INTERNATIONAL CONGRESS OF THE
EGYPTIAN
OPHTHALMOLOGICAL SOCIETY

EOS 1902

In collaboration with: MEACO

OCT Angiography and Glaucoma

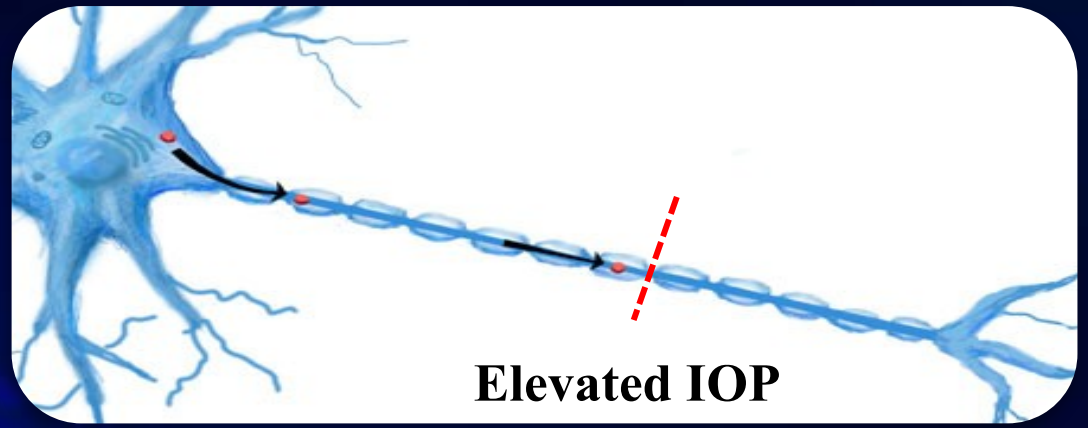
Karim A. Raafat MD.

Professor of Ophthalmology

Cairo University

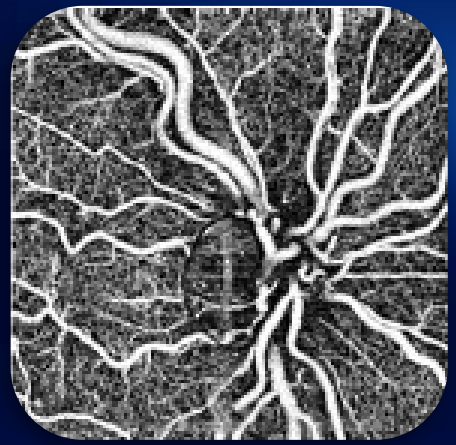
Glaucoma Optic Neuropathy Pathogenesis

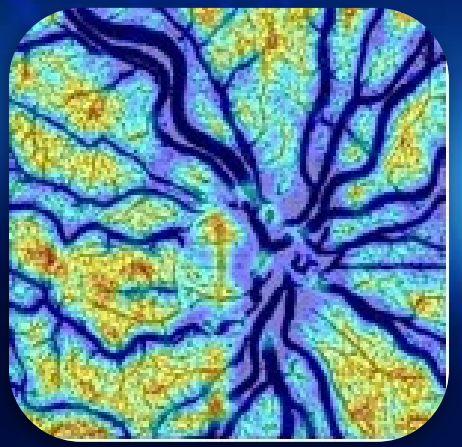
Mechanical Theory



Vascular Theory

↓ Ocular Diastolic Perfusion Pressure
(Diastolic Bl. P. – IOP)



