The Keys to Successful Automated Perimetry

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Our job as the perimetrist is to enhance patients’ ability to respond accurately, thereby eliminating false positives and false negatives in visual field testing. The first steps to an accurate visual field test include setting patients at ease, making them physically comfortable in position at the perimeter, and ensuring that they understand the task. Paying attention to patients, encouraging them, and preventing distractions all augment the success of the testing.

The following strategies increase the accuracy of automated perimetry:

• Advise patients to respond promptly, but not in haste, when they see a brief stimulus.
• Test a patient’s better-seeing eye first, especially if he or she has not undergone perimetry before.
• Completely cover the eye not being tested.
• Properly position patients at the perimeter. This reduces their fatigue and helps them to maintain proper ocular alignment. Both affect the test result.
• Remember that best-corrected distance refraction is critical. Correct for cylinder of more than 1.00 D during the visual field test. Accommodating adds are considered according to the patient’s age.
• Bear in mind that four circumstances require a full add (+3.25 D) for perimetry: (1) age greater than 60 years; (2) pseudophakia or aphakia; (3) cycloplegia; and (4) myopia greater than -3.00 D.
• Use a full-aperture lens with a narrow metal rim around the glass, not a lens with a broad rim around a smaller glass.

INSTRUCTIONS FOR THE VISUAL FIELD TECHNICIAN

Review the last clinical note for visual field instructions. Most clinicians generally prefer a SITA-Standard 24-2 algorithm, but they may sometimes want to use SITA-Fast, short-wavelength automated perimetry (blue on yellow), and 10-2 strategies.

Take a thorough history and complete the front page of the clinical note. Do not leave any sections blank.

Always check the patient’s best-corrected distance and near visual acuity before the visual field test. Refract all new patients and also returning patients who have a change in visual acuity. Always record the refraction in the clinical note and on the visual field.

Assess pupillary size. If pupil is less than 3 mm in diameter, ask your doctor about possible dilation before performing visual field testing. Only dilate the pupils of patients with your doctor’s approval. Always record the pupil’s size on the visual field test. Fortunately, the pupil’s size is measured automatically when the gaze-tracking function is on.

Be sure always to use a size III stimulus unless told otherwise. Foveal function should always be on. The foveal function helps clinicians to determine the etiology of visual field loss.

Pay close attention to the patient during the visual field test. Encourage and instruct him or her as necessary. Assess his or her reliability, concentration, eye and head movement, and understanding of the examination. Record your assessment at the bottom of the visual field. Include your name on each visual field test you perform.

Report to your doctor any questions or difficulties you encounter during visual field testing.
Emerging medical technologies such as optical coherence tomography (OCT) have become the standard of care in the diagnosis as well as the management and follow-up of many ocular diseases, including glaucoma and various retinal pathologies such as age-related macular degeneration. As a technician, it is of vital importance that you be able to quickly and accurately capture the data. With a good understanding of basic ocular anatomy, familiarity with OCT and its functions, and a recognition of the barriers to obtaining quality data, you should be able to collect a wealth of reliable data with ease.

Technological Overview
Using a principle called interferometry, the OCT device is able to obtain a virtual histological section with a resolution of around 5 µm. Similar to ultrasound but using light energy instead of sound energy and producing a higher-resolution image, an OCT scan is relatively quick and noninvasive. Spectral domain OCT applies a newer imaging modality and offers significant benefits over time domain OCT, including faster acquisition times and higher-resolution images. An advantage of OCT is the high reproducibility of scans. Using reference points to compare previous scans, the instrument is able to show change in ocular pathology over time with a high degree of accuracy.

Understanding Potential OCT Applications
Having a conceptual understanding of the ocular anatomy is crucial to obtaining quality OCT readings. The three main structures of the eye that will be imaged are the optic nerve, the macula, and the anterior chamber angle. Other areas of the eye may be imaged at the doctor’s request (e.g., a lesion in the retinal periphery). Knowing these anatomical landmarks as well as their relationship to one another will help you confidently obtain quality images.

Retinal Disease
The macula is an important anatomical landmark in the eye that is located between the temporal superior and inferior vascular arcades and is roughly 5.5 mm in diameter. It typically appears as a darkened region and may have a yellowish hue secondary to the accumulation of xanthophyll pigments such as lutein and zeaxanthin. The fovea, located in the center of the macula, is responsible for finely detailed central vision. In a healthy patient, the fovea will present as a shallow depression in the center of the macula and will be easily imaged using OCT. Damage to this part of the eye tends to be highly symptomatic and can compromise the patient’s central vision. Quality repeatable OCT scans are essential for following a multitude of conditions such as age-related macular degeneration and diabetic macular edema.

