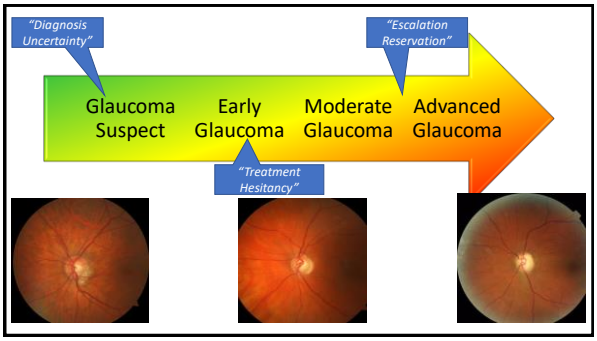
Glauco*Mantras*

Re-centering our Glaucoma Care

Kentucky Optometric Association
Fall Conference 2024

Center for Sight & Dry Eye Clinic
Diplomate (Glaucoma) AAO
Austin Lifferth OD, FAAO
September 14, 2024



mantra

NOUN
mantra *(noun)* · ***mantras*** *(plural noun)*
1.a statement or slogan repeated frequently.
ORIGIN
late 18th century: Sanskrit, literally 'a thought, thought behind speech or action', from man- 'think', related to mind.

Glaucomantra

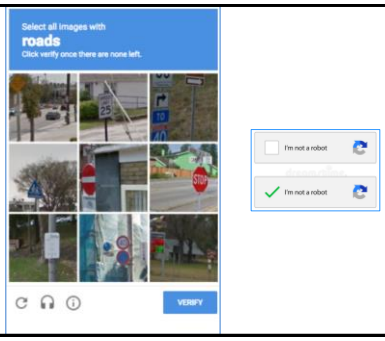
NOUN

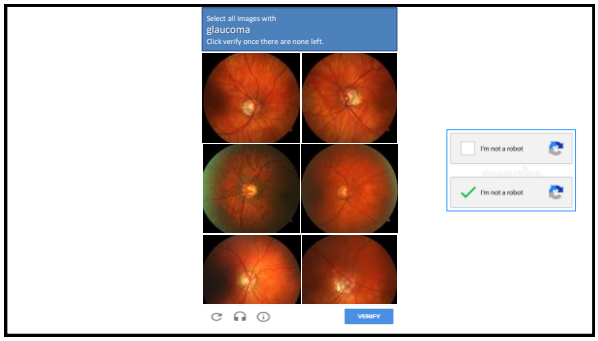
GlaucoMantra *(noun)* · *Glauco**Mantras** (plural noun)*

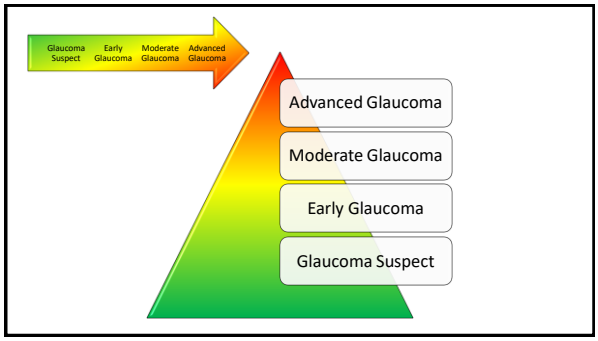
1.a statement or slogan *repeated frequently* to assist with diagnosing glaucoma earlier and treating progression sooner; phrases to *re-center* our glaucoma care

ORIGIN

late 18th century: Sanskrit, literally 'a thought, thought behind speech or action', from man- 'think', related to mind; Spring IOA 2022.







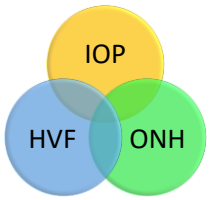
Who is a Glaucoma Suspect?

"A glaucoma suspect is an individual with clinical findings and/or a constellation of risk factors that indicate an increased likelihood of developing primary open-angle glaucoma (POAG)."

Prum J, Lim M, Williams R, et al. Preferred practice pattern: Primary Open-Angle Glaucoma Suspect Preferred Practice Pattern® Guidelines. Ophthalmology. January 1, 2016;123:P112-P151.

Who is a Glaucoma Suspect?

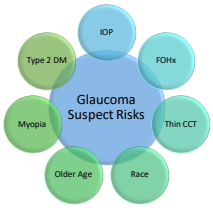
"A diagnosis for primary open-angle glaucoma (POAG) suspect is *established by the presence of one of the following conditions*: a consistently elevated intraocular pressure (IOP), a suspicious-appearing optic nerve, or abnormal visual field."



Prum J, Lim M, Williams R, et al. Preferred practice pattern: Primary Open-Angle Glaucoma Suspect Preferred Practice Pattern® Guidelines. Ophthalmology. January 1, 2016;123:P112-P151.

Who is a Glaucoma Suspect?

"Highlights of established risk factors for a POAG suspect diagnosis include an elevated IOP, family history of glaucoma or glaucoma suspect, thin central cornea, race, older age, myopia, and type 2 diabetes."



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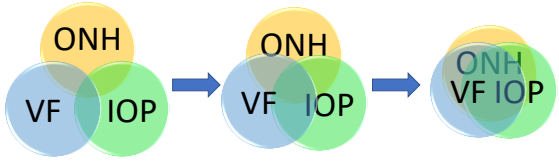


Case Presentation

- 41 year-old male returns for *continued* glaucoma suspect evaluation and testing
  - No relevant ocular history
  - Review of Systems: unremarkable and noncontributory.
    - No medications
    - Non-smoker
    - Social drinker
    - Healthy, active
  - Negative FOHx

Case Presentation

UNCORRECTED VISUAL ACUITY

OD: = 20/20

OS: = 20/20

PUPILS

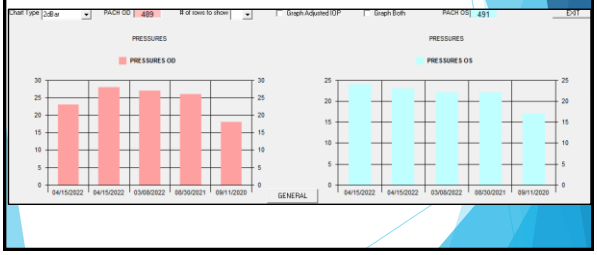
OU: round, reactive; (-) rAPD OD, OS

CONFRONTATION VISUAL FIELDS

OD: Full to FC

OS: Full to FC

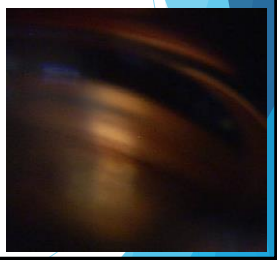
Case Presentation

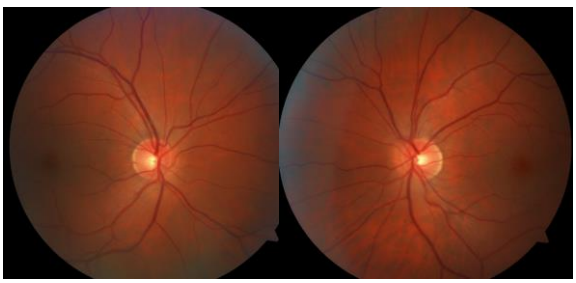


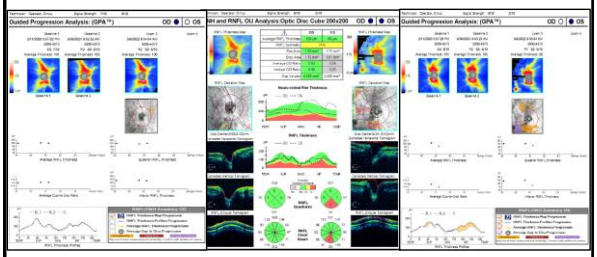
Case Presentation

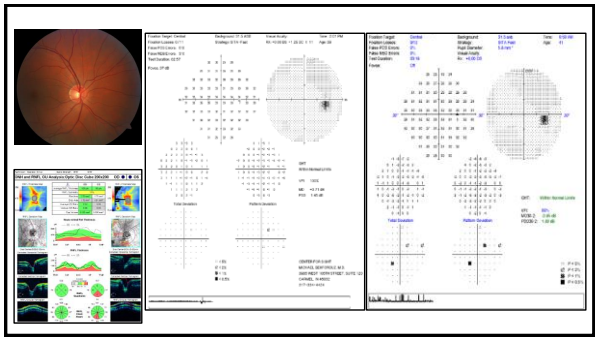
SLIT LAMP EXAM OU

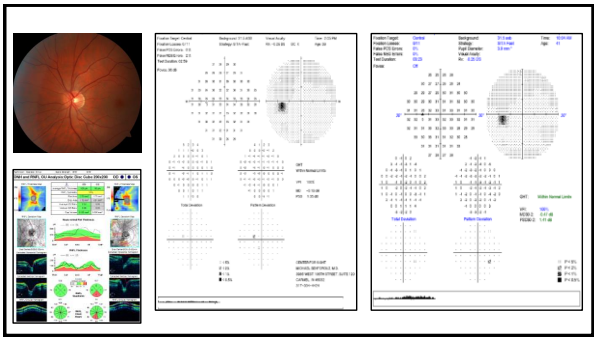
- Lids/Adnexa: clear OU
- Conjunctivae: palpebral/bulbar clear
- Sclera: white
- Cornea: clear/normal; (-)pigment OU
- Anterior Chamber: deep and quiet OD,OS; NO cell
- Iris: clear/normal; NO NVI, synechiae
- Lens: clear OU; NO PXE OU







