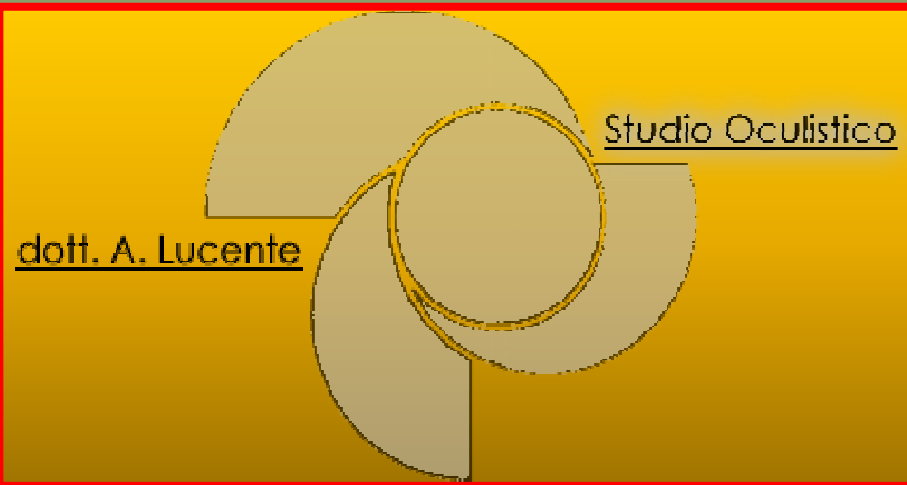




# ***OCT & Glaucoma***

***XIII Congresso SOC  
Lamezia Terme***

**Comitato Organizzatore  
Dr. Michele SERGI, Dr. Gregorio RIJILLO  
Resp. Scientifico Dr. Alfonso DURANTE  
Presidente Prof. Giovanni SCORCIA**



***[www.amedeolucente.it](http://www.amedeolucente.it)***

***No commercial interests***

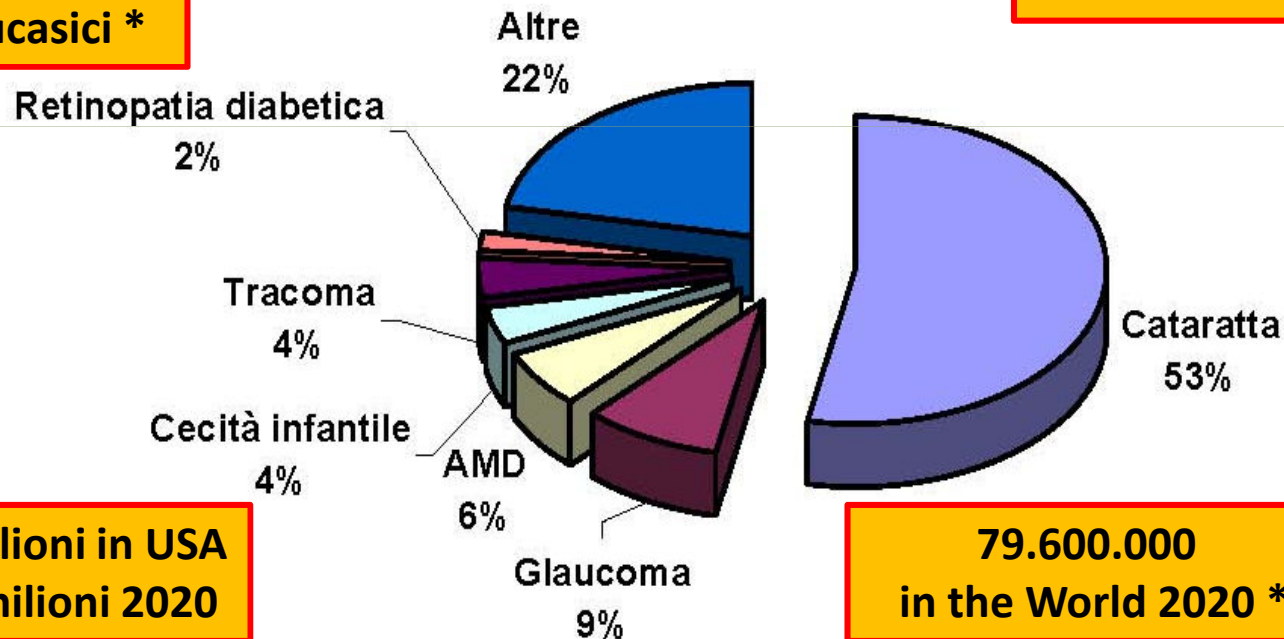
# Glaucoma 2<sup>a</sup> causa di cecità al mondo, 1<sup>a</sup> causa di cecità irreversibile

## Dati OMS 2010

Cause di cecità e ipovisione nel mondo su 285 milioni di disabili  
(dati preliminari Oms 2010)

2,5% over 40  
Caucasici \*

800.000 Italia



2,5 milioni in USA  
3,36 milioni 2020

- \* Bonomi L. et al. The Egna-Neumarkt Study 1998
- \*\* Quigley H.A. et al. Br. J. Ophthalmol. 2006

### Glaucoma

**What is it?**  
Glaucoma is a group of diseases that can damage the optic nerve. There are often no symptoms in its early stages. Left untreated, it can lead to vision loss & blindness.  
Most common form: Primary open-angle

**What are the numbers?**  
2.7 million people in the U.S. have **glaucoma**

50% KNOW 50% DON'T KNOW

By 2030, 4.2 million people in the U.S. will have **glaucoma**

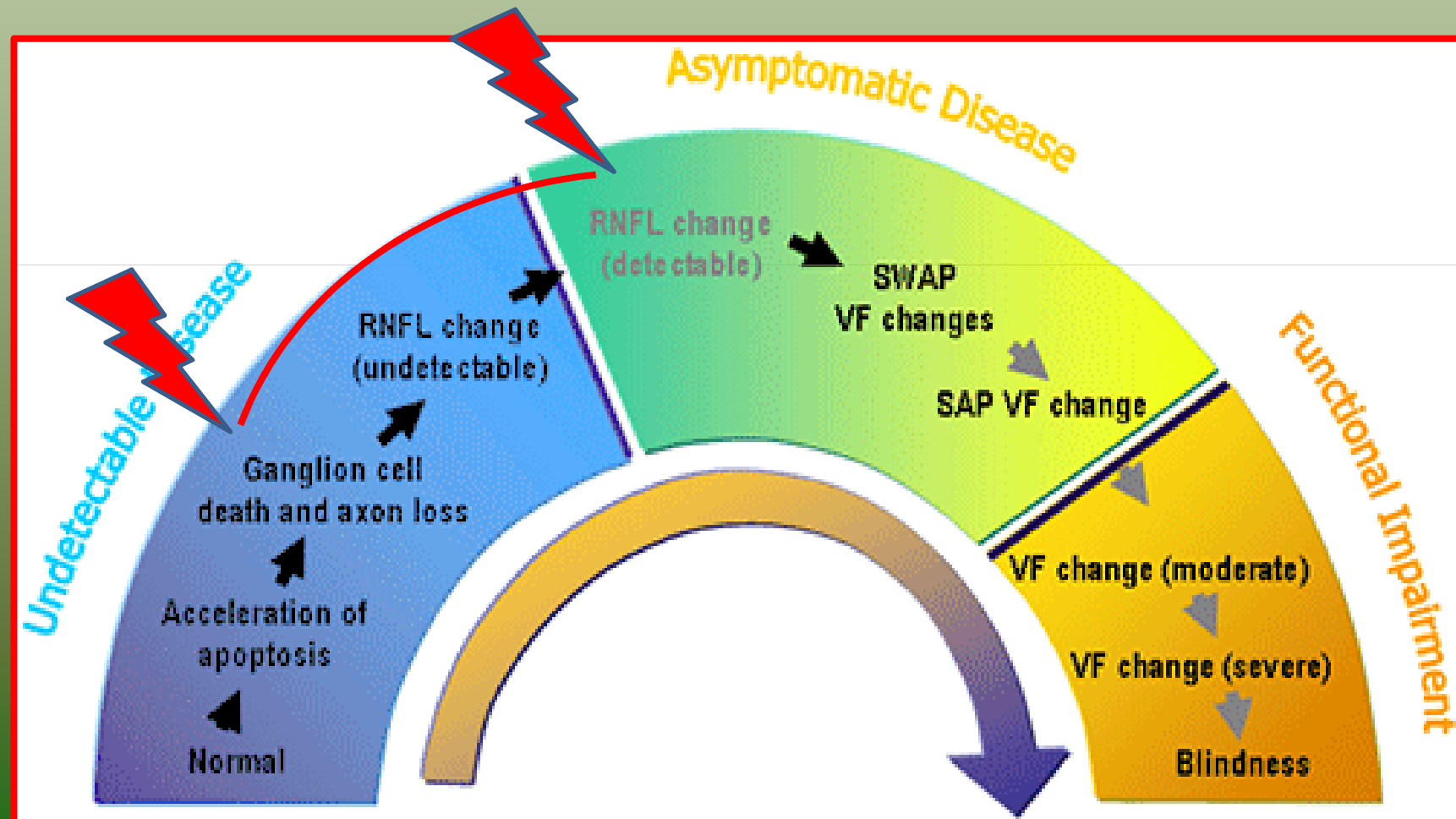
**Who's at higher risk?**  
African Americans 40+  
Everyone 60+ especially Mexican Americans  
Family history of glaucoma

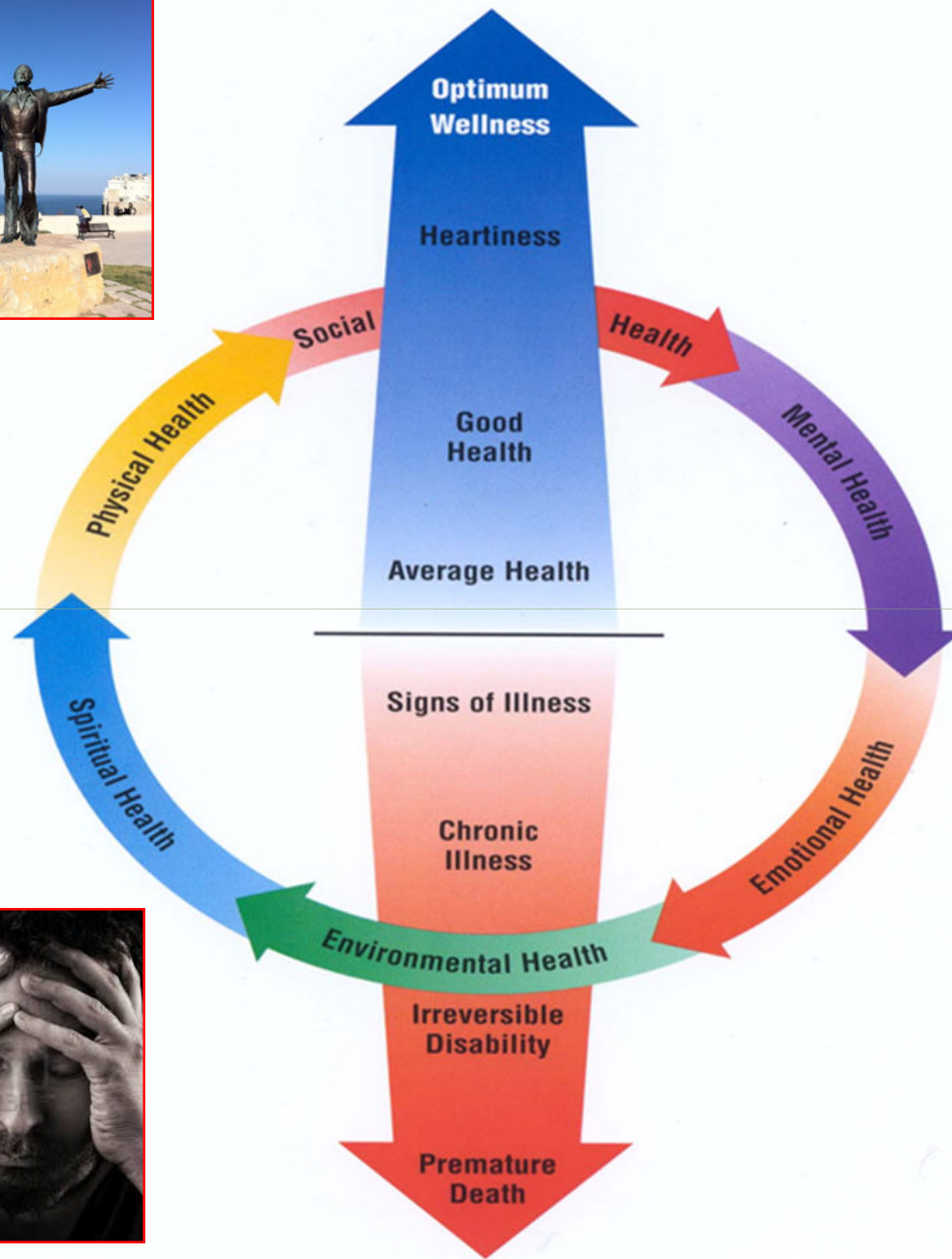
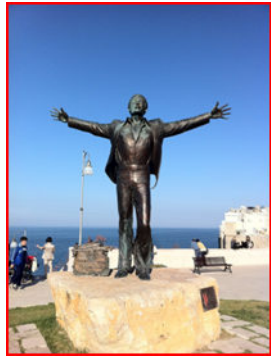
**What to do?**  
Get a comprehensive dilated eye exam every 1-2 years  
Early detection and treatment can help save your sight

Source: National Eye Institute, 2013

# The Glaucoma Continuum

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



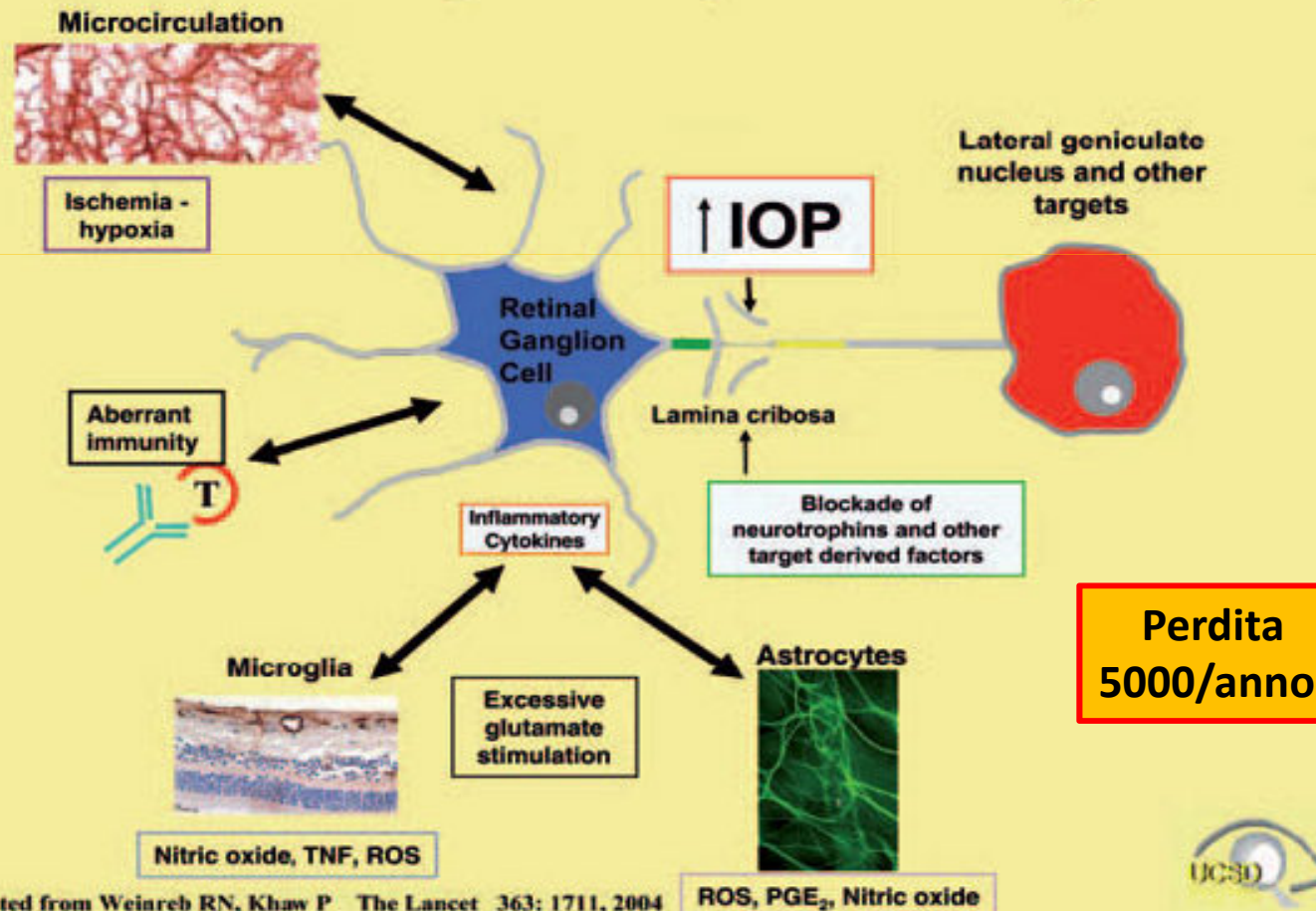




# Retinal Ganglion Cell

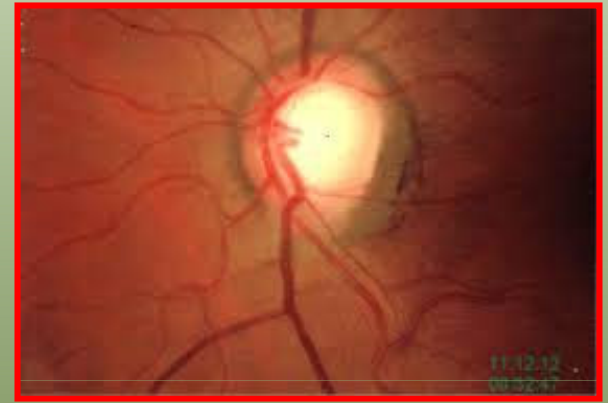
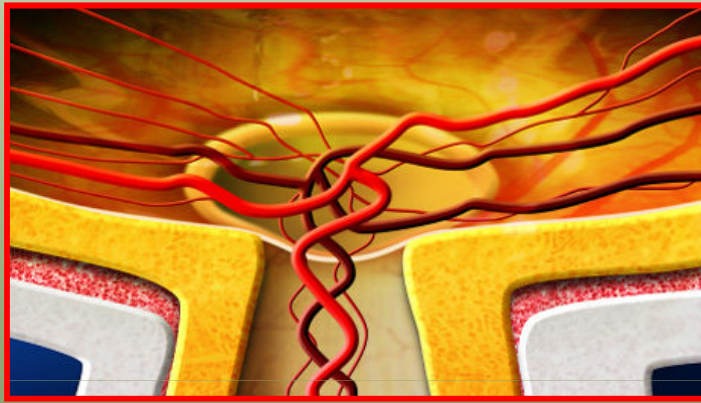
Weinreb R. The Lancet 363; 1711, 2004

## What damages the optic nerve in glaucoma?



Adapted from Weinreb RN, Khaw P. The Lancet 363: 1711, 2004

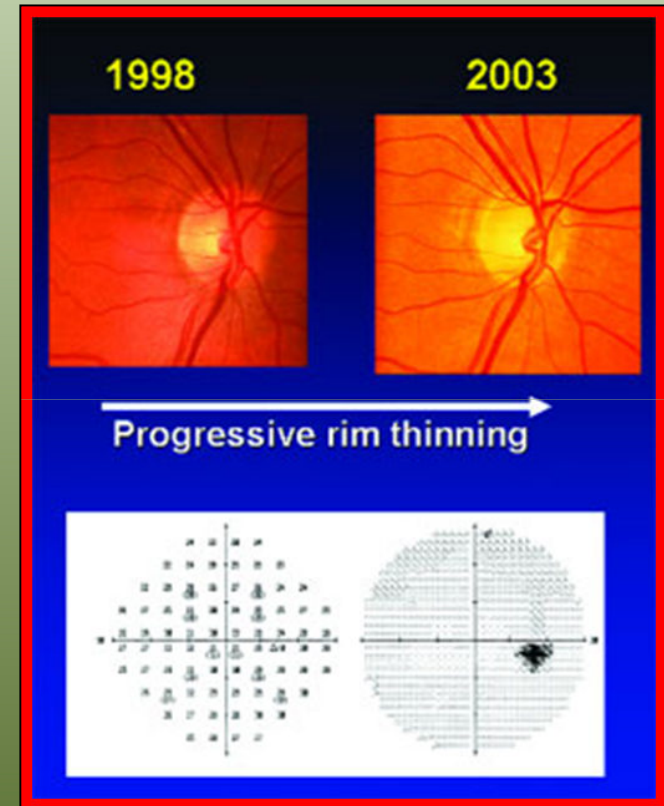
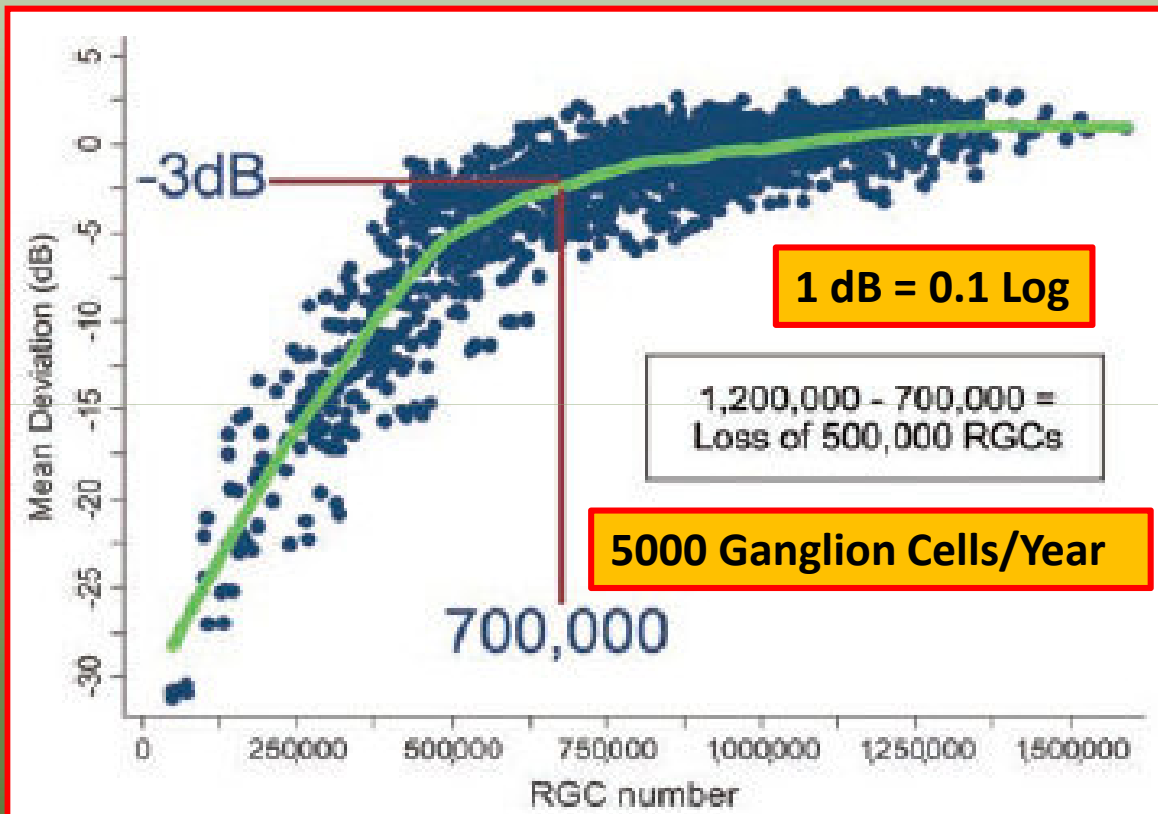
# ***OH v/s Glaucoma***



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

- Kass M A et al; OHTS Ocular Hypertension Treatment Study 2002
- Miglior S. et al; Results of the European Prevention Study 2005

