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Topics

- Primary Open Angle Glaucoma (POAG)
- Ocular Hypertension (OHT)
- Normal Tension Glaucoma (NTG)

At the end of this presentation, you must be able to answer these

Learning Objectives

- Discuss
  - Differences between POAG, NTG and OHT
- Discuss
  - Etiology, clinical features, investigation and management of POAG
- Discuss
  - Etiology, clinical features, investigation and management of NTG
- Discuss
  - Etiology, clinical features, investigation and management of OHT

Primary Open Angle Glaucoma

Definition

- Chronic, slowly progressive Optic neuropathy with characteristic patterns of optic nerve damage and visual field loss
- Not caused by another systemic or local disease.

Epidemiology

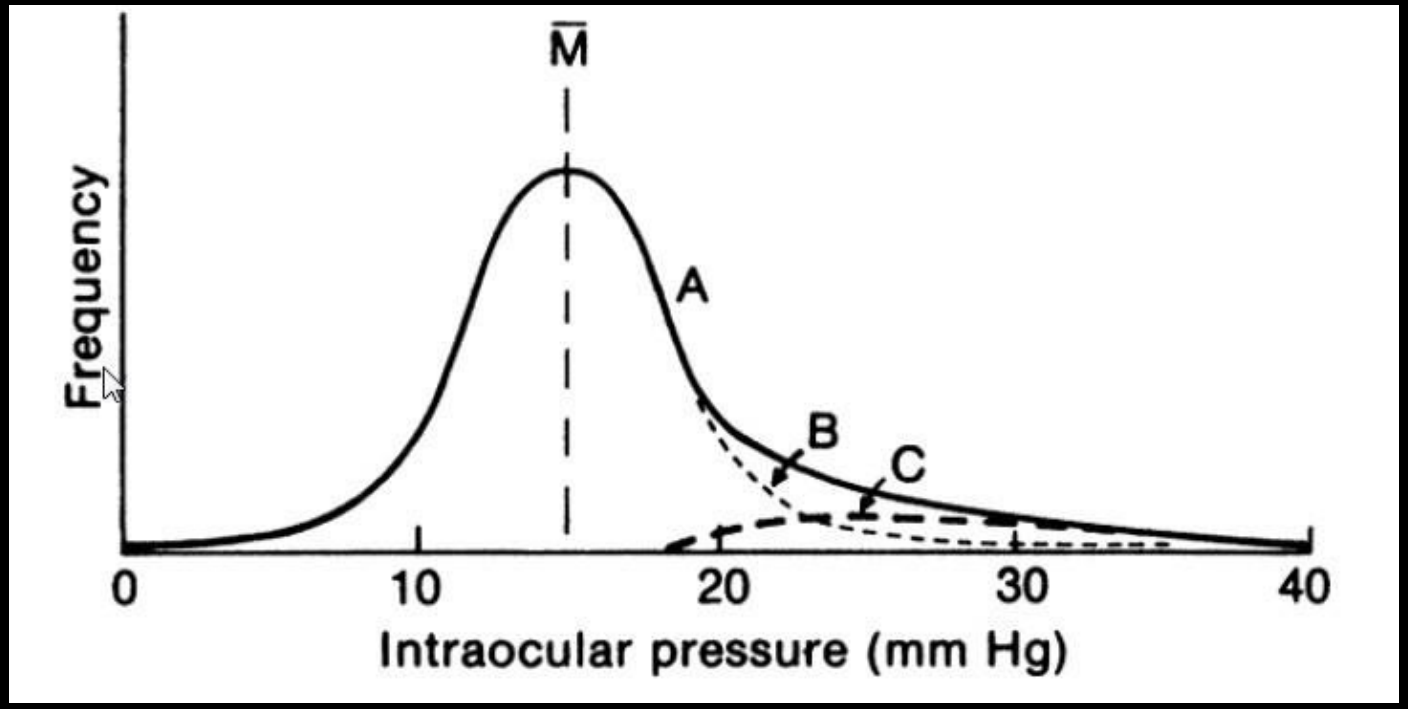
- Glaucoma is the 2nd cause of blindness and leading cause of irreversible blindness worldwide. (AAO 2010)
- POAG … Most common form of glaucoma (60-70%)
- Prevalence of bilateral blindness: 8% in blacks and 4% in whites

Risk factors

- Elevated IOP
- Increased C/D ratio
- CCT (<550 µm)
- Family Hx (x 3.7 in first degree)
- Age (> 60y/o)
- Race (x 6 in African Americans)
- Other (CRVO, Myopia, HTN, DM and Migraine)

Intra Ocular Pressure

- Mean IOP: 15.5 mm Hg ± 2.6 SD



Distribution of intraocular pressure in population.

Line B represents the “normal” population completing a gaussian distribution.
Line C represents the abnormal population, which added to the normal population produces the tail.

Central Corneal Thickness

- Average 525-545 µm
- Increased CCT in OHT
- Decreased CCT in NTG

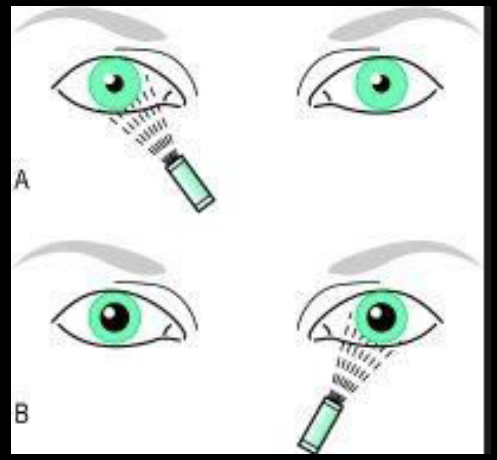
Clinical features

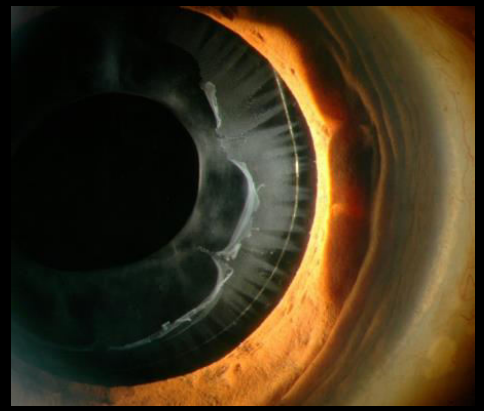
- Insidious
- Slowly progressive
- Painless
- Significant visual loss
- Usually bilateral (asymmetric)

