainder who are Queensland-based, approximately half are from outside the Brisbane metropolitan area. In past years, 20 to 25 per cent of the group came from outside Queensland.'

Brett Jenkinson, who practises at Total Eyecare in Hobart, completed the Graduate Certificate in Ocular Therapeutics at QUT in 2007. He says he flew to Brisbane about five times over the 12 months it took to attain the qualification. 'During the first semester, I had to fly to Brisbane three times over three weekends, but I was able to sit the exam in Hobart,' he said. 'I did my placements at the Royal Hobart Hospital in the public eye clinic, then I flew back to Queensland for the oral exam and to submit my case reports.'

Dr Hendicott says optometrists could opt to do their clinical placements over two semesters rather than one, if necessary. 'They organise their own placements to fit in with their timetable and the [supervising] ophthalmologist's timetable,' he said. 'Some people may choose to do two or three different placements, so they get a broader spectrum.'

In 2010, the Graduate Certificate in Ocular Therapeutics course at QUT will cost students $7,750 per semester.

University of New South Wales

The UNSW Graduate Certificate in Ocular Therapeutics started in 2007, graduating the first cohort of students in October last year. Seventy-seven students enrolled in the course in 2009.

The university offers the didactic subject over four weekends in the second semester. Optometrists from New South Wales and interstate must attend classes for three or four days over four weekends between July and December. Course materials and information are provided and sent electronically.

South Australia Division is negotiating with the UNSW to bring its Graduate Certificate in Ocular Therapeutics to Adelaide. In the meantime, Libby Boschen, South Australia Division executive officer, says she is working with the university to allow South Australian optometrists to complete the didactic component of the course in their home state. The proposal would also allow optometrists to complete examinations and clinical placements in private practices locally.

'We still have to resolve how the hospital placements would work,' she said. 'We're sourcing an alternative at the moment and I expect the course will start next year.'

Ms Boschen said the proposal was originally organised by Tony Martella, CEO of Western Australia Division. 'Tony has done most of the hard work, but since Western Australia's legislation has been delayed, we agreed to trial it in South Australia first,' she said.

The cost of undertaking postgraduate therapeutics at UNSW is lower than at the other two universities because attendees are eligible to apply for a Commonwealth Supported Place. In 2010, the fee for each subject will be $1,891.

Make Rx instructions clear and precise

Writing inadequate instructions on a prescription is poor practice and can lead to confusion for pharmacists and patients. **Helen Carter** reports

Therapeutically endorsed optometrists have been urged to write clear, simple instructions on eye-drop prescriptions, rather than stating 'use as directed'.

Consumer advocate in the University of Western Australia's School of Population Health, Anne McKenzie, claims that writing 'use as directed' or 'take as directed' is poor and dangerous practice. 'Patients often forget what you tell them, or dosage might change from a previous visit,' says McKenzie, who is also a consumer representative on the Consumers Health Forum of Australia and Medicines Australia's code of conduct committee. 'We urge optometrists to put clear, precise instructions on how drops are to be taken.'

The guidelines for clear prescribing instructions, as found on the Optometrists Association website, state that when preparing prescriptions for therapeutic ocular medicine, optometrists should define the medication and its use, and include the strength, quantity, dose, frequency of use, timing of use, method of administration, duration of treatment, instructions and other relevant information.

The University of Melbourne head of the Department of Optometry and Vision Sciences Professor Neville McBrien says optometry students and optometrists undertaking a therapeutics course are advised to give clear instructions on their prescriptions and not to use the term 'use as directed.'

Pharmacists have lobbied the Department of Health and Ageing to have 'take as directed' removed from prescribing and dispensing software.

McKenzie says research from the school reveals some GPs are writing 'take as directed' on some prescriptions and some pharmacists are restating this on the label.

During research on medication safety and chronic illness, two community forums attracted 104 people aged 65 and older taking multiple medications. A panel of consumers and focus groups was established to provide ongoing input and identify relevant issues for consumers.