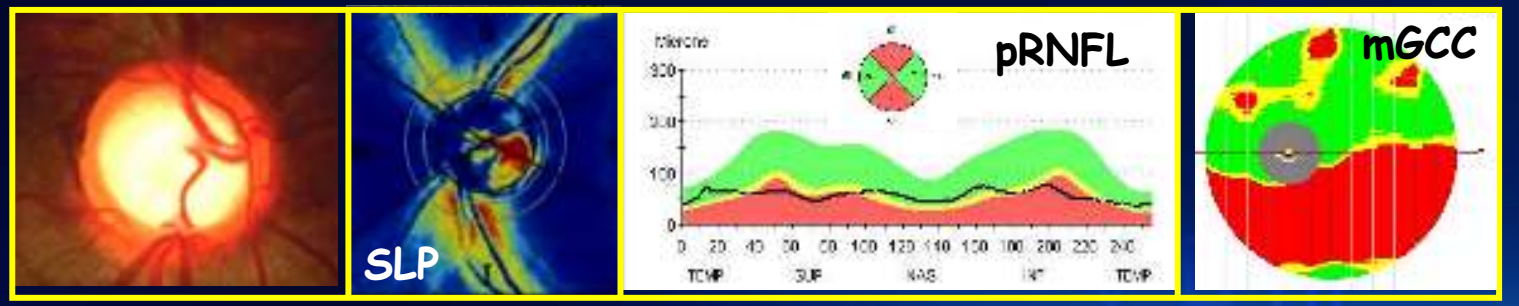


Glaucoma Diagnosis & Follow up

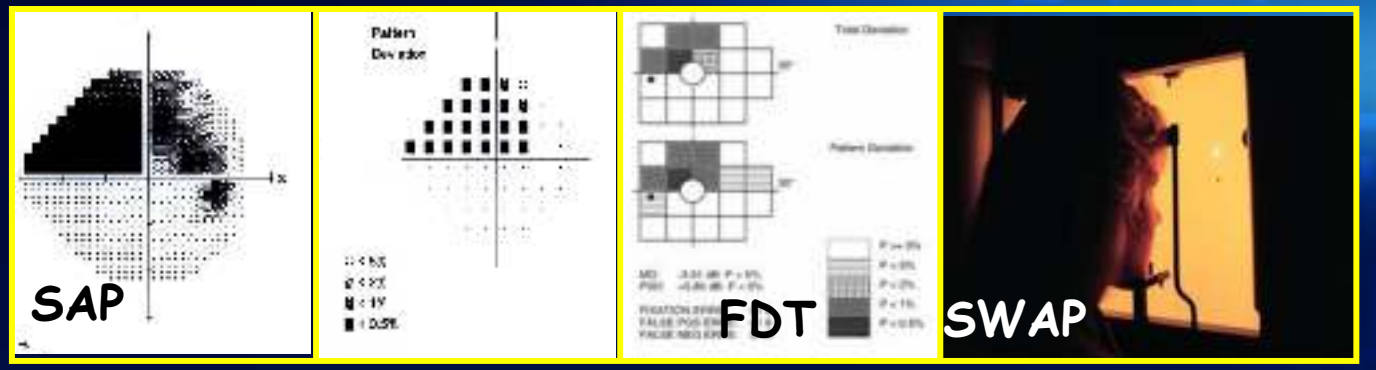
- **Office- Based :** History , systemic workup
  IOP , Gonioscopy , Optic Disc