# Relationship between MD and RGC number

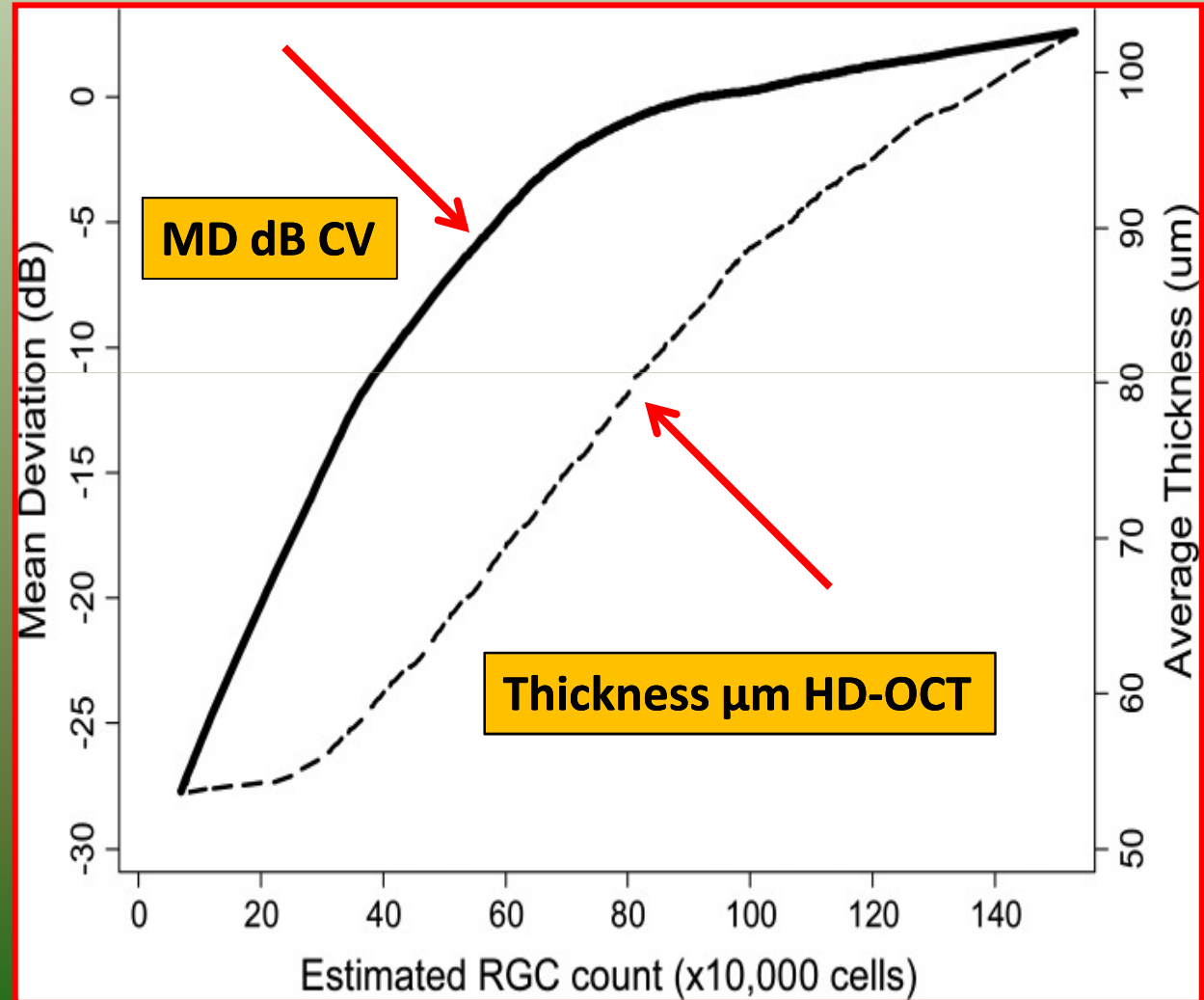


Adapted from Medeiros FA, Lisboa R, Weinreb RN, et al. A combined index of structure and function for staging glaucomatous damage. Arch Ophthalmol. 2012;130(5):E1-10.)

**Mean Deviation (dB)** —————  
**Average Thickness ( $\mu\text{m}$ )** - - - - -  
**Estimated RGC count (x 10.000 cells)**

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).

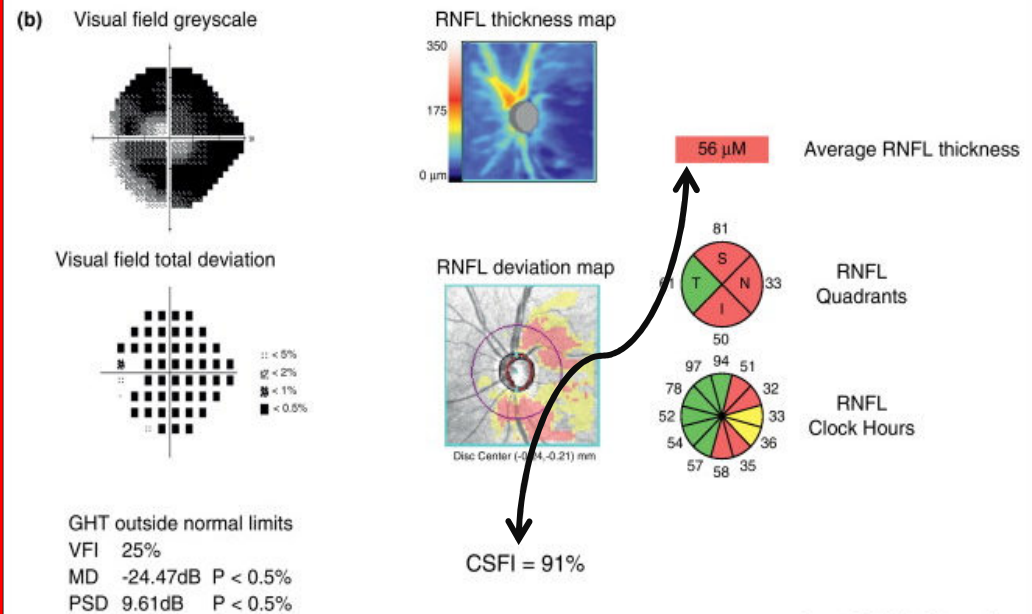
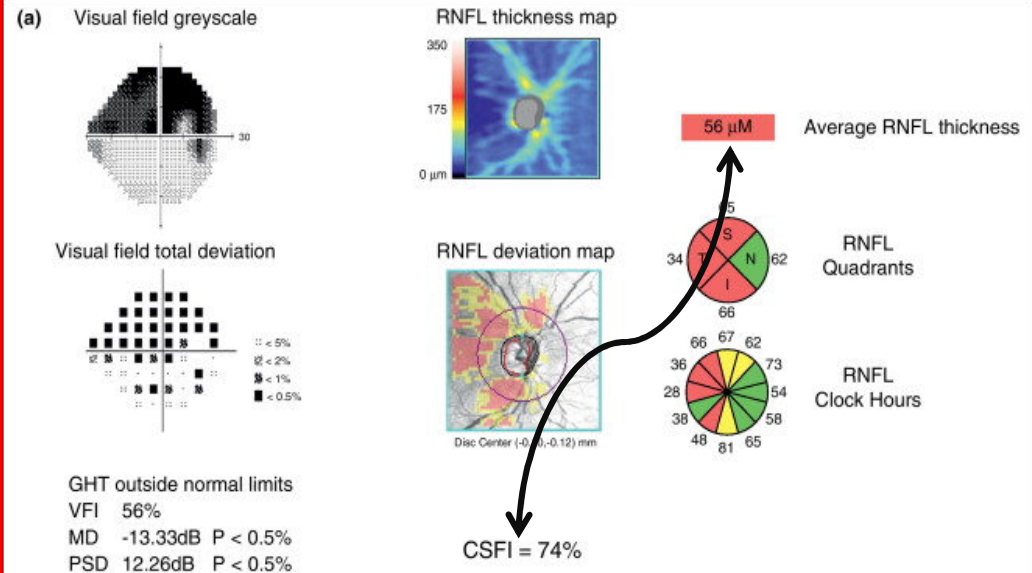
At *advanced stages* of damage (*low RGC counts*), changes in estimated *RGC* counts correspond to relatively *large changes in MD*, but only *small changes in average RNFL* thickness.



# 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





# ***Biblio CSFI***

***Specificità 95%***

**1. Lisboa R, Sony P, Viney G, et al.**

*Diagnostic capability of optical coherence tomography in evaluating the degree of glaucomatous retinal nerve fiber damage.* Invest Ophthalmol Vis Sci 2006;47(5):2006-10.

**2. Medeiros FA, Lisboa R, Weinreb RN, et al.**

*A combined index of structure and function for staging glaucomatous damage.* Arch Ophthalmol. 2012;130 (5):E1-10.

**3. Harwerth RS, Wheat JL, Fredette MJ, Anderson DR. Linking Structure and function in glaucoma.** Prog Retin Eye Res. 2010;29(4):249-71.

**4. Medeiros FA, Zangwill LM, Anderson DR, et al. Estimating the rate of retinal ganglion cell loss in glaucoma.** Am J Ophthalmol. 2012; Jul 26. [Epub ahead of print].



# HRT III



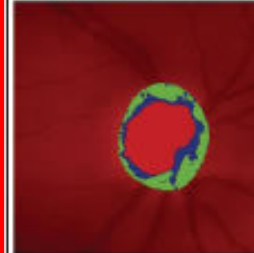
## Heidelberg Retina Tomograph OU Report

**HEIDELBERG  
ENGINEERING**

Patient: **DOB:** 1930 **Examination:** Mar/22/2001  
 PatID: **Gender:** female **Ethnicity:** African origin

Quality: Very good (SD 14 µm) **Initial Report** Quality: Very good (SD 13 µm)  
 Focus: 2.00 dpt Focus: 2.00 dpt  
 Operator: --- **OD OS** Operator: ---

Disc Size: 2.09 mm<sup>2</sup> (average) **CUP** Disc Size: 2.42 mm<sup>2</sup> (average)

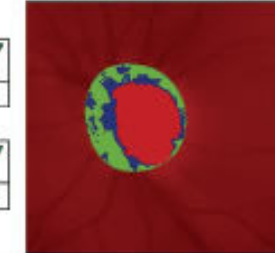


**Linear Cup/Disc Ratio [ ]**

0.71 ✓	Asymmetry 0.01 ✓	0.70 ✓
p = 0.05	p = 0.41	p = 0.09

**Cup Shape Measure [ ]**

0.06 ✗	Asymmetry 0.12 ✗	-0.08 ✓
p < 0.001	p < 0.001	p = 0.12



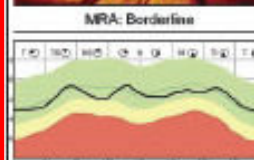
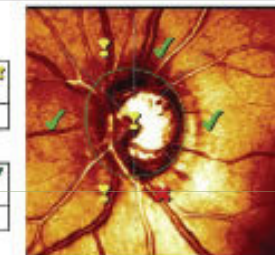
**RIM**

**Rim Area [mm<sup>2</sup>]**

1.05 ✗	Asymmetry -0.18 ✓	1.23 ?
p < 0.001	p = 0.27	p = 0.003

**Rim Volume [mm<sup>3</sup>]**

0.22 ✓	Asymmetry -0.05 ✓	0.27 ✓
p = 0.06	p = 0.4	p = 0.1



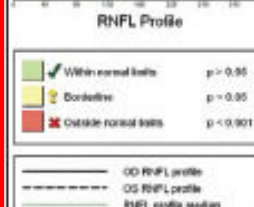
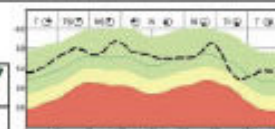
**RNFL**

**Height Variation Contour [mm]**

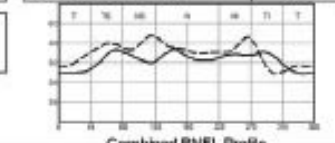
0.26 ✓	Asymmetry -0.13 ✓	0.39 ✓
p = 0.16	p = 0.05	p > 0.5

**Mean RNFL Thickness [mm]**

0.19 ✓	Asymmetry 0.00 ✓	0.19 ✓
p = 0.24	p = 0.4	p = 0.24



**Inter-Eye Asymmetry** 46 %



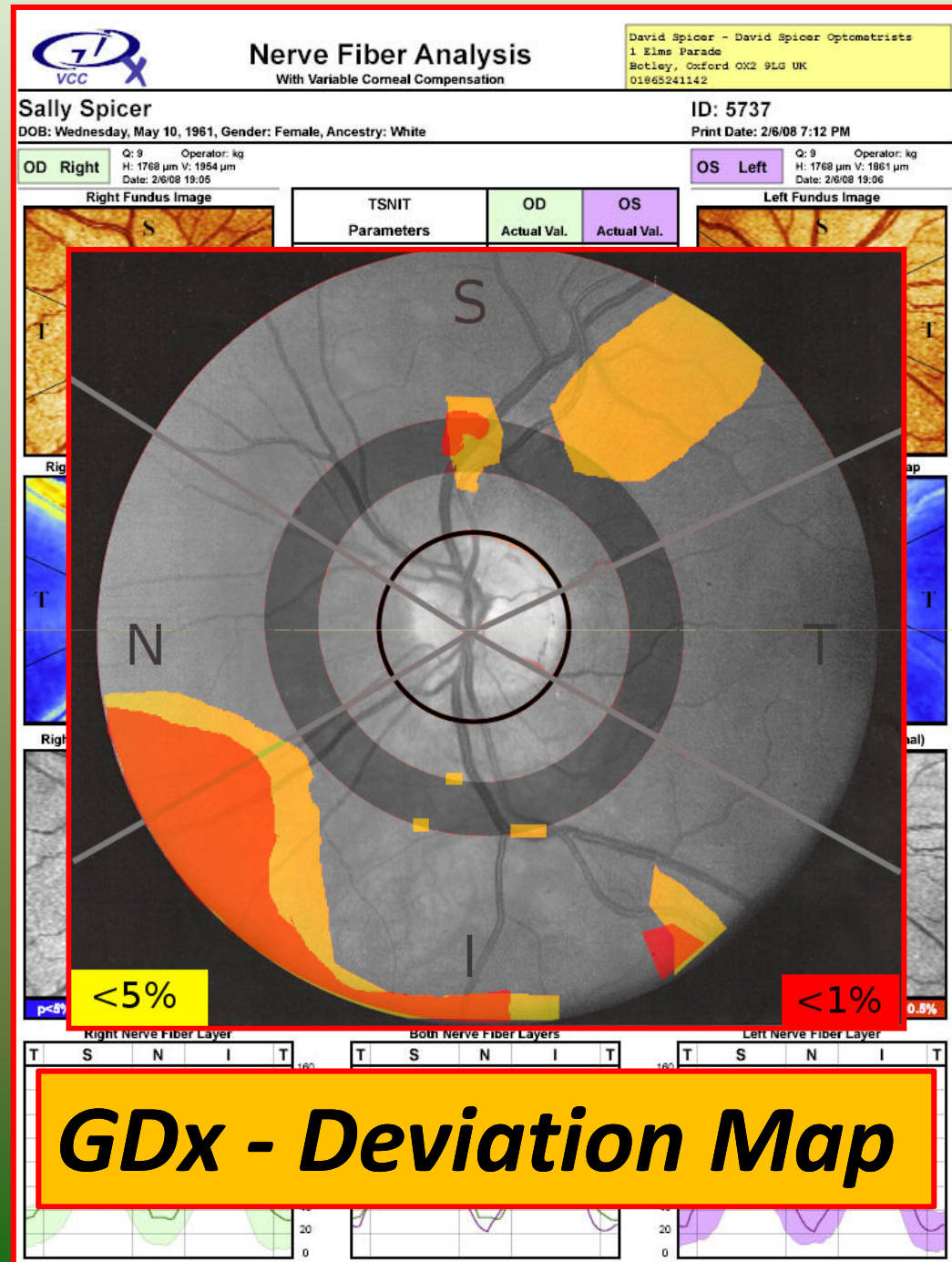
Software Version: 2.8.2/09  
 www.heidelberg-engineering.com

Comments:

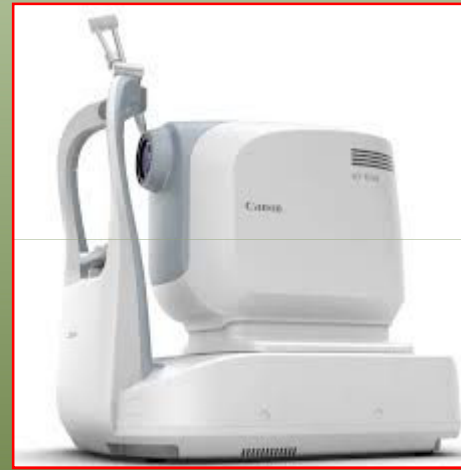
Signature:  
 Date: 11/10/2005

Image quality is expressed in terms of the average standard deviation and should be as low as possible. A Standard Deviation of 50µm or higher indicates you should use the data with caution.

# GDX PRO



# ***SD/HD OCT***



# ***Perché l'OCT nel glaucoma***

## ***Technical Reasons***

- ***Non invasivo***
- ***Non dannoso***
- ***Ripetibile***
- ***Riproducibile***
- ***Affidabile***
- ***Veloce***
- ***Esecuzione delegabile?***
- ***Hi Tech in progress***

# ***Perché l'OCT nel glaucoma***

## ***Clinical Reasons***

- ***1 Glaucoma in terapia/2,5 senza terapia***
- ***Danno CV dopo 25-40% perdita ganglion cell***
- ***RNFL diminuisce  $\pm$  6 anni prima dei danni al CV***
- ***RNFL diminuito nei giovani con CV OK***
- ***HD-OCT & AS-OCT & CV in COMBO***

# ***OCT Limits***

- ***Opacity dioptric media***
- ***Tilting retina***
- ***High myopia***
- ***Agreement***
- ***Higt Costs***
- ***In the later stages of glaucoma OCT measurements appear to reach a plateau***

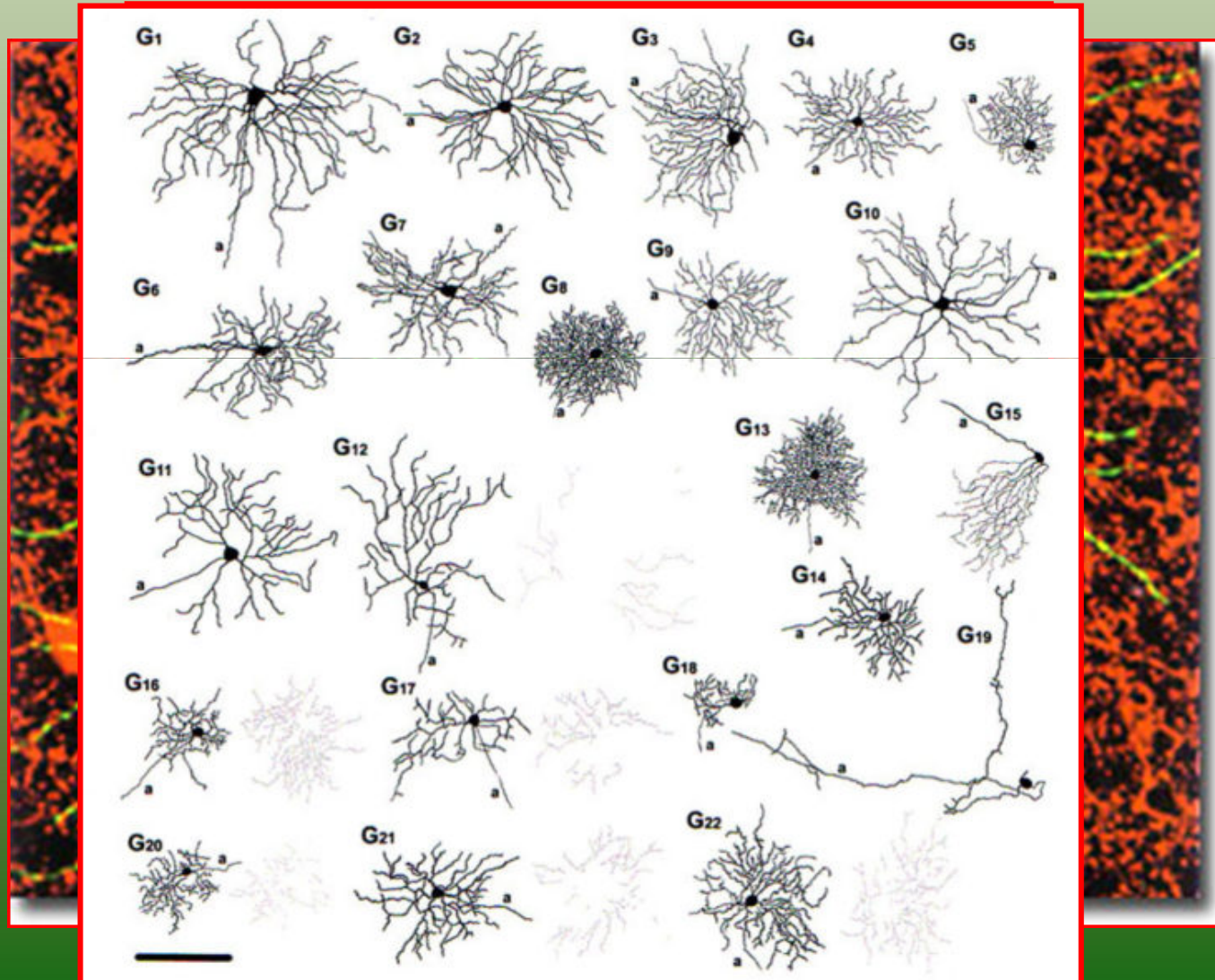


# ***HD-OCT Über alles***

- ***Valutazione corio-retina **strato x strato*****
- ***Valutazione spessore in toto e **strato x strato*****
- ***Valutazione **3D*****
- ***Valutazione **en-face*****
- ***Valutazione papilla ottica **ONH*****
- ***Valutazione del Segmento Anteriore **AS-OCT*****
- ***Valutazione flussimetrica con **OCT-Doppler*****
- ***Valutazione ossimetrica corio-retinica***
- ***Valutazione cellulare con **Ottiche Adattive*****

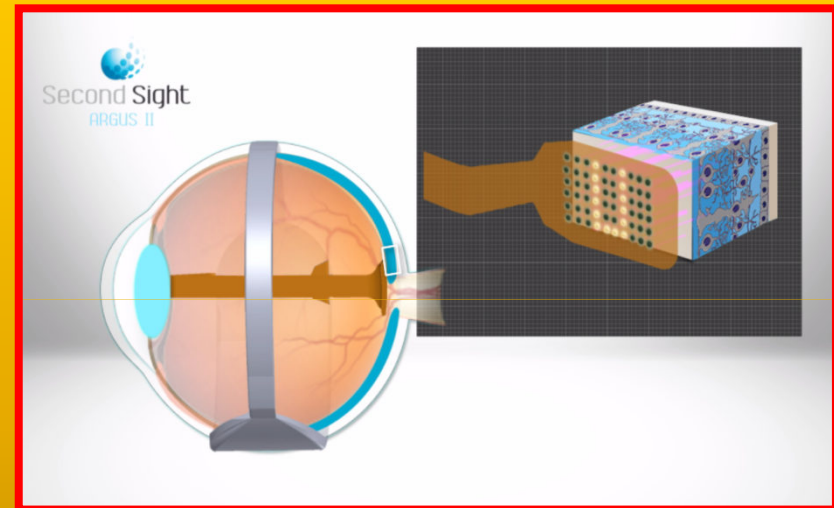
# Retinal Ganglion Cells

[www.olympusfluoview.com](http://www.olympusfluoview.com)



