

# iTech

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## TREATING THE AGING EYE

### CERTAIN CONDITIONS AFFECT YOUR OLDER PATIENTS MORE

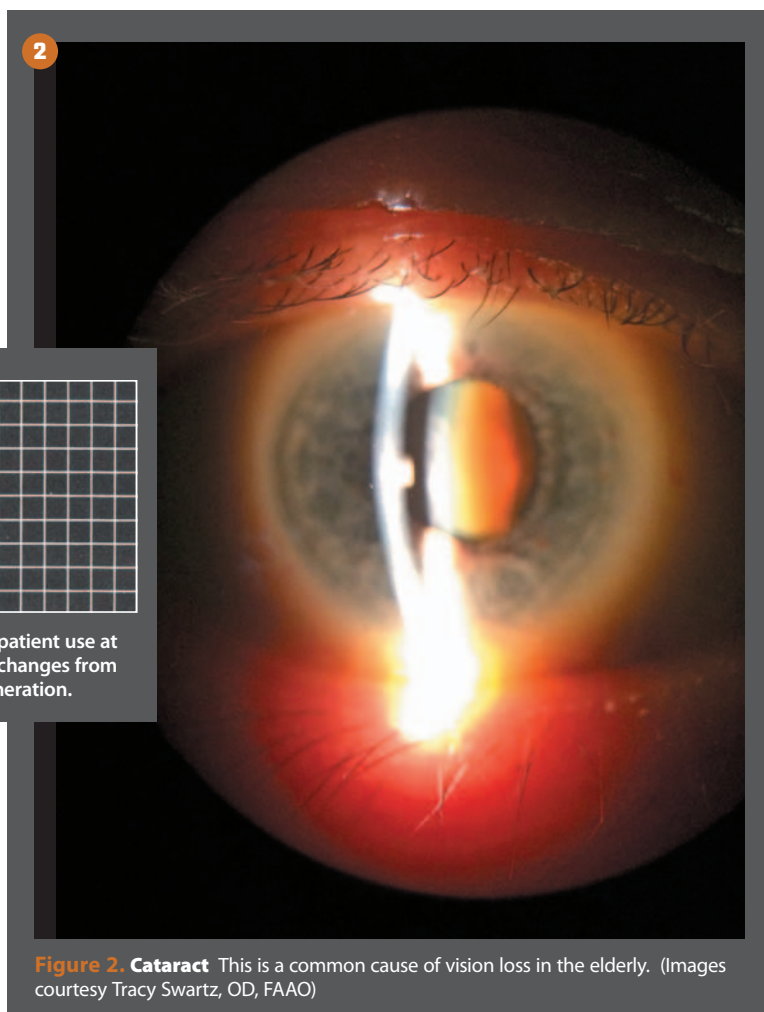
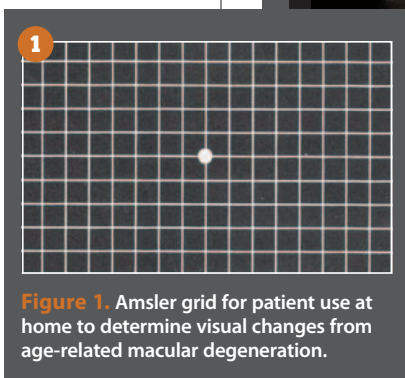
By Phyllis L. Rakow, COMT, NCLM, FCLSA(H)

Advances in medicine have extended the average life span of American men to 76.4 years and American women to 82.1 years,<sup>1</sup> but greater life spans have brought one or more chronic illnesses to 80 percent of those over the age of 60.<sup>2</sup> Along with their general medical problems, older patients must deal with declining vision and its physiological and psychological effects.

Loss of vision can restrict one's ability to carry out daily activities and lead to depression, social isolation, falls, fractures, and the inability to live independently.

