

# Optic Nerve Head Changes In Glaucoma

By

Prof. Dr. Ali Khalifa

The Egyptian Society For The  
Glaucoma's

2013

*“It’s time to change paradigm. Instead of relying only on IOP and VF, we should consider the appearance of the optic disc and the RNFL. This may be even more important than the VF examination in the future.”*

RN Weinreb, 2003

# **Five Rules for the Assessment of the Optic Nerve Head in Glaucoma**

**Remo Susanna Jr, MD**

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Hamilton Glaucoma Center  
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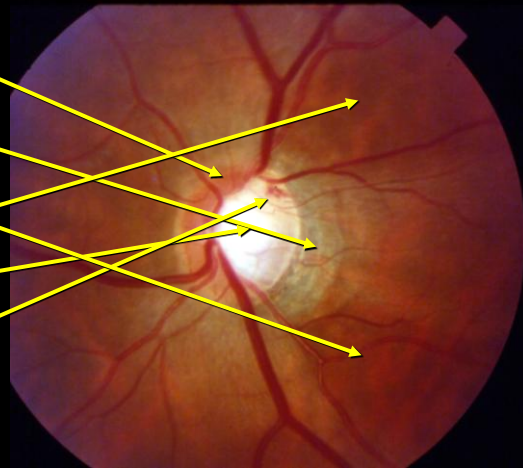


Prof. Ali Khalifa

Prof. Remo Susanna

## Five Rules for the Assessment of the Optic Nerve Head in Glaucoma

1. Look first at the rim (and not at the cup)
2. Look at the peripapillary region
3. Look at the retinal nerve fiber layer
4. Look at the lamina cribrosa
5. Look for optic disc hemorrhage



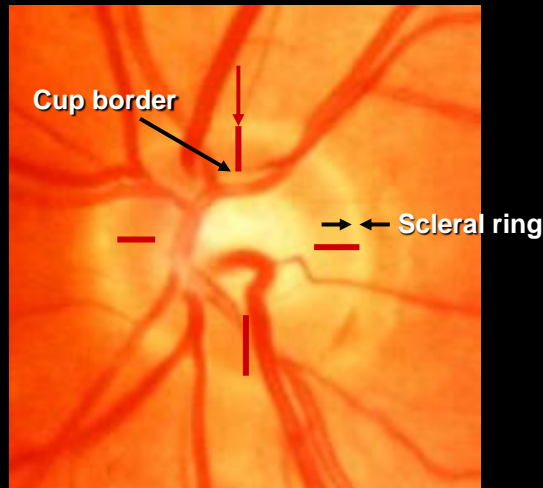
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# Rule #1

## Identify the Rim: Look at the Scleral Ring and Cup Border

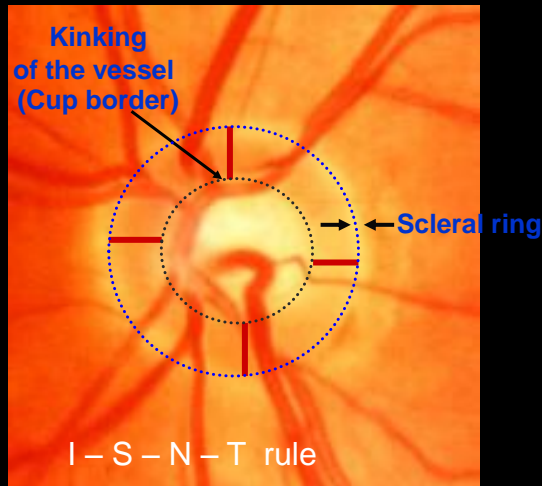
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**Rim width** = distance between the scleral ring and the location where the vessel is bent (cup border) NOT the white



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**Rim width** = distance between the scleral ring and the location where the vessel is bent (cup border)



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## Clinical Importance of Glaucomatous Signs

