



## Field Follies and Perimetry Pearls

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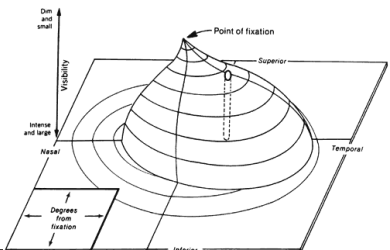


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## Island of Vision



Dim and small

Intense and large

Point of fixation

Superior

Inferior

Nasal

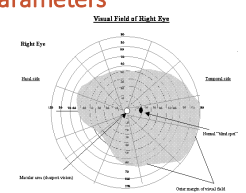
Temporal

Degrees from fixation

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## Normal Visual Field Parameters

- 60° superior
- 60° nasal
- 75° inferior
- 100° temporal
- Macula the central 13°
- Fovea the central 3°



Visual Field of Right Eye

Right Eye

Nasal

Temporal

Superior

Inferior

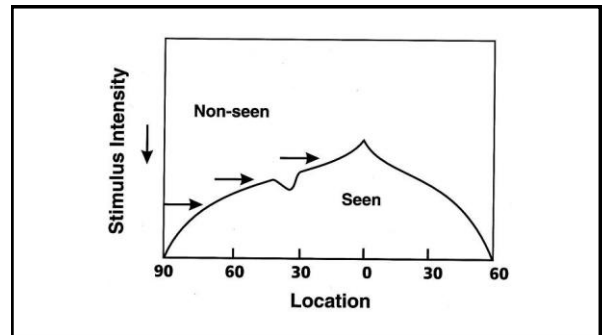
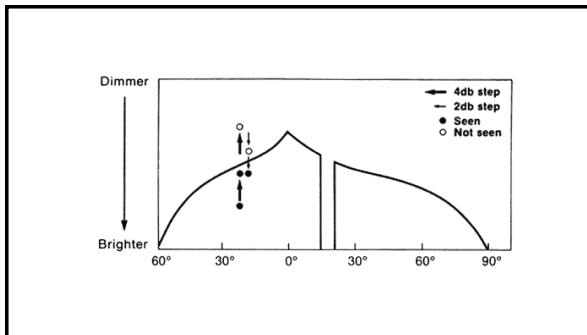
Macula

Fovea

The normal horizontal field of vision is 180°-190°

Visual field is limited by the size of the retina and margins of the orbit

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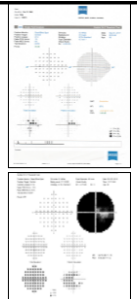
## Pearls on Static Visual Fields

- Most visual fields test 0-51 decibels
  - 41-51 decibels is outside human vision
- 1 diopter of refractive blur in undilated patient
  - A little more than 1 decibel of depression of the hill of vision
    - With Goldmann III stimulus
- Leave cylindrical errors of less than 2 diopters uncorrected
  - Adjusted with spherical equivalent
  - Above 2 diopters correct the astigmatism with trial lens
- Background of a visual field illuminated (31.5 apostilbs)
  - Minimum brightness for photopic or daylight
  - Cones are isolated, test photopic system
    - More on contrast, less on absolute brightness
  - Changes in pupil size, crystalline lens color and transparency have less effect on result

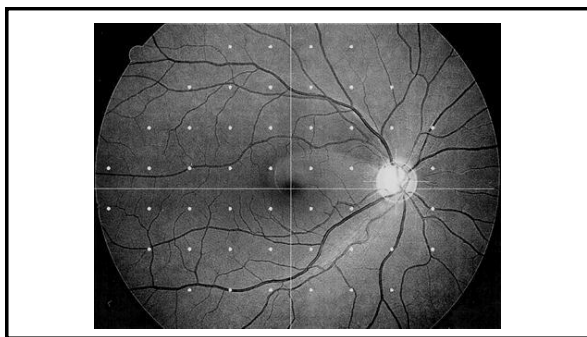
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## 24-2 vs 30-2 vs 10-2 Static Visual Field

- 30-2 tests 76 locations
- 24-2 tests 54 locations
  - Tests 30 degrees nasal
  - Little diagnostic information lost in 24-2
  - Time is saved; Fewer trial lens and lid artifacts
- 24-2 has become the VF for glaucoma
  - Only a small percentage of glaucomatous defects occur in the peripheral visual field alone
  - Only down side, 30-2 can sometimes find progression earlier due to more test points
- 10-2: Measures 10 degrees temporally and nasally and tests 68 points. Used for macula, retinal and neuro-ophthalmic conditions and advanced glaucoma



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## "A thousand points of light"



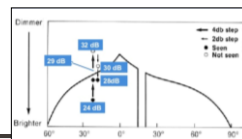
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## SAP and SITA

- SAP- Standard Automated Perimetry
  - Determines the threshold (how dim of light) can be seen at various points
  - Various algorithms have been developed to determine this threshold using few to numerous individual points in a single visual field test
- SITA-Swedish Interactive Thresholding Algorithm
  - Optimizes the determination of perimetry thresholds
  - Continuously estimating what the expected threshold is based on the patient's age and neighboring thresholds
  - Reduce the time necessary to acquire a visual field by up to 50%.
  - Decreases patient fatigue and increases reliability
  - SITA mode is now widely used in many computerized automated perimeters
- SITA- can be applied to:
  - SAP- Standard Automated Perimetry
  - SWAP-Short Wavelength Automated Perimetry (SWAP)

## SITA Standard versus SITA Fast

- SITA strategies are twice as fast as previous strategies
- SITA fast takes 67% the time of SITA standard
  - Sita fast has larger retest variability
- Primary difference is between the two strategies is the amount of certainty that is required before testing is stopped
- SITA standard
  - More precise
  - More tolerate of mistakes
  - Easier test as stimuli are brighter
- "SITA -Faster" now available



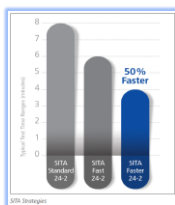
## SITA Faster – tests in 2 minutes or less without compromise to test results

