

# **OCT-HD: DIAGNOSI E FOLLOW- UP DEL GLAUCOMA**

**SAN GIOVANNI ROTONDO, 4 APRILE 2014**

*Presidente: dr. Antonio Laborante*

*Moderatore: dr. Domenico Lacerenza*

## ***Glaucoma tra struttura e funzione: la risposta degli HD-OCT***

**ZEISS**  
We make it visible.

**GLAUCOM**

**COO group**

**NIDEK**

**OCT-HD:  
DIAGNOSI E FOLLOW - UP  
DEL GLAUCOMA**

**Venerdì 4 Aprile 2014**  
San Giovanni Rotondo,  
Ospedale Casa Sollievo della Sofferenza  
Sala Convegni, 4 Piano

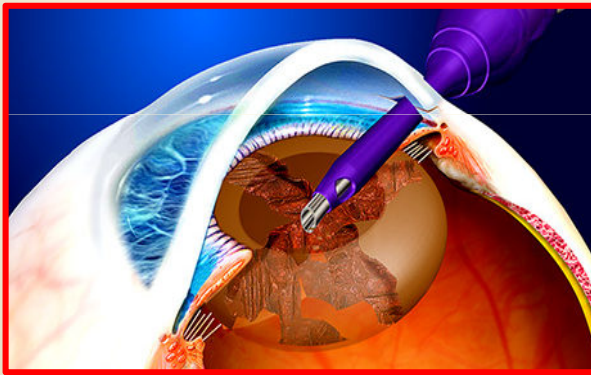
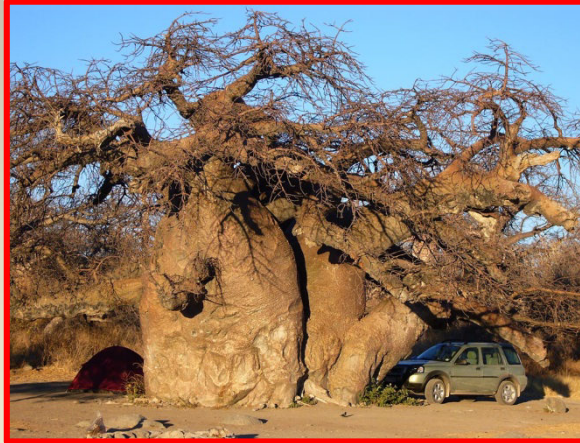
**Studio Oculistico**

**dott. A. Lucente**

**IN OCULIS SAPIUS**

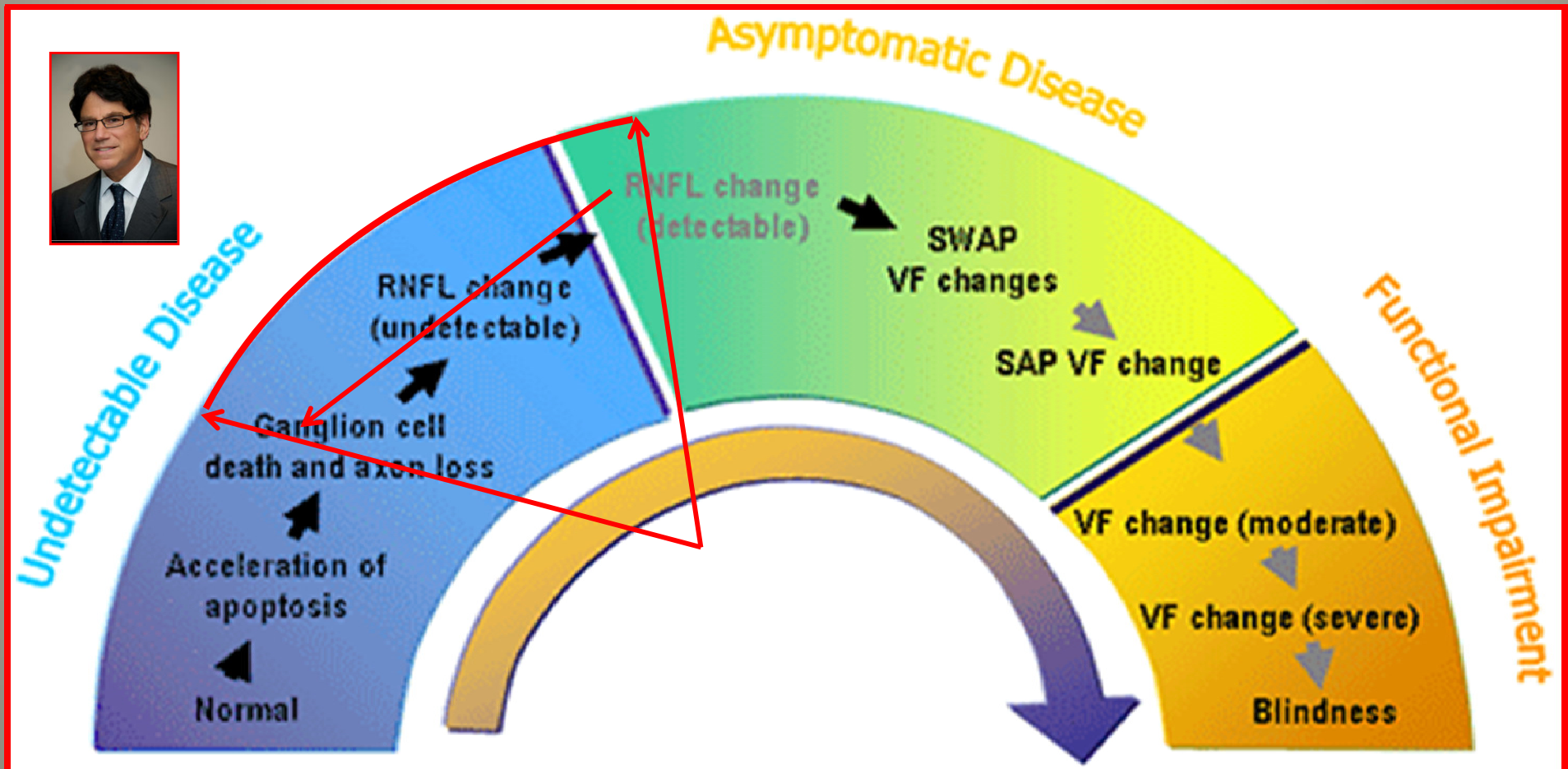
***The author declares no competing financial interests***

# Structure and function: not only glaucoma

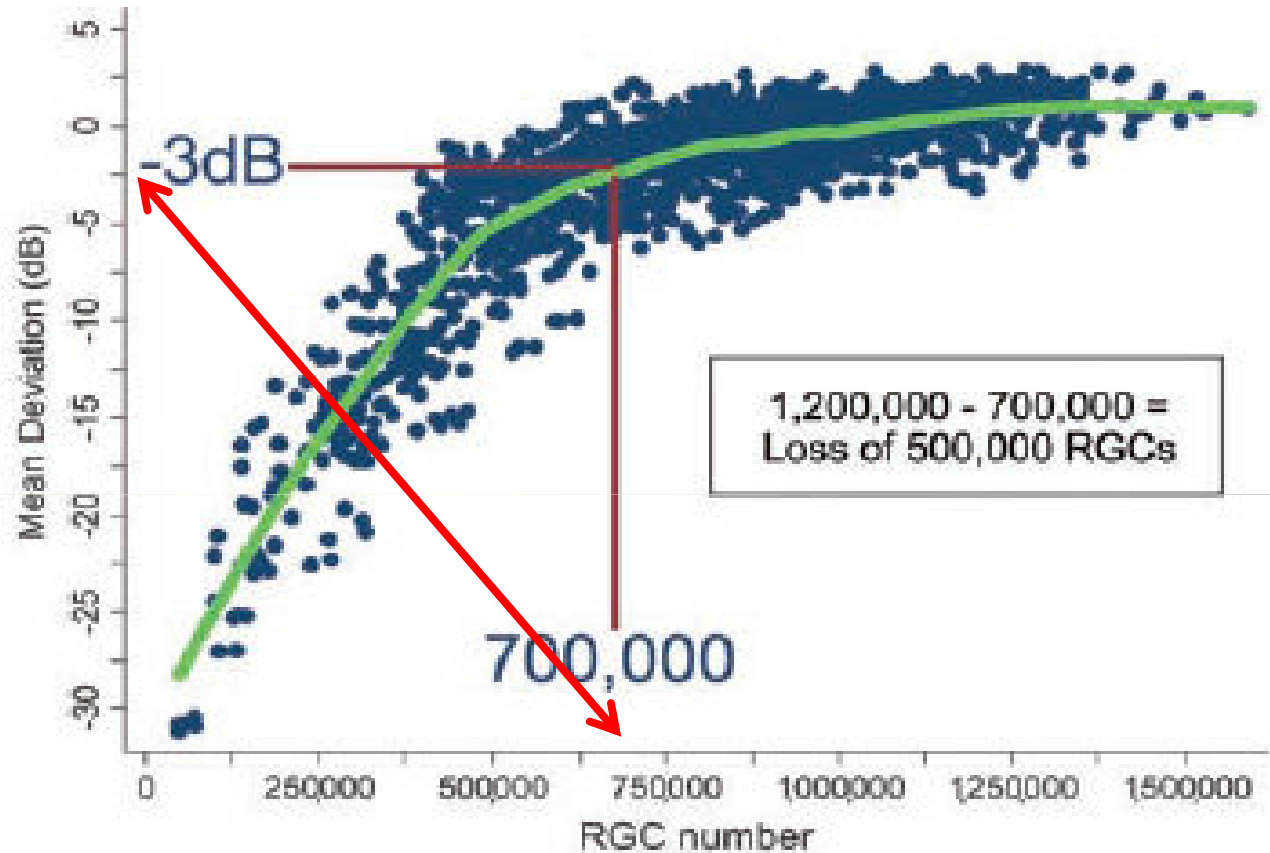
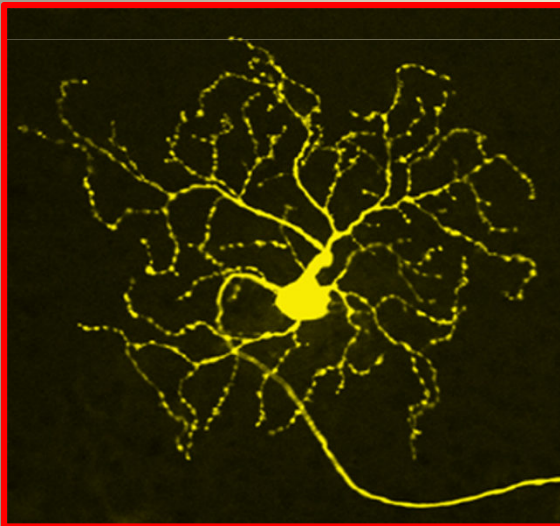
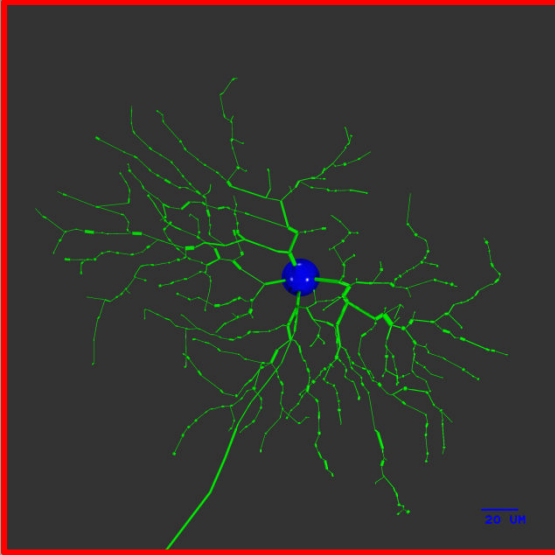