- **Investigative tools :**

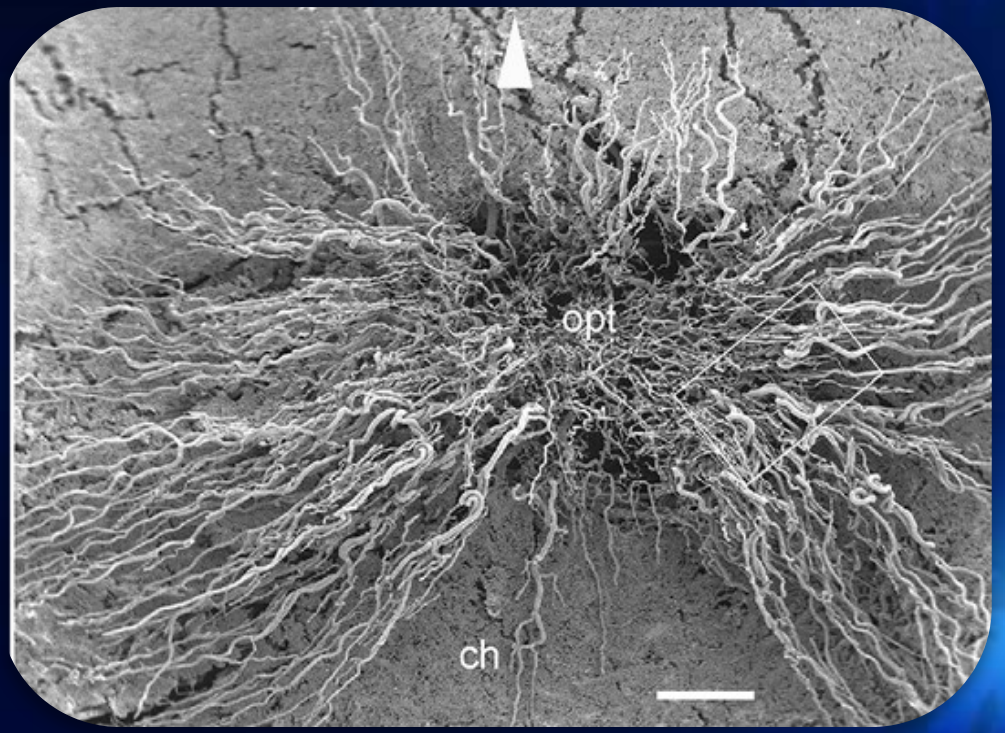
Structure



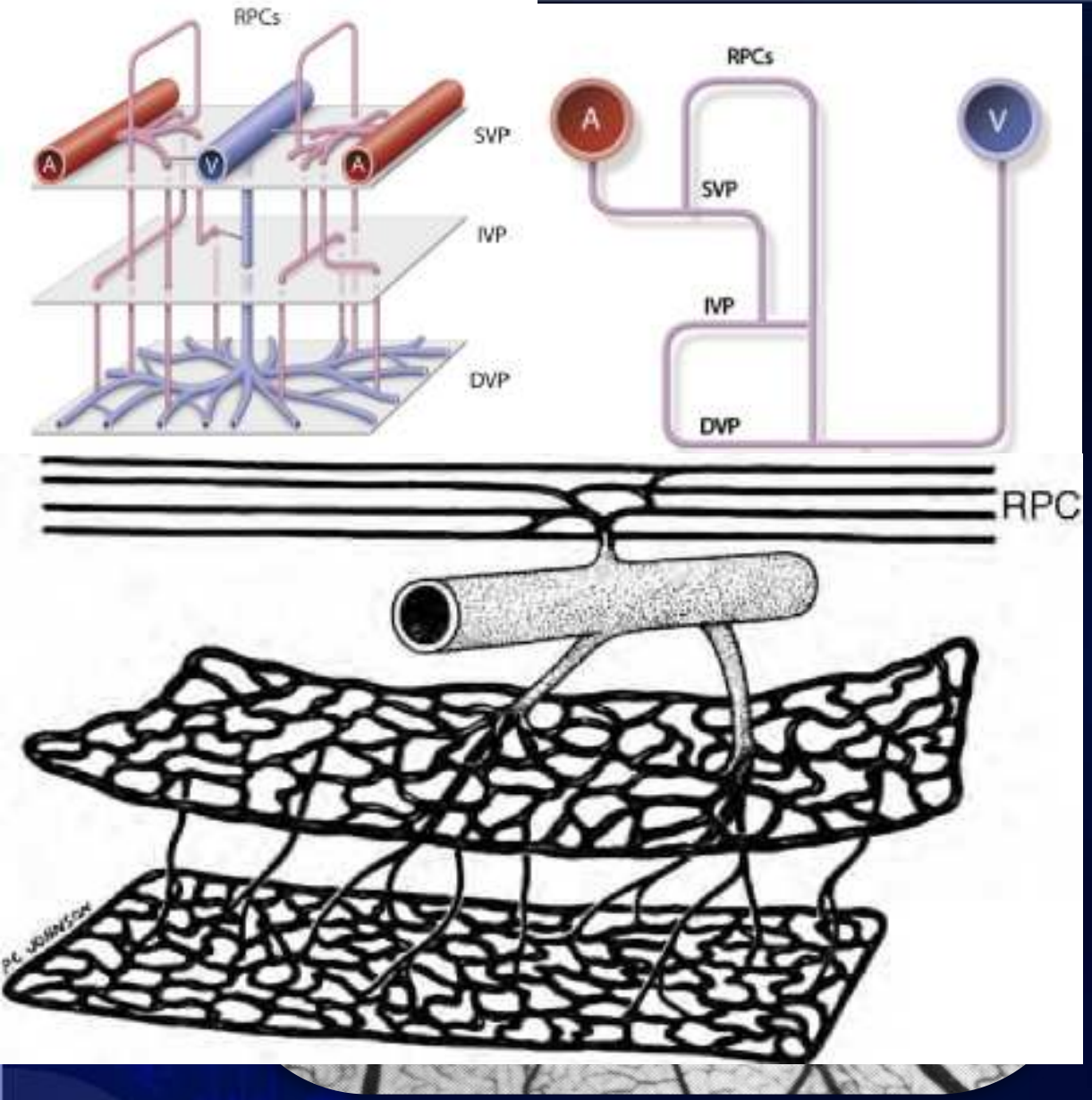
Function



Radial Peri-papillary Capillaries (RPC's)



Karim A. Raafat



- Unique vascular plexus
- Long , straight course.
- Infrequent anastomoses
- Arise from peri –papillary arterioles.
- Radially from ON along the arcuate nerve bundles.
- Run in NFL.

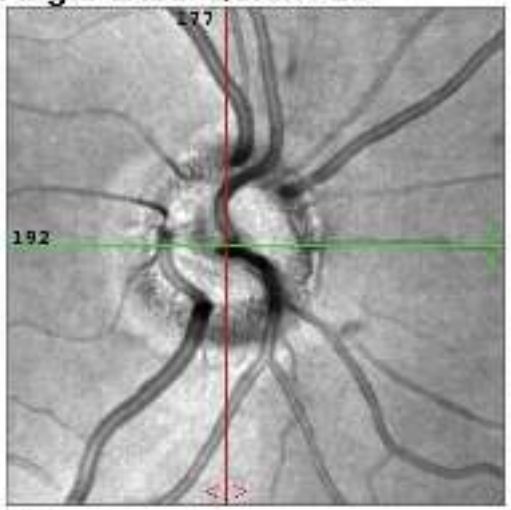
More vulnerable to IOP elevation

Angio Disc QuickVue

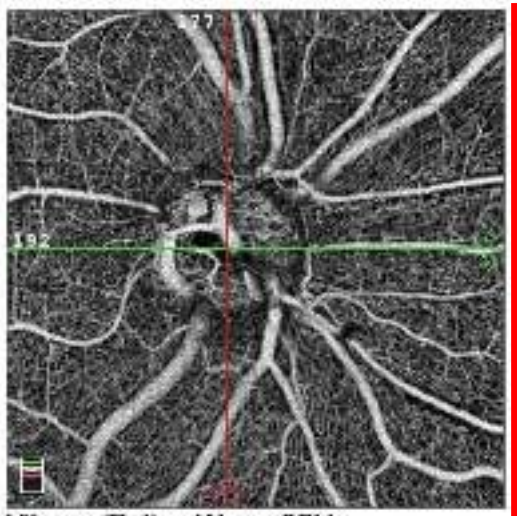
Scan Quality 9/10

4.5 x 4.5 Scan Size (mm)

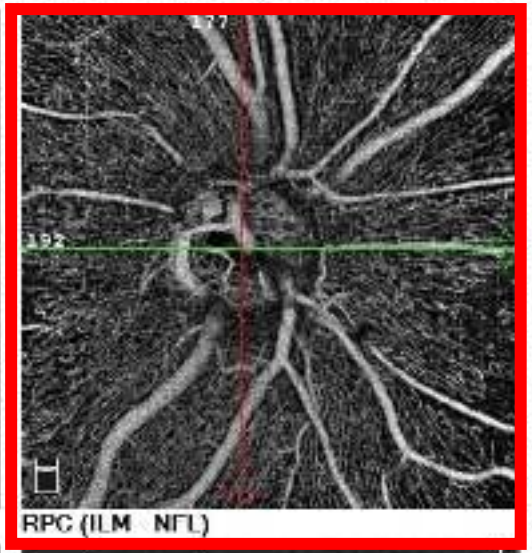
Right / OD



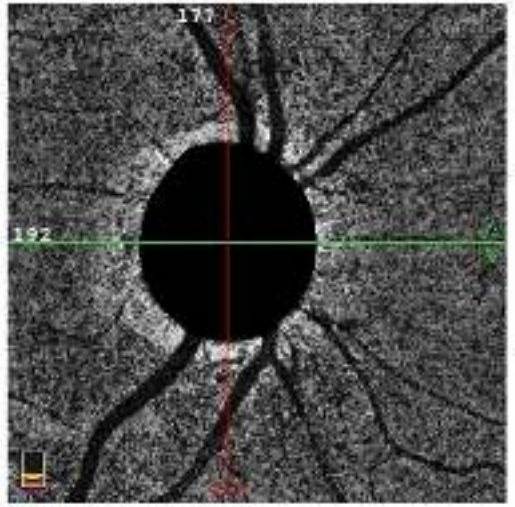
SLO



Vitreous/Retina (Above OPL)