Weak



Moderate

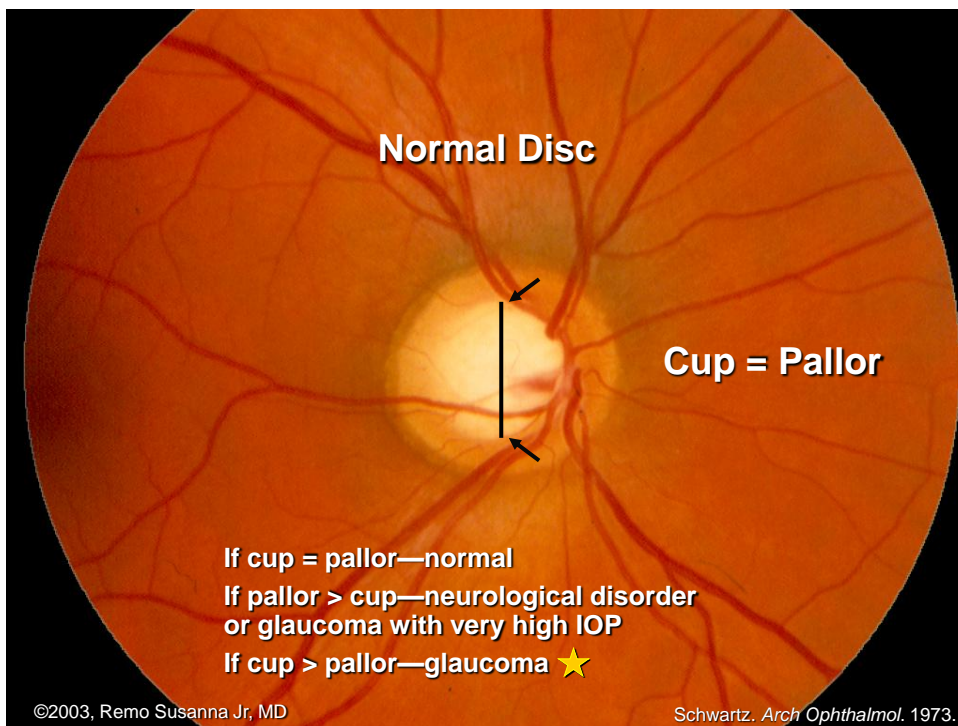


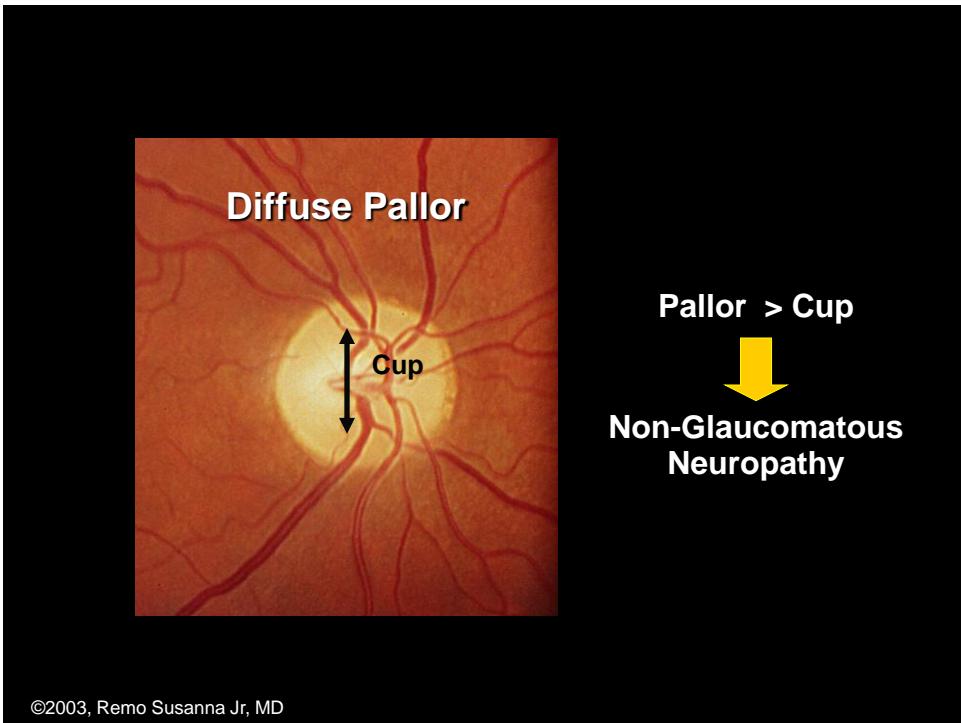
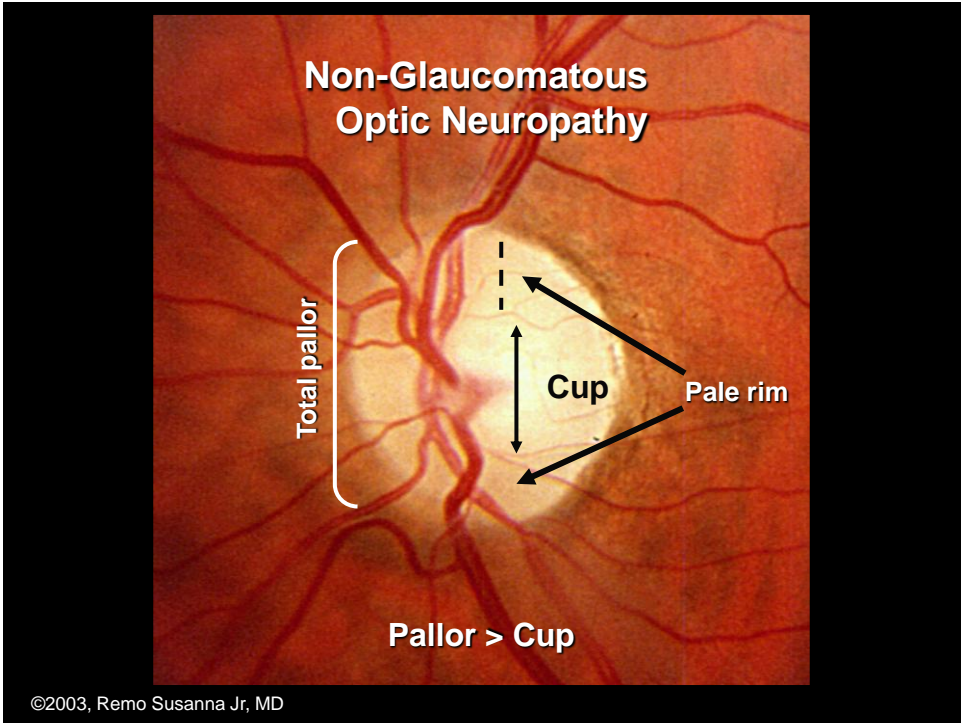
Strong

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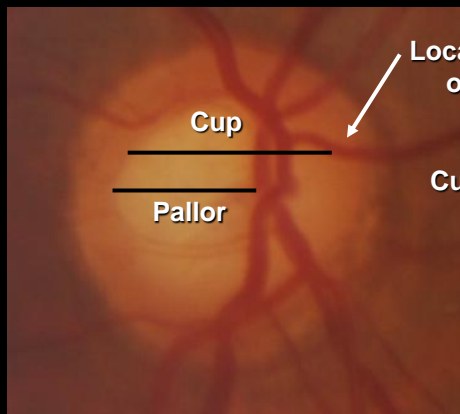
## The Color of the Rim

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# Glaucoma

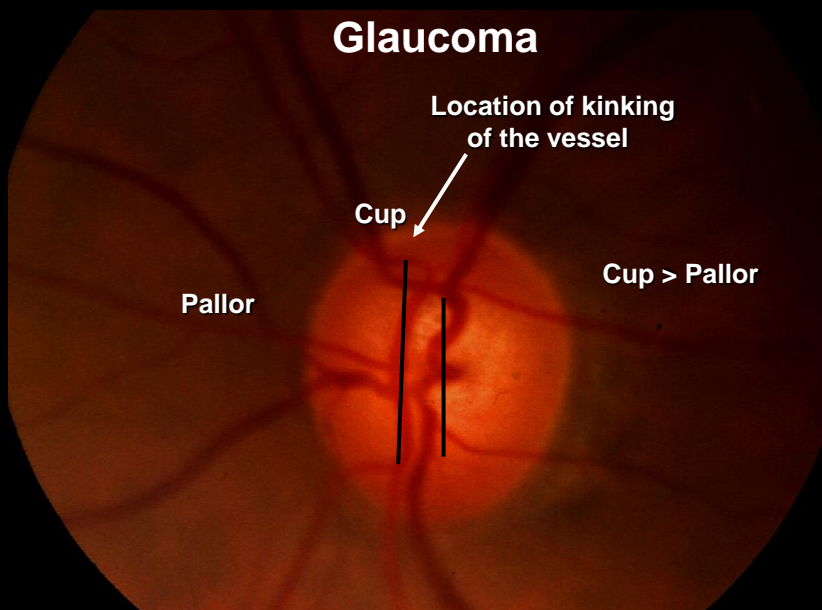


Location of kinking  
of the vessel

Cup > Pallor

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# Glaucoma



Location of kinking  
of the vessel

Cup > Pallor

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## Rule #2 Look at the Peripapillary Region

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### Peripapillary Halo

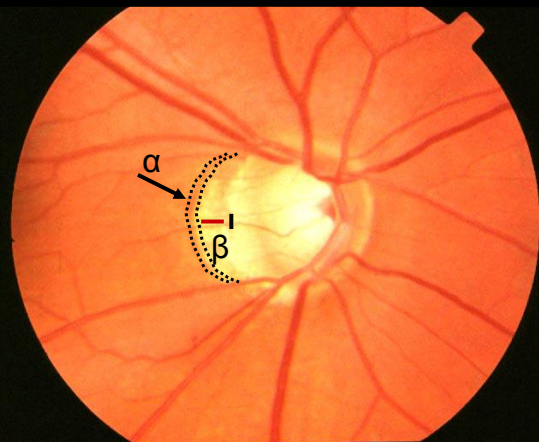
**Alpha Zone**

**Beta Zone** ★

Sensitivity 20% to 30%

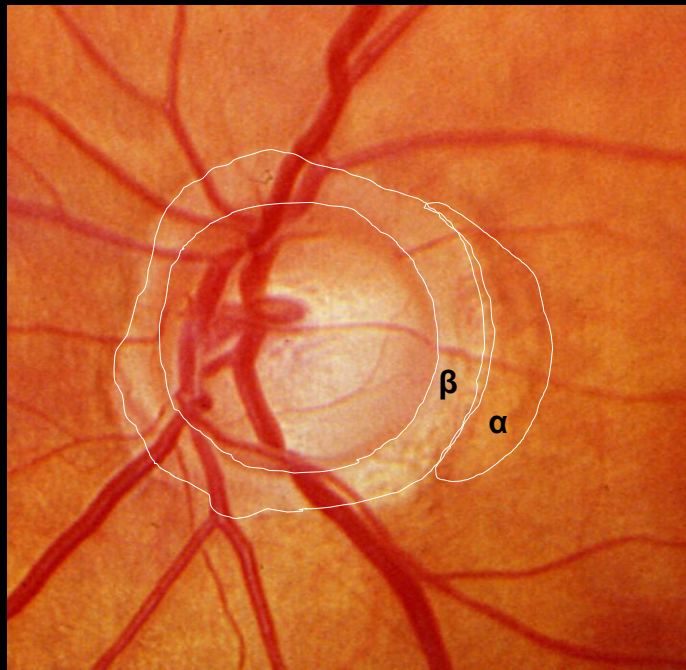
Specificity 80%

360°—normotensive  
senil-sclerotic glaucoma



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Jonas, et al. *Invest Ophthalmol Vis Sci*. 2000.