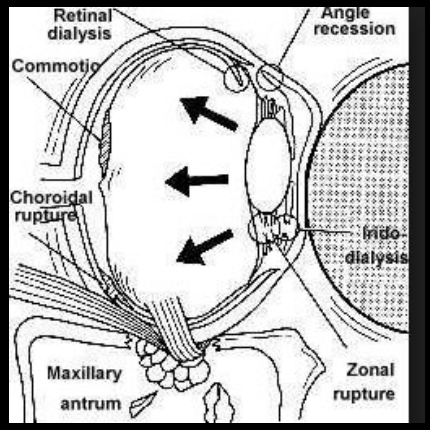
Diagnosis

Combination of structural and functional damage of optic nerve

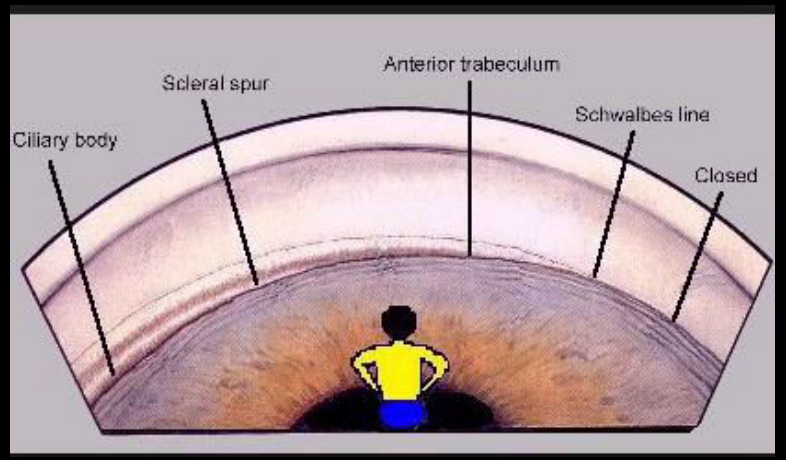
Clinical Examination

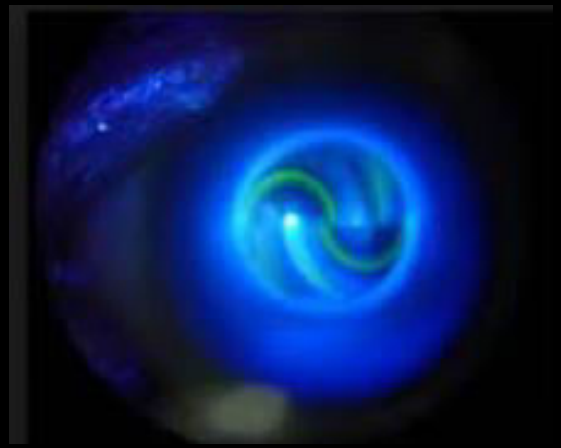