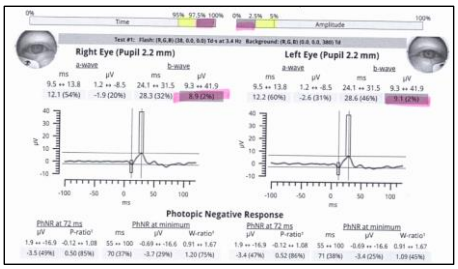


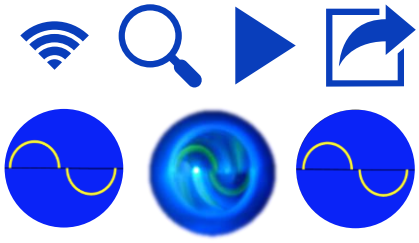


FACTORS	Points for Factors				
	0	1	2	3	4
Age (years)	☑ <45	☐ 45 to < 55	☐ 55 to <65	☐ 65 to <75	☐ ≥75
Intraocular Pressure (mm Hg) Mean (3 measurements per eye and average of 2 eyes)	☐ <22	☐ 22 to <24	☐ 24 to <26	☑ 26 to <28	☐ ≥28
Central Corneal Thickness (μ) Mean (3 measurements per eye and average of 2 eyes)	☐ ≥ 600	☐ 576-600	☐ 551-575	☐ 526-550	☑ ≤525
Vertical Cup/Disc Ratio by Contour Mean (1 measurement per eye and average of 2 eyes)	☐ <0.3	☑ 0.3 to <0.4	☐ 0.4 to <0.5	☐ 0.5 to <0.6	☐ ≥0.6
Visual Field: Humphrey Pattern Standard Deviation (dB) Mean (2 measurements per eye and average of 2 eyes) - OR -	☑ <1.8	☐ 1.8 to <2.0	☐ 2 to <2.4	☐ 2.4 to <2.8	☐ ≥2.8
Octopus Loss Variance Mean (2 measurements per eye and average of 2 eyes)	☐ < 3.24	☐ 3.24<4.0	☐ 4.0<5.76	☐ 5.78<7.84	☐ ≥7.84
Sum of Points and Estimated 5-Year Risk of Developing POAG					
Sum of Points	0-6	7-8	9-10	11-12	>12
Estimated 5-Year Risk of Developing POAG	≤4.0%	10%	15%	20%	≥33%

Total Points: 8 Estimated Risk: 10% The patient's estimated 5-year risk (%) of developing early glaucoma in at least one eye.

Risk Calculator | Ocular Hypertension Treatment Study (OHTS) (wustl.edu)





Intraocular Pressure Applications

- Mean IOP is the greatest modifiable risk factor in the development[1-2] and the progression of glaucoma[3-6].
  - Each mmHg matters[1-7].
- IOP reduction decreases the risk of development[1-2] and progression of glaucoma[3-6].
  - Even among patients with IOP with a median IOP of < 20mmHg, 30% IOP reduction decreased risk of progression[7].
  - Each mmHg matters[1-7].

1. Kass MA, Heuer DK, Higginbotham EJ, et al. The Ocular Hypertension Treatment Study: a randomized trial determines that topical ocular hypotensive medication delays or prevents the onset of primary open-angle glaucoma. Arch Ophthalmol. 2002;120(6):701-830.
2. Miglior S, Zeyen T, Pfeiffer N, et al. Results of the European Glaucoma Prevention Study. Ophthalmology. 2005. 112: 366-375.
3. Heijl A, Leske MC, Bengtsson B, et al. Reduction of intraocular pressure and glaucoma progression: results from the Early Manifest Glaucoma Trial. Arch Ophthalmol. 2002;120(10):1268-1279.
4. Musch DC, Gillespie BW, Niziol LM, Lichter PR, Varma R, CIGTS Study Group. Intraocular pressure control and long-term visual field loss in the Collaborative Initial Glaucoma Treatment Study. Ophthalmology. 2011;118(9):1766-1773.
5. The Advanced Glaucoma Intervention Study (AGIS) 7. The relationship between control of intraocular pressure and visual field deterioration.The AGIS Investigators. Am J Ophthalmol. 2000;130(4):429-440.
6. Sommer A., Tielsch J.M., Katz J., et al. Relationship between intraocular pressure and primary open angle glaucoma among white and black Americans. The Baltimore Eye Survey. Arch Ophthalmol. 1991;109:1090-1095.
7. Comparison of glaucomatous progression between untreated patients patients with normal-tension glaucoma and patients with therapeutically reduced intraocular pressures. Collaborative Normal-Tension Glaucoma Study Group. Am J Ophthalmol. 1998. 126:487-497.

IOP Implications

"...the most important healthcare implication from this analysis is to avoid being falsely reassured by a lower level of IOP in glaucoma case finding."[1]

- IOP is not glaucoma.

1. Chan MPY, Khawaja AP, Broadway DC, Yip J, Luben R, Hayat S, Peto T, Khaw KT, Foster PJ. Risk factors for previously undiagnosed primary open-angle glaucoma: the EPIC-Norfolk Eye Study. Br J Ophthalmol. 2021 Jun 25:bjophthalmol-2020-317718.

IOP Implications

"Kill the magic number"

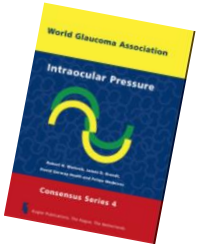
"We have so far failed to eliminate the incorrect notion that the IOP value 21 mmHg is meaningful or represents a benchmark for treatment…

We should not care if the baseline IOP is 30, 20, or 10mmHg, as we will use whatever is the baseline to set a target lowering."

Quigley HA. 21st century glaucoma care. Eye (Lond). 2019 Feb;33(2):254-260.

IOP Limitations

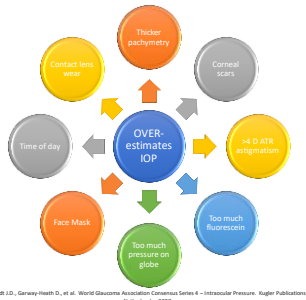
"Among chronic diseases, glaucoma is remarkable in that its primary risk factor, IOP, is measured only *rarely and mostly randomly*, perhaps a few time a year in most patients."



IOP Limitations

"…a single IOP measurement during so-called office hours is *a poor surrogate of the entire IOP profile* of a patient with glaucoma…"

Konstas AG, K. M. (2018). Diurnal and 24-h Intraocular Pressures in Glaucoma: Monitoring Strategies and Impact on Prognosis and Treatment. *Adv Ther.*, 35(11)1775-1804.



Weinbreb R.N., Brandt J.D., Garway-Heath D., et al. World Glaucoma Association Consensus Series 4 – Intraocular Pressure. Kugler Publications, The Hague, The Netherlands. 2007.
Asia-Pacific Glaucoma Guidelines, Second Edition
Davanian AM, Donahue SP, Mogil RS, Groth SL. Mask-induced Artifact Impacts Intraocular Pressure Measurement Using Goldmann Applanation Tonometry. J Glaucoma. 2021 Mar;30(3):e87-e89.

