

How Do You Interpret a 24-2 Humphrey Visual Field Printout?

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Perimetry has long been an important tool for identifying visual field defects and guiding glaucoma patients' treatment. Kinetic perimetry involves the use of moving targets from nonseeing to seeing areas to delineate spots of decreased or absent vision. Static perimetry, of which there are several versions, uses a computer algorithm to present targets at fixed locations to delineate scotomas in a more expedited fashion. A full discussion of the differences between static and kinetic perimetry is beyond the scope of this column; however, those interested are encouraged to explore the suggested reading at the end of this article. Our discussion focuses on the salient points for proper interpretation of the 24-2 Swedish Interactive Thresholding Algorithm (SITA) full-threshold Humphrey visual field (HVF) (Carl Zeiss Meditec Inc., Dublin, CA). We typically use this test in our practices to assess visual field loss in our glaucoma patients.

SEQUENCE OF HVF PRINTOUT INTERPRETATION

1. Confirm patient's name, ID number, and date of examination.

2. Identify which testing algorithm (24-2, 30-2, etc) is being used. This point is important because follow-up examinations should be of the same test type in order to properly identify changes.

3. Confirm that the appropriately sized target was used for the test. HVF targets come in sizes ranging from 0.25 mm² to 64.00 mm² represented by Roman numerals I through V. Typically, a size III stimulus (4 mm²) is used in patients with good visual acuity (usually at least 20/200 or better). In cases of decreased visual acuity, a size V (64 mm²) target is used to garner useful information.

This section also lists the background light intensity in apostilbs (31.5 asb), which was chosen as standard to create scotopic light conditions and was originally set as the standard for Goldmann perimetry.

Finally, the testing strategy (SITA-Fast vs SITA-Standard) is also listed. SITA was designed to replace full-threshold testing that required more time to complete and led to patient fatigue during testing. Both SITA Standard and SITA Fast use complex software to speed up visual field evaluation by relying on normative data as well as the test takers' previous responses. SITA Fast may be used in special situations of inattentiveness or with patients who require more time to learn the process of visual field testing. Most glaucoma specialists rely on

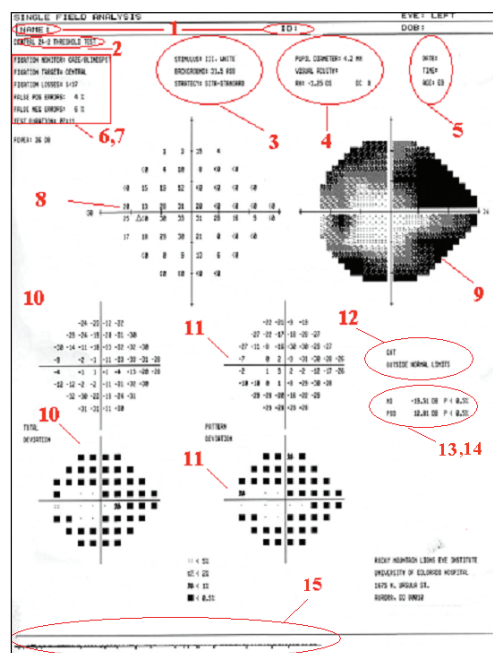


Figure 1. The numbers on this 24-2 Humphrey Visual Field Printout delineate the authors' recommended interpretive sequence.

SITA Standard, which is expedited without eliminating a significant amount of data that can be evaluated in an assessment.

4. There is a section that lists the pupil diameter at the time of testing. Pupils smaller than 2 mm and larger than 6 mm may influence the testing outcome by introducing artifacts due to light diffraction or induced aberrations. The appropriate refraction should be listed to allow proper vision for the testing distance of the perimetry bowl. Age-adjusted charts are available to the technician to correct for the target distance (30 cm) with lenses placed in front of the tested eye. The Humphrey machines will also calculate the appropriate lens add needed if the patient's age and distance correction are recorded into the machine. Astigmatism more than 1.25 D should be corrected in addition to the sphere adjustments. Special attention should be given to aphakic and pseudophakic patients, regardless of age, as well as those who wear contact lenses.

5. The date and time is noted as well as the patient's age. Testing points for the HVF are compared with age-matched controls in clusters of 10 years. For this reason, a patient who is 69 years old is compared to patients between 60 and 69 years of age. The visual field in a patient at the end of one testing group may appear to improve on subsequent testing when he ages 1 year and is then compared with individuals 70 and 79 years of age. Therefore, it is important to note the patient's age and take it into account at extremes of the age brackets.