### Two minute test for near normal patients

- ~50% faster than SITA Standard, ~30% faster than SITA Fast
- Clinically equivalent to SITA Fast and Standard
- Same SITA algorithm and normative data as Standard and Fast
- Removes unnecessary "dead time" during the test
- No Blind Spot or False Negatives
  - Uses Gaze Monitoring and False Positives for test quality monitoring

### Mixed SITA GPA Reports

- Allows mixing all SITA test strategies for GPA reports
- Helps immediately adopt SITA Faster
- Clinical equivalence of tests allows intermixing



## Foveal Threshold

### Fovea "On" versus "Off"

- Instrument can do 51 db
  - Perfect macula and perimetrically trained young person = 40 db
- Visual acuity and foveal threshold should correlate
  - Each validate each other
  - Visual acuity is good and threshold is low
    - Possible early damage to fovea
      - Glaucoma
      - Retinopathy
- 47% of patients with 20/20 had threshold better than 37db<sup>1</sup>
  - This method may be useful to predict visual acuity in eyes with possible nonorganic visual acuity loss.

<sup>1</sup> Elwell CJ, Bannister JB, Quinlan L. Relationship between foveal threshold and visual acuity using the Humphrey visual field analyzer. Am J Ophthalmol. 2007 May;143(5):875-7. Epub 2007 Jan 2

## Glaucoma Visual Field

- Need a current refraction
  - Cataracts cause refractive shifts
- 24-2
- Sita-Standard (not fast)
- Fovea "on"
- Sita Faster on the experienced VF test taker

## Interpreting Visual Fields

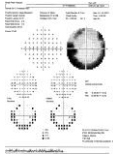
- No longer reliable or unreliable
  - A continuum from highly reliable to marginally informative
- False positives
  - More destructive to interpretation than formerly believed
- False negatives
  - Expected to be abnormal in a glaucomatous visual field
  - Even in attentive tester
- Gaze tracker
  - Typically a better indicator than blind spot
- Progression is not present or absent
  - Is the rate of change acceptable

## 5 Decibel Loss

- Read slower
- Don't leave home as much
- Walk slower
- Increase in car accidents



- The patient needs a near correction.
- The perimeter will tell you what to use based upon the patient's age and distance correction
- When in doubt, look at the last field and use that trial lens.
- It must be adjusted as close to the eye as possible.



**EXTREME GLAUCOMA**



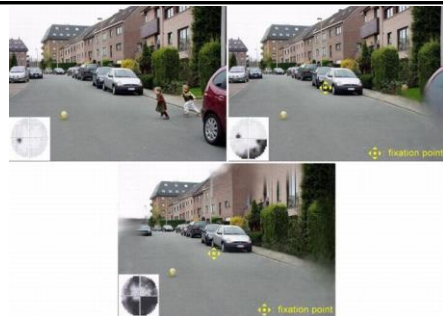
**ADVANCED GLAUCOMA**

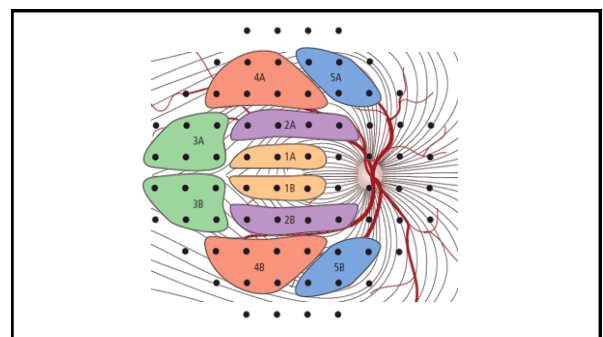
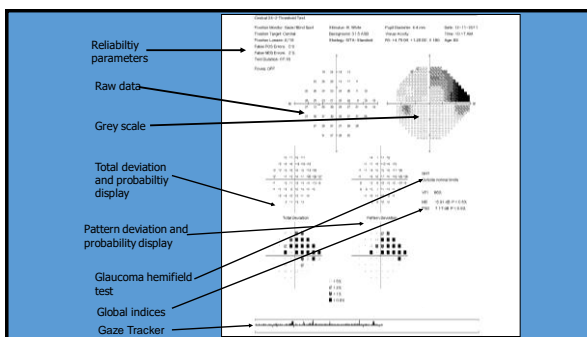
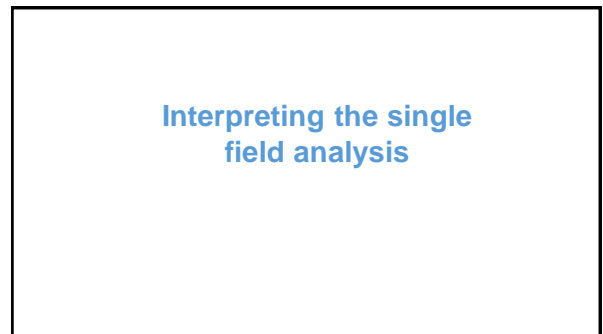
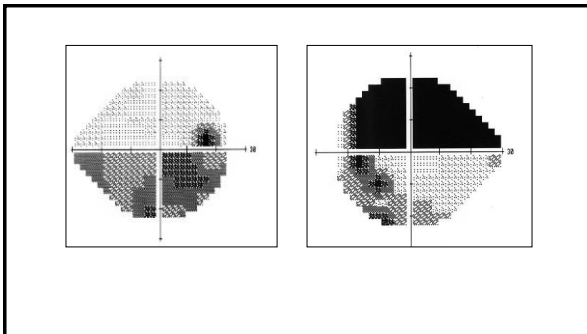
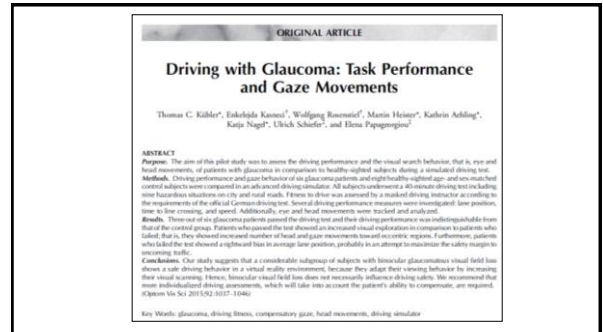
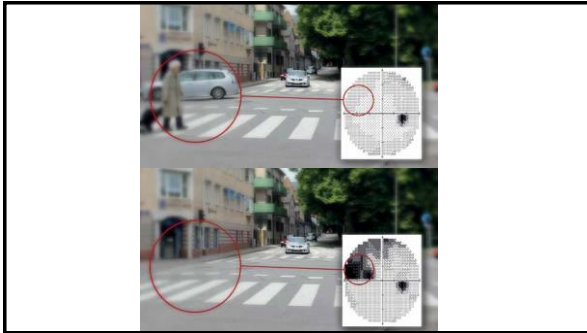