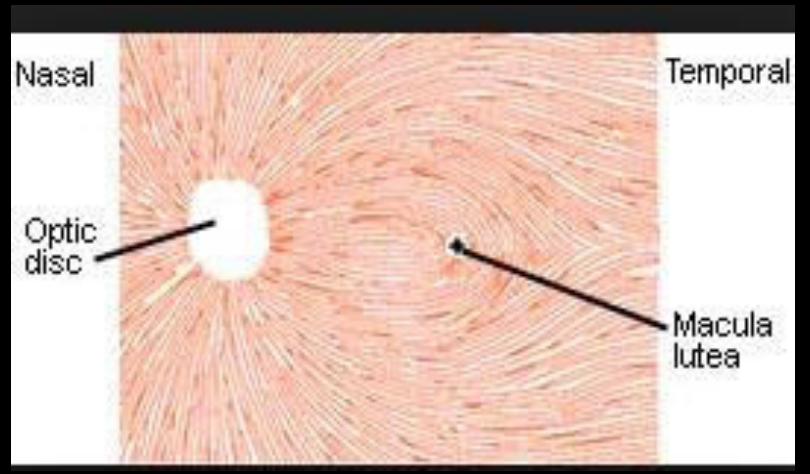




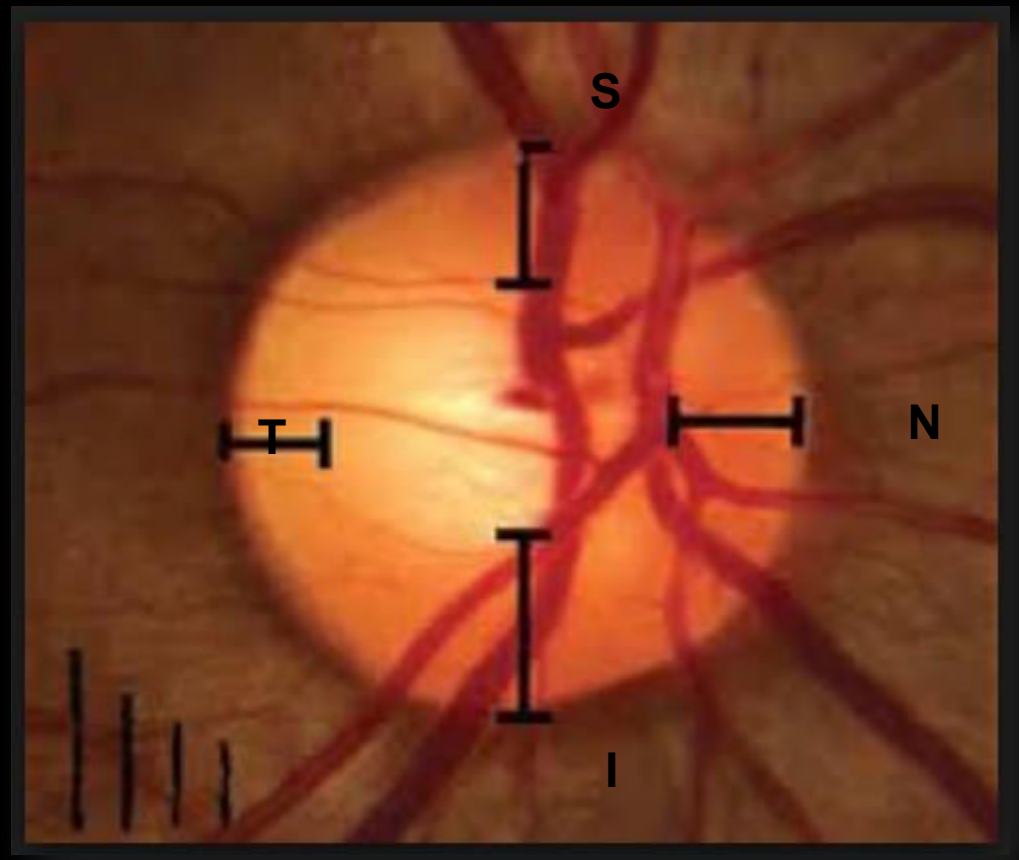
Clinical Examination



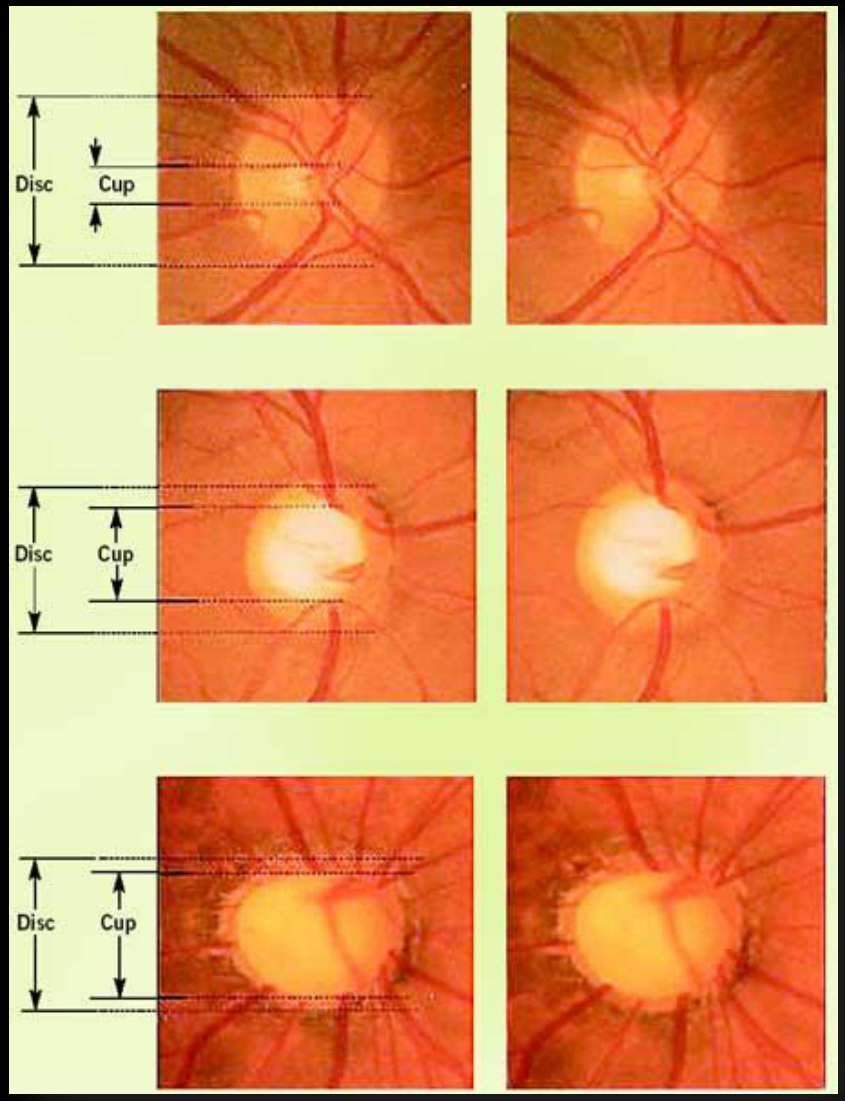




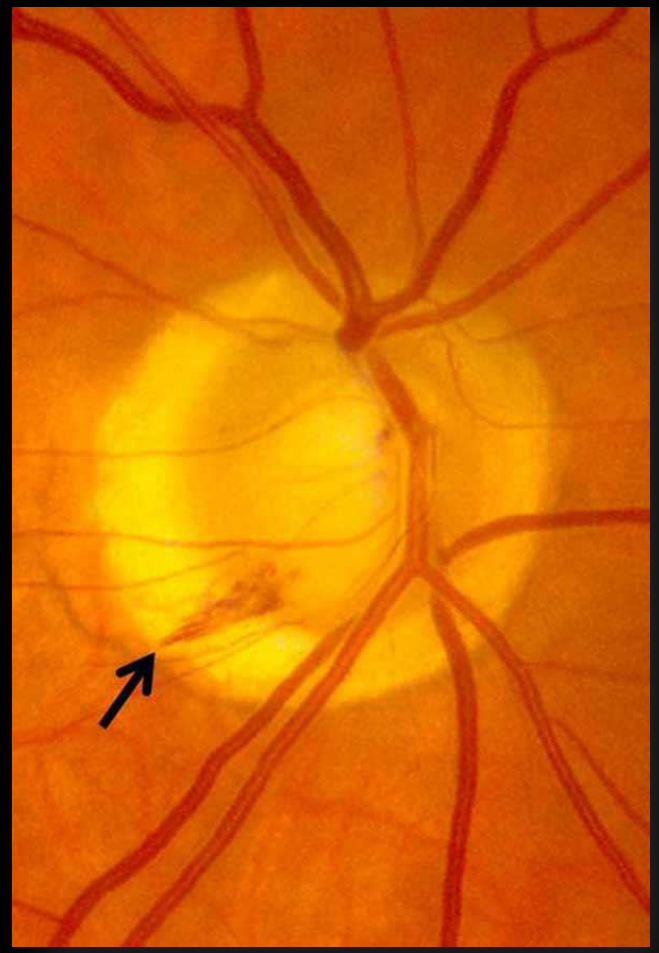
Optic Disc Appearance (ISNT rule)