In the aging eye, accommodation decreases; the crystalline lens yellows, hardens, and eventually opacifies; and systemic diseases such as arthritis, thyroid disease, cancer, diabetes, atherosclerosis, and high blood pressure take their toll on the eye. In addition, cognitive and functional limitations affect the aged. They may not have support from their families or be unaware of available community services. Often changes in vision are undiagnosed and untreated. Patients may be living with unoperated cataracts, undiagnosed

See **Aging eye** on Page 3



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## Aging eye

Continued from page 1

primary open-angle glaucoma, age-related macular degeneration, or diabetic retinopathy.

Keep in mind that one-third of new cases of blindness could have been prevented by early intervention.

Let's look at some of the common visual conditions that affect our senior population.

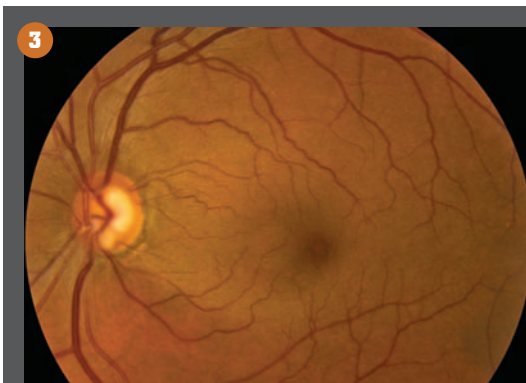
### Macular degeneration

Age-related macular degeneration (ARMD) is a significant cause of vision loss in the elderly.<sup>3</sup> Risk factors include increasing age, family history, fair complexion and light irises, smoking, sleep apnea, metabolic syndrome (the most serious heart attack risk factors, including diabetes, prediabetes, abdominal obesity, high cholesterol, and high blood pressure), and high myopia.<sup>3</sup>

Initially, vision may be normal in spite of subtle degenerative changes, such as yellow, subretinal deposits known as drusen. In this "dry" form of ARMD, vision loss may be gradual. Straight lines may appear broken, wavy, or crooked, and patients may have difficulty reading or seeing road signs.

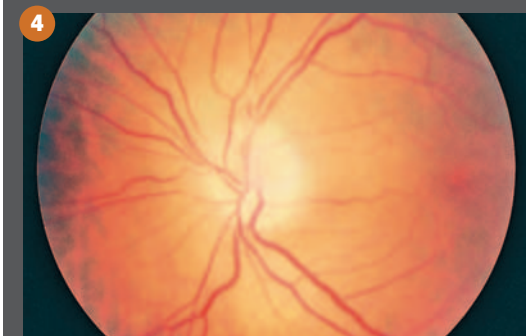
Macular degeneration can be demonstrated with the Amsler Grid (see Figure 1). Patients should wear their near correction when being tested. One eye is covered, and the chart positioned is 14 inches from the eye being tested. The patient is then asked to stare at the white dot in the center and notice if any of the lines on the grid appear to be wavy, broken, or missing.

"Wet" ARMD usually starts out as the dry form and results in a sudden, significant loss of vision caused by leakage of blood or



**Figure 3.**  
**Glaucoma**

This is the second most common cause of visual loss among seniors. Early diagnosis and treatment can prevent vision loss.



**Figure 4.**  
**Temporal arteritis**

This condition is an inflammation of the lining of the arteries that supply blood to the brain.

fluid from new, abnormally-formed vessels under the retina (subretinal neovascularization). Although it affects only about 20 percent of those who have macular degeneration, it accounts for two-thirds of the people with profound vision loss.<sup>4</sup> ARMD affects only central vision. Patients develop a large central scotoma (blind spot), although they still maintain the ability to walk around without the assistance of a cane or seeing eye dog. Injections such as Eylea (aflibercept, Regeneron), Lucentis (ranibizumab, Genentech), and Avastin (bevacizumab, Genentech) may slow or stabilize vision loss by preventing the growth of leaky new blood vessels.<sup>5</sup>

Can we prevent the development of macular degeneration? Positive steps to take include stopping smoking, controlling cardiovascular disease, taking

antioxidant dietary supplements, and following a diet high in fruits and vegetables, especially dark green, leafy vegetables like spinach and kale.

