


Perimetry Primer: Fundamentals Of Visual Fields

Dr. Mitch Ibach

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Host: Dr. Ariel Cerenzie



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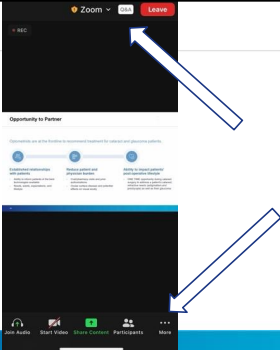

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Speaker Bio –

Dr. Mitch Ibach is a residency trained optometrist at Vance Thompson Vision in Sioux Falls, SD. Dr. Ibach attended the Pacific University College of Optometry where he graduated *summa cum laude*. Mitch completed his residency training at Minnesota Eye Consultants with a concentration on cornea, refractive surgery, external disease and glaucoma. In September of 2014, he joined Vance Thompson Vision to focus on advanced anterior segment surgery care and pathology. Mitch is a fellow of the American Academy of Optometry, an Intrepid Eye Society member, a board member for the International Keratoconus Academy (IKA), a member with the American Optometric Association, Optometric Glaucoma Society (OGS), and the South Dakota Optometric Society. Dr. Ibach is the residency co-coordinator at Vance Thompson Vision, and is also an adjunct clinical faculty for the Illinois College of Optometry and the Pikesville College of Optometry.





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Financial Disclosures for Dr. Ibach

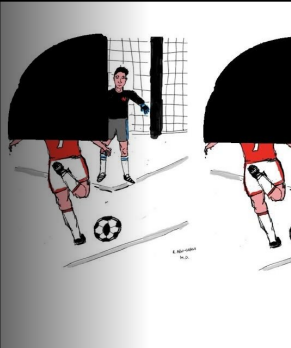
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All financial relationships have been mitigated.

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PERIMETRY PRIMER: fundamentals of visual fields

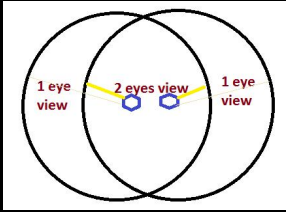


Mitch Ibach, OD FAAO
Vance Thompson Vision
Residency Co-coordinator

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What is a visual field?

- Visual Field (VF) - Everything visible at a single time from one eye

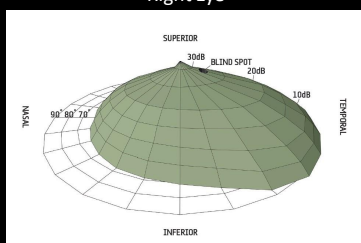


Performing a VF allows examiners to identify field loss in a specific location

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What is the Normal Field of Vision?

1. Temporal > 90*
2. Superior = 60*
3. Nasal = 60*
4. Inferior ~ 70*



*relative to a fixation point

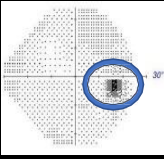

Haji, Anders, et al. The Field Analyzer Primer: Fifth Edition, 5th ed., Carl Zeiss Meditec, 2021.

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Physiologic Blind Spot – everyone has one

Physiologic Blind Spot - absolute scotoma (no sensitivity to light)

- Location of the optic nerve (ON) entering the eye (15° nasal)
- Optic nerve lacks photoreceptors
- Located 15° temporal to fixation
- Avg. blind spot is 7.5°

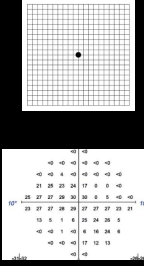



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Types of Visual Field

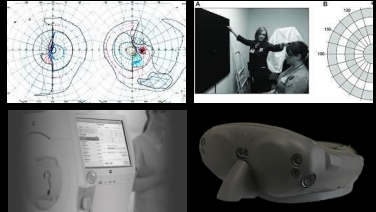
- Amsler Grid → Testing macular/GCC function Central 10*
- Confrontational VF → Screening test
- Perimetry → Automated and manual Commonly 20°, 48°, 60*



