

# How to Determine Glaucoma Progression

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## **No Financial Disclosures**

### **How Should We Set a Target Pressure?**

- “Estimated IOP where the risk of future visual impairment is balanced against the side effects of treatment”
- Based on the Baseline IOP Readings (use the highest IOP reading)
- Based on the Amount of Optic Nerve Damage
- Based on the Rate of Glaucoma Progression

### **Visual Field Quantification (Mild, Moderate, Severe)**

- Mean Deviation (MD)
- Number of Abnormal Points on the Pattern Deviation Plots
- Decibel Value of the Four Points Just Off Fixation

### **Mild Visual Field Defect**

- The Mean Deviation Index (MD) Is Better Than -5 dB
- On the Pattern Deviation Plot, Fewer Than 18 (14) of the Points Are Depressed Below the 5% Level and Fewer Than 10 (8) Points Are Depressed Below the 1% Level on 30-2 (24-2)
- No Point in the Central 5 Degrees Has a Sensitivity < 25 dB

### **Moderate Visual Field Defect**

- The Mean Deviation Is Better Than -10 dB
- On the Pattern Deviation Plot, Fewer Than 36 (28) of the Points Are Depressed Below the 5% Level and Fewer Than 20 (16) Points Are Depressed Below the 1% Level on 30-2 (24-2)
- No Point in the Central 5 Degrees Has a Sensitivity < 15 dB

### **Severe Visual Field Defect**

- The Mean Deviation Is Worse Than -10 dB
- On the Pattern Deviation Plot, More Than 36 (28) of the Points Are Depressed Below the 5% Level or More Than 20 (16) Points Are Depressed Below the 1% Level on 30-2 (24-2)
- Any Point in the Central 5 Degrees Has a Sensitivity <15
- There Are Points Within the Central 5 Degrees With Sensitivity <25 dB in Both Hemifields

### **How should we set a target pressure?**

- No Damage but High Risk OH (IOP 26 or greater AND CCT of less than 555um – 20% Reduction Of Baseline IOP
- Mild Damage - 30% Reduction Of Baseline IOP
- Moderate Damage - 30-40% Reduction Of Baseline IOP
- Severe Damage - 40-50% Reduction Of Baseline IOP

### **What's It Going to Take?**

- 20-30% reduction - 1 or 2 meds
- 30-40% reduction – 2-3 meds +/- ALT/SLT
- 40-50% reduction - 2-4 meds + ALT/SLT +/- filter

### **Simplified Target Pressures**

#### **Generally set 3 initial target pressures:**

—1. Patient with high risk ocular hypertension – no glaucoma damage with IOP of 26 or greater AND CCT of 555um or less

- Treat with 1-2 meds max

—2. Patients with definite glaucoma damage, but in the mild-moderate stage of damage

- Target pressure < 18 (consistent)

—Will use multiple meds and laser to achieve, but not filtering surgery

—3. Patients with definite damage in the moderate to severe stage of damage

- Target pressure < 15 (consistent)

—Will use multiple meds and laser to achieve and will consider filtering surgery in select cases early and will not delay filtering surgery in cases of progression on MMT

However, It Must Be Consistent!!!

### **Glaucoma Management 2021**

- Start with a prostaglandin qhs or Vyzulta qhs
- Add Beta-blocker bid
- Change beta-blocker to Cosopt bid
- SLT
- Add Rhopressa qhs or brimonidine bid
- Filtering surgery
  - Only if the benefits outweigh the risks

### **The Most Difficult Aspect of Glaucoma Management is Determining Progression**

- Compare Serial Optic Nerve/NFL Photographs
- Compare Serial GDx, OCT, HRT
- Compare Serial Visual Fields

- 55% Progressed by Disc Photos and 35% Progressed by VF's in OHTS Study
- 89% Progressed on VFs and 11% Progressed by Optic Nerve Phototgraphs in NTG Study
- It is Difficult to Differentiate Long Term Fluctuation (can vary by 10db or greater) in the Visual Field From Glaucoma Progression

### **Following for Progression**

- Glaucoma progression is generally slow
- Important to identify rapid progressors
- Patients should be followed with various tests to judge progression (optic nerve and NFL photos, imaging devices and visual fields)
- Patient who progress at a certain target pressure need further IOP lowering
- Consider filtering surgery for patients who are rapid progressors

### **OCT Cirrus Guided Progression Analysis (GPA)**

- RNFL Thickness Change Maps demonstrate change in RNFL between exams. Up to 6 progression maps are compared to baseline. Areas of statistically significant change are color-coded yellow when first noted and then red when the change is sustained over consecutive visits.
- TSNIT values from baseline and current exams are plotted.
- Areas of statistically significant change are color-coded yellow when first noted and then red when the change is sustained over consecutive visits.
- Average RNFL Thickness values are plotted for each exam.
- Yellow marker denotes change from both baseline exams.
- Red marker denotes change sustained over consecutive visits.
- Rate and significance of change are shown in text

### **Cirrus GPA™ Analysis**

- RNFL Summary Legend summarizes GPA analyses and indicates with a check mark if there is possible or likely loss of RNFL
- RNFL Thickness Map Progression (best for focal change)
- RNFL Thickness Profiles Progression (best for broader focal change)
- Average RNFL Thickness Progression (best for diffuse change)

### **Updated Guided Progression Analysis (GPA™)**

*Optic Nerve Head information now included*

- Average Cup-to-Disc Ratio plotted on graph with rate of change information.
- RNFL/ONH Summary includes item “Average Cup-to-Disc Progression”.