# Glaucoma Continuum by R. Weinreb

R. Weinreb et al. A. J. Ophthalmol 2004; 138; 458-467



# ***RGCs & MD CV HFA***



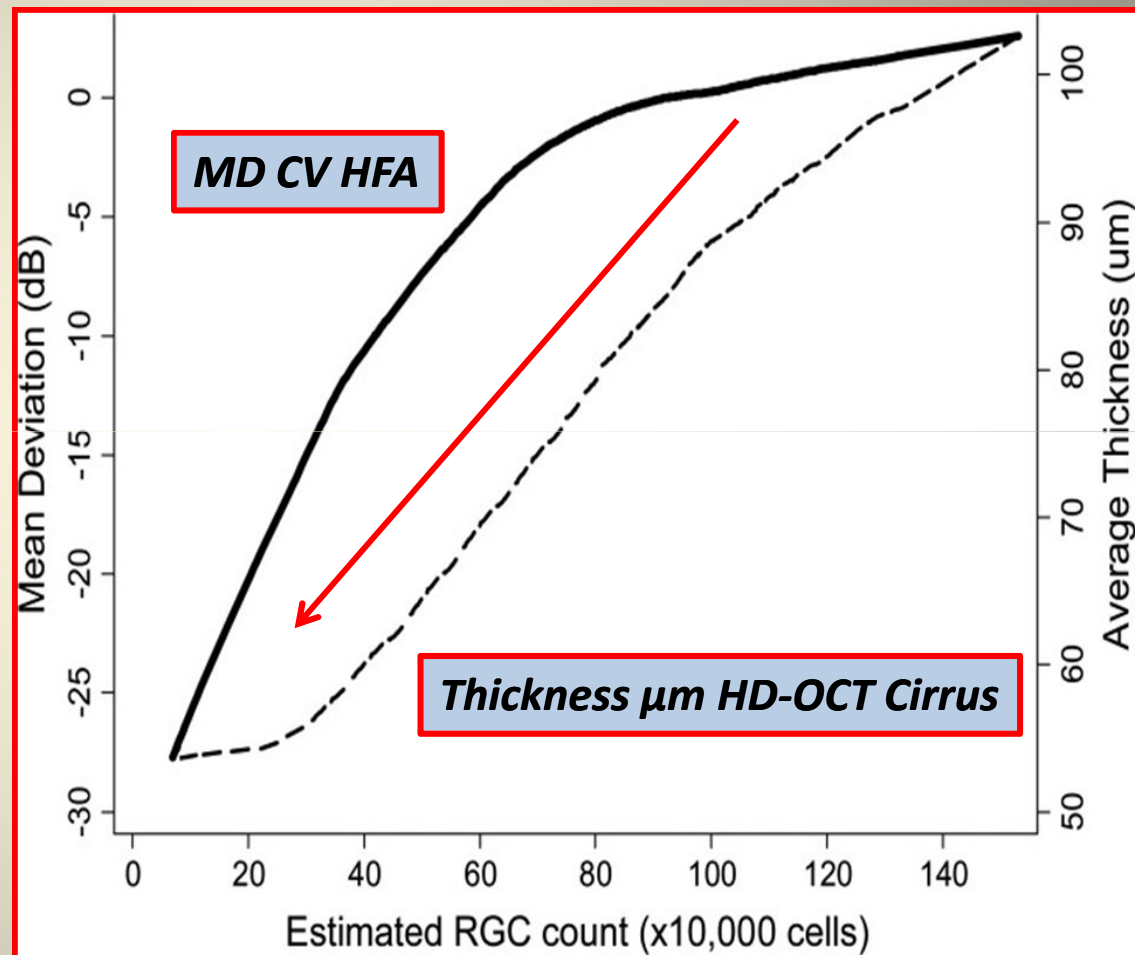
***5000/9000 Retinal Ganglion Cells/Year***

Adapted from Medeiros FA, Lisboa R, Weinreb RN, et al. A combined index of structure and function for staging glaucomatous damage. Arch Ophthalmol. 2012; 130 (5)

- At **early stages** of damage (**high RGC counts**), changes in estimated **RGC** counts correspond to relatively **smaller changes in MD** (continuous line) and relatively **larger changes in average RNFL** thickness (dashed line).

- At **advanced stages** of damage (**low RGC counts**), changes in estimated **RGC** counts correspond to relatively **large changes in MD**, but only **small changes in average RNFL** thickness.

**Estimated RGCs count (x10.000 cells)**  
**RNFL Average Thickness ( $\mu\text{m}$ )**  
**MD Mean Deviation CV (dB)**



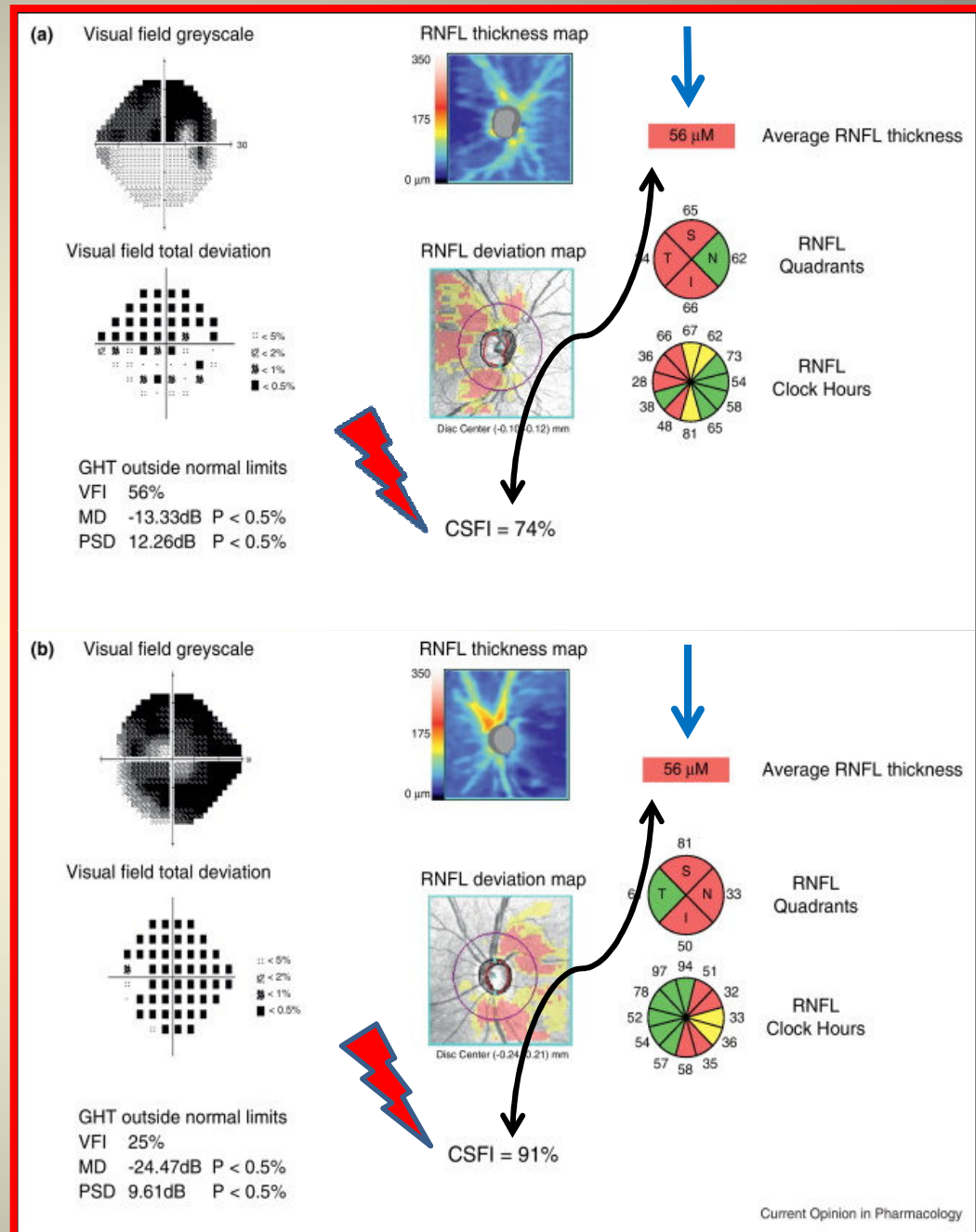
Felipe A. Medeiros, Linda M. Zangwill, Christopher Bowd, Kaweh Mansouri, and Robert N. Weinreb  
Investigative Ophthalmology & Visual Science, October 2012, Vol. 53, No. 11

