Update on Treatment and Management of Ocular Hypertension

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OPTOMETRIC Management SYMPOSIUM

Best Education for Patient Care and Business Management

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Financial disclosures.

Aerie Pharmaceuticals
Carl Zeiss Meditec
Bausch & Lomb
Novartis

2

A patient walks into our clinic with a high pressure, what do we do?

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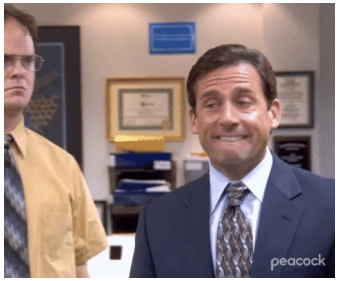

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Questions to think about….

- How high was it?
- How was it measured?
- How old is the patient?
- What are the co-morbidities?
- What is the family history?
- What are the other ocular signs/imaging?

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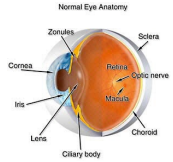
A walk through the glaucoma suspect eye

- Case history basics
- Anterior segment



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Age

- 0-3: Congenital glaucoma
- 5-35: Juvenile glaucoma
- 20-50: Pigmentary, ICE syndrome
- >50: PXE, Angle closure

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Race



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Gender

Congenital (2XF)
Pigmentary

Angle Closure
PXE
ICE Syndrome

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Refractive Error

Open angles
Deep AC
PDS, OAG, OHTN
Myopic Discs
VF defects
OCT artifact

Narrow angles
Medium/shallow AC
PACG
Small Discs

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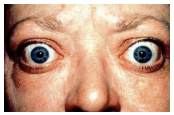
Lids, adnexa, etc.

Enophthalmos vs microcornea

Exophthalmos vs Proptosis



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Vessel Integrity

- Increased EVP
  - Obstruct venous outflow
    - Increased IOP
  - AV Malformations
    - Sturge Weber
    - CC Fistula

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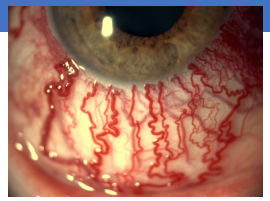

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Atypical Pigmentation

- Nevus of Ota
- Sturge Weber
- Trauma
- **Keep in mind toxicity of medications.**

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CLINICAL EXAMINATION OF THE OPTIC DISC

5 RULES (R'S) OF THE DISC:

1. Identify the scleral **Ring** to determine the size of the optic disc
2. Observe the size and quality of the **Rim**
3. Examine the **Retinal** Nerve Fiber Layer (RNFL)
4. Examine the **Region** of parapapillary atrophy (PPA)
5. Look for **Retinal** and optic disc hemorrhages (DH)

Fingeret M, Medeiros FA, Susanna R Jr, Weinreb RN. Five rules to evaluate the optic disc and retinal nerve fiber layer for glaucoma. Optometry 2005. 76(11):661-8.

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VISUAL FIELD INTERPRETATION

5 RULES FOR INTERPRETATION

1. Is it the right test (eg: 10-2, 24-2, proper Rx, etc.)
2. Is it reliable (eg: FL, FP, etc.)
3. Review probability plots
4. Does the defect follow the RNFL pattern (eg: decide if glaucomatous or non-glaucomatous defect
5. Re-affirm the diagnosis (eg: structure/function correlation)

Adapted from FORGE II.

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CIRRUS OCT EVALUATION OF THE OPTIC DISC

CONVENTIONAL REPORT

1. Observe the quality of the scan (signal strength, artifact, etc.)
2. Look closely at the RNFL at the thickness and deviation maps as well as TSNIT plot
3. Evaluate the ganglion cell layer in the macula cube scan

CIRRUS OCT EVALUATION OF THE OPTIC DISC

PANOMAP ASSESSMENT

1. Observe the quality of the scan (signal strength, artifact, etc.)
2. Look closely at the RNFL thickness maps and the RGC+ and RNFL deviation maps

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RISK ASSESSMENT

OHTS RISK CALCULATOR

CONTINUOUS METHOD FOR ESTIMATING 5-YEAR RISK OF DEVELOPING POAG

The estimated risk displayed below is a projection of the patient's likelihood of developing early glaucoma in at least one eye within 5 years, based on the information entered, and using the model developed by the OHTS-EGPS Collaboration and published in Ophthalmology: (in press). [OHTS-EGPS GLAUCOMA PREDICTOR, version 2006.1. Copyright 2006, Washington University]

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Updated use of OHTS Risk Calculator

1. **Risk Calculation in the Medication Arm of the Ocular Hypertension Treatment Study**
   a. Conclusions: The OHTS calculator can be applied to treated patients with OHTN, and repeat risk calculation after initiating IOP reduction may provide useful information that can aid in disease management.

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RULING OUT SECONDARY CAUSES OF OHTN

ANGLE CLOSURE SECONDARY GLAUCOMAS

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Angle closure

Push

- Pupillary block
- Plateau iris
- Lens-induced glaucoma
- Malignant glaucoma

Forces causing angle-closure originate posterior to the iris

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Angle closure

Pull

- Iridocorneal endothelial syndrome
- Neovascular glaucoma
- Uveitis

Forces causing angle-closure originate anterior to the iris

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Primary angle closure glaucoma

- 25% of all glaucoma globally
- ¾ of that is in Asia
- 3.1 mil Chinese blind in one eye from PACG
- 28 mil people PACS
- Causes?
  - Lens, iris thickness and insertion, CB location, degree of pupil block