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Perimetry

- Kinetic Perimetry** - Test object is moved, but brightness and size are fixed. ie: Goldmann Perimetry and Tangent Screen
- Static Perimetry** - Test object is fixed, but brightness and size are varied. ie: HFA, Octopus VF, Headset VF




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Standard Automated Perimetry (SAP)

Quantifies the sensitivity of a patient's peripheral vision (Not all or none)

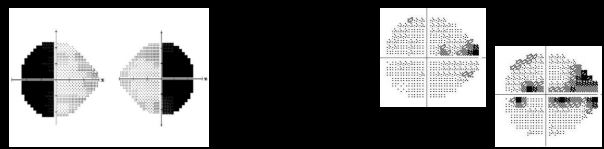
- Standardized testing algorithms
- Quantifiable threshold test (grading)
- Measures 30° from fovea/fixation



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2 Goals of Perimetry

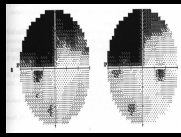
- Detect and Diagnose Visual Field Abnormalities
- Determine progression of Visual Field Abnormalities



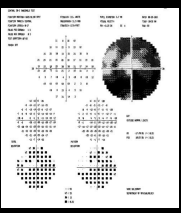
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Conditions that may require VF's

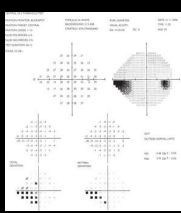
Neurologic diseases



Retinal diseases



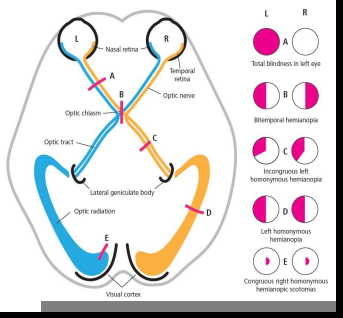
Glaucoma



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Neurologic - Understanding the Visual Pathway

- Retina damage can be partial scotomas
- Optic chiasm and posterior = bilateral VF loss (B)
- More posterior damage = more congruent (matching) defects



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Where is the Cut/damage?

<https://usbovboeunqphfahrology.pseabvck.com/chapter/optic-hematomy-hemianopia>

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Retina VF Loss

- Monocular VF loss
- Commonly more central VF loss
- 60-70% of optic nerve fibers compose the macular region

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Glaucoma VF Loss

- Definition of glaucoma includes the VF
- Perimetry is the #1 way to assess VF
- #1 goal of glaucoma therapy is to preserve VF and ultimately visual acuity (VA)

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Zeroing in on Threshold VF's for Glaucoma

30-2 Test	24-2 Test	10-2 Test
76 test points, 6° spacing	54 test points, 6° spacing	68 test points, 2° spacing

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If Fast is Good, Faster is Better

ReVive 2: Threshold test avg.- 3min 30 sec.

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A New SITA Perimetric Threshold Testing Algorithm: Construction and a Multicenter Clinical Study

ANDERS HELL, VINCENT MICHAEL PATILLA, LUKE Y. CHONG, ANDRÉ PHASE, CHRISTOPHER K. LEUNG, NINA TULLOCH, GARY C. LIU, THOMAS COLLIN, AND ROSE BRONSTEIN

30.4% shorter than SITA Fast
53.5% shorter than SITA Standard

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Analyzing a Threshold VF

1. Fixation losses – poor fixator <30%, or restart
2. False Positives: happy clicker < 15% or repeat
3. False Negatives: bored sleeper <20%

Marras, D. (2021). February 13). Looking Within Visual Fields in Glaucoma. Society of Optometry. Heij, Anders, et al. The Field Analyzer Primer: Fifth Edition, 5th ed., Carl Zeiss Medtec, 2021.