**EARLY GLAUCOMA**

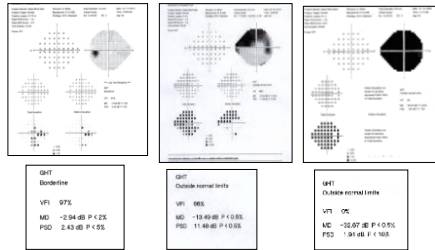


**NORMAL VISION**





## Global Indices



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## MD and PSD

### MD

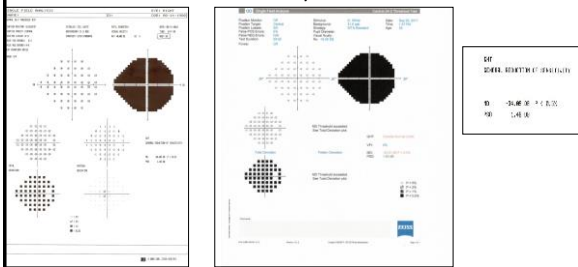
- 54 spots on 24-2
- All 54 spots reduced by 1 DB (54DB)
- MD 1DB
- 54 spots on 24-2
- 27 spots reduced by 2 DB (54 DB)
- MD 1 DB
- 54 spots on 24-2
- 13.5 spots reduced by 4 DB (54DB)
- MD 1 DB

MD	-1.08 DB
PSD	1.88 DB

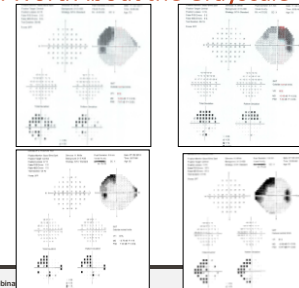
### PSD

- Low PSD (Generalized loss)
  - 1.00 DB
- Moderate PSD (More localized loss)
  - 3.00 DB
- High PSD (Localized loss)
  - 5.00 DB

## What is the Mean Deviation on a visual field of a blind eye?



## A Word About the Grayscale- It's Useful

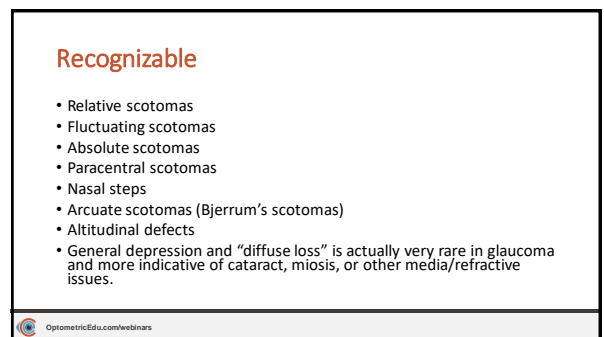
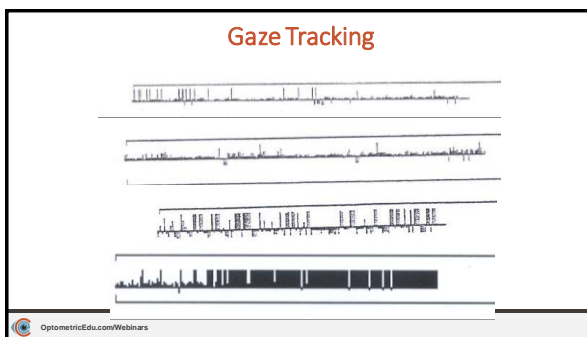
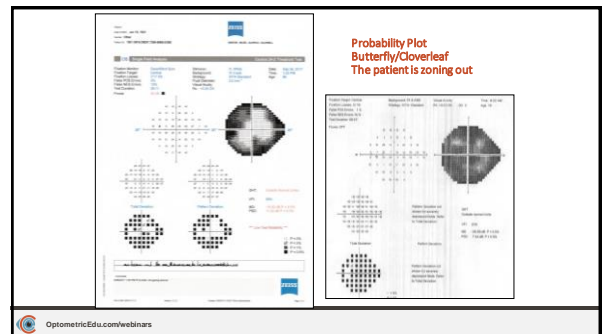
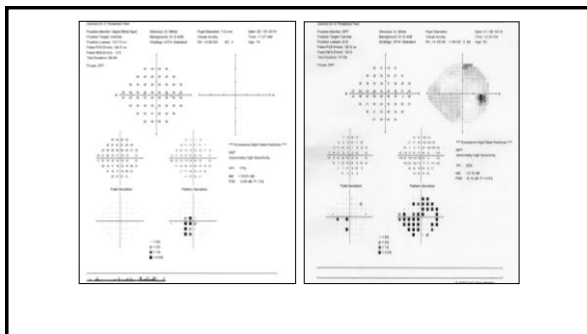
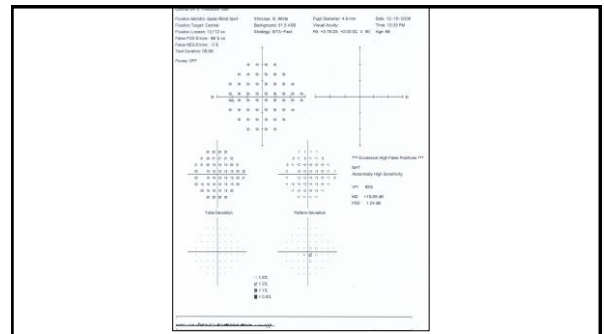
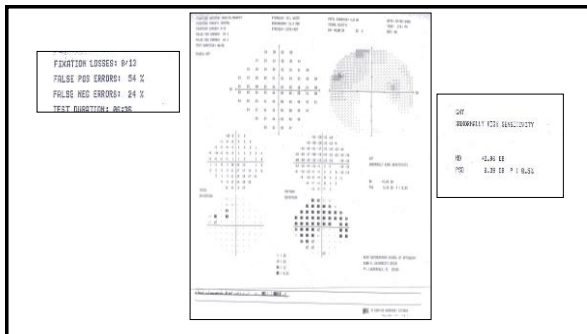