# CSFI

## Combined Structure Function Index

Felipe A. Medeiros  
Renato Lisboa  
Robert N. Weinreb  
Christopher A. Girkin  
Jeffrey M. Liebmann  
Linda M. Zangwill  
*Arch Ophthalmol.* 2012

Douglas GR, Drance SM, Schulzer M.  
A correlation of fields and discs in  
open angle glaucoma. *Can J. O.* 1974



# *Inner and outer retina*

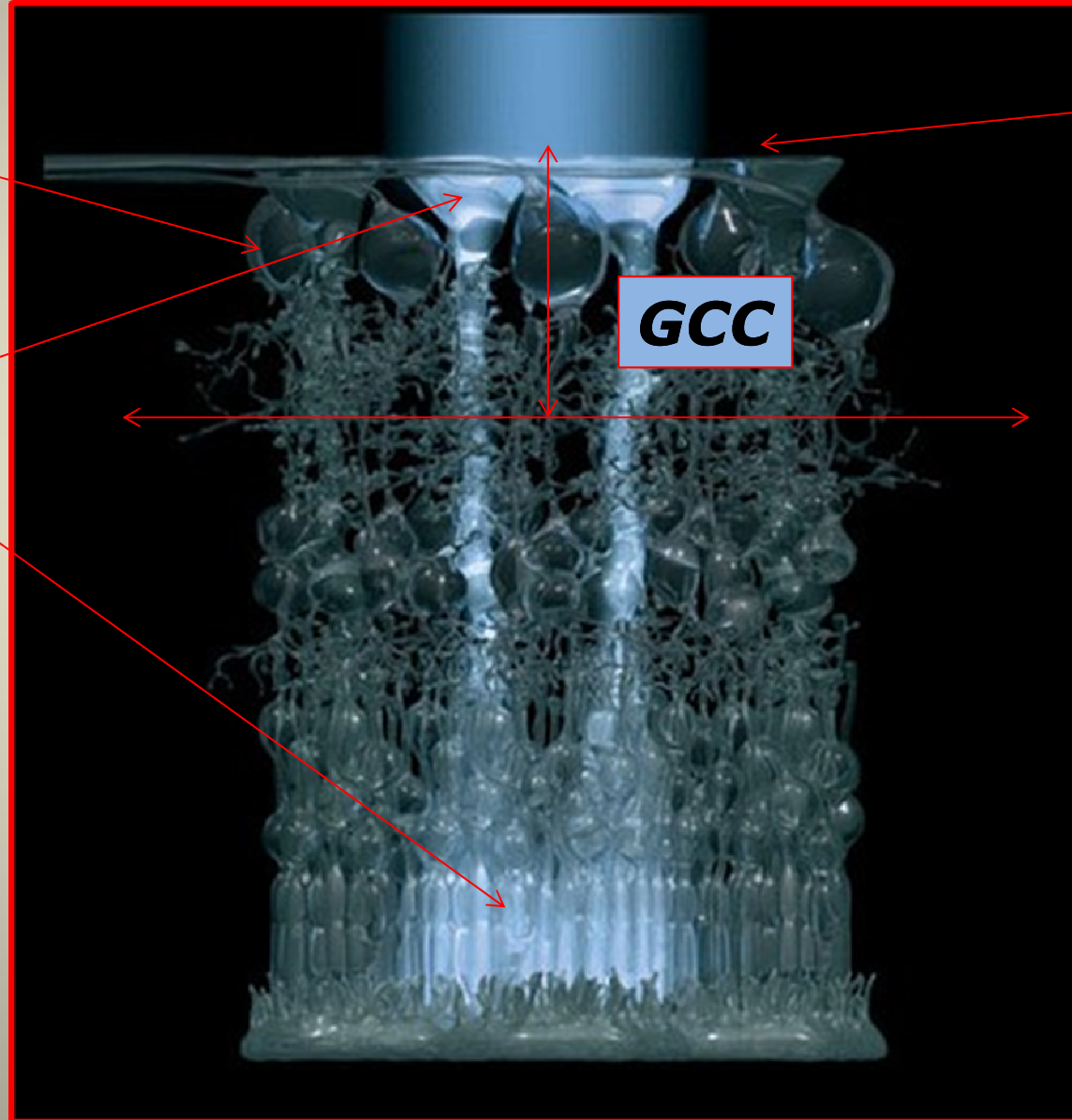