### Cataracts

Cataracts represent another common cause of visual loss in the elderly. Although we all will develop cataracts if we live long enough, the decrease in vision from cataracts is gradual, and not everyone who lives a normal life span will require surgery (see Figure 2). In addition to age, causes of cataract include ultraviolet radiation from sunlight or other sources, corticosteroids, diabetes, family history, smoking, and previous eye injuries, inflammation, or surgery.<sup>6</sup>

As cataracts develop, the crystalline lens becomes yellow or cloudy. Initially, vision may be im-

See **Aging eye** on Page 4

## Aging eye

Continued from page 3

proved with a simple prescription change in eyeglasses. As cataracts progress, they cause reduced visual acuity, increased glare, starbursts around headlights and streetlights at night, reduced color vision, and the need for more light when reading. These changes in vision are related to the size and location of the cataract and are generally slow and painless.

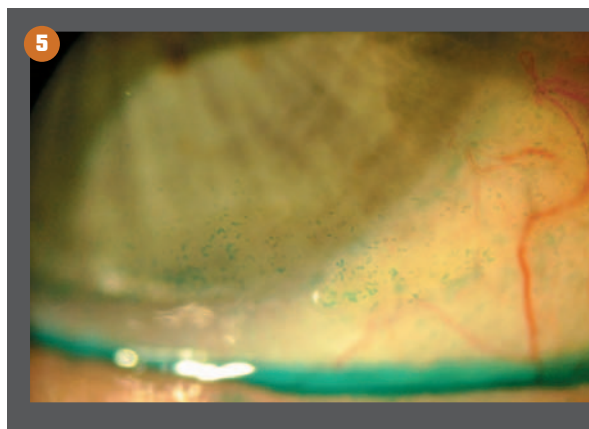
Surgery becomes necessary when cataracts interfere with normal daily activities, such as driving, watching television, or reading the newspaper. Cataract surgery is the most frequently performed surgical procedure in the United States and has an excellent prognosis, with 90 percent of patients achieving vision of 20/40 or better.<sup>7</sup> The surgery, a procedure called phacoemulsification, is done under local or topical anesthesia with IV sedation. A tiny incision is made, and the contents of the crystalline lens are emulsified, suctioned out, and replaced with an intraocular lens (IOL). The IOL power is determined by presurgi-

cal measurements. We are now able to correct astigmatism

with toric IOL designs and presbyopia with bifocal and multifocal IOL implants.

### Glaucoma

Primary open-angle glaucoma, an optic neuropathy (optic nerve disease), is the second most common cause of visual loss among seniors.<sup>8</sup> It causes changes in the optic nerve head, visual field loss, and in most cases, increased intraocular pressure (IOP), leading



**Figure 5.**  
**Dry eye**  
This is a significant problem among seniors. Extreme dryness can lead to corneal damage and affect both vision and comfort.

to blindness if left untreated (see Figure 3). Risk factors include family history of glaucoma, high blood pressure, diabetes, myopia, African racial heritage, and elevated IOP.<sup>9</sup> Early diagnosis and treatment can prevent optic nerve damage, visual field loss, and subsequent vision loss. Because pain is not associated with open-angle glaucoma, the disease may be well advanced, with significant visual field loss, before patients become aware of it.

Many categories of medications are available to decrease IOP. Because seniors tend to be more sensitive to some glaucoma medi-

cations than younger patients and may also be taking systemic

medications that can interact with their eye drops, the likelihood of side effects is greater in the elderly population. Side effects can be limited and systemic absorption reduced by covering the punctum (the tiny hole in the inner corner of the lower eyelid) and compressing the nasolacrimal duct when instilling eye drops. If IOP is not adequately controlled with eye drops, surgical intervention may be necessary.

### Diabetic retinopathy

Diabetic retinopathy is the fourth most common cause of vision loss among the elderly in America.<sup>8</sup> Over time, diabetes, especially poorly controlled diabetes, affects the circulatory system of the retina. Microaneurysms (tiny bulges that form and protrude from the walls of retinal blood vessels) can rupture and leak blood and fluids.