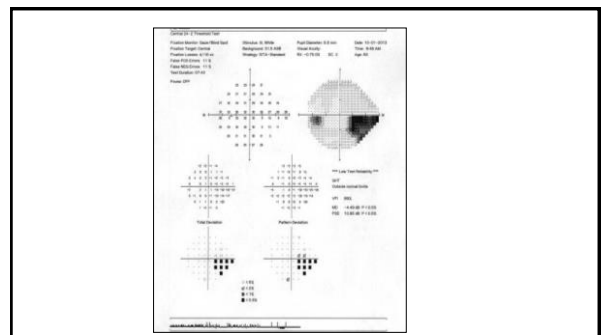
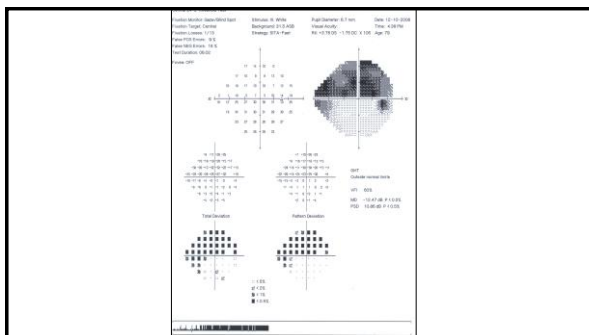
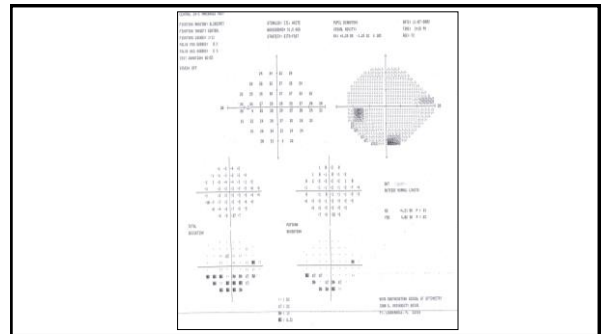
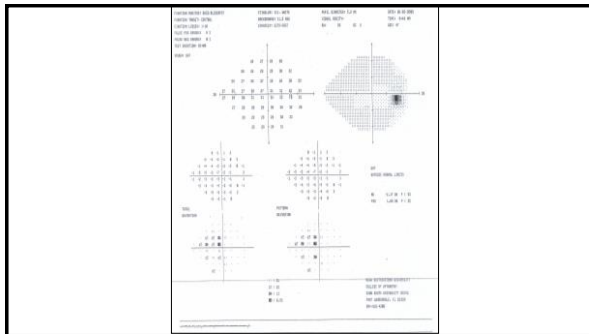
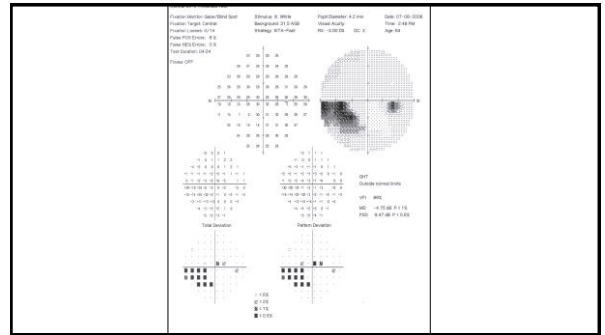
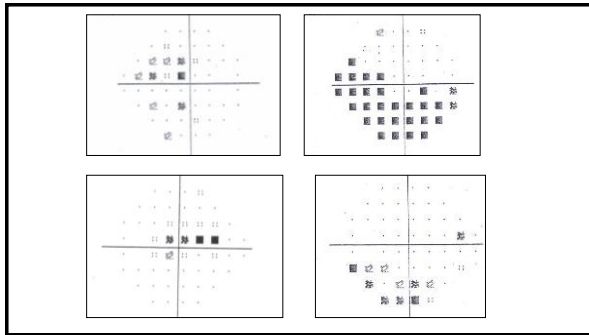
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## The Four "Rs" of Visual Fields