RPC (ILM – NFL)



Choroid (Below RPE)

Exit

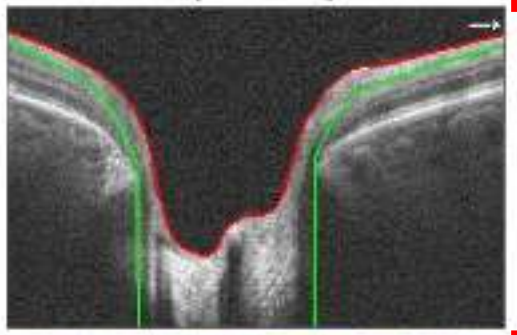
Print

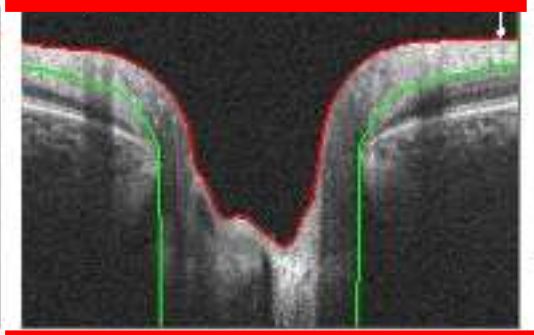
OverVue

Show Lines

ONH Analysis	
Cup/Disc Area Ratio	0.46
Cup/Disc V. Ratio	0.69
Cup/Disc H. Ratio	0.67
Rim Area (mm^2)	1.19
Disc Area (mm^2)	2.21
Cup Volume (mm^3)	0.217

RNFL Thickness (µm)	
Peripapillary	109





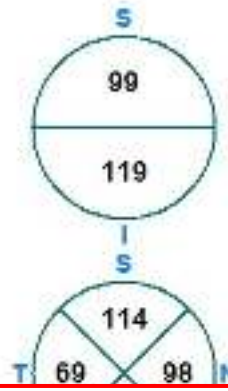
RPC Density (%)	Capillary	All
Whole Image	50.5	56.8
Inside Disc	49.4	58.4
Peripapillary	54.6	60.6
- Superior-Hemi	53.9	60.4
- Inferior-Hemi	55.4	60.9

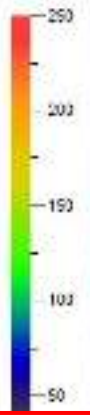
Show Grid

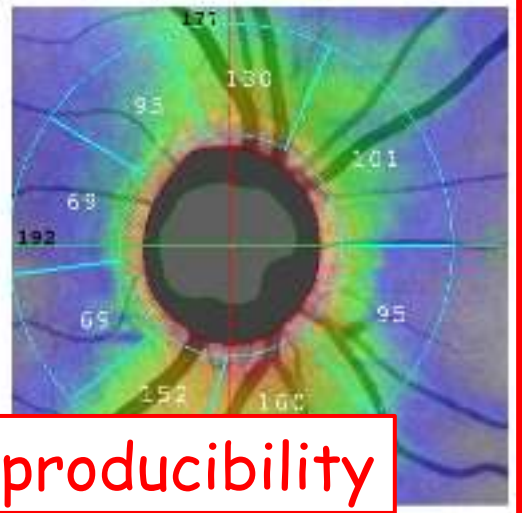
Angio Overlay

Auto Zoom

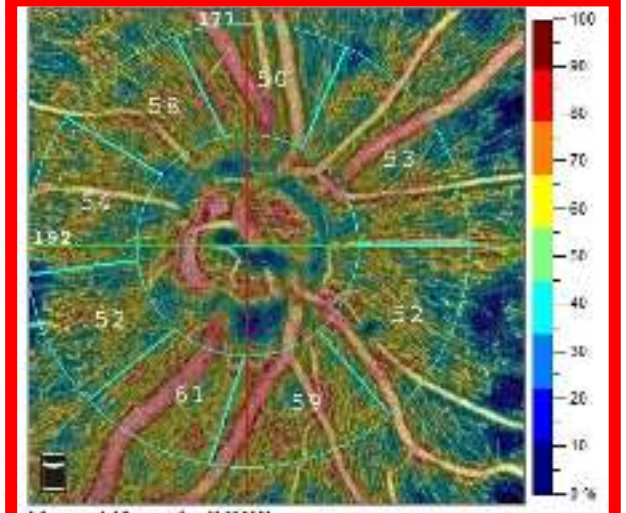
RPC Vessel Density(%) - Capillanes



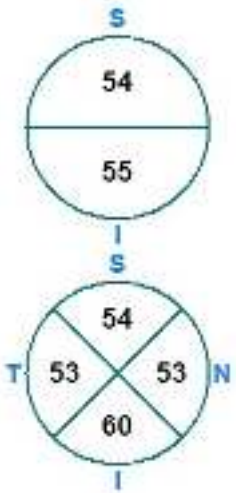




Thickness(ILM – NFL)



