

Definitions / Tables (Part 2 of 2) – Static Perimetry (Humphrey, Octopus)**Normal Visual Field: Components:**

- General Information
- Reliability Indices
- Raw Data
- Total Deviation
- Pattern Deviation
- Global Indices
- Probability Symbols

General Information:

- Machine information: what is tested (# degrees) and how it is tested (ex. Threshold)
 - Also: stimulus size, machine used, strategy used
- Patient information: Name, date, birthdate, refraction, pupil diameter, visual acuity

<u>Instrument Variables:</u>	<u>Humphrey</u>	<u>Octopus</u>
• Background luminance	31.5 asb (=Goldmann) Low photopic	4 asb Low photopic; Mesopic or scotopic if miosis and/or cataract
• Stimulus size	III or V	III or V
• Stimulus Duration	0.2 sec	0.1 sec
• Fixation control		
• Interstimulus time		
• Cupola diameter		

Patient Variables:

- Refractive errors: 1.26 dB reduction per Diopter uncorrected
- Cataracts and other media opacities
- Pupil diameter: General reduction in sensitivity with pupil < 2.5 mm
- Age: Octopus: 0.5 dB/decade in central VF; 1 dB/decade peripherally
- Social structure
- Perimetric experience
- Fatigue
- Psychological factors (ex. Instruction: “Do not expect to see all the lights.”)

Reliability Indices:**False Positive (FP):**

- Sound cue without light source or subthreshold stimulus
- SITA: FP = response within the patient’s response time
- > 33% is significant

False Negative (FN):

- No response to a 9 dB brighter stimulus at a location that had a measurable threshold earlier
- > 33% is significant
- “Clover leaf” pattern with fatigue

Fixation Losses (FL):

- Heijl-Krakau method of periodic testing of the blind spot
- Video monitor ± IR camera to detect pupil movement

- Pseudofixation losses from high refractive errors due to lens-induced shift in blind spot location
- > 20% is significant

Short-Term Fluctuation (SF):

- Repeated threshold @ a single point can vary within the same VF
- (Long-term fluctuation (LTF) occurs between sessions)
- 10 points retested on Humphrey; all 59 points retested on Octopus
- Any point 5 dB above or below expected is also retested (Humphrey)
- > 3-4 dB can indicate early glaucomatous loss, even in the presence of an otherwise normal VF

Fovea

Test Time

⊛ After testing a badly damaged VF, it is helpful to look at the least damaged area (ex. raw data values) to determine how reliable the patient was

Raw Data: Testing Algorithms: Screening or Threshold

Screening:

- 120 point screener (H) or Program 7 (O)
- Compared with age-matched control data
- Humphrey can also screen with respect to threshold tested at 1 location/quadrant
- 2 Strategies:
 - Single-level suprathreshold test
 - Stimulus 2-6 dB higher than threshold or expected hill of vision
 - Result: seen (normal) or not seen (defect)
 - Name: Threshold-Related Strategy (Humphrey)
 - 2-Level suprathreshold test
 - 3 categories: Normal, relative defect, absolute defect
 - Done as per single-level but abnormal spots are tested with 0 dB attenuation so that a relative scotoma is seen but an absolute scotoma is not seen

Threshold (Humphrey):

- 24-2: 54 points (including 2 points for blind spot)
 - 30° nasally still tested; 24° elsewhere
 - 30-2: 76 points
 - 3° above & below the horizontal & left & right of vertical, then every 6°
 - 30-1: On the horizontal and vertical meridians
 - 30-1 & 30-2 combined: 3° spot interval
 - 1-2% of glaucomas have initial defects outside the central 30°
 - 10-2: Central 10°; 68 points
 - Fovea: 16 points, central 4°
 - Stage I: Threshold
 - Stage II: Abnormal points in stage I tested using past threshold of stage I
 - Stage III: 24 points tested for reliability indices
- Fastpac faster than Full Threshold

- Full Threshold:
 - **Fast Bracketing:** 4-2 algorithm; start at a point with respect to known sensitivity for that age
 - **Normal Bracketing:** 4-2 algorithm but each point retested
- Fastpac:
 - Threshold tested at each point but not 4-2; 3 dB steps used and threshold crossed only once
- Swedish Interactive Threshold Algorithm (SITA):
 - Fast (faster than Fastpac)
 - Standard (faster than Full Threshold)
 - Prior knowledge of normal threshold levels, interpoint correlation, frequency of seeing curve where the dB interval between steps across threshold is based on how sensitive the patient is to the steps
 - Bayesian probability calculates the probability of a point being normal or abnormal and tests threshold accordingly
 - The patient paces the test, rather than the test pace being fixed
 - Far fewer catch trials!!! (FP by response time analysis and FL by eye tracking)

Threshold (Octopus):

- G-1: Program 32; 2.8° between points, expands peripherally
- M-1: Central 10°
 - 37 points, 1.4° grid in center

Total Deviation: (Humphrey)

- Plot of deviation at each point relative to age-matched controls

Pattern Deviation: (Humphrey)

- Plot of total deviation accounting for MD for each point
- Reset to 7th highest threshold of non-edge points to recalculate and find focal losses

Global Indices:

Humphrey

Mean Deviation (MD):

- Based on age-matched controls
- = weighted-average

- Sensitive to diffuse changes but relatively insensitive to focal changes

Pattern Standard Deviation (PSD):

- Depicts abnormality of smooth contour of hill of vision
- Analogous to standard deviation

Short term Fluctuation (SF):

Corrected PSD (CPSD):

Octopus

Mean Defect (MD):

- Mean of threshold values @ point
- = average
- Normal range -2 to +2

Loss Variance (LV):

- Normal range 0 to 6 (always +)

Short term Fluctuation (SF):

- Normal range < 2

Corrected LV (CLV):

- $CPSD = (PSD^2 - STF^2)^{1/2}$
- Normal range 0 to 4
- Represents the irregularity of the contour not accounted for by SF

Glaucoma Hemifield Test (GHT):

- Looks at clusters of points above & below the horizontal for any sig. difference.
- Describes the field as “Within normal limits”, “Borderline” or “Outside normal limits”

Bebie Curve (Octopus):

- For each raw data point, the expected age-corrected normal threshold is subtracted and this difference is plotted from the least to the greatest difference / defect
- 5%, 95% area shaded with 2 extra lines indicated: 50%, 99%
- X-axis: Represents the rank of a particular test location
- Y-axis: Amount by which each point deviates from the normal
- Identifies focal and generalized losses by the slope of the different area of the curve

Arcuate = Bjerrum scotoma = in area 10-20° from fixation

Paracentral = within 10° of fixation

Siedel scotoma = arcuate defect than connects to the blind spot

“Baring of the blind spot”

- Physiologic: artifact of kinetic perimetry as the inferior retina is less sensitive than the superior retina thus inferior isopter plotted at the threshold of the superior retina may lead to baring of the blindspot superiorly
- Usually confined to a single, central isopter in the superior VF
- Pathologic: > 1 central isopter lost

1) Paracentral and nasal step - 50%

2) Paracentral - 25%

3) Nasal step - 25%

4) Temporal wedge - 2% (myopes)