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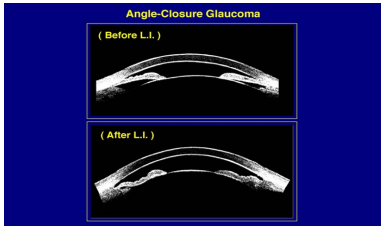

Courtesy of Jeffrey M Liebmann, MD

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Primary Open-Angle Glaucoma Suspect PPP

HIGHLIGHTED FINDINGS AND RECOMMENDATIONS FOR CARE

1. **Diagnosis of POAG suspect:**
   1. Ocular hypertension
   2. Suspicious ONH, RNFL or VF in one or both eyes
2. **Established risks:**
   1. Older age
   2. African race or Latino/Hispanic ethnicity
   3. Increased IOP
   4. Family history
   5. Low OPP
   6. Type 2 DM
   7. Myopia
   8. Thin CCT
3. **Treatment target of OHT: 20%**
4. **Testing:**
   1. Gonio, Pachy, IOP, perimetry, clinical exam of ONH, ocular imaging

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Be suspicious of asymmetric IOP

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Unilateral Glaucomas

- Vascular
- Inflammatory
- Traumatic
- Autoimmune
- Metabolic
- Iatrogenic
- Neoplastic
- Congenital
- Developmental

Remember that "POAG" is a diagnosis of exclusion

***Mnemonic is courtesy of Dan Gong, MD*

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- **Vascular** → Increased EVP: Sturge Weber, CC Fistula, Venous obstructed Dz; Neovascular: RVO, RAO, Ocular ischemic syndrome, DR
- **Inflammatory + Infectious** → UGH syndrome, uveitis, Posner-Schlossman, herpetic, fuchs heterocyclitis; viral
- **Traumatic** → Angle recession, post-cyclodialysis closure, "Garbage in TM" (Schwartz syndrome, Ghost cell)
- **Autoimmune** → Uveitis
- **Metabolic** → ? DM, ? HTN, ? Metabolic syndrome, NVG

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- **Iatrogenic + Idiopathic** → Drugs (steroid), Angle recession, s/p cyclodialysis closure, steroid response, malignant glaucoma, viscoelastic in AC, lens particle
- **Neoplastic** → Iris/CB melanoma, cyst, lymphoma
- **Congenital** → Anterior segment dysgenesis syndrome (Peters, Aniridia, Axenfeld); Aphakic
- **Developmental + Degenerative** → ICE (Chandler, Cogan Reese, Essential iris atrophy), PXE, Angle closure, ODM; Lens-Induced

You can only diagnose what you know to look for!

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ASYMMETRIC PROCESS….

- PIGMENT DISPERSION SYNDROME
- PSEUDO-EXFOLIATION SYNDROME

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Rule of thumb

Get out your gonio

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Let's talk about IOP

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Definition

- "Intra" – "ocular" – "pressure"
- Misnomer?
- Applanation = Transcorneal Pressure Difference
- IOP = pressure in the AC + atmospheric pressure
- Indication of translaminar pressure difference

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Where does cerebrospinal fluid (CSFP) come in?

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Cerebrospinal fluid

CSFP = true counter-pressure against the IOP across the lamina → ½ trans-lamina cribrosa pressure difference (TLPD) → CSFP is measured via lumbar puncture

Ex: elevated TLPD due to elevated IOP or abnormally low CSFP → "NTG" = hot topic

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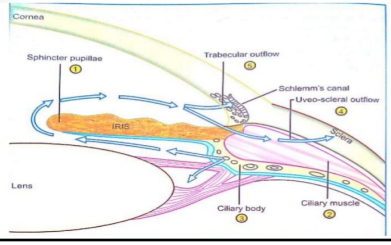
Aqueous humor dynamics



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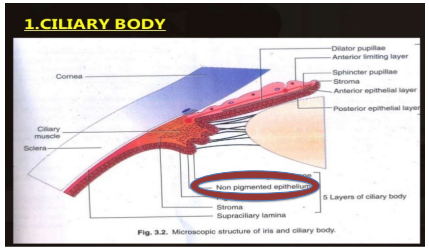

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Is there a "normal" IOP?

"Normal" range = 10 -21mmHg

Functionally "normal"

Where did this come from?

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How do we lower IOP?

MEDICATIONS: TOPICAL VS ORAL

LASER

SURGERY

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IOP in clinical trials

OHTS	20%	9.5%	4.5%
EMGT	25%	62%	45%
CNTGS	30%	35%	12%
AGIS	<18	No progression	
CIGTS	38%(meds)	45% (surg)	No progression

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OHTS → 20% → 9.5% → 4.5%

- 10 years of follow-up, 1636 patients with OHTN
- Ages 40-80, normal VF, normal ONH
- Untreated IOP 24-32, 21-32
- Observation vs treatment (7.5 years of f/u offered tx)
- Main outcome measure = VF + DP
- Linked IOP and onset of glaucoma

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OHTS 3: 20 years later....

1. **Assessment of Cumulative Incidence and Severity of Primary Open-Angle Glaucoma Among Participants in the Ocular Hypertension Treatment Study After 20 Years of Follow-up**
   a. **Conclusions and Relevance** In this study, only one-fourth of participants in the Ocular Hypertension Treatment Study developed visual field loss in either eye over long-term follow-up. This information, together with a prediction model, may help clinicians and patients make informed personalized decisions about the management of ocular hypertension.

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EMGT → 25% → 62% → 45%

- 7-11 yrs f/u
- 255 patients, aged 50-80 with early glaucoma in at least 1 eye
- Goals:
  - 1. Observation vs Tx, 2. Magnitude of Tx effect
- Progression determined by age, initial IOP and degree of damage, etc.
- Mean IOP, not fluctuation mattered
- Exfoliation, exfoliation, exfoliation

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Important highlight….