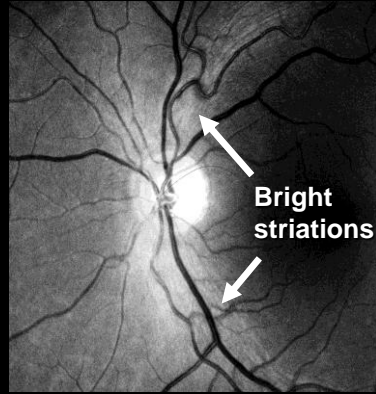
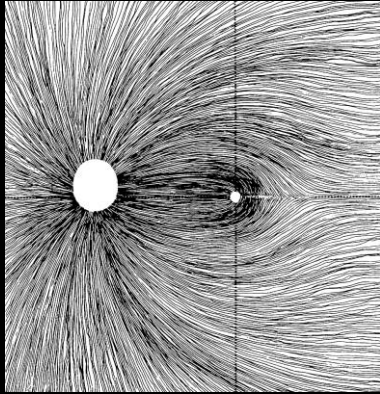


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### Rule #3 Look at the Retinal Nerve Fiber Layer

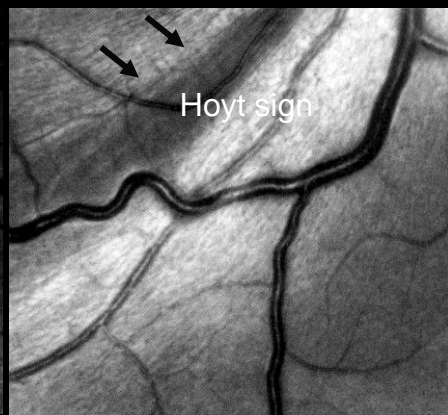
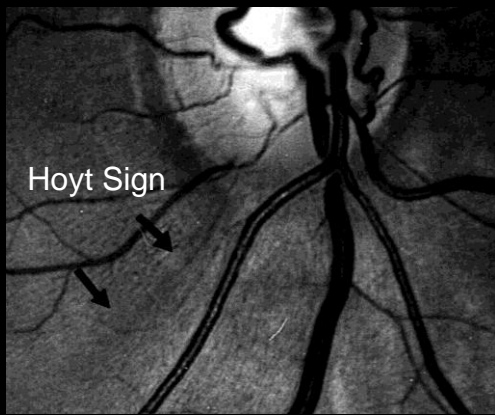
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# RNFL Red-Free Photographs



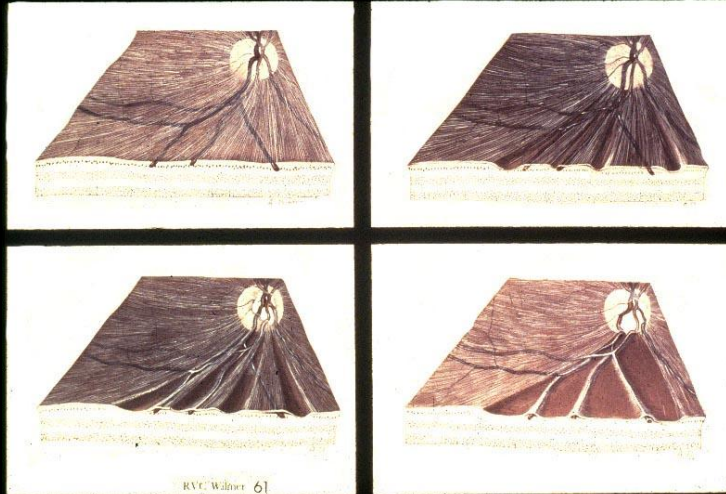
©2003, Remo Susanna Jr, MD

With Red - Free light



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## Localized RNFL Loss

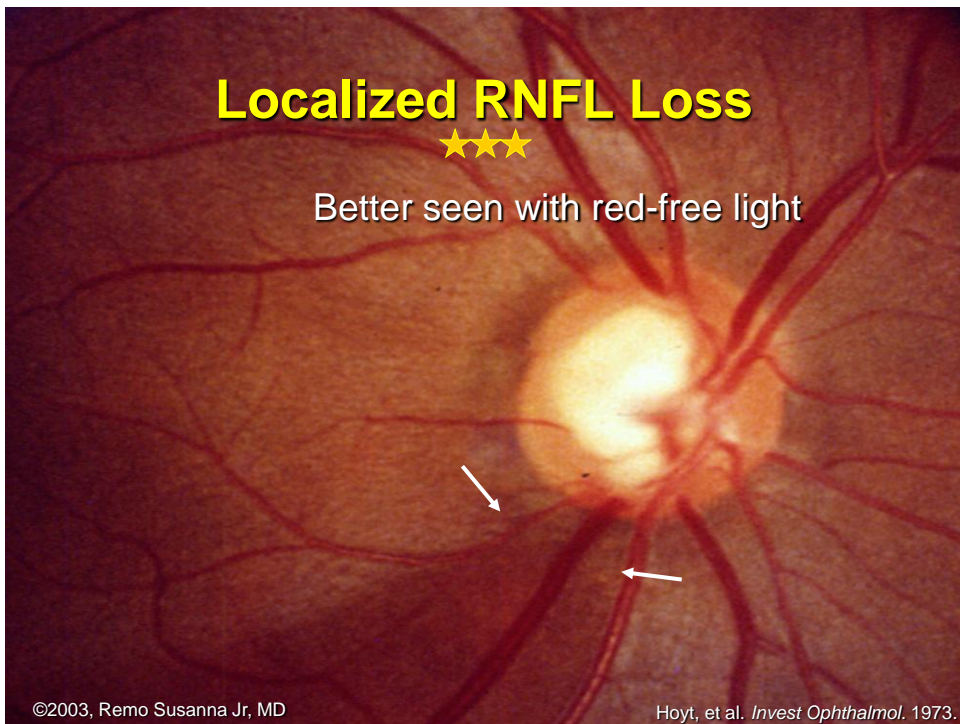


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## Localized RNFL Loss



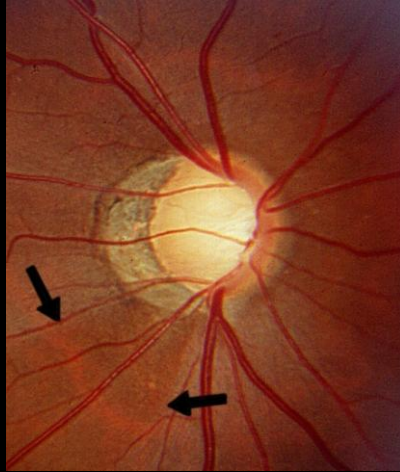
Better seen with red-free light



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Hoyt, et al. *Invest Ophthalmol.* 1973.