'This is really poor practice and we would like it to be considered unnecessary practice,' said McKenzie. 'As far as we can see, there are no legal or other requirements to write the actual instructions. It would be unacceptable in hospital records to record 'take as directed' and if patients present to emergency with a medication bag, it would not help staff.'

She is lobbying to have the practice stopped and is approaching stakeholders to discuss action.

Australian Medical Association vice-president Dr Steve Hambleton says it is acceptable for a GP to write 'take as directed' on a script for simple items such as paracetamol where instructions are on the box, or when the patient has been taking the medication for a long time. Nonetheless, he prefers to always type precise instructions on each prescription to avoid confusion when the script is presented at the pharmacy.

'With eye-drops for infections it is not appropriate to write 'use as directed'. Patients need clear instructions because there are safety concerns,' he says.

Hambleton urges optometrists prescribing eye-drops to also advise the patient's usual GP. There is potential for confusion and safety problems if patients are receiving scripts from doctors, optometrists and other health-care professionals who are not aware of other prescriptions.

'There is a risk of duplication and medication error if the patient is being prescribed the same drug but different brands and no-one is co-ordinating it. They might be inadvertently taking extra doses of their medication each day. E-health records will help prevent this,' he says.

National president of The Pharmacy Guild of Australia Kos Sclavos says about eight per cent of prescriptions for chronic therapy medicines come with 'take as directed' instructions, although they are rarely given for single one-off therapy.

'The guild believes these short cuts should be removed from prescribing software and dispensing software,' says Salavos. 'Pharmacists can generate multiple label instructions so there is no case for a prescriber not to give the pharmacist full instructions to be placed on the label.'

If no instructions are stated on the prescription, pharmacists ask patients if instructions were given and add those but, for legal reasons, they cannot default to the manufacturer's instructions, Sclavos says. If the doctor cannot be reached, the pharmacist will contact a medical surgery staff member but Sclavos says that usually this will not help; they will just be directed back to the patient's doctor.

Sclavos says that under the pharmacists' electronic prescription system, information from the pharmacist goes back to the doctor's patient file and over time this will stop 'take as directed' being written on prescriptions.

PBS list of medicines for optometrists 9 November 2009

	Product	Max qty	Repeats
Antiglaucoma preparations			
Betaxolol eye-drops, suspension, 2.5 mg (as hydrochloride)/mL, 5 mL	Betoptic S	1	5
Betaxolol eye-drops, solution, 5 mg (as hydrochloride)/mL, 5 mL	Betoptic		
	BetoQuin	1	5
Bimatoprost eye-drops 300 mg/mL, 3 mL	Lumigan	1	5
Bimatoprost with timolol eye-drops containing 300 mg bimatoprost with timolol 5 mg (as maleate)/mL, 3 mL	Ganfort 0.3/5	1	5
Brimonidine eye-drops containing brimonidine tartrate 2 mg/mL, 5 mL	Alphagan		
	Enidin	1	5
Brimonidine with timolol eye-drops containing brimonidine tartrate 2 mg with timolol 5 mg (as maleate)/mL, 5 mL	Combigan	1	5
Brinzolamide eye-drops 10 mg/mL, 5 mL	Azopt		
	BrinzoQuin	1	5
Dorzolamide eye-drops 20 mg (as hydrochloride)/mL, 5 mL	Trusopt	1	5
Dorzolamide with timolol eye-drops containing dorzolamide 20 mg (as hydrochloride) with timolol 5 mg (as maleate)/mL, 5 mL	Cosopt	1	5
Latanoprost eye-drops 50 micrograms/mL, 2.5 mL	Xalatan	1	5
Latanoprost with timolol eye-drops 50 micrograms latanoprost with timolol 5 mg (as maleate)/mL, 2.5 mL	Xalacom	1	5
Pilocarpine eye-drops containing pilocarpine hydrochloride 10 mg/mL, 15 mL	Isopto Carpine		
	Pilopt	1	5
	PV Carpine		
Pilocarpine eye-drops containing pilocarpine hydrochloride 20 mg/mL, 15 mL	Isopto Carpine		
	Pilopt	1	5
	PV Carpine		
Pilocarpine eye-drops containing pilocarpine hydrochloride 40 mg/mL, 15 mL	Isopto Carpine		
	Pilopt	1	5
	PV Carpine		
Pilocarpine eye-drops containing pilocarpine hydrochloride 60 mg/mL, 15 mL	Pilopt	1	5
	PV Carpine		
Timolol eye-drops 2.5 mg (as maleate)/mL, 5 mL	Tenopt		
	Timoptol	1	5
Timolol eye-drops 5 mg (as maleate)/mL, 5 mL	Tenopt		
	Timoptol	1	5
Timolol eye-drops (gellan gum solution) 2.5 mg (as maleate)/mL, 2.5 mL	Timoptol XE	1	5
Timolol eye-drops (gellan gum solution) 5 mg (as maleate)/mL, 2.5 mL	Timoptol XE	1	5
Timolol eye gel 1 mg (as maleate)/g, 5 g	Nyogel	1	5
Travoprost eye-drops 40 micrograms/mL, 2.5 mL	Travatan	1	5
Travoprost with timolol eye-drops 40 micrograms travoprost with timolol 5 mg (as maleate)/mL, 2.5 mL	Duotrav	1	5