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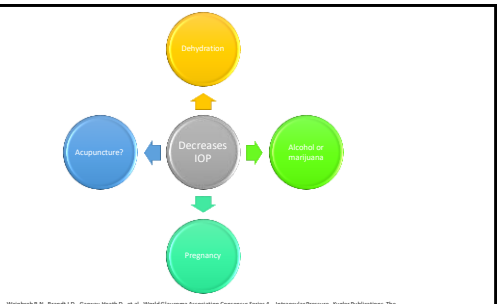

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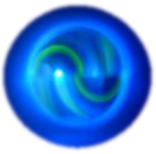
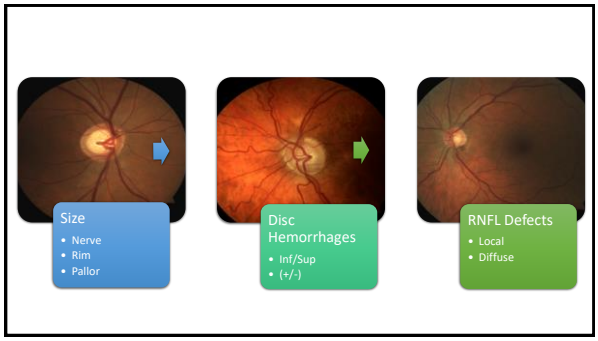
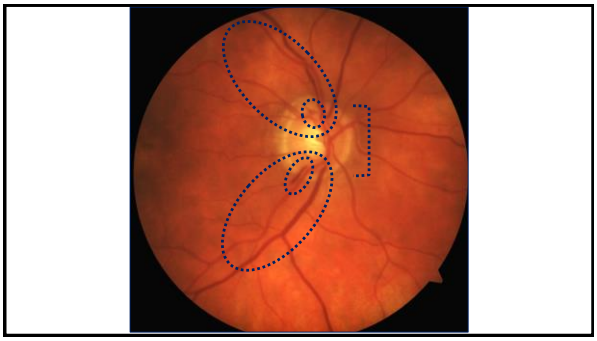
Asia-Pacific Glaucoma Guidelines, Second Edition

ACTIVITY	INTRAOCULAR PRESSURE
Light touch through adnexal skin or lids (gentle eye wiping)	Approximately double baseline IOP
Voluntary squeezing of lids (squinting)	Elevations up to 90 mmHg
Eye Compression (massaging, rubbing, wiping, drying)	Up to 30 mmHg and 40 mmHg
Short duration supine positions	A mean elevation of 4.4 mmHg
The dependent (lower) eye during side sleeping	A mean of 2 mmHg above supine IOP
Long duration prone sleeping	A mean elevation of 40 mmHg
Contact between the eye and bedding surfaces	A mean elevation of 22±5 mmHg
Inverted body position	A mean elevation of 36 mmHg
Wearing swimming goggles	Elevations up to 48 mmHg
Straining involving facial congestion	Elevations of 10-25 mmHg
Playing loud, high pitch notes on a trumpet	Elevations sup to 44 mmHg
Wearing a tight necktie	Elevations of 2-4 mmHg

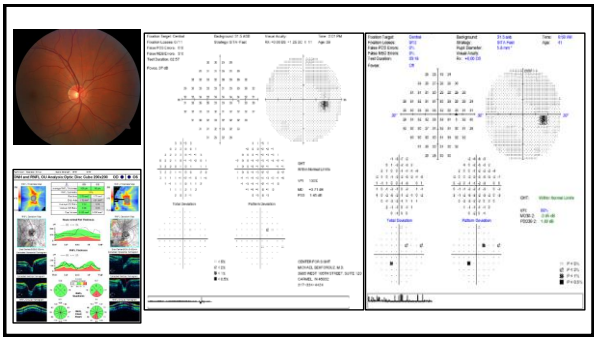
McMonnies, C. (2015). An examination of the hypothesis that intraocular pressure elevation episodes can have prognostic significance in glaucoma suspects. *J Optom*, 8(4):223-235.

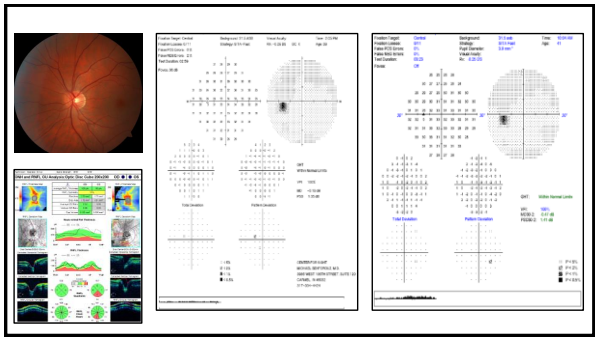



Size
• Nerve
• Rim
• Pallor
Disc Hemorrhages
• Inf/Sup
• (+/-)
RNFL Defects
• Local
• Diffuse

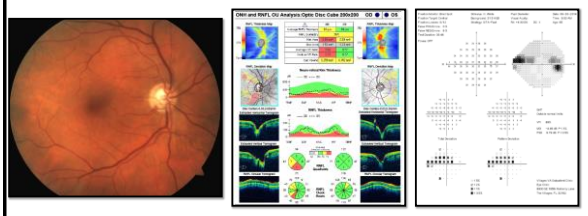


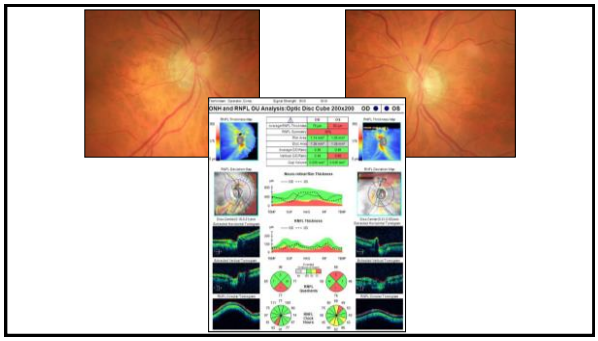

Correlate
And
Carry
On

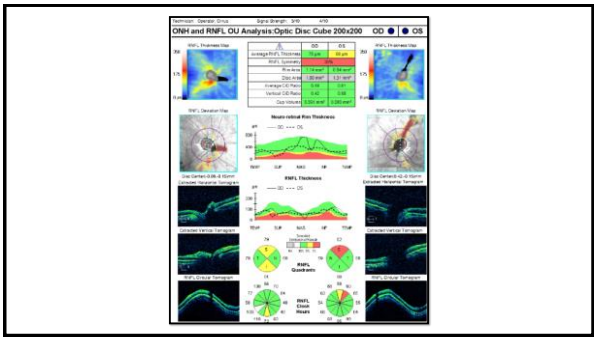


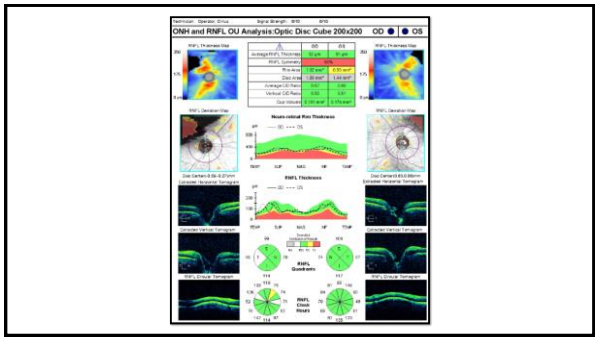


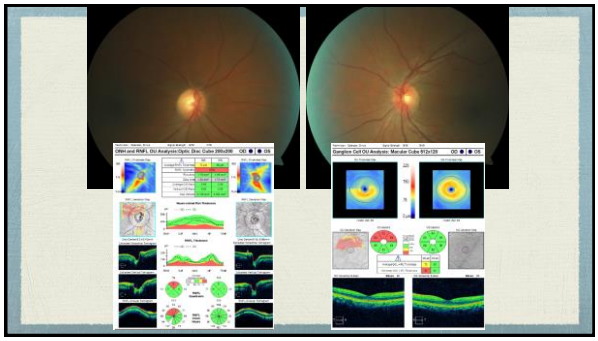
Preferential Loss
- Structural and Functional Correlation -

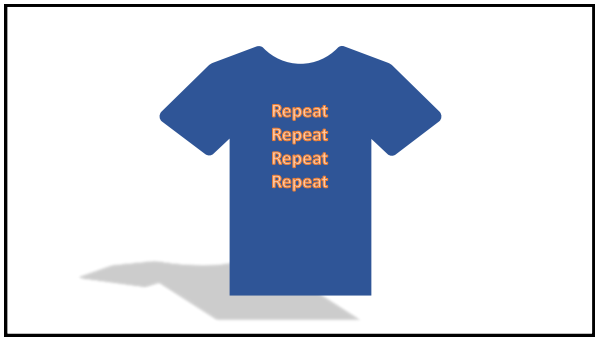







ONH and RNFL OU Analysis Optic Disc Cube 200x200 OD OS

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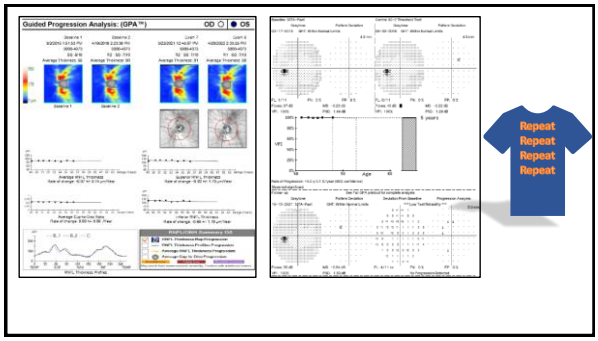
Guided Progression Analysis: (GPA™) OD OS
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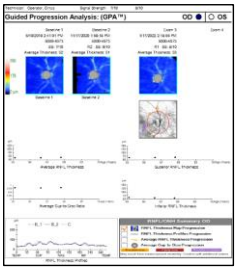
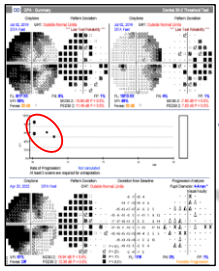
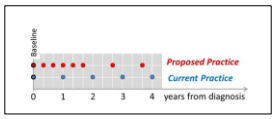


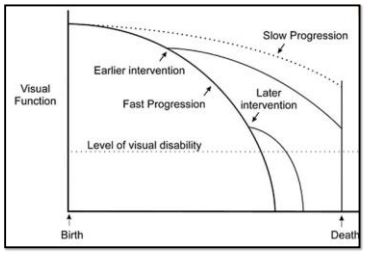


"Perform sufficient examinations to detect change."

