

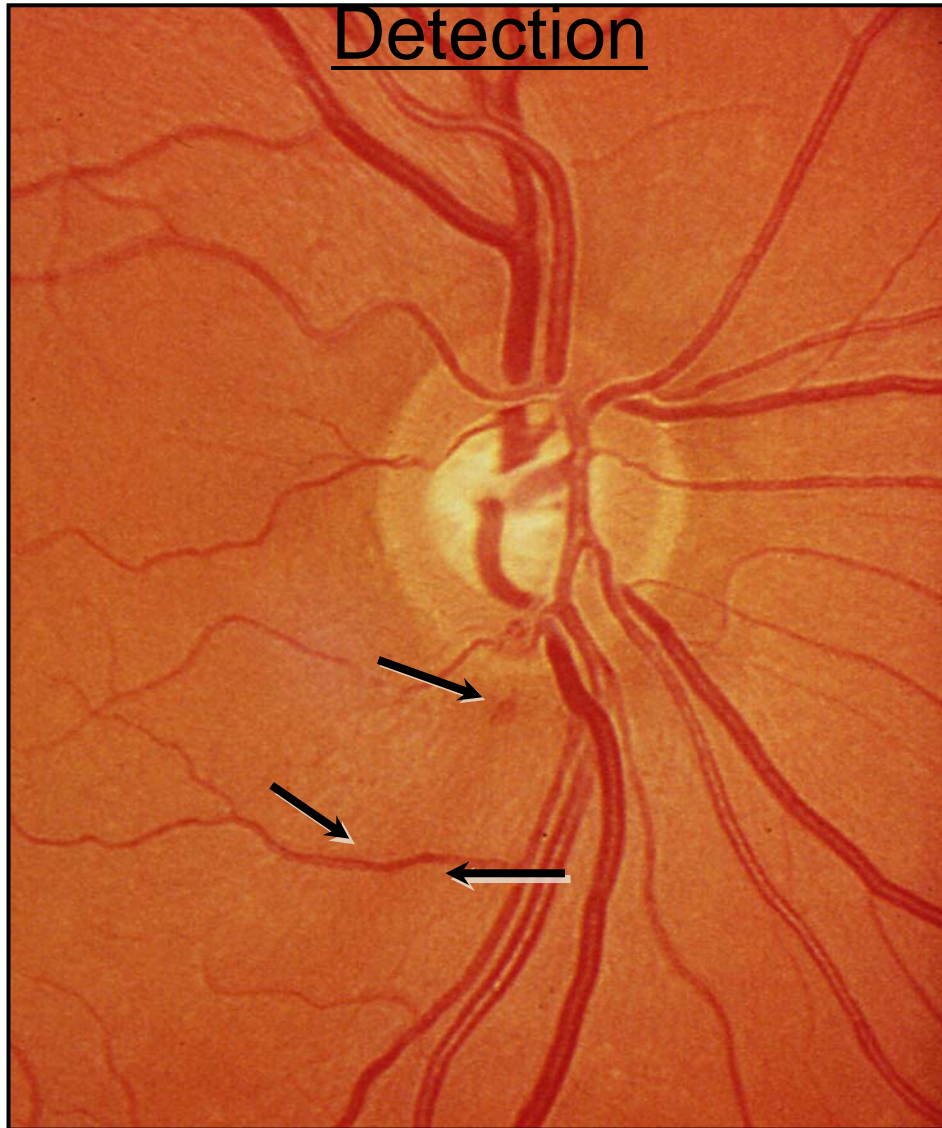
Glaucomatous Structural Technologies: Optic Nerve Photography

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What are we looking for?