10% risk reduction for every 1mmHg lowering

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Take home points….

OHTS	Treatment of IOP delays onset of glaucoma, take risks into account
EMGT	Every 1mmHg matters, reset target as needed
CNTGS	IOP matters in NTG, monitor progression closely
AGIS	Reducing IOP slows VF loss
CIGTS	Aggressive IOP yield results, maintain steady IOP

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How do we measure IOP?

- Frequency
  - IOP fluctuation, peaks, means
  - Diurnal and nocturnal IOP
- Measuring devices
  - Non-contact
  - Contact

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Diurnal variation

01	02	03	04
Avoid missing IOP elevation	Finds the peak	>/= 6mmHg above daytime average are more likely to progress	Fluctuation can be more telling than mean IOP for progression

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Fluctuation

J Glaucoma. 2000 Apr;9(2):134-42.

Large diurnal fluctuations in intraocular pressure are an independent risk factor in patients with glaucoma.

Asrani S1, Zeimer R, Wilensky J, Gieser D, Vitale S, Lindenmuth K.

CONCLUSIONS:
In patients with glaucoma with office IOP in the normal range, **large fluctuations in diurnal IOP are a significant risk factor**, independent of parameters obtained in the office. Fluctuations in IOP may be important in managing patients with glaucoma. Development of methods to control fluctuations in IOP may be warranted.

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Fluctuation

Ophthalmology. 2007 Feb;114(2):205-9. Epub 2006 Nov 13.

Fluctuation of intraocular pressure and glaucoma progression in the early manifest glaucoma trial.

Bengtsson B[1], Leske MC, Hyman L, Heijl A; Early Manifest Glaucoma Trial Group.

CONCLUSIONS:
These results confirm our earlier finding that elevated IOP is a strong factor for glaucoma progression, with the HR increasing by 11% for every 1 mmHg of higher IOP. Intraocular pressure fluctuation was not an independent factor in our analyses, a finding that conflicts with some earlier reports. One explanation for the discrepancy is that our analyses did not include post-progression IOP values, which would be biased toward larger fluctuations because of more intensive treatment. In contrast, in this EMGT report, no changes in patient management occurred during the period analyzed.

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Peak

Am J Ophthalmol. 2005 Feb;139(2):320-4.

Correlation between office and peak nocturnal intraocular pressures in healthy subjects and glaucoma patients.

Mosaed S[1], Liu JH, Weinreb RN.

METHODS:
24-hour data of IOP collected from 33 younger healthy subjects (aged 18 to 25 years), 35 older healthy subjects (aged 40 to 74 years), and 35 untreated older glaucoma patients (aged 40 to 79 years) housed in a sleep laboratory

CONCLUSION:
Using a modification of the diurnal IOP curve, the magnitude of peak nocturnal IOP in untreated glaucoma patients can be estimated during routine office visits. Supine IOP measurements estimate peak nocturnal IOP better than sitting measurements. This estimation may provide the clinician with valuable information regarding the nocturnal IOP peak in glaucoma patients.

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Measuring devices: Non-contact

NON-CONTACT TONOMETER (NCT)

OCULAR RESPONSE ANALYZER (ORA)

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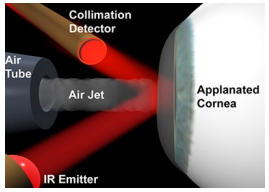
Non-contact tonometer, aka "air puff"



- 1972 "air puff"
- Measures time or force of puff to create standard amount of corneal deformation
- Good correlation with "normal IOP range"
- Generally used as screening tool

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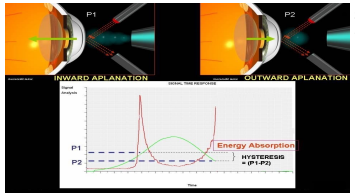
Ocular response analyzer (Reichert)



Similar to NCT but accounts for corneal hysteresis

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Measuring Devices: Contact

Schiotz
GAT
Perkins
Tonopen
Pascal
Pneumotonometer
Icare

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Schiotz (1905)

- Amount of weight indents cornea
- Displaces a volume of fluid within eye
- Lower IOP than GAT

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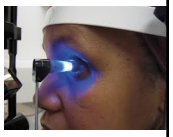
Goldmann Applanation Tonometer



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Imbert Fick Principle

- Applanation tonometry is based on the Imbert-Fick principle, which asserts that the pressure (P) inside a sphere equals the force (F) necessary to flatten its surface divided by the area (A) of flattening
- *P = F/A*
- Cornea is flattened => IOP is determined by the applanating force and the area flattened.
- *GAT* measures the force necessary to flatten an area of the cornea of 3.06 mm diameter.

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Human Error

- Intra examiner variation
  - 1.5 +/-2
- Inter examiner variation
  - 1.9 +/- 2.4 mmhg
- Thickness of mires
- Pulsations
- Astigmatism
  - WTR: IOP underestimated, ATR: IOP overestimated
  - Align red mark on probe to MINUS cyl axis
- Holding lids
- Calibration

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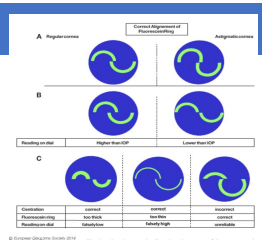

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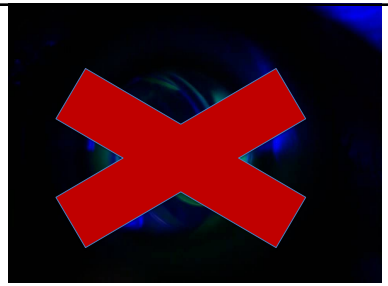