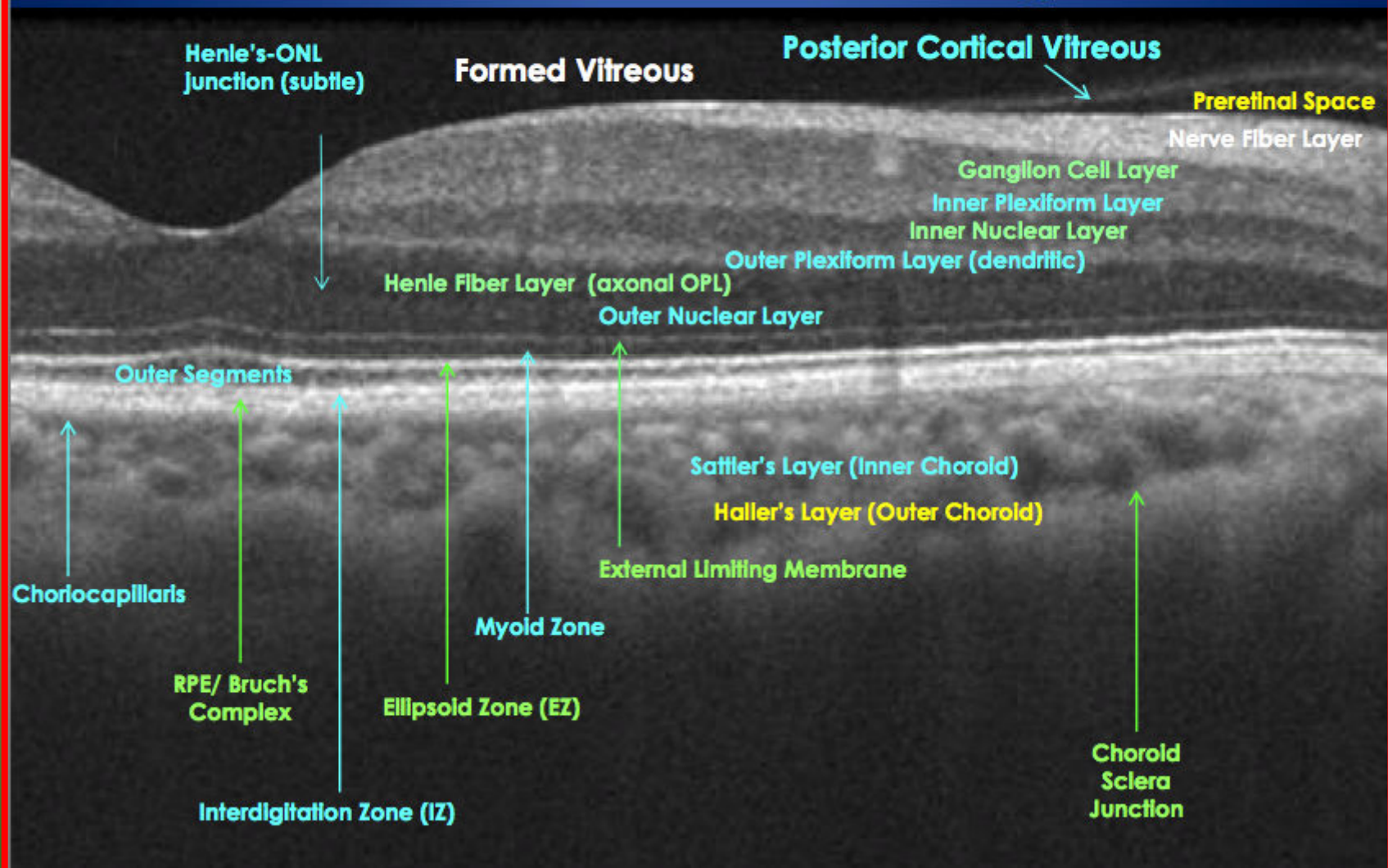
# Retinal cells

- **125.000.000 Bastoncelli**
- **5.000.000 Coni**
- **5.000.000 EPR**
- **1.000.000 Gangliari**
- **1.000.000 Bipolari**
- **1 : 9 gangliari/glia = 9.000.000 Muller (25.000/mm<sup>2</sup>)**
- **Amacrine, Orizzontali.**

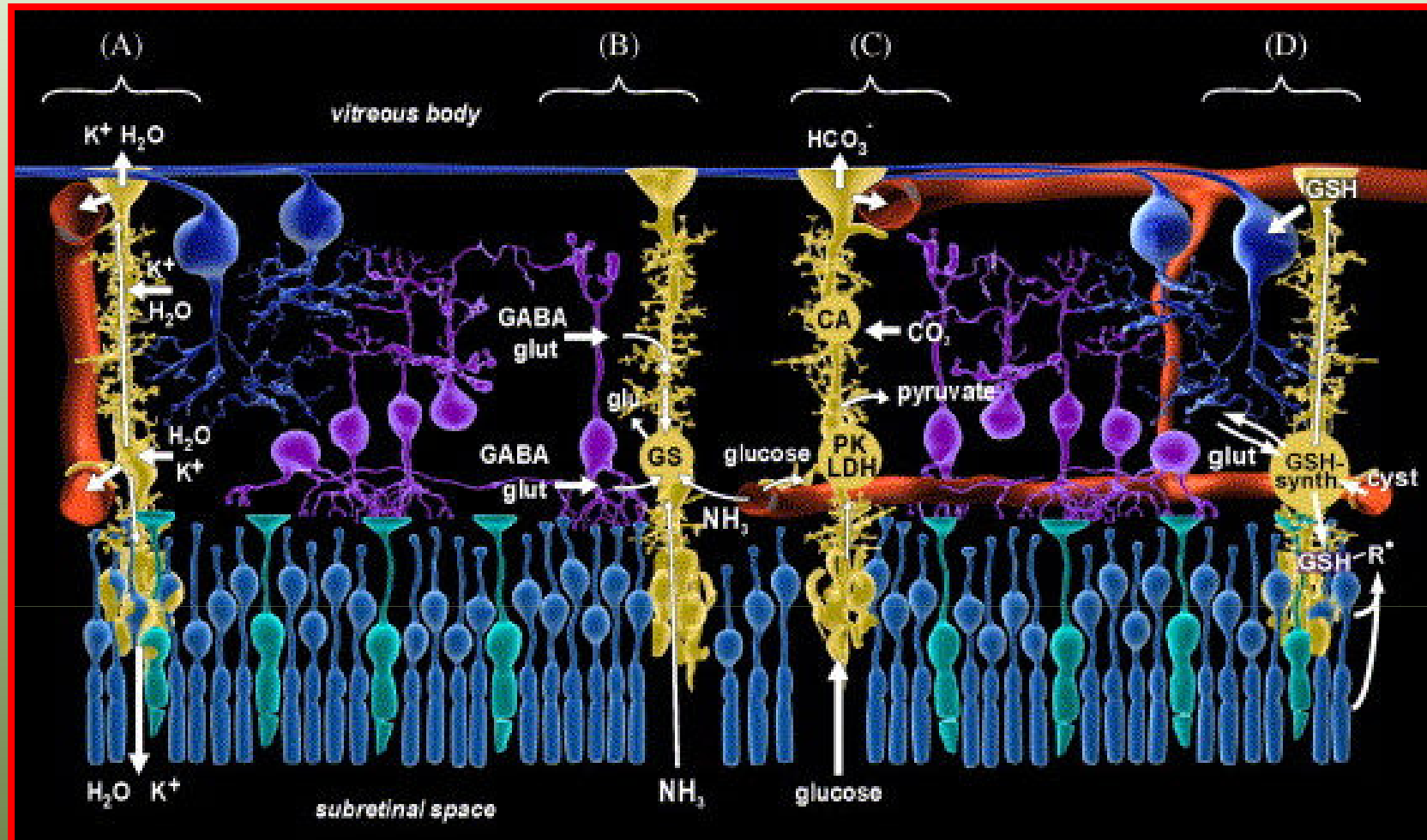


# International Nomenclature for OCT Meeting

## Consensus Normal OCT Terminology





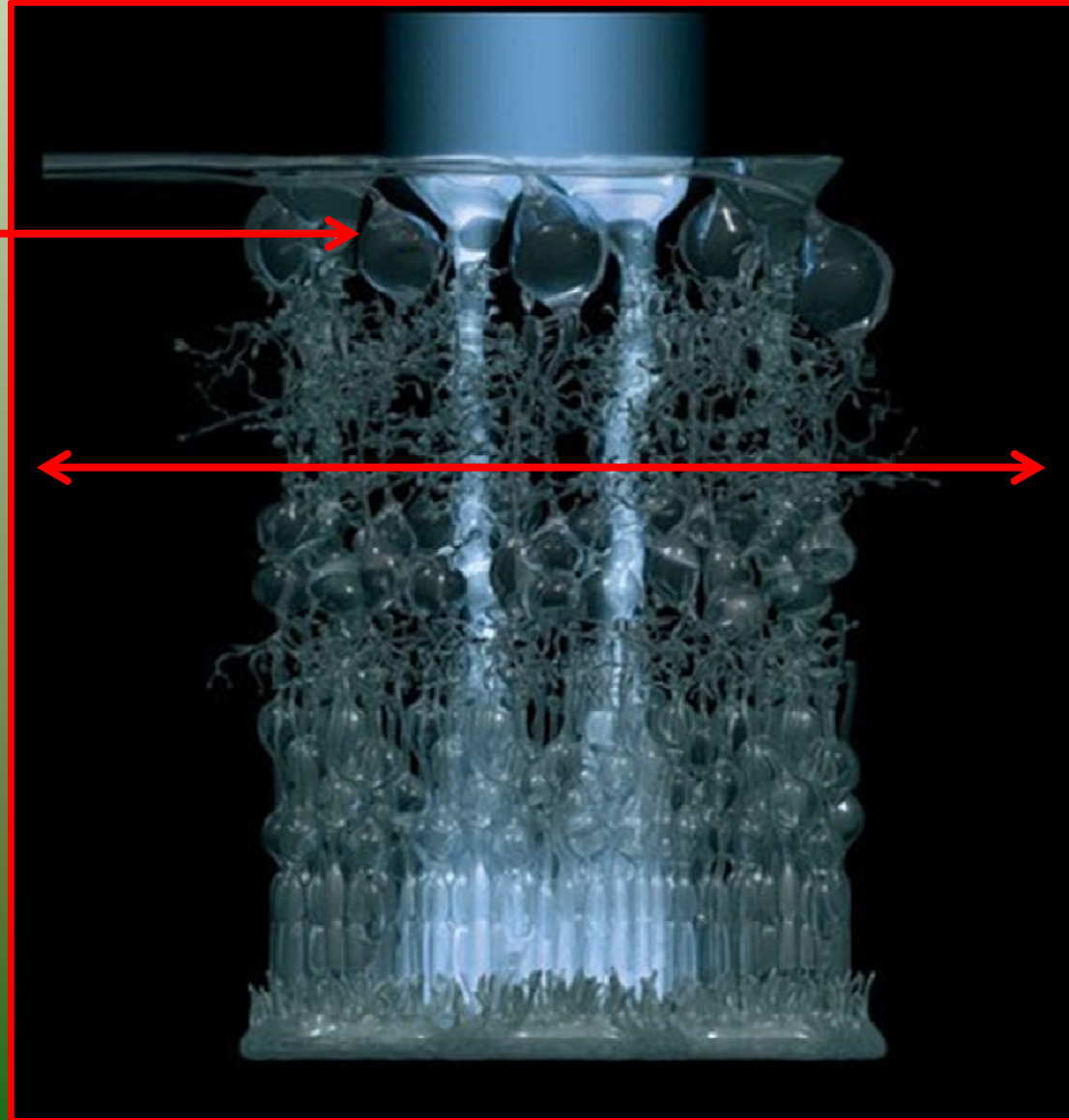


**Important Müller cell - neuron interactions in the normal mature retina.** (A) Spatial buffering of K<sup>+</sup> ions and water. (B) Transmitter recycling. (C) "Metabolic symbiosis". (D) Free radical scavenging/GSH metabolism . CA, carbonic anhydrase; cyst., cysteine; GABA, gamma-aminobutyric acid; glut, glutamate; GS, glutamine synthetase; GSH, glutathion; LDH, lactate dehydrogenase; PK, pyruvate kinase; R radical dot, free radical molecule.

([www.sciencedirect.com](http://www.sciencedirect.com))

# *Retinal Ganglion & Muller Cell*

**RGC**

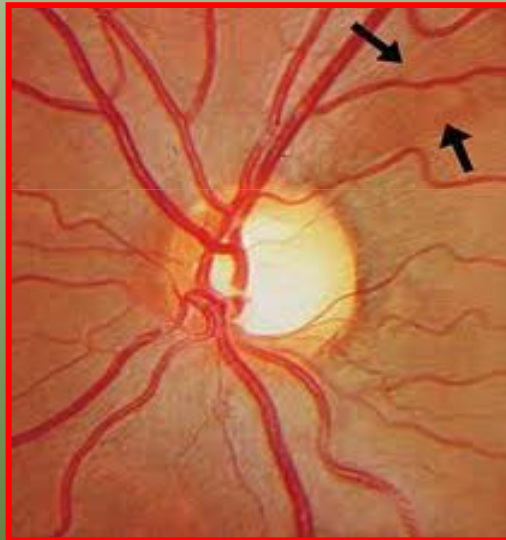


**IPL**

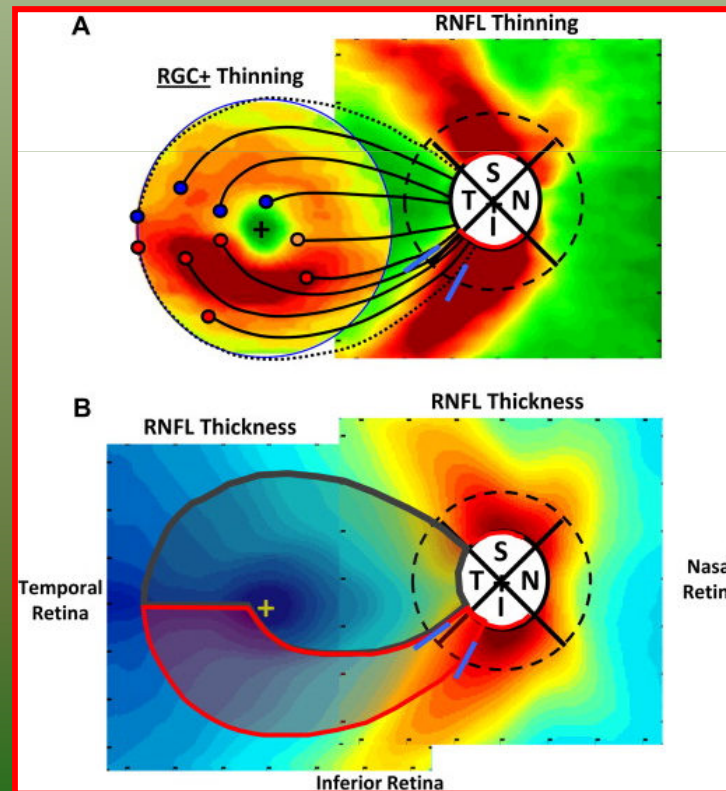


# Glaucoma affects 3 areas in the retina of the eye

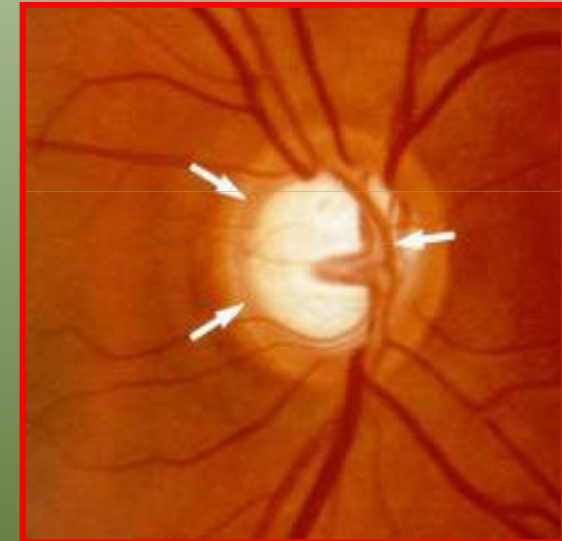
**RNFL**



**GCC**



**ONH**



# ***HD-OCT & Glaucoma***

- ***RNFL*** —————→ ***Retinal Nerve Fiber Layer***
- ***ONH*** —————→ ***Optical Nerve Head***
- ***GCC*** —————→ ***Ganglion Cell Complex***
- ***AS-OCT*** —————→ ***Anterior Segment OCT***
- ***HD-OCT & CV*** ***Piattaforme multimediali***

# ***HD-OCT & Glaucoma*** **1**

## **★ RNFL Retinal Nerve Fiber Layer** **1**

- **ONH Optical Nerve Head**
- **GCC Ganglion Cell Complex**
- **AS-OCT Anterior Segment OCT**
- **HD-OCT & CV**

# ***RNFL Retinal Nerve Fiber Layer***

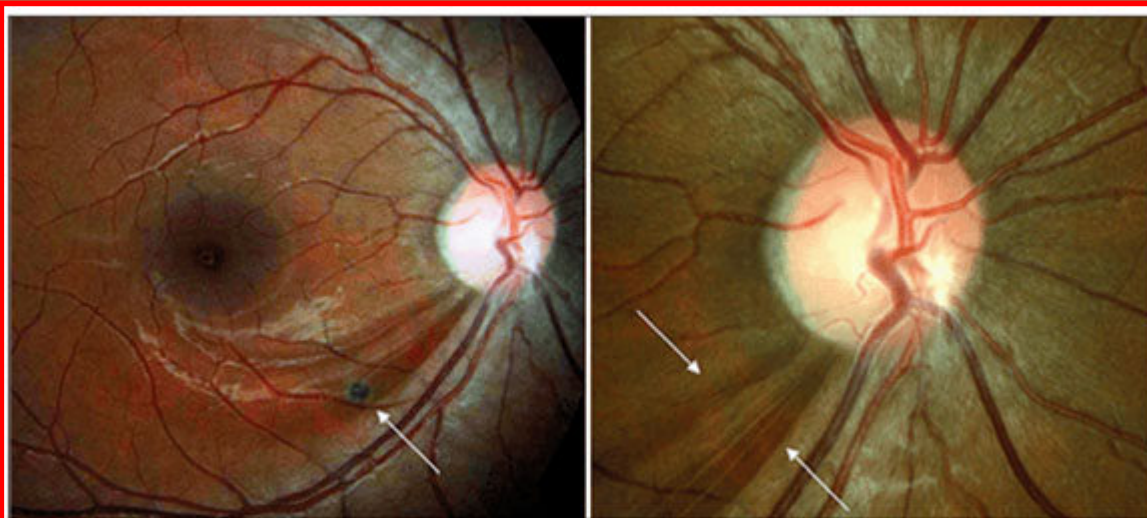
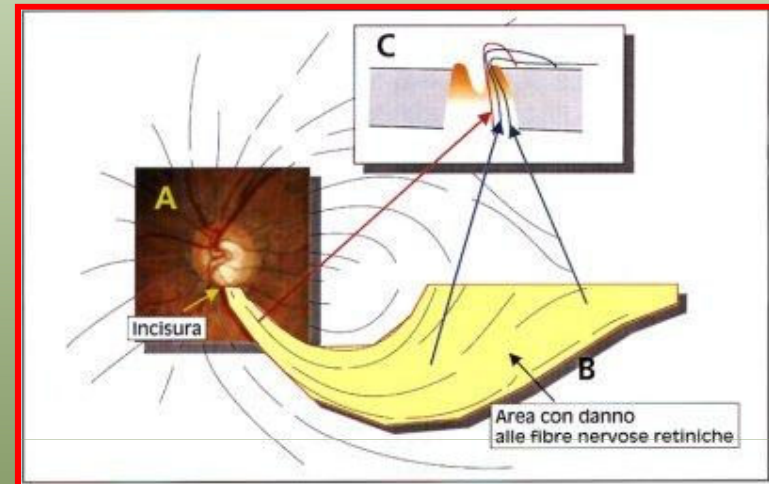
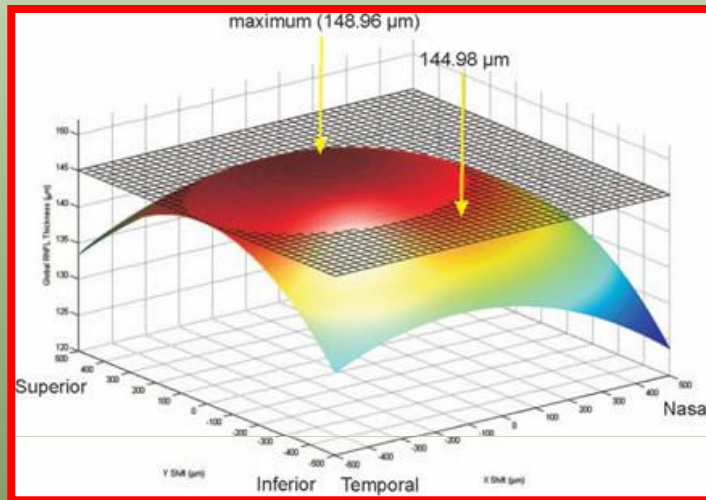
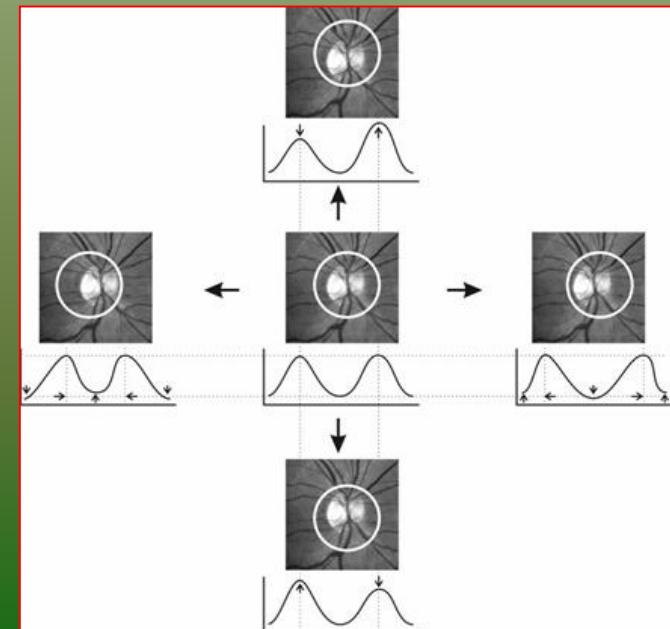
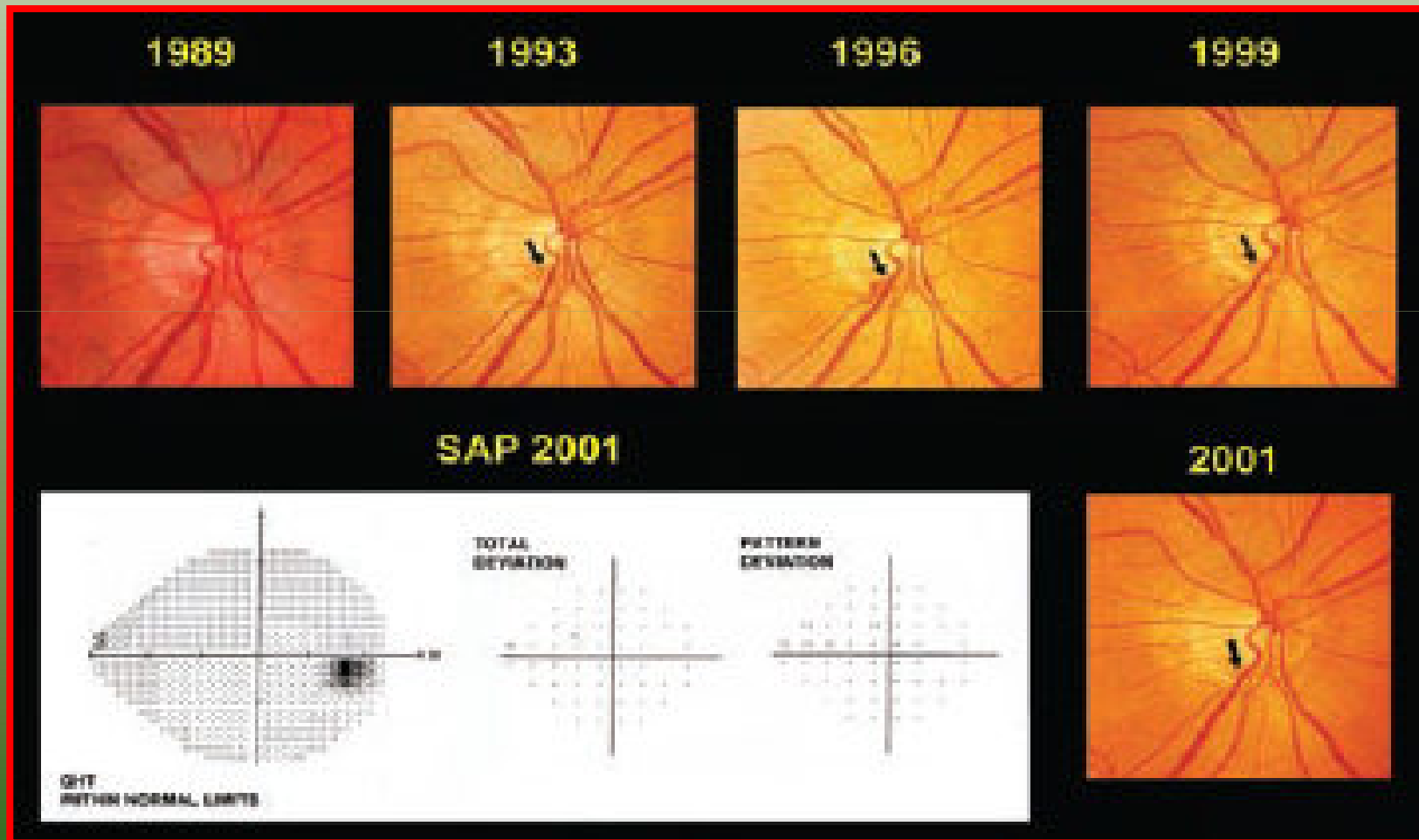