Asymmetry of the rim or cupping



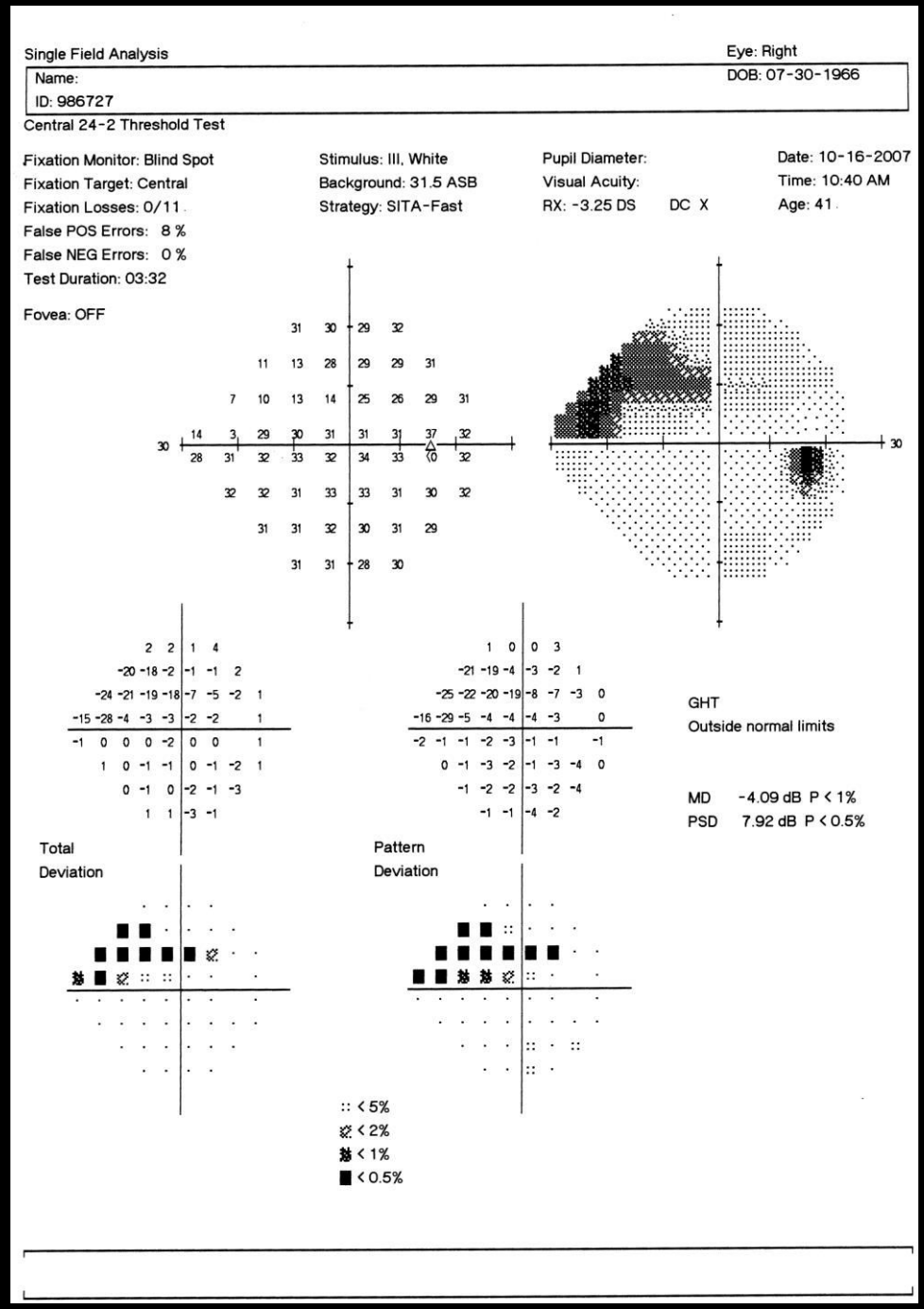
Disc hemorrhage



Visual Field Loss

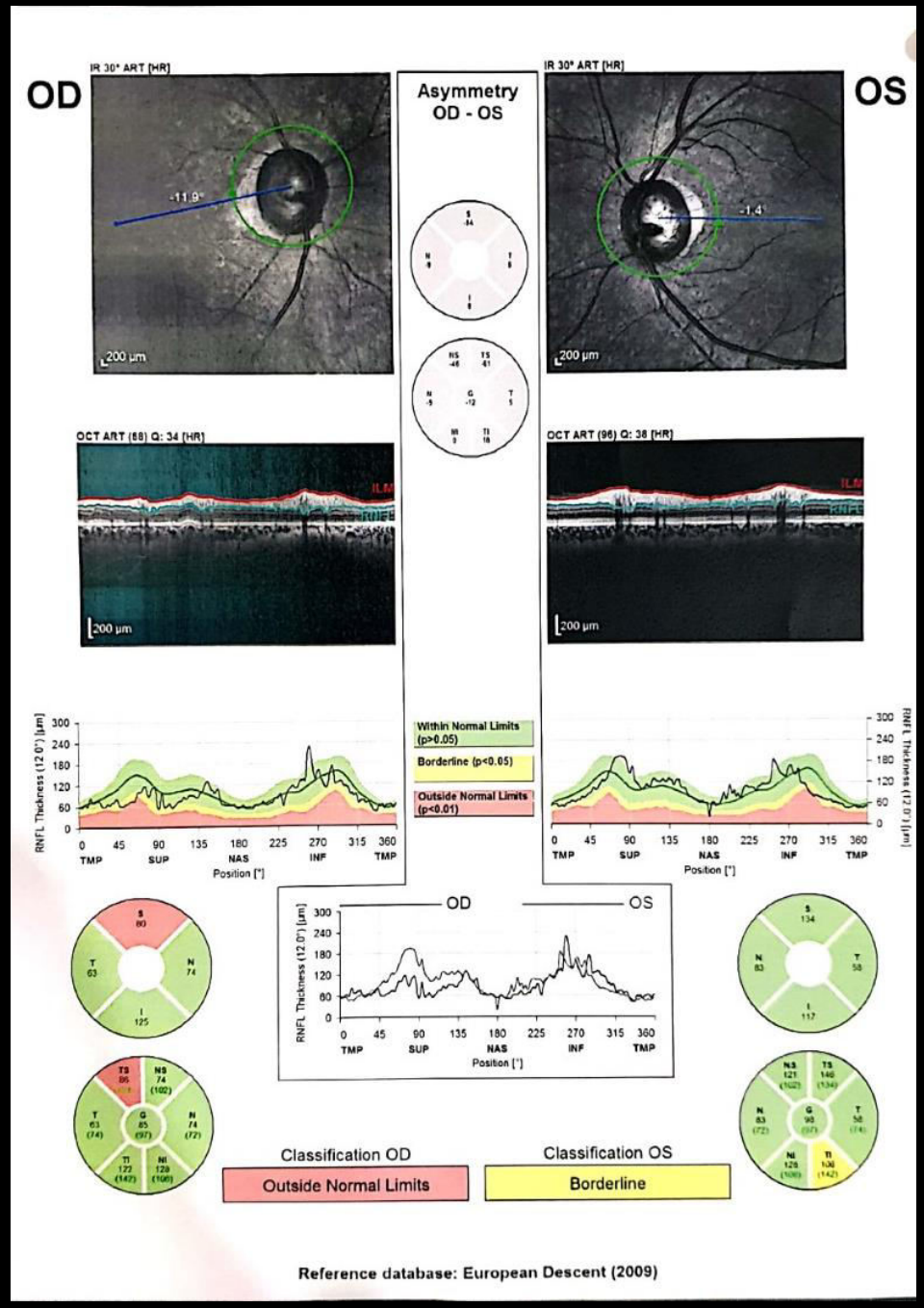
Functional loss

- Humphrey
  - White on White Full Threshold
  - SITA – Swedish Interactive
  - Thresholding Algorithm
  - Blue on Yellow
- Frequency Doubling Test
- Octopus
- High Pass Resolution



Structural Loss

- Optical Coherence Tomography (OCT)
- Heidelberg retinal Tomography (HRT)



Management

- Target is to achieve an IOP which stops progression of the optic neuropathy and development of complications.
    - Medical
    - Laser
    - Surgical