Small disc size

Vertical Cup Elongation

Deep Cup

Vessel “Nasalization”

Rim thinning (inferiorly)
ISNT rule violated

Localized RNFL defect (inferiorly)

No significant PPA

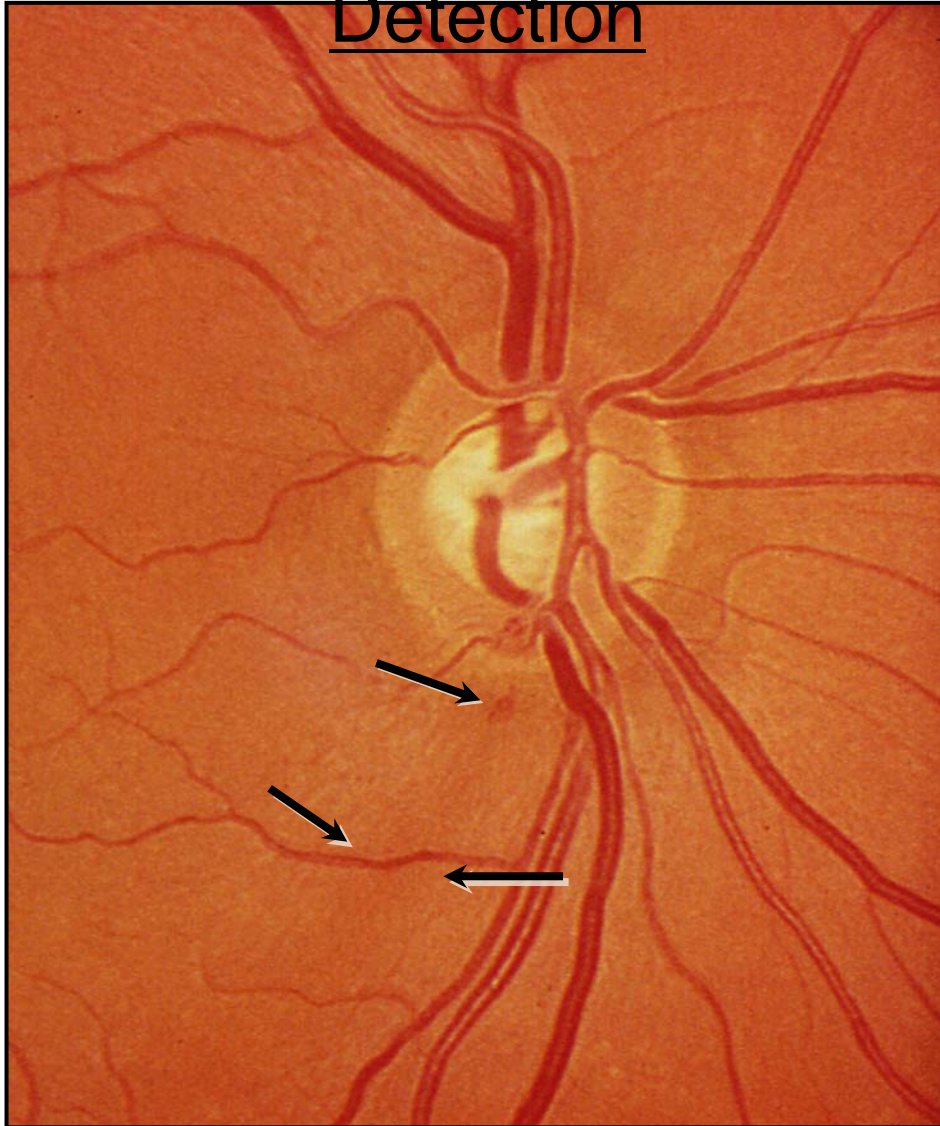
NFL Heme

GLAUCOMA

(Adapted from FORGE II)

What are we looking for?