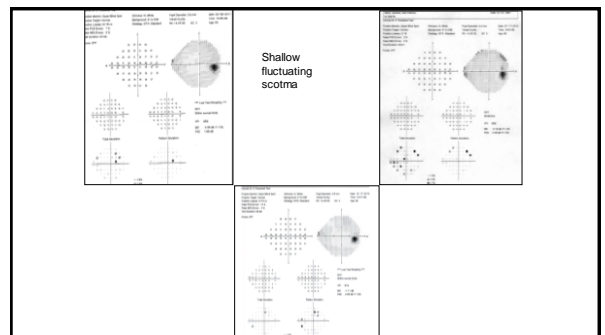
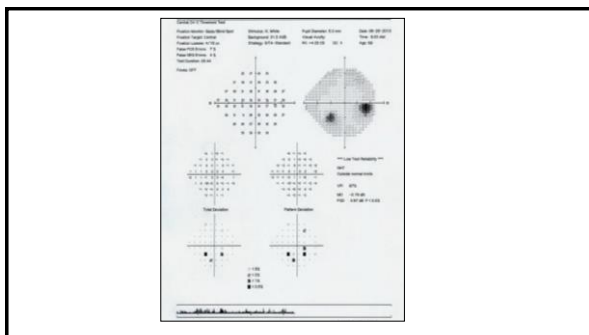
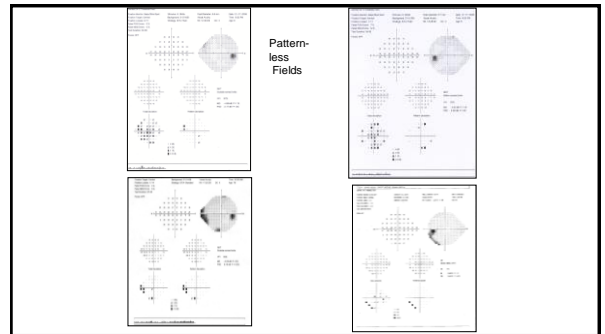
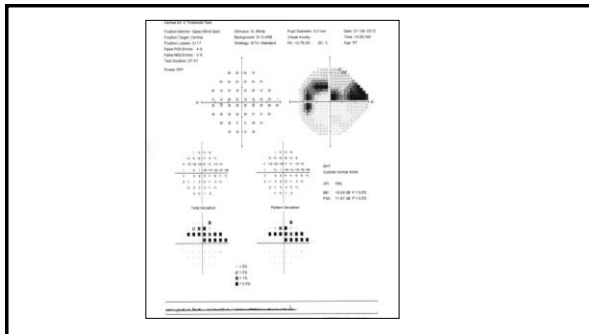
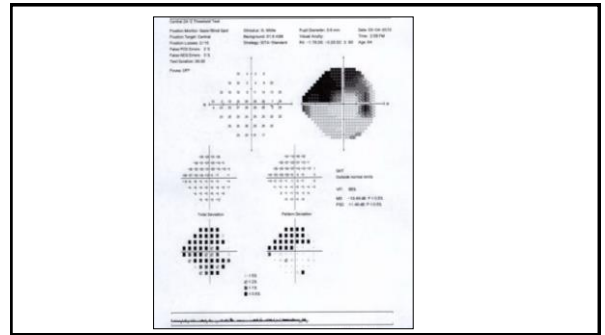
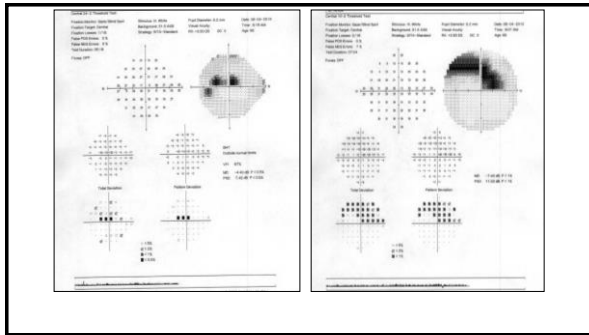
- **Reliable**
  - Reliability parameters vs. gaze tracker vs. comments
  - New thoughts dismiss "Reliable" and "Unreliable"
  - "Highly useful information" to "No useful information"
  - Very subjective determination
- **Recognizable**
  - As glaucomatous defects rather than something else
- **Relatable**
  - Correlate field to anatomy to support or refute "defects"
- **Reproducible**
  - Reproducibility is perhaps the greatest indicator of reliability
  - Reproducibility increases the likelihood that "insignificant" defects are indeed significant.

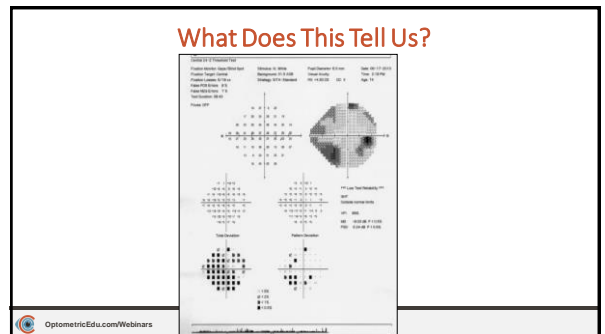
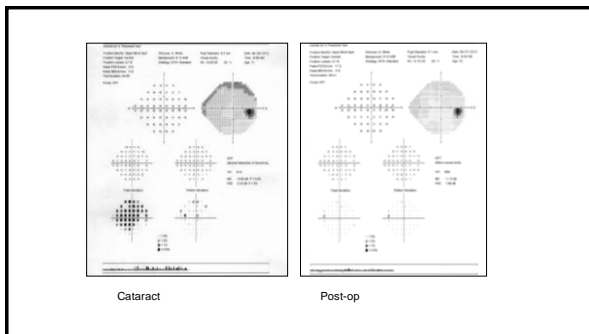
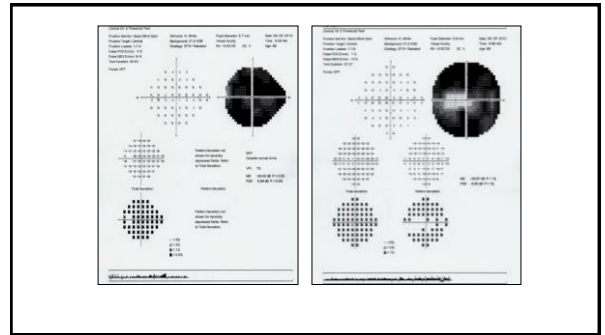
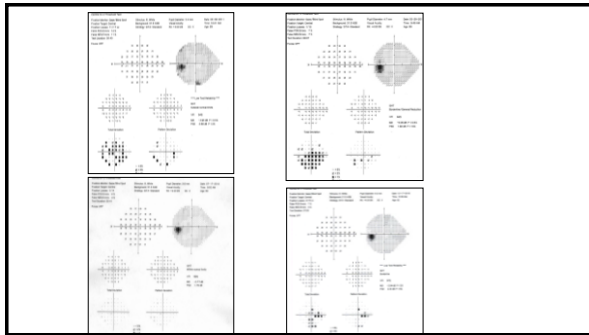
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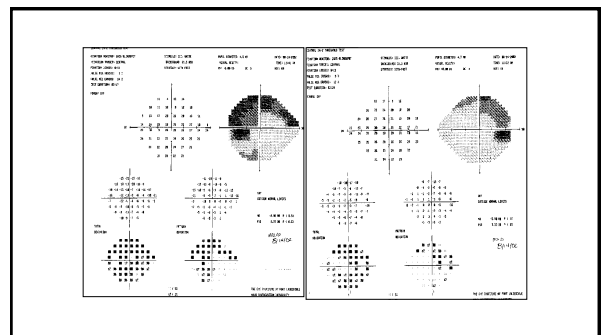


