What are the 3 main problems with visual field tests for glaucoma?

Problem
01

High variability at moderate to severely damaged test locations (<20 dB) [1,2]

Problem
02

Poor sensitivity to small central defects when testing with the 24-2 test pattern [3]

Problem
03

Long test times which only get worse with the inclusion of more test locations

Test re-test variability is a real problem with current threshold tests used to detect and manage glaucoma.

Below 20dB variability is so high that meaningful measures of threshold are no longer attainable (Figure 1) [1,2].

So why continue to test at levels below 20dB? Doing so significantly increases overall variability, impacts the ability to see change in the current global measures of progression and lengthens test times.

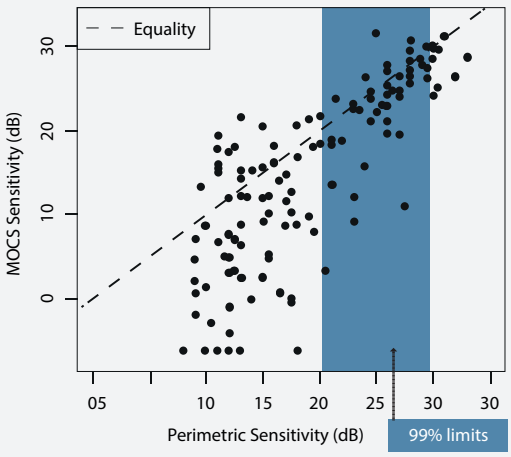

Figure 1: Test re-test variability at different levels of loss, redrawn from Gardiner [1].

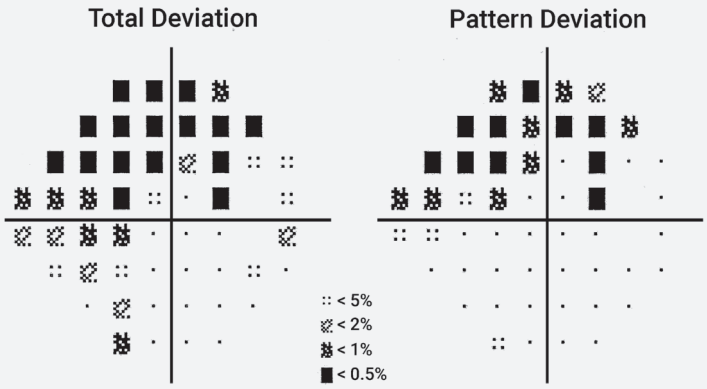

Figure 2: Probability maps used on SAP standard printout.

The pattern and total deviation probability maps currently used on the SAP standard printout (Figure 2) give an output that is not influenced by thresholds below the 99.9% level – i.e. defects in the highly variable region shown in Figure 1, above – they simply state whether or not each location is significantly different from normal at a series of different probability cut offs.

So, logically, why is there not a visual field test that just tests at the 95, 98 and 99% probability limits? Such a test would reduce variability (Problem 1); allow for more test locations (Problem 2) and shorten test times (Problem 3).

The 24-2 test pattern is widely used to detect and monitor visual field loss but is known to under-sample the central 10 degrees [3]. Ideally, patients should be monitored with a combined 24-2 and 10-2 test but such a test is impracticable with current threshold algorithms, as it takes more than 10 minutes to complete – however, it would be possible with an algorithm based on testing at probability limits (Figure 3).

Such a test could be extendable in three stages: starting by testing just a few key 24-2 locations to screen for loss, then continuing, as required, to a full 24-2 test and again to a 24-2 plus 10-2 test.

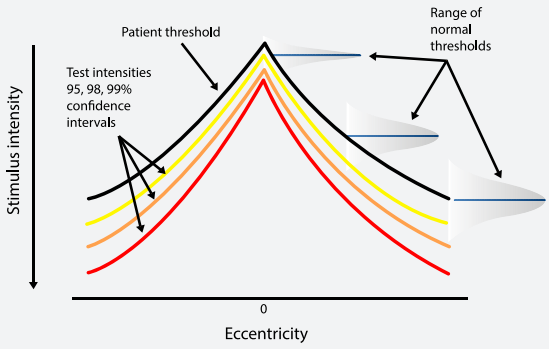

Figure 3: Test levels based on 95, 98 and 99% probability of being seen by an age matched eye with no visual field loss.

There is now a new visual field test that solves these problems.

Henson 9000 Smart Supra test

Faster glaucoma detection with unprecedented sensitivity

Solution
01

Tests at the 95%, 98% and 99% confidence limits and produces industry-standard deviation probability maps.