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Analyzing a Threshold VF

1. Threshold values: measured decibel sensitivity at each point
2. Gray scale: Patient education map. Darker areas equals less sensitivity

Marras, D. (2021). February 13). Looking Within Visual Fields in Glaucoma. Society of Optometry. Heij, Anders, et al. The Field Analyzer Primer: Fifth Edition, 5th ed., Carl Zeiss Medtec, 2021.

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Analyzing a Threshold VF

1. Total Deviation: deviation from age-matched normal on each test point
2. Pattern Deviation: deviation measured in decibels but removes distractors
3. Probability maps: TD and PSD → plots statistical significance of missed points

Marras, D. (2021). February 13). Looking Within Visual Fields in Glaucoma. Society of Optometry. Heij, Anders, et al. The Field Analyzer Primer: Fifth Edition, 5th ed., Carl Zeiss Medtec, 2021.

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Analyzing a Threshold VF

1. GHT: compares mirror image clusters of points above and below midline
2. MD-24: weighted average of values in TD plot
3. PSD-24: summarizes VF loss but ignores general depression

Marras, D. (2021). February 13). Looking Within Visual Fields in Glaucoma. Society of Optometry. Heij, Anders, et al. The Field Analyzer Primer: Fifth Edition, 5th ed., Carl Zeiss Medtec, 2021.

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Common Glaucomatous Visual Field Defects

Paracentral Scotoma/Defect

Heij, Anders, et al. The Field Analyzer Primer: Fifth Edition, 5th ed., Carl Zeiss Medtec, 2021.

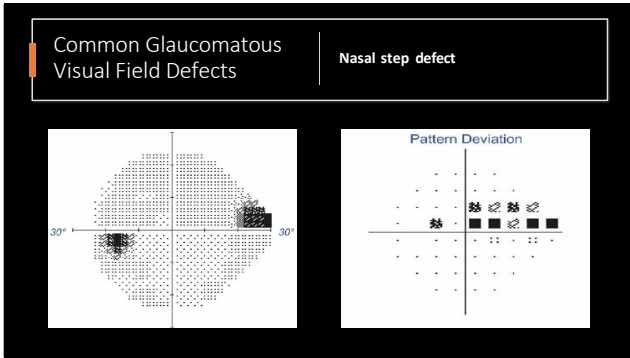
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Common Glaucomatous Visual Field Defects

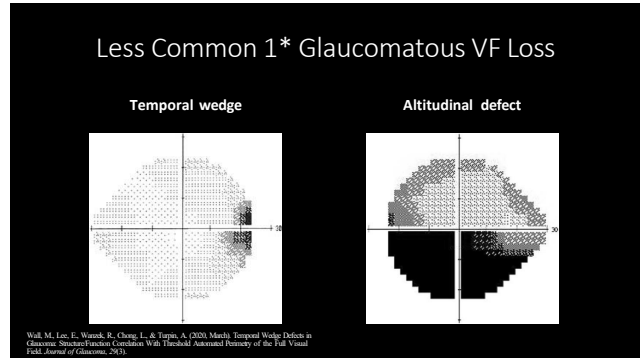
Arcuate Defect: Bjerrum scotoma

Heij, Anders, et al. The Field Analyzer Primer: Fifth Edition, 5th ed., Carl Zeiss Medtec, 2021.