## Localized RNFL Loss

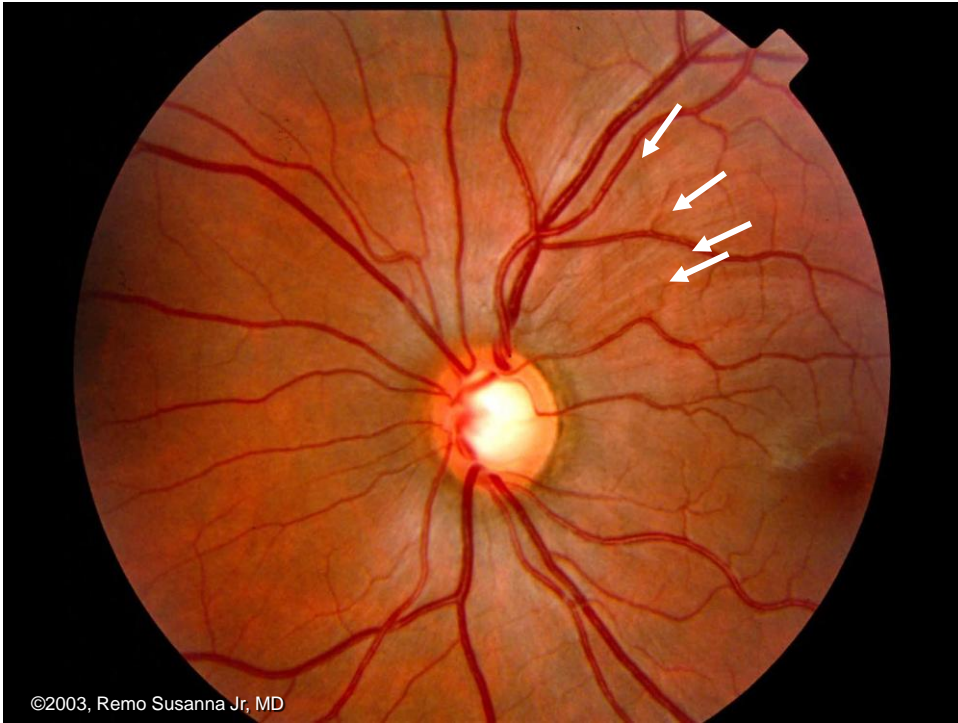


Localized RNFL loss – wedge-shaped dark area

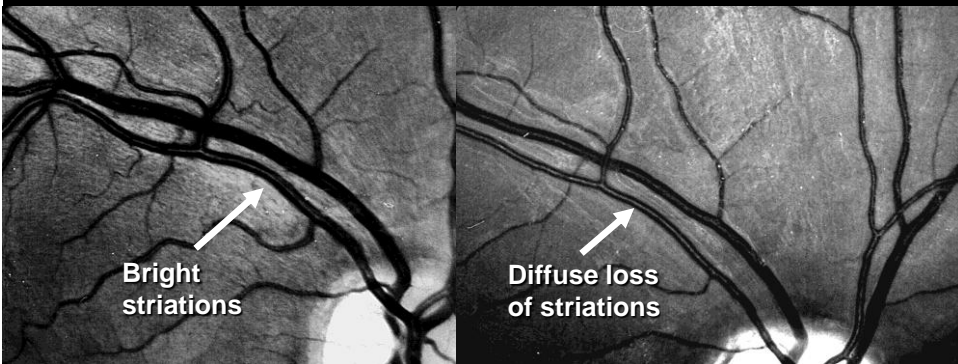
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## Diffuse RNFL Loss



**Diffuse RNFL loss – diffuse loss of the striate pattern + increased visibility of retinal vessel borders**

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## Normal RNFL

## Diffuse RNFL Loss ★★★



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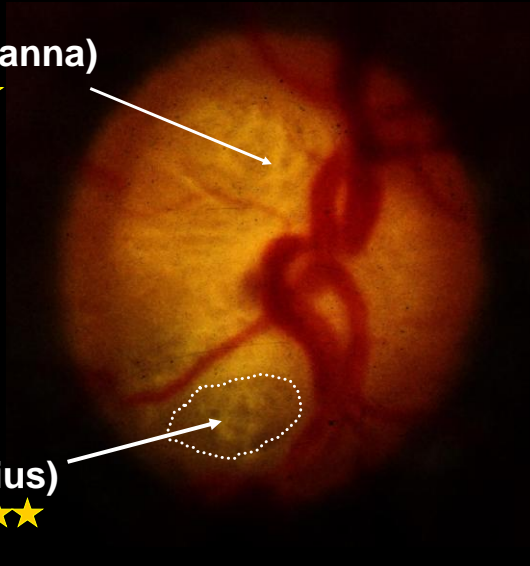
## Rule #4 Look at The Lamina Cribrosa

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# Lamina Cribrosa

## Striated pattern (Susanna)

Susanna R Jr. *Can J Ophthalmol.* 1983. ★



## Acquired optic pit (Radius)

Radius RL, et al. *Br J Ophthalmol.* 1978. ★★★

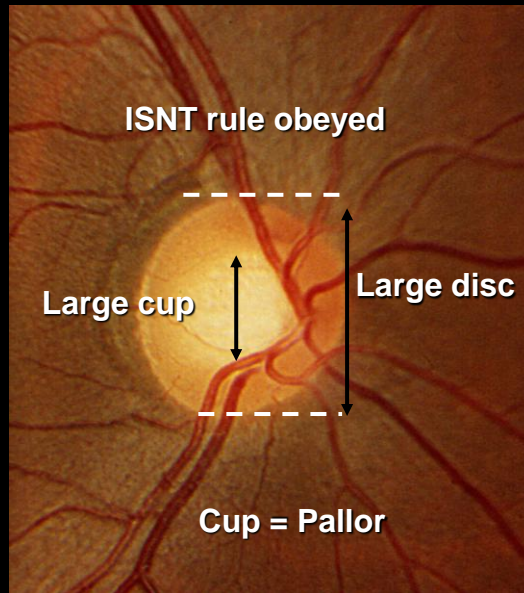
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**Remember That a  
Normal Large Disc Has a Large Cup**

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## Normal Disc

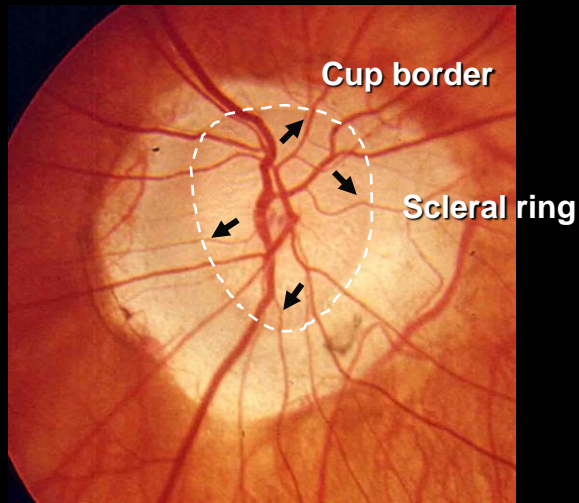


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## Be Cautious With Myopic Discs

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## Cup Size



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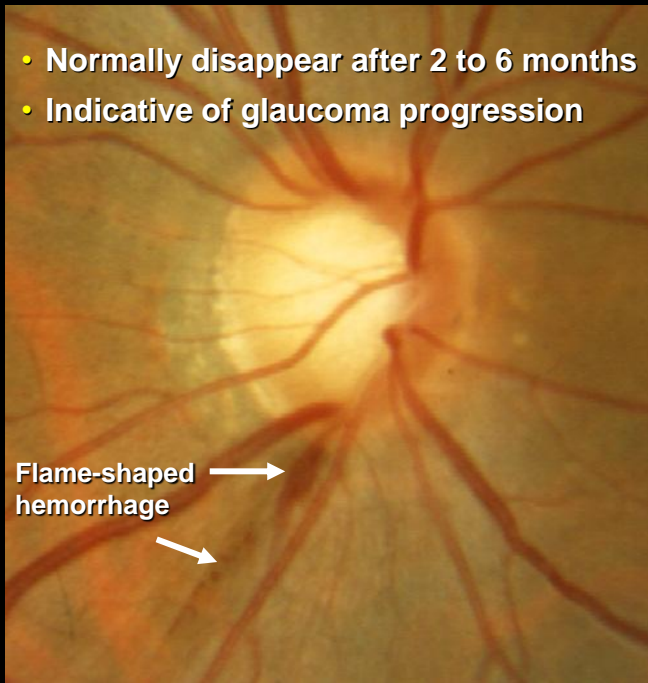
## Rule #5 Look for Optic Disc Hemorrhage