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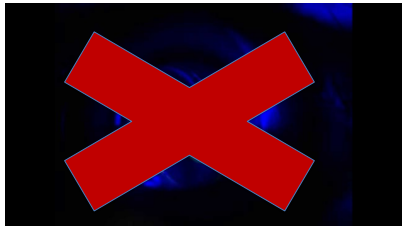

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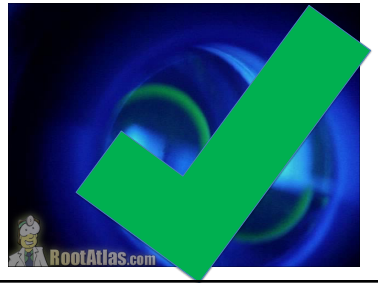

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Perkins

- Resembles a GAT with applanating prism
- Portable
- Good correlation with GAT
- Good for supine
- Good for children

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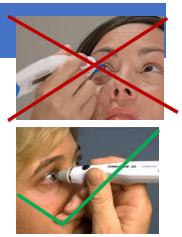
Tono-pen (Reichert)

- Small plunger gauges resistance of anesthetized cornea
- Good for corneal pathology
- Disposable latex tip
- Good correlation with GAT
- Underestimates high
- Overestimates low



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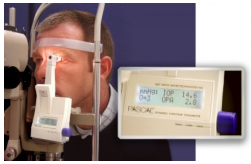
Pascal



- Curved probe
- Larger than GAT tip
- Measures IOP via hydrostatic coupling
- Takes into account corneal biomechanics

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Pneumotonometer

- Good for corneal pathology
- OK correlation with GAT
- Underestimates low
- Overestimates high

4 components:

1. Sensor that responds to IOP
2. Transducer converts pneumatic signal to electric
3. Amplifier + recorder that amplifies signal and provides readout
4. Air supply unit for compressed air

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Icare

Exp Ther Med. 2017 May;13(5):1912-1916. doi: 10.3892/etm.2017.4164. Epub 2017 Feb 24.

Comparison of the iCare rebound tonometer and the Goldmann applanation tonometer.

Pan F[1], Liu X[1], Xiao H[1], Pan Y[2].

CONCLUSION:

- The RT is well tolerated and safe, and can be considered a reliable alternative to GAT for patients in a **low to moderate IOP range**.
- The RT readings are influenced more by CCT compared to GAT in higher IOP range.

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Cleanliness of the tip

- HIV and hepatitis can't infect one to next patient
- Adenovirus, COVID, HSV can infect one to the next
- AAO: alcohol swab is adequate disinfection for applanation tip

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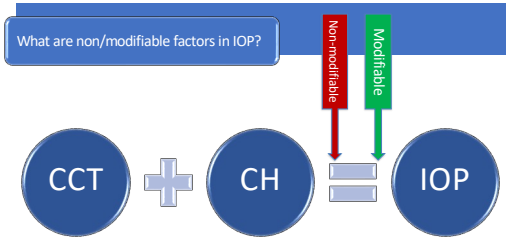
What are non/modifiable factors in IOP?



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Cornea Biomechanics

The corneas of NTG patients are more deformable than normal controls.

The corneas of HTG and OHT patients are stiffer.

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Central Corneal Thickness

- Ethnicity
- Age
- K values
- CL
- Hormones
- Disease

Variable

- OHTS
- Post-refractive sx

Independent risk factor

- KCN
- FED

Corneal Pathology

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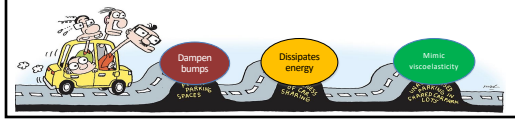
Corneal Hysteresis

- Cornea has viscoelastic properties, not simply elastic (springs).
- CH = response to the load/unload of stress.
- **How corneal tissue absorbs and dissipates energy during deformation and return.**
- Greater CH is associated with more compliance/bowing of the lamina cribrosa with IOP elevation

Shock absorbers….



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NON-MODIFIABLE

- Genetics
- Age
- Refractive error
- Gender
- Ethnicity

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MODIFIABLE

- *Diurnal variation
- *Postural variation
- Exertional influences
- Lid and eyelid movement
- Intraocular conditions
- Systemic conditions
- Environment
- Anesthesia
- Foods and Drugs

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Exertional influences

- Yoga "gravity inversion"
- Valsalva – wind instrument (EVP)
- Cardiovascular exercise:
- "Running
- Cycling

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Lid and eyelid movement

- Blinking (10mmHg)
- Hard squeezing (90mmHg)
- Lid widening (2mmHg)
- Applying pressure to trab

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Foods and drugs

- Caffeine
- Tobacco
- Corticosteroids
- LSD
- Alcohol
  - *Less secretion due to diuretic*
- Heroin
- Marijuana

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Intraocular conditions

- Posner Schlossman
- Schwartz syndrome
- Secondary glaucomas
- Anterior uveitis
- RD

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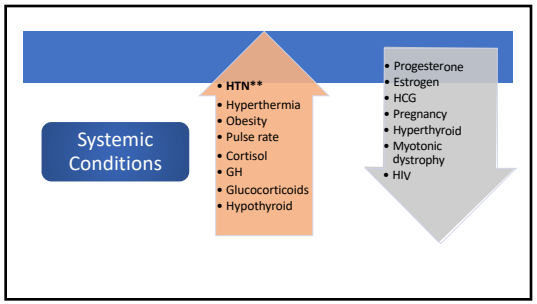

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Hypertension

Br J Ophthalmol. 2005 Mar; 89(3): 284–287.
doi: 10.1136/bjo.2004.048769PMCID: PMC1772559

Intraocular pressure and systemic blood pressure: longitudinal perspective: the Beaver Dam Eye Study

B E K Klein, R Klein, and M D Knudtson

Aim: To investigate the relation between change in systemic blood pressures and change in intraocular pressure.
Methods: This was a population based study of people 43–86 years old living in Beaver Dam, Wisconsin. Measurements at baseline (1988–90) and 5 year follow up of systemic blood pressures, intraocular pressures, and history of use of blood pressure medications.
Results: Intraocular pressures were significantly correlated with systolic and diastolic blood pressures at both baseline and follow up.