- "A good baseline of reliable VFs is essential to be able to monitor for progression."
- "Decisions on progression should not be made by comparing only the most recent field with the one before."
- "Suspected progression should be confirmed by repeating the field."[1]



1. R.N. Weinreb, D. G.-H. (2011). *Progression of Glaucoma – World Glaucoma Association 8th Consensus Meeting*. Paris: Kugler Publications.
Boodhna T, Crabb DP. More frequent, more costly? Health economic modelling aspects of monitoring glaucoma patients in England. *BMC Health Serv Res*. 2016;16(1):611.
*See also: Chauhan BC, Garway-Heath DF, Goñi FJ, Rossetti L, Bengtsson B, Viswanathan AC, Heijl A. Practical recommendations for measuring rates of visual field change in glaucoma. Br J Ophthalmol. 2008 Apr;92(4):569-73.

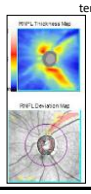


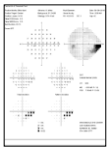
"Clinicians should aim to measure the rate of VF progression."

R.N. Weinreb, D. G.-H. (2011). *Progression of Glaucoma – World Glaucoma Association 8th Consensus Meeting*. Paris: Kugler Publications.
Caprioli J. The importance of rates in glaucoma. *Am J Ophthalmol*. Feb 2008;145(2):191–192.

Visual Field Progression
- WHERE do we see it? -

- Regional preferential rim loss depending on stage of disease:
  - Early: Look carefully in I.T. and S.T. disc regions
  - Moderate: Temporal horizontal disc region
  - Advanced: Inferior nasal, then superior nasal rim loss
- The sequence of disc sector rim loss *correlates* with the progression of the VF defects:
  - Early VF loss: Nasal upper or lower quadrant
  - Moderate VF loss: Connecting arcuate
  - Advanced: Island of sensitivity in the inferior-temporal VF

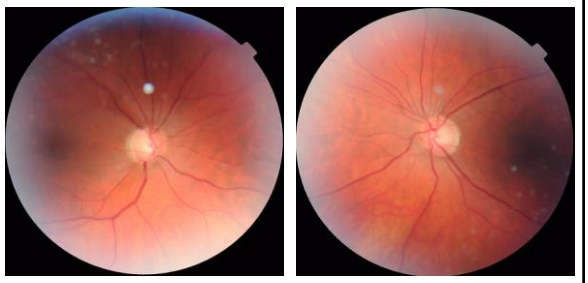


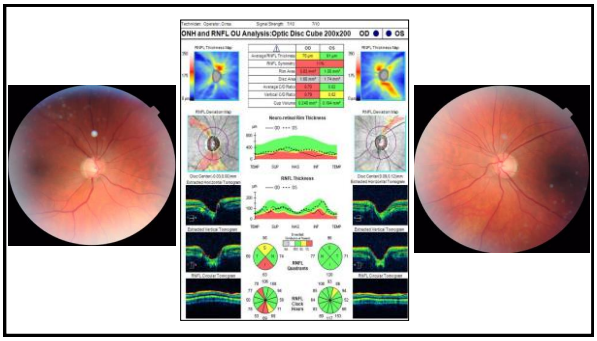


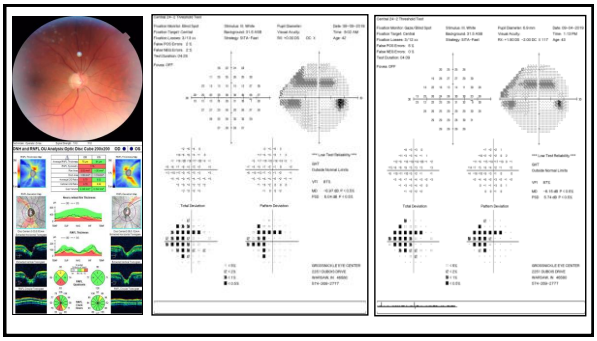
Visual Field Progression
- HOW can we detect it? -

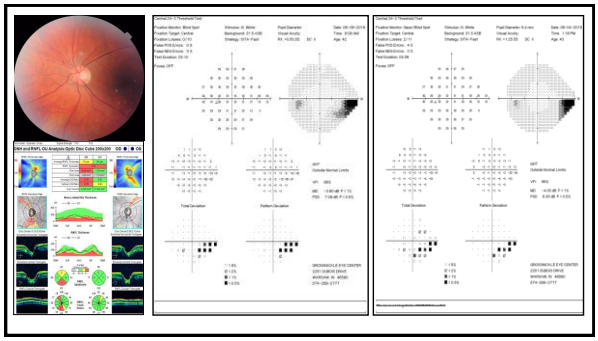
- LOOK for:
  - Deepening of current defects (PSD)
  - Enlargement of current defects (MD)
  - NEW defects
- "Visual field progression may be analyzed by either 'event-' or 'trend-'based methods"
  - "In general, event-based methods are used early in the follow-up, when few VFs are available for serial analysis.
  - "In general, rate-based analyses are used later in the follow-up, when a greater number of VFs is available over a sufficient period of time to measure the rate of progression."

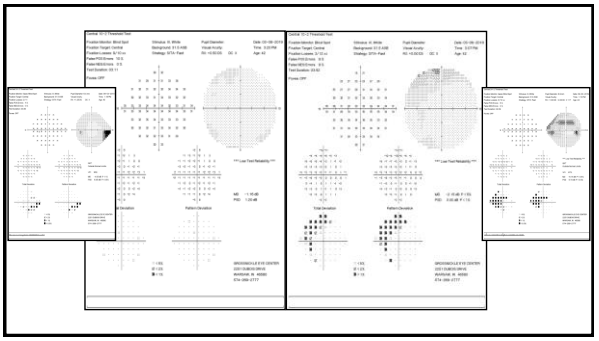
R.N. Weinreb, D. G.-H. (2011). *Progression of Glaucoma – World Glaucoma Association 8th Consensus Meeting.* Paris: Kugler Publications.

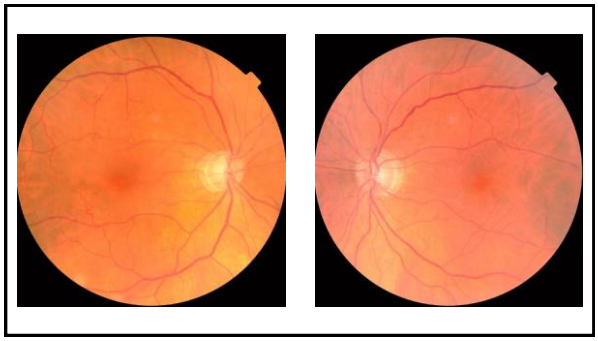


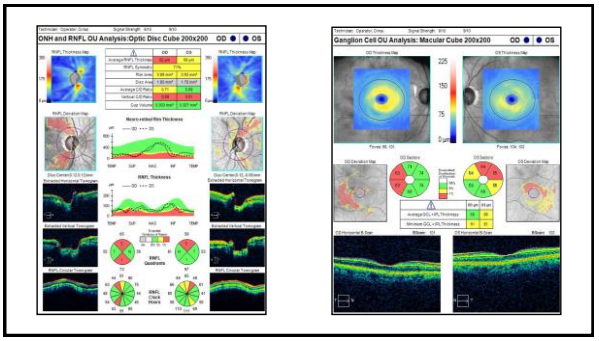


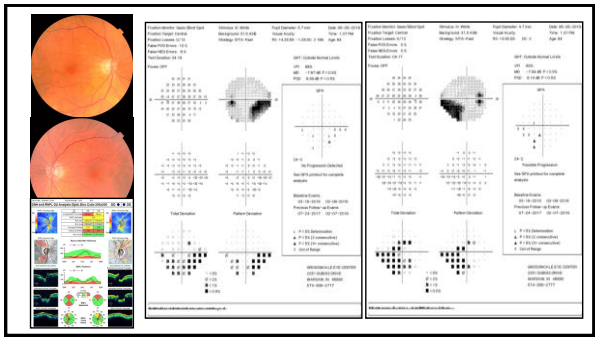


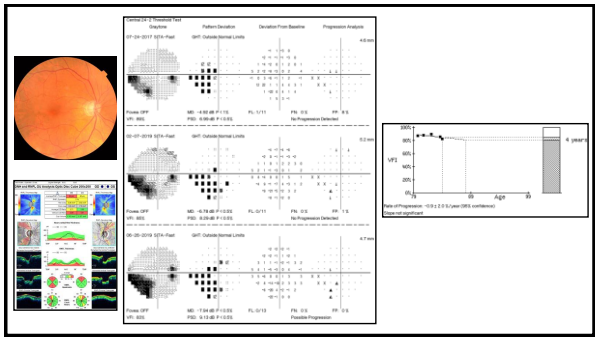







ONH and RNFL OU Analysis:Optic Disc Cube 200x200
OD
OS
Ganglion Cell OU Analysis: Macular Cube 200x200
OD
OS