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- Normally disappear after 2 to 6 months
- Indicative of glaucoma progression

Flame-shaped hemorrhage →



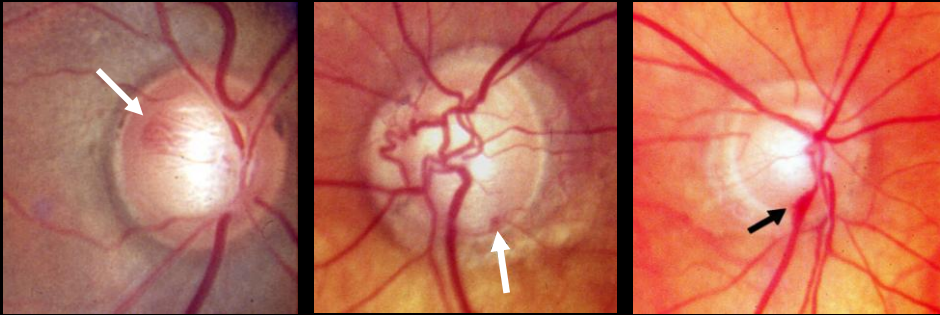
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- Normally disappear after 2-6 months
- Indicative of glaucoma progression



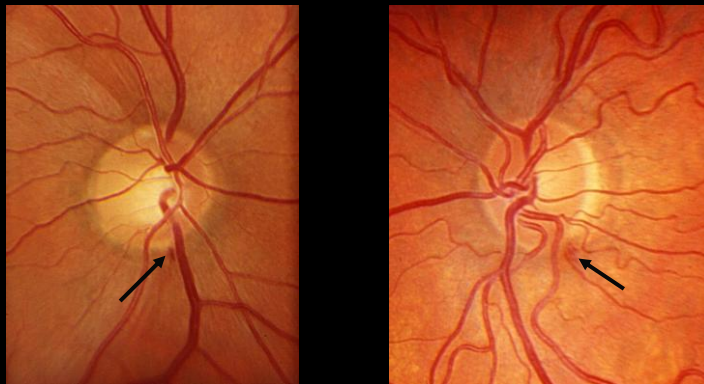
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**Detection of disc hemorrhages requires careful optic disc examination**



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**Detection of disc hemorrhages requires careful optic disc examination**



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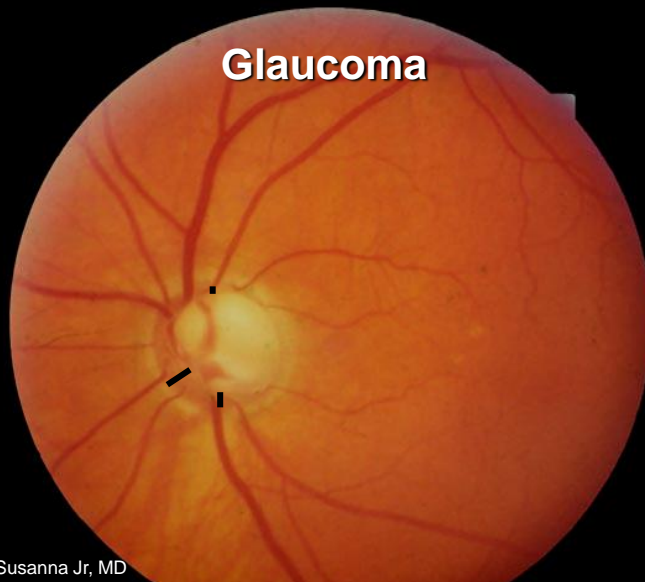
# Detecting Glaucoma

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## ISNT Rule Is Not Obeyed



Glaucoma



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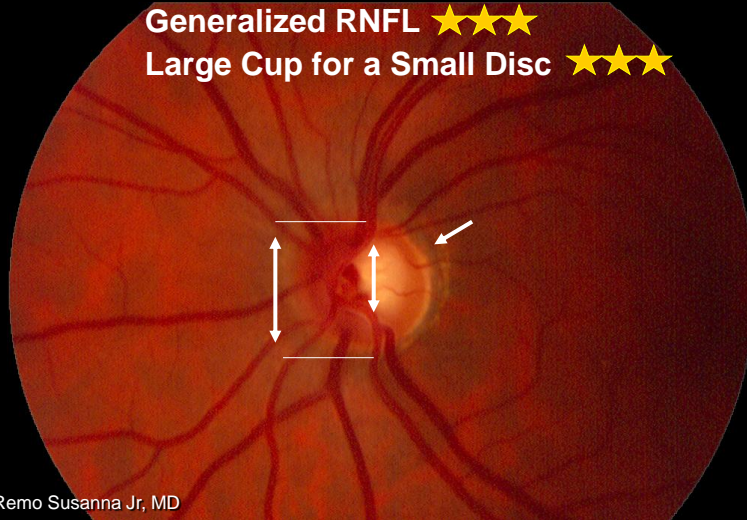
# Glaucoma – Small Disc

Peripapillary Halo ★

Narrowing of Retinal Arteries ★

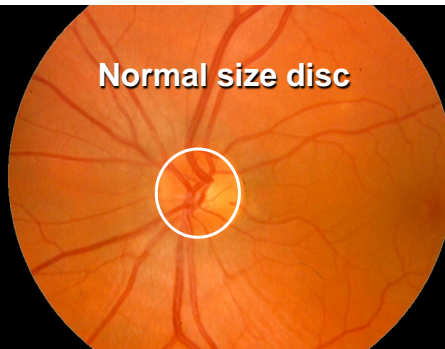
Generalized RNFL ★★ ★

Large Cup for a Small Disc ★★ ★

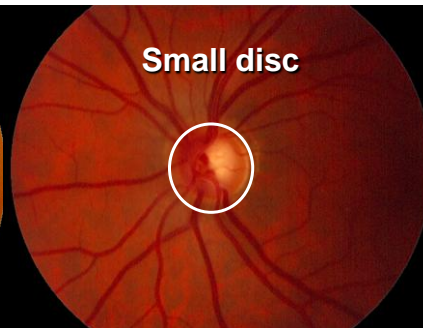


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Normal size disc



Small disc



Large disc



Small aperture (5 degree)  
of Welch-Allen direct  
ophthalmoscope

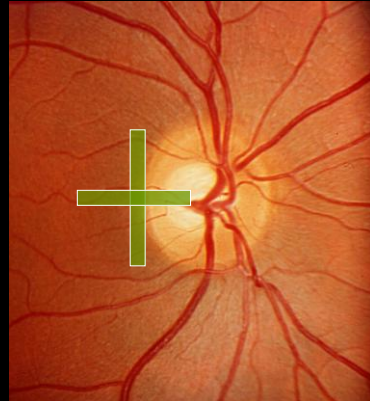


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# Optic Disc Size

## Measurement of optic disc size:

- Biomicroscopy:
  - Volk lens
  - Measure size of slit beam
- Correction factors:
  - Volk 60D – x 1.0
  - Volk 78D – x 1.1
  - Volk 90D – x 1.3

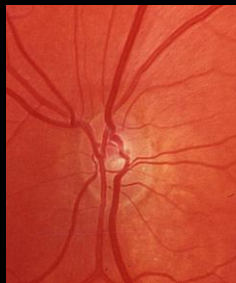


Average vertical diameter: 1.8 mm  
Average horizontal diameter: 1.7 mm

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# Optic Disc Size

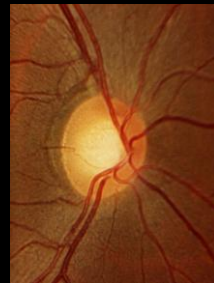
Size of the cup varies with size of the disc