Symptoms are mild or nonexistent in the early stage, which is known as background or non-proliferative diabetic retinopathy, although leakage from the microaneurysms may cause macular edema (swelling and fluid retention). As the disease progresses, new, fragile blood vessels form in the retina and vitreous (the gel that fills the back of the eye) and leak blood into the vitreous. This is known as proliferative diabetic retinopathy, which can cause severe vision loss and even blindness if left untreated. Laser treatment stops the leakage of blood and fluid and seal the abnormal, leaky blood vessels.

### Retinal occlusions

Total, sudden loss of vision may be caused by an embolus (blood clot or plaque) that lodges in and occludes the central retinal artery

**1/3**

**of new cases of blindness could have been prevented by early intervention**

(central retinal artery occlusion). The loss of vision may be transient or permanent and requires immediate referral to an ophthalmologist. The entire retina, except for the fovea (center of the macula), becomes edematous. Loss of a portion of the visual field can be caused by a branch retinal artery occlusion. In either case, treatment involves trying to move the embolus further downstream to minimize retinal damage, but loss of vision is often permanent.

Central or branch retinal vein occlusions can also occur and are caused by a thrombus (blood clot) blocking the vein that drains the blood from the eye. They are often seen in patients with high blood pressure, diabetes, glaucoma, and atherosclerosis, and require comanagement with the patient's primary care physician.<sup>10</sup>

### Temporal arteritis

Temporal arteritis, also known as giant-cell arteritis is an inflammation of the lining of the arteries that supply blood to the brain (see Figure 4). Symptoms include head pain and tenderness, especially around the temples; scalp pain; jaw pain (claudication); sudden, permanent loss of vision in one eye; night sweats; and unexplained weight loss. Immediate referral to an ophthalmologist is critical to prevent loss of vision in the contralateral (opposite) eye. The condition is treated with steroids.

### Dry eye syndrome

Dry eye syndrome, although a more benign condition, is still a significant problem among the senior population. Good tear quality and quantity is essential to maintain corneal integrity: to remove debris, to lubricate the eye, and to protect against disease.

Keratitis sicca is the term used for markedly dry eyes. Patient symptoms include burning, grittiness, excessive tearing, and injection (redness). Patients with rheumatoid arthritis and other collagen diseases may have been diagnosed with Sjögren's syndrome, and live with dryness of the mouth and other mucus membranes in addition to dry eyes. Extreme dryness can lead to corneal damage and affect vision as well as comfort (see Figure 5).

In mild cases, artificial tears, used as needed, may provide sufficient relief. Restasis (cyclosporine A, Allergan) is a prescription eye drop that may increase tear production in patients whose tear deficiency is due to ocular inflammation associated with keratoconjunctivitis sicca (severe, chronic dry eye).<sup>11</sup> Other dry eye treatments include punctal occlusion (silicone plugs placed in the tear drainage ducts to keep more tears in the eye), intense pulsed light therapy (IPL) that directs bursts of light at the lower eyelids and lower cheek areas to heat blocked eyelid glands; sleep masks that hydrate the eyes during the night; dry eye vitamins; and nutritional supplements such as flaxseed oil and fish oil.

### Conclusion

Although the aging eye is affected by multiple conditions and diseases, technology and modern medicine enable eyecare practitioners and primary care physicians to work together and treat and manage many of them. By making senior citizens aware of the importance of regular eye care, we can help them to benefit from new treatments and therapies, maintain their mobility and independence, and prevent the depression and

social isolation that often occur when elderly patients are confronted with severe vision loss. ▀

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# It's all fun and games with pediatric patients

Start simple with your younger patients and increase complexity as they age

By **Jessica Barr, COMT, ROUB**

The pediatric eye exam differs greatly from the adult eye exam—children are more than just tiny adults. To further that point, the whole dynamic of the examination is different because you are really interviewing and interacting with the family and not just the patient. In the pediatric arena, the family becomes

your patient.

The first step to eliciting a good examination is to build rapport with your young patient and his family. Small children are often timid, hiding behind Mom or Dad's leg, and shying from the big scary exam chair. Let them shy away for now; you don't need smaller patients in the exam chair in order to get your history and have a chat with

Mom or Dad.

