A newly published article on optometric prescribing is exciting and highly reassuring. The optometric profession prescribed over four million medical prescriptions in 2013, and the trend is ever increasing. Here are some highlights from this article:

- “It could be argued that much of the debate about the role optometrists play in disease management is not whether optometrists are performing this clinical work, but rather about the healthcare impact of such management. The one segment that has shown a decrease in total prescriptions has been the branded anti-infective area. This could point to the possibility of there being an increased availability of unbranded, generic, topical antibiotics. This could possibly signal a higher adoption of unbranded or generic medications by this group, but no doubt it was gathered on that segment. This is the one study limitation.”
- “We interpret this overall trend as an indication that optometrists in the United States have a more comfortable attitude towards prescribing ophthalmic drugs for the treatment of eye diseases.”
- “In addition, it may be beneficial to provide guidance to create health care policies related to eye care, and provide a new perspective of the role that medical optometric care represents to the healthcare market.”
- “The authors believe that the data signal optometry’s unique shift, indicating that the profession is expanding and becoming more comprehensive in providing both refractive and medical eyecare.”
- “This study may become a precedent for the development of prospective inferential studies to better understand the management paradigms of this profession, influencing the public perception of optometry as well as creating a better understanding of the role of optometric medical care in the healthcare system.”

Note that this article only addresses topical ophthalmic medications, and does not capture the prescribing that we do of systemic medications. We suspect this would add another 10% to 20% to these numbers.

The two most exciting trends we see from this data, covering 2011 to 2013, are that the number of topical antibiotic prescriptions is probably stable, while the number or prescriptions for topical steroids is steadily increasing. It is our perception that most optometrists now recognize that prescribing an antibiotic may be suboptimum in recognizing that the epidemiology of the acute red eye is most often one of inflammation, and not of infection. The number of optometric prescriptions for topical steroids is steadily increasing, as are the number of prescriptions written for topical antivirals. These observations are strong indicators of the increasing competence in the delivery of medical eye services by the profession of optometry.

Dear Optometric Colleagues:

Since we last authored this annual work, there has not been a single new brand-name ophthalmic drug brought to market! This, however, does not deter us from sharing with you an abundance of new clinical and medical insights, and reiterating several points germane to the enhancement of patient care.

In this annual Clinical Guide to Ophthalmic Drugs, we share with you a large number of clinical pearls we have gleaned from over 65+ combined years of full-time clinical practice. Interestingly, our three main areas of professional interests center around anterior segment conditions, glaucoma and dry eye disease. Perplexingly, these same areas are ones in which we have observed less-than-optimum patient care. We think that in the case of anterior segment disease, suboptimum care is due to failure to use steroids when indicated; in glaucoma, it is due to failure to use pachymetry and to definitively diagnose glaucomatous optic neuropathy; in dry eye disease, it is due to failure to embrace pulse-dosing of topical steroids to suppress inflammation. Shortfalls in these three clinical areas can be rectified by thoughtful, enlightened and attentive clinical thought, and by taking note of the knowledge and insights we have gained through our years of clinical practice and share with you in this annual guide.

Beyond this, we passionately urge our colleagues to subscribe to one or both of the premier ophthalmology journals, Ophthalmology or American Journal of Ophthalmology. Over the years, we have gained enormous clinical empowerment by perusing these educational resources and trust you will do the same.

We expend considerable effort each year to bring this clinical guide to the profession of optometry. Our sole purpose is to do our best to enable you, our colleagues, to provide your patients the absolute best in clinical care.

Our very best wishes to each of you,

Randall Thomas, OD, MPH
Ron Melton, OD

Disclosure: Drs. Melton and Thomas are consultants to, but have no financial interests in, the following companies: Alcon Laboratories, Bausch + Lomb, Carl Zeiss Meditec, Icare, and Nicox.

Note: The authors present unapproved and “off label” uses of specific drugs in this guide.
Antibiotics from A to Z

Here is a comprehensive review of the topical and oral antibiotics used in eye care.

Azithromycin

There are three macrolide antibiotics: azithromycin, clarithromycin and erythromycin. The two most commonly used in eye care are azithromycin (orally and topically) and erythromycin (topical ointment). These share a common allergenicity.

- **Topical azithromycin.**
  The topical form of azithromycin 1% is known by the brand name AzaSite (Akorn). Its approved indication in eye care is for treatment of bacterial conjunctivitis. Because of its highly viscous delivery vehicle (DuraSite), it has a convenient dosing schedule of twice a day for two days, then daily for five more days. (While azithromycin may also have some very limited role in the amelioration of eyelid disease, it pales in comparison to the efficacy of a combination antibiotic/steroid such as Zylet, TobraDex or generic Maxitrol.)

- **Oral azithromycin.** Oral azithromycin is the drug of choice in treatment of adult inclusion (chlamydial) conjunctivitis, which is pathognomonically characterized by the presence of giant follicles in the inferior fornical conjunctiva, usually unilaterally. Given as a single dose of 1,000mg, oral azithromycin is chlamydiacidal in almost all cases. It is available generically and by the brand name Zithromax (Pfizer) in 250mg and 500mg tablets, and as a pre-packaged 1,000mg oral suspension.

Implications of Azithromycin and Fluoroquinolone Use

After repeated exposure to azithromycin or fluoroquinolone antibiotics, *Staph. epidermidis* significantly increases on the conjunctival surface.

- “The repeated use of azithromycin or fluoroquinolone antibiotics significantly alters the composition of conjunctival flora by increasing the percentage of *S. epidermidis*.”
- “Resistant strains of *S. epidermidis* emerge rapidly after antibiotic exposure and possess co-resistance to other classes of antibiotics.”
- “The high percentage (75%) of baseline resistance to azithromycin may have allowed resistant *S. epidermidis* strains to readily out-compete other flora.”
- “The practice of long-term or repeated use of azithromycin for blepharitis may therefore select for not only azithromycin-resistant but also doxycycline-resistant strains of *S. epidermidis*.”

Bacitracin

Available since 1948, bacitracin remains a highly efficacious bactericidal drug against gram-positive bacterial pathogens. It is only available in ointment form, which limits its practical clinical use to the treatment of staphylococcal blepharitis and as augmentation to topical therapies when treating severe bacterial conjunctivitis and/or keratitis. Bacitracin ointment is best instilled at bedtime because of ointment-associated blur.

Bacitracin/Polymyxin B

Bacitracin is almost exclusively gram-positive bactericidal, so combining it with polymyxin B, which is almost exclusively gram-negative bactericidal, produces a highly effective, nontoxic combination antibiotic. The drawback is that it is only available as an ophthalmic ointment, which limits its clinical usefulness. However, some doctors treat children’s eye infections by smearing this ointment on the eyelids, where body temperature melts the ointment and allows adequate ocular surface application of the drug. (Such a principle can be applied to all ointment formulations for patients of all ages.)

When used to treat bacterial keratitis or a severe bacterial conjunctivitis, this combination medicine

<table>
<thead>
<tr>
<th>Topical Antibiotic Drugs</th>
<th>Brand Name</th>
<th>Generic Name</th>
<th>Manufacturer</th>
<th>Preparation</th>
<th>Pediatric Use</th>
<th>Bottle/Tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoroquinolones</td>
<td>Besivance</td>
<td>besifloxacin 0.6%</td>
<td>Bausch + Lomb</td>
<td>suspension</td>
<td>≥ 1 yr.</td>
<td>5ml</td>
</tr>
<tr>
<td></td>
<td>Ciloxan, and generic</td>
<td>ciprofloxacin 0.3%</td>
<td>Alcon, and generic</td>
<td>sol./oint.</td>
<td>≥ 1 yr./ ≥ 2 yrs.</td>
<td>5ml, 10ml/3.5g</td>
</tr>
<tr>
<td></td>
<td>Moxeza</td>
<td>moxifloxacin 0.5%</td>
<td>Alcon</td>
<td>solution</td>
<td>≥ 4 mos.</td>
<td>3ml</td>
</tr>
<tr>
<td></td>
<td>Ocuflox, and generic</td>
<td>ofloxacin 0.3%</td>
<td>Allergan, and generic</td>
<td>solution</td>
<td>≥ 1 yr.</td>
<td>5ml, 10ml</td>
</tr>
<tr>
<td></td>
<td>Vigamox</td>
<td>moxifloxacin 0.5%</td>
<td>Alcon</td>
<td>solution</td>
<td>≥ 1 yr.</td>
<td>3ml</td>
</tr>
<tr>
<td></td>
<td>Zymaxid</td>
<td>gatifloxacin 0.5%</td>
<td>Allergan, and generic</td>
<td>solution</td>
<td>≥ 1 yr.</td>
<td>2.5ml</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Tobrex, and generic</td>
<td>tobramycin 0.3%</td>
<td>Alcon, and generic</td>
<td>sol./oint.</td>
<td>≥ 2 mos.</td>
<td>5ml/3.5g</td>
</tr>
<tr>
<td></td>
<td>Garamycin, and generic</td>
<td>gentamicin 0.3%</td>
<td>Perrigo, and generic</td>
<td>sol./oint.</td>
<td>N/A</td>
<td>5ml/3.5g</td>
</tr>
<tr>
<td>Polymyxin B Combinations</td>
<td>Polysporin</td>
<td>polymyxin B/bacitracin</td>
<td>generic</td>
<td>ointment</td>
<td>N/A</td>
<td>3.5g</td>
</tr>
<tr>
<td></td>
<td>Neosporin</td>
<td>polymyxin B/neomycin/gramicidin</td>
<td>generic</td>
<td>solution</td>
<td>N/A</td>
<td>10m</td>
</tr>
<tr>
<td></td>
<td>polymyxin B/neomycin/ bacitracin</td>
<td>generic</td>
<td>ointment</td>
<td>N/A</td>
<td>3.5g</td>
<td></td>
</tr>
<tr>
<td>Other Antibiotics</td>
<td>AzaSite</td>
<td>azithromycin 1%</td>
<td>Akorn</td>
<td>solution</td>
<td>≥ 1 yr.</td>
<td>2.5ml</td>
</tr>
<tr>
<td></td>
<td>Ilotycin, and generic</td>
<td>erythromycin 0.5%</td>
<td>Perrigo</td>
<td>ointment</td>
<td>≥ 2 mos.</td>
<td>3.5g</td>
</tr>
<tr>
<td></td>
<td>Bacitracin</td>
<td>bacitracin 500u/g</td>
<td>Perrigo</td>
<td>ointment</td>
<td>N/A</td>
<td>3.5g</td>
</tr>
</tbody>
</table>

Antimicrobial Resistance

- “The high prevalence of fluoroquinolone-resistant organisms among ocular and nasal flora in our patient population raises concern with regard to the usefulness of topical fluoroquinolones as the best first-line agent in the setting of ophthalmic prophylaxis and for empiric use in acute ophthalmic infectious processes.”
- Staph. epidermidis was the most common pathogen in this study.
- 97% of all isolates were sensitive to gentamicin.
- Fluoroquinolone resistance ranged from 32% to 40%.

can be applied at bedtime to nicely augment daytime eyedrops.

**Bacitracin/Polymyxin B/Neomycin**

Neomycin, an aminoglycoside, is inherently broad spectrum with the notable exception of *Pseudomonas* species. It is a terrific drug, yet its use is avoided (out of proportion) because of its slight potential to cause a type 4 delayed hypersensitivity reaction to the eye surface and eyelid tissues. This annoying reaction, which is not a serious concern, is reported to occur in about 10% of patients, and is one reason this triple antibiotic ophthalmic is minimally used.1 (Another likely reason is that it is generic and therefore has no marketing advocate.)

If such a delayed reaction occurs, simply stop the antibiotic and instruct the patient to use cool compresses. Or, replace the antibiotic with a steroid to suppress the inflammatory process. Once the neomycin combination is discontinued, the reaction will subside in a few days. Again, this is an annoyance, not a crisis.

This triple antibiotic was originally known as Neosporin, and is available in both solution (which contains gramicidin in place of bacitracin) and ointment forms. (By the way, when this drug is combined with a corticosteroid, such neomycin reactions are either muted or rarely seen—more on this in the Combination Antibiotic-Steroid chapter, page 12.)

**Besifloxacin**

Besifloxacin 0.6% is available as Besivance (Bausch + Lomb) suspension. This unique bihalogenated chlorofluoroquinolone is a highly effective, broad-spectrum topical antibiotic. It is our drug of choice when treating moderate to severe bacterial or corneal infections.

For severe infectious processes, we dose besifloxacin hourly (while awake) for one to three days, then taper the dose to every two hours.

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**Penicillin and Cephalosporin Cross-Sensitivity**

- Both possess a beta-lactam ring.
- “Cephalosporins are first-line treatments for many infections and are used widely in ophthalmology.”
- “Despite historical concerns, however, many cephalosporins can be administered safely to patients reporting penicillin allergy … [For instance] more than 90% of patients who report a history of penicillin allergy lack penicillin-specific IgE and can tolerate the antibiotic safely.”
- Penicillin allergy “should not prevent the use of second- and third-generation cephalosporins with distinct side chains.” These are cefuroxime, cefprozil, ceftazidime and cefpodoxime.

for a few more days, then to four times a day for a few more days. Depending upon the severity and character of the infectious process, we may adjunctively prescribe Polysporin or Neosporin ointment at bedtime.

**Cephalixin**
This is the “go-to” oral antibiotic we prescribe for almost all moderate to advanced cases of acute eyelid infections. It is prescribed at 500mg by mouth twice a day for one week. We always urge aggressive use of warm soaks along with antibiotic use for lid infections.

This first-generation cephalosporin shares about a 1% cross-allergenicity with the penicillins, so if a patient has had a severe reaction to penicillin, then avoid first-generation cephalosporins.

For those very rare patients who do have a true allergy to penicillin, they have plenty of other options:
- Second- or third-generation cephalosporins
- Sulfamethoxazole/trimethoprim (Bactrim or Septra)
- One of the fluoroquinolones
- Doxycycline
- One of the macrolides

**Ciprofloxacin**

This early-generation fluoroquinolone is still a drug of choice against *Pseudomonas* species. It remains a good drug for general external eye bacterial infections, and is close in efficacy to the fourth-generation fluoroquinolones.

However, ciprofloxacin is a somewhat unstable solution that precipitates out when treating corneal ulcers and gives a fine powder-like appearance to the ulcer bed, which is of no clinical significance.

**Doxycycline**

Other than doxycycline, tetracycline and minocycline are the other two drugs in the tetracycline class. But unlike tetracycline (which is rarely used), doxycycline (which is available only for oral use) can be taken with meals.

It is a drug of choice for treating methicillin-resistant *Staph. aureus* (MRSA) eyelid and other skin infections, and is dosed at 100mg twice a day for seven to 10 days. Doxycycline can be used to treat chlamydial infections at 100mg twice a day for two weeks. In most of these cases, we prefer the simpler dosing of oral azithromycin; however, if the chlamydial species proves resistant to azithromycin, we consider using the longer course of the oral doxycycline.

By far, the greatest utility of doxycycline is in the treatment and management of meibomian gland disease, rosacea blepharitis, dry eye, pterygium and recurrent corneal erosion. These five conditions comprise a sizable chunk of those seen in routine practice. Doxycycline is used in low doses and for extended periods of time for these conditions. As a general rule, we prescribe 50mg of doxycycline daily for one to six months, depending upon the patient’s specific condition. Some finer points:
- For dry eye disease and meibomian gland dysfunction, we find

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**Oral Doxycycline and Pterygial Angiogenesis**
- UV light is a known trigger for pterygenesis and progression.
- Doxycycline (and corticosteroids) can inhibit neovascularization.
- Perhaps pterygium management can be augmented with 50mg oral doxycycline daily for many weeks or many months after (or concurrent with) topical loteprednol QID for one month, then BID for two months.

Minocycline, MGD and Dry Eye

If for any reason doxycycline becomes unavailable, we would without hesitation default to minocycline. Indeed, “oral minocycline can provide clinical benefits in treating moderate and severe meibomian gland dysfunction by reducing inflammatory cytokine levels,” concluded a recent prospective, randomized clinical trial.

Some additional conclusions:

- “Lid hygiene plus minocycline showed significant improvement in clinical signs and remarkable changes in fatty acid composition.”
- “Our study showed a remarkable benefit with 50mg oral minocycline twice daily for two months.”
- “To obtain meaningful patient satisfaction and favorable clinical results, we should consider minocycline as a first-line therapy for the treatment of moderate and severe MGD.”
- Prescribe minocycline at 50mg per day, just as with doxycycline.