Detection



(Adapted from FORGE II)

To make the diagnosis, we use:

Normative Database Knowledge

Disc Size

Topography of Rim & Cup

Evaluation for PPA

Comparison of 360 of Rim

NFL "analysis"

Color

Hemorrhage

Variability of Appearance

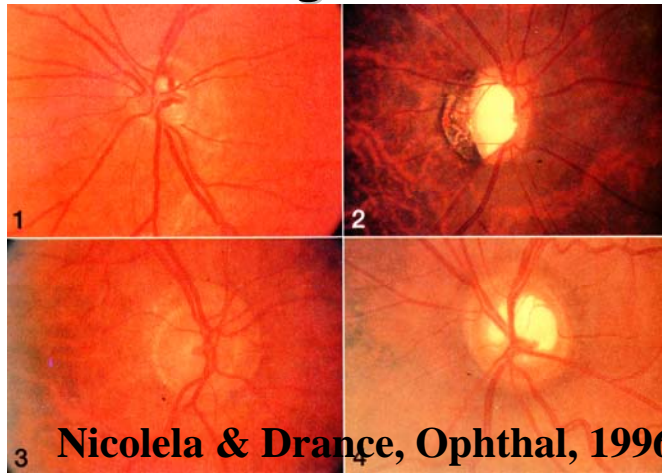
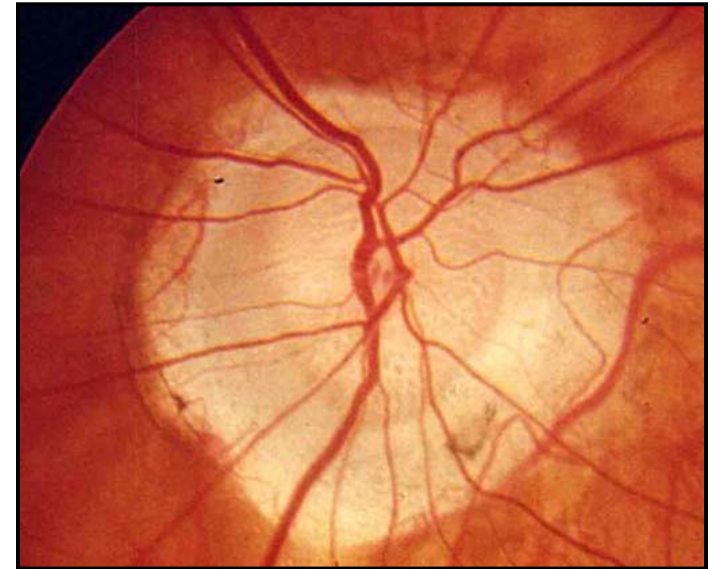
Size, Angle of Insertion, Myopia, Co-Morbidities, etc.