Setting a relaxed tone for your initial interaction is reassuring to younger patients. Aside from having to read an eye chart at a fixed distance, most other aspects of the examination can be conducted with the child sitting in a different seat, or even sitting on the floor. With a small child, history starts with the parents (this helps make the child com-

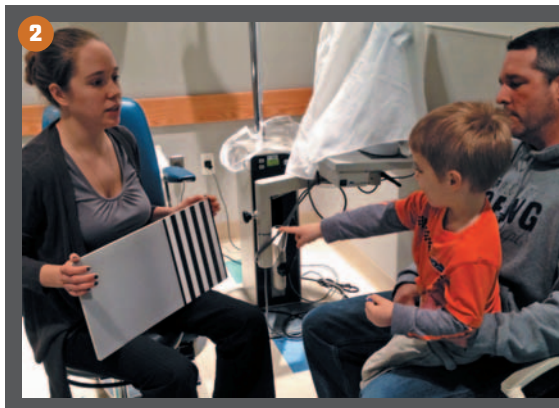


**Figure 1.** Reclining a child in a chair or on a parent's lap aids with history and when instilling medications.

fortable and builds trust). In an older child, history starts with the patient and is then verified or added to by the parent. See Figure 1.

Moving forward, children's participation in their medical care should increase commensurate with their age. Autonomy is one of the pillars of medical ethics, and that extends to minor-aged patient.

Next, we move on to the physical examination. Have you ever written "unable" for the exam of the child who has come to your office? Unless you work for a pediatric ophthalmologist, it may be standard operating



**Figure 2.** A child's gaze is reflexively drawn to the grating lines on the Teller Acuity card, which is why it is called a preferential looking test.

procedure to write "unable" (or something similar) for the young child who has come in to your adult or general ophthalmology practice.

Here is the most important tip in this article: Something written in the exam record is

better than nothing. In our youngest and least cooperative patients, we start with the most basic techniques and eventually graduate to the more sophisticated techniques used for examining adults.

See **Pediatric patients** on Page 8



**Figures 3A and 3B.** Children are taught from a very young age to make associations through matching games. Instead of making them read the eye chart, create a fun and exciting matching game that uses letters or symbols to have the child engage with increasingly smaller optotypes on the eye chart.

## Pediatric patients

Continued from page 7

Let's review these techniques for a pediatric eye examination.

### Visual acuity

Perhaps a 1-year-old cannot read the eye chart, but can he fix and follow? At the very least, is the child light averse or light perceptive? As children get older, the method of visual assessment becomes increasingly more sophisticated. The visual assessment technique evolves from light averse, to fix and follow, the preferential looking test, matching pictures, then finally graduating to the standard Snellen acuity chart that we use on adults.

First, assess if your young patient is reactive to light. Next, see if she can fixate on the light and follow the stimulus. This is the fix and follow (F+F) technique. After that, the technique gets slightly more sophisticated. Is her gaze central, steady, and maintained (CSM) on the stimulus? Remember, these two techniques require only a target to fixate—no other special equipment.

In the pediatric ophthalmology practice, technicians also utilize a type of visual assessment called the preferential looking test (see Figure 2). For this test, the patient is shown large, rectangular cards. Stripes or pictures are docked to either the left or the right side of the

card. The Teller Acuity Cards use stripes, and Cardiff Cards use pictures. As you progress through the cards during the test, the stripes or pictures grow fainter and fainter, requiring higher and higher levels of visual acuity to see.

The cards are held face down

to the stripes or pictures on the card. This level of interaction offers a greater level of accuracy in the results.