Minocycline provides a more robust and quicker onset of action than do fish or flaxseed oils.

- For patients with severe dry eye disease, we may begin with doxycycline for a couple of months before converting them over to omega-3 oils for maintenance care.
- For recurrent corneal erosion and for inflamed pterygia, we typically prescribe doxycycline 50mg daily for about six to eight weeks along with Lotemax gel (loteprednol 0.5%, Bausch + Lomb) three to four times a day for six to eight weeks.
- For rosacea blepharitis, we prescribe doxycycline for about two to four months, along with eyelid scrubs once daily and Lotemax gel four times a day for one month, then twice a day for one month. For enduring care, eyelid hygiene and warm soaks usually keep most of these rosacea blepharitis conditions in check.

Erythromycin

- **Topical erythromycin.** Ophthalmic erythromycin is a soothing, non-toxic, weakly bacteriostatic ointment. Like its oral counterpart, it is rarely ever used as first-line treatment for anything, but often as second-line treatment for many things. We never use this ointment for active disease treatment because of its relatively poor antimicrobial spectrum of activity (although it is active against gram-positive cocci, such as Staph. and Strep).

  However, erythromycin is useful for “soft” overnight prophylaxis when indicated, such as for corneal abrasions, marked exposure keratitis, etc.

- **Oral erythromycin.** The oral form (dosed at 250mg to 500mg BID or QID, depending on disease severity and the weight of the patient) can be very helpful in the treatment of blepharoconjunctivitis in children under the age of 10. However, QID dosing of erythromycin is impractical in young children; for this reason clarithromycin, and especially azithromycin, have replaced erythromycin as the macrolide of choice for this purpose. Doxycycline is preferable for patients over age 10 with this condition.

Erythromycin is not a high-use medication, either topically or orally.

Gatifloxacin

Topical gatifloxacin 0.5% is available as Zymaxid (Allergan) solution, and is a fairly effective fourth-generation fluoroquinolone for bacterial conjunctivitis. Although it is still a useful medicine, all fourth-generation fluoroquinolones are exhibiting increasing bacterial resistance. Like all topical antibiotic medicines, use it more frequently initially (i.e., every one to two hours) until the condition comes under control. Then reduce its use to four times a day for a few more days until the condition is resolved.

Evolving Fluoroquinolone Resistance

“Fourth-generation fluoroquinolones are significantly more expensive than generic traditional antibiotic eyedrops such as gentamicin sulfate and polymycin B sulfate/trimetoprim, which have been shown to cover endophthalmitis isolates at least as well … Given the frequent and increasing resistance, subtherapeutic penetration and higher cost compared with other antibiotic eyedrops, the widespread perioperative and periprocedural use of fourth-generation fluoroquinolone antibiotic eyedrops should be reevaluated.”

Gentamicin (and Tobramycin)

These old, generic aminoglycosides are some of the most highly efficacious antibiotic eyedrops available. The reason: These medicines are not used systemically (because of ototoxicity issues), and therefore are relatively protected from the bacterial resistance that comes from primary care use. It is the widespread systemic use of an antibiotic that tends to fast-forward its resistance.

While these drugs have a reputation for their potential to be corneotoxic, we have never experienced such in our practices. With most medicines, the key is to “get in and get out” as quickly as possible. We can’t imagine a situation in which these aminoglycosides ever would be used for more than seven to 10 days, which may be why we’ve never seen a toxic response.

If such a response were to occur, simply stop the offending medicine and try a different drug, such as trimethoprim/polyoxymyxin B or Besivance. Consider adding artificial tears for a few days to help restore the ocular surface to normal. As can be seen from the studies quoted on these pages, the contemporary professional literature advocates for the use of the aminoglycosides.

Levofloxacin

- **Topical levofloxacin.** This so-called third-generation fluoroquinolone came in two concentrations: levofloxacin 0.3% as Quixin and levofloxacin 1.5% as Iquix. But both have been discontinued in the US.

- **Oral levofloxacin.** The oral form is known by the original brand name Levaquin (Janssen Pharmaceuticals), but is also available generically. Levofloxacin is a superb oral antibiotic, and is very convenient to take as one 500mg tablet daily for seven to 10 days.

   But, even the generic form of levofloxacin is more expensive than other first-tier generic options, and so it is not our first choice. For acute eye and eyelid infections, we commonly prescribe cephalaxin (Keflex, Victory Pharma, or generic) at 500mg twice a day for...
one week. However, if the patient is truly penicillin-allergic, then oral levofloxacin may be an excellent alternative.

**Moxifloxacin**

Topical moxifloxacin 0.5%, available as Moxeza (Alcon) and Vigamox (Alcon), has been perhaps the most popular of the fourth-generation fluoroquinolones and has served the public well. But, like all the classic fluoroquinolones, it has developed significant bacterial resistance. Both varieties function very similarly. But Moxeza has a xanthan gum base, which allows it prolonged contact time and thus a slight reduction in dosing frequency.

In spite of this evolving class resistance, moxifloxacin appears to remain a satisfactory choice for bacterial conjunctivitis; personally, we would choose Besivance or fortified antibiotics (vancomycin or tobramycin) for bacterial keratitis because of their documented enhanced efficacy.

An attribute of Vigamox is that it is preservative-free, thus reducing the potential for a toxic or allergic response. Also, do inform patients that the drop has a slight yellow color to avoid the misconception that the medicine has “gone bad.”

**Ofloxacin**

Although it is now a minimally used, second-generation fluoroquinolone antibiotic, ofloxacin 0.3% is still a reasonable option for bacterial conjunctivitis—primarily because it is an inexpensive generic drug. It is also available as brand-name Ocuflox (Allergan).

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**Topical Fluoroquinolones Are Losing Efficacy**

- “The fourth-generation fluoroquinolones demonstrated an in vitro efficacy of less than 80%.”
- “Many organisms, especially coagulase-negative staphylococci, are commonly resistant to the fourth-generation fluoroquinolones, which are the most popular topical antibiotics used in ophthalmology today.”
- “In an era where products are heavily advertised by pharmaceutical companies, it is sometimes difficult to separate peer-reviewed scientific studies from promotional literature printed by the drug manufacturer.”

**Sodium Sulfacetamide**
Topical sodium sulfacetamide, a workhorse of the 1960s and 1970s, has long ago gone by the wayside, chiefly because of a high resistance rate and the number of sulfa-allergic patients. But it still pops up from time to time, usually prescribed by older physicians, urgent care centers and emergency departments.

The reasons we end up seeing a subset of these folks in our offices are because of a wrong diagnosis (most common) or ineffectiveness of the drug.

**Trimethoprim**
• **Topical trimethoprim.**
Because of its efficacy against primarily the gram-positive spectrum, trimethoprim is found only in combination with other drugs. Thus, it is combined with polymyxin B to make it a truly broad-spectrum topical combination antibiotic. This combination was originally known as brand name Polytrim (Allergan), but is widely available generically. Do note that trimethoprim itself is not a sulfa drug, although it also inhibits the production of bacterial folic acid.

Beyond the excellent therapeutic efficacy of this topical combination, it also has the advantage of being packaged in a 10mL bottle, allowing the patient to get more drug for the purchase price. It has minimal toxic potential, so we like to prescribe this combination along with bandage contact lens therapy if there is significant epithelial compromise, as in a corneal abrasion.

• **Oral trimethoprim.** Systemically, trimethoprim is combined with sulfamethoxazole and known by its original brand names of Bactrim or Septra. This is one of the drugs of choice for MRSA infections. Like levofloxacin, it’s an option when a patient is truly penicillin-allergic.

The signatura (sig.) is two “DS” tablets twice a day for seven to 10 days. (The standard strength is called “double strength,” thus the DS designation.) Note that the added sulfamethoxazole is a sulfonamide, so be sure to inquire about true sulfa allergy prior to prescribing.


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**Topical Antibiotics After Intravitreal Injection: Is There a Need?**
Topical antibiotics should theoretically decrease the risk of endophthalmitis following intravitreal injection. But is their use leading to more resistant and more virulent organisms?

• “Mounting evidence suggests that ocular surface organisms are becoming more resistant to fluoroquinolone, with up to 30% of cultured isolates being resistant.”

• In this prospective study, “one group (84 patients) received topical moxifloxacin QID for three days after each intravitreal injection, whereas the other group (94 patients) did not receive any prophylactic antibiotics … The treated group had a higher culture-positive rate at post-injection month one, two and three, compared to the group that received no post-injection topical antibiotics.”

• “The use of povidone iodine has been the only proven method in reducing the risk of endophthalmitis after intraocular surgery … When povidone iodine is used before injection, topical antibiotics have no additional benefit in reducing conjunctival colonization.”

• Conclusions and relevance: “Repeated use of topical moxifloxacin after intravitreal injection significantly increases antibiotic resistance of ocular surface flora. We recommend that routine use of prophylactic antibiotics after intravitreal injection be discouraged.”

This provides further support that there is overusage and overexposure to topical antibiotics in many areas of eye care. We need to think very carefully about “how, why, and when” before we prescribe any type of antibiotic in our practices.

Steroid/Antibiotic Combination Drugs

This class of ophthalmic pharmaceuticals enjoys widespread clinical embrace… perhaps even more than it should.

There are several factors to consider when contemplating prescribing a steroid/antibiotic combination drug:

1. Is there indeed any need for an antibiotic, or would steroid monotherapy be more appropriate?
2. Is the condition primarily infectious with secondary inflammation, or is the condition primarily inflammatory with perceived need for bacterial prophylaxis?
3. Does the patient have any known allergies to medicines?
4. Which antibiotic has the highest probability of being clinically effective?
5. Is the condition acute or chronic?
6. Is the corticosteroid component ketone-based or ester-based?

Combination Considerations

Let’s take a closer look these management factors in turn.

1. Is there indeed any need for an antibiotic, or would steroid monotherapy be more appropriate? An antibiotic is indicated only when there is obvious mucopurulent discharge, which indicates an active infection. Many times, such discharge may not be grossly visible (even at the slit lamp), so a high-magnification look at the lacrimal lake may be required to thoroughly search for subtle microparticulate debris. This is accomplished in a manner similar to that used when evaluating for anterior chamber cells and flare: have the room relatively dark, and use high magnification. There is also another maneuver: use your thumb or finger to raise the lower eyelid a few millimeters, which in turn raises the lacrimal lake high enough so that the iris (not the bulbar conjunctiva and sclera) is the background for your viewing. It is easier to see whitish debris against the darker background of the iris.

If there is no evidence of active infection, then there is no need for an antibiotic.

2. Is the condition primarily infectious with secondary inflammation, or is the condition primarily inflammatory with perceived need for bacterial prophylaxis? This determination is almost exclusively predicated upon the integrity of the corneal epithelium. Superficial punctate keratitis (SPK, also called punctate epithelial erosion)
does not require antibiotic protection. We all see patients with SPK practically every day, but do not prescribe an antibiotic because these epithelial defects are not predisposed to opportunistic bacterial infection. For the most part, if there is no significant breach in epithelial integrity, then antibiotic prophylaxis is not needed. However, if there is significant epithelial compromise, then a prophylactic antibiotic may be of value.

Most clinically significant bacterial infections cause substantial secondary conjunctival inflammation. This is why we treat most bacterial conjunctival entities with a combination medicine. That is, kill the bacteria while concurrently suppressing the secondary inflammation to help normalize tissues as rapidly as possible.

3. Does the patient have any known allergies to medicines? This is critically important. Always, without exception, inquire about any known allergies prior to prescribing any medication, topically or orally.

4. Which antibiotic has the highest probability of being clinically effective? This question requires that we know the expected spectrum of antimicrobial activity of each antibiotic. For example, the macrolides erythromycin and azithromycin (topically) have limited antibacterial effectiveness. There is increasing resistance to the fourth-generation fluoroquinolones. However, drugs such as Polytrim (trimethoprim with polymyxin B), besifloxacin, the aminoglycosides, and bacitracin with polymyxin B all show strong coverage against common bacterial pathogens. (See Antibiotics chapter, page 4, for further discussion.)

5. Is the condition acute or chronic? Generally speaking, most conditions that evolve quickly are acute, while conditions such as blepharitis, rosacea blepharitis, meibomian gland disease, etc., are most often chronic, and will require a more protracted use of medication.

For example, we commonly prescribe generic Maxitrol (dexamethasone, neomycin and polymyxin B, Alcon) for acute bacterial infections, but would never use it for conditions that may require more than a week of treatment. Why? The neomycin (on very rare occasions) can cause a type IV hypersensitivity/allergic reaction, and the dexamethasone has a significant propensity to increase intraocular pressure.

When needed, though, generic Maxitrol is highly effective and inexpensive, so we write for it a lot. Our sig. is most commonly for use every two hours for two days and then QID for four more days.

6. Is the corticosteroid component ketone-based or ester-based? For chronic care of a condition such as staphylococcal blepharitis, we would prescribe Zylet (loteprednol 0.5% and tobramycin 0.3%, Bausch + Lomb). Why? The tobramycin is highly effective against gram-positive species, and the ester-based loteprednol has a much enhanced safety profile than ketone-based corticosteroids.

Our sig. for Zylet is typically QID for two weeks, then BID for a month, along with eyelid hygiene, of course.

Combination Components

Now that we’ve established the basic principles of drug selection,
let’s turn our attention to the specific combination drugs available.

There are four corticosteroids used in topical combination medicines: prednisolone, hydrocortisone, dexamethasone and loteprednol. Let’s discuss these in the general order that they came to market.

- **Blephamide.** Prednisolone acetate 0.2% ophthalmic suspension (the ointment is prednisolone acetate 0.25%) and sodium sulfacetamide 10% is available generically and by its original brand name Blephamide (Allergan). However, because of sodium sulfacetamide’s poor action against many Staph species and the low concentration of prednisolone, it is rarely used in contemporary eyecare.

- **Cortisporin.** Years ago, a combination of neomycin, bacitracin (or gramicidin), polymyxin B and hydrocortisone 1% was rather popular among primary care physicians. The antibiotic combination punch was awesome, but the hydrocortisone was inadequately therapeutic. The corticosteroid component was so weak, in fact, that on the rare occasion of a neomycin reaction, it could not mask the type IV hypersensitivity and allowed the annoying neomycin reaction to manifest clinically.

This four-ingredient combination drug was originally known by the brand name Cortisporin (Monarch), but the drug is rarely used today.

- **Maxitrol.** Back in the 1970s and 1980s, the “superstar” of the combination drugs was Maxitrol (Alcon). It contains neomycin, polymyxin B and dexamethasone 0.1%. Neomycin is itself a broad-spectrum antibiotic, with the exception of *Pseudomonas* species. But because polymyxin B is highly anti-pseudomonal, it is used in many combination products to shore up activity in the gram-negative spectrum. Dexamethasone 0.1% is a highly effective suppressor of inflammation; so much so that if there were to be a sensitivity reaction to the neomycin (again, which is uncommon), the dexamethasone is able to mask it and assure overall therapeutic success, and thereby elevated Maxitrol to superstar status. As we have now emphasized three times, neomycin reactions are not a big deal clinically—yet drug developers are always looking for improvements. This undoubtedly was the main reason for the birth of TobraDex, the blockbuster combination drug of the 1990s.

- **Pred-G and TobraDex.** Pred-G (prednisolone acetate 1% and gentamicin 0.3%, Allergan) came to market just prior to the introduction of TobraDex. But the preparation stung so much that when the more comfortable and tolerable TobraDex (dexamethasone 0.1% and tobramycin 0.3%, Alcon) arrived on the scene, the latter quickly gained favor.

Tobramycin is a fully-armed, standalone, broad-spectrum antibiotic, and only in exceedingly rare cases does it cause any clinically significant toxic or allergic reaction. So, a new star was born.

However, there was still the problem of dexamethasone. While a good suppressor of inflammation, dexamethasone possesses significant potential to increase intraocular pressure, which limits the duration for which dexamethasone can be used safely. We always try to restrict use of dexamethasone to less than two weeks.

- **Zylet.** The most recent entry in the combination category solves, or most certainly reduces, the possibil-
ity of increased intraocular pressure associated with all classes of corticosteroids. And, in comparison to the fourth-generation fluoroquinolones, tobramycin and gentamicin are more clinically effective against *Staph.* species. So, we now finally have a combination drug that is both effective and safe enough to extend the range of clinical use beyond seven to 10 days. This makes it an ideal choice for treating chronic conditions such as staphylococcal blepharitis, etc.