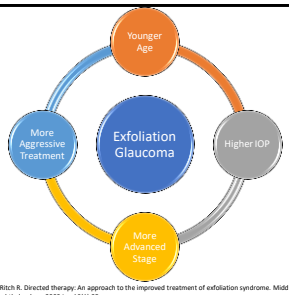




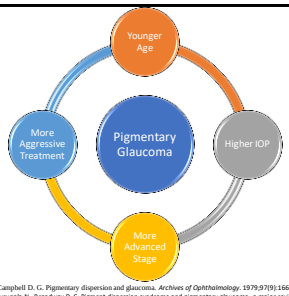
Visual Field Progression
- WHERE do we see it? -

- "When progression is identified, the clinician should ensure that the progression is consistent with glaucoma and not related to some other cause[1]."
- Nonglaucomatous optic neuropathy is associated with[2-4]:
  - younger age (<50 yoa).
  - visual acuity worse than 20/40.
  - pallor that exceeds or extends beyond the cupping (94% specific).
  - visual field defects that respect more the vertical meridian.

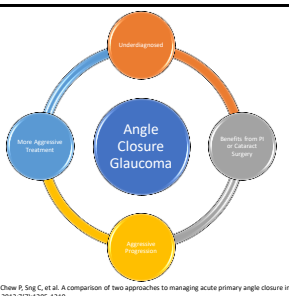
1. R.N. Weinreb, D. G.-H. (2011). *Progression of Glaucoma – World Glaucoma Association 8th Consensus Meeting*. Paric Kugler Publications.
2. Jonas JB, Budde WM, Panda-Jonas S. Ophthalmoscopic evaluation of the optic nerve head. Surv Ophthalmol. 1999; 43:293–320.
3. Choudhari N, Nelig A, Kulkarnaila V, George R. Cupped disc with normal intraocular pressure: the long road to avoid misdiagnosis. Indian Journal Of Ophthalmology. November 2011;59(6):491–497.
4. Greenfield D, Sutkowski R, Glaser J, Schatz N, Parrish R. The cupped disc. Who needs neuroimaging? Ophthalmology. October 1998;105(10):1866-1874.



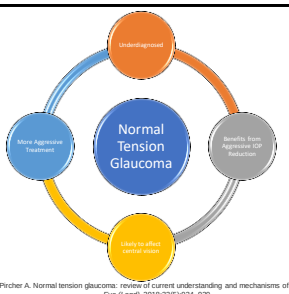
Angelilli A, Ritch R. Directed therapy: An approach to the improved treatment of exfoliation syndrome. Middle East African journal of ophthalmology. 2009 Jan;16(1):35.
Holló G, Katsanos A, Konstas AG. Management of exfoliative glaucoma: challenges and solutions. Clinical Ophthalmology (Auckland, NZ). 2015;9:907.



Campbell D. G. Pigmentary dispersion and glaucoma. *Archives of Ophthalmology*. 1979;97(9):1667–1672.
Niyadurupola N., Broadway D. C. Pigment dispersion syndrome and pigmentary glaucoma--a major review. *Clinical & Experimental Ophthalmology*. 2008;36(9):868–882.
Farrar S. M., Shields M. B. Current concepts in pigmentary glaucoma. *Survey of Ophthalmology*. 1993;37(4):233–252



Henrietta H, Chew P, Sng C, et al. A comparison of two approaches to managing acute primary angle closure in Asian eyes. Clin Ophthalmol. 2013;7(7):1205-1210.
Brown RH, Zhong L, Lynch MG. Clear lens extraction as treatment for uncontrolled primary angle-closure glaucoma. J Cataract Refract Surg. 2014;40:840-841.



Killer HE, Pircher A. Normal tension glaucoma: review of current understanding and mechanisms of the pathogenesis. *Eye (Lond)*. 2018;32(5):924–930.
King D, Drance SM, Douglas G, Schulzer M, Wijsman K. Comparison of visual field defects in normal-tension glaucoma and high-tension glaucoma. Am J Ophthalmol. 1986;101:204–7.
Collaborative Normal-Tension Glaucoma Study Group. The effectiveness of intraocular pressure reduction in the treatment of normal-tension glaucoma. Am J Ophthalmol. 1998;126:498–505

Lower is Better.

- Sufficient IOP reduction
  - Residual life expectancy/Age
- Sufficient treatment
  - Over treatment for older patients
  - Under treatment for younger patients

Target IOP Treatment Principles

"In the end, it will be impossible to know if we overreacted or did too much, but it will be QUITE apparent if we under reacted or did too little."

(Dr. Darrin M. Peppard
March 20, 2020)

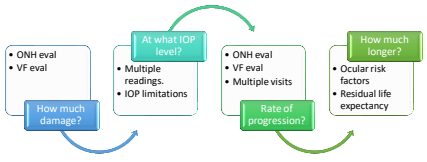
"The decision to initiate glaucoma treatment should be based on the assessment of the risks for development of functional impairment or decrease in vision-related quality of life, taking into account factors such as coexisting ocular conditions, the patient's life expectancy, and general health status, as well as his/her perception and expectations about treatment."

- Age
- Stage

Liebmann J, Weinreb R, World Glaucoma A. *Medical Treatment Of Glaucoma : The 7Th Consensus Report Of The World Glaucoma Association*. Amsterdam: Kugler Publications; 2010. p 3.

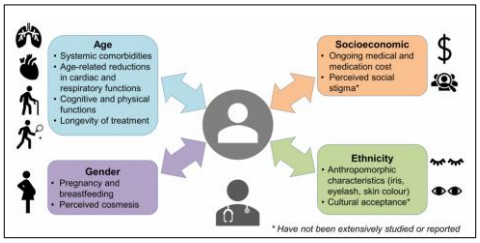
Target IOP Treatment Principles

Evaluating Target IOP



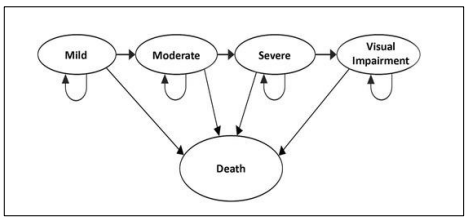
Jampel HD. Target pressure in glaucoma therapy. J Glaucoma. 1997 Apr;6(2):133-8.
Weinreb R.N., Brandt J.D., Garway-Heath D., et al. World Glaucoma Association Consensus Series 4 – Intraocular Pressure. Kugler Publications, The Hague, The Netherlands. 2007
Ihota R, Angmo D, Ramaswamy D, Dada T. Simplifying "target" intraocular pressure for different stages of primary open-angle glaucoma and primary angle-closure glaucoma. Indian J Ophthalmol. 2018 Apr;66(4):495-505.

Target IOP Treatment Principles



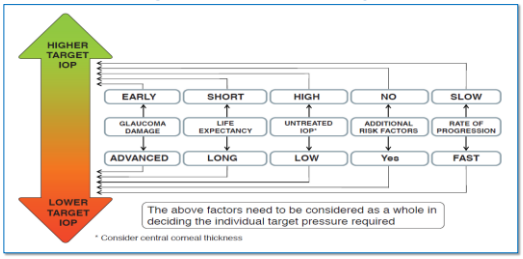
Phu J, Agar A, Wang H, Masselos K, Kalloniatis M. Management of open-angle glaucoma by primary eye-care practitioners: toward a personalised medicine approach. Clin Exp Optom. 2020 Aug 18.