***RGCs***

***MLI***

***MÜller Cells***

***GCC***

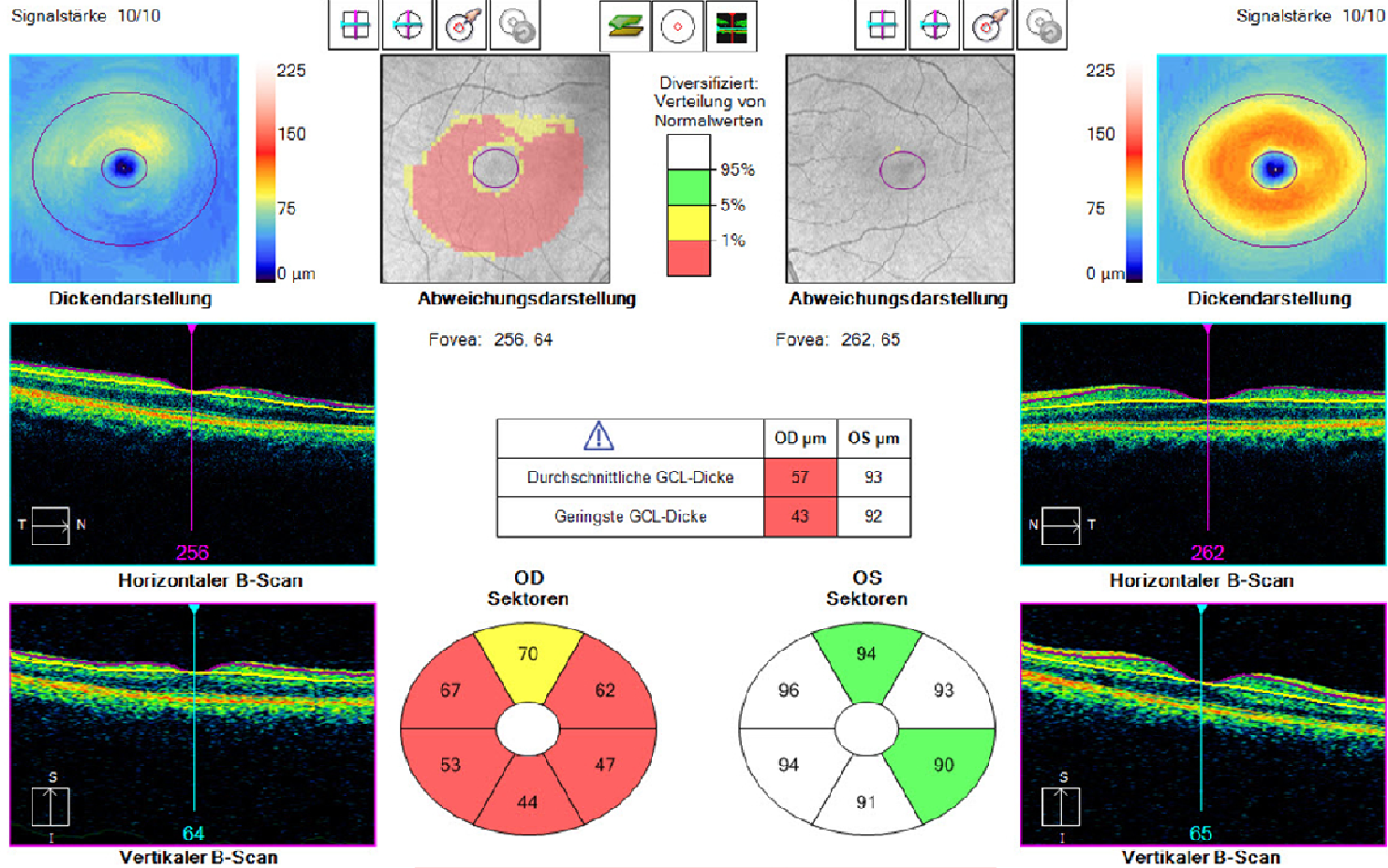
***IPL***



# Ganglion Cell Analysis Report for Cirrus

6 quadranti

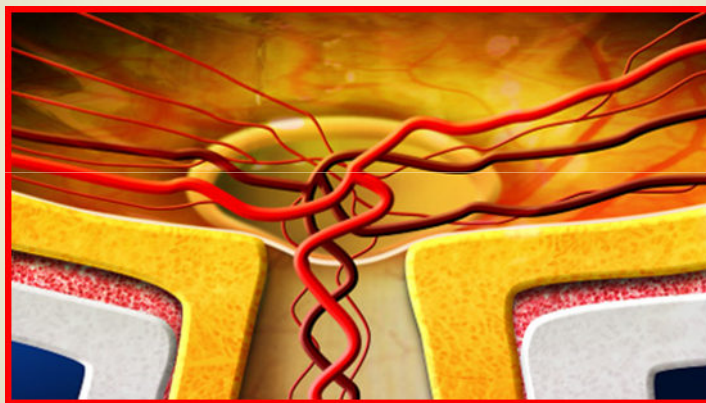
90% RCG parve 50% in macula



5000/9000 RCG/Year



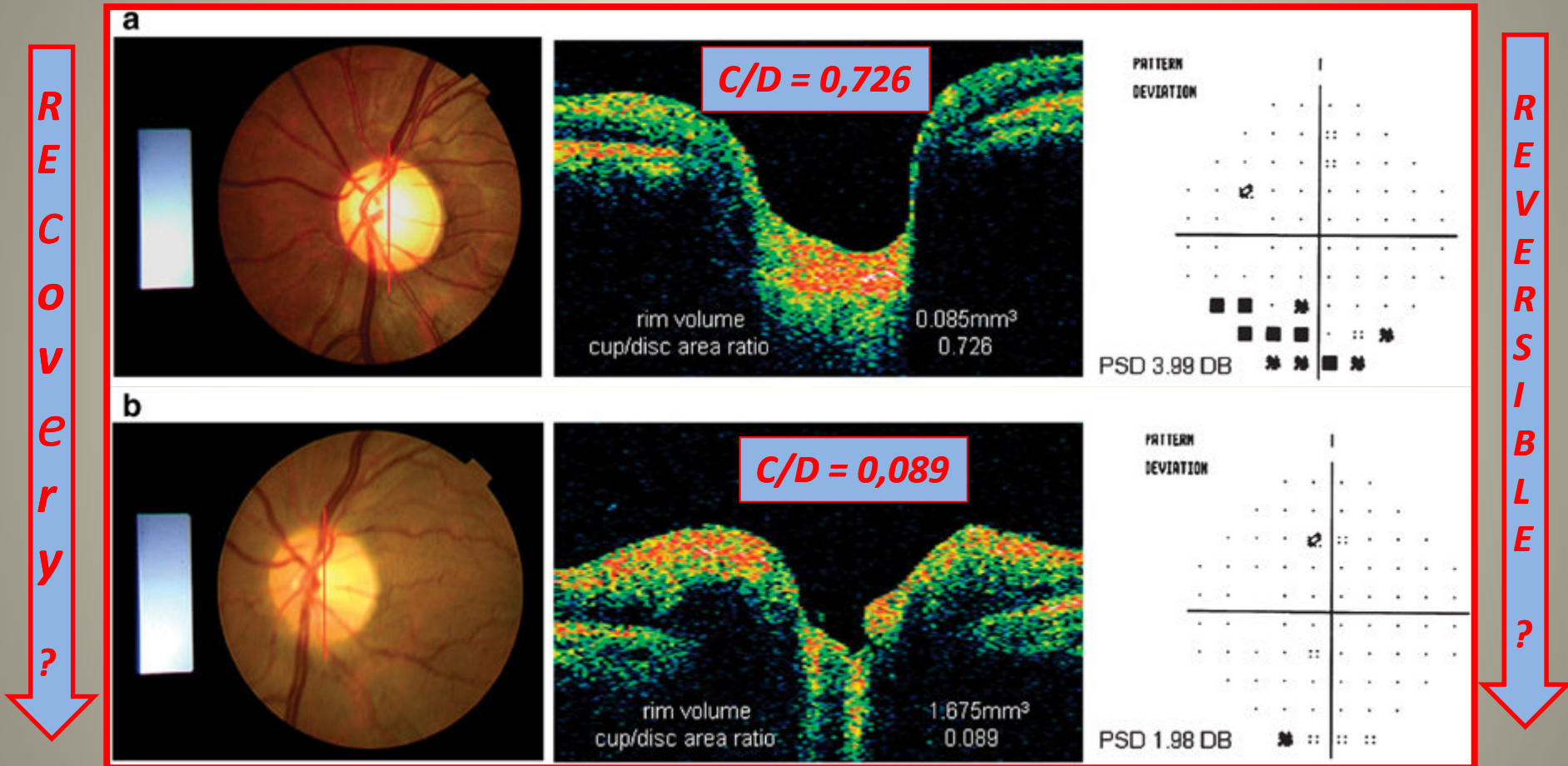
# ***OH v/s Glaucoma***



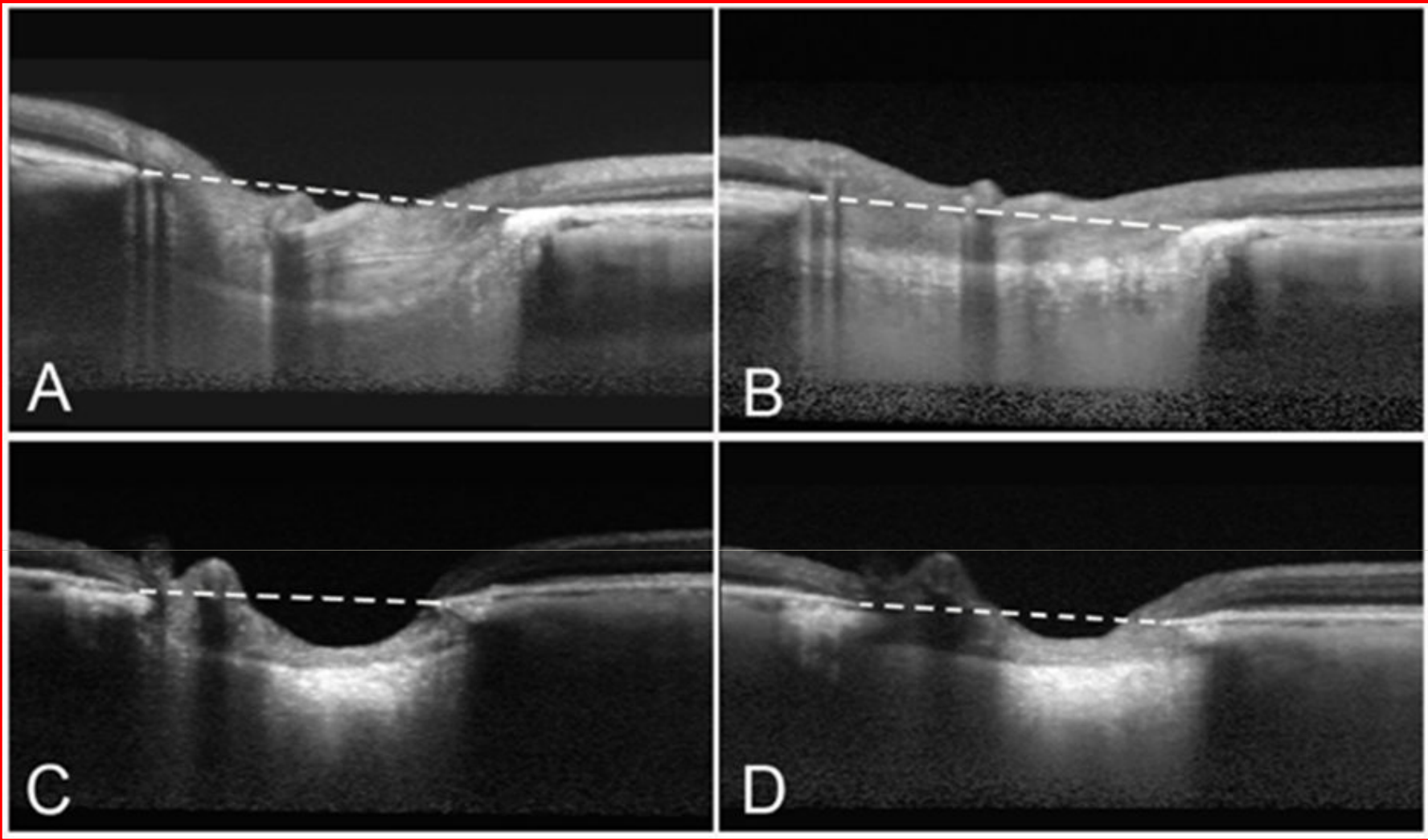
***IOP + CCP+ ETA'+ PSD + CUP/DISC + Etnia + sesso + PA + ecc***