Small



Medium

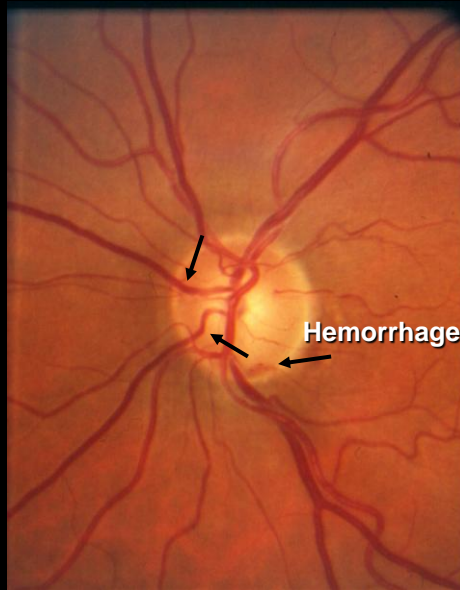


Large

**Identify Small and Large Optic Discs**  
**Small Discs: Average Diameter < 1.5 mm**  
**Large Discs: Average Diameter > 2.2 mm**

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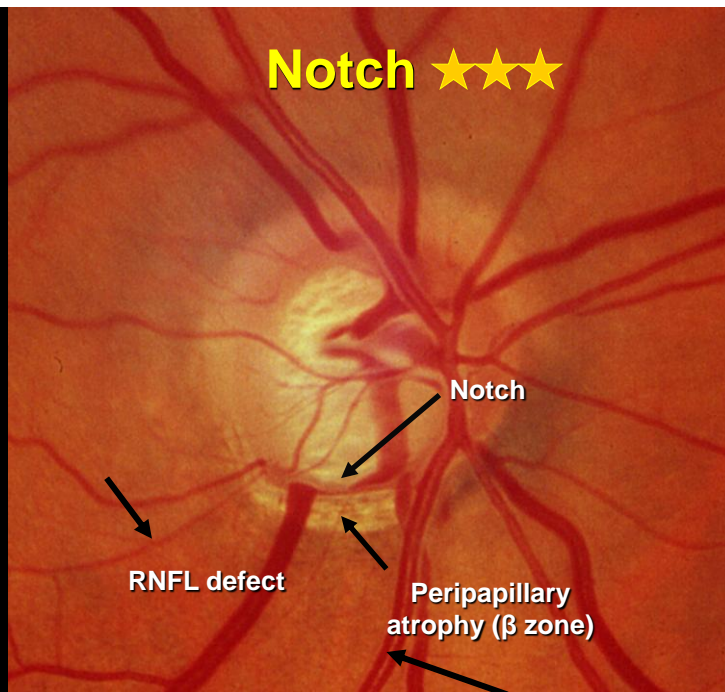
# Nasal Cupping ★★★



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Read and Spaeth. *Trans Am Acad Ophthalmol Otolaryngol.* 1974.

# Notch ★★★

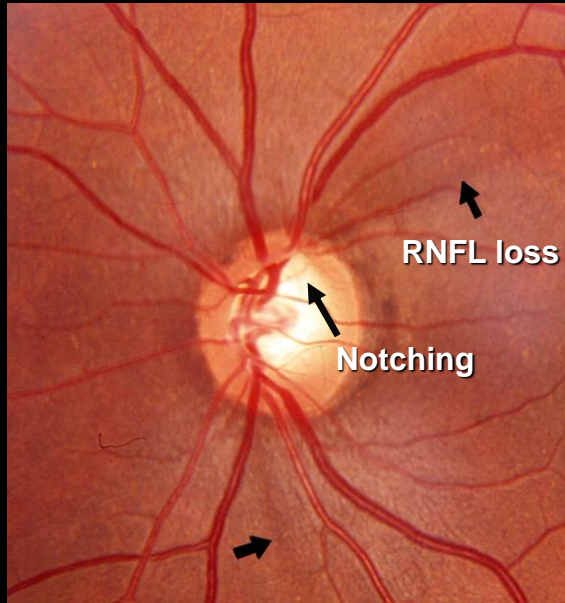


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Hitchings and Spaeth. *Br J Ophthalmol.* 1976.



# Glaucoma



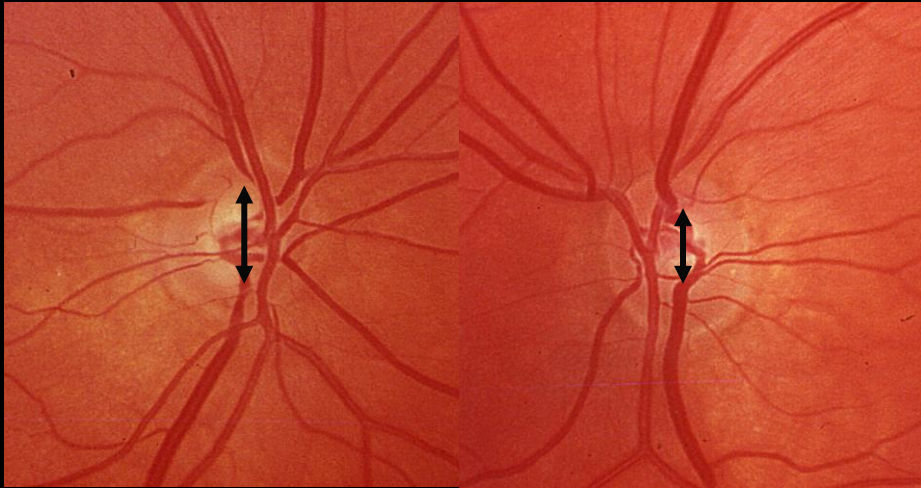
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## Cup/Disc Ratio Asymmetry $\geq 0.2$



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Armaly. *Arch Ophthalmol.* 1967.

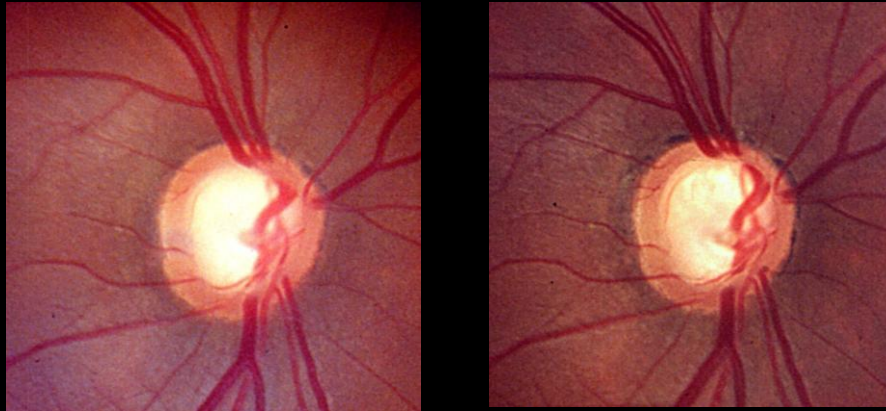


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## Detecting Progression (Compare Photographs During Follow-Up)