Once the children begin interacting with you, you can start trying to check visual acuity on the eye chart. Pre-verbal children can hold a card with the symbols

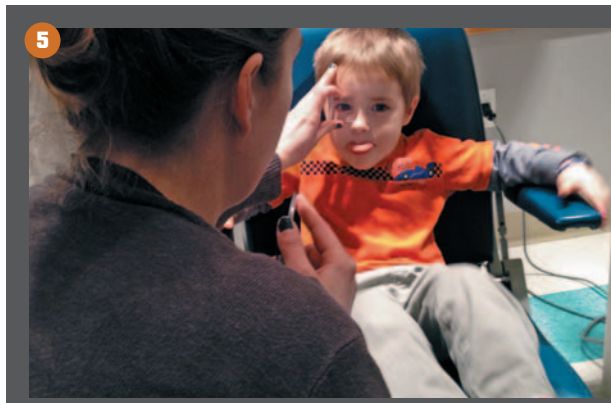


**Figure 4.** Retinoscopy is an effective and accurate method for objectively measuring the refractive error of a child when subjective refraction is not possible.

so the examiner is blind to what is on the other side. The examiner holds up the card to the patient and judges the side of the card where the patient preferred to look. Hence, this is named the "preferential looking test." The fainter the stripes or pictures the patient responds to, the higher the level of visual acuity. If cooperation permits, you can also ask the child to point

on it and point to each symbol to match to the optotypes on the acuity chart. We begin by using pictures, instead of letters, for pre-literate children. A similar, yet slightly more sophisticated method, is HOTV matching. The child holds a card with the letters H-O-T-V. The eye chart is matched to use only these letters. See Figures 3A and 3B.

Finally, we graduate them to



**Figure 5.** The Krimsky technique takes the Hirschberg one step further by utilizing a prism to recenter the abnormal corneal light reflex.



the Snellen chart. The examiner must be forgiving and acknowledge that children may know most letters, but not all. If children are afraid to say the wrong letter, encourage them to trace the letter in the air. At times, children may lack the confidence to get started reading the letters, and you need to help them. Young children need help getting started with many tasks, so give them the first letter on a Snellen line. This can help give them momentum to get started. Use lots of encouraging words. Offer lots of smiles and high fives. Give your younger patients praise when they are doing well to encourage them to keep participating.

Retinoscopy is an effective and accurate method for objectively measuring the refractive error of a child when subjective refraction is not possible (see Figure 4).

### Pupils

With adults, we instruct them to fixate in the distance while we employ the swinging flashlight test to assess direct and consensual reaction to light. We are documenting PERRL or PERRLA (pupils equal round reactive to light and accommodation). Maybe you cannot complete a full swinging flashlight test to assess pupils, but are the pupils equal and round? Reactive? No obvious pupil defect? This is an area of the examination in which it is critical to document something.

### Motility

The standard technique

for adults and most sophisticated methods to evaluate ocular alignment are the covers tests and Maddox rod. We use videos, flashing lights, or any type of visually stimulating target, to promote fixation in children sitting for the cover tests. If they cannot fixate and cooperate for cover tests, learn the Hirshberg technique, which requires only that you shine a light at them. If cooperation permits, incorporate prisms and use the Krimsky technique.

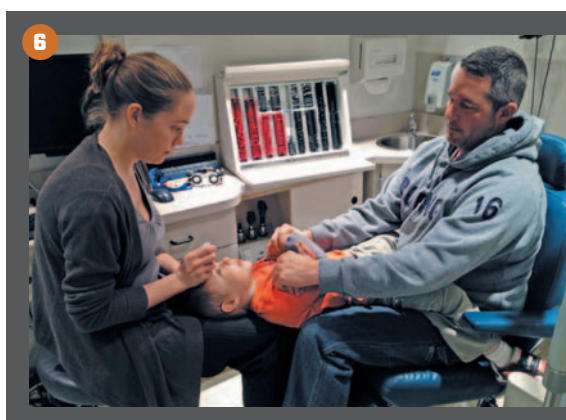
**“If pediatric patients cannot fixate and cooperate for cover tests, learn the Hirshberg technique, which requires only that you shine a light at them**

To utilize the Hirshberg technique, the only tool you need is a strong and direct light source like the transilluminator we use to check pupils. The light is shined at both eyes while seated

in front of the patient. You want to be reasonably close to see the reflection of light on the cornea (corneal light reflex, or CLR), but as far away as possible to minimize accommodation and convergence.