**A Quicker Recovery**

Over the decades, we have witnessed the use of a combination drug when all that was needed was a corticosteroid. We conjecture the main reasons that this occurs: (1) uncertainty of the diagnosis, so “shotgun it;” and (2) the irrational fear of the expression of opportunistic pathogenic bacterial superinfection.

Two observations may help make prescribing more precise: First, a skilled clinician, who takes a complete history and performs a careful slit lamp examination, can indeed make highly accurate diagnoses. Second, opportunistic bacterial infection is just plain rare.

Because corneal infections can be devastating, we come to the defense of the “shotgun” approach to corneal infiltrates. In our clinical experience, though, we have never seen a “corneal infiltrate” turn out to be the beginning of an actual bacterial ulcer—but surely it can happen (probably depending upon the time of presentation and virulence of the bacterial species). Thus, we agree with the succinct and accurate guidance of Mark Abelson, MD:

> “Left untreated, marginal infiltrates generally disappear within a week or two. Ocular steroids have been shown to be the best and only recognized drug therapy for sterile marginal infiltrates, and their application will shorten the course of inflammation, regardless of causative origin. For many patients, a quicker recovery from symptoms such as redness, tearing and discomfort is important for improving their quality of life. Steroids are often prescribed in conjunction with an antibiotic in order to decrease the chance of developing a secondary infection or corneal ulcer and to protect against misdiagnosis.”

Because corneal infiltrates are quite common in contact lens wearers, we must competently differentially diagnose such corneal lesions. After all these years of clinical patient care, we have come to fully realize this clinical reality: Round or oval lesions at or near the limbus, which stain minimally, are invariably leukocytic infiltrates and merit the use of a combination antibiotic-corticosteroid. (See “Is it an Ulcer or an Infiltrate?” page 50.)

In closing of this discussion of combination agents, the one we prescribe most often is generic Maxitrol. This is the case for two simple reasons: it works well clinically, and it is inexpensive. However, when therapeutic intervention may be needed beyond two weeks, we prescribe Zylet because of the safety profile of loteprednol.


**Pearls For Using Combination Drugs**

- Any time you see any round or oval-shaped process at or near the limbus, it is inflammatory in nature. Herpetic infection can present at this area, but it is usually linear (as opposed to oval) in morphology.
- In any acute, unilateral red eye with a serous discharge, be sure to rule out herpetic corneal lesions. Also, consider early adenoviral infection, especially if there is palpable lymphadenopathy on the initial or more involved side.
- In the context of a red eye with a mild secondary iritis, instill a short-acting cycloplegic agent, particularly if a pure antibiotic is used. A combination product will generally eliminate such an iritis without the need for a cycloplegic, though this is a fine clinical point.
Corticosteroids

Don’t be timid when using topical steroids. Their enormous benefits overshadow their potential, uncommon and manageable side effects.

The sight-saving, quality-of-life-enhancing benefits of oral and topical corticosteroids are still not optimally embraced because of antiquated teaching that stresses their thorns, not their roses.

To be sure, improper use of steroids can cause damage; however, this reality is commonly overshadowed by their enormous benefit!

While there is a plethora of indications for the use of steroids, there is only one contraindication: epithelial herpetic infection. There is also only one precaution: uncertainty of the diagnosis. This “precaution” bears explanation. It’s possible to have an *Acanthamoeba* or fungal keratitis that is difficult to diagnose, especially in the early stages. Using a steroid—even a combination antibiotic/steroid—could cause the condition to worsen; however, these are exceedingly rare presentations.

An essential element in inflammatory disease management is proper follow-up. Seeing patients in a timely manner is critical so that if your initial treatment turns out to be ineffective, close follow-up allows you to catch it sooner. Then you can refine your diagnosis and alter the therapy.

We’ve seen many cases of therapeutic error in which the patient simply did not return to the initial prescriber for timely follow-up, but instead sought care from another doctor. Had the patient returned to the initial prescriber, the diagnostic error and subsequent erroneous treatment could have been easily managed. We’ve also seen instances in which the initial prescriber did not schedule a follow-up visit, thus the patient simply decided to go elsewhere.

Here is an example what to do to avoid such an unfortunate scenario: Let’s say we see a patient with a typical corneal lesion that could be Thygeson’s or herpetic. Because the majority of acute eye presentations that we see are inflammatory in nature, we’re inclined to initiate therapy with a steroid. However, in this type of situation, we would tell the patient something like this: “This medicine should help your eye get better quickly; however, the diagnosis of your condition is not completely clear, and there is a chance your eye could actually worsen on this medicine. It is important that you let me see you again in a couple of days. I will be glad to work you in anytime.” We believe this truly caring, straightforward conversation is crucial for optimum patient care and rapport.
All this is called “patient management” and it is far more than disease management. (This not only applies to steroid treatment, but to the treatment of any eye condition.)

**Maximum Efficacy Steroids**

The key to success in suppressing inflammation is to select an appropriate topical steroid medicine and have the patient use it frequently until control is achieved, then tapering can begin as indicated.

The two most efficacious topical ophthalmic corticosteroids are Durezol emulsion (difluprednate 0.05%, Alcon) and Pred Forte (prednisolone acetate 1%, Allergan)—but not generic prednisolone acetate! (More on this below.)

• **Durezol.** Durezol is an emulsion and does not need to be shaken before instillation. We use it as our “big gun” to treat advanced cases of iritis and episcleritis. Durezol’s longer duration of action permits less frequent dosing than with prednisolone formulations, but provides equal efficacy.¹ So, we dose it every two hours initially, rather than hourly.

  But, along with Durezol’s increased efficacy comes an increased risk of significant IOP elevation, especially in children.² So be sure to monitor IOP attentively.

• **Pred Forte.** Prednisolone acetate 1% also has good anti-inflammatory efficacy.³ Pred Forte is a workhorse and, like Durezol, is used primarily to treat significant cases of anterior uveitis and episcleritis, and other...
Steroids

Lotemax Gel vs. Lotemax Ointment

Patients, practitioners and pharmacists may mix up these two medicines, so let's set the record straight.

• Lotemax gel. Though called a gel, this comes in a dropper bottle, like a solution. However, inside the bottle, it is indeed a highly viscous, semisolid gel formulation. But, through a process called adaptive viscosity, it becomes a liquid when squeezed out of the dropper. And, upon instillation in the eye, the formulation loses its gel structure altogether as the polycarbophil polymer interacts with the electrolytes in tears. Still, the drop is rather thick upon instillation, and will cause a moment of initial blur until the gel fully converts into a liquid. We advise patients to allow the drop to spread out on the ocular surface for four to five seconds before blinking, so that the initial blur does not displace the drop onto the eyelid.

Because of the nature of this unique gel, the steroid does not settle out of the vehicle, so it does not require shaking. (It is best to tip the bottle back and forth just once to make sure the drug enters the tip of the dropper prior to instillation, but no actual shaking is necessary.) Also, unlike with suspensions, this delivery system provides a perfectly uniform dose at every instillation.

• Lotemax ointment. This preparation comes in a 3.5g tube and contains inactive ingredients of white petrolatum and mineral oil. Because it is an ester-based corticosteroid and also because it is a preservative-free preparation, it may provide a safety advantage over fluorometholone ointment.

Lotemax ointment is indicated for the treatment of postoperative inflammation and pain, but is also applicable in many other cases in which an ointment is useful for suppression of inflammation.

Marlowe ZT, Davio SR. Dose uniformity of loteprednol etabonate ophthalmic gel (0.5%) compared with branded and generic prednisolone acetate ophthalmic suspension (1%). Clin Ophthalmol. 2014;8:23-9.

Ketone vs. Ester Steroids: What's the Difference?

Topical corticosteroids are based on two different molecular classes: ketones and esters. These are far more than lab bench distinctions; they have important implications for patient care. The older, traditional medications—dexamethasone, prednisolone, fluorometholone—are the ketone-based corticosteroids. Our bodies have limited means to actively degrade these molecules and they can, with prolonged use and on rare occasions, raise the intraocular pressure and/or cause posterior subcapsular cataract.

By contrast, the ester-based corticosteroid (loteprednol) is readily broken down by physiological esterases into inert substances shortly after providing effective anti-inflammatory effects. This dampens the risk for increased intraocular pressure, and there have been no reports of cataract formation with the use of loteprednol. We hasten to add that these side effects associated with corticosteroids are quite rare with the ketone-based steroids, and even rarer with ester-based formulations.

The enhanced safety profile of loteprednol makes it well suited for both acute conditions and chronic conditions, such as dry eye, Thygeson’s superficial punctate keratopathy, prevention of uveitis flares or corneal transplant rejection, stromal herpes simplex disease, inflamed pterygia and pingueculae, and more.


High Efficacy Steroids

Next in clinical efficacy are Lotemax gel (loteprednol 0.5%, Bausch + Lomb), generic prednisolone sodium phosphate 1% solution (original brand name Inflamase Forte), and generic prednisolone acetate 1%. Dexamethasone, either the solution or suspension form, is also in this category.

• Lotemax gel. Lotemax gel is non-settling and it does not require shaking before instillation. Don’t be confused because it’s called a “gel”—when dispensed from its dropper bottle, it becomes a viscous liquid. (See “Lotemax Gel vs. Lotemax Ointment,” left.)

We often use Lotemax gel as an “off label” treatment for our dry
eye patients, but we also use it to treat many other chronic, recurrent, inflammatory conditions such as stromal herpes simplex keratitis, Thygeson’s SPK, uveitis, inflamed pingueculae and pterygia, etc.

While loteprednol may not be quite as efficacious as prednisolone and Durezol, it has significantly less propensity to cause unwanted side effects of subcapsular cataracts and increased IOP. In Phase III studies, for instance, only two out of 409 patients on Lotemax gel had an increase in intraocular pressure greater than 10mm Hg. In addition, loteprednol 0.5% suspension was shown to be as effective as prednisolone acetate for post-op cataract surgery inflammation, and with less effect on IOP.

Note: The patent for Lotemax suspension (loteprednol 0.5%, Bausch + Lomb) expired in April 2014 and the product has been discontinued. At this time, we are not aware of a generic formulation of loteprednol suspension.

- Prednisolone sodium phosphate 1%. This generic steroid is an excellent choice when a potent, relatively inexpensive steroid is needed. Because this is a solution, it does not require shaking; so it may be an especially good choice for older people with arthropathies for whom shaking a bottle can be a challenge.

- Prednisolone acetate 1%. Generic prednisolone acetate suspension is a reasonable choice for mild to moderate acute inflammatory conditions, especially if cost is a concern—but not in the setting of advanced iritis and episcleritis, as discussed above.

Rimexolone 1% (Vexol, Alcon) and dexamethasone 0.1% (Decadron solution [Merck] and Maxidex suspension [Alcon]) are fine products, but are no longer commonly used.

Microcystic edema is a marker for tissue inflammation and is easily suppressed with topical corticosteroid therapy.

Moderate Efficacy Steroids

Moderate efficacy steroids in common usage are fluorometholone 0.1% suspension and Alrex (loteprednol 0.2%, Bausch + Lomb) suspension, both of which must be shaken prior to instillation.

- Fluorometholone 0.1%. There are two derivatives of fluorometholone 0.1% suspension—the alcohol (FML, Allergan, and generic) and the acetate (Flarex, Alcon, and generic). The acetate moiety gives the fluorometholone molecules some additional anti-inflammatory effectiveness over the alcohol moiety.

Fluorometholone is available generically and is thus reasonably inexpensive. (However, there have been sporadic reports of fluorometholone not being available in

Shake Up Your Patient’s Suspension

Don’t just tell patients to “shake well” when prescribing a suspension. Physically shake the bottle in front of them to demonstrate the action needed. Hopefully, this will ensure compliance.

When a patient cannot properly shake a suspension (this can be the case for any number of reasons), remember that prednisolone sodium phosphate is the only solution form of a generic topical corticosteroid. There are two brand name topical corticosteroids that do not require shaking: Alcon’s Durezol and Bausch + Lomb’s Lotemax gel drops.

Relative Clinical Efficacy of Topical Steroids

Here, based on our clinical experience and the comparative information we have available, we rate the relative efficacy of the topical steroids, starting with the most efficacious:

1. Difluprednate 0.05%
2. Prednisolone 1%
3. Loteprednol 0.5%
4. Rimexolone 1%
5. Fluorometholone acetate 0.1%
6. Dexamethasone 0.1%
7. Fluorometholone alcohol 0.1%
8. Loteprednol 0.2%
9. Prednisolone 1/8%
10. Hydrocortisone 1%
Steroids

Angular blepharitis is best treated with a corticosteroid ointment.

Various parts of the country. When prescribing, be sure to check with your pharmacy for availability.) While fluorometholone has less tendency to increase intraocular pressure than other ketone steroids, we are not nearly as comfortable using it long-term as we are with the ester-based loteprednol.

FML Forte (fluorometholone 0.25%, Allergan) is not recommended because fluorometholone 0.1% represents the top of the dose response curve—meaning that the 0.25% formulation is no more efficacious than the 0.1%. Moreover, the 0.25% concentration has a greater tendency to raise IOP.

• Alrex. For allergic eye disease, prescribe a topical steroid when itching is accompanied by clinical signs of conjunctival injection, chemosis or eyelid swelling. In these instances, Alrex (or even Lotemax gel) is the answer. We typically dose Alrex (or Lotemax gel) QID for one week, then BID for one month.

Beyond awareness of the various delivery systems (suspensions, solutions, emulsions, gels and ointments), knowing the clinical efficacy of these drugs is important.

Steroid Ointments

The ophthalmic ointments enjoy a wide array of clinical indications. There are three corticosteroid medicines that merit frequent clinical use in the ointment formulation:

• Lotemax ointment. Lotemax ophthalmic ointment (loteprednol...

Angular blepharitis is best treated with a corticosteroid ointment.
0.5%, Bausch + Lomb) is the only ester-based steroid ointment available. It is indicated for postoperative inflammation and pain, but also has many “off-label” clinical uses: dry eye, allergy, corneal transplant protection, blepharitis, giant papillary conjunctivitis, chronic uveitis, stromal immune herpetic keratitis, Thyeson’s SPK, RCE, augmentation of steroid eyedrop therapy in acute advanced uveitis or episcleritis, contact dermatitis, and other inflammatory conditions.

• FML ointment. FML ophthalmic ointment (fluorometholone 0.1%, Allergan) is used much the same as Lotemax ointment. It is indicated for inflammation of the palpebral and bulbar conjunctiva, cornea and anterior segment of the globe, and any of the “off label” uses mentioned above. The only very minor difference is to keep a little bit closer watch on the patient for steroid-related adverse effects.

• Triamcinolone 0.1% cream. This is a dermatologic preparation that works well for periocular dermatitis conditions. Triamcinolone 0.1% cream, which became generic long ago, has been our favorite medicine for many years to treat contact blepharodermatitis. It comes in 15g and 30g tubes, each costing less than $10 in most markets.

    Be sure to tell the patient that on the side of the tube is the statement “NOT FOR OPHTHALMIC USE,” but that the medication is perfectly fine to use as you have prescribed. We explain that triamcinolone, also known by the brand name Kenalog, is frequently used by retina subspecialists for FDA-approved injection into the eye. In other words, if some of the triamcinolone cream gets into the patient’s eyes, it’s nothing to worry about.

Corticosteroids are the most essential and highly prescribed medicines in the treatment of ocular inflammation of any stripe. Their widespread clinical usage confirms that ocular inflammation is the most common clinical manifestation seen in eyecare. It is so impor-

Tips for Tapering
Ever had a challenge tapering a patient off a topical corticosteroid? Steroids are wonderful for short-term therapy, but carry intrinsic risks when used long-term.

    Here are a couple of thoughts: You can usually get patients down to three or two times a day, or even once daily, before a relapse occurs. Of course, now you have to increase the dosage again and try a longer, slower taper. Try adding a topical NSAID, such as Prolensa (bromfenac, Bausch + Lomb), daily as you begin the next step-down of the corticosteroid. This may offer enough supplemental anti-inflammatory support to enable the continuation of the steroid taper. Or, try the oral NSAID route: prescribe Celebrex (celecoxib, Pfizer) 100mg per day for a few weeks.