Small

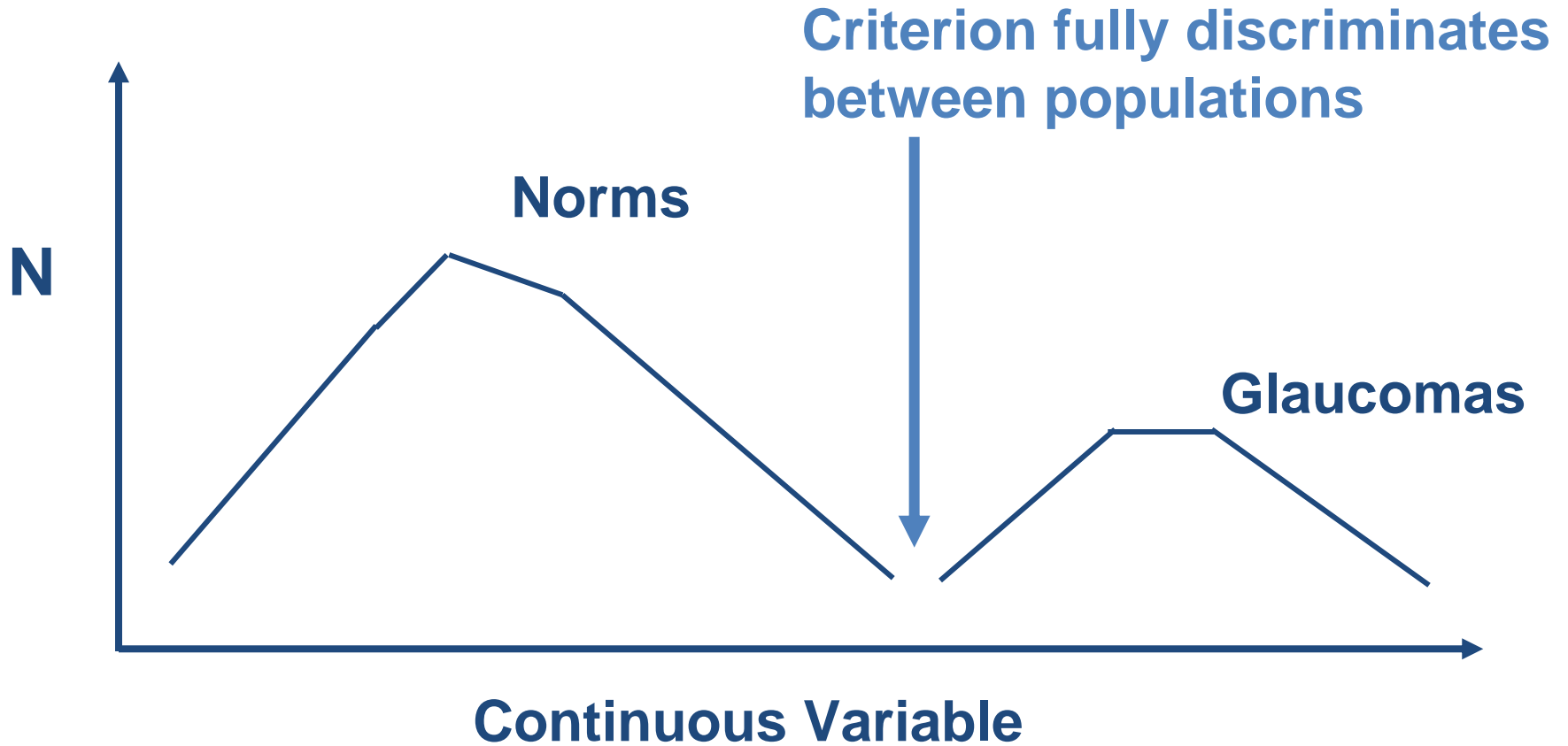


Large

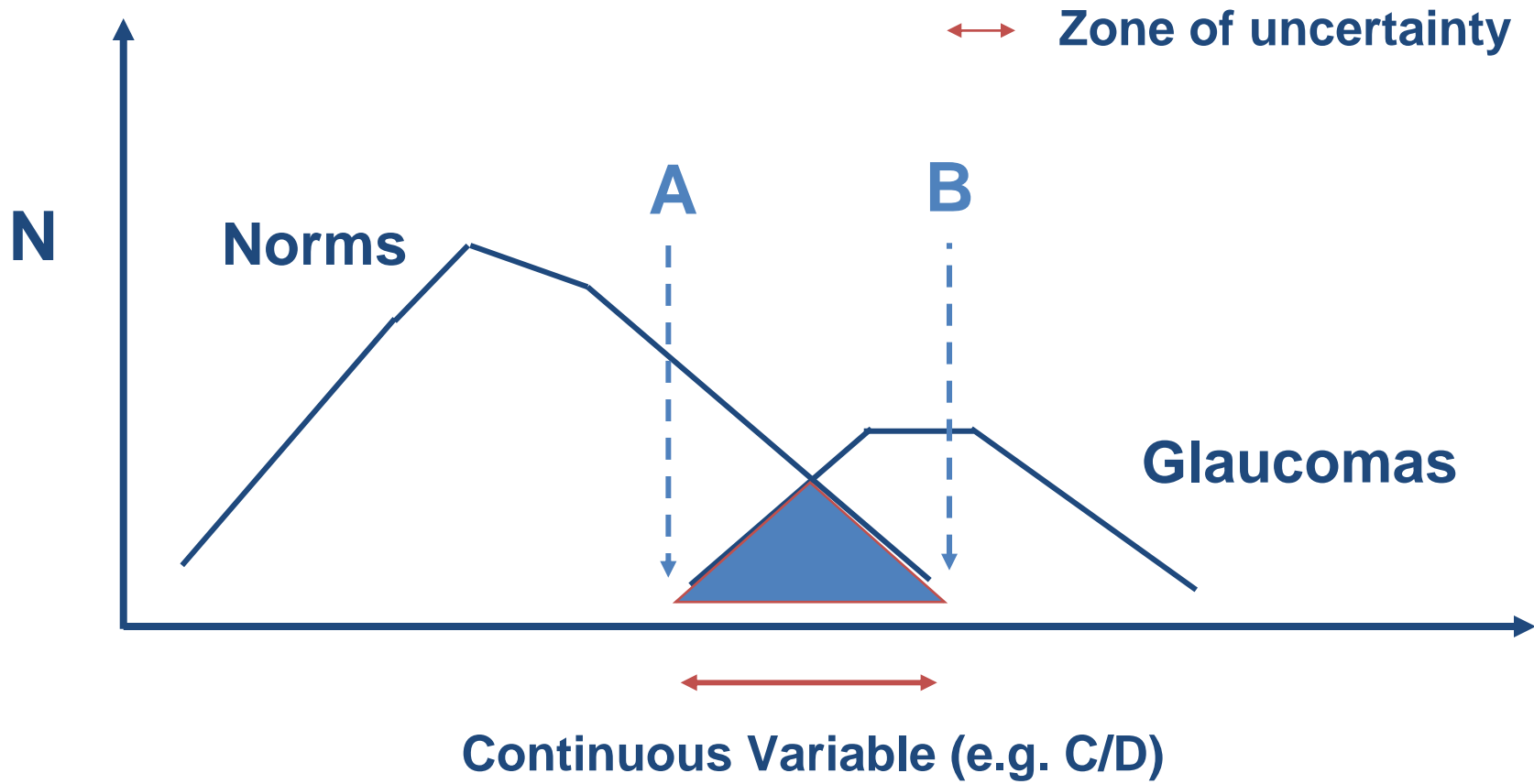


Nicolela & Drance, Ophthal, 1996

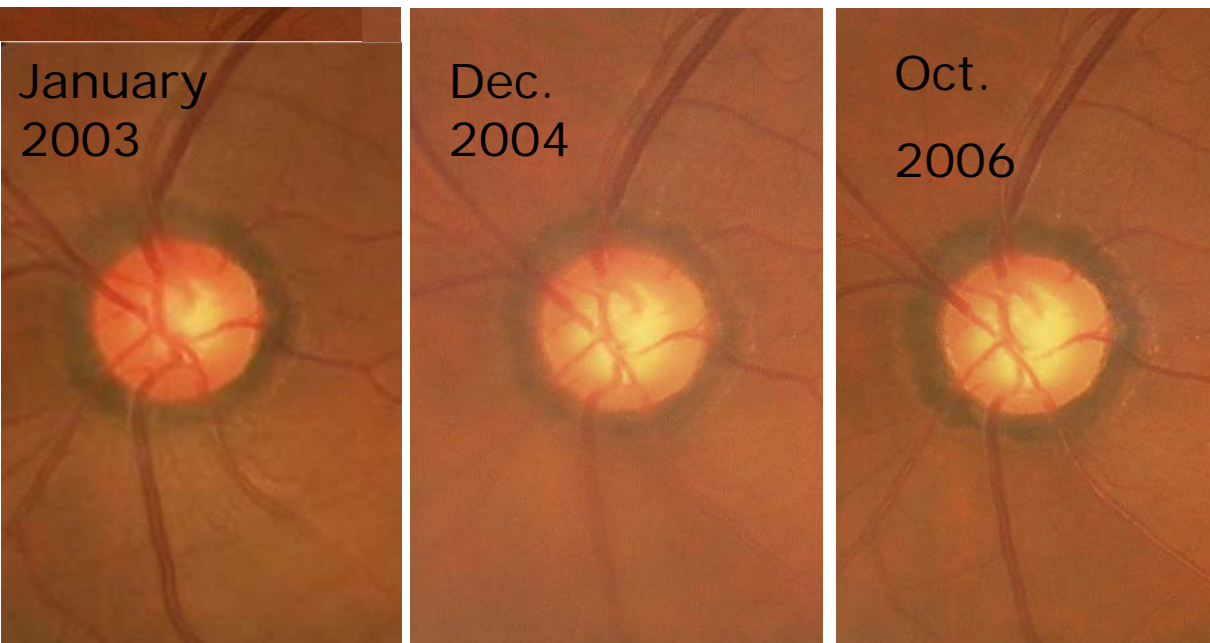