Figure 1 - Multiple inferior-temporal retinal nerve fiber layer defects (right arrow) close to a small chorioretinal scar (left arrow) in the right eye

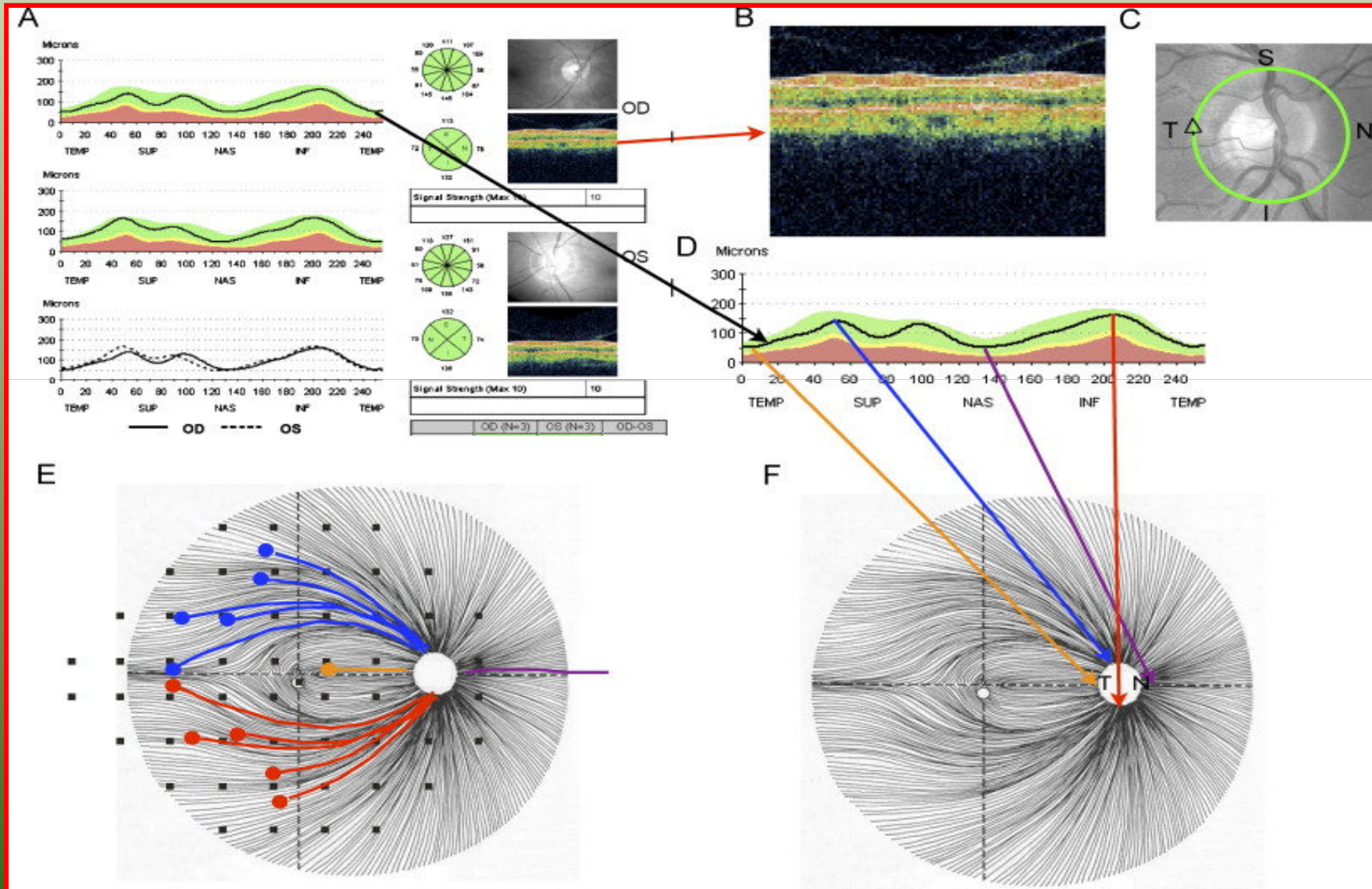


***At early stages of glaucoma, large structural changes can be associated with statistically normal visual fields***





# RNFL Retinal Nerve Fiber Layer





# RNFL Retinal Nerve Fiber Layer

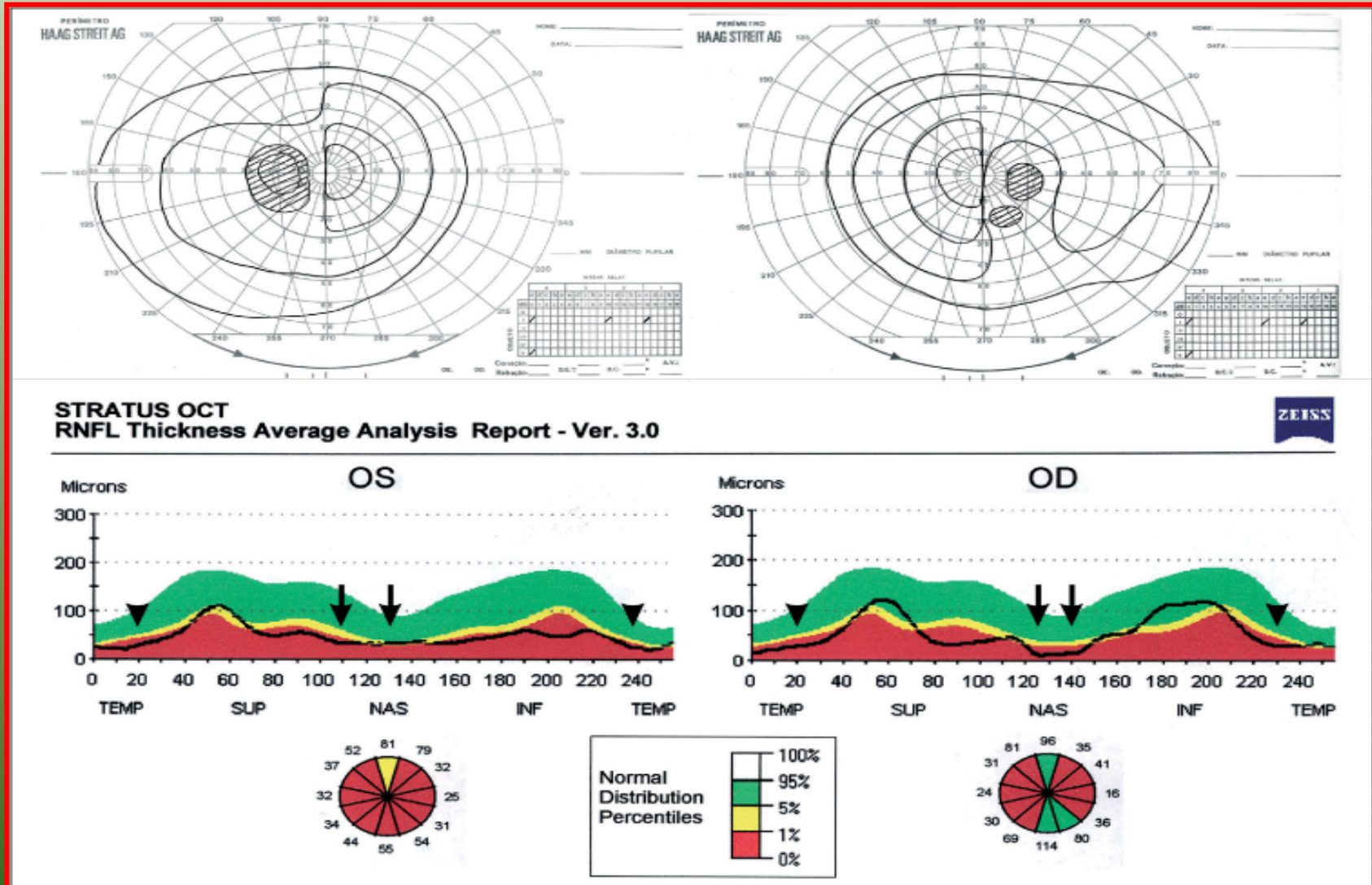


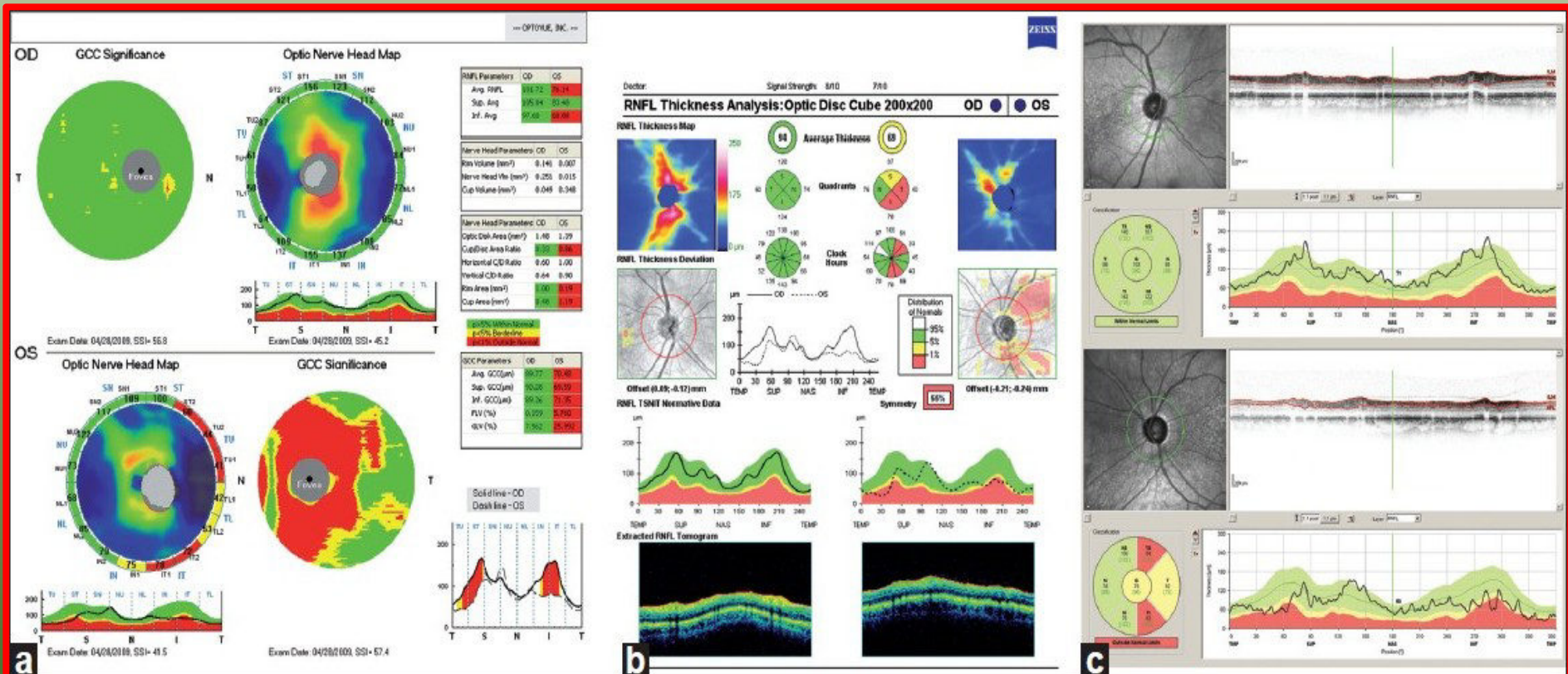
Figure 2 - Case 2: Goldmann visual fields showing bitemporal hemianopic scotomas. Stratus OCT™ showing diffuse reduction of RNFL in both eyes, including the nasal (arrows) and temporal (arrowheads) portions of the disc

# Glaucoma Reports

RTvue

Cirrus

Spectralis

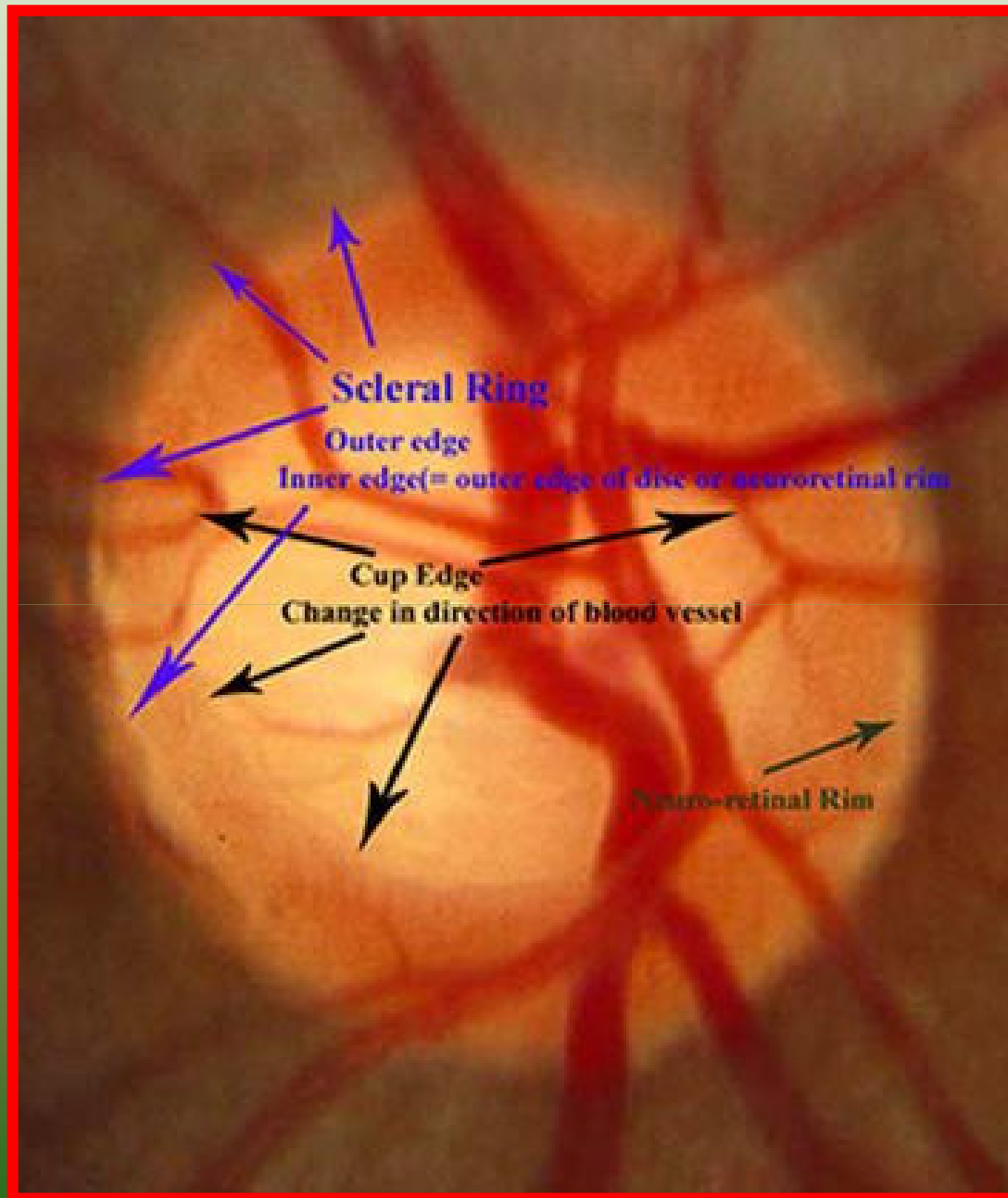


# ***HD-OCT & Glaucoma*** **2**

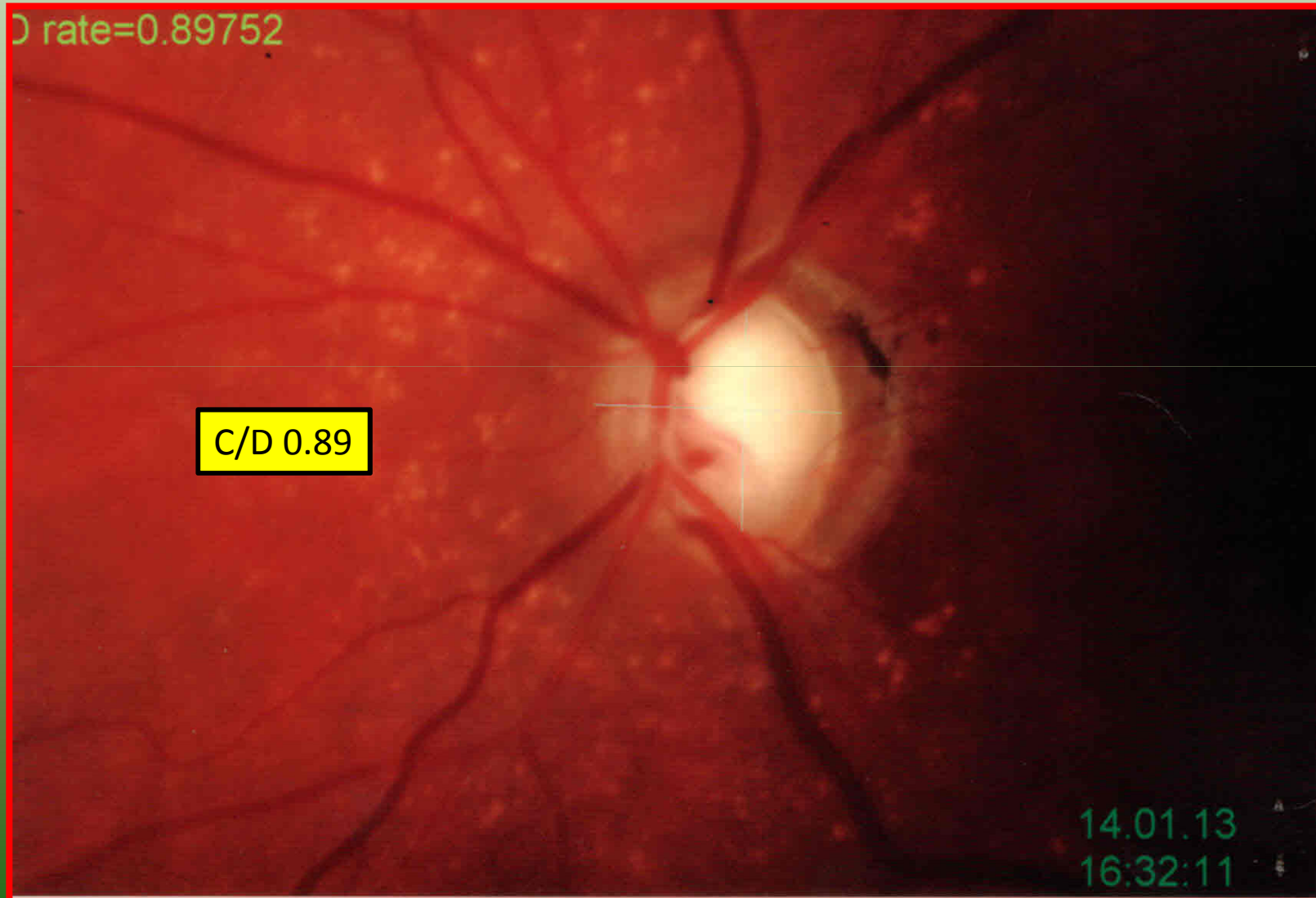
- **RNFL Retinal Nerve Fiber Layer**

★ ***ONH Optical Nerve Head*** **2**

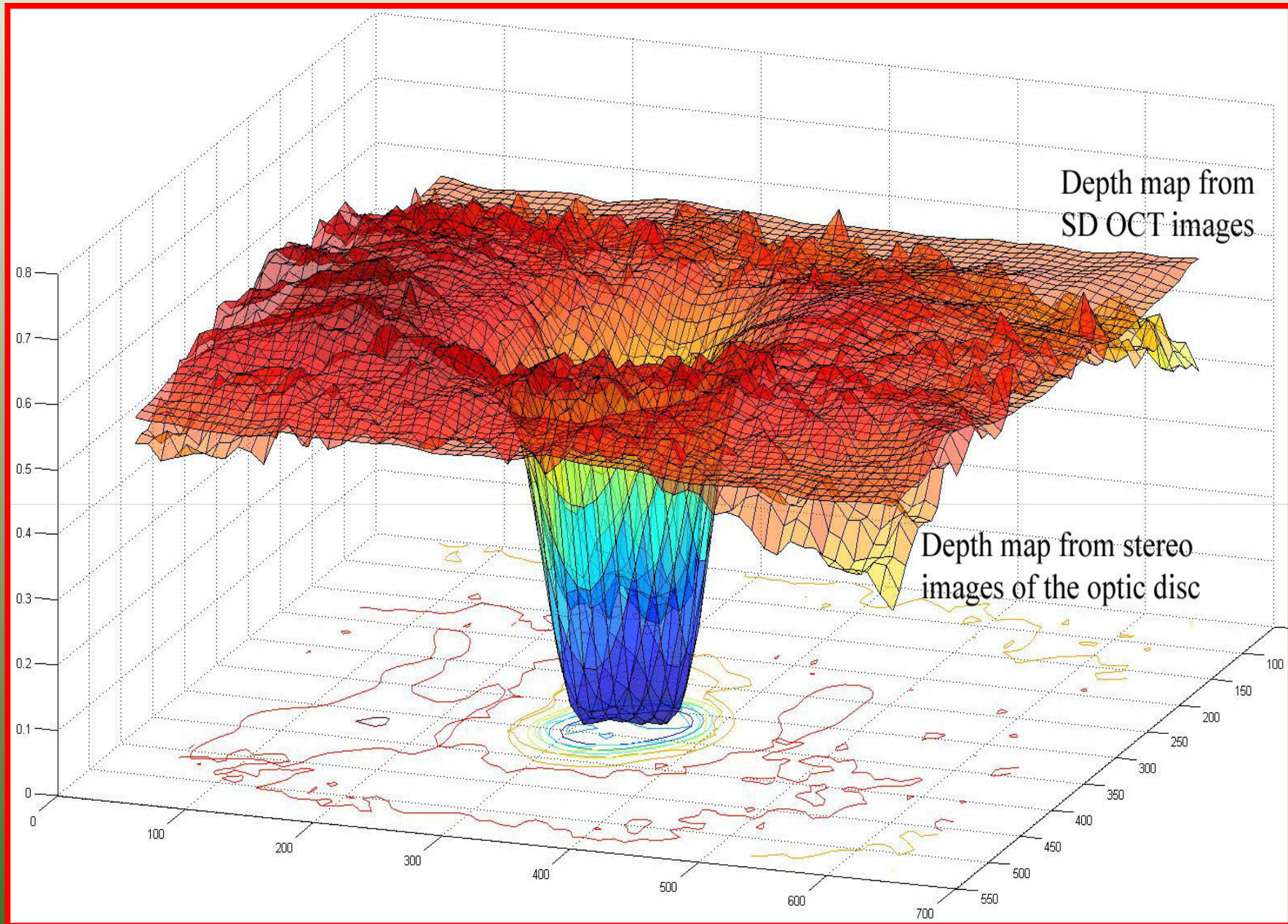
- **GCC Ganglion Cell Complex**
- **AS-OCT Anterior Segment OCT**
- **HD-OCT & CV**