# Structural and functional recovery in juvenile open angle glaucoma after trabeculectomy

C K S Leung, J Woo, M K Tsang and K K Tse



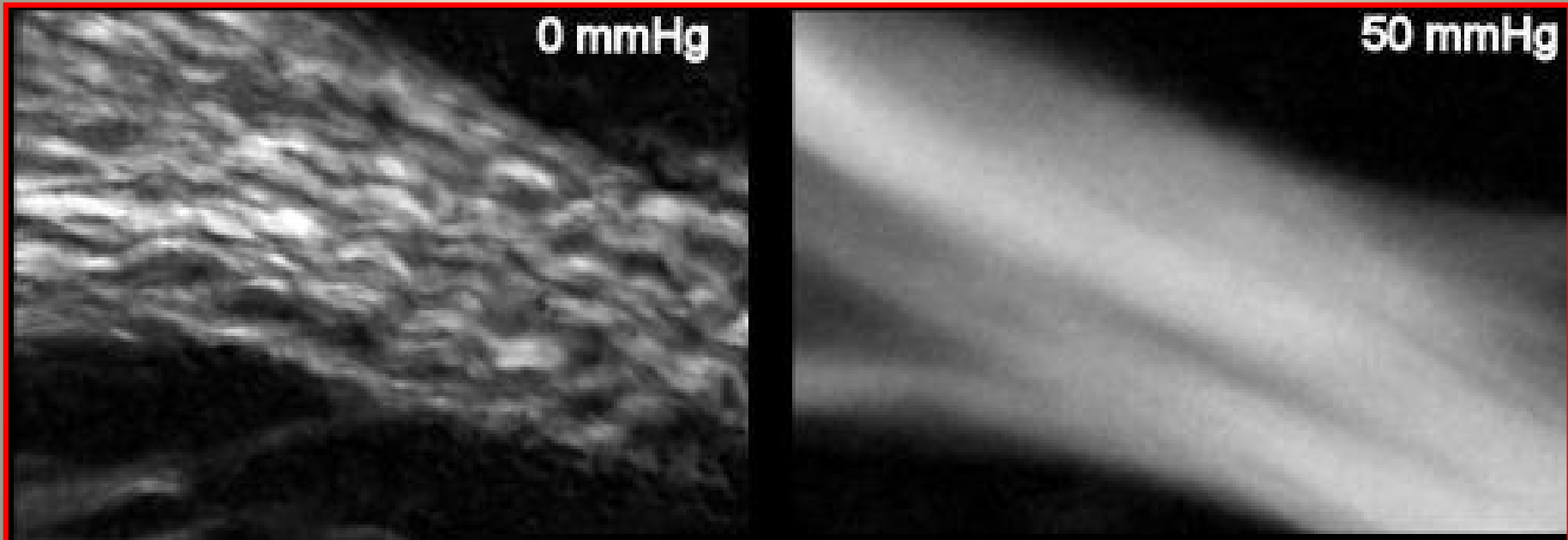
Fundus photographs, OCT optic nerve head scans (vertical cut) and Humphrey visual field pattern deviation plots of the left eye obtained the day before trabeculectomy (a) and 1 week postoperatively (b). The red lines on the fundus photographs indicate the location of the OCT scans in the middle panel. *Eye (Lond)*. 2006 Jan;20(1):132-4



Preoperative and postoperative optic nerve images of the left eye of a 18-year old (A, B) and an 81-year old woman (C, D), where the IOPs were lowered from 25 to 6 mmHg and from 20 to 7 mmHg, respectively. The reversal of the backward bowing of the lamina cribrosa is clearly noticeable. Images were taken by enhanced depth imaging SD-OCT. Dashed lines indicate the plane of Bruch's membrane opening. (da Weinreb et al. 2012)

***IOP Elevation Reduces the Waviness of the Load Bearing Collagen Fibers in the Lamina Cribrosa***

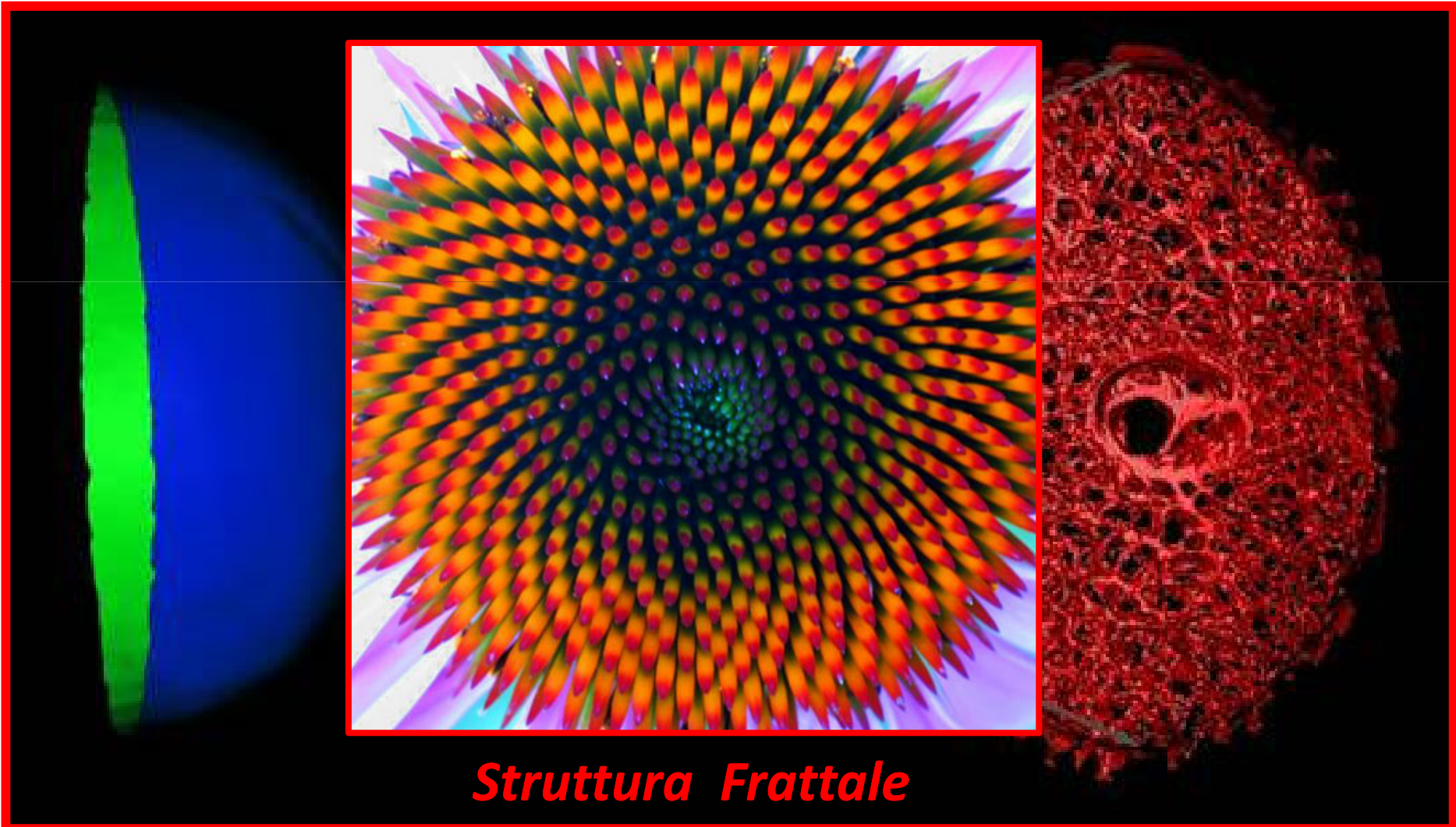
*Ian A. Sigal et al. ARVO 2013 Annual Meeting Abstracts*



*Collagen fibers with and without crimp*

# ***Finite Element Modeling of the Lamina Cribrosa of the Optic Nerve Head in Glaucoma***

**Devers Eye Institute / National Institute of Health Optic Nerve Head Research Laboratory  
directed by dr. Claude Burgoyne (Portland Oregon)**



***Struttura Frattale***

## ***Racial Differences in Mechanical Strain in the Posterior Human Sclera***

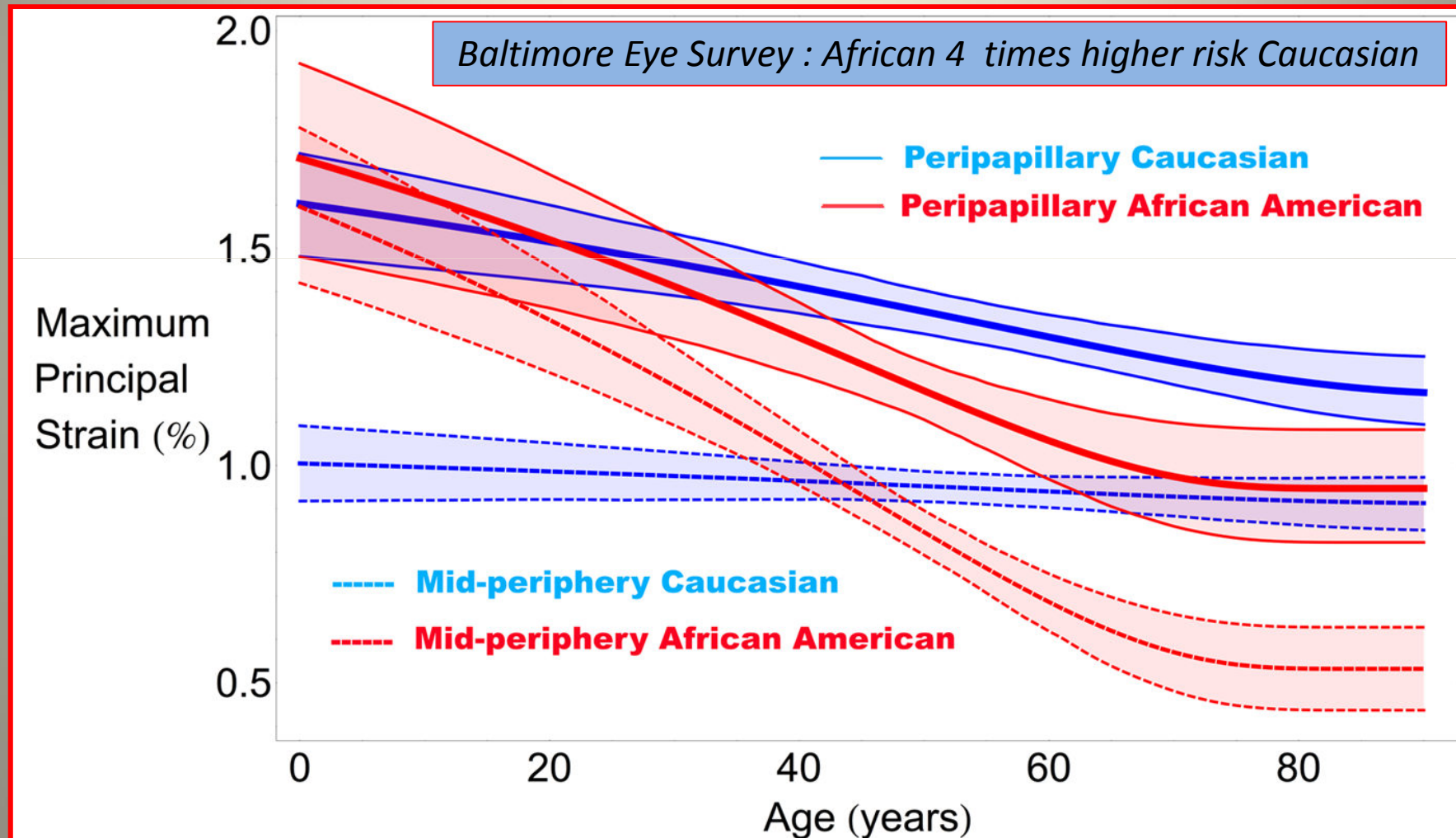
M. A. Fazio **1-2**, R. Grytz **1**, L. Bruno **2**, J. S. Morris **3**, C. A. Girkin **2**, J. Crawford C. Downs **2**.