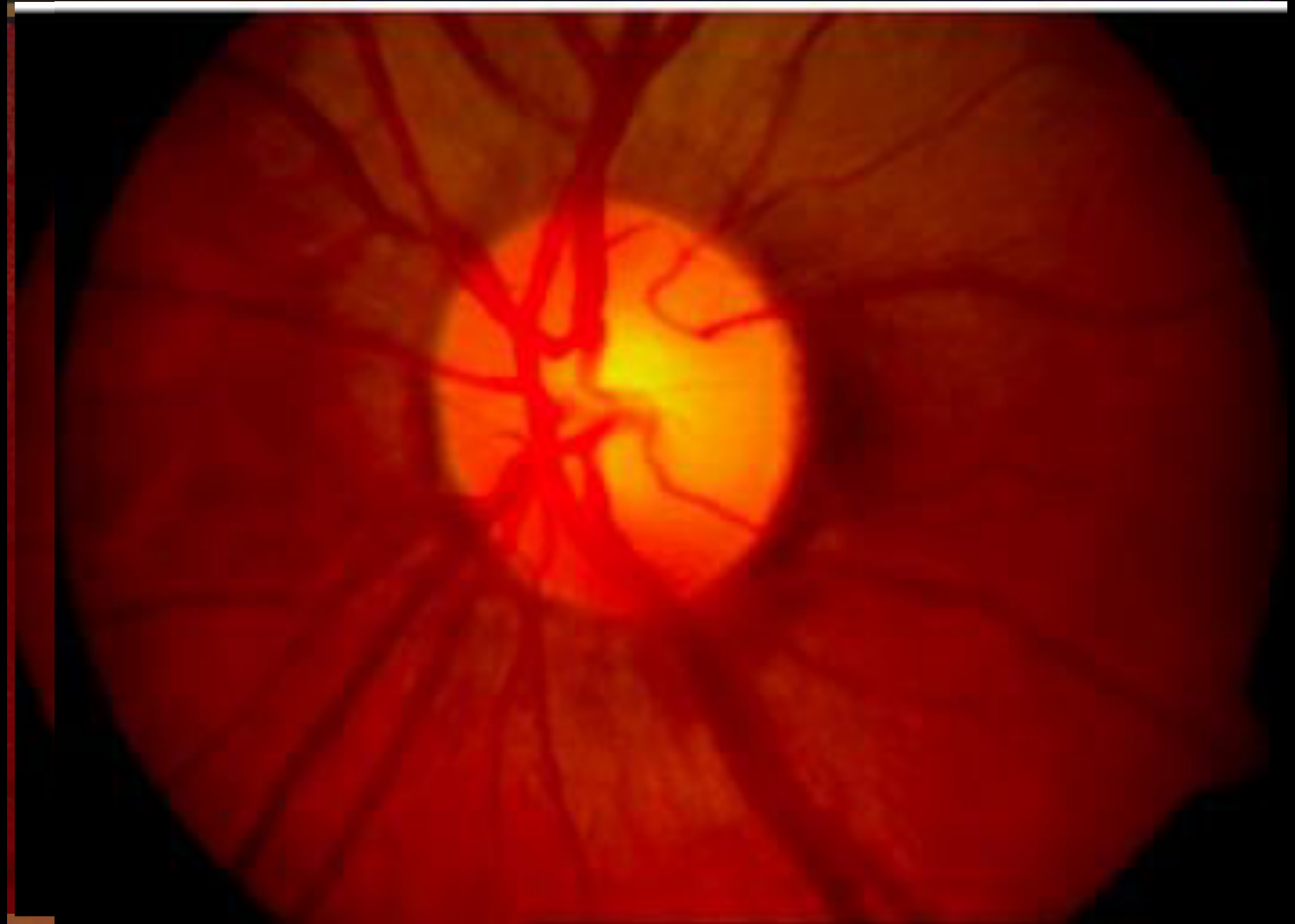
Ocular Hypertension

Definition

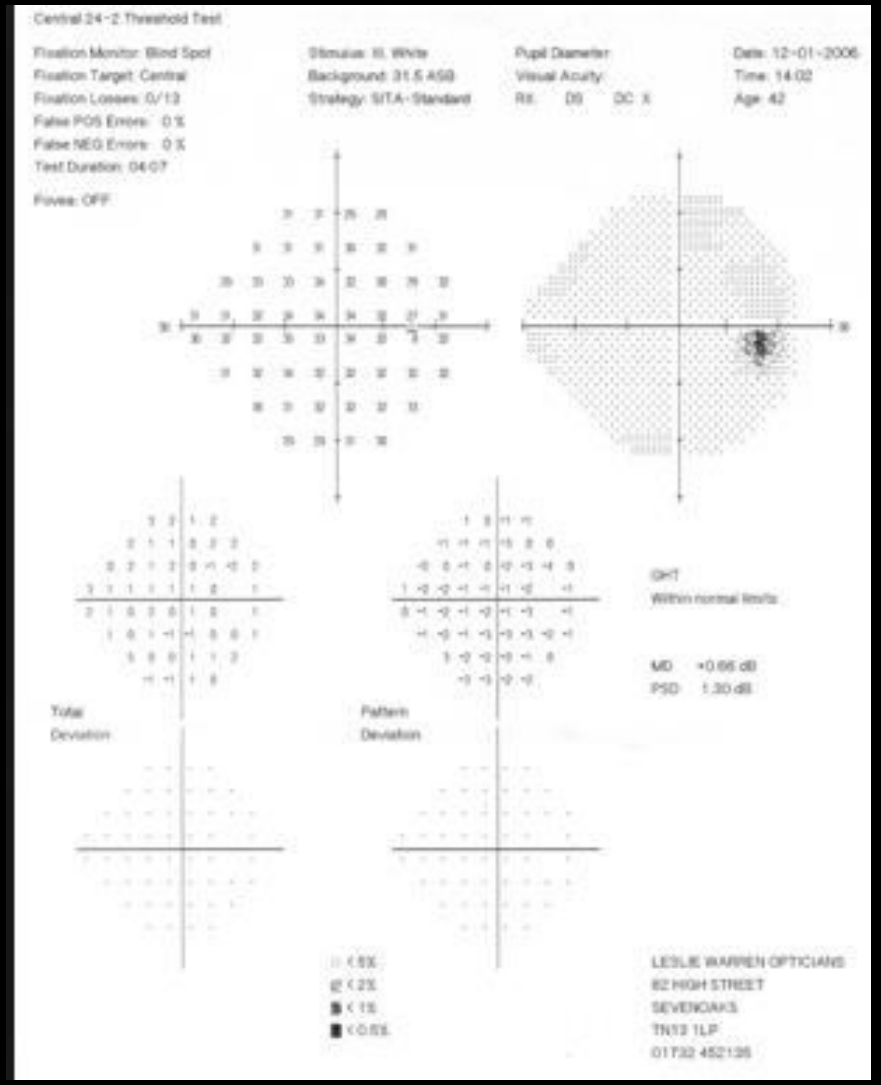
- Elevated intraocular pressure without evidence of structural