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Anxiety

Appl Psychophysiol Biofeedback. 2017 Nov 8. doi: 10.1007/s10484-017-9385-x. [Epub ahead of print]

Could White Coat Ocular Hypertension Affect to the Accuracy of the Diagnosis of Glaucoma? Relationships Between Anxiety and Intraocular Pressure in a Simulated Clinical Setting.

Méndez-Ulrich JL[1], Sanz A[2,3], Feliu-Soler A[4,5], Álvarez M[1], Borrás X[1].

RESULTS:
- Results suggest that high levels of both anxiety-state and anxiety-trait significantly predicted a clinically relevant increase of intraocular pressure.
- These results suggest a common mechanism of regulation underlying anxiogenic variability found on both intraocular pressure and heart rate.
- A reduction in parasympathetic activity appears as a possible mechanism underlying to this phenomenon.

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Mindfulness

- Decrease in IOP and serum cortisol
- Improvement in ONH perfusion
- Improvement in QOL

- Potential treatment?

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How is target IOP determined?

- IOP that does not lead to further damage
- Lower IOP => lower risk of VF loss
- AAO guidelines:
  - Initial target 20% to 40% lower than baseline
  - More than 1 medication may be required

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PPP

Adjustment of Therapy

The indications for adjusting therapy are as follows:

- Target IOP is not achieved and the benefits of a change in therapy outweigh the risks for the patient
- A patient has progressive optic nerve damage despite achieving the target IOP
- The patient is intolerant of the prescribed medical regimen
- The patient does not adhere to the prescribed medical regimen
- Contraindications to individual medicines develop
- Stable optic nerve status and low IOP occur for a prolonged period in a patient taking topical ocular hypotensive agents. Under these circumstances, a carefully monitored attempt to reduce the medical regimen may be appropriate.

Downward adjustment of target pressure can be made in the face of progressive optic disc, imaging, or visual field change.[68, 687-690]

Upward adjustment of target pressure can be considered if the patient has been stable and if the patient either requires (because of side effects) or desires less medication. A follow-up visit in 2 to 8 weeks, depending on disease severity, may help to assess the response and side effects from washout of the old medication or onset of maximum effect of the new medication.

85

What is on the horizon for IOP?

- Home tonometry
- Contact lens sensors

86

JAMA Ophthalmol. 2017 Oct 1;135(10):1-7. doi: 10.1001/jamaophthalmol.2017.3151.

Measurement of Intraocular Pressure by Patients With Glaucoma.

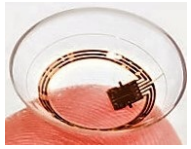
Bronin SJ, Brown LL, Meazw BL, Tatham AJ.

IMPORTANCE:
The ability of patients to measure their own intraocular pressure (IOP) would allow more frequent measurements and better appreciation of peak IOP and IOP fluctuation.

CONCLUSIONS AND RELEVANCE:
Most patients could perform self-tonometry and the method was acceptable to patients. Self-tonometry has the potential to improve patient engagement, while also providing a more complete picture of IOP changes over time.

87

Contact lens sensor



- Triggerfish (Sensimed) contact lens contains sensors to monitor changes in the curvature of the cornea.
- Enables 24-hr monitoring of "presumed" IOP

88

JAMA Ophthalmol. Published online May 24, 2018. doi:10.1001/jamaophthalmol.2018.1746

Association Between 24-Hour Intraocular Pressure Monitored With Contact Lens Sensor and Visual Field Progression in Older Adults With Glaucoma

De Moraes CG, Mansouri K, Liebmann J, Ritch R; for the Triggerfish Consortium

- **Question**: Does a single 24-hour curve with a contact lens sensor that measures intraocular pressure–related patterns correlate with the rates of visual field progression in patients with treated glaucoma?
- **Findings**: In a cohort study including 445 patients (445 eyes) with glaucoma, a combination of contact lens sensor–derived variables was associated with prior rates of visual field progression of glaucoma. These variables performed better than Goldmann intraocular pressure measurements taken over follow-up.
- **Meaning**: These findings suggest that a single 24-hour contact lens sensor session can help in risk stratification of patients with treated glaucoma.

89

Don't forget about the person behind the eyes

Identifying Outcomes That Are Important to Patients with Ocular Hypertension or Primary Open-Angle Glaucoma: A Qualitative Interview Study

a. limitations in performing vision-dependent activities of daily living
b. problems with visual functions or perceptions;
c. burden of medical treatment
d. IOP.