**1** Ophthalmology, The University of Alabama in Birmingham, Birmingham, AL;

**2** Mechanical Engineering, University of Calabria, Cosenza, Italy;

**3** Department of Biostatistics, The University of Texas MD Anderson Cancer Center, Houston, TX.

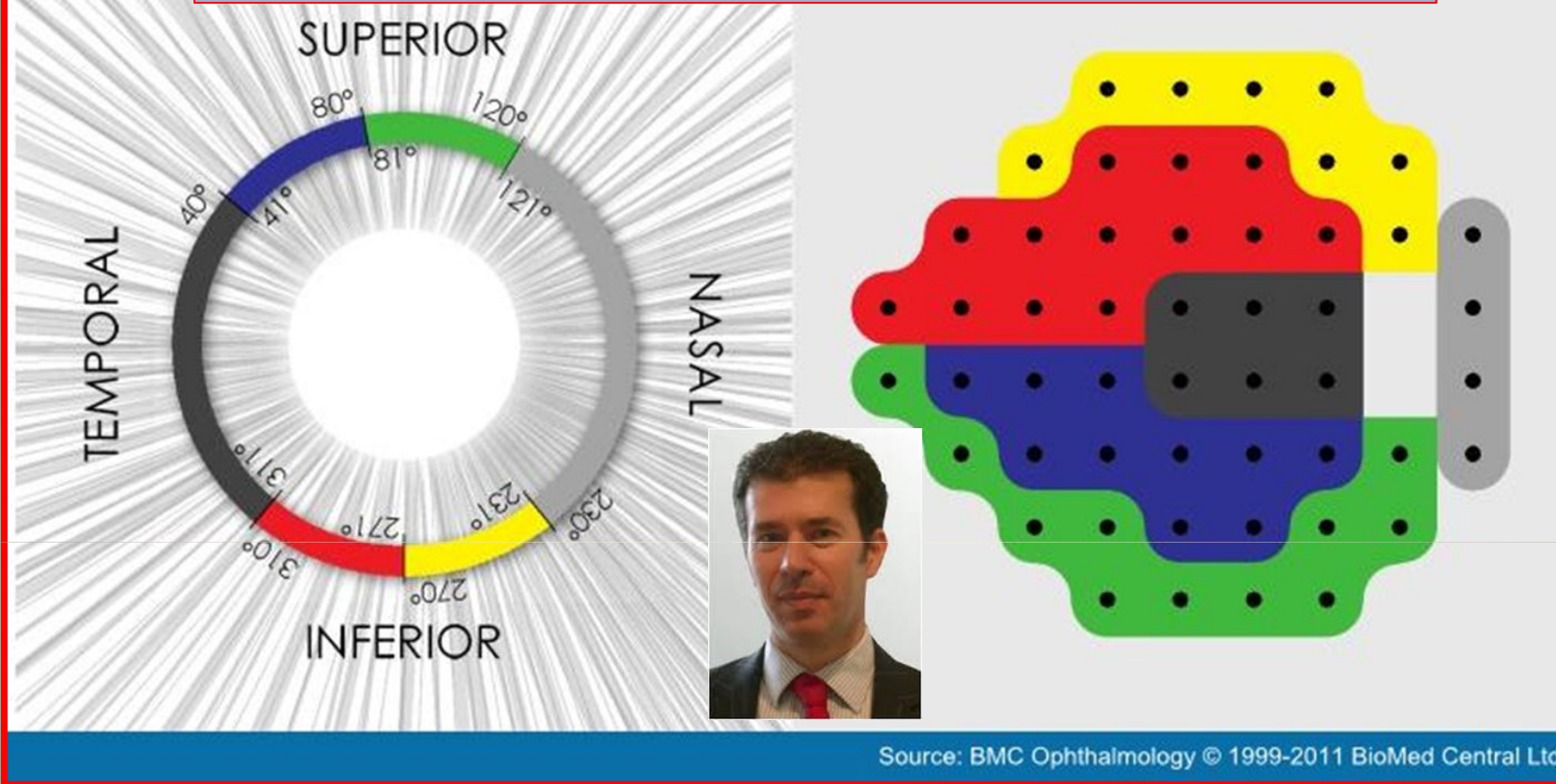
ARVO 2013 Annual Meeting Abstracts



## ***Piattaforme Multimediali & Combo Report***

- ***Zeiss Cirrus & Humphrey con **FORUM*****
- ***Heidelberg Spectralis & HEP con **HEYEX*****
- ***Optovue & Octopus **Bundle Haag-Streit \******

## Garway-Heath, Moorfields Eye Hospital London



Source: BMC Ophthalmology © 1999-2011 BioMed Central Ltd

Map representing the **relationship between Standard Automated Perimetry** visual field sectors and sections of the **peripapillary OCT scan circle**. This map is based on the **work of Garway-Heath et al** and shows the correspondence **between areas of the visual field and peripapillary retinal nerve fiber layer** due to the anatomical configuration of the retinal nerve fiber bundles.

First Release : Presented in part at the Glaucoma Society (UK & Eire) Annual Meeting, London, England, November **1998**



Six corresponding *regions* of *neuroretinal rim area (A)*, *peripapillary retinal nerve fiber layer (B)*, and *visual field (C)*, used to measure the structure–function relationship (based on structure–function map introduced by *Garway-Heath* et al.)  
 Nilforushan N et al. Invest Ophthalmol Vis Sci. 2012 May