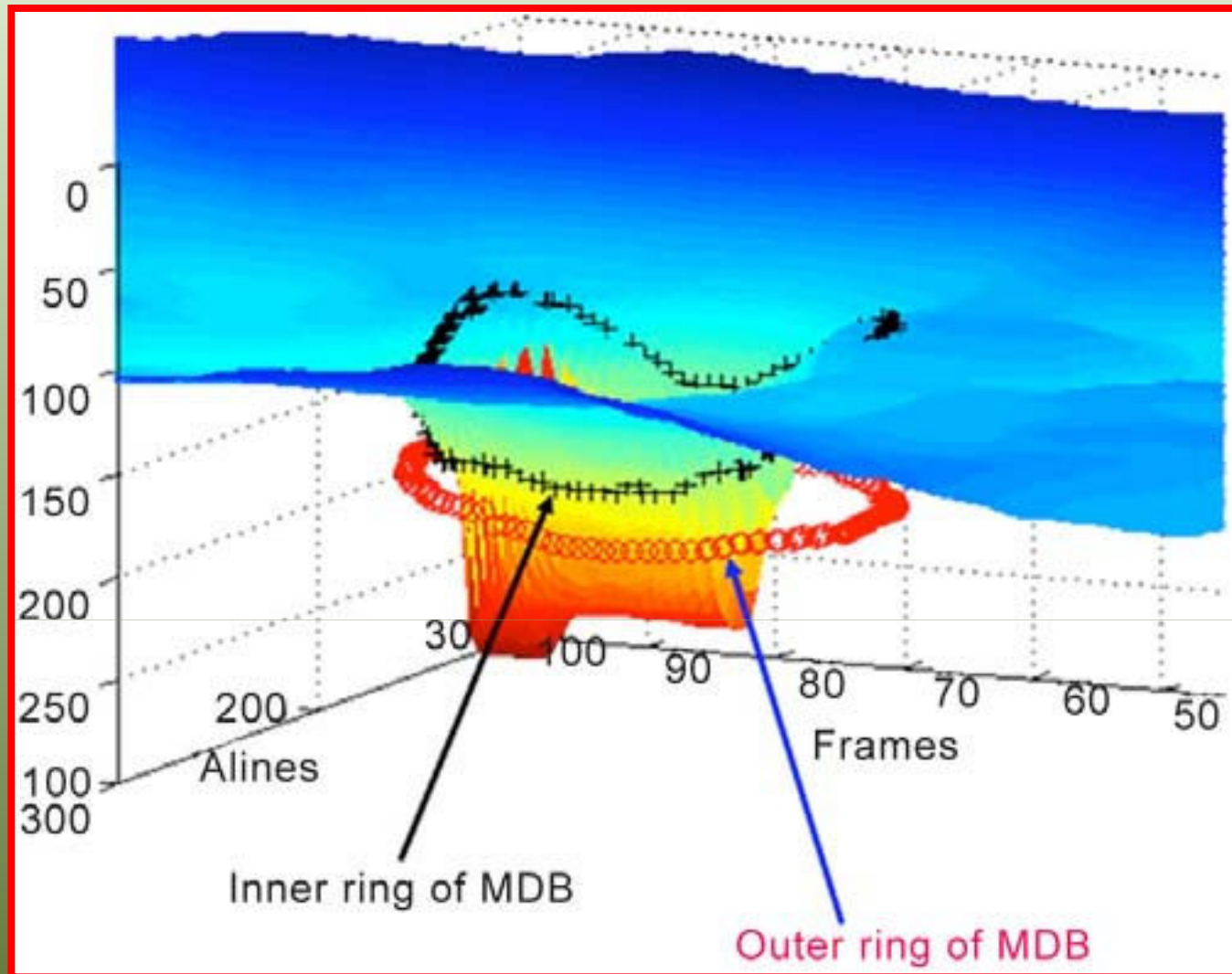


# *Cup/ Disk come fattore di rischio*









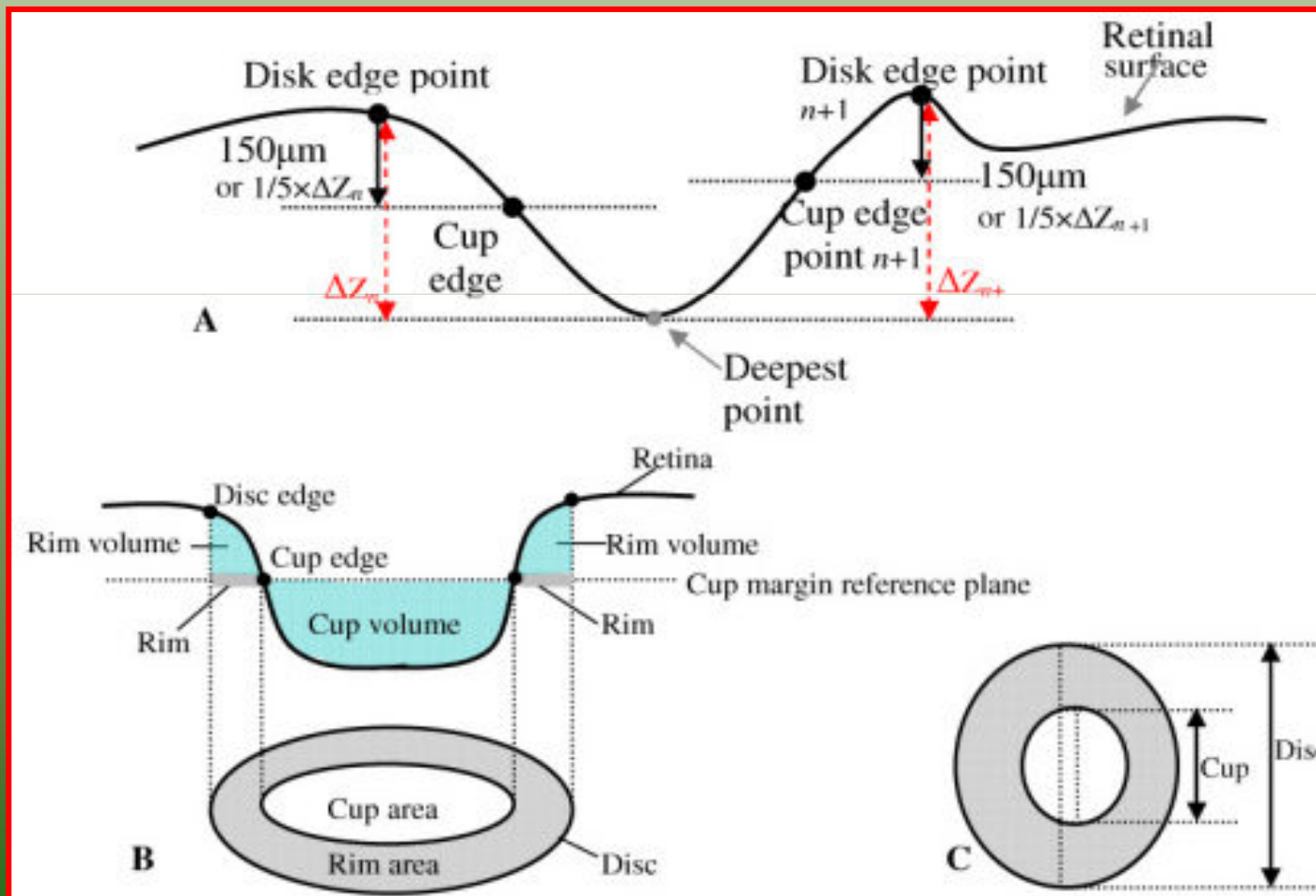
Method for "minimum distance band" (MDB) determination in spectral domain optical coherence tomography (SD-OCT) images of the optic nerve head. Minimum distance mapping using three-dimensional optical coherence tomography for glaucoma diagnosis.

***Boris Povazay et al***

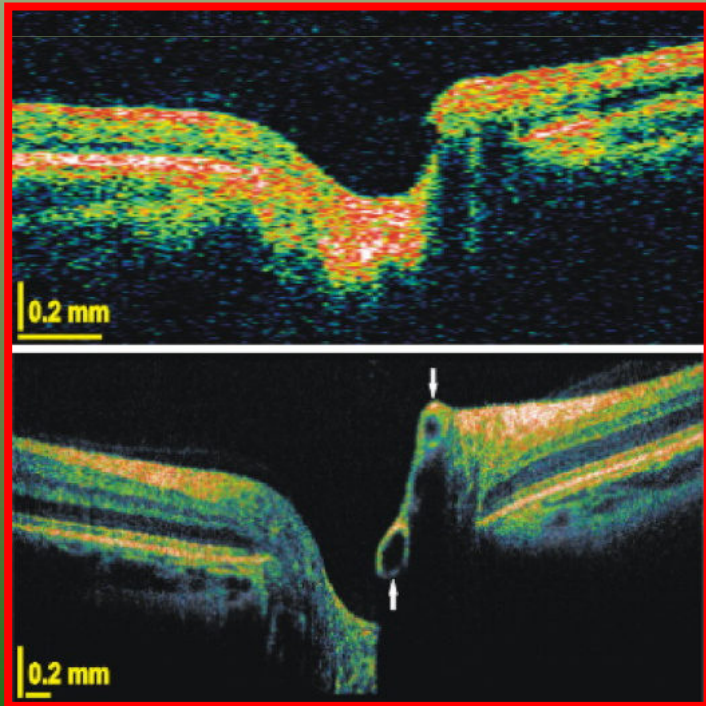
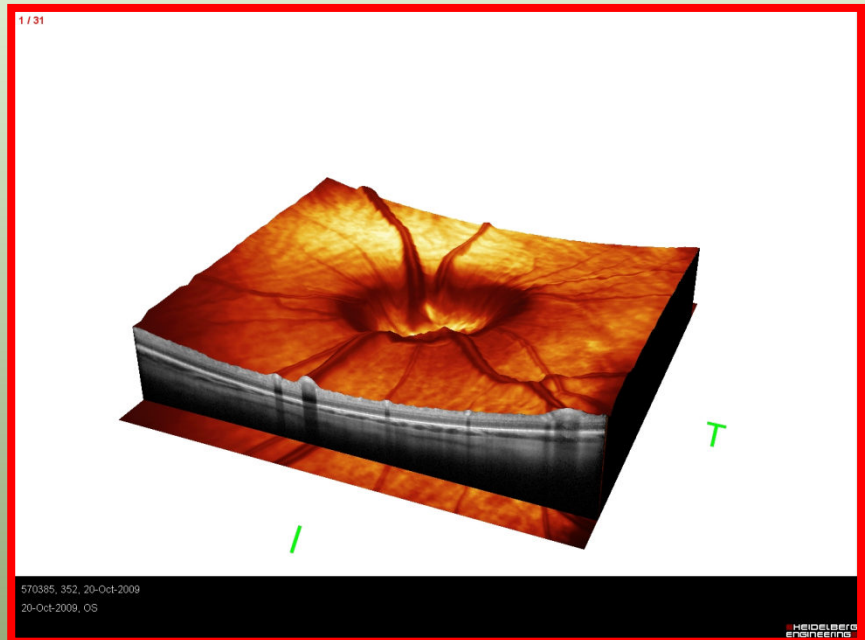
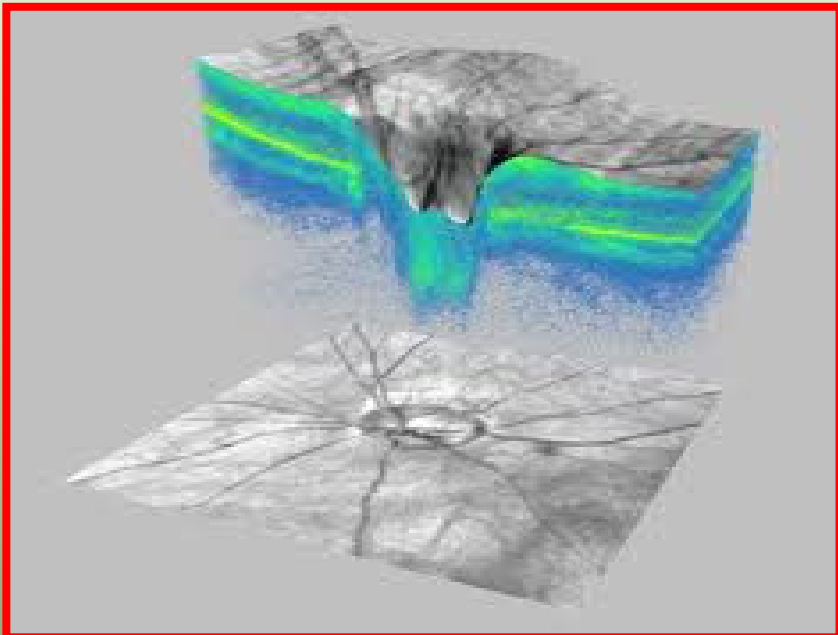
# Automated volumetric evaluation of stereoscopic disc photograph

Juan Xu et al Optics Express, Vol. 18, Issue 11, pp. 11347-11359 (2010)

<http://dx.doi.org/10.1364/OE.18.011347>







Glaucoma 3D Scan Quality Index: Good / 71 Right / OD

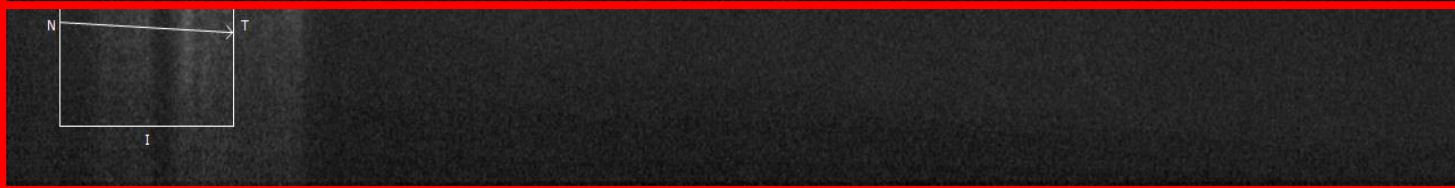
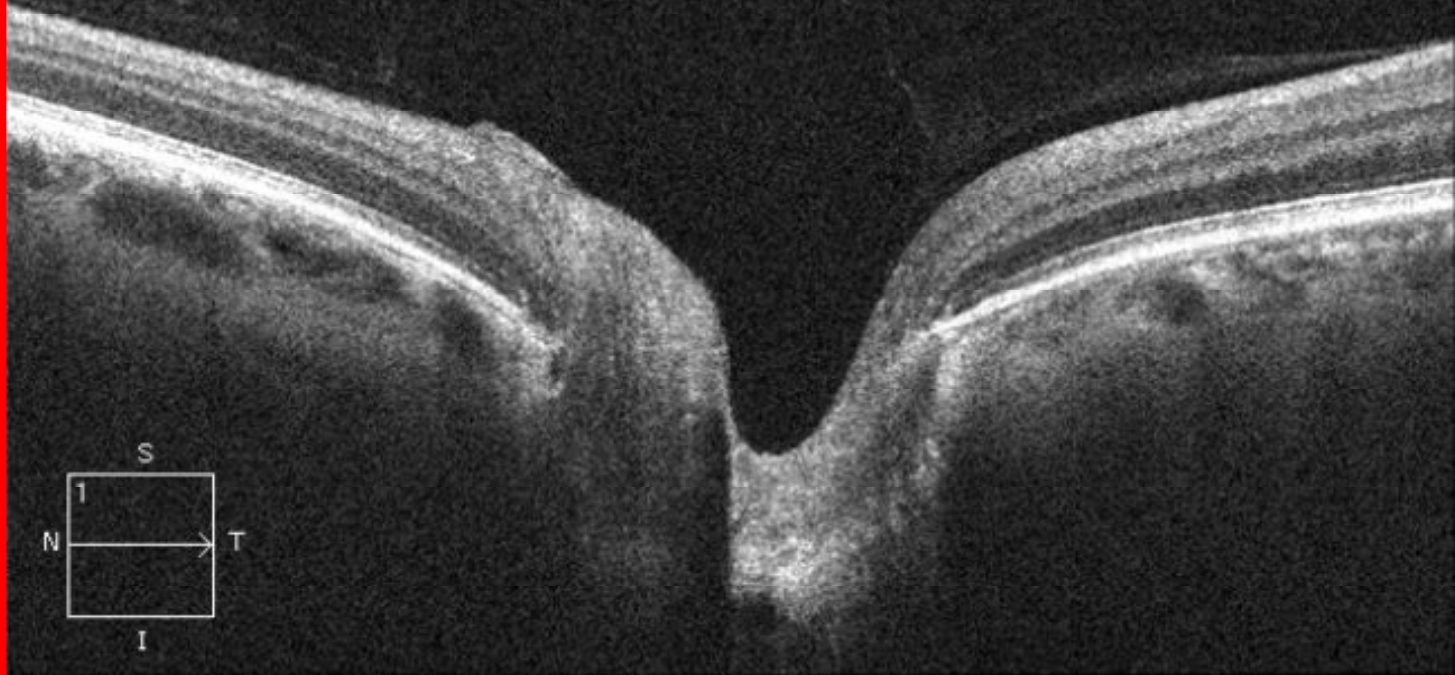
Exit  
Reset View  
 Out 3D

Surface  
 SLO 3D  
 Full Thickness  
 ILM-NFL Thickness  
 NFL-RPE Thickness

Print Comment optovue

The screenshot shows the Glaucoma 3D software interface. It displays a 3D topography map of the cornea and a cross-sectional OCT scan. The interface includes a 'Scan Quality Index' of 'Good / 71' and 'Right / OD'. There are buttons for 'Exit', 'Reset View', and 'Print'. A 'Comment' button is also present. The 'optovue' logo is in the bottom right corner. A 'Surface' menu is open, showing options for 'SLO 3D', 'Full Thickness', 'ILM-NFL Thickness', and 'NFL-RPE Thickness'. The 'Out 3D' checkbox is checked. A small globe icon with 'N' and 'S' is visible in the bottom right of the main view area.

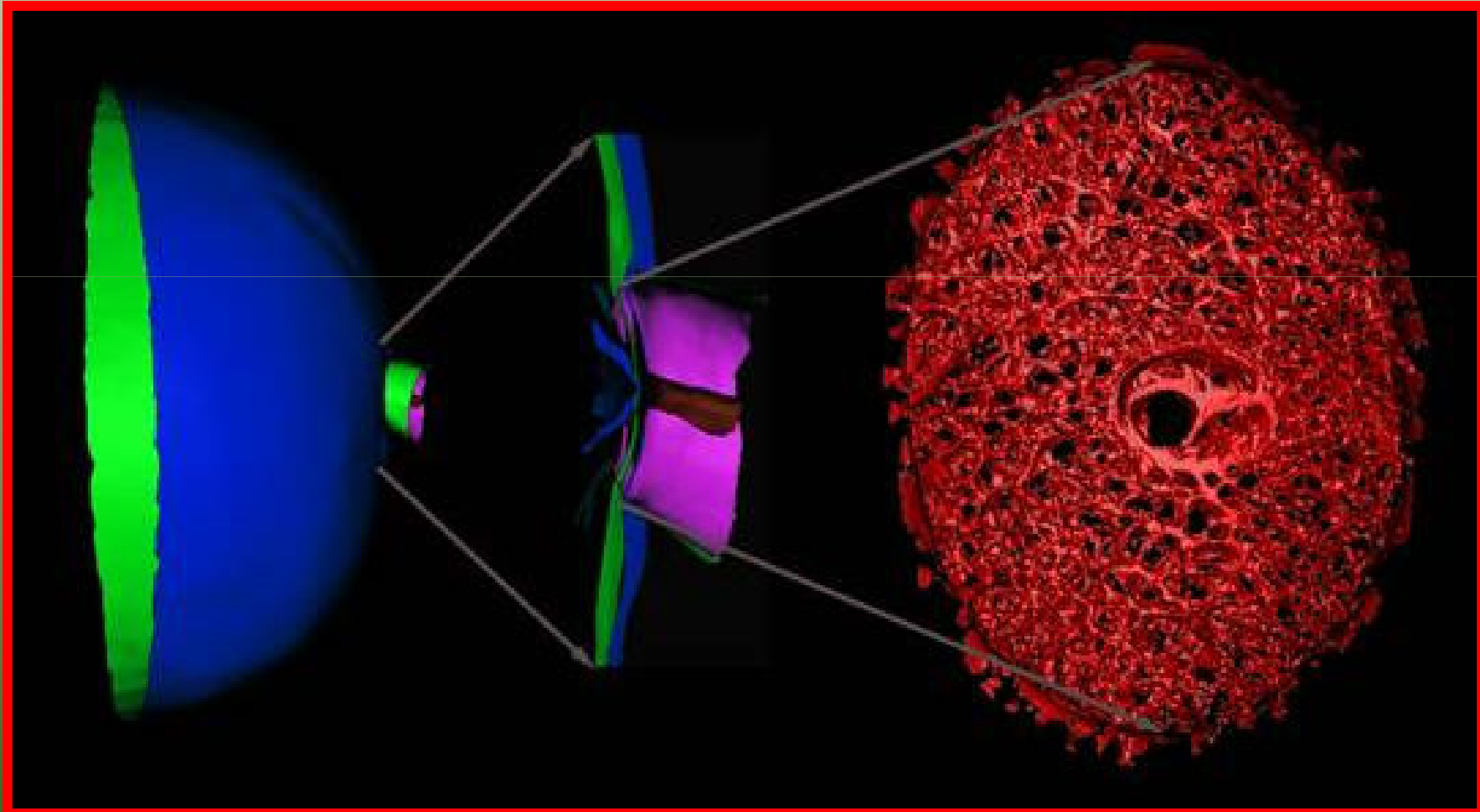
B:124 C: 20





# 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)



# Report Cirrus RNFL and ONH

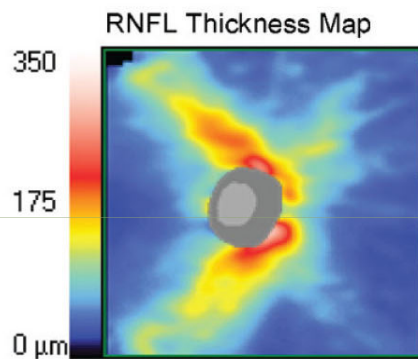
Doctor:

Signal Strength: 9/10

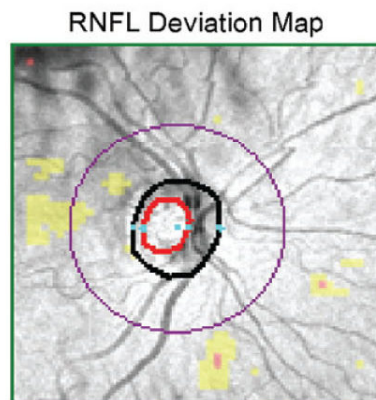
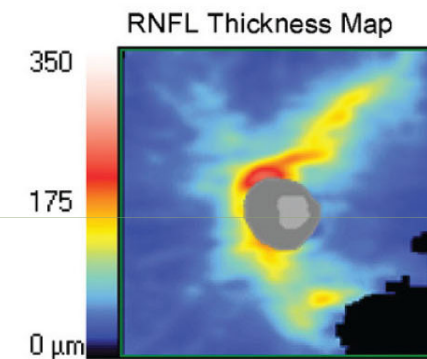
3/10

## RNFL and ONH: Optic Disc Cube 200x200

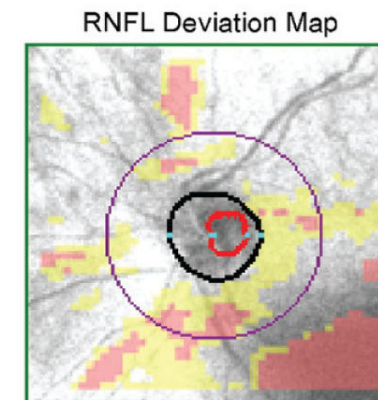
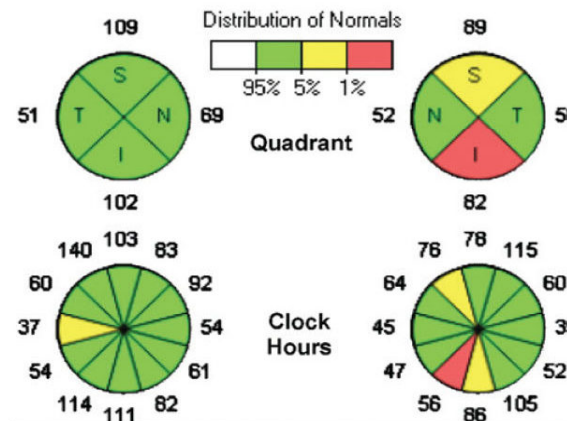
OD ● OS ●