Solution
02

Has an extending test pattern that starts with a fast 26 point pattern extendable to 24-2 and a combined 24-2 + 10-2 test.

Solution
03

01 and 02 combined give a faster result than standard 24-2 tests, even when using Smart Supra's fully extended 24-2 + 10-2 pattern.

Benefits of Henson Smart Supra

Increase business efficiency

The faster test increases patient throughput, enabling more efficient day-to-day practice management.

Identify more glaucoma sufferers

The addition of the 10-2 test pattern increases sensitivity in the previously under-sampled central field.

Remain in sync with existing tests

By using industry-standard test patterns Smart Supra retains compatibility with standard tests and results on other devices, facilitating hassle-free adoption.

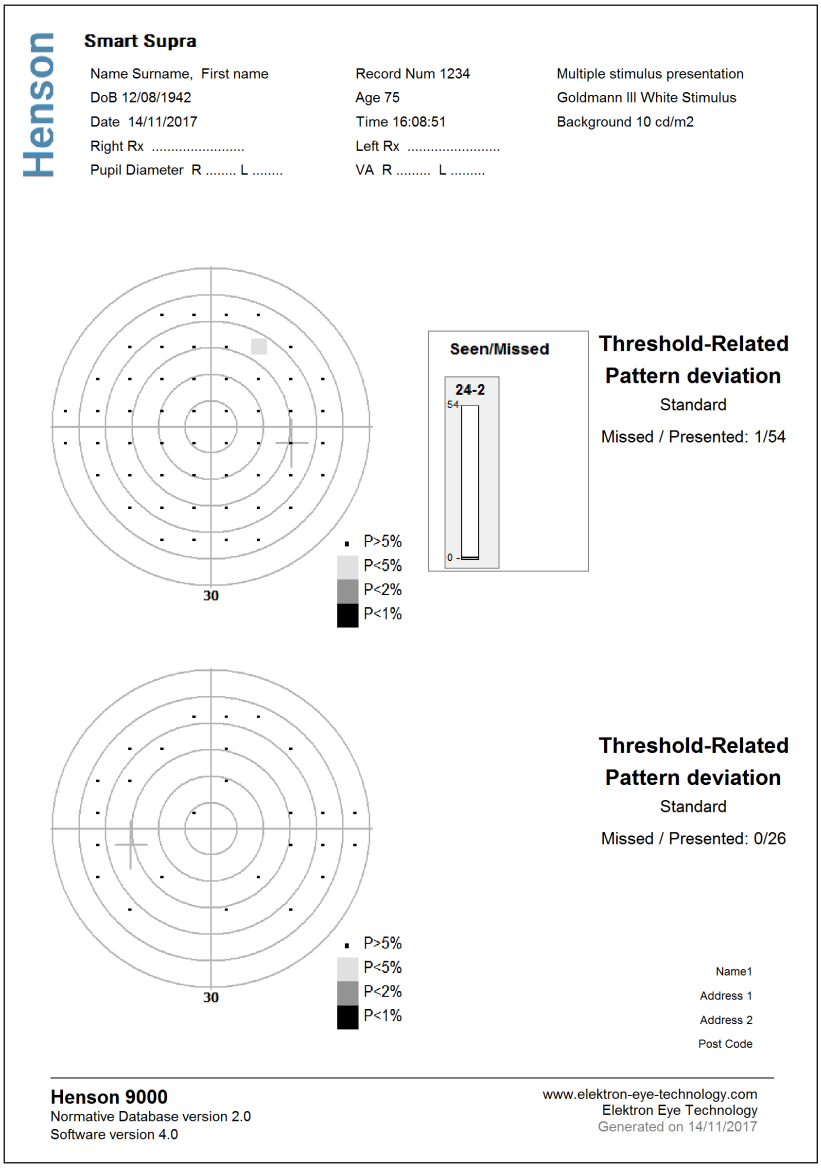

Figure 4: Example results output from the new Henson 9000 Smart Supra test

References

1. Gardiner SK, Swanson WH, Goren D, Mansberger SL, Demirel S. (2014) Assessment of the Reliability of Standard Automated Perimetry in Regions of Glaucomatous Damage. *Ophthalmology* 2014;121:1359-1369.

2. Henson DB, Chaudry S, Artes PH, Faragher EB, Ansons A. (2000) Response variability in the visual field: comparison of optic neuritis, glaucoma, ocular hypertension and normal eyes. Invest *Ophthal Vis Sci* 2000;41:417-421.

3. Hood DC, Raza AS, de Moraes CGV, Liebmann JM, Ritch R. (2013) Glaucomatous damage of the macula. *Progress in Retinal and Eye Research* 2013; 32:1-211