The patient will typically fixate on a central target, while you optimize and capture the data. Most OCT devices will assign a color code for various degrees of tissue reflectivity, thereby helping to delineate the various retinal layers. Subtle changes, however, are often best appreciated using the gray scale. In addition to high-resolution of the retinal layers, newer versions of OCT using spectral domain technology are able to visualize the vitreous—in particular, the vitreal retinal interface. The vitreous is the jelly-like substance that occupies the largest portion of the globe. It has attachments in several places throughout the eye, with two of the attachments being at the optic nerve and macula. As the vitreous composition changes with age, traction can develop on retinal structures such as the macula, leading to conditions like vitreoretinal traction. OCT has allowed clinicians not only to visualize these conditions but also to understand their etiology and devise appropriate treatment plans.

Glaucoma
Another important structure that is commonly analyzed with OCT is the optic nerve, which comprises a collection of hundreds of thousands of visual fibers.
coursing together to carry visual signals to the brain. Because one of the most common diseases of the optic nerve is glaucoma, patients diagnosed with or suspected to have the disease will often undergo OCT of the optic nerve.

The optic nerve is an easily identifiable anatomical landmark. It generally appears as a round disc approximately 1.75 mm in size that is pink to orange in color with distinct margins. In the center of the optic nerve is a depression called the *cup*, which progressively enlarges in glaucoma. The retinal vasculature can easily be seen radiating from the center of the optic nerve.

For scans of the optic nerve, patients will typically look at a target slightly displaced nasally of center. You will then center the scan on the optic nerve and capture the image. Spectral domain OCT is able to capture a wealth of data concerning the optic nerve, including disc size and area as well as cup size, and it can calculate the thickness of the retinal nerve fiber layer (RNFL). Disease conditions of the optic nerve often affect the RNFL, making this a value of particular importance. In glaucoma, the RNFL thins as the disease progresses. Using a normative database, most OCT devices are able to calculate whether the RNFL of a particular patient falls within normal limits. Thus, OCT has become a valuable test for the early diagnosis and monitoring of glaucoma. Recent advances in OCT technology enhancing optic nerve topography and the assessment of peripapillary RNFL thickness and the actual number of ganglion cells have made possible not only the accurate detection of glaucoma but also the accurate detection of its progression.

**Corneal and Anterior Chamber Angle Pathology**

One of the more recent modalities in OCT has been the imaging of the anterior chamber anatomy as well as corneal imaging. The iridocorneal angle is where the majority of aqueous fluid produced by the ciliary body drains. It is essential for the clinician to have a thorough understanding of a patient’s angle anatomy when diagnosing various disease states, notably glaucoma. Using a technique called *gonioscopy*, the clinician is able to evaluate the structures of the angle and determine whether it is wide open, narrow, or closed. Some angles may be difficult to grade, however, because of an absence of pigment, an overabundance of pigment, or hazy media. OCT imaging may be able to provide another view of the angle anatomy, thus allowing the clinician to confirm the diagnosis. OCT can also image and document various corneal conditions such as the depth of an opacity or confirm that a corneal graft is in adequate condition.

**STEPS TO OBTAINING AN OCT SCAN**

First, position the patient comfortably facing the OCT device. Then, enter his or her information into the database and select the appropriate scan. Place the patient’s head comfortably in the headrest and make the necessary height adjustments.

Instruct the patient to blink a few times and have him or her focus on the fixation point. Ask the patient to hold his or her eye as still as possible and to try not to blink.

Obtain the scan and check it for reliability and artifact. If the scan is adequate, save the image and provide it to the clinician.

**IMAGE ACQUISITION: CONSIDERATIONS**

The patient must be able to fixate steadily on a target for the duration of the scan. Excessive movement will degrade the image.

The patient’s eyes must remain open. Blinking will produce unwanted artifacts.

Uncooperative patients or those with significant media opacity will present more difficulty in terms of obtaining quality images.

Patients with dry eye disease can be given artificial tears to optimize the images.

While usually unnecessary, a very mild dilating agent can be used if needed.