By writing a PBS prescription for an antiglaucoma agent, the prescriber is certifying that the criteria set out in the PBS guidelines are satisfied

	Product	Restriction	Max qty	Repeats
Anti-viral eye preparations		Restricted:		
Aciclovir eye ointment 30 mg per g (3%), 4.5 g	Zovirax	Herpes simplex keratitis	1	0
Antibiotics		Unrestricted		
Chloramphenicol eye-drops 5 mg/mL (0.5%), 10 mL	Chlorsig		1	2
	Chloromycetin		1	2
Chloramphenicol eye ointment 10 mg/g (1%), 4 g	Chlorsig		1	0
	Chloromycetin		1	0
Framycetin sulfate eye-drops 5 mg/mL (0.5%), 8 mL	Sofracycin		1	2
Sulfacetamide sodium eye-drops 100 mg per mL (10%), 15 mL	Bleph-10		1	2
Anti-inflammatory agents		Unrestricted		
Fluorometholone eye-drops 1mg/mL (0.1%), 5mL	Flucon		1	0
	FML Liquifilm		1	0
Fluorometholone acetate eye-drops 1 mg/mL (0.1%), 5 mL	Flarex		1	0
Flurbiprofen sodium eye-drops 300 µg/mL (0.03%) single dose units 0.4 mL, 5	Ocufen		1	0
Hydrocortisone acetate eye ointment 10 mg/g (1%), 5 g	Hycor		1	0
Anti-allergy agents		Restricted:		
Sodium cromoglycate eye-drops 20 mg/mL (2%), 10 mL	Cromolux	Vernal keratoconjunctivitis	1	5
	Opticrom		1	5