    There are instances when long-term steroid use is indicated. Some patients who have had corneal transplants, stromal immune corneal disease, chronic uveitis or recalcitrant dry eye disease may be kept on steroids for life. While older ketone-based steroids have been used for long-term therapy in the past, we would recommend ester-based loteprednol 0.5% gel once daily for these protracted dosing schedules. (The ketone-based steroids seem to work well in this low-dose approach, yet it stands to reason that loteprednol, being an ester-based steroid, is preferable because of its enhanced safety profile.) Some patients just require one drop of steroid daily to maintain control of their condition.

Iris synechia in the setting of anterior uveitis. Two days later, following intensive topical steroid therapy along with cycloplegia, the synechia has broken. Use of phenylephrine 2.5% or 10% can be helpful in breaking more problematic synechia.
Get a Grip on Oral Steroids

Steroids, both topically and orally, are not fully embraced in optometric care. The awesome ability of these medicines to subdue damaging inflammation should be highly applauded. Seasoned clinicians fully understand this.

Of course, steroid effects are two-fold: Used short-term, they are highly beneficial—for example, steroids reduce or prevent corneal scarring by inhibiting the action of fibroblasts. But it’s the long-term use of steroids that gives pause. For instance, topical steroids can increase intraocular pressure because they up-regulate glycosaminoglycans accumulation in the trabecular meshwork, which can impede aqueous outflow.

Since we all need to be comfortable using oral prednisone, this topic merits careful attention. For perspective, when treating acute onset optic neuritis and giant cell arteritis, appropriate care is the intravenous administration of 1,000mg of methylprednisone daily for three days, followed by high-dose oral prednisone for another several days. In comparison, the most common dosage of oral prednisone in typical eye care is 40mg per day, with ranges from 20mg to 80mg a day. If you have any reservations about using oral prednisone in a particular clinical case, make a quick call to the patient’s primary care physician for consultation and “medical clearance” prior to initiation of such therapy.

When we prescribe prednisone at 40mg or less per day, we simply have the patient take four 10mg tablets in a single daily dose; however, when we prescribe 60mg or higher a day, we typically instruct the patient to divide the dose into half the prescribed amount twice daily (i.e., 30mg at breakfast and 30mg with the evening meal).

The concept of “tapering” oral prednisone is now relatively outdated in acute care conditions. For most conditions, dose 40mg per day for three to five days, then stop. Alternatively, you can prescribe a steroid dose-pack, which come in 4mg, 5mg and 10mg packages. (Note that the standard Medrol Dosepak [Pfizer] is 4mg methylprednisolone, not prednisone.) When using the 5mg pack, for example, the patient would take six tablets on day one (30mg starting dose), then reduce the dose by one 5mg tablet per day for the six-day period. Either approach is clinically adequate for most cases in primary eye care. We advise our patients that prednisone should always be taken with a meal, preferably breakfast; the medicine is simply better tolerated this way.

Some clinical conditions for which we most commonly prescribe oral prednisone are: hyperalgesic conjunctivitis; severe contact blepharodermatitis; orbital pseudotumor (idiopathic orbital inflammatory disease); augmentation to topical steroid therapy for severe uveitis; and any marked inflammatory condition where oral prednisone is deemed to be potentially helpful.

While there is a wide range of clinical conditions in which oral prednisone is indicated, there are also a few precautions. Let’s take a look at these:

- **Pepic ulcer disease.** Our consultant gastroenterologists recommend the concurrent use of a proton (hydrogen) pump inhibitor medication, such as OTC Prevacid or Prilosec (one 20mg tablet per day), or a histamine subtype 2 receptor blocker, such as cimetidine (Tagamet) 800mg twice daily, or ranitidine (Zantac) 150mg twice daily. Do not hesitate to have a quick chat with the patient’s physician if you feel one of these medications would be of benefit.

- **Diabetes.** Our consultant endocrinologists make these observations: For patients with type 1 diabetes, instruct them to alter the insulin dosage on a “sliding scale.” Patients with type 1 diabetes know how to do this. For patients with type 2 diabetes, the endocrinologists bemoan that most of these patients are “out of control” periodically anyway, so a few hyperglycemic days are not a concern in most cases. Again, give the patient’s diabetes doctor a call if you have any concerns.

- **Pregnancy.** We rarely ever treat a pregnant patient with any medication without first consulting with her obstetrician.

- **Tuberculosis.** Most of the time, patients who have clinically significant tuberculosis know it; but if there is any concern, order a chest X-ray or have a chat with the patient’s primary care physician prior to prescribing.

- **Adverse response with prior use of oral prednisone.** Of course, if the patient became hallucinogenic, suicidal, sleepless, etc., with prior use of prednisone, then physician consultation is necessary prior to prescribing.

For perspective, we have prescribed prednisone hundreds of times, and have yet to have any significant issues whatsoever. Again, these are short, focused dosages, which is what is needed in almost all cases. Having conversations with primary care physicians can rapidly accelerate your and your patient’s comfort level.
Dry Eye Disease

Why is dry eye disease still so hard to treat? We must help patients address lipid-layer deficiency while combating ocular surface inflammation.

The question has been asked, “So, why does clinical dry eye disease still seem so hard to treat?” We think we know the answer. Reading this section will give you our conclusion as well as some expert opinion from leaders in the field of dry eye disease.

Elements of Dry Eye

There are two critical factors that need to be understood when dealing with dry eye disease (DED).

1. Lipid layer deficiency. First, it is well established that meibomian gland malfunction leads to a lipid-deficient pre-corneal tear film. It is also well known that most dry eye results from such lipid layer deficiency. Why does it seem that there has been a rather abrupt epidemic of this condition? We don’t know; it could be that we are just now discovering the vital importance of the lipid layer, or that there are dietary and/or environmental influences that affect meibomian function more so now than in the past.

Lipid-Based Artificial Tears (for Evaporative Dry Eye)

- Vast majority of dry eye patients have MGD
- Meta-stable emulsions are optimum Tx
- Rapidly provides a protective lipid barrier
- Reduces harmful evaporation to prevent tear loss
- Replenishes the tear film
  - Refresh Optive Advanced (10ml) – Allergan
  - Retaine MGD (unit dose) – OcuSoft
  - Soothe XP – Bausch + Lomb
  - Systane Balance emulsion (10ml) – Alcon

* Soothe XP will be returning to the market by midsummer 2014

Aqueous-Based Artificial Tears (for Aqueous-Deficient Dry Eye)

- Less common cause of dry eye
- Aqueous-based solutions are optimum Tx
- Rapidly provides ocular surface hydration
- Main ingredients commonly include substituted cellulose ether, glycerin, polyethylene glycol, propylene glycol
  - Blink Tears (15ml) – AMO
  - FreshKote (15ml) – Focus Labs
  - Optive (15ml) – Allergan
  - Soothe Xtra Hydration (15ml) – Bausch + Lomb
  - Systane Ultra (15ml) – Alcon

This patient has advanced dry eye, reduced lacrimal lake and meibomian gland dysfunction, suggesting a poor tear film lipid layer. A lipid-based tear is needed, for starters.
that lipid-layer deficiency is the primary cause of dry eye, the initial topical therapy to alleviate most cases of dry eye should be a lipid-based artificial tear.

2. Inflammation is pathogenic. Inflammation plays a critical, central role in almost all cases of dry eye disease. The literature on ocular surface inflammation allows us to formulate a rational and effective protocol to help patients with dry eye disease. (See “What the Journals Say About Dry Eye,” page 26.)

Three-Pronged Approach
Based on the dry eye literature and our own clinical experience, we recommend a three-pronged approach:

- Use a lipid-based artificial tear as initial and maintenance therapy.
- Use a corticosteroid (preferably in a "pulse-dosed" manner, an off-label approach) to suppress the ocular surface inflammation. (It should be evident that using the safest available, clinically efficacious topical corticosteroid, i.e., loteprednol, would be the steroid of choice in managing any chronic, recurrent, inflammatory condition of the ocular surface.) What is pulse dosing? Our initial (off-label) treatment of corticosteroid is QID for two weeks, BID for four weeks, and stop. Then, if necessary, prescribe a "pulse dose" of one or two weeks QID.
- Use essential fatty acids (fish oil, krill oil or flaxseed oil) to underpin this entire process.

Mimic the Lipid Layer
“Overall, decades of research has shown a strong correlation between dry eye symptoms and the state of the tear film lipid layer, as well as a clear connection between the status of the lipid layer and the osmolarity of the tear film.”

“Increasing the thickness of the tear lipid layer improves the stability of the tear film, suggesting that in selecting a dry eye therapy, an important feature would be the ability of the treatment to mimic the lipid layer of the tears.”

Because a hyperosmotic tear stimulates inflammation, using either oral doxycycline or essential fatty acid supplementation along with lipid-based tears could maintain tear film integrity, particularly following corticosteroid suppression of ocular surface inflammation.


Lipid-Containing Lubricants for Dry Eye
“Randomized controlled interventional studies have shown that lipid-containing lubricants are effective in the signs and symptoms of dry eye under certain situations. Despite the presence of some flaws in the studies reviewed, the conclusions of all the studies were clear, and there is now sufficiently strong evidence that lipid-containing lubricants can be recommended.”


Remember that not everyone can swallow the large fish oil capsules, so tell those patients about “swallowable” options (such as Coromega Omega-3 Orange Squeeze packets and Nordic Naturals Omega-3 Liquid).

Beyond these three pivotal interventions, punctal plugs can also be very helpful, but need not be attempted until after a two- to four-week induction therapy of corticosteroid suppression of ocular surface inflammation.

Lacriserts (Valeant Ophthalmics) are useful in a small subset of patients who simply require more lubrication than standard measures can achieve. (Your contact lens assistant or technician can go to the company’s website, www.lacrisert.com, for an instructional video on proper insertion and use procedures.)

Dry Eye Discussion
Now, let’s revisit our initial question: “So, why does clinical dry eye disease still seem so hard to treat?” Undoubtedly, there are several reasons, but one is that many eye doctors are still reluctant to embrace the virtues of topical corticosteroids, and thus they have commonly defaulted to less effective options.

In an effort to better care for our...
patients with dry eye disease, we need to take attentive notice of the professional literature and follow its conclusions to maximize the care of our patients with dry eye disease. The chart below succinctly summarizes how we care for our patients. The reason we do so is quite simply because it works.

Human beings often make bad patients. This seems to be especially true of those with chronic eye diseases. Patients commonly slack off their use of artificial tears and/or their essential fatty acid supplements, and then the entire cycle repeats itself. This is where an off-label “pulse-dose” of topical corticosteroid enters the medical protocol. We consistently guide our patients in the proper care of their dry eyes via a printed handout and the following verbal instruction:

**Physician Care of Dry Eye Patients**

Who can best handle dry eye?

“Surprisingly, the cornea specialists did not show better conformance [to established Preferred Practice Patterns] than other ophthalmologist subtypes because they received special training in the diagnosis and management of dry eye syndrome.”

In our opinion, an attentive, compassionate doctor of optometry should be the best at caring for patients with dry eye disease. It also underscores the realization that dry eye is woefully mistreated and undertreated in many, many patients.


“Now after weeks or months, your eyes may become uncomfortable again. This is called ‘symptomatic breakthrough.’ If or when this occurs, use the Lotemax gel drops four times a day for one week, then stop. Or, if using Lotemax ointment, instill it at bedtime for one week, then stop. This therapeutic maneuver is called ‘pulse-doing,’ and has been shown to be very beneficial in regaining control of dry eye symptoms. Most patients need to do this only once or twice a year.”

While “pulse-dosing” of loteprednol 0.5% is effective for most patients, there is a small subset of patients who may require once-daily—or even twice-daily—therapy with loteprednol indefinitely. In our extensive experience in using

<table>
<thead>
<tr>
<th>Two Weeks</th>
<th>Four Weeks</th>
<th>Indefinitely</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lipid-Based Artificial Tear</strong></td>
<td><strong>Lipid-Based Artificial Tear</strong></td>
<td><strong>Lipid-Based Artificial Tear</strong></td>
</tr>
<tr>
<td>Four to six times a day as needed</td>
<td>Three to four times a day as needed</td>
<td>Two to four times a day as needed</td>
</tr>
<tr>
<td><strong>Loteprednol 0.5%</strong></td>
<td><strong>Loteprednol 0.5%</strong></td>
<td>Discontinue Loteprednol 0.5%</td>
</tr>
<tr>
<td>Four times a day</td>
<td>Two times a day</td>
<td>If symptoms break through or continue, then either pulse dose loteprednol four times a day for two weeks, or consider loteprednol once daily as needed.</td>
</tr>
</tbody>
</table>

The risk of increased IOP with loteprednol is uncommon at high dosage and rare at low dosage. Our experience has been that if an increase in IOP is going to occur, it will do so at the initial one-month follow up, and not later.

**Omega-3 essential fatty acids** (derived from fish and/or flaxseed oil) can be initiated at any stage, based on clinical judgment.

*Alternatively, instill loteprednol ointment daily at bedtime for three weeks, then M-W-F for three weeks. Loteprednol therapy for inflammation due to dry eye disease is considered an “off-label” use.*
Look at the Lacrimal Lake

Beyond the history and preocular tear breakup time, be sure to attentively analyze the character and volume of the lacrimal lake. This needs to be done prior to placing any other drops or fluorescein in the eye. A “low tear lake” is another objective sign of corneal surface dryness. Also observe for any lagophthalmos, which can be an exacerbating factor in symptomatic dry eye.

For those patients who simply cannot afford the ester-based corticosteroid, we reluctantly default to generic fluorometholone 0.1% ophthalmic suspension or ointment (with the same sig.), but we follow such patients a bit more frequently because of the increased potential for cataract formation and/or increased IOP.

As clinicians, you know that not every patient will respond optimally to any medical interventional protocol. In such cases of suboptimal response, significant thought—and rational trial and error—is required to determine the best course of treatment for the patient.

What the Journals Say About Dry Eye

The following are quotes from experts in the field of dry eye disease and published in journal articles that provide a sound, consistent scientific basis for our clinical intervention:

• Prominent Role of Inflammation. “The pathogenesis of DED is not fully understood; however, it is recognized that inflammation has a prominent role in the development and amplification of the signs and symptoms of DED.”

The Value of Tear Osmolarity Testing?

There has been some very spirited debate recently in the ophthalmic journals about tear osmolarity measurement for dry eye disease.

One retrospective study concluded: “Changes in tear osmolarity do not correlate significantly with changes in patient symptoms or corneal fluorescein staining in dry eye disease.”

This was countered by an editorial in the same issue of the journal that said, “Well-controlled prospective studies have repeatedly shown that tear osmolarity is capable at monitoring therapy. Oftentimes, improvements in tear osmolarity precede that of staining and symptoms.”

For one, this offers a case example of why it’s so important to keep up with the latest literature. But, more to the point, if you’re interested in investing in this technology for your practice and your long-suffering dry eye patients, be sure to invest some time in learning more about the science behind it, as the research appears to still be developing.


“Although the exact place of inflammation in the stream of events leading to ocular surface distress is not clear, its role is unmistakable.”

“Regardless of the origin, a self-perpetuating cycle of inflammation develops that is central to the pathogenesis of dry eye disease.”

“The evidence implicating inflammation in the pathogenesis of DED has opened new avenues for the treatment of this complex disorder. The successful application of anti-inflammatory medications in the treatment of DED provides hope for the millions of individuals who daily experience this deleterious condition.”

• Anti-inflammatory Treatment. There are several extracellular matrix metalloproteinases (MMPs); however, the subtype MMP-9 appears to be highly correlated to ocular surface inflammation typically seen in dry eye disease.

“MMP-9 has been found to regulate physiological shedding of the corneal epithelium ... MMP-9 activity on the ocular surface increases in eyes with tear dysfunction.”

“Doxycycline, a tetracycline derivative, ameliorates DED by inhibiting the activity of MMPs, primarily MMP-9, promoting ocular surface integrity.”

Essential fatty acid supplements do this also, but not as rapidly or effectively as doxycycline.

“Over the past decade, there has been a trend towards increased use of anti-inflammatory therapies to improve comfort, corneal smoothness and barrier function.”

“Topical CsA [cyclosporine A] significantly reduced severity of corneal fluorescein staining after four and six months of use. Corticosteroids, tetracyclines and omega-3/omega-6 essential fatty acids have also been found to decrease production of a variety of inflammatory...
mediators and improve corneal epithelial disease.”