	OD	OS
Average RNFL Thickness	83 $\mu\text{m}$	69 $\mu\text{m}$
RNFL Symmetry	93%	
Rim Area	1.23 $\text{mm}^2$	1.26 $\text{mm}^2$
Disc Area	1.77 $\text{mm}^2$	1.62 $\text{mm}^2$
Average C/D Ratio	0.55	0.47
Vertical C/D Ratio	0.57	0.48
Cup Volume	0.119 $\text{mm}^3$	0.034 $\text{mm}^3$



Offset (-0.36,-0.06) mm

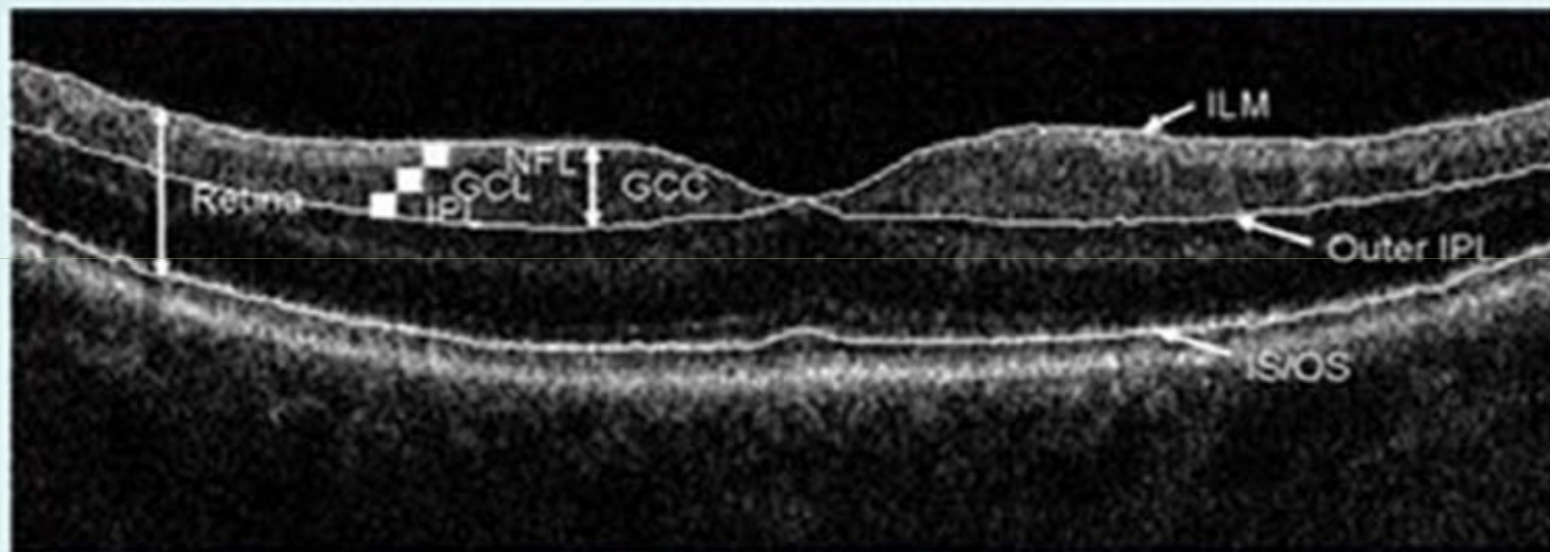


Offset (0.00,-0.18) mm

# ***HD-OCT & Glaucoma*** **3**

- ***RNFL Retinal Nerve Fiber Layer***
- ***ONH Optical Nerve Head***
- ★ ***GCC Ganglion Cell Complex*** **3**
- ***AS-OCT Anterior Segment OCT***
- ***HD-OCT & CV***

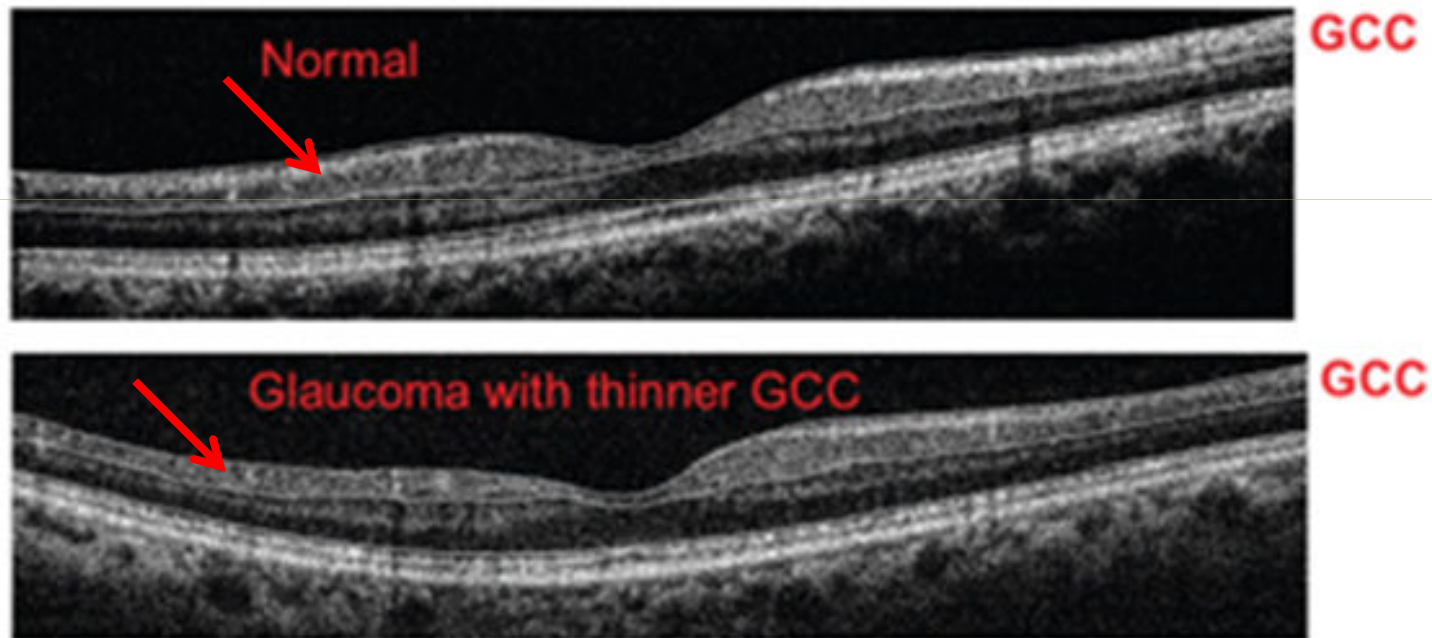
The **Ganglion cell complex (GCC)** measures the thickness of the 3-innermost retinal layers that are preferentially affected in glaucoma



### Ganglion cell complex (GCC)

Axons = Nerve fiber layer (NFL)  
Body = Ganglion cell layer (GCL)  
Dendrites = Inner plexiform layer (IPL)

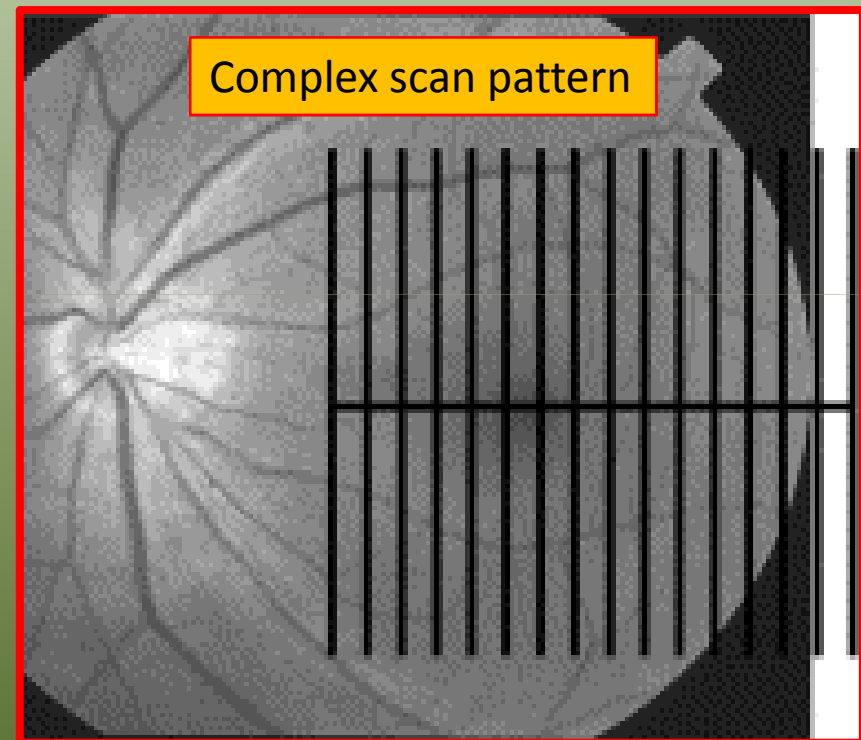
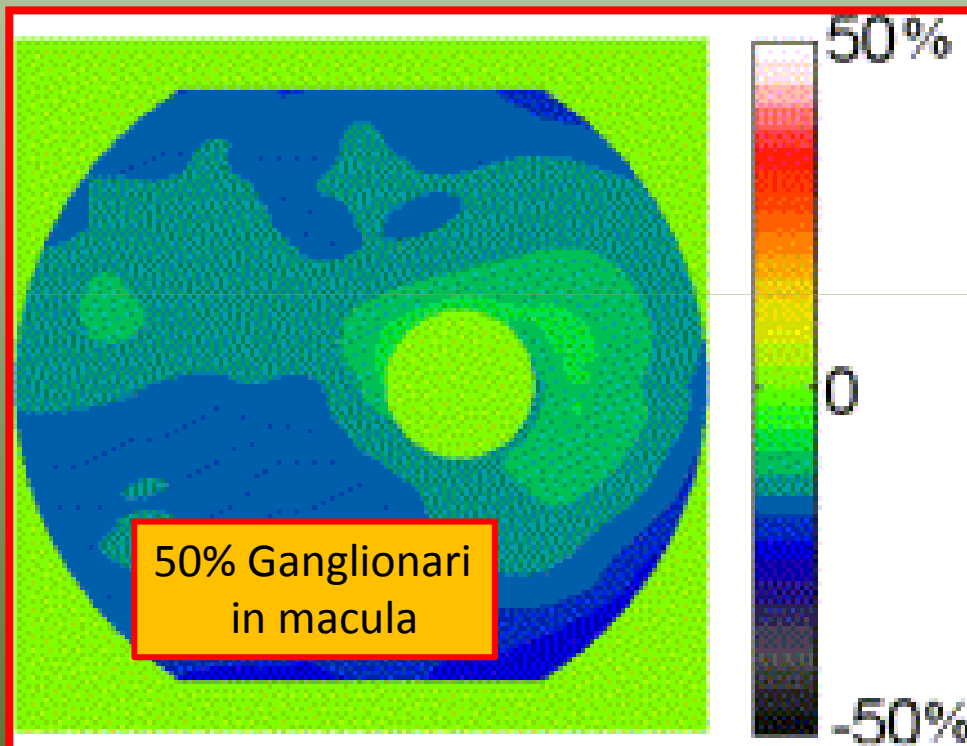
## The Ganglion Cell Complex (GCC) Becomes Thinner in Glaucomatous Eyes





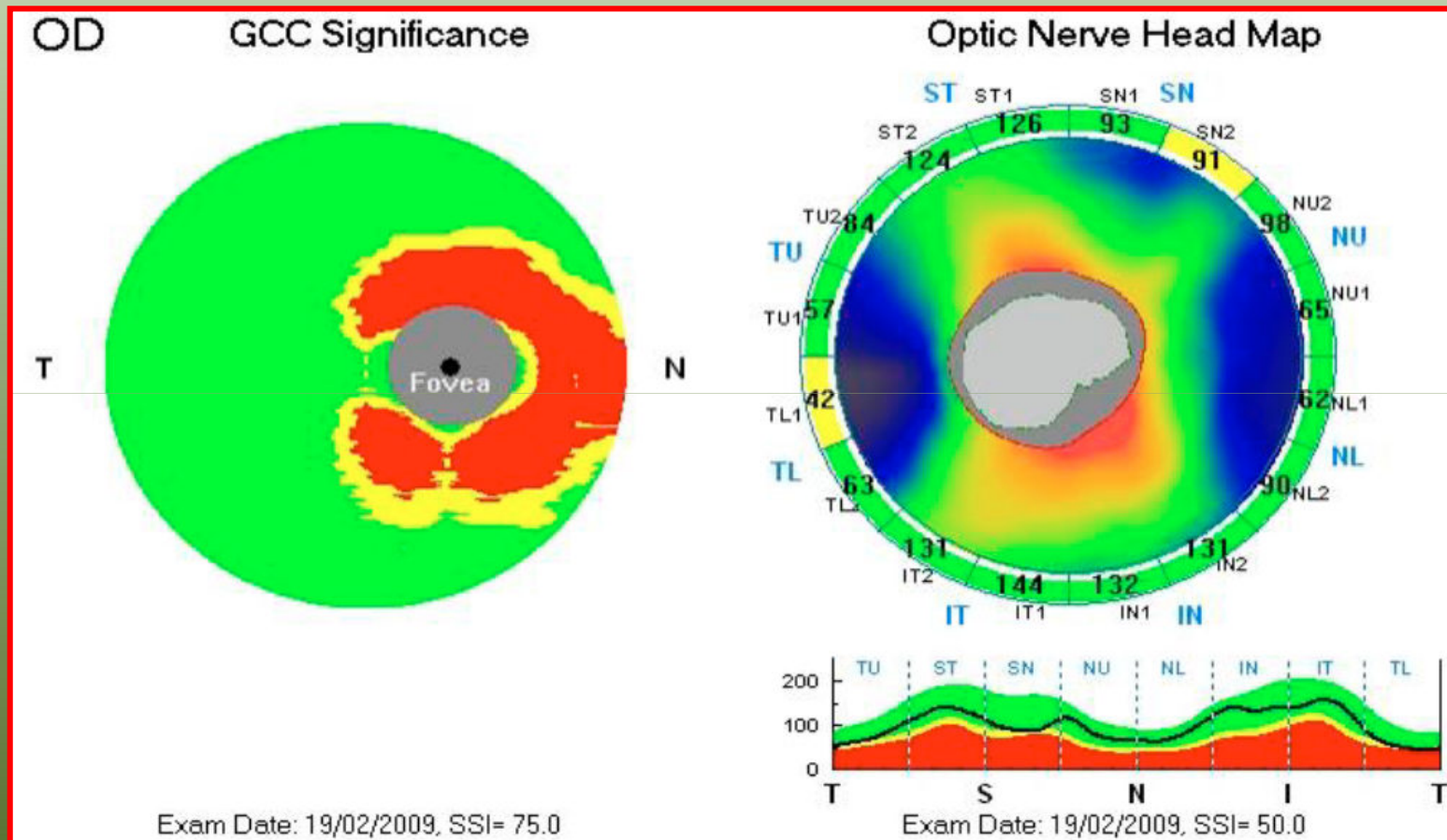
# ***GCC Ganglion Cell Complex***

7 mm scan area 14.944 a-scan 0.58 sec



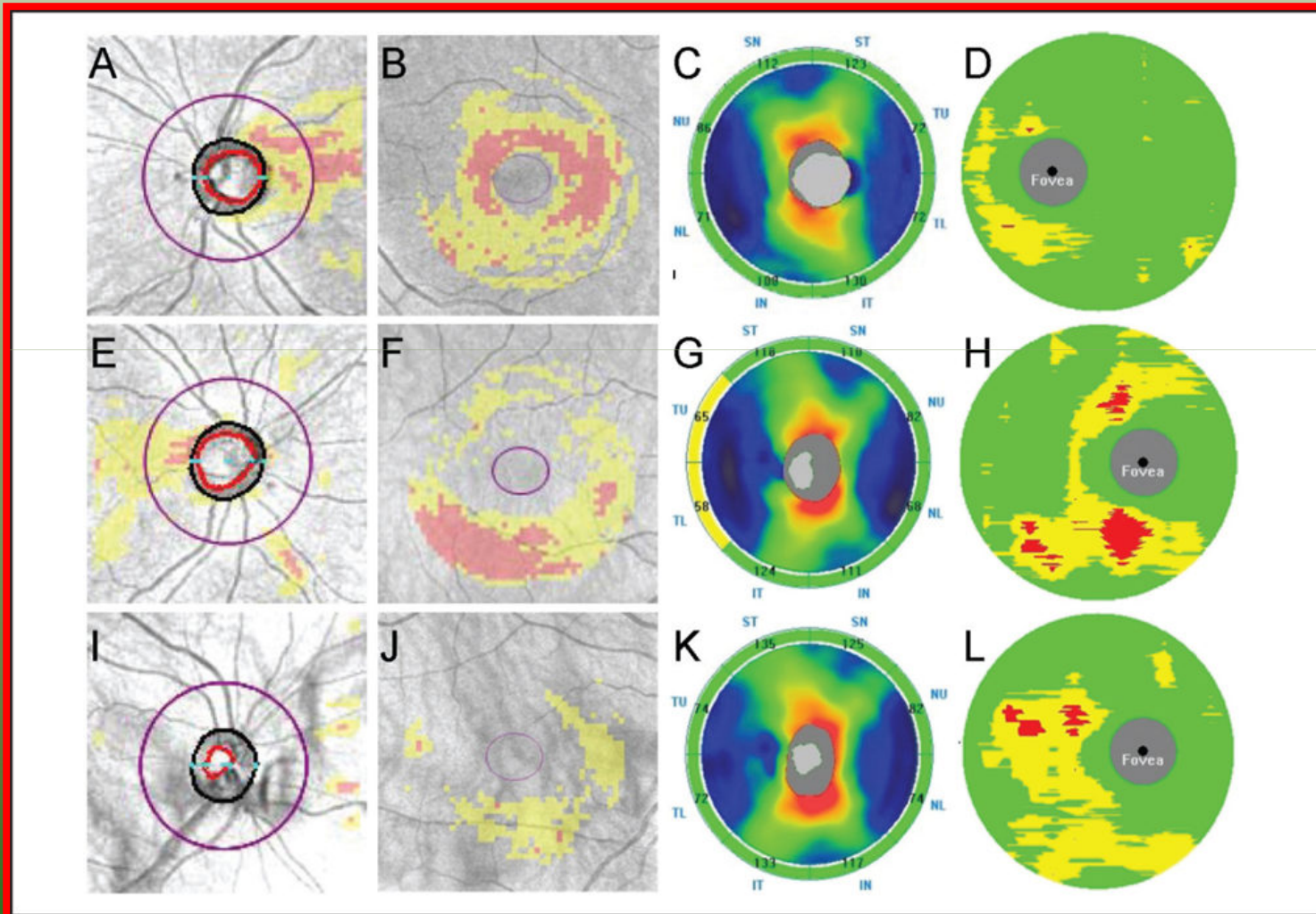
Schultze A, et al. Diagnostic ability of retinal ganglion cell complex ....  
Graefes Arch Clin Exp Ophthalmol 2011 Jul; 249 (7) : 1039-45

# Abnormal GCC in spite of normal RNFL Thickness



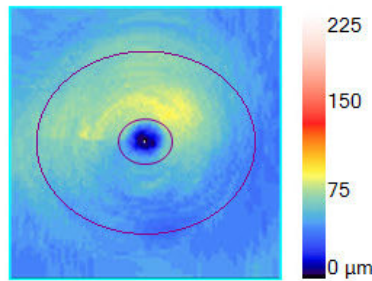
Reproducibility of retinal nerve layer and macular thickness ecc  
Garas A et al Ophthalmology 2010 Elsevier

# Normal RNFL Thickness v/s abnormal GCC



# Ganglion Cell Analysis Report

Signalstärke 10/10

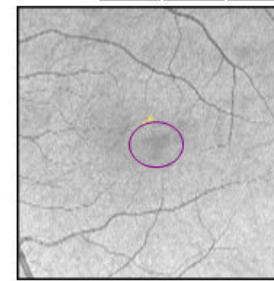
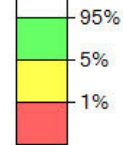


Dickendarstellung



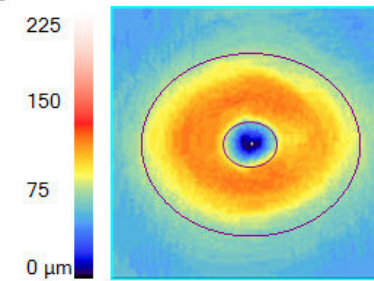
Abweichungsdarstellung

Diversifiziert:  
Verteilung von  
Normalwerten

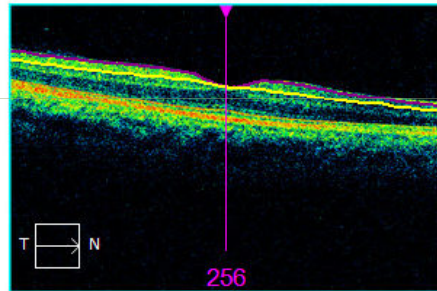


Abweichungsdarstellung

Signalstärke 10/10




Dickendarstellung

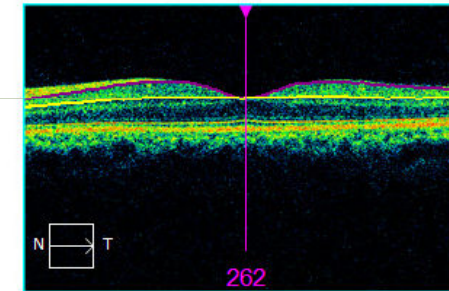


Horizontaler B-Scan

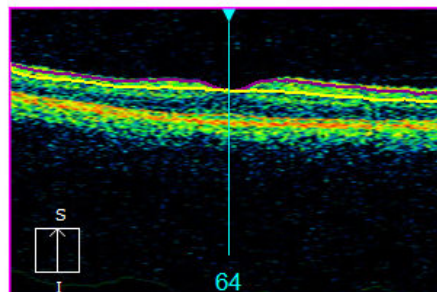
Fovea: 256, 64

Fovea: 262, 65

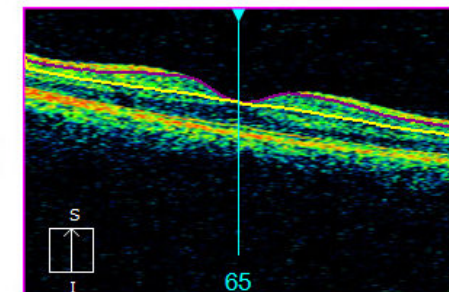
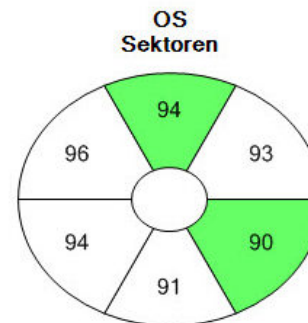
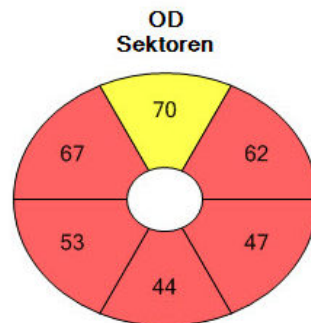
	OD $\mu\text{m}$	OS $\mu\text{m}$
 Durchschnittliche GCL-Dicke	57	93
Geringste GCL-Dicke	43	92