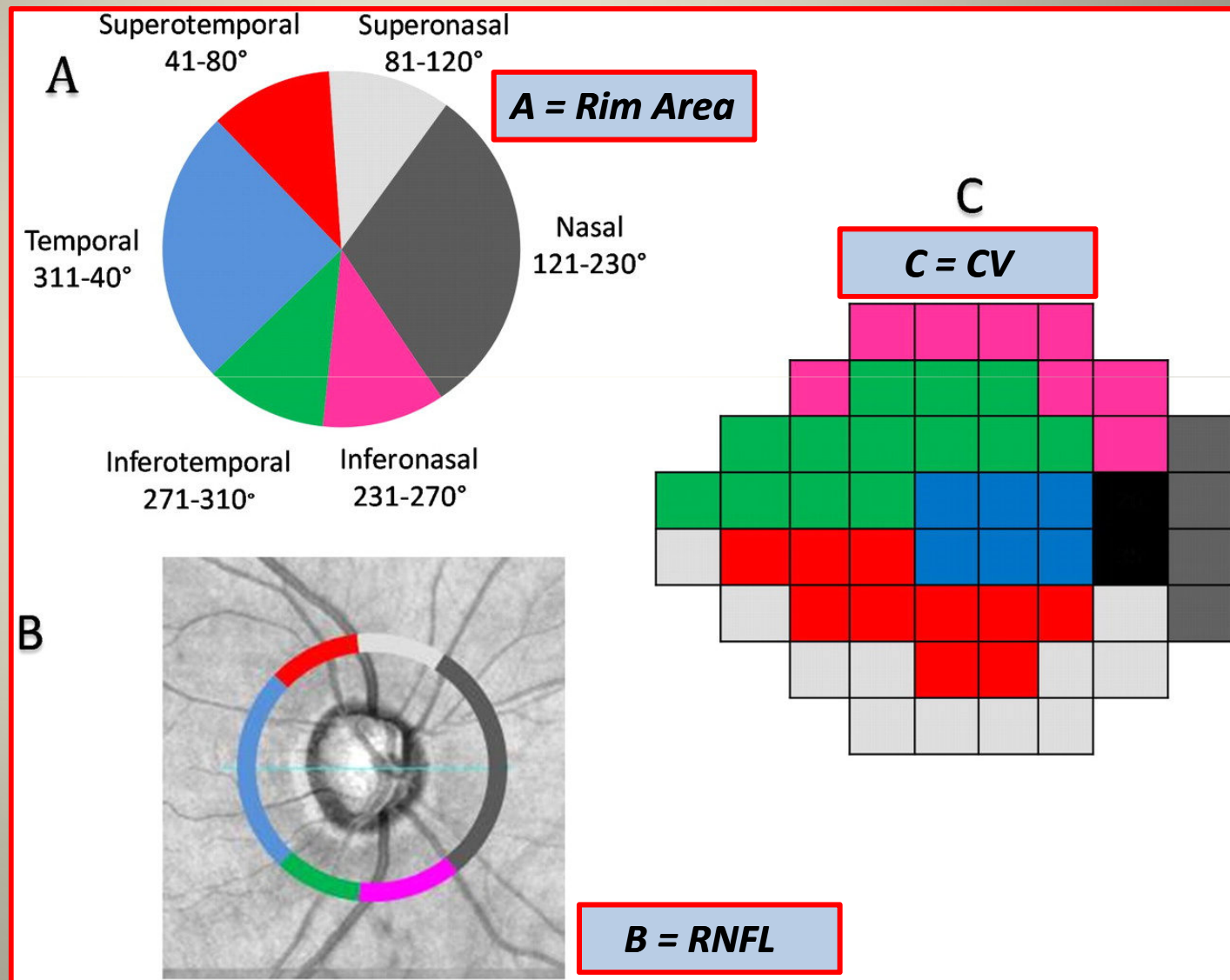
**ST + SN : 80°+**

**IN + IT : 80° +**

**Nasal : 110° +**

**Temporal : 90° =**

**Rim / RNFL: 360°**



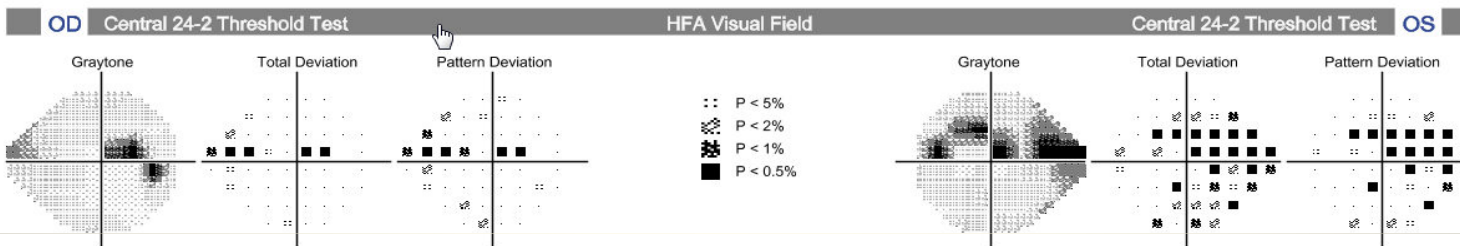
# Forum Glaucoma Workplace

A. Lucente

Patient: DEMO FGW, 01  
 Date of Birth: Aug 17, 1934  
 Gender: Male  
 Patient ID: 54854



## Combined structure and function reports

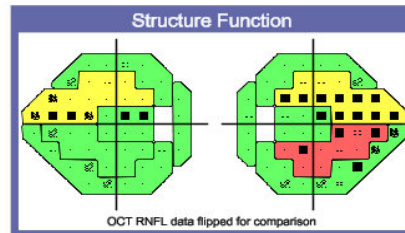


Feb 27, 2013 SITA-Standard

Feb 27, 2013 SITA-Standard

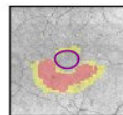
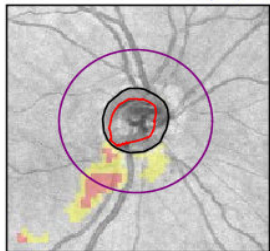
FP: 11%  
 FN: 9%  
 VFI: 90%  
 MD: -2.09 dB P < 5%  
 PSD: 6.76 dB P < 0.5%  
 GHT: Outside Normal Limits

FP: 2%  
 FN: 6%  
 VFI: 77%  
 MD: -7.58 dB P < 0.5%  
 PSD: 9.81 dB P < 0.5%  
 GHT: Outside Normal Limits



### OD CIRRUS HD-OCT

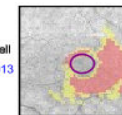
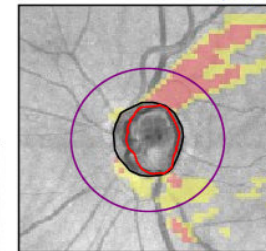
RNFL Apr 26, 2013



Ganglion Cell  
 Apr 26, 2013

### OS CIRRUS HD-OCT

RNFL Apr 26, 2013



Ganglion Cell  
 Apr 26, 2013

OD		OS
88µm	Average RNFL Thickness	80µm
0.72	Average C/D Ratio	0.83
0.88mm <sup>2</sup>	Rim Area	0.75mm <sup>2</sup>
0.66	Vertical C/D Ratio	0.92
0.400mm <sup>3</sup>	Cup Volume	1.021mm <sup>3</sup>
1.81mm <sup>2</sup>	Disc Area	2.26mm <sup>2</sup>

Distribution of Normals: N/A, 95%, 5%, 1%

Comments

Signature

Database HFA : 422 18aa ≥ età ≤ 89 aa; + 5D ≥ Range ≤ + 5D



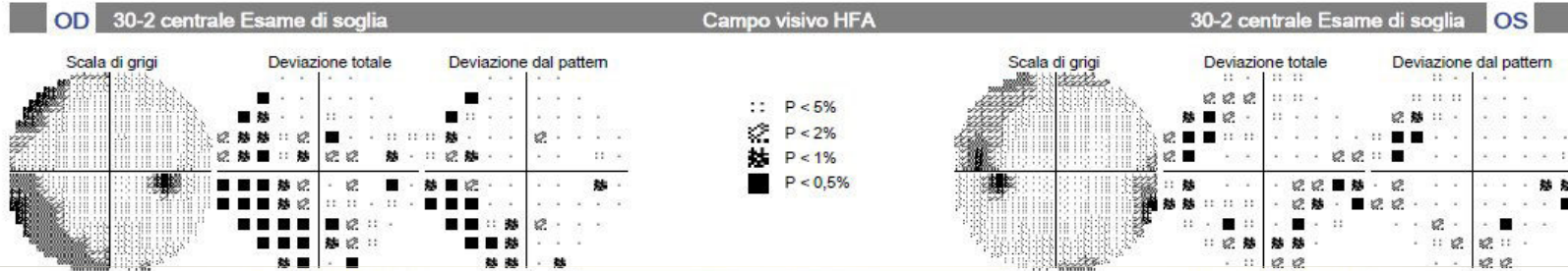
# Forum Glaucoma Workplace

Paziente:  
DDN: 14-feb-1972  
Sesso: Altro  
ID: 1972.0214.AFF7.0859.5824.4FE9



A. Lucente

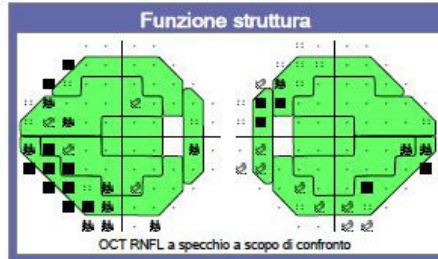
## Combined structure and function reports



15-ott-2013 SITA-Standard

FP: 3%  
FN: 13%  
VFI: 91%

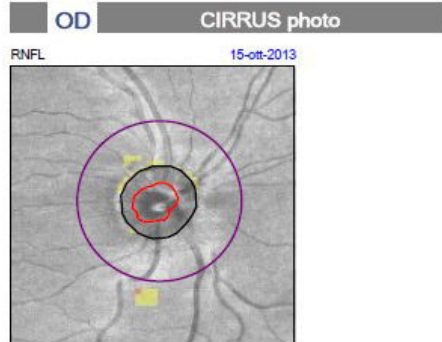
MD: -6,43 dB P < 0,5%  
PSD: 5,79 dB P < 0,5%  
GHT: Fuori limiti normali



15-ott-2013 SITA-Standard

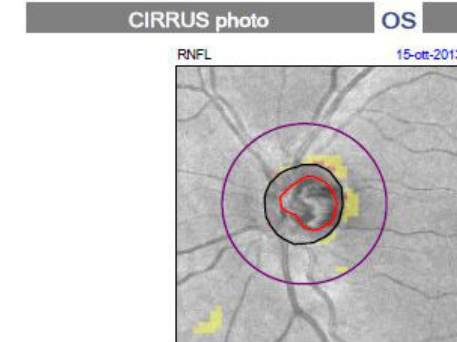
FP: 5%  
FN: 6%  
VFI: 93%

MD: -4,76 dB P < 0,5%  
PSD: 4,92 dB P < 0,5%  
GHT: Fuori limiti normali



OD		OS
94µm	Spessore RNFL medio	93µm
1,31mm²	Area della rima	1,27mm²
1,94mm²	Area del disco	2,24mm²
0,56	Rapporto C/D medio	0,66
0,51	Rapporto C/D verticale	0,68
0,213mm²	Volume di escavazione	0,433mm²