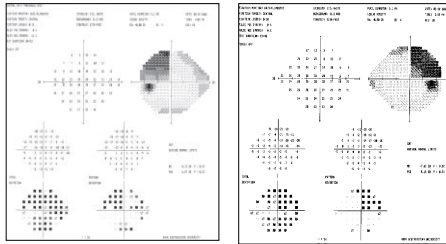




## Recognizable

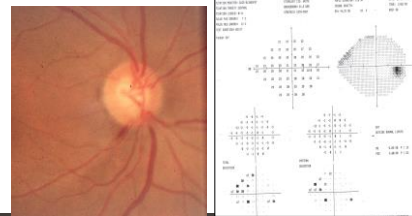
- 68 YOWF
- Treated for glaucoma at various facilities
- Old records obtained
- "Pressure excellent"
- "Disc pallor OU"
- "Old longstanding familial optic atrophy"
- "Consider neuro-ophthalmology consult"
- "Continue current medications"





Don't forget to pull the "omas" out of glaucoma

## Relatable

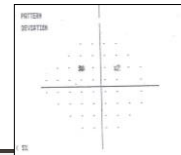


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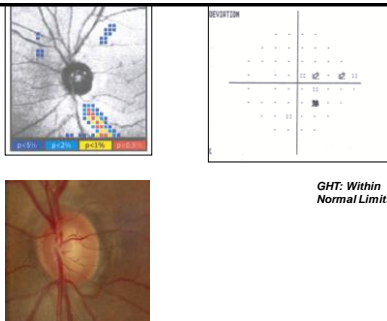


## Visual Fields

- Don't automatically call all depressions, "isolated missed points", especially if there is a structural correlate



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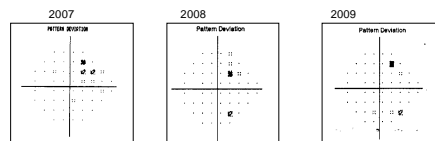


GHT: Within Normal Limits

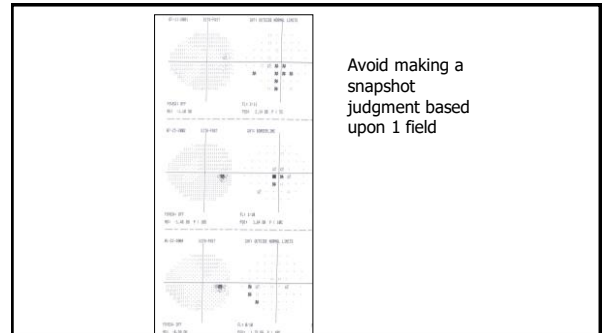
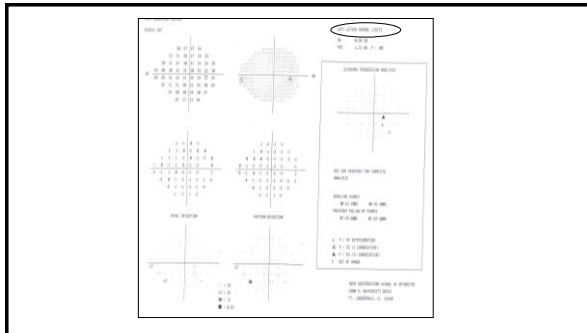
## Reproducible

- Don't automatically call all depressions, "isolated missed points", especially if they are repeatable

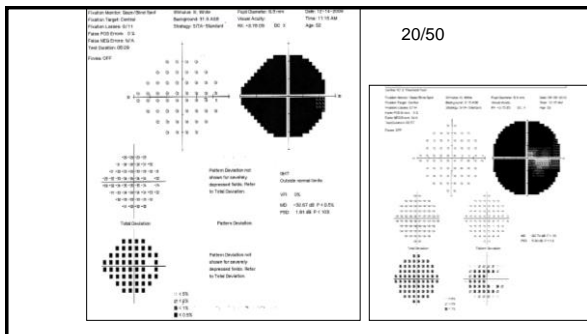
- GHT: Within Normal Limits on all fields



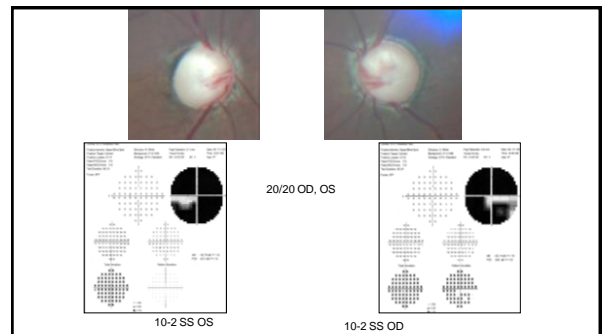
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Avoid making a snapshot judgment based upon 1 field