Ideal Diagnostic Test



Real World Scenario



What are we looking for? Progression



To detect Progression, we use:

All the same analysis as detection

Plus

Image Registration

Image Alignment

Serial Image Comparison

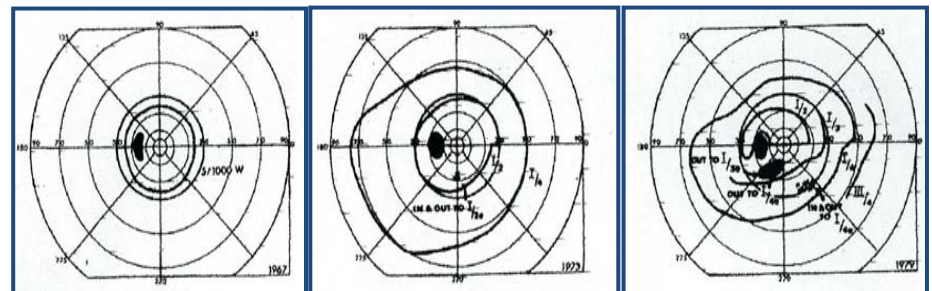
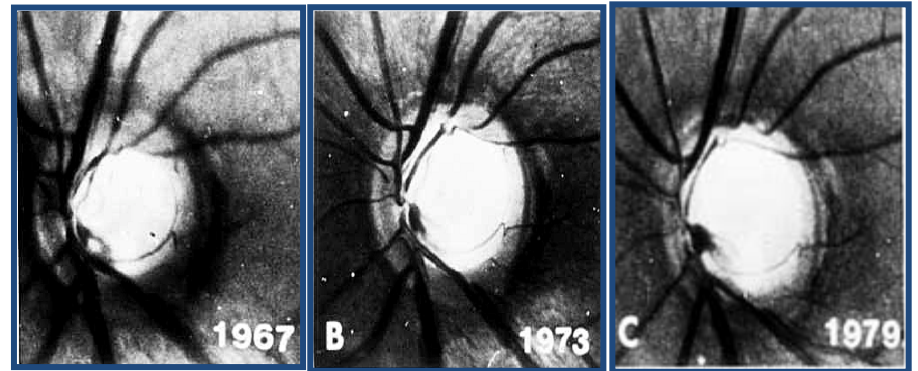
Courtesy of Murray Fingeret, OD