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## Generalized Rim Thinning

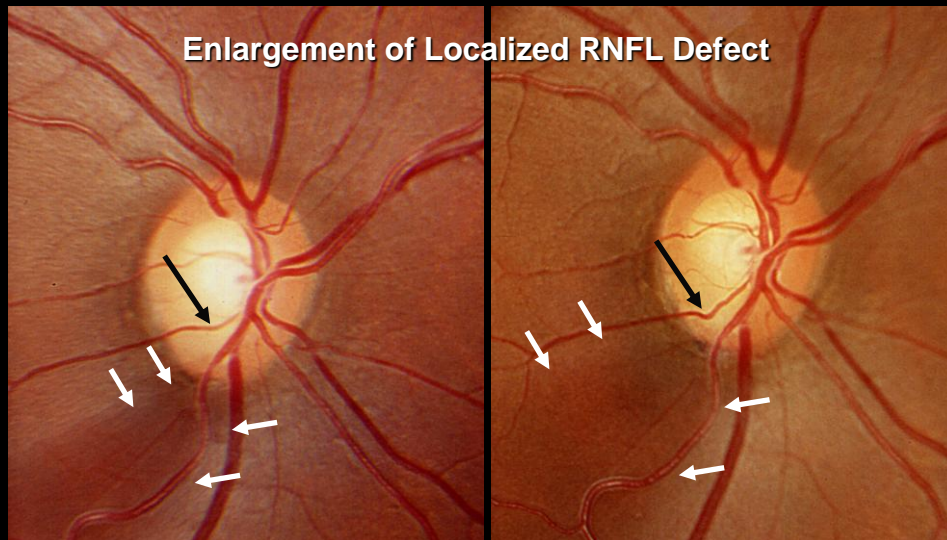


10 Years

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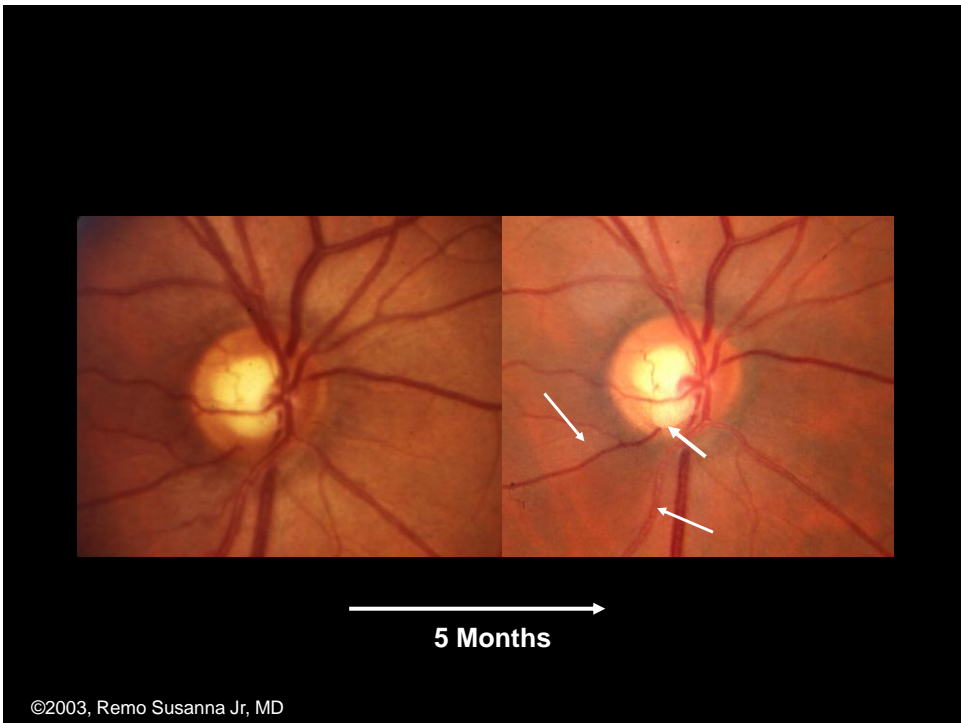
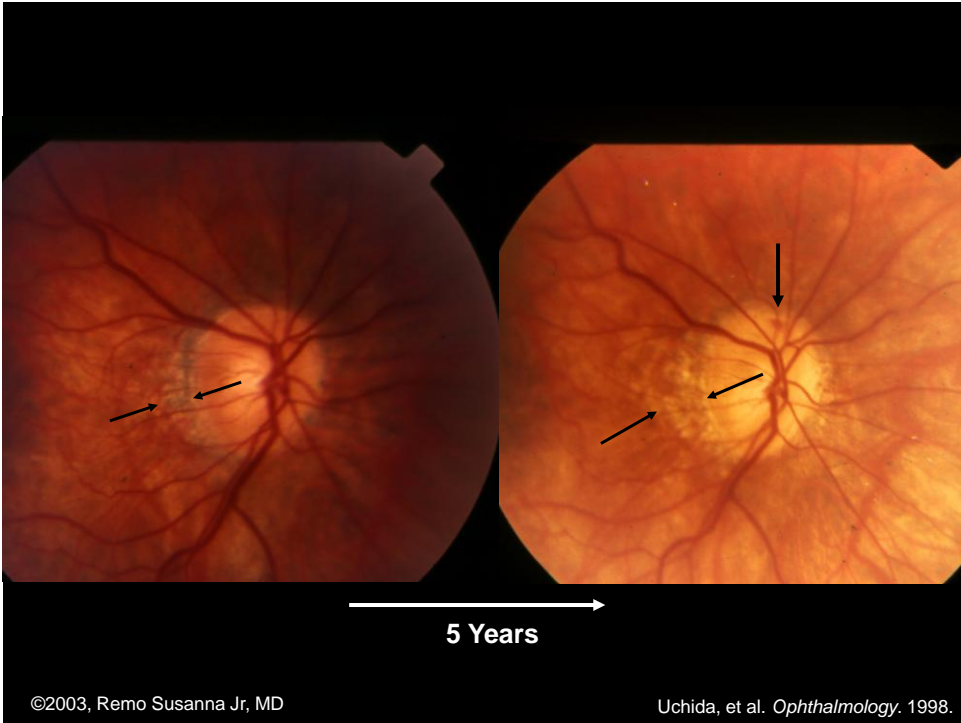
Varma R, et al. *Am J Ophthalmol.* 1992.

