

# Humphrey Blue-Yellow Perimetry A New Dawn in Visual Field Testing

What is blue-yellow perimetry?

Blue-yellow perimetry, also known as Short Wavelength Automated Perimetry (SWAP), represents a recent and exciting advance in the early identification of glaucomatous visual field loss. It differs from standard automated static perimetry only in that a carefully chosen wavelength of blue light is used as the stimulus, and a specific color and brightness of yellow light is used for the background illumination. Except for these differences, blue-yellow perimetry is still a basic threshold perimetry test, in which standard Goldmann stimuli are presented in the conventional way.

Thoroughly tested and documented  
by leading authorities

In four longitudinal studies, blue-yellow perimetry performed much better than standard computerized perimetry in identifying early glaucomatous changes. Working independently, researchers from UC Davis<sup>1</sup> and UC San Diego<sup>2</sup> found that *SWAP identified early glaucomatous visual field defects years before they could be detected using standard white-on-white perimetry*. In separate work, the Davis and San Diego teams also found that *SWAP detected progression in glaucomatous field loss significantly earlier than did white-on-white perimetry*.<sup>3,4</sup> Other papers have found SWAP to be superior in managing ocular hypertensives and in detecting neurological disease.<sup>5,6</sup>

What clinical studies have shown

***“Blue-on-yellow perimetry deficits are an early indicator of glaucomatous damage and are predictive of impending glaucomatous visual field loss for standard white-on-white automated perimetry.”***

*Chris Johnson, PhD, et al.<sup>1</sup>*

***“Preliminary findings suggest that SWAP may be useful in detecting certain neuro-ophthalmologic deficits more readily than standard automated visual field testing, especially for optic neuritis and multiple sclerosis.”***

*John L. Keltner, MD, et al.<sup>6</sup>*

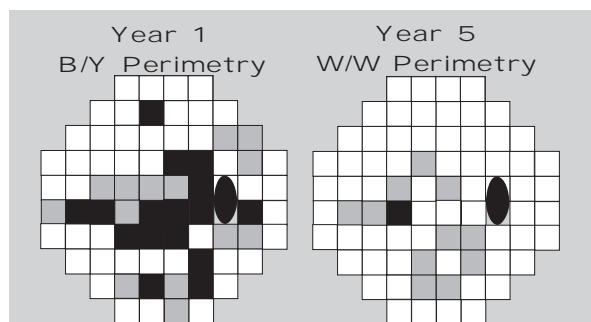


From clinical investigation to  
clinical practice

With Humphrey Blue-Yellow Perimetry, Humphrey Systems brings the promise of blue-yellow testing, as evidenced in several studies, to the clinical practice.

Detection, diagnosis, intervention—  
the sooner, the better

Blue-yellow perimetry has been reported to make it easier for the clinician to detect visual field defects, establish a diagnosis of glaucoma, and define the need for beginning therapeutic intervention, in the hopes of avoiding optic nerve damage and progressive visual field loss. Blue-yellow perimetry has been shown to be a predictor of glaucomatous visual field defects.



*Blue-Yellow Perimetry has been shown to be more effective than white-on-white perimetry in identifying early glaucomatous visual field loss in patients with ocular hypertension.<sup>1</sup>*

# Humphrey Blue-Yellow Perimetry

## How blue-yellow perimetry works

Blue-yellow perimetry isolates and measures blue-yellow ganglion cell function. The carefully chosen bright yellow background desensitizes the green and red cones, and has little effect on blue cone function. The narrow band 440 nanometer blue stimulus falls right on the peak sensitivity of blue cones. Thus, blue-yellow perimetry tests the blue cones and their ganglion cell connections.

There are at least two theories as to why blue-yellow testing provides earlier diagnosis. One theory suggests that the blue-yellow ganglion cells are selectively damaged in early glaucoma, and thus earlier diagnosis is simply a function of testing the part of the visual system which is damaged first. A second theory suggests that early diagnosis is achieved simply because blue-yellow perimetry tests one of several pathways of the visual system; if only a small part of the system is tested, then there is less redundancy, and loss will be discovered earlier.