90

CASES

CASE 1: OHT: Decision (**to/NOT to)** treat

CASE 2: OHT: Decision (**to/NOT to)** treat

CASE 3: GS with secondary risk: Decision (**to/NOT to)** treat

91

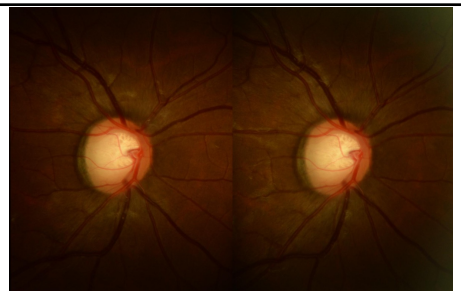
Case 1:

92

27 yo H M

- Pertinent ocular/medical hx:
  - Type 1 DM with poorly controlled BS, LA1C: 11.0
- Fam hx:
  - Father has POAG
- BCVA: 20/20 OD, OS
  - MRx: OD: -1.25, OS: -1.00
- Ant seg: Unremarkable (-) PXE, TIDs, KS OU
- PERRL-APD
- IOP: 21/21 @8:31am, (TMAX 26/26)
- CCT: 644/647
- Gonio: Gr 4, no anomalies OU
- Retina: Flat 360 OU

93



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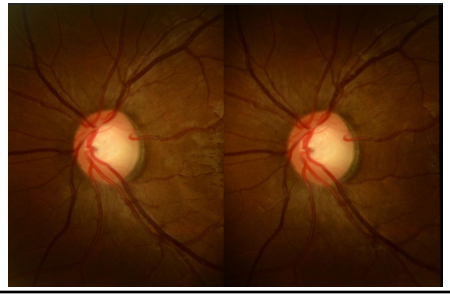

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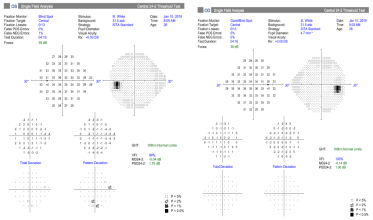
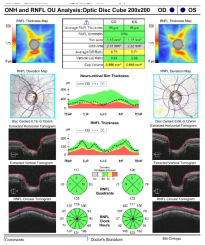


96

What do you think so far?

- 1. Open Angle Glaucoma
- 2. Definitely NOT glaucoma
- 3. Needs more information

97



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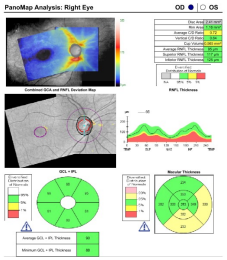

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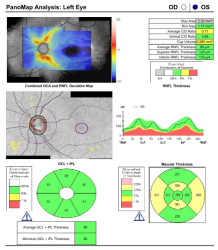

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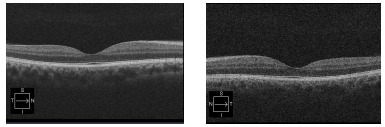


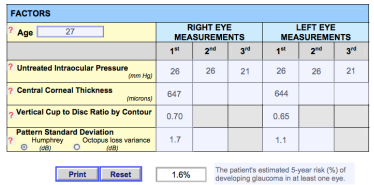
101

How about now?

- 1. Open Angle Glaucoma
- 2. Definitely NOT glaucoma
- 3. Needs more information

102

OHTS Risk Calculator

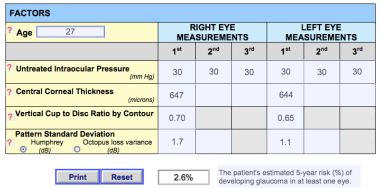


FACTORS		RIGHT EYE MEASUREMENTS			LEFT EYE MEASUREMENTS		
Age 27		1st	2nd	3rd	1st	2nd	3rd
Untreated Intraocular Pressure (mm Hg)		26	26	21	26	26	21
Central Corneal Thickness (microns)		647			644		
Vertical Cup to Disc Ratio by Contour		0.70			0.65		
Pattern Standard Deviation	Humphrey (dB) / Octopus loss variance (dB)	1.7			1.1		

Print Reset 1.6% The patient's estimated 5-year risk (%) of developing glaucoma in at least one eye.

103

What happens when IOP is increased?

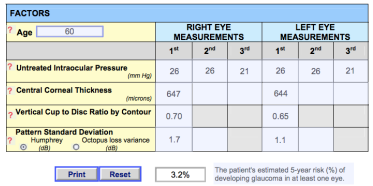


FACTORS		RIGHT EYE MEASUREMENTS			LEFT EYE MEASUREMENTS		
Age 27		1st	2nd	3rd	1st	2nd	3rd
Untreated Intraocular Pressure (mm Hg)		30	30	30	30	30	30
Central Corneal Thickness (microns)		647			644		
Vertical Cup to Disc Ratio by Contour		0.70			0.65		
Pattern Standard Deviation	Humphrey (dB) / Octopus loss variance (dB)	1.7			1.1		

Print Reset 2.6% The patient's estimated 5-year risk (%) of developing glaucoma in at least one eye.

104

What happens when age is increased?

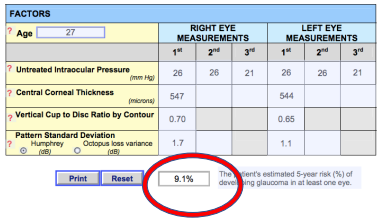


FACTORS		RIGHT EYE MEASUREMENTS			LEFT EYE MEASUREMENTS		
Age 60		1st	2nd	3rd	1st	2nd	3rd
Untreated Intraocular Pressure (mm Hg)		26	26	21	26	26	21
Central Corneal Thickness (microns)		647			644		
Vertical Cup to Disc Ratio by Contour		0.70			0.65		
Pattern Standard Deviation	Humphrey (dB) / Octopus loss variance (dB)	1.7			1.1		

Print Reset 3.2% The patient's estimated 5-year risk (%) of developing glaucoma in at least one eye.

105

What happens when CCT is thinned?