Product	Restriction	Max	Repeats	qty
Tear supplements		Restricted:		
Carbomer 980 ocular lubricating gel 2 mg/g (0.2%), 10 g	Geltears	Severe dry eye including	1	5
	PAA	Sjögren's syndrome	1	5
	Viscotears Liquid Gel		1	5
Carmellose sodium with glycerin eye-drops 5 mg-9 mg per mL (0.5%-0.9%), 15 mL	Optive		1	3
Carmellose sodium eye-drops 10 mg/mL (1%), 15 mL	Refresh Liquigel		1	5
Carmellose sodium eye-drops 5 mg/mL (0.5%), 15 ml	Refresh Tears plus		1	5
Hypromellose eye-drops 3 mg/mL (0.3%), 15 mL (contains sodium perborate)	In a Wink Moist'ing		1	5
	Genteal		1	5
Hypromellose eye-drops 5 mg/mL (0.5%), 15 mL	Isopto Tears		1	5
	Methopt		1	5
Hypromellose with carbomer 980 ocular lubricating gel 3 mg-2 mg/g (0.3-0.2%), 10 g	HPMC PAA		1	5
	Genteal gel		1	5
Hypromellose with dextran eye-drops 3 mg-1 mg/mL (0.3%-0.1%), 15 mL	Poly-Tears		1	5
	Tears Naturale		1	5
Polyethylene glycol 400 with propylene glycol drops 4 mg-3 mg/mL (0.4-0.3%); 15 mL	Systane		1	5
Polyvinyl alcohol eye-drops 14 mg/mL (1.4%), 15 mL	PVA Tears		1	5
Polyvinyl alcohol eye-drops 30 mg/mL (3%), 15 mL	PVA Forte		1	5
Polyvinyl alcohol eye-drops 14 mg/mL (1.4%), 15 mL	Liquifilm Tears		1	5
Polyvinyl alcohol eye-drops 30 mg/mL (3%), 15 mL	Liquifilm Forte		1	5
Polyvinyl alcohol eye-drops 14 mg/mL (1.4%), 15 mL (contains sodium chorite/hydrogen peroxide as preservative)	Vistil		1	5
Polyvinyl alcohol eye-drops 30 mg/mL (3%), 15 mL (contains sodium chorite/hydrogen peroxide as preservative)	Vistil Forte		1	5
Unpreserved tear supplements		Authority required:		
Carbomer 974 ocular lubricating gel 3 mg/g (0.3%), single dose units 0.5 g, 30	Poly Gel	Severe dry eye syndrome in patients sensitive to preservatives in multi-dose eye-drops	3	5
Carbomer 980 eye-drops 2 mg per (0.2%) , single dose units 0.6 mL, 30	Viscotears		3	5
Carmellose sodium eye-drops 5 mg/mL (0.5%), single dose units 0.4 mL, 30	Cellufresh		3	5
Carmellose sodium eye-drops 10 mg/mL (1%) , single dose unit 0.4 mL, 30	Celluvisc		3	5
Carmellose sodium eye-drops 2.5 mg/mL (0.25%), single dose units, 0.6 mL, 24	TheraTears		4	5
Carmellose sodium ocular lubricating gel 10 mg/mL (1%), single dose 0.6 mL, 28	TheraTears		3	5
Hypromellose with dextran eye-drops 3-1 mg/mL (0.3-0.1%), single 0.4 mL, 28	Bion Tears		3	5
Tamarindus indica seed polysaccharide eye-drops 10 mg/mL, 0.5 mL, 20	Visine Professional		3	5
Polyethylene glycol 400 with propylene glycol drops 4 mg-3 mg/mL (0.4-0.3%); single dose units 0.8 mL, 28	Systane		2	5
Soy lecithin eye spray 10 mg/mL (1%), 10 mL	Tears Again		2	5
Topical ocular lubricant ointments		Unrestricted		
Paraffin compound eye ointment 3.5 g	Polyvisc		2	5
	Duratears		2	5
Paraffin pack containing 2 tubes compound eye ointment 3.5 g	Polyvisc (2 pack)		1	5
Paraffin pack containing 2 tubes compound eye ointment 3.5 g	Ircal (2 pack)		1	5
	Lacri-Lube (2 pack)		1	5

Commercially available controlled substances that may be used or prescribed by optometrists