6. Fixation losses as well as false positives and negatives should typically be less than 20% to 30% for the test to be considered clinically valuable (see the discussion below). Testing time, typically under 5 minutes in experienced test takers, is also given.

7. When evaluating test reliability, the practitioner should be sure to look at the numbers printed on the Numeric Results (decibel [dB]) graph. A value of 40 dB or higher on this graph indicates that the patient may be "trigger happy." That is, the patient is anticipating the presentation of the stimulus and is responding before the stimulus is seen. Readings of 40 dB or higher indicate an unreliable field that will need to be repeated. It is best to catch these readings while the test is in progress and restart the test. A typical "normal" reading is around 30 dB.

8. The numeric dB graph should be studied next. The dBs tested by the Humphrey analyzer range between 0 and 50 dB (0 is the brightest and 50 is the dimmest). A value of 0 means the patient could not see the brightest target, and a 50 means the dimmest target was seen. Most values are around 30 dB, and any numbers below this range imply a possible visual field defect.

9. The grayscale representation of the numeric dB

graph illustrates values closer to 0 dB with black and those closer to 50 dB with white. The gray scale is of little value when analyzing for glaucomatous damage because it may over- or underestimate defects.

10. The mean deviation is a representation of the depressed vision for each point when compared with age-matched controls. It does not account for global depression from other sources such as cataracts or vitreous hemorrhage.

11. Pattern deviation represents focal depressed areas in the points tested when accounting for overall depression as estimated by the mean deviation plot. This information allows the physician to analyze the data obtained while accounting for any depression of the hill of vision that might be caused by cataracts, vitreous hemorrhages, or other diffuse media opacities.

12. The Glaucoma Hemifield Test compares points in the upper field to corresponding points in the lower field and then interprets the results as (a) "outside normal limits" indicating the upper and lower fields are different and may signify glaucoma; (b) borderline; and (c) within normal limits indicating glaucoma may not exist.

13. Pattern standard deviation (PSD) provides information about localized loss. A high PSD indicates a nonuniform sensitivity loss (ie, not due to diffuse depression from cataract or vitreous hemorrhage). As glaucoma advances, the PSD may appear to improve due to global depression.

14. Mean deviation (MD) is the average difference from normal expected value in the patients' particular age group. Typically, an MD of -2.00 or less could indicate glaucoma.

PEARLS AND PITFALLS

1. Size target should typically be III unless the patient has very bad vision. White-on-white testing is standard, although other colors may be used for early disease or macular defect detection.

2. "Trigger-happy" patients: The technician should inform the patient that it is normal for there to be periods of no stimulus and to wait patiently through them.

3. High dB (over 40) on a dB numeric graph typically indicates a patient who is "trigger happy."

4. Pupil size needs to be consistent when comparing across tests. If a patient on pilocarpine is dilated, he should be dilated for all tests.

5. Cataracts may be a source of depression of the mean deviation. After cataract surgery, the mean deviation may decrease in magnitude, and the pattern deviation may increase as more focal glaucoma defects are revealed.

6. The patient's age should be noted on each test, as

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there can be a significant change in the probability plot as the he crosses into a new decade.

7. The gaze tracker (#15 on the HVF printout) provides important information about patient attention—upward fluctuations are recorded when the patient looks away from the target, and downward fluctuations are times of eyelid closure (tracking failure).

8. A higher rate of false positives and negatives may occur at the edges of scotomas due to glaucoma, which must be accounted for when evaluating reliability.

9. Clustering of change among adjacent data points is the best way for the practitioner to evaluate areas of possible progression.

10. A prolonged testing time may indicate patient fatigue and must be considered if there is a large amount of global depression.

CONCLUSION

Visual field testing is a vital component in the diagnosis and follow-up of glaucoma patients. Understanding what information the machine is providing allows the practitioner to avoid accepting suboptimal data and at the same time, maximizes the use of the information available for assessment. By recognizing the strengths and limitations of visual field testing, the practitioner can more accurately diagnose and follow patients with glaucoma. □

Further Reading:

Choplin NT, Edwards RP. *Visual Field Testing With the Humphrey Field Analyzer: A Text and Clinical Atlas*. 2nd ed. Thorofare, NJ: Slack Inc.; 1999.

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SEND US YOUR QUESTIONS!

Fellows and residents are encouraged to submit their questions for consideration. Interested parties should send a question, their name, and their academic affiliation to Dr. Kahook at malik.kahook@uchsc.edu.