and functional damage by standard clinical tests.

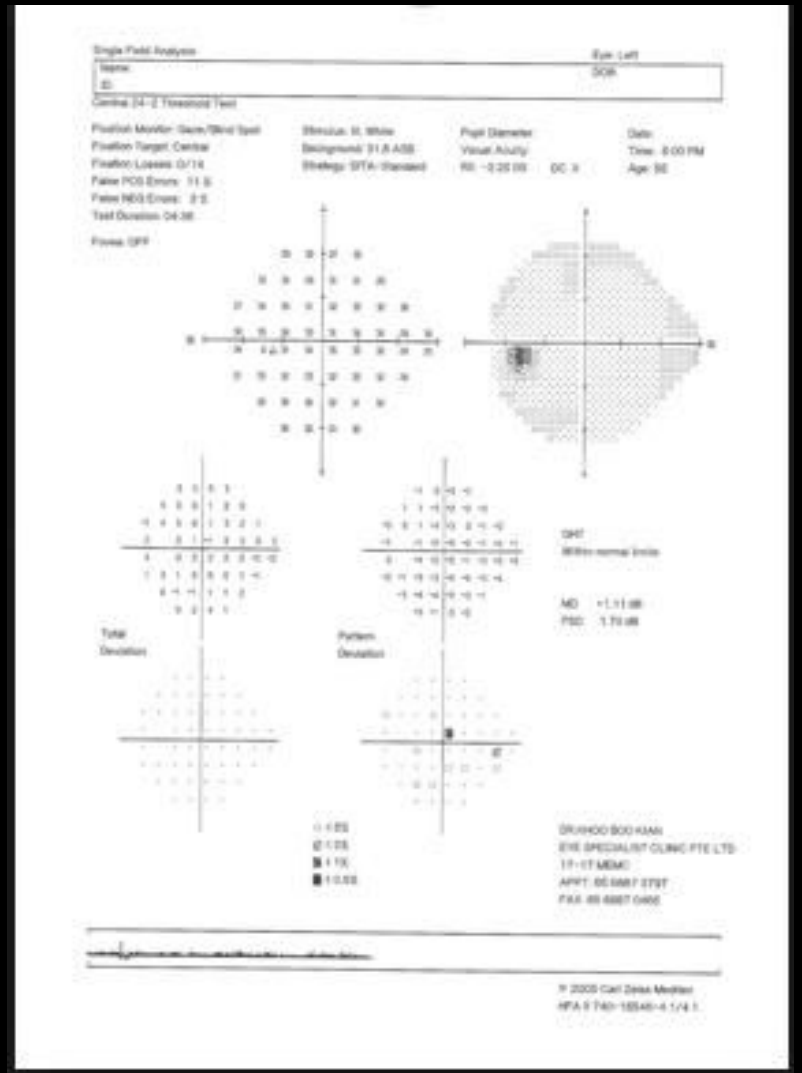
- Must have:
  - Open angles!
  - No ocular or systemic cause of elevated IOP.