Target IOP Treatment Principles



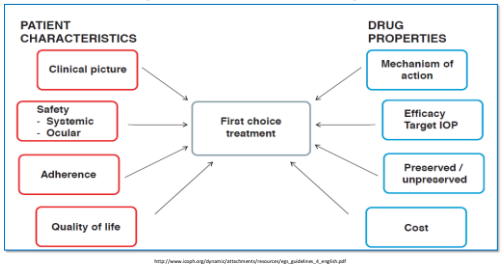
Boodhna T, Crabb DP. More frequent, more costly? Health economic modelling aspects of monitoring glaucoma patients in England. *BMC Health Serv Res.* 2016;16(1):611.

Target IOP Treatment Principles



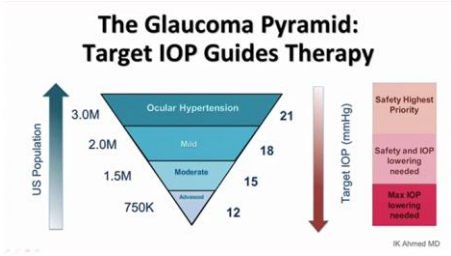
http://www.icoph.org/dynamic/attachments/resources/ego_guidelines_4_english.pdf

Target IOP Treatment Principles



http://www.icoph.org/dynamic/attachments/resources/wgs_guidelines_4_english.pdf

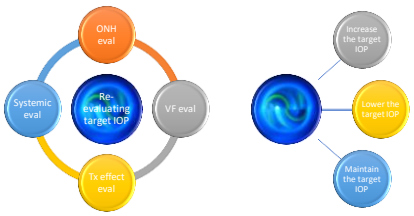
Target IOP Treatment Principles



"In treated patients, failing to achieve target IOP was associated with more rapid VF worsening. Eyes with moderate glaucoma experienced the greatest VF worsening from failing to achieve target IOP."

Villasana GA, Bradley C, Ramulu P, Unberath M, Yohannan J. The Effect of Achieving Target Intraocular Pressure on Visual Field Worsening. Ophthalmology. 2022 Jan;129(1):35-44

Re-evaluating Target IOP



Jampel HD. Target pressure in glaucoma therapy. J Glaucoma. 1997 Apr;6(2):133-8.
Weinreb R.N., Brandt J.D., Garway-Heath D., et al. World Glaucoma Association Consensus Series 4 – Intraocular Pressure. Kugler Publications, The Hague, The Netherlands. 2007
Ihota R, Angmo D, Ramaswamy D, Dada T. Simplifying "target" intraocular pressure for different stages of primary open-angle glaucoma and primary angle-closure glaucoma. Indian J Ophthalmol. 2018 Apr;66(4):495-505.

56,000 Ways To Treat Glaucoma

From ignorance our comfort flows. The only wretched are the wise.
Matthew Prior (1664–1721)

The addition of new glaucoma medications in the past few years, including several with once daily dosing and improved efficacy, has greatly expanded medical therapy options for glaucoma patients. Our treatment paradigm had long been a stepped algorithm with a reasonably obvious order of drug addition, culminating in what has been labeled, but variably defined, as maximal tolerated medical therapy (MTMT). MTMT can be defined simply as the point at which it makes no sense to add more medication. There are now more steps in the algorithm, corresponding to new classes of medications. There are more choices of individual agents within each class, and no longer is the order of addition clear-cut. As of the late 1970s, the path to MTMT began with timolol, then progressed through pilocarpine and propine and ended with an oral carbonic anhydrase inhibitor (CAI).

Choices now include: beta-blockers (timolol maleate aqueous solution 0.25% or 0.5%, timolol maleate gel-forming solution 0.25% or 0.5%, timolol hemihydrate 0.25 or 0.5%, levobunolol 0.25% or 0.5%, betaxolol 0.25% or 0.5%, metipranolol 0.3%, and carteolol 1.0%); carbonic anhydrase inhibitors (CAIs) topically (dorzolamide 2% and brinzolamide 1%), orally (acetazolamide 125 mg, 250mg, or 500mg sustained-release, neptazane 25mg or 50mg, and dichlorphenamide 50mg); prostaglandins (latanoprost 0.005%, unoprostone 0.15%, bimatoprost 0.03%, and travoprost 0.004%); adrenergic agonists (brimonidine 0.2%, brimonidine-P 0.15%, apraclonidine 0.5%, dipivefrin 0.1%, and epinephrine 0.5%, 1%, and 2%); and the miotics (pilocarpine solution 0.5%, 1%, 2%, 4%, 6% or 8%, pilocarpine gel 4%, and carbachol 0.75%, 1.5%, 2.25%, or 3%).

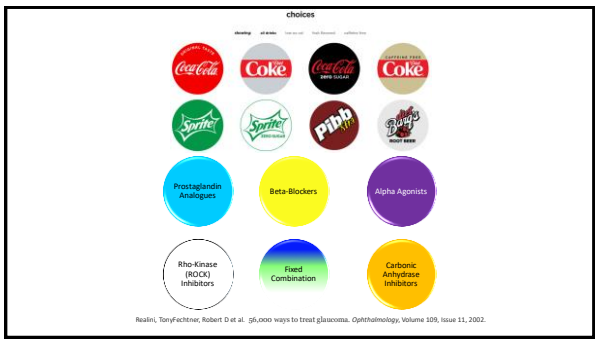
As of this writing, ignoring generic equivalents and combination products, glaucoma patients may now be on regimens consisting of any of 12 beta-blockers, 8 CAIs, 4 prostaglandins, 7 adrenergic agonists and 11 miotics. For each class of drugs, a patient is either on one of the available agents or not in that class, so that the number of choices per class is one more than the number of agents in that class. Additionally, as one choice is zero from all classes, we must subtract one from the total. Considering all possible regimens from monotherapy to MTMT with an agent from each of the five pharmacologic classes, there are some 56,159 different ways to reach MTMT. [13 (beta-blockers) × 9 (CAIs) × 5 (prostaglandins) × 8 (adrenergic agonists) × 12 (miotics) = 56,160 − 1 = 56,159!]

67,391!!

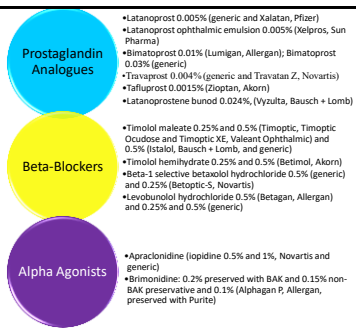
Latanoprostene Bunod

1 Rho-Kinase Inhibitor (Netarsudil)

Realini, TonyFechtner, Robert D et al. 56,000 ways to treat glaucoma. *Ophthalmology*, Volume 109, Issue 11, 2002.



Realini, TonyFechtner, Robert D et al. 56,000 ways to treat glaucoma. *Ophthalmology*, Volume 109, Issue 11, 2002.



Carbonic Anhydrase Inhibitors

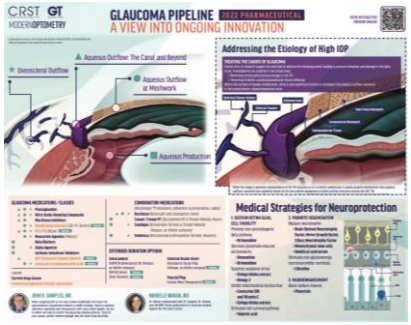
- Dorzolamide 2% (generic and Trusopt, Merck)
- Brinzolamide 1% (Azopt, Novartis)
- Acetazolamide 125 mg and 250 mg tablets (generic) and 500 mg sustained-release capsules

Rho-Kinase (ROCK) Inhibitors

- Netarsudil ophthalmic solution 0.02% (Rhopressa, Aerie Pharmaceuticals)

Fixed Combination

- Preservative-free dorzolamide and dorzolamide/timolol (Imprimis Pharmaceuticals)
- Brimonidine 0.2%/timolol 0.5% (Combigan, Allergan)
- Dorzolamide 2%/timolol 0.5% (generic, Cosopt, and Cosopt PF, Akorn)
- Brinzolamide/brimonidine 1%/0.2% (Simbrinza, Novartis)
- Netarsudil/latanoprost ophthalmic solution, 0.02%/0.005% (Roclatan, Aerie Pharmaceuticals)



Lower IS More

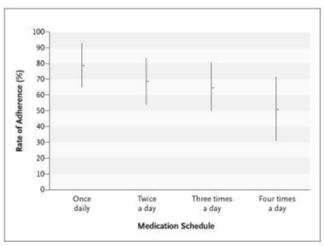
- Sufficient IOP reduction
  - Residual life expectancy/Age
- Sufficient treatment
  - Over treatment for older patients
  - Under treatment for younger patients

"The goal of glaucoma treatment is the preservation of vision *and* vision-related quality of life throughout the patient's lifetime."

Curbside Consultation in Glaucoma: 49 Clinical Questions Dale K., Heuer. Richard A., Lewis. Steve J., Geddie. 2008. SLACK Incorporated. Thorofare, New Jersey. P4.

"Patient adherence is the wild card in the deck for controlling glaucoma progression."