## Humphrey Blue-Yellow Perimetry adheres to international standards

Several years ago, teams at Davis, Berkeley, and San Diego, began working together to define an optimized standard for certain critical blue-yellow testing parameters—the wavelength of the blue stimulus, the wavelength and brightness of the yellow background, and what stimulus size should be used. They presented their recommendations to a larger group from North America and Europe for peer review and discussion. Out of this process has come an internationally accepted standard for SWAP.<sup>7</sup> Humphrey Blue-Yellow Perimetry now being offered on the Humphrey® Field Analyzer II complies with this standard.



## When to use blue-yellow perimetry

**Glaucoma suspects** Blue-yellow testing can be utilized on patients having one or more risk factors for glaucoma, whose white-on-white field results are normal.

**Glaucoma patients** Blue-yellow testing has been reported to be appropriate for ocular hypertensives and glaucoma patients with mild to moderate field loss.<sup>1-5</sup>

**Neurological patients** At least one study has demonstrated that blue-yellow testing may be an appropriate and useful test in identifying neurological disease.<sup>6</sup>

As lens density testing is not needed, patients with mild to moderate cataracts may be tested using blue-yellow perimetry. Patients having significant cataracts and those otherwise having advanced white-on-white field loss may not be good candidates for blue-yellow testing.

*“SWAP testing allows me to be more certain that I’m treating the patients who need it most.”*  
Howard S. Barnebey, MD, Seattle WA

# STATPAC™ for Blue-Yellow

STATPAC for Blue-Yellow simplifies and standardizes interpretation of test results

Translating blue-yellow findings into meaningful data is made easy with Humphrey Systems' STATPAC for Blue-Yellow, a plain language analysis program developed exclusively for Humphrey Blue-Yellow Perimetry. The familiar Humphrey STATPAC tools – age-corrected normals, probability plots, Glaucoma Hemifield Test, and global indices – are also employed with STATPAC for Blue-Yellow.

*Blue-yellow perimetry revealed more extensive visual field defects than white-on-white perimetry*

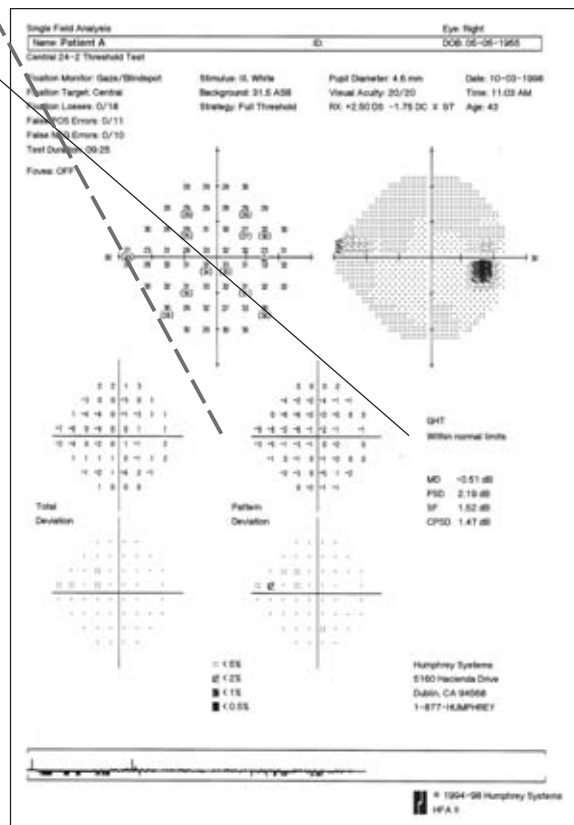
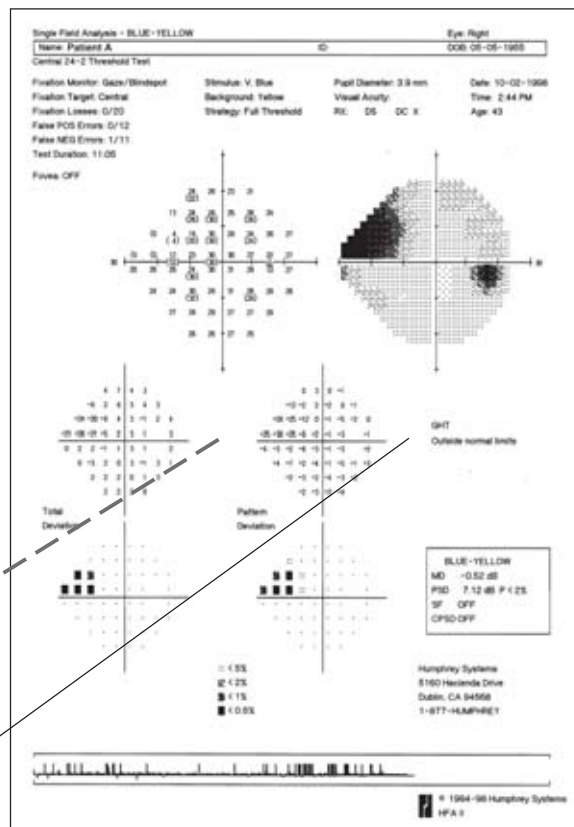
*Blue-yellow perimetry uncovered abnormal Glaucoma Hemifield Test results as compared with white-on-white perimetry*