FACTORS		RIGHT EYE MEASUREMENTS			LEFT EYE MEASUREMENTS		
Age 27		1st	2nd	3rd	1st	2nd	3rd
Untreated Intraocular Pressure (mm Hg)		26	26	21	26	26	21
Central Corneal Thickness (microns)		547			544		
Vertical Cup to Disc Ratio by Contour		0.70			0.65		
Pattern Standard Deviation	Humphrey (dB) / Octopus loss variance (dB)	1.7			1.1		

Print Reset 9.1% The patient's estimated 5-year risk (%) of developing glaucoma in at least one eye.

106

Would you treat this patient?

- 1. Yes
- 2. No

107

Which imaging was most important for you?

- 1. Disc photo
- 2. Visual Field
- 3. OCT

108

Conclusion:

- The value of a **normal OCT** in the setting of normal IOP and VF with suspicious disc.

"Can't get much more normal"

109

Discussion

- 1. Diagnosis:
  - **OHTN**
- 2. Risk Assessment:
  - **OHTS Risk Calculator**
  - **Age**
  - Systemic health
  - **Family history**
- 3. When to treat:
  - IOP of a "certain threshold"
  - Thin vs thick CCT
  - Weight given to VF vs DP vs OCT
- 4. Frequency of follow-up for the treated vs non-treated pt:

110

In THIS particular patient:

- 1. **Age**: Stakes are HIGH
- 2. **Secondary factors**: STRONG family history
- 3. **But testing is**: Normal

111

1. Where does age play a role?
2. What should the frequency of follow-up and testing look like?
3. Other comments?

112

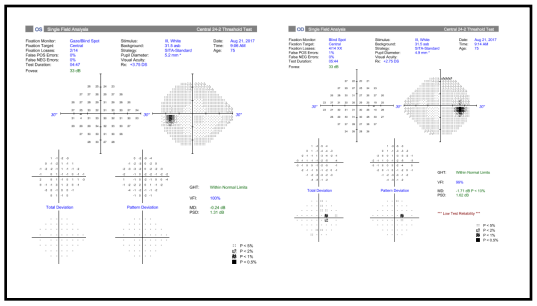
CASE 2

113

76 yo M referred for OHTN

- Pertinent history: early dry AMD, brother has glaucoma
- BCVA: OD: 20/30, OS: 20/25
  - MRx: OD: -0.75.-1.25X155, OS: +1.25-1.00X179
- Ant seg: Unremarkable (-) PXE, TIDs, KS OU
- PERRL-APD
- IOP: 26/24 @ 11:00am (TMAX: unknown)
- CCT: 523/525
- Gonio: Gr 3-4, no anomalies OU
- Macula: fine drusen OU
- ONH: See photos
- Retina: Flat 360 OU

114

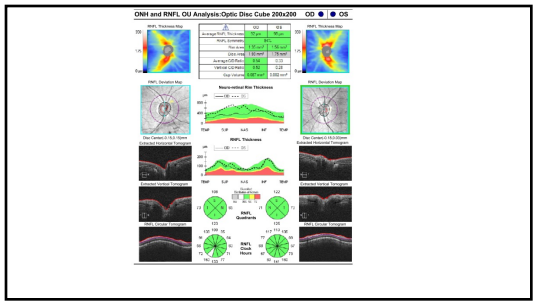


115

Thoughts so far?

- 1. Open angle glaucoma, treat
- 2. Ocular hypertension, don't treat
- 3. Ocular hypertension, treat
- 4. Need to see the OCT to decide

116



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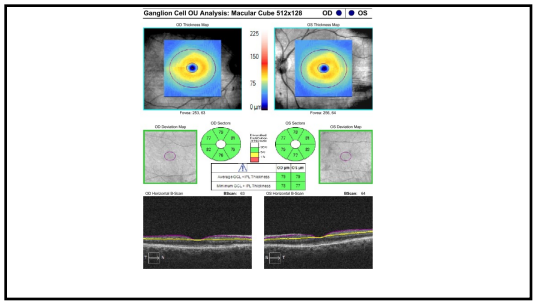

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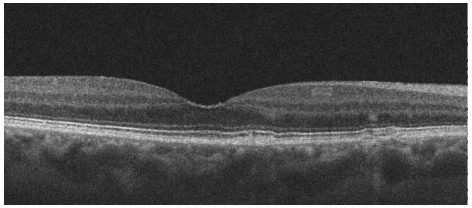

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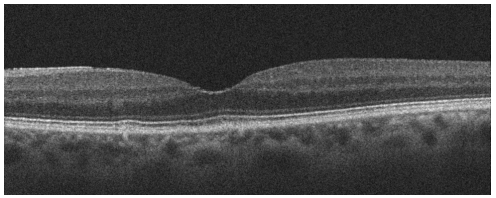


120

How about now?

- 1. Open angle glaucoma, treat
- 2. Ocular hypertension, don't treat
- 3. Ocular hypertension, treat
- 4. Need to see the OHTS calculator to decide

121

Discussion

- **OHTN**
- **OHTS Risk Calculator 24%**
- **Patient treated with Latanoprost QHS OU at second visit**
- **Patient was seen 3 months following treatment and now annually.**

122

Conclusion

- OHTN with decision to treat despite normal VF and OCT in presence of thin CCT and positive family history

123

1. Do you believe the OHTS risk calculator for this patient?
2. What should the frequency of follow-up and testing look like?
3. Other comments?