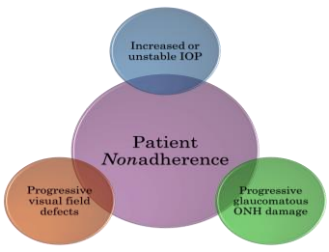
Fingeret M, Dickerson J. The Role of Minimally Invasive Glaucoma Surgery Devices in the Management of Glaucoma. *Optometry And Vision Science: Official Publication Of The American Academy Of Optometry* [serial online]. February 2018;95(2):155-162



Osterberg L, Blaschke T. Adherence to medication. N Engl J Med. 2005 Aug 4;353(5):487-97

"Ultimately,… nonadherent patients…fail to achieve the intended or full effect of the treatment."

Budenz D. A Clinician's Guide to the Assessment and Management of Nonadherence in Glaucoma. *Ophthalmology* January 1, 2009;116:S43-S47.



1. Sleath B, Blalock S, Robin A, et al. Original article: The Relationship between Glaucoma Medication Adherence, Eye Drop Technique, and Visual Field Defect Severity. *Ophthalmology.* January 1, 2011;118:2398-2402.
2. Schwartz G, Quigley H. Adherence and Persistence with Glaucoma Therapy. *Survey Of Ophthalmology.* January 1, 2008;53(Supplement):S57-S68.
3. Olthoff C, Schouten J, van de Borne B, Webers C. Original article: Noncompliance with Ocular Hypotensive Treatment in Patients with Glaucoma or Ocular Hypertension. An Evidence-Based Review. *Ophthalmology.* January 1, 2005;112:953-961.e7.
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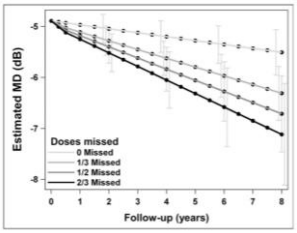


"To increase the effectiveness of our current glaucoma treatments, there is *a critical need* to focus on helping support patients in *improving their glaucoma medication adherence.*"

Newman-Casey PA, Niziol LM, Gillespie BW, Janz NK, Lichter PR, Musch DC. The Association between Medication Adherence and Visual Field Progression in the Collaborative Initial Glaucoma Treatment Study. Ophthalmology. 2020 Apr;127(4):477-483.

"…*increasing the effectiveness of adherence interventions* may have a far greater impact on the health of the population than any improvement in specific medical treatments."

Haynes RB, McDonald H, Garg AX MP. *World Health Organization*. http://www.who.int/chp/knowledge/publications/adherence_full_report.pdf

"[Eye care providers]…do a poor job of detecting nonadherence in their patients."

Budenz D. A Clinician's Guide to the Assessment and Management of Nonadherence in Glaucoma. *Ophthalmology* January 1, 2009;116:543-547.

"Physician *attitude* has been shown to play a large role in patient adherence…"

Budenz D. A Clinician's Guide to the Assessment and Management of Nonadherence in Glaucoma. *Ophthalmology* January 1, 2009;116:543-547.

"...addressing adherence issues involves changing physician behavior, which may result in changes in patient behavior."

Budenz D. A Clinician's Guide to the Assessment and Management of Nonadherence in Glaucoma. *Ophthalmology* January 1, 2009;116:563-567.

I know it must be difficult to take all your medications regularly. How often do you miss taking them?[3]

Of the medications prescribed to you, which ones are you taking?

Of the medications you listed, which ones are you taking?

Have you had to stop any of your medications for any reason?

How often do you not take medication X? (address each medication individually)

When was the last time you took medication X? (address each medication individually)

Have you noticed any adverse effects from your medications?

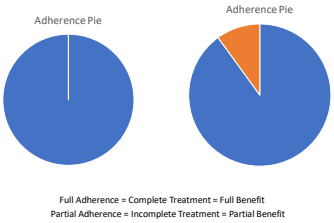
Brown MT, Bussell JK. Medication adherence: WHO cares?. *Mayo Clin Proc.* 2011;86(4):304-314. doi:10.4065/mcp.2010.0575

"Managing glaucoma…is influenced by a person's *perceived susceptibility* to the disease, the *perceived severity* of the disease, the *perceived benefits to treatment* and the *perceived barriers* to the recommended behavior change."

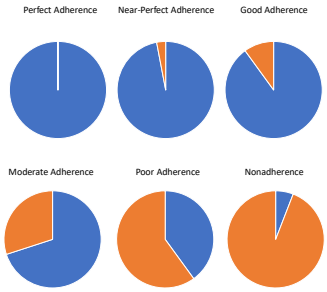
Newman-Casey PA, Shtein RM, Coleman AL, Herndon L, Lee PP. Why Patients With Glaucoma Lose Vision: The Patient Perspective. *J Glaucoma.* 2016;25(7):e668–e675.

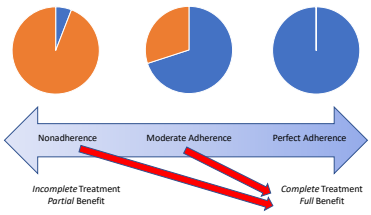
"For a glaucoma patient, this would mean that the person would only take their medication and return for their follow-up appointments *if* they believed that glaucoma would cause undesirable vision loss, the treatments offered by their doctor could mitigate this effect, and the barriers to following their physician's recommendation were not so difficult to overcome that they outweighed the perceived benefit of treatment."

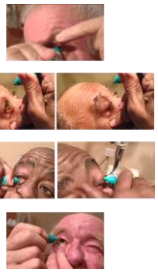
Newman-Casey PA, Shtein RM, Coleman AL, Herndon L, Lee PP. Why Patients With Glaucoma Lose Vision: The Patient Perspective. *J Glaucoma.* 2016;25(7):e668–e675.



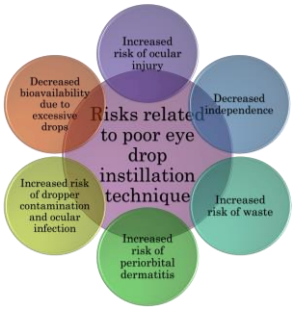
Full Adherence = Complete Treatment = Full Benefit
Partial Adherence = Incomplete Treatment = Partial Benefit

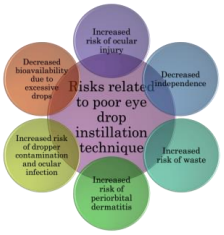






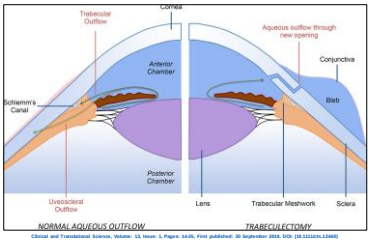
Ozcan K, Sinan B, Murat U. Review on the Eyedrop Self-Instillation Techniques and Factors Affecting These Techniques in Glaucoma Patients. JcientDisc. Vol 2014;(2014):





"Ineffective self-installation of eye drops was associated with an increased risk of glaucoma progression or treatment advancement to incisional surgery."

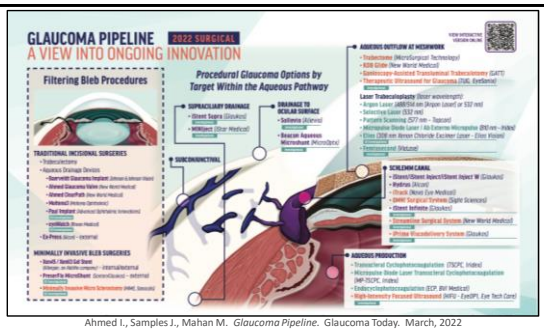
Rajanala AP, Prager AJ, Park MS, Tanna AP. Association of the Effectiveness of Eye Drop Self-instillation and Glaucoma Progression. J Glaucoma. 2022 Mar 1;31(3):156-159



Clinical and Translational Science, Volume: 11, Issue: 1, Pages: 14-25, First published: 30 September 2018, DOI: (10.1111/cts.12660)

"Minimally invasive glaucoma surgeries *fill a gap* that has existed in the treatment algorithm for glaucoma between medical therapy and laser at one end of the spectrum and traditional filtering glaucoma surgeries at the other."

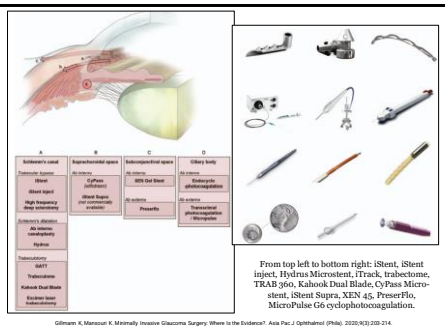
Fingeret M, Dickerson JE Jr. The Role of Minimally Invasive Glaucoma Surgery Devices in the Management of Glaucoma [published correction appears in Optom Vis Sci. 2018 Jan;95(6):554]. Optom Vis Sci. 2018;95(2):110–162.