Horizontaler B-Scan



Vertikaler B-Scan

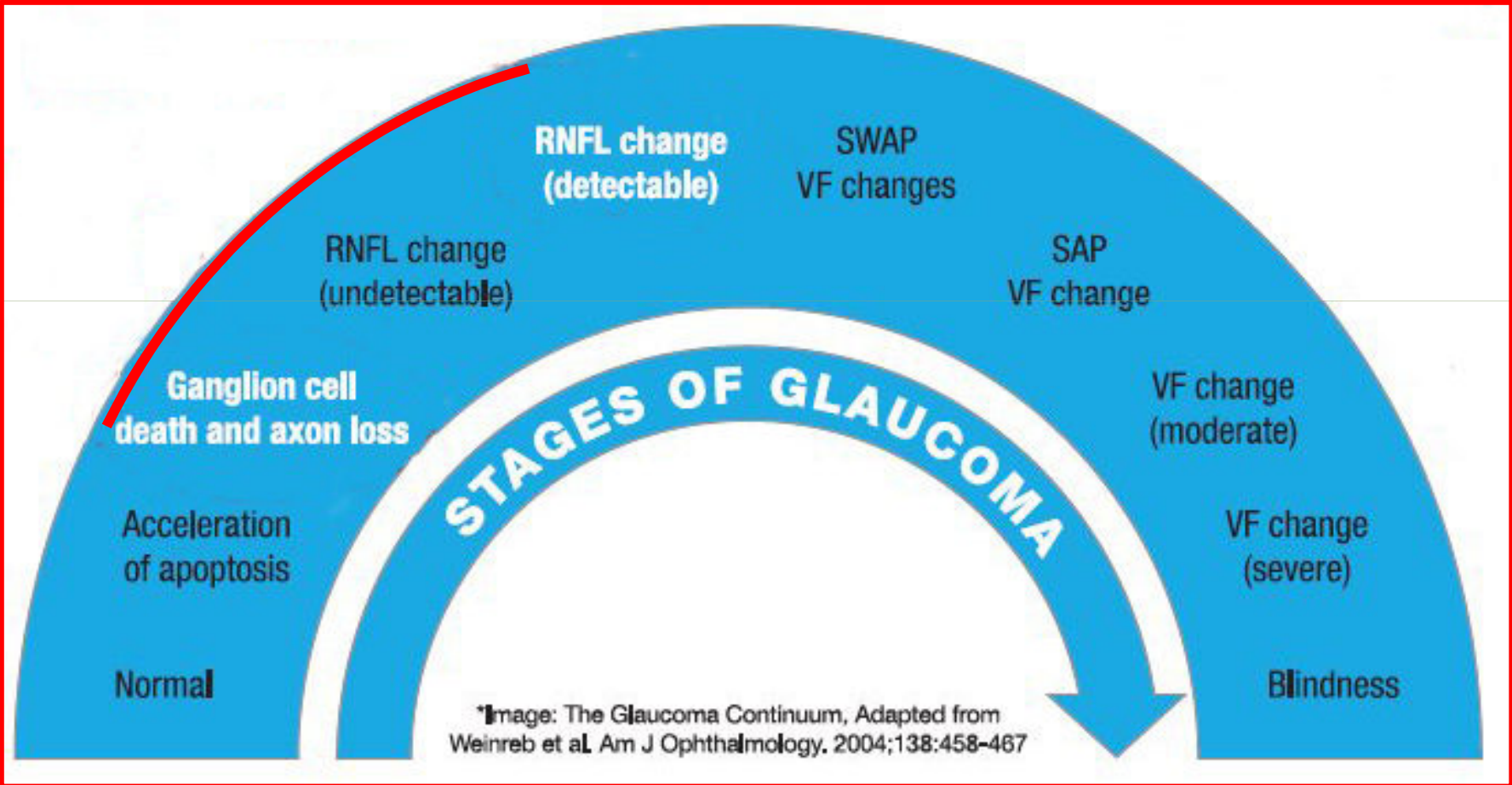


Vertikaler B-Scan

GET OCT<sup>®</sup>



# Stages of Glaucoma & GCC

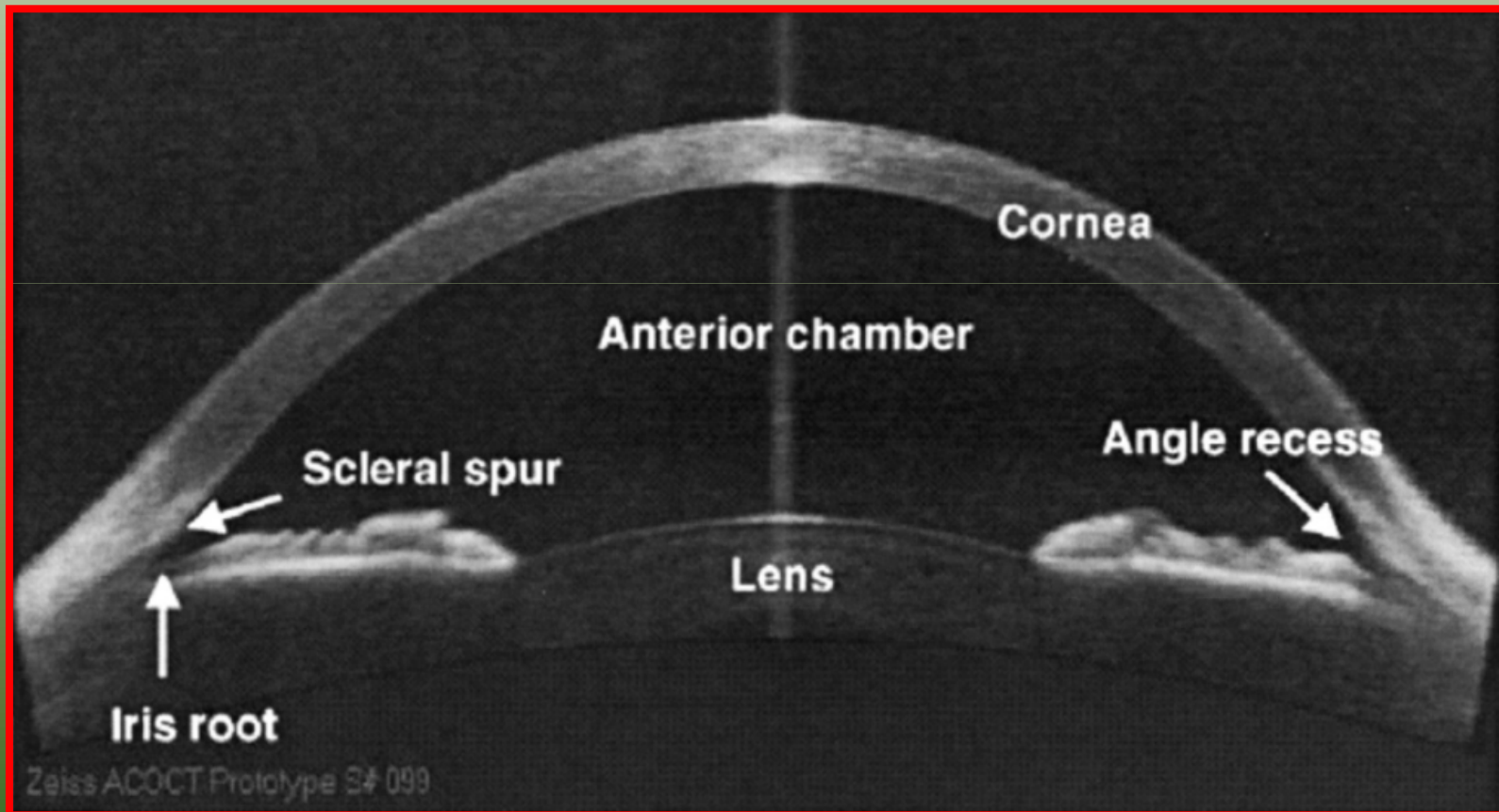




# ***HD-OCT & Glaucoma*** **4**

- ***RNFL Retinal Nerve Fiber Layer***
- ***ONH Optical Nerve Head***
- ***GCC Ganglion Cell Complex***
- ★ ***AS-OCT Anterior Segment OCT*** **4**
- ***HD-OCT & CV***

# *Visante OCT*



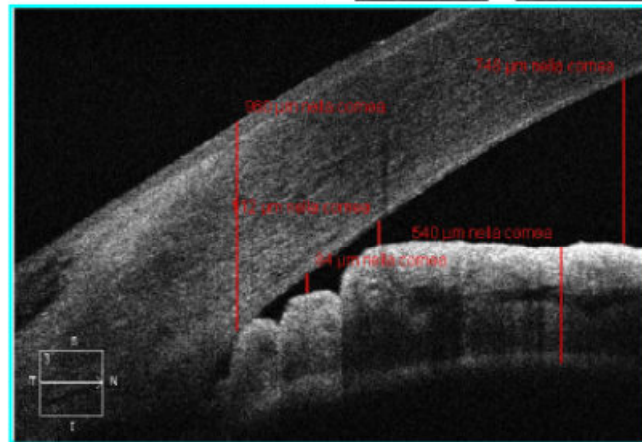
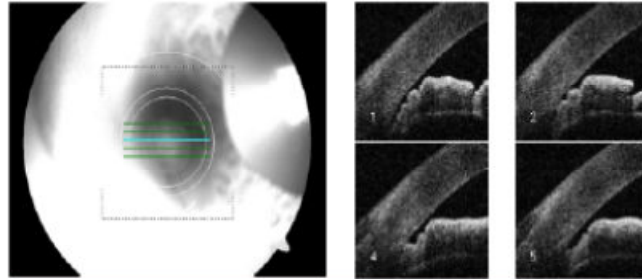
# HD-OCT Cirrus Photo AS-OCT

Nome: XXXXXXXXXXXXXXXXXXXXXXXX  
 ID: 1155272229      Data esame: 09/04/2013      dr Amedeo Lucente  
 Data di nascita: 28/11/1958      Ora dell'esame: 16:35  
 Sesso: Donna      Numero di serie: 600-1081596  
 Medico:      Intensità segnale: N/A



Immagini ad alta definizione: Anterior Segment 5 Line  OD  OS  
 Raster

Angolo di scansione: 0°      Spaziatura: 0.25 mm      Lunghezza: 3 mm



Commenti  
 Analisi modificata: 09/04/2013 16:40

Firma del medico

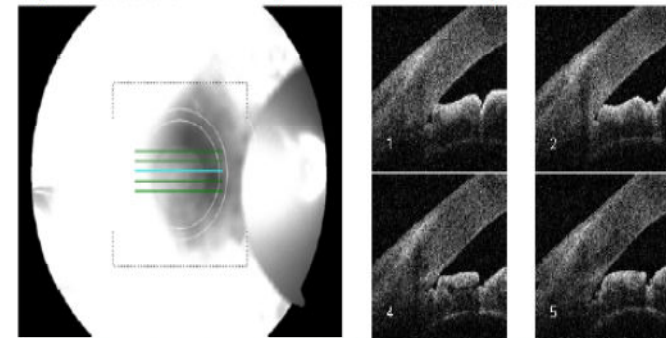
X30z  
 SW Ver: 1.5.2.1377  
 Copyright 2012  
 Carl Zeiss Medtec, Inc  
 All Rights Reserved  
 Pagina 1 di 1

Nome: XXXXXXXXXXXXXXXXXXXXXXXX  
 ID: 1155272229      Data esame: 09/04/2013      dr Amedeo Lucente  
 Data di nascita: 28/11/1958      Ora dell'esame: 16:37  
 Sesso: Donna      Numero di serie: 600-1081596  
 Medico:      Intensità segnale: N/A

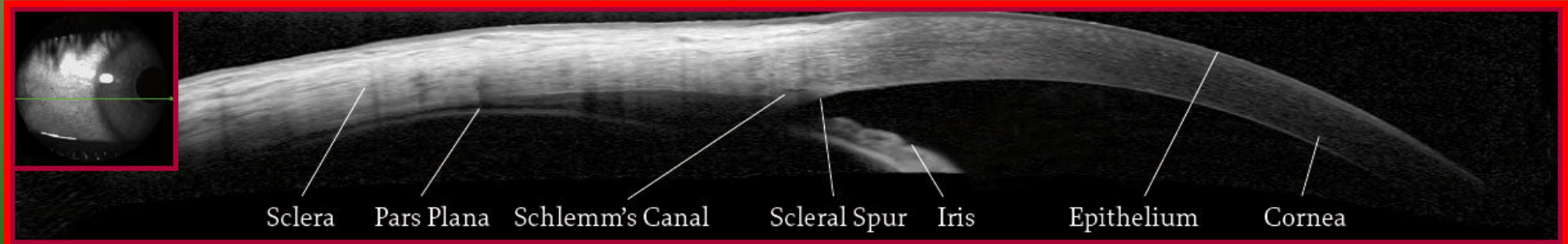
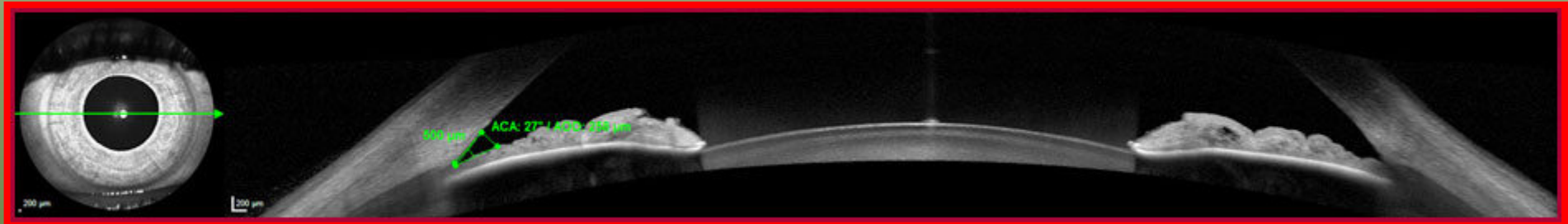
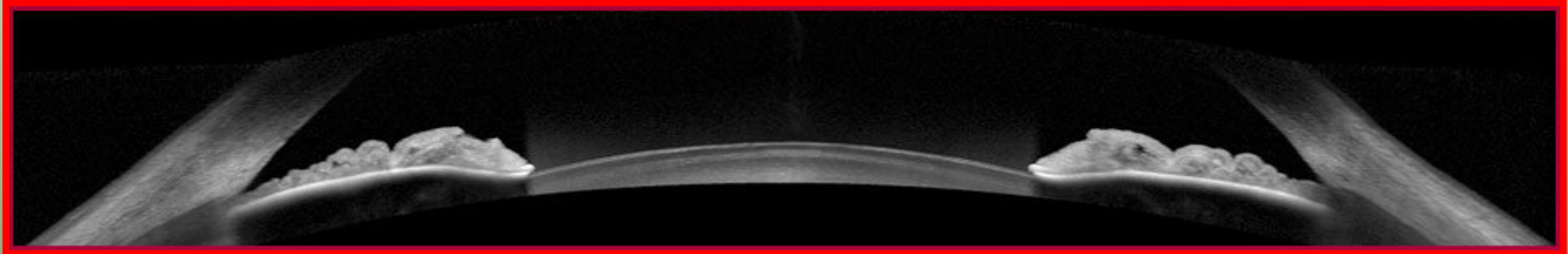


Immagini ad alta definizione: Anterior Segment 5 Line  OD  OS  
 Raster

Angolo di scansione: 0°      Spaziatura: 0.25 mm      Lunghezza: 3 mm

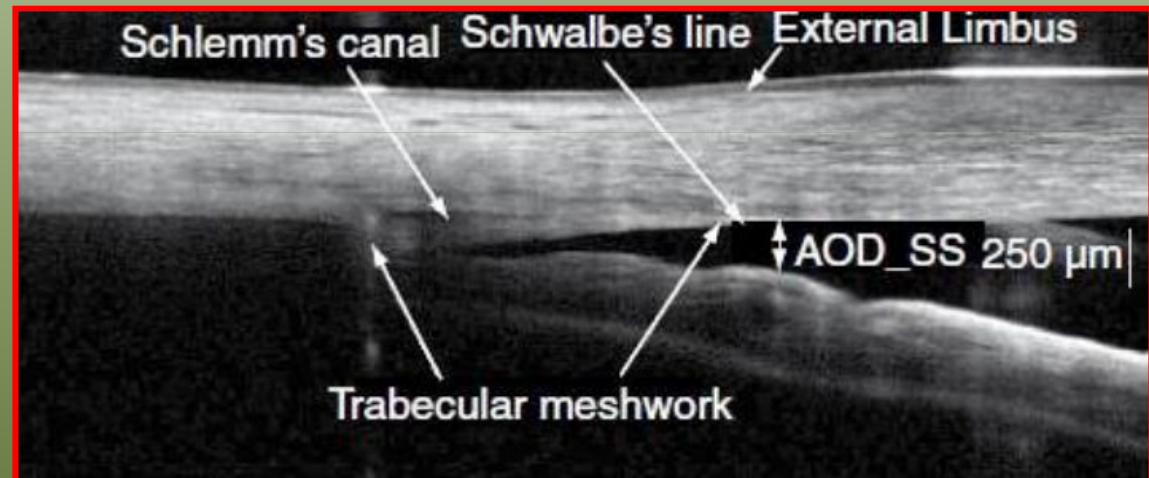
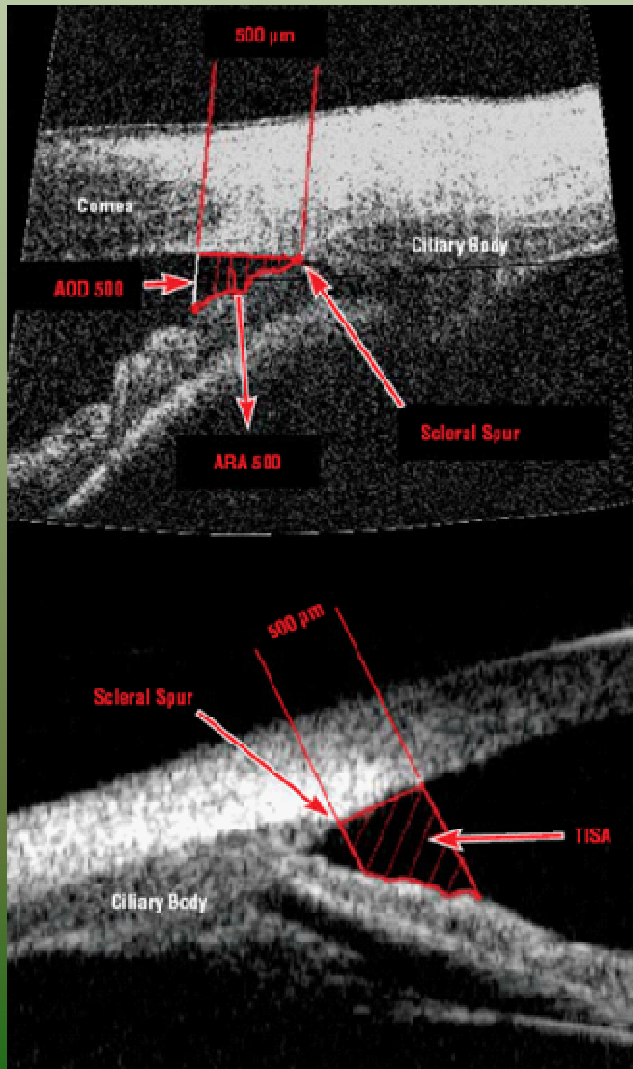


# ***SD-OCT Spectralis Anterior Segment Module***





# UBM v/s AS-OCT



## ***HD-OCT & Glaucoma***

**5**

- ***RNFL Retinal Nerve Fiber Layer***
- ***ONH Optical Nerve Head***
- ***GCC Ganglion Cell Complex***
- ***AS-OCT Anterior Segment OCT***



***HD-OCT & CV***

**5**

# ***Piattaforme Multimediali***

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

# RNFL & Visual Field Combined OU Report





# HFA Visual Field and Cirrus RNFL Combined Report

Name: CMC 206

ID: CMC 206

DOB: 12/9/64

Gender:

HFA Exam Dates

Date: 10/20/09 (OD) 10/20/09 (OS)

Time: 10:01 AM (OD) 12:37 PM (OS)

Cirrus Exam Dates

Date: 10/20/09 (OD) 10/20/09 (OS)

Time: 12:37 PM (OD) 12:37 PM (OS)

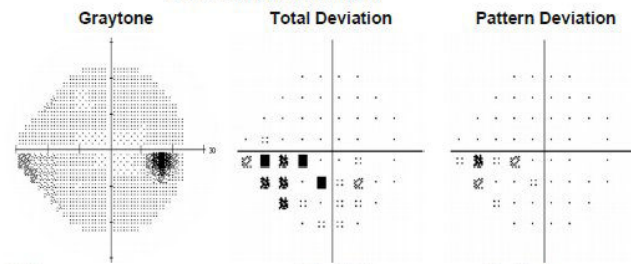


## HFA Visual Field and Cirrus RNFL Combined Report

OD

OS

### 24-2 SITA-Standard



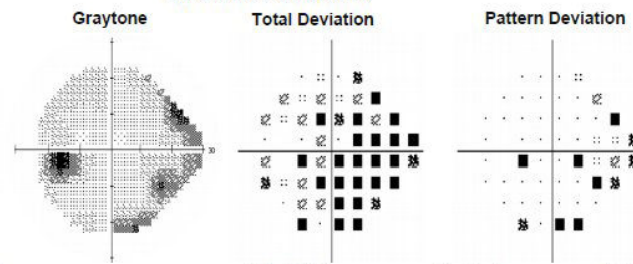
GHT  
Outside normal limits  
Fovea: OFF

VFI 98 %  
MD -2.74 dB p < 2%  
PSD 1.95 dB p < 10%

Fixation Losses: 1 / 14  
False POS Errors: 4 %  
False NEG Errors: 2 %

GHT  
Outside normal limits  
Fovea: OFF

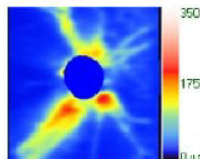
### 24-2 SITA-Standard



VFI 90 %  
MD -7.12 dB p < 0.5%  
PSD 5.52 dB p < 0.5%

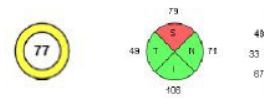
Fixation Losses: 2 / 16  
False POS Errors: 6 %  
False NEG Errors: 20 %

### RNFL Thickness Map



Signal Strength: 8/10

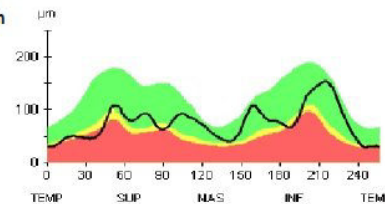
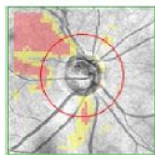
#### Average Thickness Quadrants Clock Hours



Symmetry

48%

### RNFL Thickness Deviation

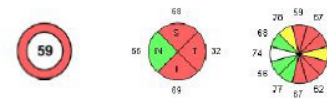


Comments

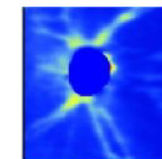
Physician's Signature

Signal Strength: 8/10

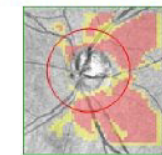
#### Average Thickness Quadrants Clock Hours