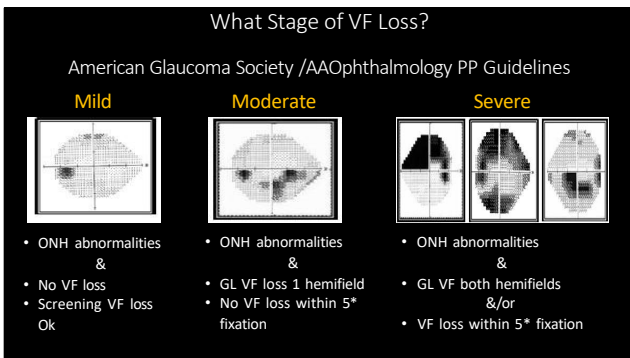
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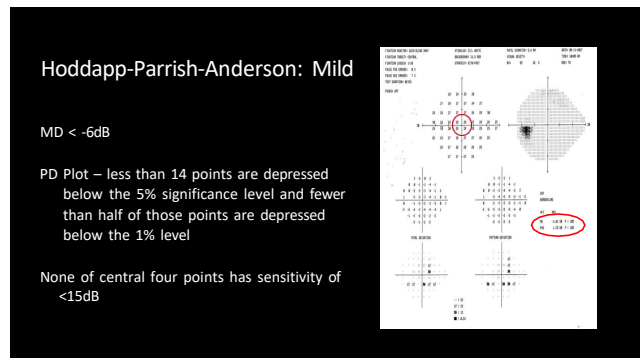
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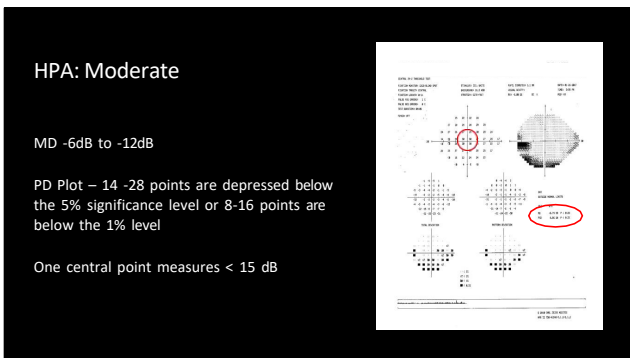
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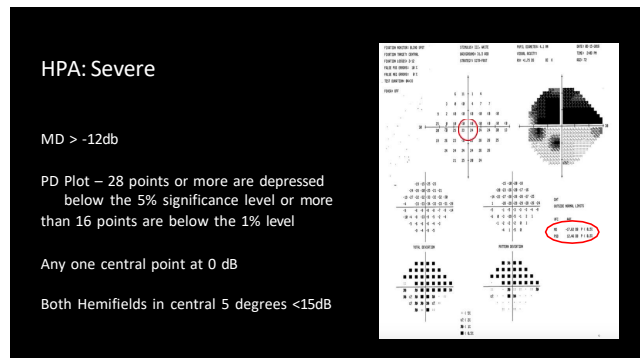
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What is VF Progression?

- How many fields are needed?
 - Event based— can detect worsening on 2 fields
 - Trend based— Need minimum 3 tests
- What is the gold standard for VF progression?
 - See picture
 - Negative rate change 1db/year minimum 2 tests/year
 - Rapid progression 2db/year minimum 6tests/year

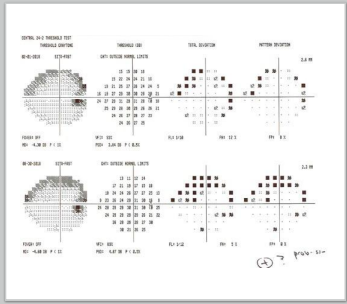


Aulic, A., & Bakker, D. (2017, December). Detecting Visual Field Progression. *Ophthalmology*, 124(12)

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Manual Progression Analysis

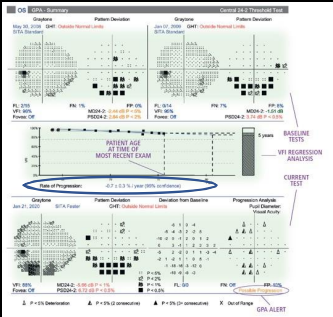
1. MD and PSD quantitative values
2. PSD Plot
3. ****Compare to structure****



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Guided Progression Analysis (Zeiss)

1. 3 tests needed to assess
2. Focus on glaucoma shifting from "Is there progression," to "What is the rate of progression?"

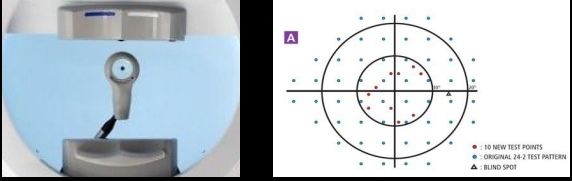


Heijl, Anders, et al. *The Field Analyzer Primer: Fifth Edition*. 5th ed., Carl Zeiss Medtec, 2021.