- **Cyclosporine.** “Topical administration of cyclosporine A has been shown to increase tear fluid secretion, possibly by promoting the local release of parasympathetic nervous system-associated neurotransmitters … The cumulative findings of several clinical trials indicate that long-term treatment with cyclosporine A 0.05% ophthalmic emulsion can yield positive results with regard to objective and subjective findings, including corneal surface staining, Schirmer test with anesthesia, blurred vision and frequency of artificial tear application.”

“...The beneficial effects of cyclosporine A treatment in DED are well established; however, it is clear that many patients with DED do not show a consistent therapeutic response to topical cyclosporine A.”

In our experience, Restasis (cyclosporine A, Allergan) is uniquely effective in very select patients, particularly those who appreciate the confidence of prescription therapy; if/when we do use it, we also prescribe a short, adjunctive course of topical corticosteroid.

“Topical cyclosporine thus offers a long-term therapeutic option for dry eye patients that targets underlying inflammation and is not associated with glaucoma or cataracts. In the present analysis, 18% of patients filled only a one-month supply of topical cyclosporine, despite the fact that the Phase III trials were based on six months of continued use. While the reasons for treatment discontinuation in this claims analysis are not available, other studies have demonstrated that burning and stinging associated with initial use of topical cyclosporine are common reasons for early discontinuation. Options previously reported to overcome this burning and stinging include patient education and adjunctive use of short courses of topical corticosteroids at initiation of topical cyclosporine, particularly in patients with more severe dry eye.”

- **Topical corticosteroids.** “Clinical trials have demonstrated the efficacy of topical corticosteroid treatment at diminishing symptom severity and minimizing ocular surface staining.”

“[T]here is increasing evidence that the use of topical corticosteroids as temporary or pulsed therapy can be useful in reducing the damaging effect of inflammation.”

“Repetitive, short-term pulsatile administration of topical corticosteroids is a promising [off-label] method of harnessing their beneficial effects, while minimizing the risk of adverse events.”

“In a prospective study of 53 patients with SS [Sjögren’s syndrome], the long-term recurrence rate of dry eye symptoms and signs after short-term pulse..."
topical preservative-free methylprednisolone therapy was evaluated. Therapy started at four times a day for the first two weeks and tapered off every two weeks until complete discontinuation. Improvement in subjective symptoms and corneal staining scores occurred as early as two weeks. Significantly improved TBUT and Schirmer test results were observed at the end of the treatment period. Impression cytology revealed a significantly increased number of conjunctival goblet cells. After the first pulse therapy, mean drug-free remission time was 56.6 weeks; 11 patients (20.8%) had a recurrence of symptoms and signs. After the second pulse therapy, mean drug-free remission time was 72.4 weeks; only one patient had a recurrence. No serious complications, including intraocular pressure elevation.

**Calling Your Attention to Conjunctivochalasis**

“Conjunctivochalasis, which is characterized by a loose, redundant, non-edematous inferior bulbar conjunctiva interposed typically between the globe and the lower eyelid, has been reported to be an important cause of ocular discomfort and tear instability.”

“Instability of the preocular tear film is the hallmark of dry eye syndrome.”

Conjunctivochalasis results from age-related degeneration of conjunctival elastic fibers. This excess conjunctival tissue can cause mechanical retardation of tear outflow or total occlusion of the inferior puncta. This sets forth a cascade of events resulting in the accumulation of inflammatory cytokines and matrix metalloproteinases. “Several studies have reported a positive association between keratoconjunctivitis sicca, conjunctivochalasis, and inflammation. Delayed tear clearance, especially in severe conjunctivochalasis, has been shown to be associated with increased tear film and ocular surface inflammation.”

Along a similar line: “Because punctal occlusion creates delayed tear clearance that might already be in eyes with conjunctivochalasis, it is generally considered contraindicated unless ocular surface inflammation is controlled.”

“Several research groups have previously reported evidence of a relationship between conjunctivochalasis and keratoconjunctivitis sicca. The levels of inflammatory cytokines in tear fluid are increased by delayed clearance of tears. Also, obliteration of the tear meniscus and delayed tear clearance aggravates ocular inflammation, leading to the occurrence of conjunctivochalasis. These findings suggest that dry eyes produce more inflammatory cytokines, which may lead to the occurrence of conjunctivochalasis.”

Furthermore, subconjunctival hemorrhages may also be associated with conjunctivochalasis. In older patients with chronic, recurrent subconjunctival hemorrhages, a careful evaluation of the inferior bulbar conjunctiva might reveal conjunctivochalasis, which may be an exacerbating factor. “Subconjunctival hemorrhage was more often found in the inferior areas of the conjunctiva than in the superior areas, and bleeding rarely extended under the superior conjunctiva.” There seems to be a direct relationship between the severity of conjunctivochalasis and the frequency and degree of these subconjunctival hemorrhages.

In summary, conjunctivochalasis can significantly influence the clinical expression of ocular surface disease. It is important that we further enhance our critical observation of ocular surface tissues in order to properly intervene therapeutically in the care of our patients with this spectrum of ocular surface disease.

As you can see from the above quotations, inflammation is also centrally involved in the pathogenesis and subsequent clinical expression of conjunctivochalasis; therefore, it certainly seems reasonable that a one- to three-week trial of a corticosteroid to subdue secondary inflammation and provide comfort, along with appropriate other dry eye interventions, would be therapeutically beneficial to patients with this condition. If symptoms persist, then consider a partial conjunctivectomy.

Anti-Inflammatory Mainstay for Dry Eye

“Topical corticosteroids have been mainstays of the eye care field more than the newer agent Restasis, and less potent corticosteroid formulations with few side effects are now available. Pulse therapy of corticosteroids has been shown to stave off dry eye symptoms for several months, and patients are more likely to notice the beneficial effects of corticosteroids earlier than with Restasis. For these reasons, and because of the lower cost, corticosteroids are an attractive option for treating dry eye.”


and cataract formation, occurred during the entire follow-up period.”

Clinical recommendations: “Although the studies evaluating 1% topical methylprednisolone were open label and retrospective, the effect was robust. If used short term, the side effects do not seem to be serious.” Although, methylprednisolone is not commercially available for topical ophthalmic use, this exemplifies the marked benefit of topical steroids in helping dry eye patients.

• Essential Fatty Acids. “Available data suggest that EFAs [essential fatty acids] can ameliorate DED; however, more evidence is needed to identify the most efficacious forms and doses of EFAs.”

“This study demonstrated that oral consumption of omega-3 fatty acids (180mg EPA and 120mg DHA twice daily for 30 days) is associated with a decrease in the rate of tear evaporation, an improvement in dry eye symptoms, and an increase in tear secretion.”

Standard fish oil supplements (equaling about 2,000 mg/day) taken with breakfast or lunch are usually well tolerated. For those few patients who encounter gastrointestinal issues, ask them to have their pharmacist guide them to the slightly more tolerable triglyceride form of fish oil.

Scrape the Lid Margin to Relieve Dry Eye Symptoms

Dry eye pioneers Donald R. Korb, OD, and Caroline A. Blackie, OD, PhD, recently described a novel, effective, in-office treatment of the meibomian glands:

1. Apply lissamine green to determine the thickness and the location of the line of Marx (LOM).
2. Evert the lower lid and ask the patient to look up. Place a golf club spud onto the lid margin directly over the LOM.
3. Gently maneuver the instrument laterally across the entire length of the LOM in small wiping motions with mild pressure. The goal is to remove the accumulated lissamine green-stained cells (scale).
4. Repeat the procedure across the entire length of the keratinized lid margin, treating all the areas from the LOM to the base of the eyelashes. Once complete, the lid margins should appear clean with little to none of the typical oily sheen.

Drs. Korb and Blackie explain:

• “Anatomic alterations at the mucocutaneous junction may inhibit proper meibum flow to the tear film.” Thus, “debridement-scaling of the LOM and lower lid margin provides statistically significant symptom relief and improvement in the MG [meibomian gland] function. The novel procedure should be considered in the management of MGD and evaporative dry eye.”

• “It is notable that a single debridement procedure improved comfort and MG function.”

• “Hypothetically, early and frequent debridement of the MCJ [mucocutaneous junction] and lid margin could prevent or delay the cascade of increased osmolarity, tissue desiccation, and ultimately inflammation and tissue damage simply because of mechanical barriers to oil entering the tear film.”

• “In the future, the health and maintenance of the MCJ and keratinized lid margin may be considered integral to routine eye care. This shift in our culture will involve improvements in our observation skills and also the willingness to incorporate novel techniques such as debridement-scaling of the MCJ and keratinized lid margin in our clinical practice.”

Putting Meibomian Glands Under Pressure

It is well established that meibomian gland dysfunction and its subsequent impact on the lipid layer of the tear film are the foundational flaws in proper tear film function. Anything we can do to enhance meibomian gland function would likely benefit the patient suffering from dry eyes.

There are two primary therapeutic interventions:

- Oral doxycycline (50mg daily taken with breakfast or lunch for two months), and physical expression of the meibomian glands following heat application in an effort to liquefy, and subsequently evacuate, the meibomian gland contents.

- According to research by Donald Korb, OD, and associates (along with others), it is very difficult to achieve optimum heat levels of the meibomian glands from anterior application because the glands are located within the tarsal plate on the posterior surface of the eyelid. In recognition of this challenge of appropriate heat application and proper glandular expression, LipiView (to diagnostically assess the thickness of the lipid layer) and LipiFlow (the active heat and massage device) technologies were approved by the FDA in 2012. These technologies (from TearScience) may be evolving toward standard-of-care intervention.

The key to maximum success in improving tear film function is to intervene early in the disease process, before meibomian gland atrophy occurs. Obviously, addressing meibomian gland occlusion and meibum stagnation in viable glands is optimum.

Preliminary research showed promising, prolonged results in improving symptoms after just one treatment.

More recently, a larger, rigorous study was completed at nine centers across the United States to evaluate the efficacy of LipiFlow treatment over a period of 12 months. TearScience reports the results of the randomized controlled study of 200 patients are very favorable (symptom and gland function improvement) when comparing long-term follow-up after a single LipiFlow treatment vs. baseline and vs. a control of twice-daily (20+ minutes) use of warm compresses and lid scrubs. Details will be submitted for peer-review publication this year.


Floppy Eyelid Syndrome and Dry Eye

Eyelash ptosis can indicate impending or present floppy eyelid syndrome. Any patient with eyelash ptosis needs to be evaluated for FES.

Typical image of floppy eyelid syndrome. Note the ptosis on the symptomatic side.

In floppy eyelid syndrome, the eyelid(s) can be evoked simply by pulling up on the lid.

Patients with floppy eyelid syndrome are often big and/or obese men in mid-life. Some may also have sleep apnea.
Ectoparasites such as Demodex have been cohabiting with human eyelashes and their accessory follicular glands for unknown eons of time. So why all the chatter about them now?

Perhaps it is simply something new to talk about, or because of the advent of newer clinical interventions or the availability of affordable microscopes to view the parasites in vivo.

Whatever the case, there is no denying that overpopulation of these little creatures can cause clinically significant blepharitis—but don’t lose sight of the fact that staphylococcal and seborrheic subtypes of blepharitis are the most common causes of symptomatic eyelid disease.

So, let’s get a firm grip on these organisms to understand their role in clinical patient care.

- **Treat as blepharitis.** Because most clinical blepharitis is staphylococcal or seborrheic in nature, therapeutic intervention should be directed along time-honored pathways such as warm soaks and meticulous eyelid hygiene, and then application of either an antibiotic or antibiotic-steroid (depending upon the amount of inflammation) four times a day for two to four weeks.

  We long ago abandoned the use of baby shampoo in favor of commercially available, pre-moistened, unit-dose “eyelid cleansers.”

  If patient comfort has not been achieved after a few weeks with initial standard care measures of blepharitis, then consider Demodex etiology.

- **Fight the mites.** Demodex are nearly ubiquitous in humans, but become more problematic in older individuals. Cylindrical debris at the base of eyelashes is pathognomonic of Demodex infestation. However, as nearly all clinicians have observed, most patients with blepharitis are asymptomatic. Such patients can be treated or observed at this stage, depending upon doctor discretion.

  When traditional approaches to treating blepharitis fail, then acaricidal intervention is most certainly in order. Tea tree oil is well recognized for its role in the treatment of Demodex infestation.

  This natural oil comes from the distillation of oils from the leaves of the *Melaleuca alternifolia*, an Australian tea tree. These oils have several biochemical constituents, the most Demodexocidal being 4-terpineol, which is the key ingredient in Cliradex eyelid and facial cleanser (Bio-Tissue Inc.).

  Because this tea tree oil-based product can be quite irritating if contact with the globe is made, it is very important that you and your patients view the instructional video prior to using the product (on the website www.cliradex.com).

  Also available is a Demodex Convenience Kit (OcuSoft), which includes a BlephBrush that is used to apply a proprietary formula that contains tea tree oil.

  Prior to the advent of these products, compounding pharmacies had to concoct a 50% tea tree oil preparation (mixing with macadamia nut oil or mineral oil). An in-office treatment was given by the doctor or trained technician once weekly for six weeks. Following a drop of proparacaine, a moist (but not saturated) cotton swab was used to gently scrub and apply the solution, about six passes, along the upper eyelid margin. Thankfully, this time-consuming, office-based treatment, while still valid, has been upgraded to home-based, patient-applied treatments.

  However, we should never allow the “tail to wag the dog.” Don’t allow marketing programs to dictate patient care. Remain focused on sound patient care, and use clinically-proven therapeutic interventions when such are clinically indicated. Just as routine flossing can minimize periodontal disease, episodic “pulse-dosing” of Cliradex may well help maintain subclinical Demodex eyelid infestation. Determining how often to use Cliradex will be a highly individualized clinical decision.


2. Tighe S, Gao YY, Tseng SC. Terpinen-4-ol is the most active ingredient of tea tree oil to kill Demodex mites. Transl Vis Sci Technol. 2013 Nov;2(7):2.
We are in the midst of a “perfect storm” of allergies. As of late April 2014, tree, mold, grass and weed pollen were reported simultaneously. That’s not normal. Typical pollen seasons are: trees in March to May; grass in May to June; weeds and ragweed in mid-August to October; and mold all season long, depending on dampness.

Regardless, we ask the patient the same basic question: “Is burning or is itching your main symptom?” Most patients can give a clear answer to this fundamental question.

For the few patients who feel the symptoms of burning and itching are about equal, or can’t decide which symptom is most bothersome, treatment with a topical corticosteroid usually quells both complaints.

If itching is the predominant symptom, then medication selection takes one of two paths:

**Symptoms Only**

If there are minimal associated signs of allergy such as chemosis, conjunctival injection and/or eyelid edema, then an antihistamine/mast cell stabilizer is an excellent clinical approach. Within this class, there are six drugs from which to choose:

- Alcaftadine (Lastacaft, Allergan)
- Azelastine (Optivar, Meda Pharmaceuticals, and generic)
- Bepotastine (Bepreve, Bausch + Lomb)
- Epinastine (Elestat, Allergan)
- Ketotifen (Zaditor, Alcon, and generic. This drop is OTC.)
- Olopatadine (Patanol/Pataday, Alcon)

Of these, all are rated pregnancy category C except for Lastacaft, which is pregnancy category B. Notwithstanding other fine differences, all of the antihistamine subtype 1 receptor blockers nicely suppress ocular itching. All are dosed initially BID (except Pataday and Lastacaft, which are dosed QD). We recommend that after two weeks at BID, have the patient try to...
reduce the drop to once-daily “maintenance” therapy. In our experience, once symptomatic itching has been brought under control, it takes less pharmacological intervention to maintain control. Then again, many patients seem best served with enduring BID therapy.

Perhaps the best news for the consumer was the loss of patent protection for Zaditor. Since 2007, ketotifen has been available generically and OTC. In addition to Zaditor, there are several “brand name” OTC ketotifen preparations, such as Alaway (Bausch + Lomb) and Refresh Eye Itch Relief (Allergan). All come in 5mL bottles (except for Alaway and TheraTears Eye Itch Relief, each of which comes as a 10mL bottle.) Interestingly, our casual observations in a variety of pharmacies reveal that the cost of these 10mL bottles are very near (and occasionally cheaper) than the price of their 5mL competitors.

‘Is it Burning or is it Itching?’

• Itching. If itching is primarily expressed, determine if it is an isolated symptom or if it is associated with concurrent inflammatory signs, and then treat accordingly. Remember:
  Symptoms only—use an antihistamine/mast cell stabilizer.
  Symptoms with signs—use a steroid such as Lotemax, Alrex or FML.