Distribuzione di valori normali: N/D, 95%, 5%, 1%



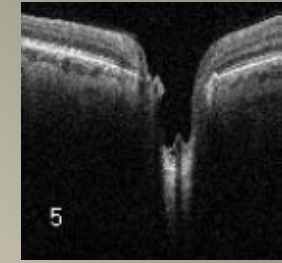
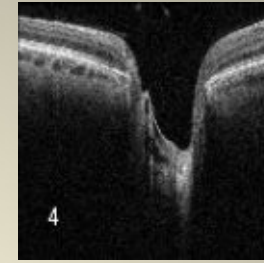
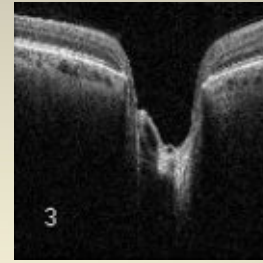
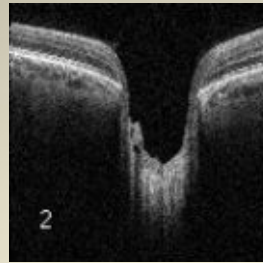
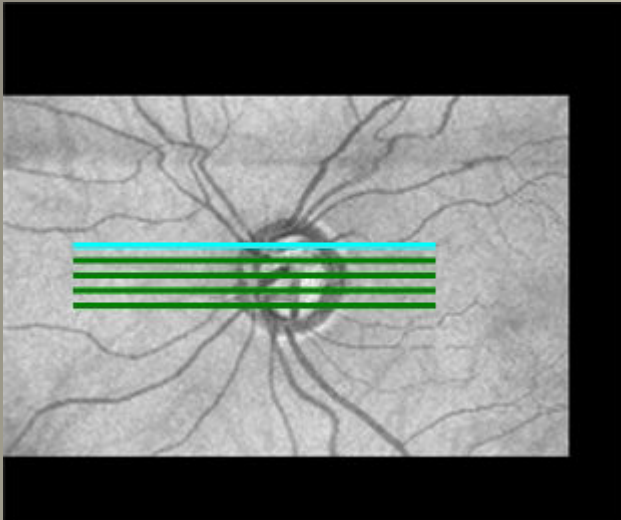
Commenti

Firma

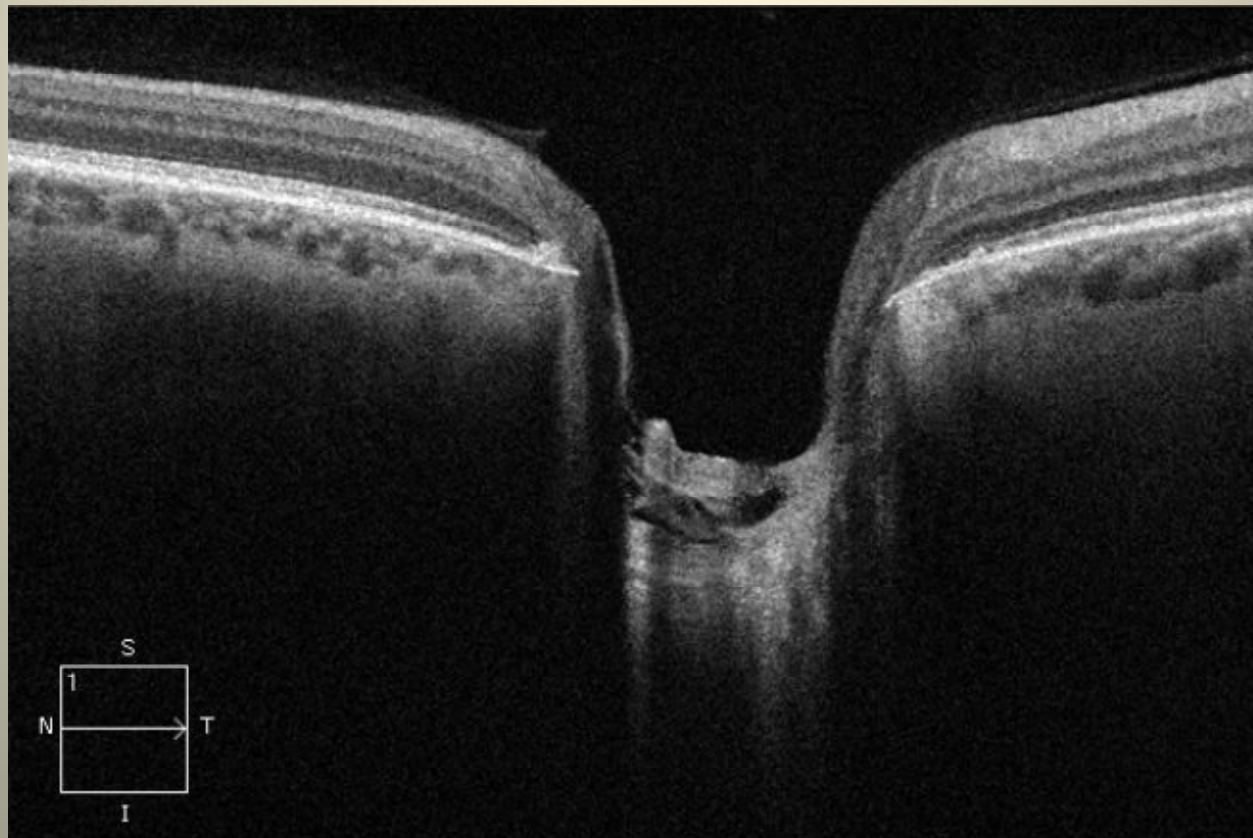
Database Cirrus 284 19 aa ≥ età ≤ 84 aa; + 8D ≥ Range ≤ -12D

Carl Zeiss Meditec - Copyright 2012. Tutti i diritti riservati.

dr Amedeo Lucente

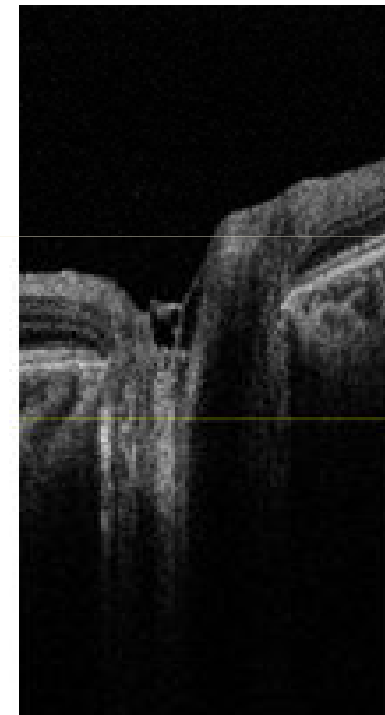
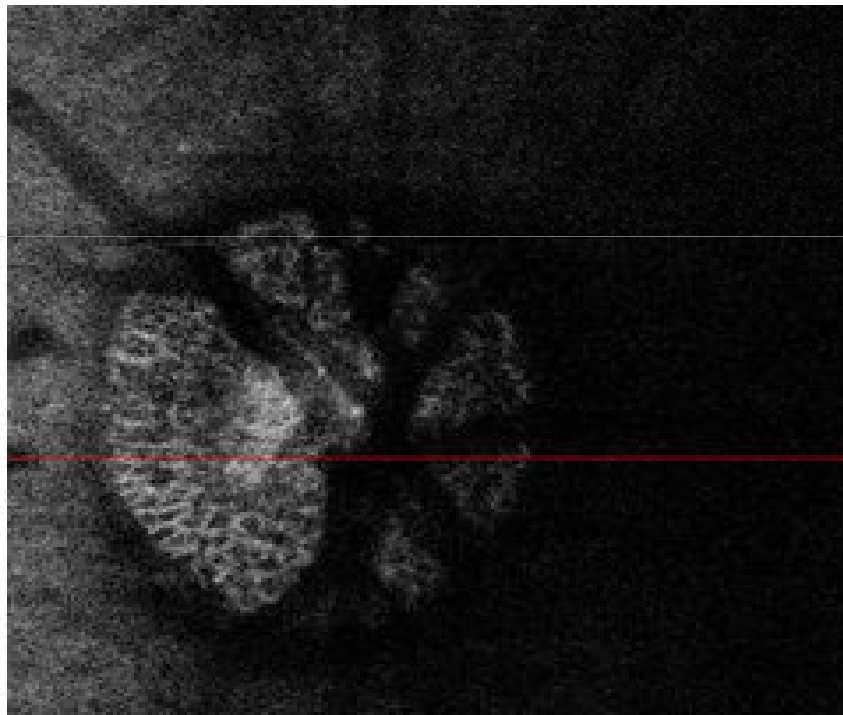


Immagini ad alta definizione: HD 5 Line Raster OS



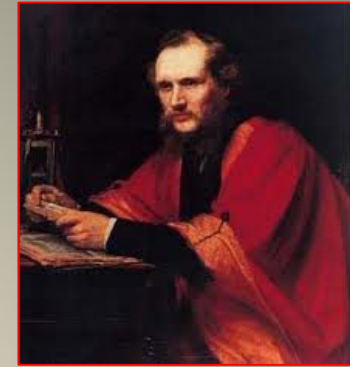
# **SS-OCT Zeiss** *Key factors: lamina cribrosa*

**Immagini EN-FACE ad alta densità  
Lamina Cribrosa**



Visualizzare pori laminari usando FOV 3 x 3 mm

***Lord William Thomson Kelvin (1824-1907)***



***« When you can measure what you speaking about and express it in numbers you know something about it; but when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind»***

***«Possiamo conoscere qualcosa dell'oggetto di cui stiamo parlando solo se possiamo eseguirvi misurazioni, per descriverlo mediante numeri; altrimenti la nostra conoscenza è scarsa e insoddisfacente»***

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*S. Giovanni Rotondo (Foggia) - Casa Sollievo della Sofferenza*

per

**Studio Oculistico**

**dott. A. Lucente**

**INOCULIS  
SALUS**

**SAN GIOVANNI ROTONDO, 4 APRILE 2014**