### RNFL Thickness Map

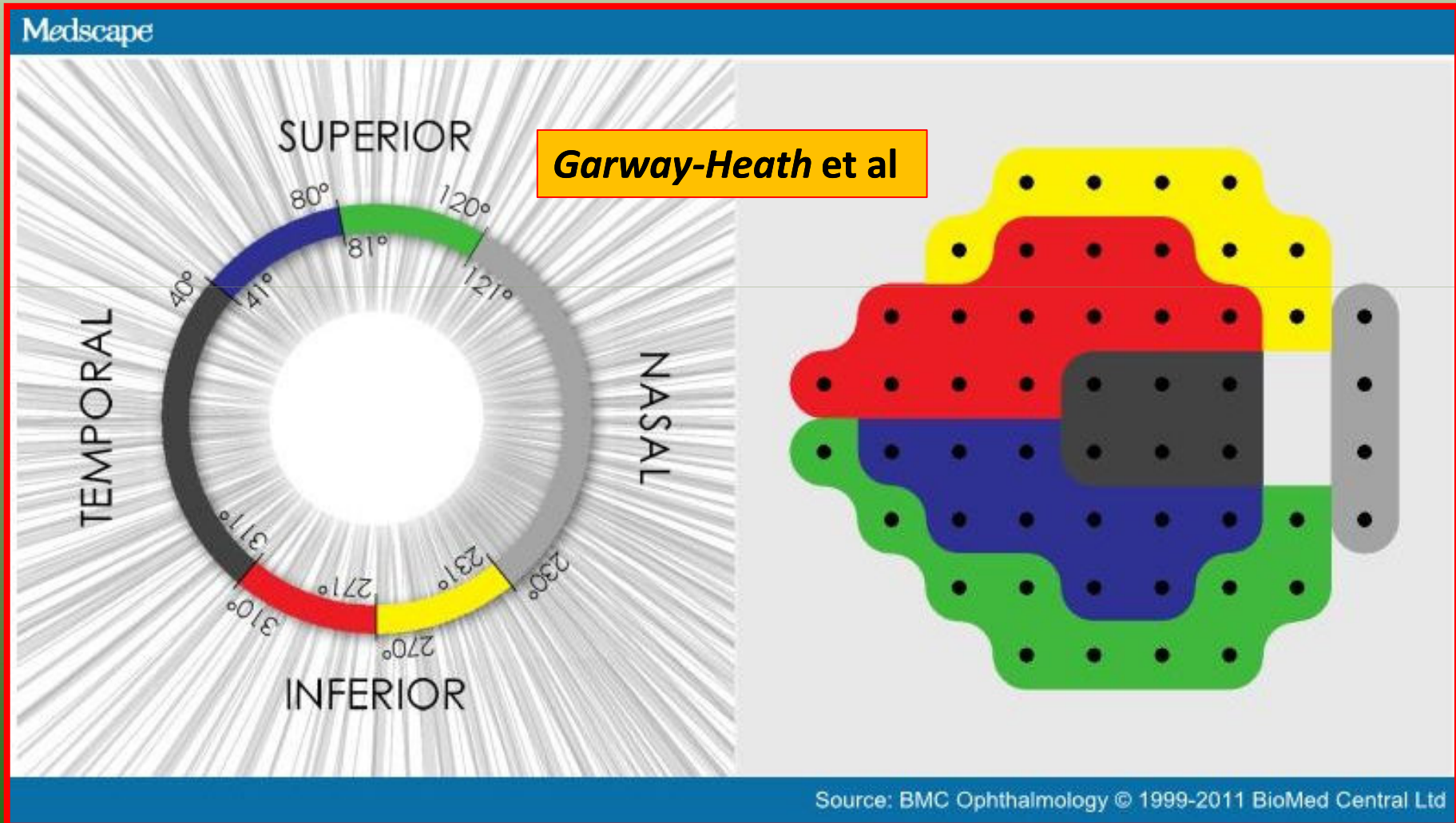


### RNFL Thickness Deviation

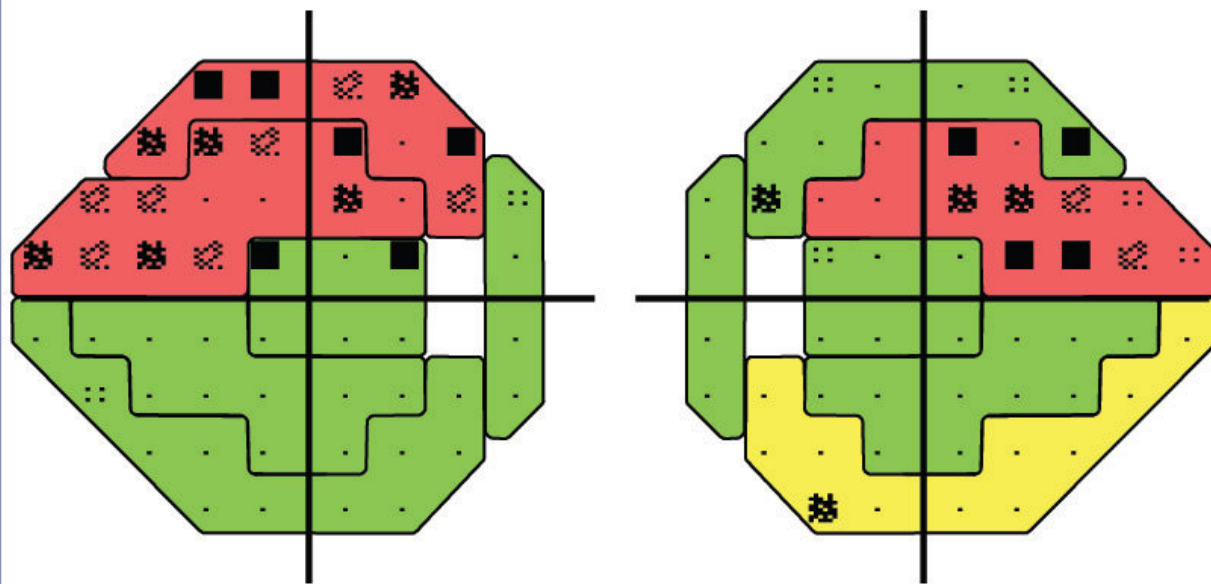


INF TEMP  
HFA II-i 750-11696 4.1 / 4.2.2 (OD)  
HFA II-i 750-11696 4.1 / 4.2.2 (OS)  
Cirrus SW Ver: 5.0.0.207

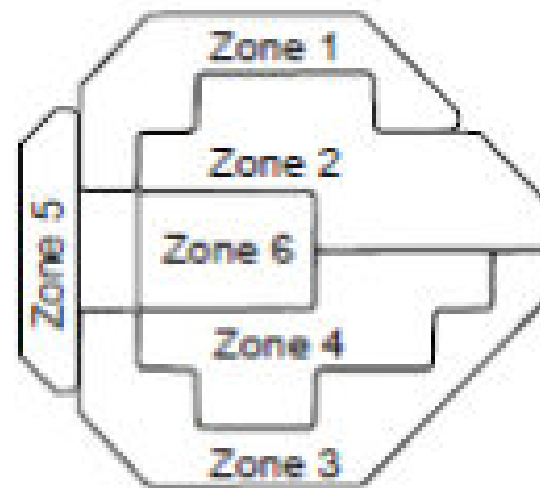
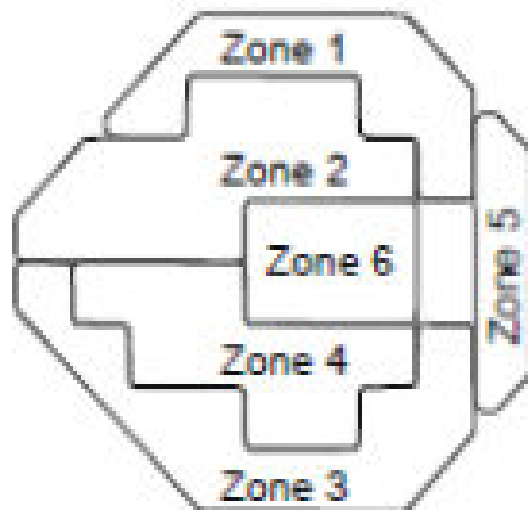
Map representing the **relationship between Standard Automated Perimetry** visual field sectors and sections of the peripapillary **OCT scan circle**. This map is based on the **work of *Garway-Heath et al*** and shows the correspondence **between areas of the visual field and peripapillary retinal nerve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



# Structure Function



OCT RNFL data flipped for comparison

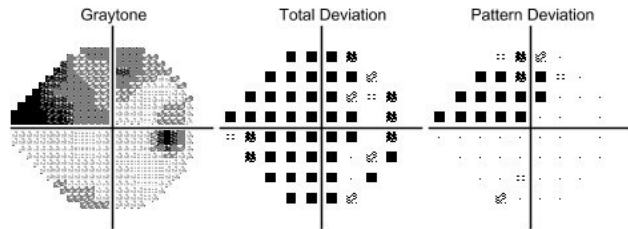


Patient: DEMO FGW, 03  
 Date of Birth: Jun 18, 1956  
 Gender: Female  
 Patient ID: 23812

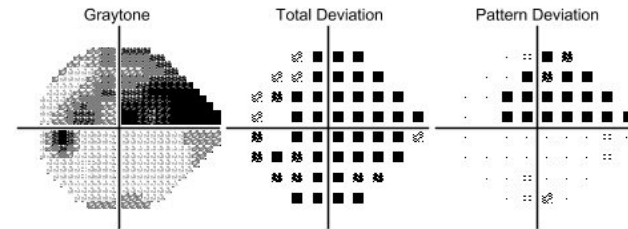


# Forum Glaucoma Workplace

## OD Central 24-2 Threshold Test HFA Visual Field Central 24-2 Threshold Test OS



:: P < 5%  
 ☼ P < 2%  
 ☼ P < 1%  
 ■ P < 0.5%

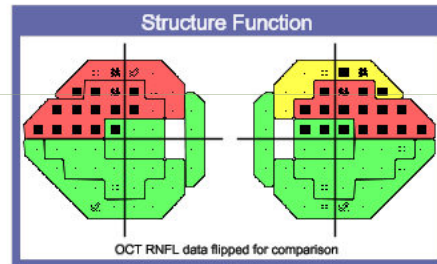


Mar 20, 2013 SITA-Standard

Mar 20, 2013 SITA-Standard

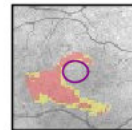
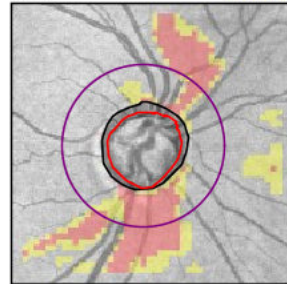
FP: 5%  
 FN: 0%  
 VFI: 79%  
 MD: -11.10 dB P < 0.5%  
 PSD: 7.36 dB P < 0.5%  
 GHT: Outside Normal Limits

FP: 3%  
 FN: 0%  
 VFI: 67%  
 MD: -13.73 dB P < 0.5%  
 PSD: 9.80 dB P < 0.5%  
 GHT: Outside Normal Limits



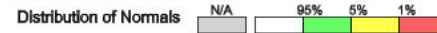
## OD CIRRUS HD-OCT

RNFL Jul 19, 2013



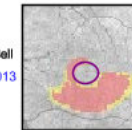
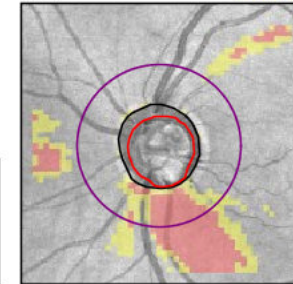
Ganglion Cell  
Jul 19, 2013

OD	Average RNFL Thickness	OS
75µm	Average RNFL Thickness	77µm
0.85	Average C/D Ratio	0.82
0.74mm²	Rim Area	0.79mm²
0.87	Vertical C/D Ratio	0.84
1.148mm³	Cup Volume	0.888mm³
2.64mm²	Disc Area	2.42mm²



## OS CIRRUS HD-OCT

RNFL Jul 19, 2013



Ganglion Cell  
Jul 19, 2013

Comments

Signature



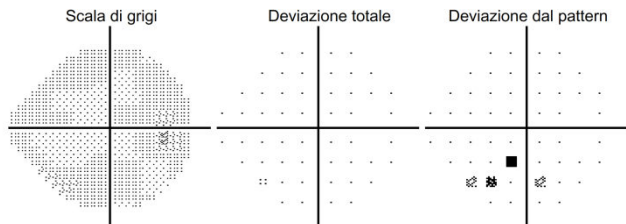


Paziente:  
 DDN: 01-gen-1972  
 Sesso: Donna  
 ID: 1578813168



# Forum Glaucoma Workplace Studio dr. Amedeo Lucente

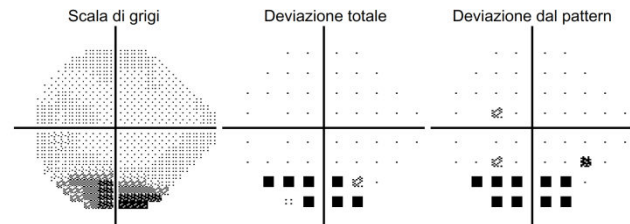
**OD** 24-2 centrale Esame di soglia Campo visivo HFA 24-2 centrale Esame di soglia **OS**



26-set-2013 SITA-Swap

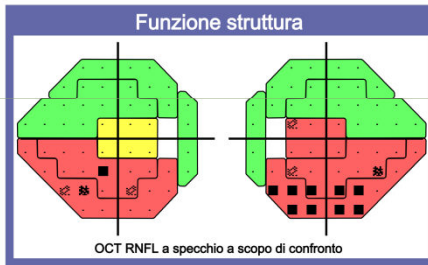
FP: 5%  
 FN: 0%  
 MD: 0,18 dB  
 PSD: 2,75 dB  
 GHT: Entro i limiti normali

- :: P < 5%
- ◻ P < 2%
- ◼ P < 1%
- P < 0,5%



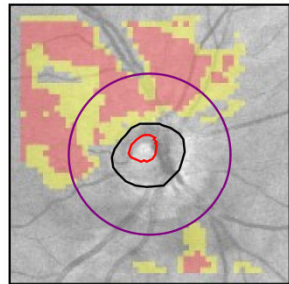
26-set-2013 SITA-Swap

FP: 2%  
 FN: 0%  
 MD: -2,13 dB  
 PSD: 8,36 dB P < 0,5%  
 GHT: Fuori limiti normali



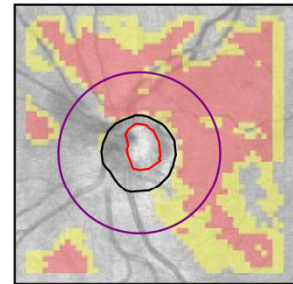
**OD** CIRRUS photo

RNFL 26-set-2013



**OS** CIRRUS photo

RNFL 26-set-2013



OD	Spessore RNFL medio	OS
66µm		66µm
1,36mm²	Area della rima	1,38mm²
1,64mm²	Area del disco	1,99mm²
0,41	Rapporto C/D medio	0,55
0,41	Rapporto C/D verticale	0,61
0,055mm³	Volume di escavazione	0,129mm³



Commenti

Firma

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

# Forum Glaucoma Workplace Studio dr. Amedeo Lucente



Paziente:  
DDN: 01-gen-1972  
Sesso: Donna  
ID: 1578813168

## OD OS Dettagli dati normativi

Data: 26-set-2013 Et : 41  
Ora: 09:34 Intensit  del segnale: 4/10

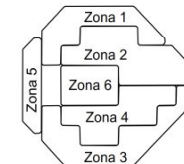
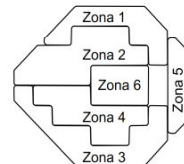
Data: 26-set-2013 Et : 41  
Ora: 09:38 Intensit  del segnale: 4/10

Parametri ONH	Valore	Valore percentuale	Valore de dotto limite riproducibilit�	Valore percentuale	Valore pi� limite di riproducibilit�	Valore percentuale
Area della rima	1,36mm <sup>2</sup>	64%	1,18mm <sup>2</sup>	24%	1,53mm <sup>2</sup>	90%
Rapporto C/D medio	0,41	73%	0,34	90%	0,48	48%
Rapporto C/D verticale	0,41	65%	0,33	88%	0,49	31%
Volume di escavazione	0,05mm <sup>3</sup>	65%	0,02mm <sup>3</sup>	85%	0,09mm <sup>3</sup>	47%

Parametri ONH	Valore	Valore percentuale	Valore de dotto limite riproducibilit�	Valore percentuale	Valore pi� limite di riproducibilit�	Valore percentuale
Area della rima	1,38mm <sup>2</sup>	57%	1,21mm <sup>2</sup>	19%	1,56mm <sup>2</sup>	79%
Rapporto C/D medio	0,55	50%	0,48	73%	0,62	16%
Rapporto C/D verticale	0,61	10%	0,53	46%	0,69	2%
Volume di escavazione	0,13mm <sup>3</sup>	63%	0,09mm <sup>3</sup>	72%	0,16mm <sup>3</sup>	55%

Parametri RNFL	Valore	Valore percentuale	Valore de dotto limite riproducibilit�	Valore percentuale	Valore pi� limite di riproducibilit�	Valore percentuale
Spessore RNFL medio	66,46�m	<1%	60,33�m	<1%	72,59�m	2%
Zona 1	90,51	19%	86,62	14%	94,40	24%
Zona 2	129,11	38%	124,62	26%	133,60	48%
Zona 3	46,18	<1%	42,07	<1%	50,29	<1%
Zona 4	62,52	<1%	58,87	<1%	66,17	<1%
Zona 5	61,39	15%	59,23	10%	63,55	19%
Zona 6	44,64	2%	43,19	<1%	46,09	3%

Parametri RNFL	Valore	Valore percentuale	Valore de dotto limite riproducibilit�	Valore percentuale	Valore pi� limite di riproducibilit�	Valore percentuale
Spessore RNFL medio	66,10�m	<1%	59,97�m	<1%	72,23�m	2%
Zona 1	102,40	37%	98,51	31%	106,29	45%
Zona 2	106,93	9%	102,44	4%	111,42	13%
Zona 3	42,27	<1%	38,16	<1%	46,38	<1%
Zona 4	58,79	<1%	55,14	<1%	62,44	<1%
Zona 5	74,69	53%	72,53	44%	76,85	58%
Zona 6	35,23	<1%	33,78	<1%	36,68	<1%



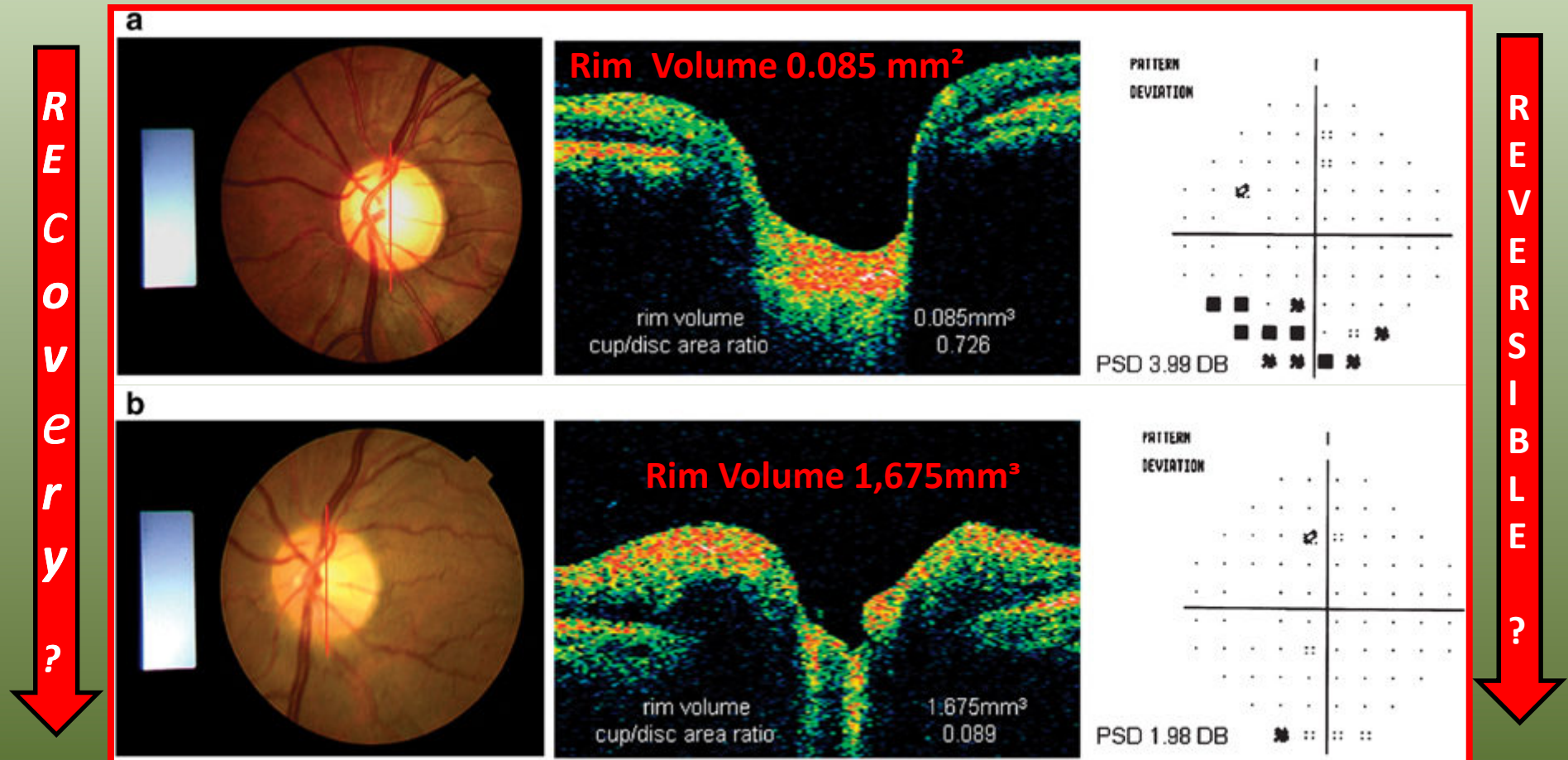
Almeno un parametro   prossimo al limite dei dati normativi; in caso di ripetizione ci  pu  comportare una modifica nella rappresentazione dei colori.



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# 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

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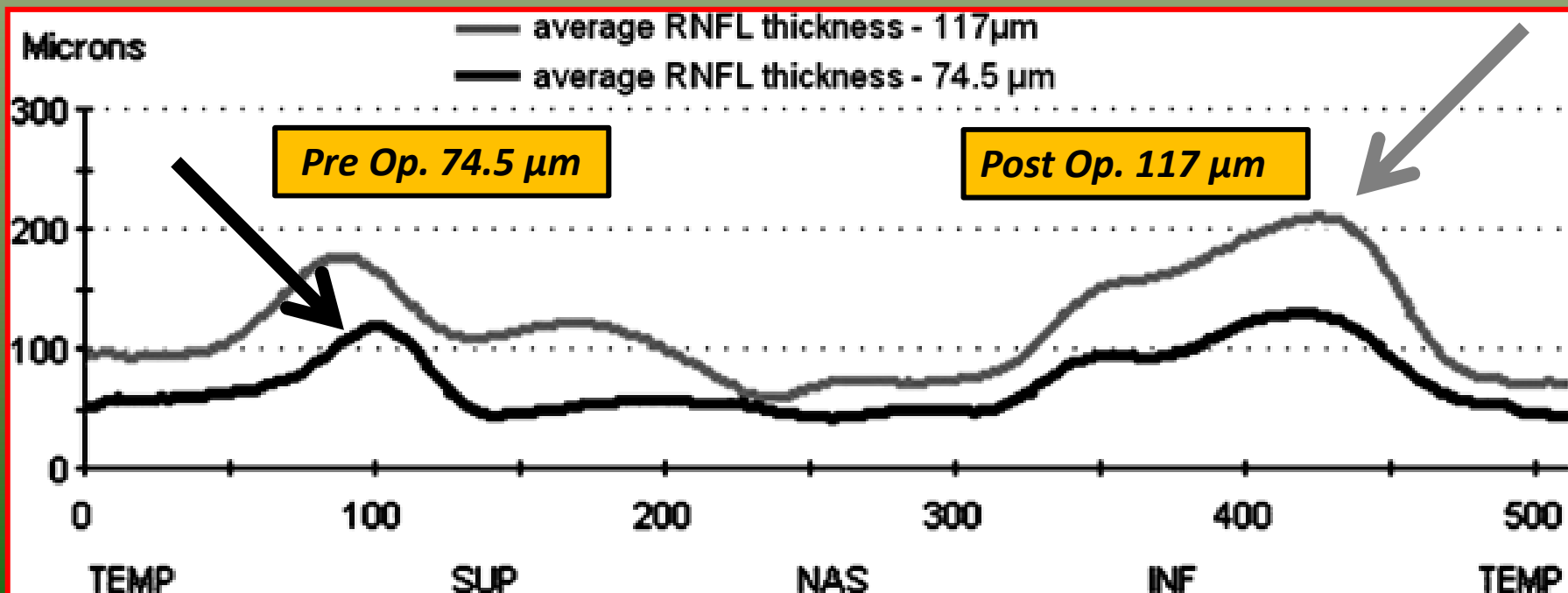
C K S Leung, J Woo, M K Tsang and K K Tse *Eye (Lond)*. 2006 Jan;20(1):132-4

***buffer-zone***

=

*A time interval in which optic nerve damage can be reversed by appropriate interventions.*

Reversal is likely to be dependent on the **degree of IOP reduction**, the **age of presentation**, and may vary with the **compliance of the lamina cribrosa** and the **composition of supporting tissue** of retinal ganglion cells.





# ***Reversibility of glaucomatous demange***

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***Grazie per l'attenzione***