• Burning. If itching is not the primary symptom, then be sure to consider dry eyes as the foundational condition and treat accordingly. If the main symptom is burning, then a thorough dry eye evaluation is in order.

There is no rule in the rulebook that says you can’t have two problems at the same time. So, because dry eye is very prevalent, always identify and manage this disease whether or not it is packaged with allergic eye disease.

When a prescription medication is preferred, perhaps a 10mL bottle of Bepreve (using a standard co-pay) would be of greatest cost value to the patient.

Symptoms Plus Signs

The other side of the dichotomous allergy presentation is the patient who presents with predominant

### Ocular Allergy Medicines

<table>
<thead>
<tr>
<th>BRAND NAME</th>
<th>GENERIC NAME</th>
<th>MANUFACTURER</th>
<th>PEDIATRIC USE</th>
<th>BOTTLE SIZE(S)</th>
<th>DOSING</th>
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<tbody>
<tr>
<td><strong>Acute Care Products</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Acular LS</td>
<td>ketorolac tromethamine 0.4%</td>
<td>Allergan</td>
<td>3 years</td>
<td>5mL, 10mL</td>
<td>BID</td>
</tr>
<tr>
<td>Alaway (OTC)</td>
<td>ketotifen fumarate 0.025%</td>
<td>Bausch + Lomb</td>
<td>3 years</td>
<td>10mL</td>
<td>BID</td>
</tr>
<tr>
<td>Alrex</td>
<td>loteprednol etabonate 0.2%</td>
<td>Bausch + Lomb</td>
<td>12 years</td>
<td>5mL, 10mL</td>
<td>QID</td>
</tr>
<tr>
<td>Bepreve</td>
<td>bepotastine besilate 1.5%</td>
<td>Bausch + Lomb</td>
<td>2 years</td>
<td>5mL, 10mL</td>
<td>BID</td>
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<tr>
<td>Claritin Eye (OTC)</td>
<td>ketotifen fumarate 0.025%</td>
<td>Schering-Plough</td>
<td>3 years</td>
<td>5mL</td>
<td>BID</td>
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<td>Elestat</td>
<td>epinastine HCl 0.05%</td>
<td>Allergan</td>
<td>3 years</td>
<td>5mL</td>
<td>BID</td>
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<td>Emadine</td>
<td>emedastine difumarate 0.05%</td>
<td>Alcon</td>
<td>3 years</td>
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<td>azelastine hydrochloride 0.05%</td>
<td>Meda</td>
<td>3 years</td>
<td>6mL</td>
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<tr>
<td>Pataday</td>
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<td>Patanol</td>
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<td>Alamast</td>
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<td>Santen</td>
<td>3 years</td>
<td>10mL</td>
<td>QID/BID</td>
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<td>Alocril</td>
<td>nedocromil sodium 2%</td>
<td>Allergan</td>
<td>3 years</td>
<td>5mL</td>
<td>BID</td>
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<tr>
<td>Alomide</td>
<td>lodoxamide tromethamine 0.1%</td>
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<td>2 years</td>
<td>10mL</td>
<td>QID</td>
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<td>Crolom</td>
<td>cromolyn sodium 4%</td>
<td>Bausch + Lomb</td>
<td>4 years</td>
<td>10mL</td>
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<tr>
<td>Opticrom</td>
<td>cromolyn sodium 4%</td>
<td>Allergan</td>
<td>4 years</td>
<td>10mL</td>
<td>QID</td>
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</table>
itching plus one or more concurrent signs such as conjunctival redness, chemosis and/or eyelid edema. For this subset of patients, a topical corticosteroid such as Alrex (loteprednol 0.2%, Bausch + Lomb), Lotemax gel (loteprednol 0.5%, Bausch + Lomb) or FML ophthalmic suspension (fluorometholone 0.1%, Allergan) is more appropriate treatment.

The only other decision involves the frequency of instillation; we typically prescribe a steroid Q2H for two days, then QID for one week, followed by BID for one more week. Once the inflammatory signs are controlled, then consider switching the patient to an antihistamine/mast cell stabilizer for ongoing symptom control. Long-term treatment with Alrex BID as maintenance therapy can be done if a steroid is what best controls their disease.

According to a conversation we had with Mark Abelson, MD, a world-renowned ocular allergist at Harvard Medical School, there is little or no clinical use for pure mast cell stabilizing drugs. He says that the antihistamine/mast cell stabilizer drugs more effectively stabilize the mast cell membranes than stand-alone mast cell stabilizers such as pemirolast (Alamast), nedocromil (Alocril), or cromolyn sodium (generic). Based on this expert opinion, we no longer prescribe these pure mast cell stabilizers.

Remember, allergy is an expression of inflammation. Cold compresses can be helpful in all ocular surface inflammatory diseases. Infectious processes, on the other hand, are often helped by the application of warm soaks.

Dosing of Topical Antihistamine
Which is better: a once-daily drop or a twice-daily drop? We’ve found that many of our allergy patients simply tend to dose their allergy drops as needed. So, for many patients (especially those with suboptimum tear function), a second drop in the afternoon provides therapeutic enhancement. This is particularly true if the patient has been working outdoors (mowing the grass, for instance). In these situations, a second drop tends to flush out allergens and further suppresses the downstream sequelae of histamine release.

On the other hand, for one drop a day is the preferred approach for patients whose allergic symptoms are well controlled with once-daily instillation. In the end, as always, patient care must be individualized.

For patients with severe allergy expression, consider both an antihistamine/mast cell stabilizer twice daily and Alrex (loteprednol 0.2%, Bausch + Lomb) or Lotemax gel (loteprednol 0.5%, Bausch + Lomb) QID along with cold compresses. After the condition has settled down, maintain the patient on the antihistamine/mast cell stabilizer once or twice daily as needed.

Intranasal Steroids for Ocular Symptoms in Allergic Rhinitis
In a randomized trial, intranasal steroids relieved both nasal and ocular symptoms.

- Because intranasal steroids are the most effective medications for allergic rhinitis symptoms (especially congestion), guidelines recommend them as first-line agents for moderate-to-severe disease.

- As many as 85% of patients with seasonal allergic rhinitis also have ocular symptoms.

- For these patients, many clinicians prescribe oral antihistamines or ocular products rather than (or in addition to) intranasal steroids.


The earlier we catch and treat a virus, the better. Delay in care leads to secondary immunological complications.

As with any infectious process, earlier therapeutic intervention enhances the rate of recovery. This is especially important in the setting of viral diseases, as a delay in seeking care can set the stage for secondary downstream immunological complications.

There are three main viral pathogens that cause patients to present to the optometric office: herpes simplex virus, varicella zoster virus and adenovirus. If herpes simplex is not treated quickly and effectively, the possibility of corneal scarring and stromal immune keratitis exists. If herpes zoster infections are not quelled quickly, there is a heightened risk of postherpetic neuralgia and immune-mediated keratouveitis. If the more virulent strains of adenovirus, which cause epidemic keratoconjunctivitis (EKC), are not subdued quickly, its antigens can get a foothold in the anterior stroma of the cornea and set the stage for vision compromise as a result of subepithelial infiltrates—which can take months, or even years, to clear without treatment.

The good news is that if patients present in a timely manner, we have a limited but highly effective armamentarium of medicines to arrest viral replication.

Don't Let the Virus Linger

No good comes from allowing the herpes simplex virus, varicella zoster virus or virulent strains of adenovirus to linger on the ocular surface. Patients who delay in seeking care—or doctors who are not quick to initiate appropriate treatment—allow time for these antigenic viruses to shed viral particles into the anterior stroma, thus setting the stage for a stromal immune response.

Such responses to herpetic stimuli result in inflammatory keratitis or keratouveitis (and if the uveal inflammation involves the trabecular tissues, the IOP can also be elevated, usually into the 40mm to 50mm Hg range). The parallel response from adenoviruses that cause EKC is the classic subepithelial infiltrate.

All of these delayed responses require steroid suppression. When treating simplex immune responses, an antiviral cover is needed to protect against potential reactivation of viral corneal epithelial infection. Antiviral cover is not needed in zoster-related disease, nor for post-adenoviral subepithelial infiltrates.

Herpetic stromal immune keratitis.
Antiviral Drugs

Is it Shingles or Giant Cell Arteritis?
When you encounter an older patient who complains of temporal/facial skin pain and headache, two possibilities should immediately come to mind: impending shingles and giant cell arteritis (GCA). (This is less of a diagnostic dilemma in non-whites because temporal arteritis is almost exclusively a disease of white patients.) We invariably get a sed rate as well as CBC and CRP (C-reactive protein) tests because we never want to miss a case of GCA.

There have been occasions when our index of suspicion for shingles was sufficient to go ahead and write the patient a prescription for an oral antiviral, and advise them that if vesicles develop, they should start the medicine right away.

Herpes Simplex
For herpes simplex epithelial disease, we have the now relatively outdated Viroptic (trifluridine, Monarch, and generic) and the newer Zirgan (ganciclovir gel, Bausch + Lomb).

Of the several advantages of Zirgan over Viroptic, the two main ones are: a less intense dosing frequency (five times daily vs. every two hours); and less surface toxicity potential (ganciclovir is a pro-drug that is only activated to a chemotherapeutic agent in virally infected cells). (See “Topical Antiviral Options,” below.)

Viroptic is generally dosed every two hours for four days, then four times a day for four more days. Zirgan is dosed five times daily for four days (or until the dendritic keratitis is resolved), then three times a day for four more days. The least expensive approach—and one that should be known to most eye care providers—is the use of oral acyclovir dosed at 400mg five times daily for one week.

These three therapeutic interventions can successfully treat epithelial herpetic disease. In our opinion, only in the most severe cases would both a topical and an oral medicine be used concurrently.

For patients with chronic, recurrent epithelial or stromal herpetic disease, a five-year disease-free course of acyclovir twice a day should be considered for prophylaxis. Although more expensive, a simpler once-daily dose of 500mg oral valacyclovir is also clinically effective. This “preventive medicine” intervention can be of immeasurable benefit to this subset of patients plagued with recurrent disease.

Herpes Zoster
Shingles can be a bear. This varicella zoster virus can wreak havoc, especially if the patient delays in seeking care, or is initially treated erroneously with an ineffective medicine. More bad news (for adults) is that with the widespread use of the chicken pox vaccine (Varivax), there are fewer infected children wandering around our communities, potentially depriving adults of periodic exposure to the chicken pox virus. This denial of “immunotweaking” may be setting the stage for increasing incidence of shingles over the next 20 to 40 years before the current generations pass away and are replaced with generations who have never had chicken pox. Therefore, this new generation of patients never experiencing chicken pox, courtesy of the Varivax vac-
cine, may not develop shingles. However, not all is lost for adults over 50 years of age even now—we can get the Zostavax vaccine! Note that Zostavax only reduces the incidence of shingles by about 50%, but even if shingles should occur in a Zostavax-vaccinated adult, its clinical course is usually significantly lessened. We encourage all optometrists to speak a brief word of encouragement to all their over-50 patients to ask their primary care practitioner about the Zostavax vaccine.

The main drawback to this vaccine is the cost, which is about $200; however, insurance copays often reduce this to little or no cost. But, our bet is that every patient who has shingles would gladly have come up with $200 rather than suffer the misery of this painful disease!

Now, how do we treat a patient presenting with shingles? Since the eye is involved about half the time in the setting of ophthalmic division shingles, these are common encounters in our practices.

When the eye is affected by herpes zoster, it is most always an inflammatory uveitis and/or keratitis. Aggressive management with a highly effective topical corticosteroid, such as Durezol, along with cycloplegia, is in order in these cases.

The primary medicine in acute shingles is an oral antiviral. Here, there are three choices, all of which perform equally well. All of these medicines are pro-drugs of sorts in that a viral enzyme (thymidine kinase) must phosphorylate, and ultimately triphosphorylate these compounds before they become an active medicine. As only virally-infected cells are involved pharmacologically, this nicely explains why these antiviral medicines are so safe.

One drawback in these medicines is their mechanism of excretion—the kidneys. Thus, if a patient has

**Perspective on Physician-recommended Zostavax**

As the third largest independently-licensed healthcare profession in the United States, it just seems right for optometry to actively promote the Zostavax vaccine for the sake of our patients and the community at large.

“The most important barrier to Zostavax vaccination is the lack of a strong physician recommendation. It is unclear why physicians do not recommend the vaccine against zoster as strongly as they do other vaccines, despite strong scientific evidence supporting the CDC recommendation since 2006. This is part of a broader problem of why physicians do not follow evidence-based clinical practice guidelines. Physician knowledge must first be addressed, followed by changed attitudes and then practice.”

“Rather than being the weak link in recommend-ed vaccination against zoster, doctors should be leaders in encouraging vaccination to decrease the incidence and severity of this disease.”

Antiviral Drugs

advanced renal compromise, such as end-stage renal disease, it will take less drug to achieve comparable therapeutic dosing using the standard dosage. In the event that you encounter a patient with clinically significant renal disease, ask your staff to call the patient’s kidney physician (nephrologist, internist, etc.), and speak with a nurse to obtain the patient’s most recent creatinine function and glomerular filtration rate. Then consult with the patient’s pharmacist, who has dosage conversion software to quickly generate the proper dose of the chosen antiviral. Alternatively, you could just chat with the patient’s treating doctor for his or her recommendation. This may sound complicated, but it is really very straightforward.

The standard dosages of the antiviral medications used to treat shingles are:
- Acyclovir: 800mg five times a day for one week
- Valacyclovir: 1,000mg three times a day for one week
- Famciclovir: 500mg three times a day for one week

All of these medicines are generic, yet acyclovir continues to be the least expensive of the three. The other two have a more convenient dosing schedule (three times a day vs. five times daily). Prescribe accordingly.

There is no need for topical antiviral therapy in the setting of zoster disease. Furthermore, there is no need for “antiviral cover” when treating the globe with topical steroids. The “beauty” of zoster disease, from a clinical perspective, is that it is usually easy to diagnose, and the treatment is virtually cookbook. It doesn’t get any easier than this!

There is a caveat: If the patient is not started on treatment for zoster early, or is immunocompromised, a stormy clinical course can ensue and the patient may be best served by sharing the care with his or her primary care physician or infectious disease specialist.

While these three antiviral medications are most effective when instituted within the first three days of the onset of clinical disease, they are still effective, albeit slightly subdued, even after a delay of five to seven days, and perhaps even longer. So, since these are very safe medicines, do not withhold their use even in delayed care circumstances. For older patients with severe affliction, consider concurrent treatment with 40 to 60mg of oral prednisone for a few days.

All in all, helping the patient with shingles is highly satisfying, and these patients are extremely grateful for your competent, compassionate care.

A 52-year-old white male with shingles and concurrent global inflammation. What’s the proper treatment?

The patient was treated with the appropriate oral antiviral dosed TID for one week, along with topical steroids.
Adenovirus

Adenoviral disease comes in two main forms: pharyngoconjunctival fever (PCF) and epidemic keratoconjunctivitis (EKC).

PCF is most often seen in children who typically manifest a unilateral red eye, watery discharge, a low-grade sore throat (pharyngitis), and a low-grade fever. We generally prescribe a mild steroid such as generic fluorometholone 0.1% suspension or Alrex (loteprednol 0.2%, Bausch + Lomb) suspension four times a day for four days, then twice a day for four more days. PCF is an uncommon presentation.

EKC is caused by more virulent serotypes that result in more aggressive expressions of ocular inflammation. Patients with EKC are usually miserable, and many have been treated elsewhere with an ineffective medicine. The key, as stated earlier, is to eradicate the inciting virus as early and as quickly as possible. (See “Povidone-Iodine Treatment for EKC,” below.)

Effective killing of microorganisms occurs when they are rapidly replicating. If the patient presents after enduring these horrible red eyes for over a week, the active infectious phase is likely winding down. Thus the therapy should be focused on suppressing the marked secondary inflammatory conjunctivitis. Aggressive use of an effective topical corticosteroid (preferably ester-based loteprednol for long-term use) can clear subepithelial infiltrates with such a regimen: four times a day for two to four weeks, then three times a day for two to four weeks, then twice a day for two to four weeks, and then every day for another two to four weeks. Obviously, it is far superior to quickly eradicate the acute EKC infection rather than deal with downstream sequelae.

The inflammatory phase usually ranges from seven to 10 days, and can even express severe membrane deposition on the tarsal conjunctival tissues.