9 November 2009

Ocular Medicine	Vic	Tas	Qld	NSW & ACT	NT	SA	WA*	PBS Optometry	PBS Listed
Anti-infectives									
Chloramphenicol	✓	✓	✓	✓	✓	✓	–	✓	✓
Ciprofloxacin	✓	✓	✓	–	✓	✓	–	–	✓
Framycetin	✓	✓	✓	✓	✓	✓	–	✓	✓
Gentamicin sulfate	✓	✓	✓	–	✓	✓	–	–	✓
Ofloxacin	✓	✓	✓	–	✓	✓	–	–	✓
Sulfacetamide	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tetracycline	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Tobramycin	✓	✓	✓	–	✓	✓	–	–	✓
Aciclovir	✓	✓	✓	–	✓	✓	–	✓	✓
Anti-inflammatories									
Dexamethasone	✓	✓	◆	–	✓	✓	–	–	✓
Fluorometholone	✓	✓	✓	✓	✓	✓	–	✓	✓
Fluorometholone acetate	✓	✓	✓	✓	✓	✓	–	✓	✓
Hydrocortisone	✓	✓	✓	✓	✓	✓	–	✓	✓
Prednisolone	✓	✓	◆	–	✓	✓	–	–	✓
Diclofenac	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Flurbiprofen	✓	✓	✓	✓	✓	✓	–	✓	✓
Ketorolac	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Decongestants, anti-allergics and astringents									
Antazoline	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Ketotifen	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Levocabastine	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Lodoxamide	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Naphazoline	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Olopatadine	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Pheniramine	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Sodium cromoglycate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tetrahydrozoline	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Anti-glaucoma preparations									
Apraclonidine	✓	✓	◆	✓	✓	✓	–	–	✓
Betaxolol	✓	✓	◆	✓	✓	✓	–	✓	✓
Bimatoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Brimonidine	✓	✓	◆	✓	✓	✓	–	✓	✓
Brinzolamide	✓	✓	◆	✓	✓	✓	–	✓	✓
Dorzolamide	✓	✓	◆	✓	✓	✓	–	✓	✓
Latanoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Pilocarpine	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol	✓	✓	◆	✓	✓	✓	–	✓	✓
Travoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Bimatoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Brimonidine	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Dorzolamide	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Latanoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Travoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Mydriatics and cycloplegics									
Atropine	✓	✓	✓	✓	✓	✓	–	–	✓
Cyclopentolate	✓	D	✓	✓	✓	✓	D	N/L	N/L
Homatropine	✓	✓	✓	✓	✓	✓	–	–	✓
Pilocarpine	✓	✓	✓	–	✓	✓	–	–	✓
Phenylephrine	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Tropicamide	✓	D	✓	✓	✓	✓	D	N/L	N/L
Local anaesthetics									
Amethocaine	✓	D	✓	✓	✓	✓	–	N/L	N/L
Lignocaine	✓	D	–	–	✓	✓	–	N/L	N/L
Oxybuprocaine	✓	D	✓	✓	✓	✓	D	N/L	N/L
Proxymetacaine	✓	D	✓	✓	✓	✓	D	N/L	N/L

◆ The use of these medicines by optometrists is currently being considered
* Optometrists in Western Australia do not have access to the PBS
D Diagnostic use only
N/L Substance is not listed under the PBS

FORESIGHT

[the ability to see into the future and be alert to the signs ahead]

Never has it been more vital to test for age-related macular degeneration (AMD).

AMD is now the leading cause of blindness in Australia.[1,6] Lucentis offers real hope to those diagnosed with wet AMD.[2,3,5]

Already helping thousands maintain independent lives, Lucentis is proven to help patients gain and sustain vision.[2,3,4] Some patients treated report improvement as early as 7 days after treatment.[2]

Because early detection and treatment of AMD can significantly improve future outcomes,[1,2,3] *your referral today could save your patient's sight tomorrow.*

LUCENTIS®
RANIBIZUMAB
Improving vision. Restoring hope.[2,3,5]