STATPAC for Blue-Yellow provides high sensitivity with no loss in specificity

Humphrey Systems' STATPAC provides the same high level of specificity for its blue-yellow perimetry as is currently found in standard white-on-white perimetry. Specificity is the ability of a diagnostic technique to correctly identify actual normals as being normal. STATPAC states the specificity levels associated with each probability symbol. For example, if the Pattern Standard Deviation (PSD) on a particular print-out is significant at the 2% level, that means that fewer than 2% of normals would be expected to have a PSD as bad or worse.

***“SWAP perimetric indices seem to be more sensitive than W/W perimetric indices in Primary Open Angle Glaucoma patients.”***  
A. Perdicchi, et al.<sup>8</sup>

Blue-Yellow Printout



White-on-White Printout

# Humphrey Blue-Yellow Perimetry



## Humphrey Blue-Yellow Perimetry in your practice

Humphrey Blue-Yellow Perimetry is a standard feature on the Humphrey model 745 and 750 perimeter. Any Humphrey Field Analyzer II perimeter can be upgraded to a model with blue-yellow testing capability.

Some patients may prefer white-on-white perimetry, even though blue-yellow testing conditions are no brighter than standard indoor lighting levels. Use of the 24-2 test pattern and FastPac™ testing strategy with Fluctuation turned off reduces test time and improves patient acceptance. A typical blue-yellow test might take seven to twelve minutes using these testing parameters.

The need for lens density measurements is not required.<sup>9</sup> Only about three minutes are needed to adapt to the yellow background. Patients properly informed about the benefits of blue-yellow perimetry adapt to the new testing conditions quite well.

## References

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2. Sample PA, Taylor JDN, Martinez GA, Lusk M, Weinreb RN. Short-wavelength color visual fields in glaucoma suspects at risk. *Am. J. Ophthalmol.* 115:225-233, Feb. 1993.
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4. Sample PA, Weinreb RN. Progressive color visual field loss in glaucoma, *Invest. Ophthalmol Vis. Sci.*, 33:6 pp. 2068-71, May 1992.
5. Johnson CA, Brandt JD, Khong AM, Adams AJ. Short-wavelength automated perimetry in low-, medium-, and high-risk ocular hypertensive eyes. *Arch Ophthalmol.* 113:70-76, Jan. 1995.
6. Keltner JL, Johnson CA. Short-wavelength automated perimetry in neuro-ophthalmologic disorders. *Arch Ophthalmol.* 113:475-481, April 1995.
7. Sample PA, Johnson CA, Haegerstrom-Portnoy G, Adams AJ. Optimum parameters for short-wavelength automated perimetry. *J Glauc.* 5:6, pp. 375-383, Dec. 1996.
8. Perdicchi A, et al. STATPAC software analysis for short wavelength automated perimetry (SWAP) in primary open angle glaucoma (POAG), ARVO, 1998.
9. Sample PA, Martinez GA, Weinreb RN. Short-wavelength automated perimetry without lens density testing, *Am. J. Ophthalmol.* 118:5 pp. 632-641, Nov. 1994.

For more information about Humphrey Blue-Yellow Perimetry, or to obtain a recommended reading list on short wavelength automated perimetry, call or write Humphrey Systems.



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