After instillation of phenylephrine 2.5% to minimize bleeding, and proparacaine to minimize discomfort, use your forceps of choice to physically remove these annoying membranes. The patient is still going to experience some degree of misery, but between the aggressive use of steroids and the removal of the bulk of these membranes, the misery should be considerably less. The body’s immune system will soon restore the tissues to normal.

Avoiding all this inflammation and misery is best accomplished through early, off-label intervention with Betadine 5% Sterile Ophthalmic Prep Solution (30ml opaque bottle), Alcon

Povidone-Iodine Treatment for EKC

- Betadine 5% Sterile Ophthalmic Prep Solution (30ml opaque bottle), Alcon
- A broad-spectrum microbicide.
- Indicated for “pre-operative prep and irrigation of the ocular and periocular surfaces.”
- Off label use: Tx adenoviral keratoconjunctivitis
  - Anesthetize with proparacaine
  - Instill one or two drops of NSAID
  - Instill several drops Betadine 5% in eye(s); close eye(s)
  - Swab or rub excess over eyelid margin
  - After one minute, irrigate with sterile saline
  - Instill one or two drops of NSAID
  - Rx steroid QID for four days
- Avoid use if patient is allergic to iodine.
- CPT code 99070—materials and supplies
mic Prep Solution (povidone-iodine, Alcon), as described—provided, of course, the patient has presented in a timely fashion after initial onset of symptoms.

Although we are seasoned, self-confident clinicians, we still (and always will) encounter diagnostic challenges. Most cases of EKC will be clearly evident to you when you walk into the exam room; however, not every EKC patient will have a palpable node, nor will the fellow eye always be involved, particularly if the patient presents on day two, three or four, which is typically just before the other eye’s involvement becomes apparent. There are simply times when the unilateral (or even occasionally bilateral) red eye(s) can be difficult to accurately diagnose. This is why we keep a supply of the AdenoPlus (Nicox) adenoviral testing kits at the ready in our examination rooms, which can aid an uncertain red eye diagnosis.

In summary, a variety of viral pathogens afflict the eye. The legendary dendritiform epithelial lesion characterizes herpetic epithelial disease, the vesicular dermatomal expression along the distribution of the sensory fibers of the fifth cranial nerve characterize varicella zoster disease, and the asymmetric bilateral red, watery eye(s) with a palpable preauricular lymph node (especially on the side of the initially afflicted eye) nicely characterizes adenoviral disease.

There are good primary therapies for all three of these diseases; however, if they are not caught early and treated appropriately, inflammatory sequelae commonly occur. Most initial treatments are rather simple; inflammatory sequelae require more exquisite clinical judgment and follow-up care.


AdenoPlus revealed that it was an atypical case of EKC. The left eye became red the next day!
The Challenges of Glaucoma

Prostaglandins are first-line therapy. But don’t forget that beta blockers are still an excellent, and affordable, choice for reducing IOP.

For the most part, glaucoma is a pretty straightforward disease entity. To be sure, there can be maddeningly challenging cases—almost always with patient compliance problems. But on the whole, glaucoma care is glorified ocular plumbing: decrease aqueous production and/or increase aqueous outflow.

The universal weak link in glaucoma care is missing the disease. To wit, the most common lawsuit in all of optometric care is “failure to diagnose”!

So, we strongly urge all eye physicians to study the optic nerve, for it has been our observation that missing subtle optic neuropathy (optic nerve head cupping) is the major cause of missed diagnosis.

Optic Nerve Examination

Optic nerve head examination is best done via slit lamp-enabled ophthalmoscopy. The most critical observation is evaluation of the anatomy of the neuroretinal rim tissues, particularly the inferotemporal and superotemporal rim tissues. There is less glial support tissue in these two critical areas, and this sets the stage for axonal loss in these two watershed areas.

This is underscored by the “ISN’T rule,” which emphasizes that as a general rule in a healthy, normal optic nerve, the Inferior neuroretinal rim tissues are the thickest, followed by the Superior rim tissues, then the Nasal rim tissues and, thinnest of all, the Temporal rim tissues. “Oblique insertions” of the optic nerve head can complicate assessment of the entire cup-to-disc interface. A keen eye is required, as is supplemental testing, such as retinal nerve fiber layer scanning.

Central Corneal Thickness

Beyond critical study of the optic nerve head anatomy, the second area requiring critical assessment is vastly simpler: the central corneal thickness. We remain dismayed, however, that not all optometrists have a pachymeter. Knowing the central corneal thickness holds enormous risk-assessment and diagnostic value, and obtaining this information is simple, cheap and easy for ancillary staff to accomplish. Unless you reflect the IOP against the central corneal thickness, you really
When to Watch—and When to Treat?

- “In the end, the physician is stuck with the persistent problem of whom to treat and whom to watch.”
- “It probably still makes sense that young patients with lots of high risk factors should receive prophylaxis, while elderly patients with few risk factors should not. The endless symposia and debates on how to best manage patients with ocular hypertension will probably continue unabated.”


Glaucoma Evaluation

The entire pursuit of diagnostic precision is overshadowed only by

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<thead>
<tr>
<th>Topical Glaucoma Drugs</th>
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<tr>
<td><strong>BRAND NAME</strong></td>
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<tr>
<td>Beta Blockers</td>
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<td>Betagan, and generic</td>
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<td></td>
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<td>Betimol</td>
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<td>Betoptic-S</td>
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<tr>
<td>IStalol</td>
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<td>Timoptic, and generic</td>
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<tr>
<td>Timoptic (preservative-free)</td>
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<tr>
<td>Timoptic-XE, and generic</td>
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Prostaglandin Analogs

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<tr>
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<th><strong>GENERIC NAME</strong></th>
<th><strong>MANUFACTURER</strong></th>
<th><strong>CONCENTRATION</strong></th>
<th><strong>BOTTLE SIZE</strong></th>
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<tbody>
<tr>
<td>Lumigan</td>
<td>bimatoprost</td>
<td>Allergan</td>
<td>0.01%</td>
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<tr>
<td>Travatan Z</td>
<td>travoprost</td>
<td>Alcon</td>
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<td>latanoprost</td>
<td>Pfizer, and generic</td>
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<tr>
<td>Zioptan</td>
<td>tafluprost</td>
<td>Akorn</td>
<td>0.0015%</td>
<td>unit-dose</td>
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Docosanoid Compound

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<th><strong>MANUFACTURER</strong></th>
<th><strong>CONCENTRATION</strong></th>
<th><strong>BOTTLE SIZE</strong></th>
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<tbody>
<tr>
<td>Rescula</td>
<td>unoprostone isopropyl</td>
<td>Sucampo</td>
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<td>5ml</td>
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Alpha Agonists

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<tr>
<th><strong>BRAND NAME</strong></th>
<th><strong>GENERIC NAME</strong></th>
<th><strong>MANUFACTURER</strong></th>
<th><strong>CONCENTRATION</strong></th>
<th><strong>BOTTLE SIZE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alphagan P, and generic</td>
<td>brimonidine</td>
<td>Allergan, and generic</td>
<td>0.1%, 0.15%, 0.2%</td>
<td>5ml, 10ml, 15ml</td>
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<td>dorzolamide</td>
<td>Merck</td>
<td>2%</td>
<td>5ml, 10ml</td>
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Combination Glaucoma Medications

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<th><strong>BRAND NAME</strong></th>
<th><strong>GENERIC NAME</strong></th>
<th><strong>MANUFACTURER</strong></th>
<th><strong>CONCENTRATION</strong></th>
<th><strong>BOTTLE SIZE</strong></th>
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</thead>
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<tr>
<td>Combigan</td>
<td>brimonidine/timolol</td>
<td>Allergan</td>
<td>0.2%/0.5%</td>
<td>5ml, 10ml</td>
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<tr>
<td>Cosopt</td>
<td>dorzolamide/timolol</td>
<td>Akorn</td>
<td>2%/0.5%</td>
<td>5ml, 10ml</td>
</tr>
<tr>
<td>Cosopt PF</td>
<td>dorzolamide/timolol</td>
<td>Akorn</td>
<td>2%/0.5%</td>
<td>unit-dose</td>
</tr>
<tr>
<td>Simbrinza</td>
<td>brinzolamide/brimonidine</td>
<td>Alcon</td>
<td>1%/0.2%</td>
<td>8ml</td>
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the decision of “when to watch, and when to treat”—the holy grail of decision-making in the care of patients with glaucoma.

**History**

To maximize the validity of this decision, an exhaustive clinical evaluation must be conducted, and that evaluation should begin with the patient’s family history. Glaucomatous optic neuropathy tends to run in families, but the fragility of this data is the validity of the history. Many times mom or dad are said to have had glaucoma, but indeed are/were being treated for a disease they do/did not have. Twenty or so years ago, many doctors still called a pressure over 21mm Hg “glaucoma,” when in fact the patient did not have glaucoma!

In our experience, it is the sibling history that may hold the most value. Determining the true glaucoma status of a brother or sister may assist in your decision making. When possible, try to get siblings in the office for a definitive examination. Or, if a sibling is out of the area, try to get a copy of the sibling’s medical records to gather as much information as possible.

**Clinical Examination**

Many factors go into the decision of if/when to initiate treatment. As we’ve just stated, family history can be quite valuable. Then consider the baseline status of the optic nerve, the patient’s overall health status, and the desire of the patient to be treated—after an objective, informative discussion of the risks, benefits and alternatives to both treatment and non-treatment.

The comprehensive glaucoma evaluation includes:

- **Best visual acuity.**
- **Pupillary function.** Is there a relative afferent pupillary defect?
- **Anterior segment tissues.** Is there pseudoexfoliation, pigment dispersion, endothelial guttata (which can potentially alter corneal thickness measurements and can be a relative contraindication of the use of carbonic anhydrase inhibitors because the inhibition of carbonic anhydrase in the metabolism of the corneal endothelium)?
- **Gonioscopy to assess the iridocorneal angle.** We typically use a four-mirror goniolens to perform these anatomic assessments. Note the patency of the anatomic angle as well as the degree of trabecular pigmentation. If laser trabeculoplasty is ever considered, it will be essential to know the degree of pigmentation because there must be a reasonable amount of pigment present to absorb laser energy. Said another way, if there is little or no angle pigmentation, laser trabeculoplasty is not a meaningful therapeutic option. (Another clinical pearl: Laser trabeculoplasty can be much more effective in a phakic patient than in a pseudophakic one).
- **Intraocular pressure.** The standard of care remains Goldmann applanation tonometry. Always note the time of day the measurement is taken. When practical, try to obtain three to four IOP readings prior to initiating treatment so that a more comprehensive intraocular pressure profile can be established. Knowing the IOP profile can be very useful, especially when establishing the peak IOP.
- **Corneal pachymetry.** Intraocular pressure in a vacuum can be deceiving. The central corneal thickness must be known in order to have a meaningful understanding of the intraocular pressure. Beyond this IOP correction, a physiologically thin cornea is an independent risk factor for the development of glaucoma.

Pachymeters are inexpensive and every OD needs such a device to help assess risk for the development of glaucoma. For those ODs who tend to refer out glaucoma suspects, such knowledge can radically improve the sensitivity and specificity of your patient referrals.

- **Nerve fiber layer measurement.** Having an HRT, GDx and/or OCT is not critical, but exceedingly helpful, so these instruments are highly recommended. OCT technology is particularly informative, and is the most versatile of these technologies. We encourage all optometrists to acquire an OCT device.

One word of caution—while all the devices are generally referred to as generating “objective data,” such data are only relatively objec-
Gonio Before Laser
Argon and selective laser trabeculoplasty require sufficiently pigmented target tissues to be maximally effective. Therefore, it is imperative to perform gonioscopy prior to considering laser trabeculoplasty to determine not only angle patency, but also the degree of pigmentation present in the meshwork tissues. Along these same lines, laser trabeculoplasty can be much more effective in a phakic patient than in a pseudophakic patient.

Detect a Defect? Repeat the Field!
The key to visual field testing is to believe a significant defect if it correlates with optic nerve head anatomy or if it is normal. If a defect is thought to be significant, yet there is no clear anatomic correlation, then the visual field must be repeated, often two or three times, to know with certainty whether the defect is spurious or indeed a reflection of reality. This is scheduled within a few weeks.

If you observe a single instance of a visual field defect, don’t believe it to be a true representation of tissue compromise without repeating visual field testing.

We repeat: if there is any doubt as to the validity of a visual field defect, repeat the field!

SITA SWAP vs. SITA Fast
- SWAP: 12 minutes, SITA SWAP: 4.1 minutes, SITA Fast: 3.5 minutes
- “Surprisingly, there was no significant difference between conventional SAP and the two SWAP programs in diagnostic sensitivity.”
  - “SITA Fast has previously been reported to be able to identify at least as much significant glaucomatous field loss as SITA Standard … and to have a diagnostic sensitivity of more than 90%.”
  - Results “indicate that there may be some differences in sensitivity between SWAP and SAP, but that those differences are probably smaller than what has been believed previously.”

If the preponderance of the assessment yields a decision to lower the intraocular pressure, then the next step is to set a target pressure range and select a medicine to best achieve the goal. Because compliance is the weak link in the chain of care, and cost is often the most likely reason for poor compliance, we must consider the potential cost as well as the clinical efficacy of the medicines we choose for each patient.

**First-Line Therapy**

**Prostaglandins**

For most patients most of the time, a prostaglandin analog is the “go-to” option for first-line therapy. Thanks to the innovative drug Xalatan (latanoprost, Pfizer) going generic in 2011, as well as free-market competition, all prostaglandins are now more affordable than ever. Because there have been concerns about inconsistency with the various manufacturers of generic latanoprost, some doctors and patients are sticking with consistent formulations of brand-name Travatan Z (travoprost, Alcon), Lumigan (bimatoprost, Allergan) and Zioptan (tafluprost, Akorn). All prostaglandins function nearly identically, thus knowing which of these brand-name products is the least expensive is a kind expression of patient advocacy. Also, all of these brand-name products have various coupons that enable cost reduction approaching generic prices. So, whichever way you prefer—generic or coupon-assisted pricing of brand-name products—the cost of these wonderful drugs is now more affordable.

While the prostaglandins are systemically safe, there are small barbs here and there. Remember that cold or flu-like symptoms can occur, hazel-colored irides can become darkened, gastrointestinal disorders can arise, and orbital fat can be compromised, causing enophthalmos. And, of course, as with any drug, idiosyncratic allergic reactions can occur. However, for the most part, prostaglandins perform beautifully for most patients most of the time.

Although prostaglandins perform optimally when used in the evening, many people “take their medicine” at breakfast, and so if compliance is enhanced with breakfast time administration, so be it. Our observation is that efficacy and compliance is attained or at least improved in this manner.

Two medicines of the prostaglandin class require refrigeration for long-term storage: latanoprost and Zioptan. Once dispensed to the patient, though, these medicines can be kept at room temperature. The only representative of the prostaglandin class that is preservative-free and comes in unit-dose packaging is Zioptan. There are eight to nine drops per container, so many patients are able to double their savings by getting two days of therapy from one vial. Not many patients truly need preservative-free options, in our experience.

**Dose Prostaglandins Three Times a Week?**

In 2004, a research team in Israel dosed patients with latanoprost once daily or once weekly for three months. At the end of three months, intraocular pressure control was identical! Based on this knowledge, we are comfortable placing select, highly responsible patients on a Monday-Wednesday-Friday dosing schedule, cutting their medication cost in half.

Now, let’s think about this concept using reason, logic and knowledge: The goal of treating glaucoma is to achieve and maintain a target intraocular pressure so as to prevent further loss of vision function.

If we monitor these patients for a couple of months and find that their intraocular pressure is maintained within the target range with M-W-F dosing, then our goal is fully upheld, financial burden is reduced, patient care is optimized, and the patient is most grateful.

**Suspicious Cupping in Children**

- Normal tension glaucoma is seen in older adults.
- “A glaucomatous process in childhood without an associated rise in IOP is extremely rare and should be a diagnosis of exclusion.”
- Examine family members to see if suspicious cupping is merely a family trait.


**Beta Blockers**  
The beta blockers are the other first-line treatment option, in that they are about as effective as prostaglandins (25% vs. 30% to 35% reduction in IOP) and can be used once daily—but absolutely must be instilled in the morning.²

Numerous corroborating studies have found that once-daily instillation of a nonselective beta blocker (timolol and levobunolol) works as well as BID dosing.³ But there is little benefit to nocturnal instillation of a beta blocker—none of our current glaucoma medicines exert much of an effect during sleeping as during waking periods.