The technician assesses how central the CLR is in each eye and the symmetry of the light reflex on the eyes. A reflection that is slightly decentered nasally in both eyes, but symmetric, is a normal and common finding. If the CLR is decentered nasally in only one eye, this can indicate the presence of exotropia. For each 1 mm of decentration, we estimate approximately 15.00 D of prism deviation. Conversely, if the light reflex is decentered in one eye in the temporal direction, this indicates the presence of esotropia, and the same 1 mm to 15.00 D of prism deviation applies. When the light reflex is decentered superiorly or inferiorly, this indicates the presence of a vertical, or hyper, deviation.

Moving forward, we integrate of the use of prisms to recenter the CLR and take our measurement of the deviation from the amount of prisms required to center the reflex. This is the Krimsky technique (see Figure 5).



**Figure 6.** This method of holding the child is very effective when administering medications. The parent tucks the child's legs under her arms, then crosses the child's arms across the chest, and leans the child back. The technician stabilizes the head and administers the medications efficiently.

See **Pediatric patients** on Page 10

## Pediatric patients

Continued from page 9

Both of these techniques are significantly less sophisticated than the cover tests with prisms and provide only an estimation of the deviation. If you cannot recall all of the details of utilizing and documenting the Hirshberg or Krimsky techniques, at the very least, document the presence of CLR asymmetry for the patient record and the physician.

### Confrontation visual fields

Children are not unlike many of our adult patients: they have

“**Young children need help getting started with many tasks, so give them the first letter on a Snellen line.**”

the firmness of the globe underneath. Once an eye becomes firm from elevated intraocular pressure, the pressure is usually very high, so this is not a very sensitive test.

If you know you have always had normal intraocular

child's hand to demonstrate the drops will not hurt. If children still refuse, make sure you obtain the consent and assistance of the parents if more force or restraint is required. Let children sit in their parent's lap, or hold the parent's hand (see Figure 6). You need to work quickly if you are instilling more than one drop. Make sure to get multiple drops ready on the counter and take all the lids off the bottles before you start administering.

### Summary

Start with broad details and, as the pediatric patient gets older, you can drill down further and obtain the perfect adult type of eye exam. Use the less sophisticated methods, and gradually increase the complexity of methods as the child gets older. You have to accept that you will not get a perfect exam on a child, but that does not mean you should not try to get something on every pediatric patient.

If you have never used some of these techniques, give them a try with your next pediatric examination. The more you perform these techniques, the more confident you will become interpreting and documenting the results.

Keep in mind that even a well-equipped pediatric ophthalmology practice must employ less sophisticated methods of evaluation to begin yielding exam results on young children. Make it fun, use games, and start documenting your findings and observations on your pediatric patients. By doing this, you will get more of an examination and have a more productive and fulfilling experience with your pediatric patients and their families. ▀

## The pediatric exam

When administering the following tests, start with the most basic method of assessment, then eventually graduate to the more sophisticated.

- **Visual acuity**
- **Confrontation visual fields**
- **Pupils**
- **Tonometry**
- **Motility**
- **Instilling eye drops**

difficulty fixating on a nonmoving target for long periods of time. Turn a confrontation visual field test in to a staring contest to encourage fixation. Consider using toys instead of having them count fingers. Be patient. Give the pediatric patient multiple opportunities to accurately participate in the confrontation visual field.

### Tonometry

If you are unable to applanate or use a Tonopen, palpate the eye and document a soft globe. A common description for this technique is “soft to palpation” or “STP.” This technique requires only that you gently press on closed eyelids and comment on

pressure (IOP), consider touching your own eyes for a point of comparison to the patient (and always sanitize between touching your hands and the eyes of the patient!).

### Instilling eye drops

You may use tropicamide and phenylephrine to dilate, but we use “giggle drops,” “Batman drops,” and “Princess drops.” Try relating the experience of getting drops to something that does not scare them. For example, “Do you like swimming? Getting eye drops is a lot like getting pool water in your eye. It feels funny, or maybe burns, but it goes away really fast.”

Try putting a drop on the



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