124

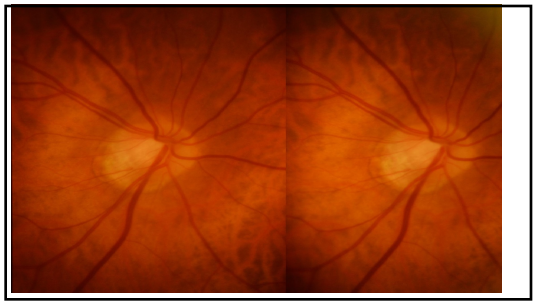
Case 3

125

63 yo WF

- BCVA 20/25 OU
- Moderate myopia OU
- PERRL-APD
- PXE with atrophy OU
- GAT: 15/18 @7:27am (on Xelpros but D/C 3 days ago 2^ irritation)
- CCT 528, 530
- Gonioscopy: Gr 4, flat, CBB, gr 1 pigment 360 OU
- NS OU

126



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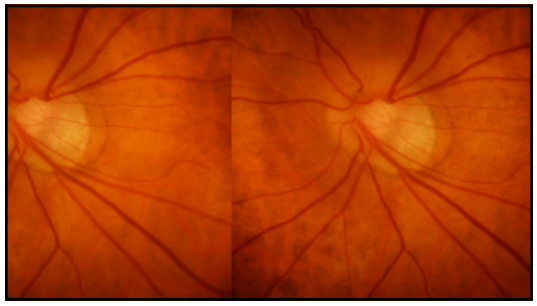
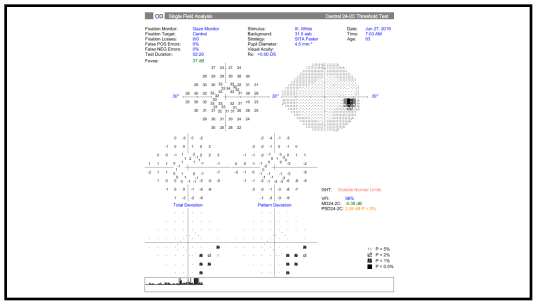


128

Is glaucomatous damage present?

- 1. Definitely yes
- 2. Definitely no
- 3. Difficult to say

129



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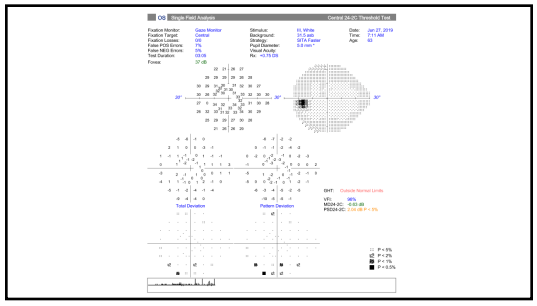

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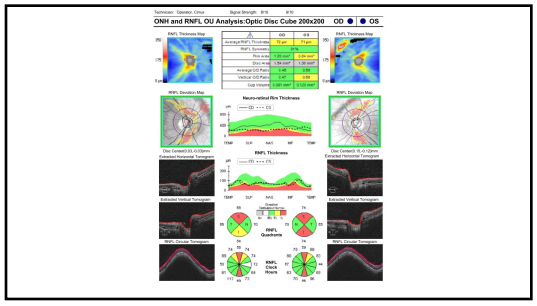

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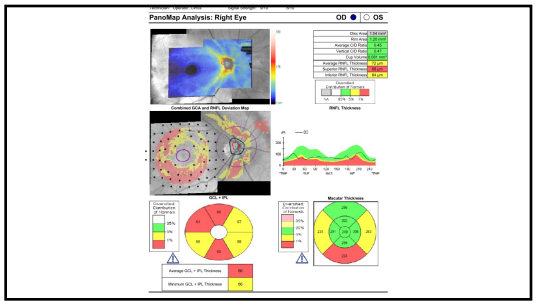

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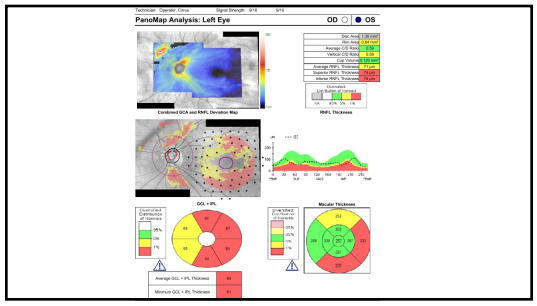
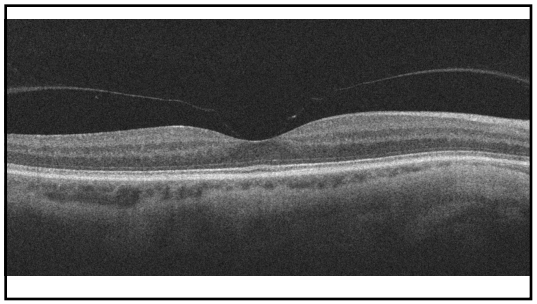


134

Is glaucomatous damage present?

- 1. Definitely YES
- 2. Definitely NO
- 3. UNCERTAIN

135



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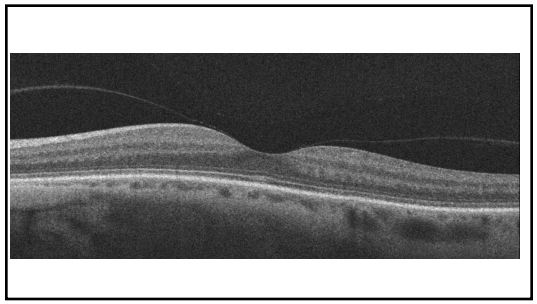

137

Should we treat this patient?

- 1. Yes
- 2. No
- 3. Refer to glaucoma specialist

138

Asessment and Plan:

- Glaucoma suspect 2^ PXE OU
  - Given young age, likely will need Rx
  - Return for diurnal curve and then suggest Lx (HS, HS)

139

Conclusion

- IOP plays an important role in ocular health – namely glaucoma
- Complete assessment to r/o secondary causes is important
- Measurement technique and imaging matters
- Monitor your patient

140

References

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