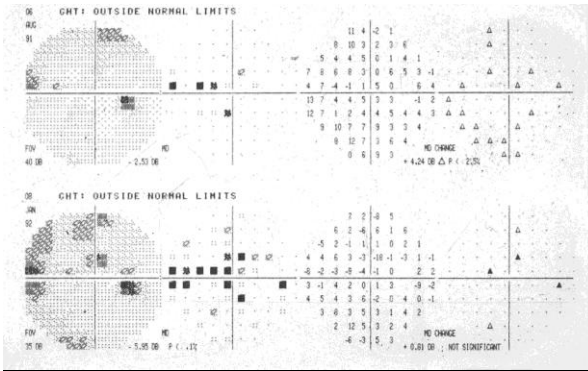
## Progressive Rim Thinning



4 Years

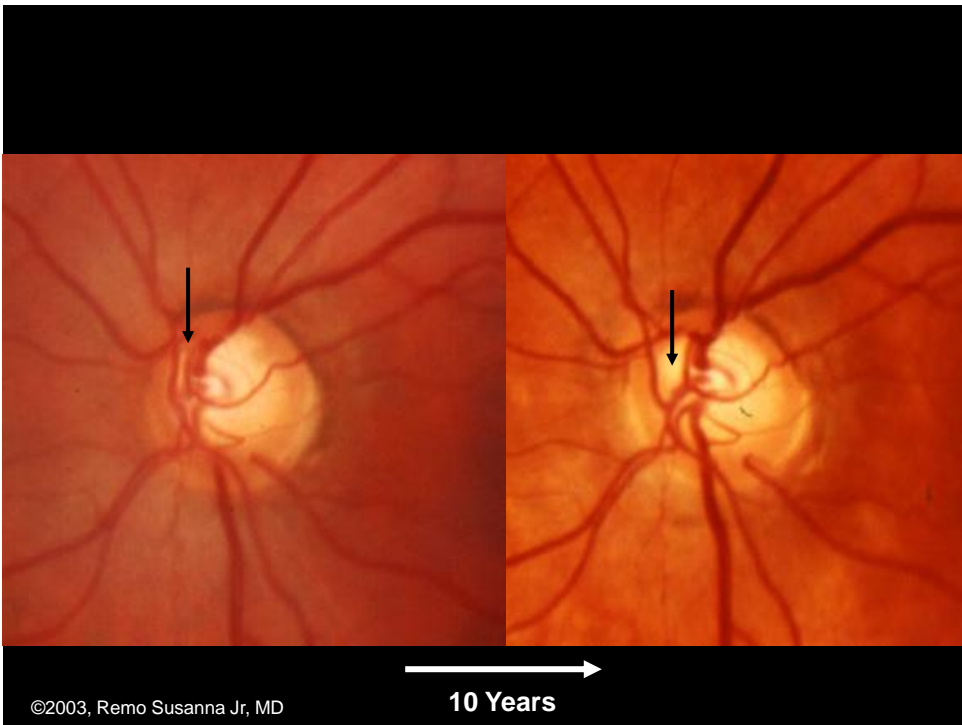
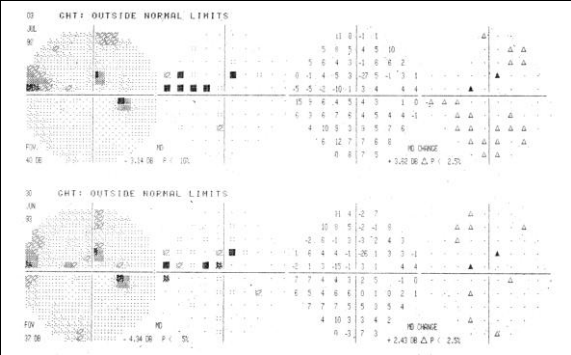
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**Corresponding VF defects  
(previous slide)**

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**Thank You**

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**3D Workshop**

***Put Your 3D Glasses On***

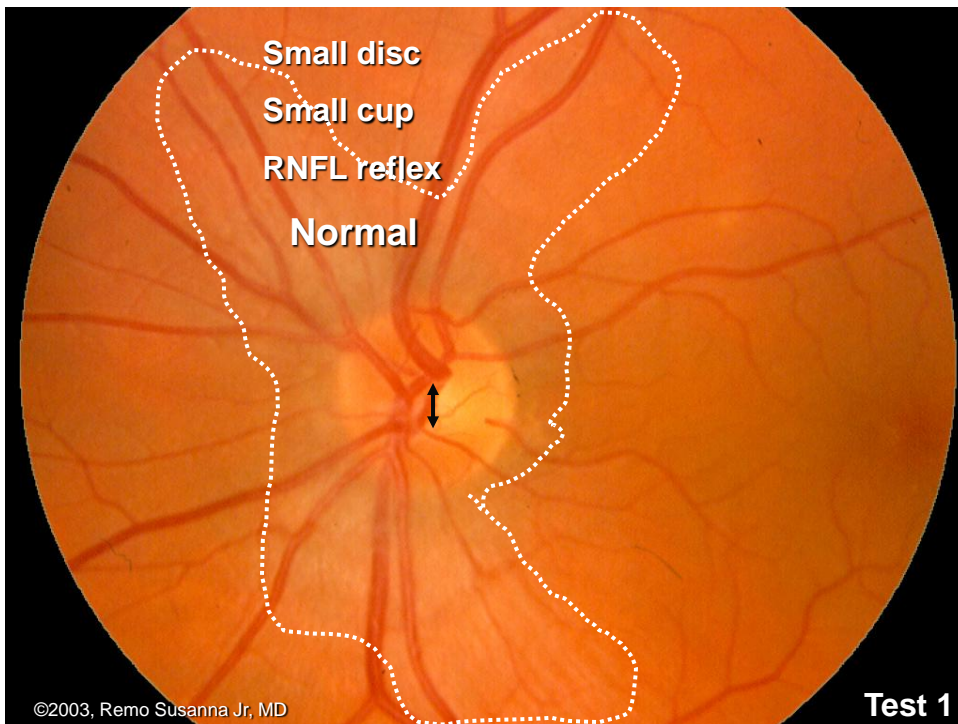
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# Optic Nerve Head Evaluation Test II



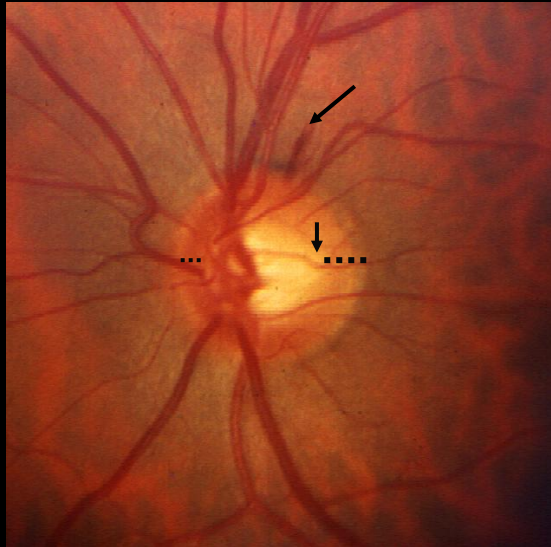
20 seconds/Test

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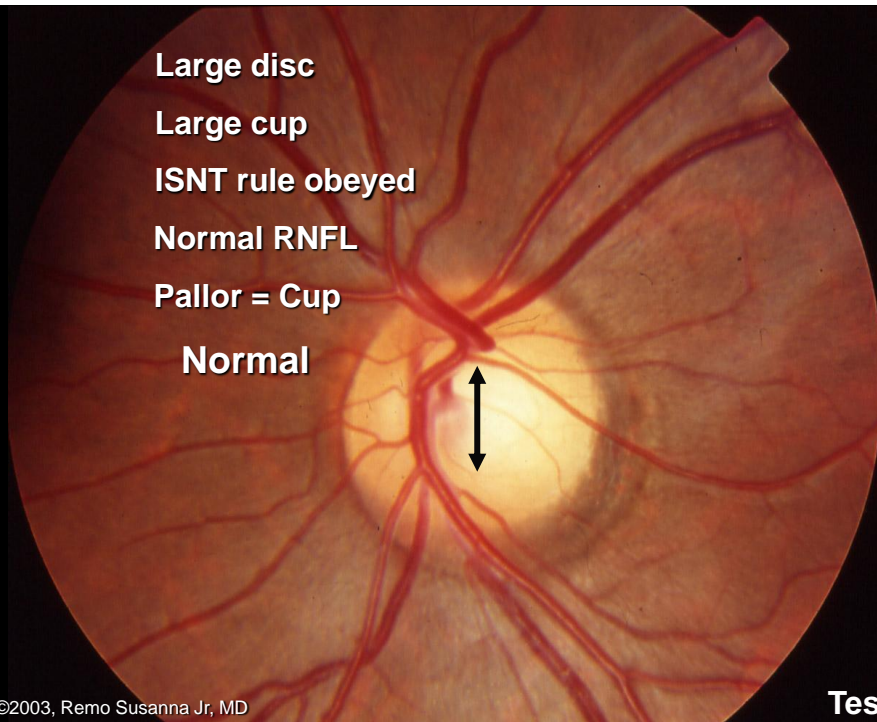
**Disc hemorrhage  
ISNT rule not obeyed  
Glaucoma**



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**Test 2**

**Large disc  
Large cup  
ISNT rule obeyed  
Normal RNFL  
Pallor = Cup  
Normal**



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**Test 3**