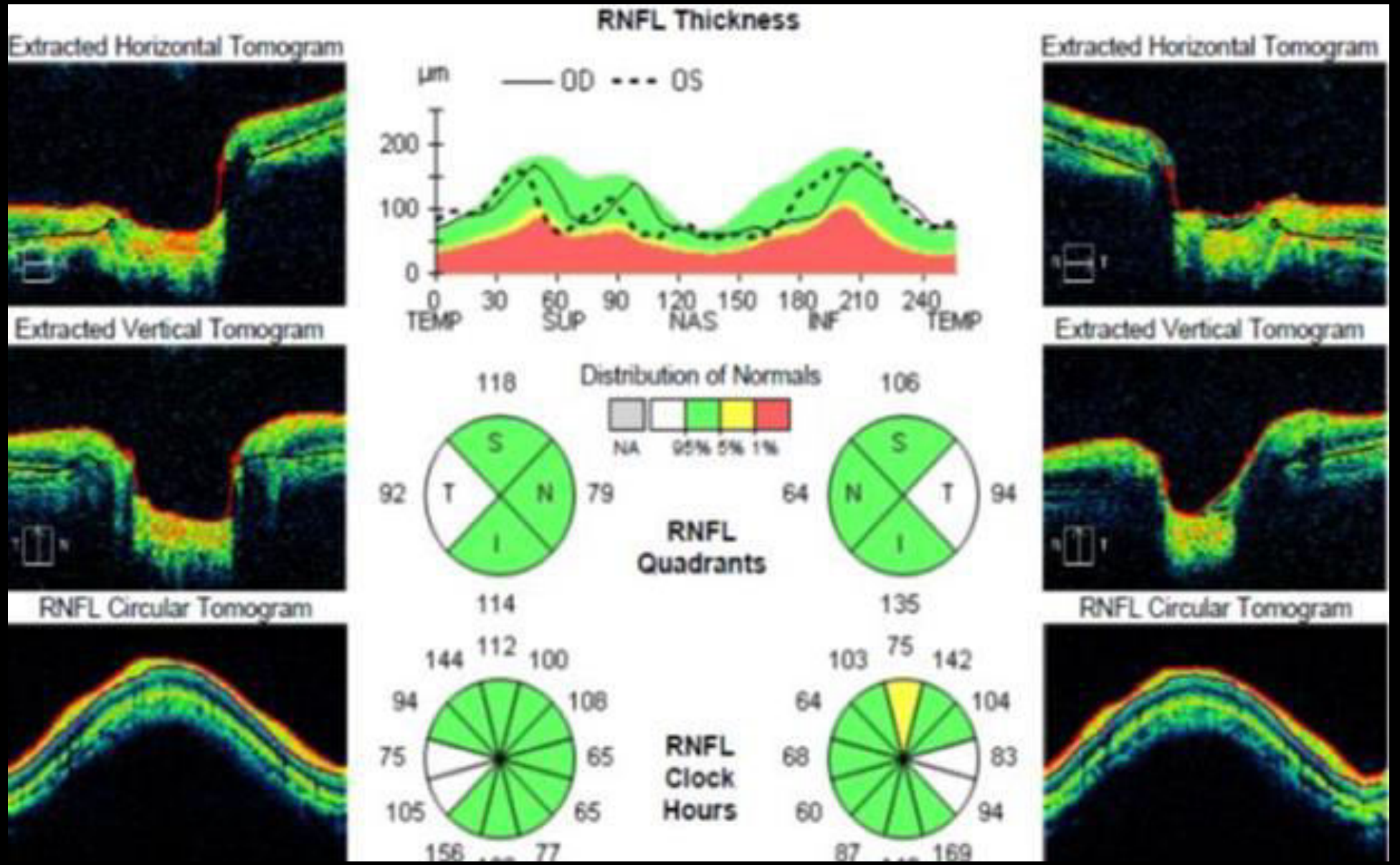
>21 mmHg



Next step?


Central 24-2 Threshold Test
Fixation Monitor: Blind Spot
Fixation Target: Central
Fixation Losses: 0/13
False POS Errors: 0 %
False NEG Errors: 0 %
Test Duration: 04:07
Fovea: OFF
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard
Pupil Diameter:
Visual Acuity:
Rx: DS DC X
Date: 12-01-2006
Time: 14:02
Age: 42
GHT
Within normal limits
MD +0.66 dB
PSD 1.30 dB
Total Deviation
Pattern Deviation
< 5%
< 2%
< 1%
< 0.5%
LESLIE WARREN OPTICIANS
82 HIGH STREET
SEVENOAKS
TN13 1LP
01732 452135


Single Field Analysis
Eye: Left
Name
ID:
Central 24-2 Threshold Test
Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 0/14
False POS Errors: 11 %
False NEG Errors: 2 %
Test Duration: 04:38
Fovea: OFF
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard
Pupil Diameter
Visual Acuity
Rx: -0.25 DS DC X
Date:
Time: 8:00 PM
Age: 50
GHT
Within normal limits
MD +1.11 dB
PSD 1.70 dB
Total Deviation
Pattern Deviation
DR KHOO BOO KIAN
EYE SPECIALIST CLINIC PTE LTD
APPT: 65 6887 2737
FAX: 65 6887 0400


RNFL Thickness
Extracted Horizontal Tomogram
µm
OD
OS
200
100
0
0 30 60 90 120 150 180 210 240
TEMP SUP NAS INF TEMP
Extracted Horizontal Tomogram
Extracted Vertical Tomogram
Distribution of Normals
NA 95% 5% 1%
118
S
92 T N 79
I
114
106
S
64 N T 94
I
135
RNFL Quadrants
Extracted Vertical Tomogram
RNFL Circular Tomogram
144 112 100
94 108
75 65
105 65
156 77
103 75 142
64 104
68 83
60 94
87 169
RNFL Clock Hours
RNFL Circular Tomogram

Conclusion

Topical ocular hypotensive medication is effective in reducing the incidence of glaucomatous VF loss and/or ON deterioration in subjects with IOP between 24-32 mmHg.

Treatment

- Goal:
  - Setting a reasonable target: <21.
- Follow-up at least every 6 months with tests.