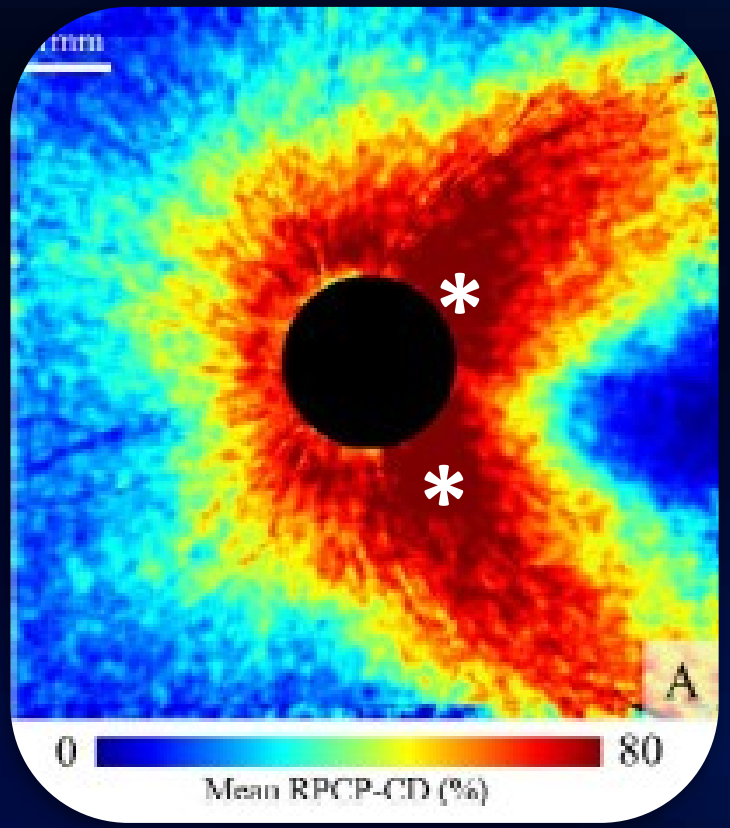
Vessel Density (RPC)

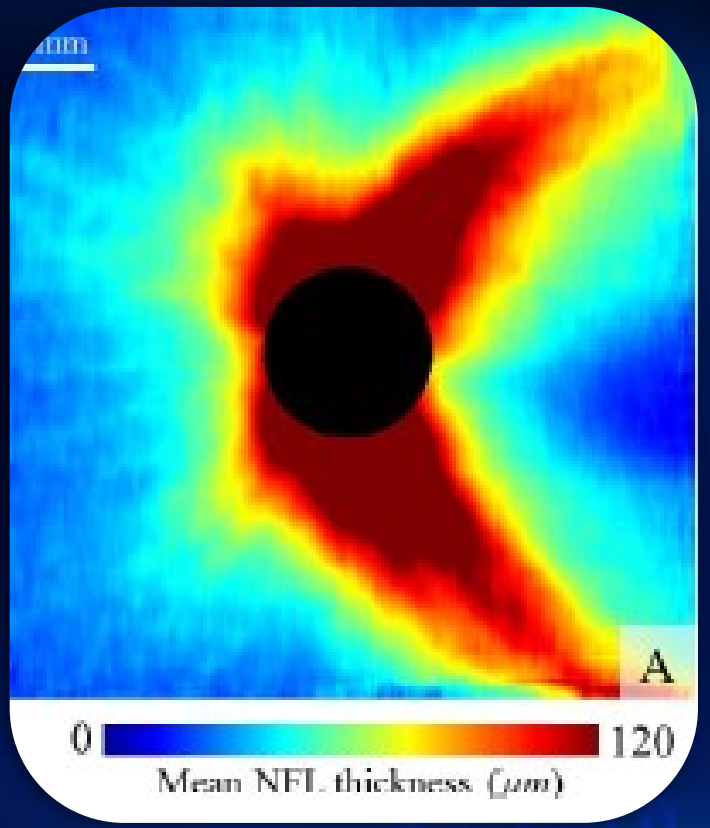


RNFL

High Repeatability & Reproducibility

* Highest Density





RPC Density RNFL Thickness

RPC primarily responsible for RNFL nourishment

Discriminatory Ability of OCTA in Glaucoma

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EGYPTIAN OPHTHALMOLOGICAL SOCIETY