Ahmed I., Samples J., Mahan M. *Glaucoma Pipeline.* Glaucoma Today. March, 2022

"Minimally invasive glaucoma surgery has been shown to provide a safe surgical approach, particularly in combination with cataract surgery, and may provide good intraocular pressure–lowering effectiveness and the opportunity to reduce or eliminate ocular hypotensive medications. *Identifying those patients who could benefit from minimally invasive glaucoma surgery through decreased dependence on medications and the potential for better control of their glaucoma is in alignment with the overall goals of optometric practice."*

Fingeret M, Dickerson JE Jr. The Role of Minimally Invasive Glaucoma Surgery Devices in the Management of Glaucoma [published correction appears in Optom Vis Sci. 2018 Jun;95(6):554]. Optom Vis Sci. 2018;95(2):155–162.



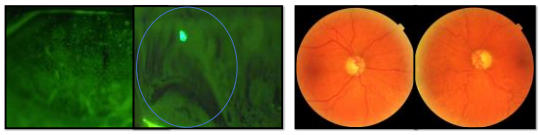
From top left to bottom right: iStent, iStent inject, Hydrus Microstent, iTrack, trabectome, TRAB 360, Kahook Dual Blade, CyPass Microstent, iStent Supra, XEN 45, PreserFlo, MicroPulse G6 cyclophotocoagulation.

Gillmann K, Mansouri K. Minimally Invasive Glaucoma Surgery: Where Is the Evidence?. Asia Pac J Ophthalmol (Phila). 2020;9(3):208-214.

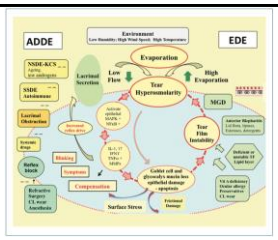
Prevalence and Association

Dry Eyes
>30 Million in US

Glaucoma
>3 Million in US

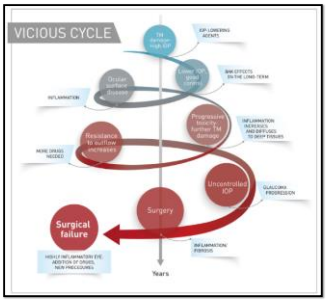


"The _____cycle"



"Since tear osmolarity is a function of tear evaporation in either ADDE or EDE, tear hyperosmolarity arises due to evaporation from the ocular surface and, in that sense, all forms of DED are evaporative. In other words, EDE is more accurately considered a hyper-evaporative state."

Craig JP, Nelson JD, Azar DT, Belmonte C, Bron AJ, Chauhan SK, de Paiva CS, Gomes JAP, Hammitt KM, Jones L, Nichols JJ, Nichols KK, Novack GD, Stapleton FJ, Willcox MDP, Wolffsohn JS, Sullivan DA. TFOS DEWS II Report Executive Summary. Ocul Surf. 2017 Oct;15(4):802-812

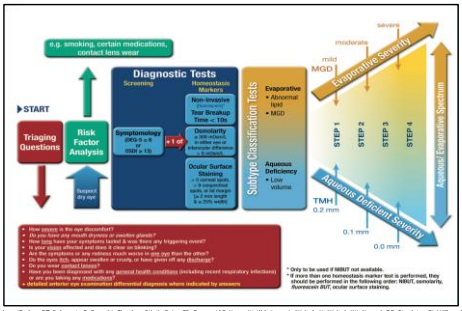


Baudouin C, Kolko M, Melik-Parsadaniantz S, Messmer EM. Inflammation in Glaucoma: From the back to the front of the eye, and beyond. Prog Retin Eye Res. 2021 Jul;83:100916

Treatment Goals

Dry Eyes
Improve Quality of Life
Increase Homeostasis

Glaucoma
Preserve Visual Function
Decrease IOP



Craig JP, Nelson JD, Azar DT, Belmonte C, Bron AJ, Chauhan SK, de Paiva CS, Gomes JAP, Hammitt KM, Jones L, Nichols JJ, Nichols KK, Novack GD, Stapleton FJ, Willcox MDP, Wolffsohn JS, Sullivan DA. TFOS DEWS II Report Executive Summary. Ocul Surf. 2017 Oct;15(4):802-812

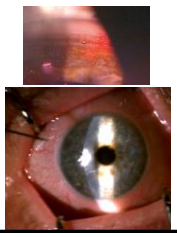
STEP	TFOS DEWS II recommendations for the staged management and treatment of DED	
1	• Education regarding the condition, its management, treatment and prognosis • Modification of local environment • Education regarding potential dietary modifications (including oral essential fatty acid supplementation)	• Identification and potential modification/elimination of offending systemic and topical medications • Ocular lubricants of various types (if MGD is present, then consider lipid-containing supplements) • Lid hygiene and warm compresses of various types
2	**If above options are inadequate consider:** • Non-preserved ocular lubricants to minimize preservative-induced toxicity • Tea tree oil treatment for Demodex (if present) • Tear conservation o Punctal occlusion o Moisture chamber spectacles/goggles • Overnight treatments (such as ointment or moisture chamber devices) • In-office, physical heating and expression of the meibomian glands (including device-assisted therapies) • In-office intense pulsed light therapy for MGD	• Prescription drugs to manage DED o Topical antibiotic or antibiotic/steroid combination applied to the lid margins for anterior blepharitis o Topical corticosteroid (limited-duration) o Topical secretagogues o Topical non-glucocorticoid immunomodulatory drugs o Topical lymphocyte function-associated antigen-1 antagonist drugs o Oral macrolide or tetracycline antibiotics
3	**If above options are inadequate consider:** • Oral secretagogues • Autologous/allogeneic serum eye drops	• Therapeutic contact lens options o Soft bandage lenses o Rigid scleral lenses
4	**If above options are inadequate consider:** • Topical corticosteroid for longer duration • Amniotic membrane grafts	• Surgical punctal occlusion • Other surgical approaches (eg tarsorrhaphy, salivary gland transplantation)

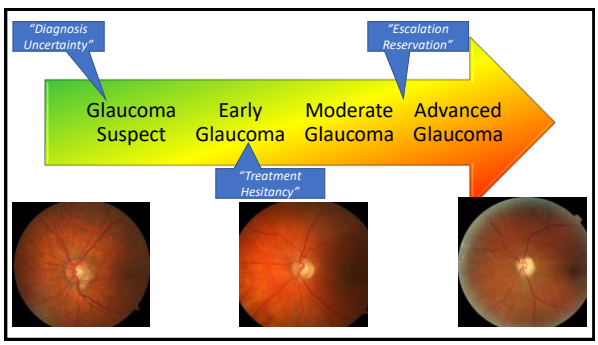
Craig JP, Nelson JD, Azar DT, Belmonte C, Bron AJ, Chauhan SK, de Paiva CS, Gomes JAP, Hammitt KM, Jones L, Nichols JJ, Nichols KK, Novack GD, Stapleton FJ, Willcox MDP, Wolffsohn JS, Sullivan DA. TFOS DEWS II Report Executive Summary. Ocul Surf. 2017 Oct;15(4):802-812

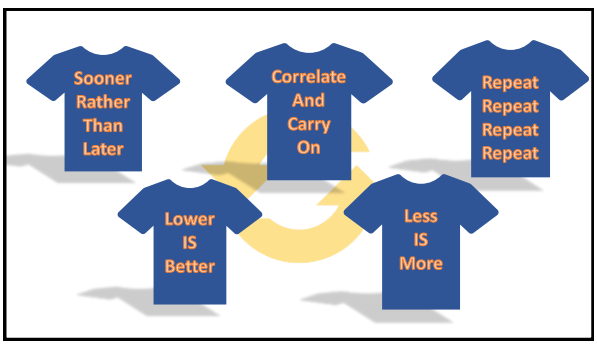
In-Office Procedures

Dry Eyes

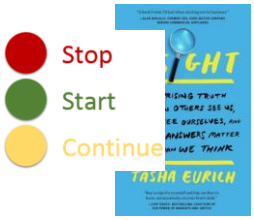
Glaucoma







Better providers…Better care



Better providers…Better care

Start	Stop	Continue
"What should we/I start doing?"	*"What should we/I stop doing?"*	*"What should we/I continue doing?"*
List ideas/Items: • Things that are not being done, but should be done • Things to begin doing to get better results • Things worth experimenting with for better results	List ideas/Items: • Things that are not working or helping • Things that impede or are not practical • Not delivering desired results • We or others dislike	List ideas/Items: • Things that are working well • Things that we want to keep • Worth continuing to see if they're worthwhile • We like or need

Questions??

Email: austin@caringforeyes.com
Instagram: qlaucomaqd Website: www.glaucomaqd.org