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What's New in Visual Field Testing?

Humphrey Field Analyzer



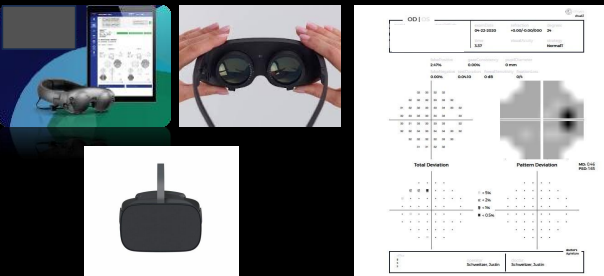
Heijl, Anders, et al. *The Field Analyzer Primer: Fifth Edition*. 5th ed., Carl Zeiss Medtec, 2021.

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Current Potential Problems	Virtual VF Solutions
<ul style="list-style-type: none"> • Bottleneck to clinic flow • Declining reimbursements • Requires dedicated room & lighting • Reduced patient comfort, positioning 	<ul style="list-style-type: none"> • Improved efficiency with multiple devices • Allows for potential home testing and telehealth • No dedicated room/space needed • Automated tests, easier on patient positioning 

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Portable Wearable VR Testing



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Olleyes VisuALL VR VF

- VisuALL S
- In Office
- 24-2/10-2/Suprathreshold



- VisuALL H
- Home model




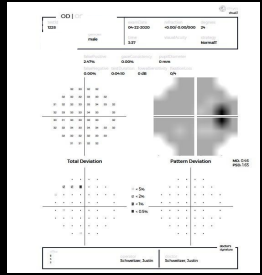
- VisuALL Acuity
- Landolt C



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Portable Wearable VR Testing





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Radius XR

- Headset



- Any lighting condition

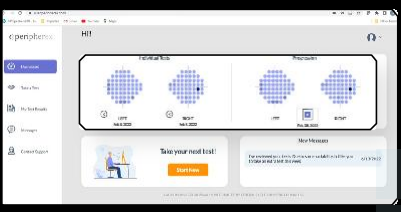



- Tablet





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Peripherex Visual Field



Online 

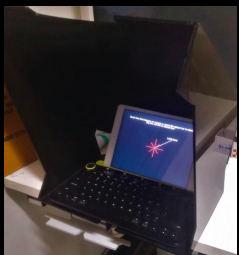
Self-test 

In-office or at-home 

Currently in clinical trials

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Melbourne Rapid Fields



Clinical Study
 Comparison of Perimetric Outcomes from Melbourne Rapid Fields Tablet Perimeter Software and Humphrey Field Analyzer in Glaucoma Patients

Harsh Kumar and Mihnea Thalesides


Glaucoma Services, Centre for Sight, 45 St. Elizabeth, Sofaringa, Sydney, New South Wales, 2043, Australia

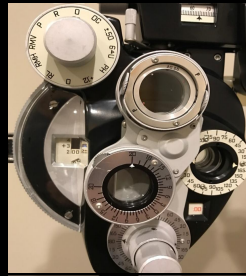
Conclusion: MRF may be questionable for early detection compared to other options.


Kumar, H., & Thalesides, M. (2023, August 24). Comparison of Perimetric Outcomes from Melbourne Rapid Fields Tablet Perimeter Software and Humphrey Field Analyzer in Glaucoma Patients. *Journal of Ophthalmology*.

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Which is better, 1 or 2?








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Visual Field Pearls

- P**erimetry allows function assessment
- Neurologic **dE**fects are bilateral
- Retinal defects **A**re monocular
- match **peR**imetry to nerve cupping
- Wearab**L**e Devices compare well to HFA
- Visual field **S** are a must in glaucoma

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THANK YOU
& PEACE

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