**Additive and Secondary Therapy Beta Blockers**  
Because simpler dosing schedules typically lead to better compliance, once-daily medications are preferable. This is why we almost always add a nonselective beta blocker to a prostaglandin when the prostaglandin alone does not achieve target intraocular pressure. We prescribe the 0.25% concentration for white patients and the 0.5% concentration for black and darkly-pigmented patients. Melanin pigments tend to bind beta blocker molecules, so in the end both types of patients receive approximately a 0.25% concentration.

We never dose these medicines BID when added to a prostaglandin. The beta blocker is dosed in the morning and, when practical, the prostaglandin is dosed in the evening. This combination, in our experience, achieves target intraocular pressure nearly 90% of the time.

**Alpha Agonists**  
Brimonidine, an alpha adrenergic agonist, decreases intraocular pressure through enhancement of aqueous outflow and, to some degree, reduction in aqueous production.⁴ Although FDA-approved for TID instillation, brimonidine is more often used BID in actual practice. Because alpha agonists do little or nothing while we sleep and because trough levels occur about eight hours after instillation, it makes sense to optimize the timing of instillation during diurnal hours.⁵ This is why brimonidine is perhaps best dosed shortly after waking and again about eight hours later, not near bedtime. When used as monotherapy, brimonidine is best used TID, otherwise there is often complete loss of the IOP effect after 10 to 12 hours.⁶  
Brimonidine is available in three concentrations: 0.2% and 0.15% Glaucoma


generically, and 0.1% as brand-name Alphagan P (Allergan).

All three concentrations perform very much the same. The 0.2% is an inexpensive generic, 0.15% is a relatively expensive generic, and the brand-name is the most expensive. (The combination drugs Combi-gan and Simbrinza contain the 0.2% brimonidine.)

For cost-related concerns, we most always prescribe the 0.2% concentration. About 10 to 20% of patients develop a local allergic reaction to brimonidine, which is slightly concentration-dependent. If an allergic reaction does occur, we move on to another class of drug, such as a carbonic anhydrase inhibitor (CAI), the docosanoid Rescula (unoprostone isopropyl, Sucampo Pharmaceuticals) or a combination drug containing a beta blocker with a CAI. We would use such a combination drug if we had already established efficacy with a beta blocker and needed to reduce the IOP a bit more.

CAIs

The topical carbonic anhydrase inhibitors are Azopt (brinzolamide 1%, Alcon) ophthalmic suspension and generic dorzolamide 2% ophthalmic solution. Both brinzolamide and dorzolamide perform similarly, yet the suspension is more comfortable upon instillation than is the solution; on the other hand, the solution does not have to be shaken before instillation as the suspension does.

Marijuana and Glaucoma: Position of the American Glaucoma Society

Tell your glaucoma patients there’s no need for weed.

- Marijuana has only a three- to four-hour duration of effect.
- Smoke contains hundreds of compounds besides THC.

“Unless a well-tolerated formulation of a marijuana-related compound with a much longer duration of action is shown in rigorous clinical testing to reduce damage to the optic nerve and preserve vision, there is no scientific basis for use of these agents in the treatment of glaucoma.”

“Summary: Although marijuana can lower the intraocular pressure (IOP), its side effects and short duration of action, coupled with lack of evidence that its use alters the course of glaucoma, preclude recommending this drug in any form for treatment of glaucoma at the present time.”


Diastolic Blood Pressure, Ocular Perfusion Pressure and Glaucoma

- “The driving force for ocular blood flow is the ocular perfusion pressure (OPP), defined as the ophthalmic artery pressure minus the IOP.”
- “Large cross-sectional prevalence studies in different populations found a significant association between low diastolic OPP and the prevalence of OAG.”
- “The greater incidence of progression in patients with lower blood pressure, seen mainly in patients with lower IOP, suggests a vascular risk factor for progression independent of IOP.”
- “Low blood pressure … may be the most important vascular risk factor for glaucoma progression.”


Check Blood Pressure in Glaucoma Patients and Suspects

- Ocular perfusion pressure can be calculated as diastolic blood pressure minus intracocular pressure: OPP = diastolic BP – IOP
- Theory: OPP <50mm Hg is a risk factor for glaucoma and glaucoma progression

Examples:

- DBP of 65 and IOP of 15mm Hg = OPP of 50mm Hg
- DBP of 85 and IOP of 35mm Hg = OPP of 50mm Hg

These two patients may be at equal risk because they have same theorized OPP of 50mm Hg.

- Take home message: Check blood pressures on your glaucoma patients and glaucoma suspects, especially those with lower IOPs.

Docosanoid

Unoprostone isopropyl, available as Rescula, is a somewhat enigmatic molecule in that it has many properties similar to prostaglandins and many properties dissimilar to prostaglandins. It is very safe and has hardly any known side effects, but it decreases intraocular pressure only about 3mm to 4mm Hg. It is indeed a niche drug whose efficacy is similar to the carbonic anhydrase inhibitors.

Combination

There are three combination glaucoma drugs: Combigan (timolol 0.5% with brimonidine 0.2%, Allergan), Cosopt (timolol 0.5% with dorzolamide 0.2%, Akorn) and Simbrinza (brimonidine 0.2% with brinzolamide suspension 1%, Alcon).

For combination drugs, we have found it is best to try each of the component drugs first to be sure each component exerts a meaningful therapeutic effect before using the combination formulation. The carbonic anhydrase inhibitors reduce intraocular pressure by suppressing aqueous production, but do so by only about 15%. Like brimonidine, they are approved as TID products, yet are used twice daily in general clinical care. Dorzolamide is an ophthalmic solution and brinzolamide is an ophthalmic suspension. When we need to prescribe one of these, we dose the medication twice daily: first dose in early morning and the second drop about eight hours later (just as we do with brimonidine).

Cosopt is unique in that it is available as a traditional bottled product and as a preservative-free unit-dose, Cosopt PF. Simbrinza is the only suspension combination drug. Its other main difference is that, unlike Cosopt and Combigan, it does not contain a beta blocker. Thus, for a patient with asthma or one who is non-responsive to beta blockers, Simbrinza would likely be an ideal “add-on” to a prostaglandin drug, once individual trials of both brinzolamide and brimonidine are found to be efficacious. What may be found, however, is that if the prostaglandin brought us close to target intraocular pressure, yet fell short, it is likely that adding brinzolamide or generic brimonidine alone will get the IOP to target, and using a more expensive combination drug may not be necessary.

In summary, we typically initiate glaucoma therapy with a prostaglandin, and add timolol 0.25% or 0.5% once daily (in the morning) if target intraocular pressure is not reached with the prostaglandin alone. Be mindful that prostaglandins generally reduce intraocular pressure about 30% to 35%, whereas nonselective beta blockers reduce intraocular pressure by about 25%. That’s only about 1mm to 3mm Hg separation! So, do not lose sight of the fact that beta blockers remain an excellent choice.

**Glaucoma Pearls**

- Glaucoma nerve fiber layer analyzers are most helpful in the early assessment of glaucoma and/or in helping establish glaucoma risks. Once the presence of a visual field defect is confirmed by repeat field testing, visual field testing is the best parameter to use to follow the patient and to determine the ongoing adequacy of intraocular pressure control.

- Especially in the setting of low-tension glaucoma, two things are critical:
  1. Know the patient’s blood pressure (particularly the diastolic pressure). The unique subset of glaucoma patients with low-tension glaucoma is thought to represent at least in part inadequate vascular perfusion of the optic nerve.
  2. In acknowledgement of the critical nature of blood supply, if the patient is taking blood pressure medicines, it is probably best to coach the prescribing physician to instruct the patient to take his or her blood pressure medicines upon waking, and not use any blood pressure medicine in the evening, and most certainly not at bedtime in an effort to prevent an ocular hypotensive event. Many people have physiologically decreased nocturnal diastolic blood pressure already, and to further suppress the diastolic blood pressure pharmacologically may drop the diastolic blood pressure so low as to harm the optic nerve tissue. Such nocturnal hypotension can also predispose the optic nerve to infarction, resulting in anterior ischemic optic neuropathy.
for reducing intraocular pressure. We still regularly initiate glaucoma therapy with a beta blocker, particularly when only a 4mm to 5mm Hg reduction in IOP is needed and/or when we believe that cost is a critical factor in patient compliance. A 5mL bottle of timolol is generally available for about $5!

Taking all this together, it can be seen that initial therapeutic interventions are easy; but if the patient is a prostaglandin nonresponder and/or has active asthma, establishing a therapeutic plan becomes more like a chess game—it involves considerable strategy and therapeutic trials until target intraocular pressure is achieved. (Having ample samples on hand is tremendously helpful in augmenting these various therapeutic trials.)

Glaucoma is the only disease having its own subspecialty fellowship within ophthalmology. This is due to the highly specialized surgical procedures and intraocular devices that are often needed for treatment of advanced and end-stage disease. For the large majority of patients who thankfully do not require such highly specialized microsurgical interventions, glaucoma medical care should be firmly in the province of optometric physicians.

Combination Drugs: When One is Better than Two
The lynchpin to glaucoma therapy is patient compliance to medication use. Of course, a major factor in compliance is cost. But convenience is also important—and in the case of multiple medications, convenience sometimes trumps cost.

We all know that the more drops a patient is prescribed, the less likely the patient is going to comply perfectly with the regimen. This is where combination medicines come in.

To that end, we always explain to patients the many reasons we prefer the single combination medicine, and we also let them know that the single combination bottle may be more costly than the two individual medicines.

We also communicate our reasoning to the pharmacist, with a note as follows:

“We much prefer the single bottle as prescribed. However, if the patient prefers to use two less expensive medicines, then you may substitute the ingredient drugs for the prescribed combination. The sig is the same: For timolol, it is one drop daily, upon waking. The other medicines (brimonidine, dorzolamide and brinzolamide) must be used twice daily; one drop upon waking, and a second drop about 4:00-5:00 PM, always waiting about 15 minutes between eye drops.”

Cataract and Glaucoma
Cataract surgery often results in a 1mm to 2mm Hg reduction in intraocular pressure, so cataract surgery may be helpful in some challenging patients with borderline IOP control. As there is zonular weakness associated with pseudoexfoliation, such patients with cataracts should have cataract surgery earlier than a patient without pseudoexfoliation.

A glaucoma patient who was doing well with brimonidine—until she developed a classic allergic reaction to the alpha 1 agonist. We stopped the brimonidine and substituted a carbonic anhydrase inhibitor. Her conjunctiva renormalized in a few days.

You learn a lot working “in the trenches.” Here are just a few pearls and pointers we’ve picked up in our many years of caring for patients.

Here, we’ve selected numerous pearls, pointers and perspectives that may benefit other clinicians who, like us, are “in the trenches” caring for patients every day.

• When a young person presents with acute onset of painless unilateral vision loss, we quickly consider optic neuritis. These people usually have some “pain with motion” as one complaint in their constellation of symptoms. Why is this? The rectus muscles insert into a common adventitial sheath with the peripheral optic nerve. When the optic nerve is inflamed, and the extraocular muscles pull and tug on such inflamed tissues, it can cause discomfort and/or pain. Not all patients with optic neuritis have “pain with motion” because the site of the optic nerve foci of inflammation is remote to the region of rectus insertions.

• Patients commonly present with a “tiny, clear bump” on their bulbar conjunctiva, and of course they are concerned. Almost all of these patients have asymptomatic lymphangiectatic cysts and merit an explanation and reassurance. Occasionally a patient presents

Is it an Ulcer or an Infiltrate?

Many times a sterile corneal infiltrate is wrongly diagnosed as an infectious process. The doctor dutifully blasts away with an antibiotic and indeed the patient improves—but this is because such leukocytic infiltrates spontaneous resolve naturally; the antibiotic was completely unnecessary!

One particular pearl we’ve found extremely helpful is to note the size of the corneal stromal infiltrate lesion compared to the size of the fluorescein staining pattern of the epithelium. If the size of the staining defect is considerably smaller than the underlying stromal lesion, this is a sterile, leukocytic process. However, if the staining defect is approximately the same size as the underlying infiltrate, the lesion is highly suspicious for a bacterial infectious process. The following table expands upon this differential diagnosis:

<table>
<thead>
<tr>
<th>Ulcer</th>
<th>Infiltrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rare</td>
<td>• Common</td>
</tr>
<tr>
<td>• Usually painful</td>
<td>• Mild pain</td>
</tr>
<tr>
<td>• Tend to be central</td>
<td>• Tend to be peripheral</td>
</tr>
<tr>
<td>• Staining: defect is same size as lesion</td>
<td>• Staining: defect size relatively small</td>
</tr>
<tr>
<td>• Cells in anterior chamber</td>
<td>• No cells in anterior chamber</td>
</tr>
<tr>
<td>• Generalized conjunctival injection</td>
<td>• Sector-skewed injection pattern</td>
</tr>
<tr>
<td>• Usually solitary lesion</td>
<td>• Can be multiple lesions</td>
</tr>
<tr>
<td>• Possible tear lake debris</td>
<td>• Clear tear lake</td>
</tr>
</tbody>
</table>

Treatment: Antibiotic

Treatment: Antibiotic: Steroid/antibiotic combination
Asymptomatic lymphangiectatic cysts can be easily removed with iris scissors.

with significant foreign body sensation from a more elevated and/or lobulated lesion. These lesions have to be decompressed and destroyed. Because of the unique cytoarchitecture of these lymphangiectatic lesions, needle puncture is insufficient. Yes, the needle puncture will immediately deflate the lesion, but the lesion usually reforms within just a few days. Thus, these lesions must be destroyed.

Iris scissors are perfect for this task. First, instill proparacaine and a drop of 2.5% phenylephrine because as you cut through any bulbar conjunctival tissue, there is a good chance of light bleeding and subsequent subconjunctival hemorrhage. The vasoconstrictive action of the phenylephrine helps diminish any bleeding. Now, use the iris scissors to transect the lesion three or four times to be sure you have adequately destroyed the cell walls. Prescribe generic Maxitrol (about $10) to be used four times a day for four days. Now you have another happy patient!

On rare occasions, a subconjunctival hemorrhage can leak into one of these lymphatic vesicles and give an interesting presentation. In these instances, patient reassurance is all that is needed. But if there is also significant foreign body sensation, then use the iris scissors as described above.

- There is an epidemic of uncontrolled systemic hypertension out there. We encourage you to purchase a basic wrist blood pressure monitor, and direct your staff to get a blood pressure reading on all of your patients over age 40 on each visit. This can be highly beneficial to your patients and your practice, and it can set the stage for enhanced relationships with your medical community. Furthermore, it is becoming more firmly established that low diastolic blood pressure can be a highly significant risk factor for the progression of low-tension glaucoma. Now we have three very important reasons to check our patients’ blood pressures: to save lives, to decrease morbidity, and to save vision.

- “Ask me first!” This is what all optometrists need to encourage their patients to do. Let us explain. We both practice in traditional ophthalmological settings. A large portion of our patients undoubtedly think we are ophthalmologists, so we get to hear a lot of interesting stories; most of them quite sad from an optometric practice management perspective. We see lots of new patients on a regular basis who have historically seen their optometrist for their eye care needs, but now that they have developed a floater, unilateral blurred vision, eye ache or pain, trichiasis, subconjunctival hemorrhage, a red eye... you get the picture—all of which an optometrist could easily manage, but still these patients bolt to an ophthalmology clinic.

When we tell patients with such problems that they could have seen their own optometrist, they often reply:

- “Oh no, she is not a real doctor.”
- “He only does eye exams.”
- “I just felt like I needed to see an MD.”
- “She just examines me for my glasses [or contacts].”
- “He’s not an ophthalmologist.”

We encourage you to proactively educate your patients about what services you provide, and tell them, “If you ever have any concerns or questions about any eye or vision problem, ask me first.”

This way, you have the opportunity to serve their needs through direct patient care or via direction to the appropriate subspecialist who will return the patient to your care.

Clinical Pearls

Asymptomatic lymphangiectatic cysts can be easily removed with iris scissors.

Capture Ant Seg Images with Your Smartphone

We well remember the days of extensive anterior segment slit lamp-affixed cameras. Thankfully, technology evolves. Now, any optometrist with a smartphone can easily capture anterior segment images at any slit lamp with the use of one of several versatile (pretty much one-size-fits-all) smartphone adapters. If you would like to begin taking excellent corneal, conjunctival or eyelid photographs, such a device enables you to do just that!