- Printout includes an optional second page with table of values, including Rim Area, Disc Area, Average & Vertical Cup-to-Disc Ratio and Cup Volume. Each cell of the table can be color coded if change is detected.
- Miscellaneous updates to the report design.
- Updated Guided Progression Analysis (GPA™)

### **Ganglion Cell Analysis (GCA) Guided Progression Analysis (GPA)**

- Two Baseline exams are required
- Third exam is compared to the two Baseline exams
- Sub pixel map demonstrates change from Baseline Yellow pixels denote change from both Baseline exams
- Third *and* fourth exams are compared to both Baselines.
  - yellow pixels denote change from both Baselines
  - change identified in three or more comparisons is indicated by red pixels

### **Judging Progression Can Sometimes Be Confusing or Conflicting**

G Suspect based on IOP 18-24  
 Would You Start This Patient on Tx?  
 One Year Later – Stable?  
 Does This Patient Have Glaucoma?  
 What is a Significant Change?  
 Look at Repeatability Limits

### **Significant OCT Change**

- GCA thickness >3um change
- Ave NFL thickness > 5um change
- Quadrant Sector NFL thickness > 10um change
- Sector NFL thickness > 15um change
- Must be confirmed with additional scans

### **VFs Are Best for Judging Progression in Advanced Glaucoma**

### **Should We Be Performing More 10-2 Visual Fields?**

#### **24-2C Program**

- OCT GCA suggests central visual loss in glaucoma
- In a standard 24-2 program only 4 points are tested in the central eight degrees
- 24-2C program adds 10 additional testing points to the central 10 degrees of the 24-2 program for a total of 22 testing points
- Using the sita faster 24-2C program takes less testing time than standard 24-2 sita fast

### **Variability Issues with Standard Perimetry**

### **Trend Analysis Using VFI and MD**

Need 5-6 VFs to calculate slope of VFI and MD  
You should have 5-6 VFs to judge for progression  
Can look at MD or VFI trend plots  
Gives you the rate of progression per year  
Extrapolates the 5 year future rate of progression

### **VFI (Visual Field Index)**

- Based on Pattern Deviation Plots when MD better -15dB
- Based on Total Deviation Plot when MD worse -15dB
- Central points are weighted more significantly than peripheral points
- Range 0-100%

### **MD (Mean Deviation)**

- Global index of the overall elevation or depression of the normal VF
- Age compared
- Can be positive if better than age match norm
- Bottoms out at around -32dB depending on patient's age
- -1 dB MD = -3% VFI

### **What is significant VFI change?**

- Slow Progressor
- VFI -1.5% or less, MD -.5 dB or less per year
- Moderate Progressor
- VFI -2 to -4.5%, MD -1.0 to -1.5 dB per year
- Rapid Progressor
- VFI -5% or greater, MD -2.0 dB or greater per year
- You should have 5-6 VFs to judge for progression

### **Clinical Pearls**

- Correlate visual field to optic nerve and NFL
- Use visual fields to judge for progression in conjunction with optic nerve and NFL photos and imaging devices
- Glaucoma Clinical Trials suggest a minimum of five or six visual fields to judge for progression
- Glaucoma Progression Analysis (GPA) can help differentiate long term fluctuation from true progression
- Use Trend Analysis of MD or VFI to assess the rate of progression and future risk of blindness

### **What did we learn?**

- Glaucoma progression varies amongst individual patients
- Poor adherence to treatment is common
- Need to emphasize that glaucoma is a life long disease and damage is irreversible
- Mild to moderate damage gives no symptoms, so patients must be educated to risk of permanent visual impairment and blindness

- Some patients get lucky because their glaucoma progression is slow even without treatment
- Imperative to identify rapid progressors early and to treat aggressively and follow closely

### **Who Should We Worry About Going Blind From Glaucoma**

- Patient who presents with severe damage, based on optic nerve, NFL or VF
- Patient already blind in one eye from glaucoma
- A patient with both hemifields of both eyes showing damage
- Patient who is young
- Patient who is African American or Latino
- Patient with family member blind from glaucoma
- Patient who is an IOP spiker
- Patient who shows rapid progression of glaucoma despite glaucoma treatment
- Patient who is non-compliant with meds and f/u