Marteleye
MEDICAL GROUP

VISUAL FIELD TESTING

A visual field test is a method of measuring an individual's entire scope of vision, that is their central and peripheral (side) vision. Visual field testing actually maps the visual fields of each eye individually. The visual field test is a subjective examination, requiring the patient to understand the testing instructions, fully cooperate, and complete the entire test in order to provide useful information.

WHAT IS A VISUAL FIELD TEST USED FOR?

Visual field testing is most frequently used to detect any signs of glaucoma damage to the optic nerve. In addition, visual field tests are useful for detection of central or peripheral retinal disease, eyelid conditions such as ptosis or drooping, optic nerve disease, and diseases affecting the visual pathways within the brain. The visual pathways carry information from the eye to the visual or occipital cortex in the brain, where this information is processed into vision.

HOW IS VISUAL FIELD TESTING DONE?

There are a variety of methods utilized to measure the visual fields. Virtually all visual field testing is performed one eye at a time, with the opposite (contralateral) eye completely covered to avoid errors. In all testing, the patient must look straight ahead at all times in order to avoid testing the central vision rather than the periphery. Most modern visual field testing devices also continuously monitor fixation, or the ability of the patient to maintain a consistent straight ahead gaze. To summarize, visual field testing is useful for numerous reasons:

- screening for glaucoma
- testing patient with glaucoma for treatment response,
- screening and testing for lid droop or ptosis, particularly for insurance approval of lid lift surgical procedures,
- testing for macular diseases such as macular degeneration or toxicity from certain medications such as Plaquenil used for rheumatoid arthritis
- testing for peripheral retinal disease such as retinal detachment or retinitis pigmentosa
- testing for malingerers, or patients who may have secondary gains from poor vision, such as a false insurance claim,
- testing the function of the optic nerve looking for tumor, injury, poor circulation or stroke, compression from swelling in the eye socket or orbit, or severe dietary deficiency
- testing the visual pathways to the brain, looking for tumor, brain swelling, injury, or poor circulation
- testing the visual or occipital cortex, looking for tumor, injury, brain swelling, or poor circulation.

A crude visual field test can be done by having the patient look straight ahead and count the fingers shown by the examiner from the side. More typically, however, visual fields are measured by a computerized assessment in an optometrist's, ophthalmologist's, or neurologist's office. For these procedures, one eye is covered and the patient places his or her chin in a bowl-shaped chin rest. Then, when the patient sees lights or movement of various intensities and at different locations, he or she pushes a button. In all standardized testing, the right eye is tested first, followed by the left eye. This process produces a computerized map of the visual field.

Thus, visual field testing can be grouped into several important categories:

- Confrontational: The test is given one on one by a doctor or technician as a screening tool, in which peripheral finger movements are brought from the far periphery to the near periphery in four quadrants
- Amsler grid: It's an important tool to test macular vision in and around the center of the retina and detect specific conditions such as macular degeneration
- Static perimetry: The most common type of modern visual field testing employs a device with fixed light sources, either stationary pinpoint light sources or projected dots within a large white bowl. Popular devices include the Octopus or the Humphrey-Zeiss field analyzer. These tests are automated and run by the onboard computer, thus minimizing the time spent by a technician running the test.
- Kinetic perimetry: The process utilizes moving light sources, such as the traditional workhorse Goldmann perimeter. This test produces an island map of peripheral visual perception intensity. Fixation monitoring as well as movement of the light source require a dedicated trained technician throughout the entire test. This test is particularly useful in weeding out malingerers.
- Frequency doubling analysis: This test utilizes varying intensities of a shimmering grid of light in standardized sectors of the peripheral and central visual field. It is particularly useful in detecting early glaucoma field loss and can be about 40% more sensitive in doing so than standard static or kinetic perimetry.

Visual field testing is generally covered by virtually all health-care insurance plans. Testing may be limited to one time per year for patients who are called glaucoma suspects, that is, likely to develop glaucoma in the future. Insurance plans usually allow two visual field tests per year for patients who have already been diagnosed with glaucoma.

These visual field testing devices all incorporate an internal computer with the ability to store, print, and transmit important patient data. The field report generated by modern visual field devices includes a wealth of information, all of which can be useful to the doctor interpreting the results:

- Fixation errors: the number of times the patient looks away from the central target. This is a key indicator of patient cooperation or fatigue.
- False positives: the number of times the patient pushes the button when, in reality, a light source is not illuminated.
- False negatives: the number of times the patient fails to push the button when, in reality, there is a light source illuminated. These spots can be repeat tested by the onboard computer at exactly the same spot to best understand the patient's ability to produce an accurate field test.
- Points tested: indicates the total number of separately illuminated testing points, and therefore data points presented to the patient for testing. Reliable patients can produce a very useful field with a limited number of test points.
- Reliability index: the overall reliability of the patient's testing for each eye. Poor reliability may indicate patient fatigue, insufficient understanding of the test, or poor vision for other reasons such as cataracts. Visual field tests can also be used to ferret out malingerers.
- Standard deviation: the difference in peripheral field acuity when compared to a normative database, or simply put, a large group of similar normal patients. This tells the doctor whether or not a particular part of the peripheral field is normal, depressed, or absent.
- Visual field map: the final basic report indicating the patient's visual field anywhere from the central 10 degrees all the way out to the farthest reaches of the field at 90 degrees. Altered patterns in the field

map from reliable patient testing are often extremely useful in the diagnosis of ocular or neurological disorders.

The visual field test generally is performed after visual acuity testing, but before examination by the doctor. Visual field testing requires a minimal amount of time for most otherwise healthy patients, but it may be moderately tiring or stressful for ill or elderly patients. Visual field testing is also very difficult for younger children or patients with mental disabilities or developmental delay, such as Down's syndrome for example. Common testing time for visual fields in both eyes:

- Amsler grid: one minute
- Confrontational field: two minutes
- Static field for glaucoma screen: eight minutes
- Static field for lid droop or ptosis screen: eight minutes
- Static field for complete glaucoma evaluation: 15 minutes
- Kinetic Goldmann field for complete glaucoma evaluation: 20 minutes
- Frequency doubling analysis for glaucoma screen or evaluation: 10 minutes