Normal Tension Glaucoma

NTG - Definition

- “low-tension glaucoma, normal-pressure glaucoma”
- Chronic optic neuropathy
- Parallels primary open angle glaucoma with:
  - Characteristic optic nerve cupping
  - Visual-field loss

BUT:

- Consistently normal IOP (≤21mmHg)
- Absence of systemic/ocular features contributing to other forms of optic neuropathy

Pathophysiology

- Different schools of thought:
  - Hypersensitivity to IOP
  - Vascular perfusion problem
    - deficiency in short posterior ciliary circulation
  - Autoimmune process

Risk Factors

- Not just IOP!
- Currently not known
- Suspected risk factors:
  - Age → elderly
  - Sex → female preponderance
  - hereditary component (variable)
  - Vasospastic disorders
  - Autoimmune disease

Raynaud's Phenomenon

Diagnostic Evaluation

- Take a good medical history! Ask about:
  - Past steroid use, (prior ocular hypertension)
  - Thin corneas (i.e. past refractive surgery)
  - Past symptoms of anemia
  - Orthostatic symptoms
  - Symptoms of sleep apnea
  - Migraine

Further Diagnostic Evaluation

- Diurnal IOP curve
- Gonioscopy → rule out angle closure, angle recession, previous intraocular inflammation
- Stereoscopic disc evaluation → rule out congenital/acquired disc anomalies
- Visual field → glaucomatous defects
- +/- medical/neurologic evaluation → blood work (anemia, infection etc.), auscultation of carotid arteries, CT/MRI brain/orbits

NTG vs. POAG

- How can you differentiate the two?

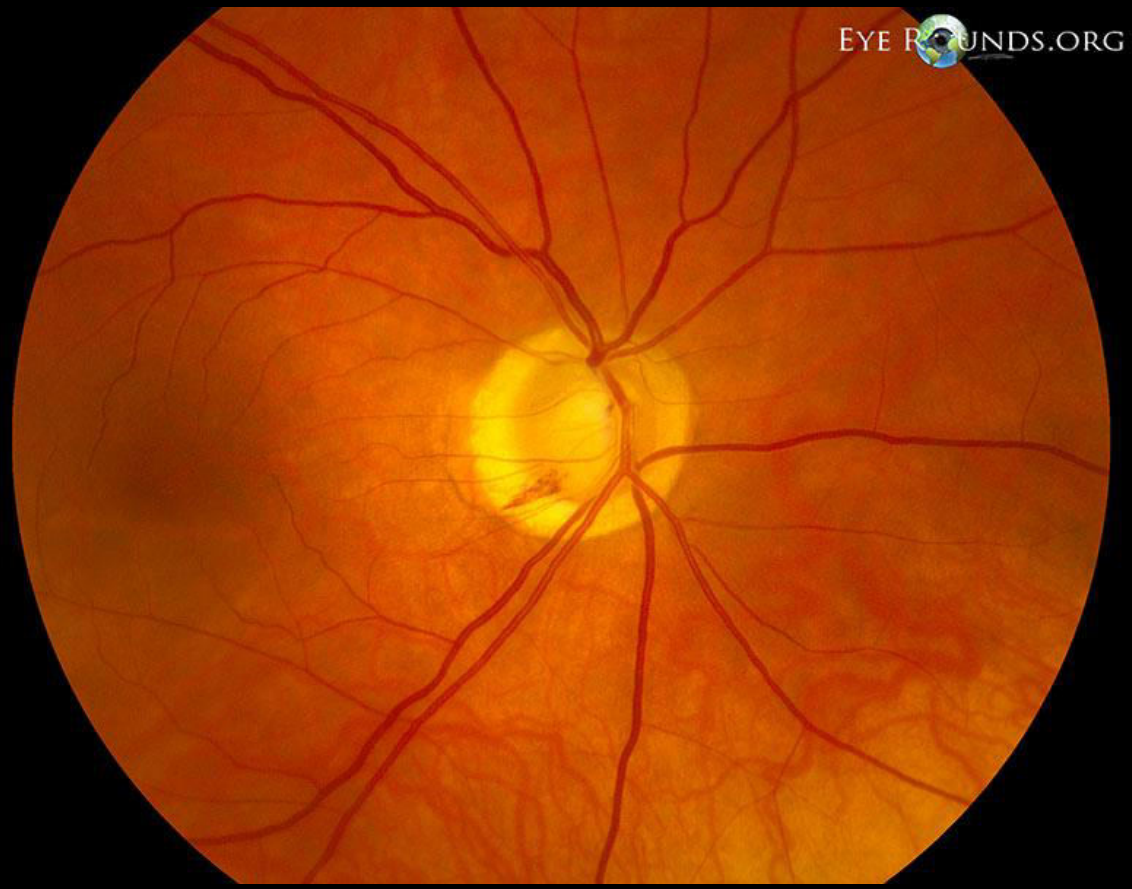
NTG vs. POAG

- Lower IOP
- Visual field defects are deeper, steeper and closer to fixation
- Visual field defects worse than expected based on optic disc appearance
- More focal notching and localized defects on nerve fiber layer
- Higher propensity for disc hemorrhages

NTG vs. POAG Patients

- NTG patients 10 years older on average
- Female
- Familial tendency
- Myopic
- Recurrent disc hemorrhages → linked with progression in visual field

Disc Hemorrhage



Significance of Disc Hemorrhages

- Associated with and a risk factor for disease progression
- Need amplification in glaucoma therapy!

Treatment

- Initiated for NTG, unless optic neuropathy is stable
- CNTGS → results supported reduction of IOP by 30% to reduce progressive visual field loss

In Summary

- NTG → diagnosis of exclusion!
- Need to take a thorough medical history and physical examination over time
- Reducing IOP by 30% is effective in slowing down disease progression

Summary

- Normal Tension Glaucoma
- Ocular Hypertension
- Normal Tension Glaucoma

Any Question ?

MCQ 1

- A 45 years old male is referred for glaucoma evaluation. His IOP is 32 & 24 mm Hg in right & left eye respectively with cupping of optic discs. There also changes on OCT RNFL and Visual field testing with open angles on Gonioscopy on both sides. He denies any systemic illness or trauma history.

What is your most probable diagnosis in this case?

A. Normal tension glaucoma
B. Ocular hypertension
C. Pigmentary glaucoma
D. Primary open angle glaucoma
E. Secondary open angle glaucoma

Ans: D

MCQ 2

- A 65 years old female is referred for glaucoma evaluation. Her IOP is 12 & 11 mm Hg in right & left eye respectively with cupping of optic discs. There are also changes on OCT RNFL and Visual field testing with open angles on Gonioscopy on both sides. She has history of migraine .

What is your most probable diagnosis in this case?

A. Normal tension glaucoma
B. Ocular hypertension
C. Pigmentary glaucoma
D. Primary open angle glaucoma
E. Secondary open angle glaucoma

Ans: A

Thank you