Measuring Progression, Not Detection, Is Greatest Promise

Cioffi GA: ONHA in the 1990's, J Glaucoma, 1993

Detecting Glaucomatous Change with Photos

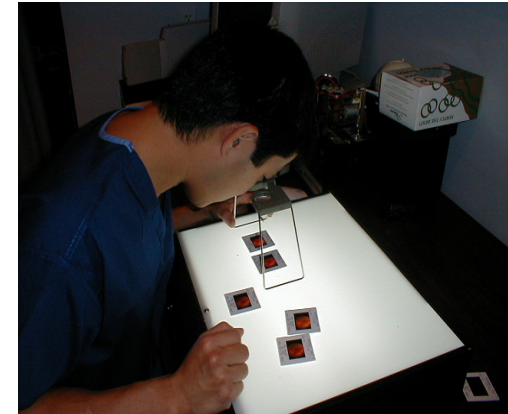
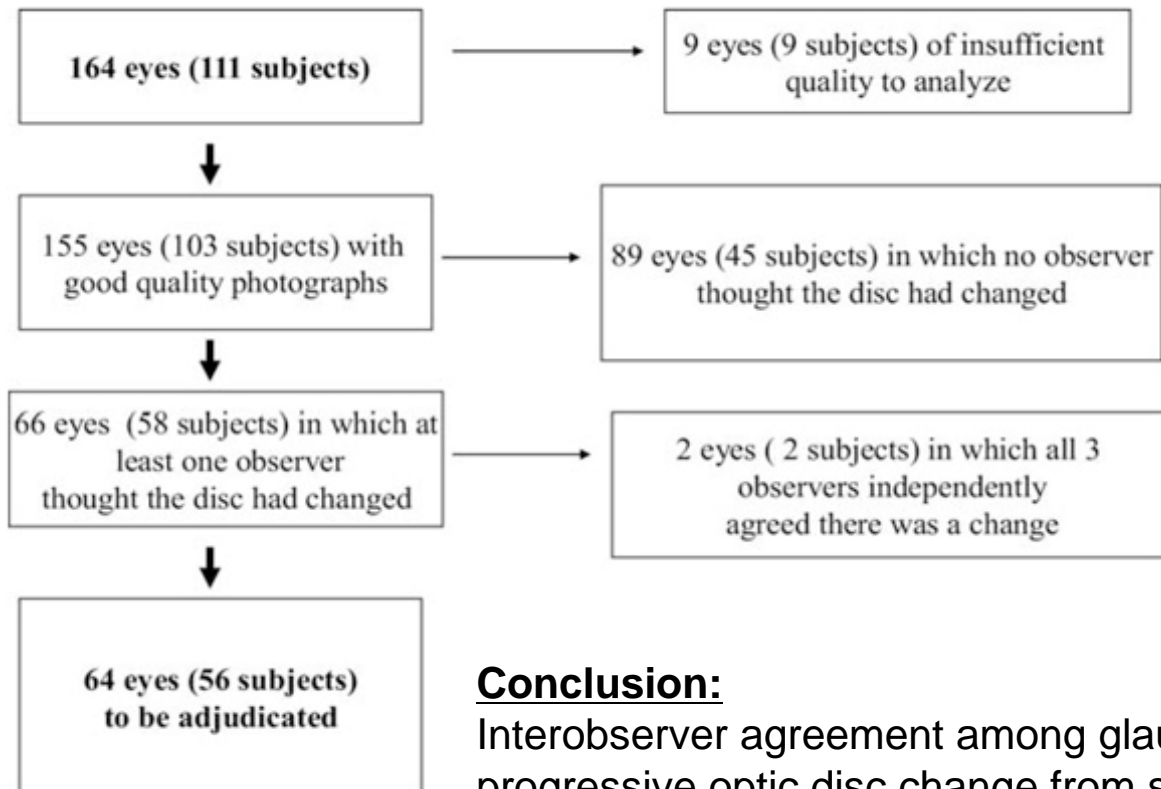
- Retrospective study of serial disc photographs (taken over 15 years) of 259 patients with elevated IOPs
- 29 eyes showed progressive enlargement of optic cup
 - Vertical extension: 17%
 - Horizontal extension: 3%
 - Generalized expansion: 79%



Pederson et al. *Arch Ophthalmol.* 1980;98:490-495.

Agreement among glaucoma specialists in assessing progressive disc changes from photographs in open-angle glaucoma patients

Jampel, Friedman, Quigley, Vitale, Miller, Knezevich, Ding
AJO 2009 147 (1)



Conclusion:

Interobserver agreement among glaucoma specialists in judging progressive optic disc change from stereophotographs was slight to fair.

Kappa = 0.20

Stereo Disc Photography

- An Eroding Gold Standard

- Reproducible
- True color image
- Serial comparison



- Decreasing Availability

- Less photographers
 - Less Stereo-Acquisition Technology
 - Less Standardization
 - Storage – EMR & Image Management Systems
- Lack of agreement b/t experts