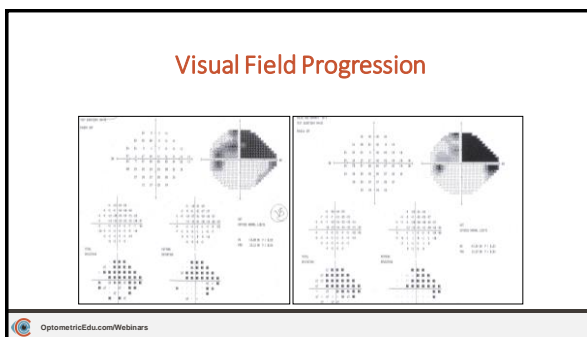
20/50



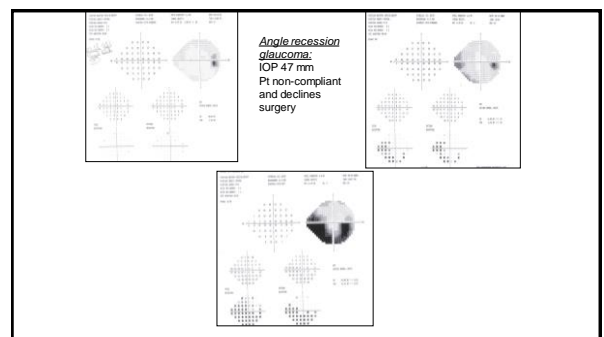
20/20 OD, OS

10-2 SS OS

10-2 SS OD



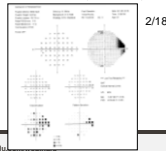
Visual Field Progression



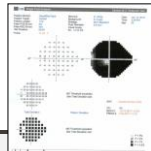
Angle recession glaucoma, IOP 47 mm Hg. Pt non-compliant and declines surgery.

## Miss Daisy, Driving?

- Angle recession OS from blunt trauma several years ago
- Peak IOP 47 mm- corneal edema
- Hyperemia with Travatan Z- sampled with Zioptan
  - Much better than Travatan, but still a little hyperemia. Scheduled for 3 week f/u and presents promptly 11 months later- only used 3 drops of Zioptan

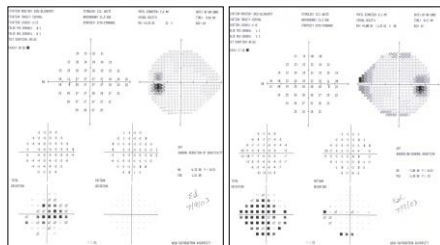
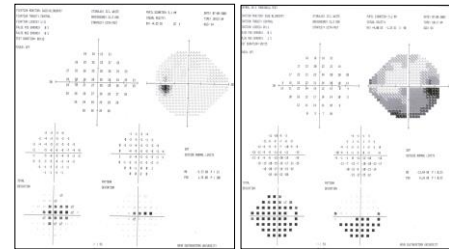


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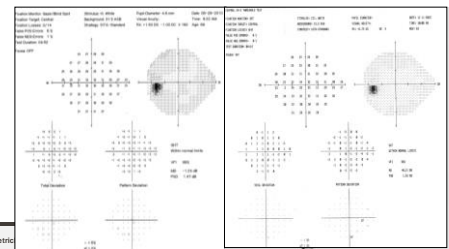


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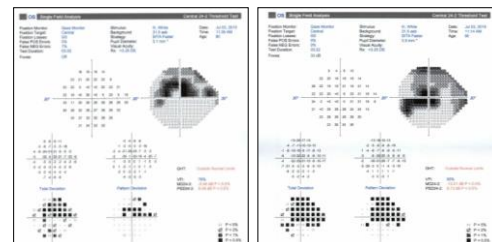
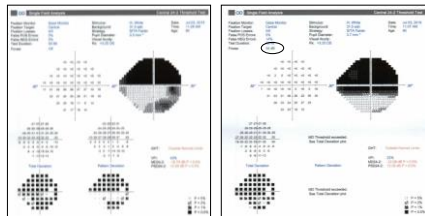
Lines to  
try to  
drive  
with OS  
to see if  
she can  
do it

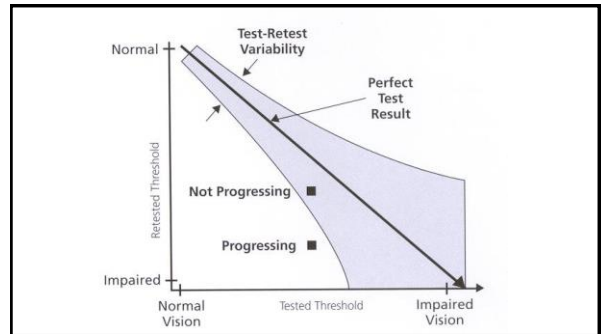
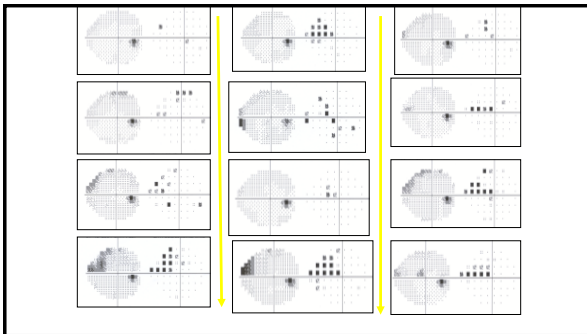
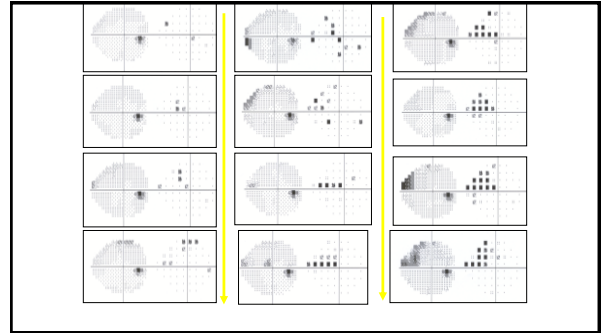
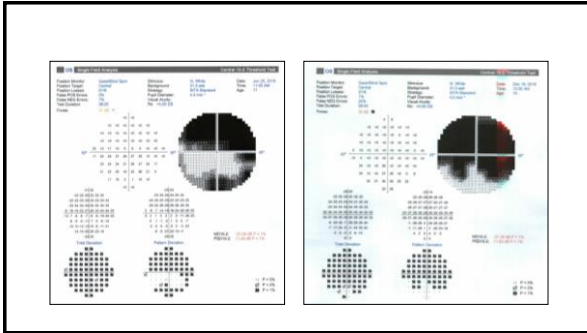