Brit. J. Ophthal. (1968) 52, 26

RADIAL PERIPAPILLARY CAPILLARIES OF THE RETINA*†‡

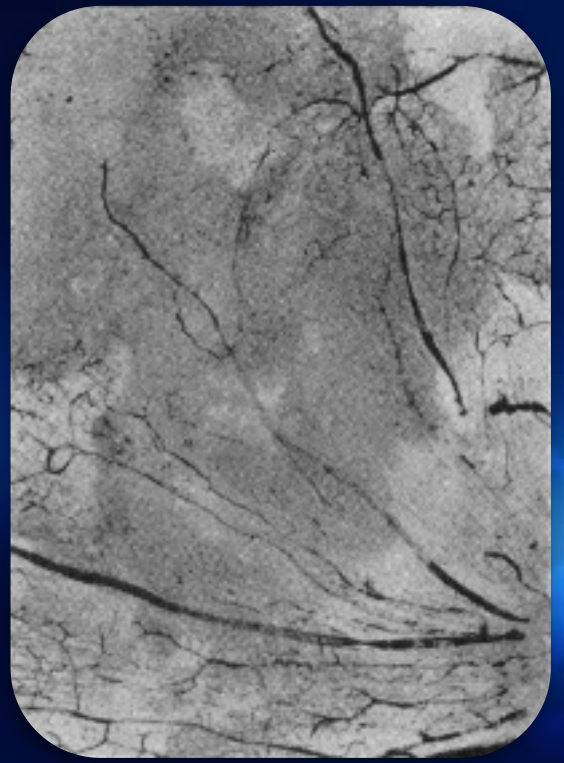
II. POSSIBLE ROLE IN BJERRUM SCOTOMA

BY

MORTON ALTERMAN AND PAUL HENKIND

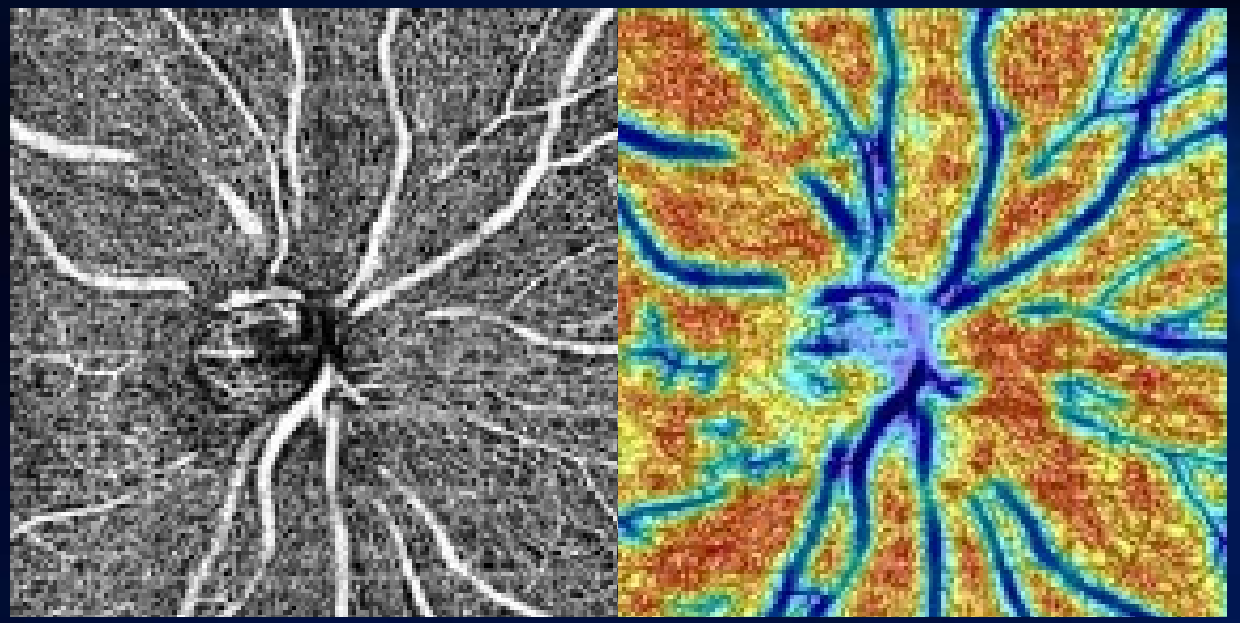