PBS Dispensed Price: $1975.93. Please refer to the Product Information before prescribing. Product Information is available from Novartis Pharmaceuticals Australia Pty Limited or visit www.novartis.com.au. For further information please contact Medical Information & Communication on 1800 671 203. **Indication:** Treatment of neovascular (wet) age-related macular degeneration (AMD). 0.5 mg or 0.3 mg is recommended to be administered by intravitreal injection once a month. **Dosage and administration:** Recommended dose is 0.5 mg (0.05 mL) or 0.3 mg (0.03 mL) given monthly. Interval between doses should not be shorter than 1 month. Treatment might be reduced to one injection every 3 months after the first three injections but, compared to continued monthly doses, dosing every 3 months may lead to an approximate 5-letter (1-line) loss of visual acuity benefit, on average, over the following 9 months. Patients should be evaluated regularly. Must be administered by a qualified ophthalmologist using aseptic techniques. Broad-spectrum topical microbicide and anaesthetic should be administered prior to injection. Patient should self-administer antimicrobial drops four times daily for 3 days before and after each injection. Not recommended in children and adolescents. **Contraindications:** Hypersensitivity to product components, active or suspected ocular or periocular infections, active intraocular inflammation. **Precautions:** Intravitreal injections have been associated with endophthalmitis, intraocular inflammation, rhegmatogenous retinal detachment, retinal tear and iatrogenic traumatic cataract. Proper aseptic injection techniques must be used. Monitor patients during the week following injection to permit early treatment if an infection occurs. Intraocular pressure and perfusion of the optic nerve head must be monitored and managed appropriately. Safety and efficacy of administration to both eyes concurrently have not been studied. There is a potential risk of arterial thromboembolic events following intravitreal use of VEGF inhibitors. *A numerically higher stroke rate was observed in patients treated with ranibizumab 0.5mg compared to ranibizumab 0.3mg or control, however the differences were not statistically significant. Patients with known risk factors for stroke, including history of prior stroke or transient ischaemic attack, should be carefully evaluated by their physicians as to whether Lucentis treatment is appropriate and the benefit outweighs the potential risk.* As with all therapeutic proteins, there is a potential for immunogenicity with Lucentis. No formal interaction studies have been performed. Should not be used during pregnancy unless clearly needed; use of effective contraception recommended for women of childbearing potential; breastfeeding not recommended. Patients who experience temporary visual disturbances following treatment must not drive or use machines until these subside. **Side effects:** Very common: Conjunctival haemorrhage, eye pain, vitreous floaters, retinal haemorrhage, *intraocular pressure increased*, vitreous detachment, intraocular inflammation, eye irritation, cataract, foreign body sensation in eyes, lacrimation increased, visual disturbance, blepharitis, subretinal fibrosis, ocular hyperaemia, visual acuity blurred/decreased, dry eye, vitritis, eye pruritis, *nasopharyngitis*, headache, *arthralgia*. Common: Ocular discomfort, eyelid oedema, *eyelid pain*, conjunctival hyperaemia, posterior capsule opacification, punctate keratitis, corneal abrasion, anterior chamber flare, *injection site haemorrhage*, eye haemorrhage, retinal exudates, injection site reactions, conjunctivitis, *conjunctivitis allergic, eye discharge, photopsia*, photophobia, maculopathy, detachment of the retinal pigment epithelium, retinal degeneration, retinal disorder, retinal detachment, retinal tear, *retinal pigment epithelium tear*, vitreous haemorrhage, *vitreous disorder*, uveitis, iritis, *iridocyclitis, cataract subcapsular, influenza, anaemia, anxiety, stroke, cough, nausea, allergic reactions (rash, urticaria, pruritis, erythema)*. Uncommon: Keratopathy, *iris adhesions, corneal deposits*, defect, corneal striae, *injection site pain, injection site irritation, abnormal sensation in eye*, hyphema, cataract nuclear, angle closure glaucoma, endophthalmitis, eyelid irritation, blindness, corneal oedema, hypopyon. Rare but serious adverse reactions related to intravitreal injections include endophthalmitis, rhegmatogenous retinal detachment, retinal tear and iatrogenic traumatic cataract. **Please note changes to Product Information in italics.* **1.** Bressler NM. J Am Board Fam Pract 2002; 15: 142–152. **2.** Rosenfeld PJ et al. N Engl J Med 2006; 355: 1419–1431. **3.** Brown DM, et al. N Engl J Med 2006; 355: 1432–1444. **4.** LUCENTIS Approved Product Information. **5.** Chang TS, et al. Arch Ophthalmol. 2007; 125: 1460–1469. **6.** Attebo K, et al. Ophthalmol. 1996; 103: 357–364. Novartis Pharmaceuticals Australia Pty Limited. ABN 18 004 244 160. 54 Waterloo Road, North Ryde NSW 2113.

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PBS Information: Authority required. Refer to PBS schedule for full Authority Required Information.