## Is This Field Progressing?



## Is this patient getting worse?

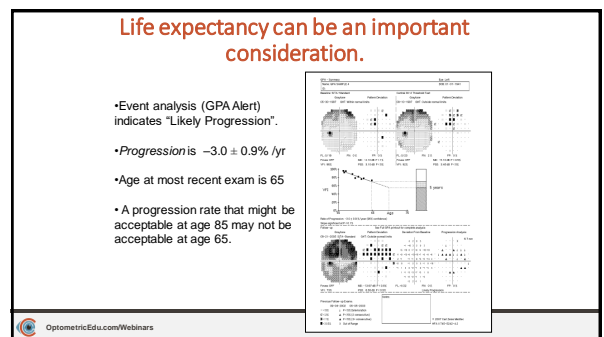
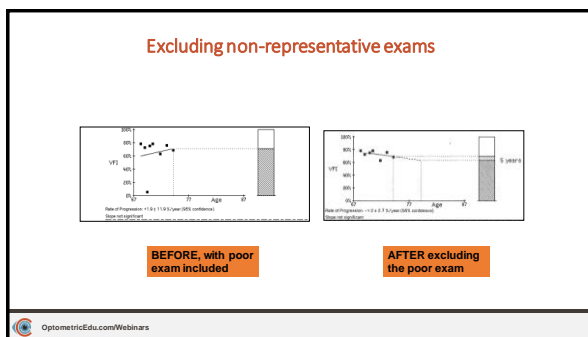
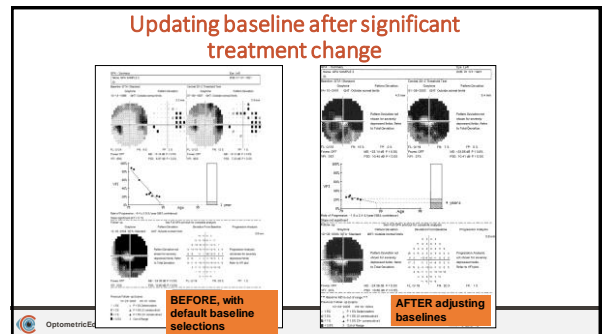
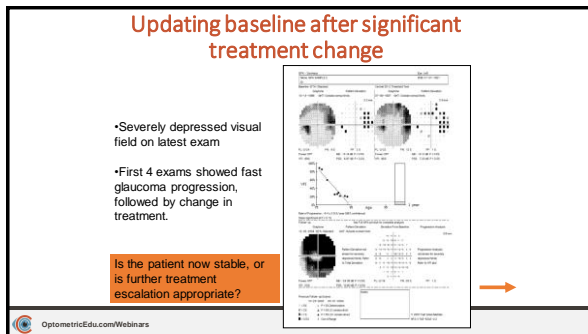
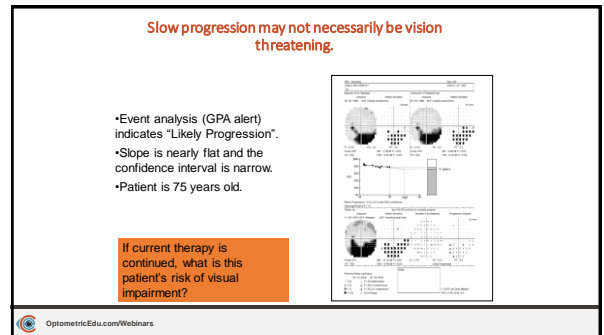
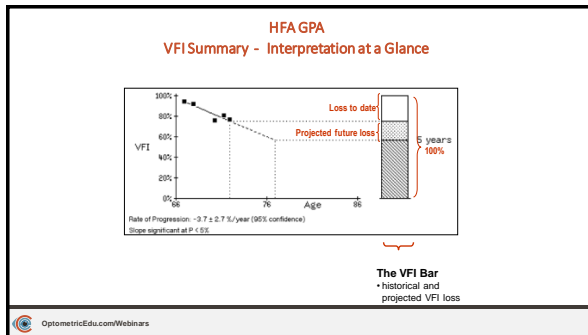




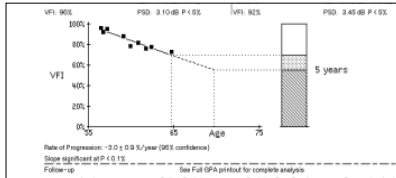
### Guided Progression Analysis: GPA

- Designed to help identify clinically significant progression of visual field loss in patients with glaucoma
- Highlights changes from selected baseline examinations that are larger than typical clinical variability in patients with similar degrees of glaucoma.
- Identifies consistent and repeated patterns of loss
- Can be used on full threshold, SITA Standard, and SITA Fast strategies
- Event analysis and trend analysis

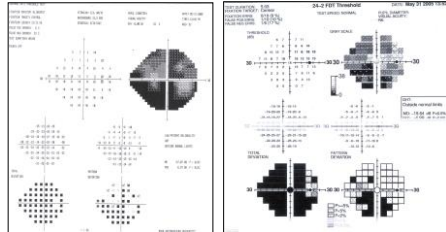
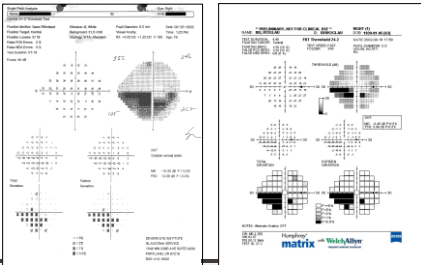








#### HFA & Humphrey matrix Printouts Glaucoma Patient A



#### Short Wavelength Automated Perimetry (SWAP)

- Blue-yellow perimetry
- Goldmann V stimuli on yellow background
- Thought to detect glaucomatous defect earlier than white on white
- Due to SITA standard strategy can find defect as early