Histo pathology
&
Animals

Control

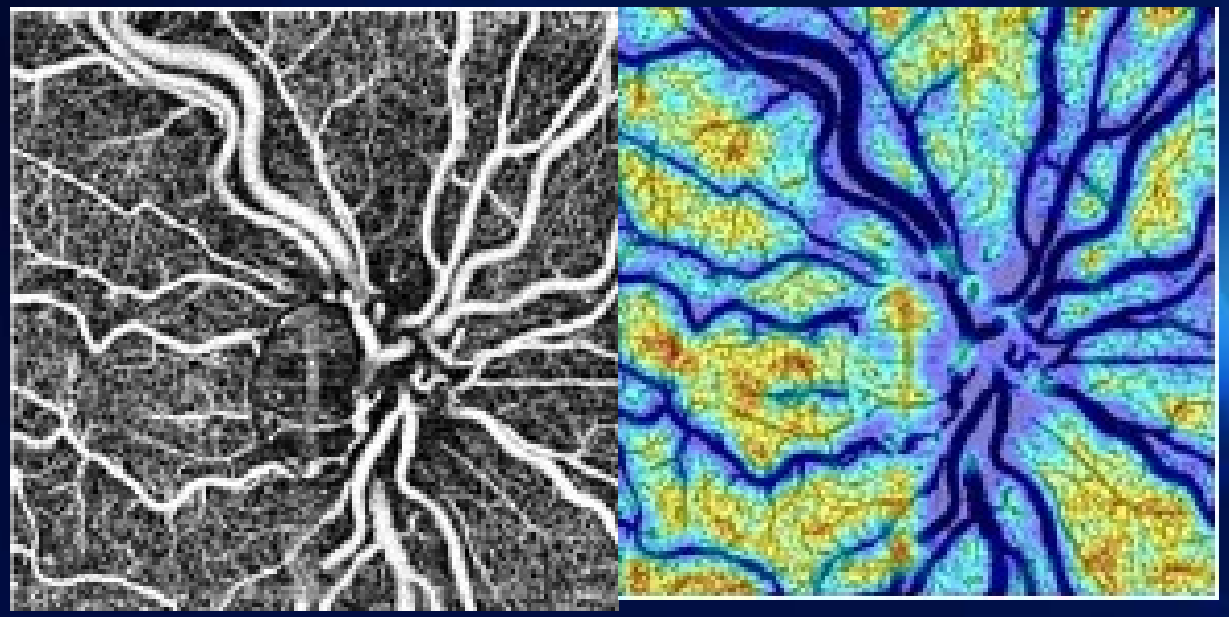


Glaucoma

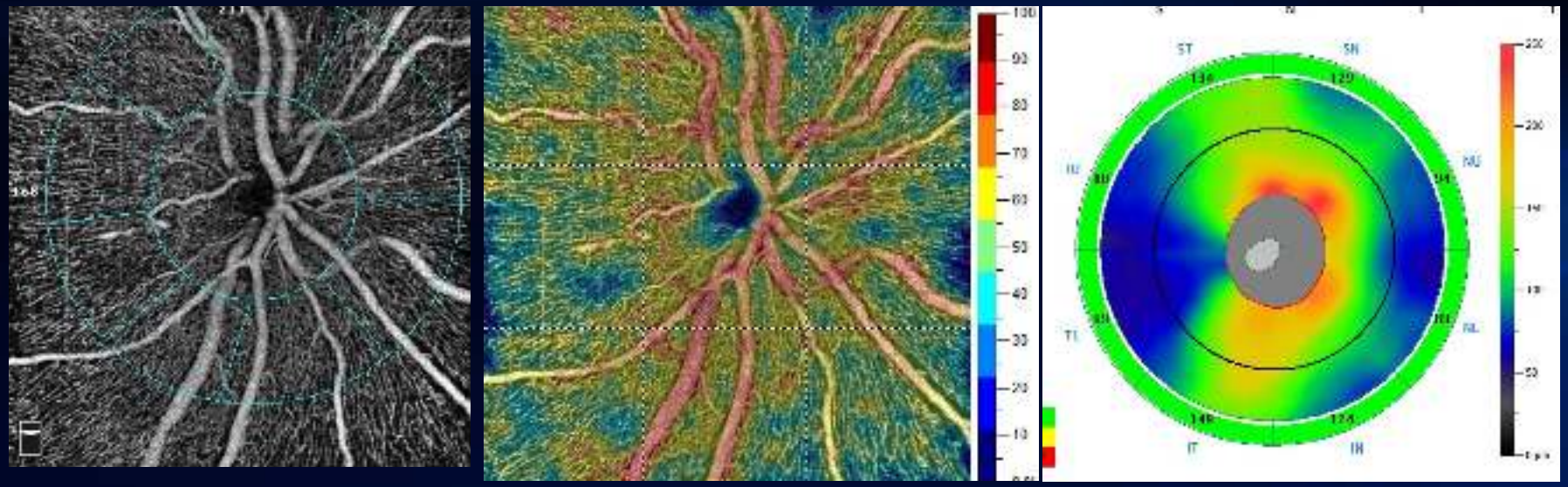
Control



Glaucoma

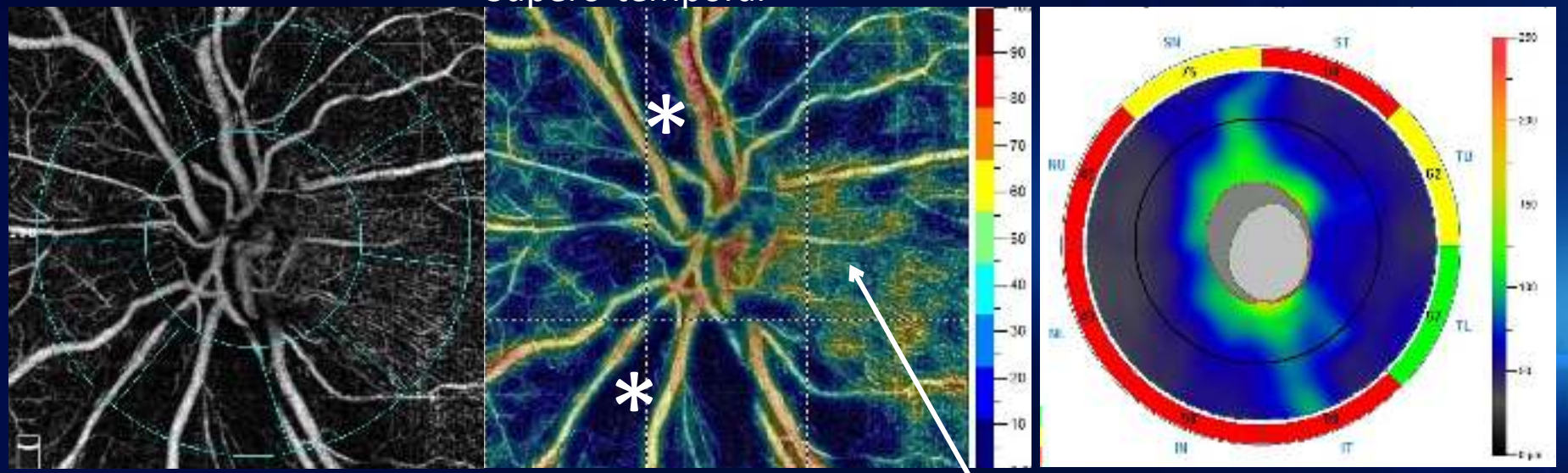


Control

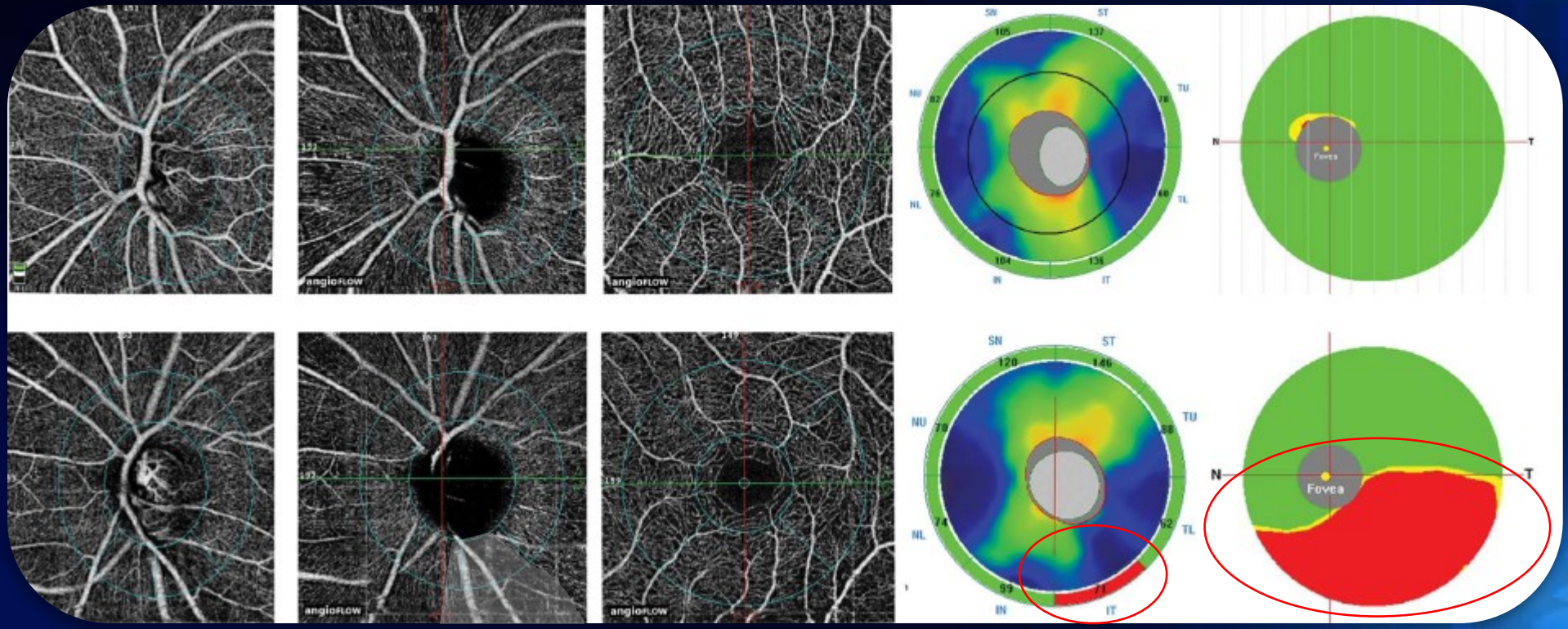


Vascular / Structure

Glaucoma

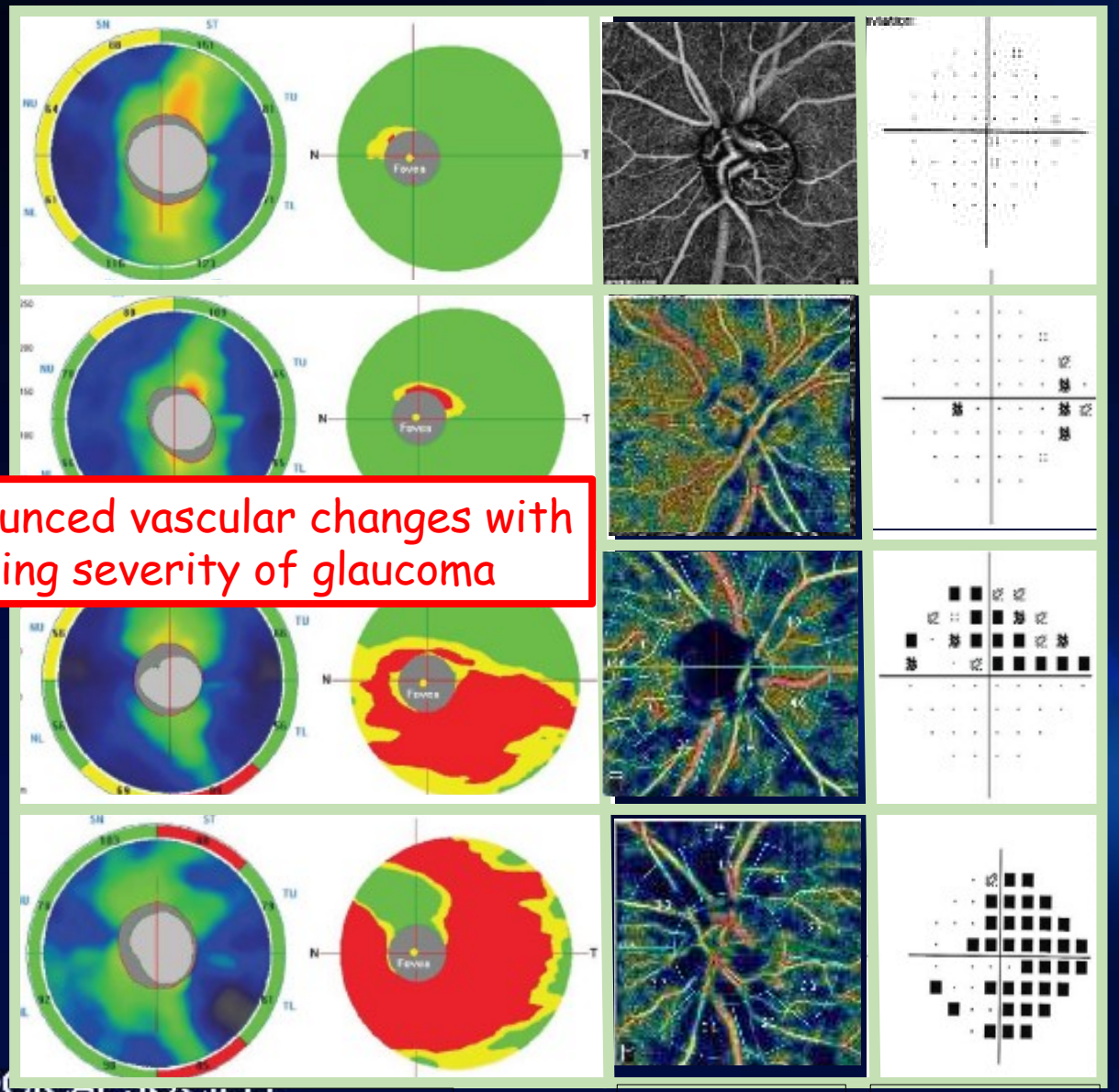


Normal



Glaucoma

Disease Severity



More pronounced vascular changes with Increasing severity of glaucoma

Pre perimetric

Early

Moderate

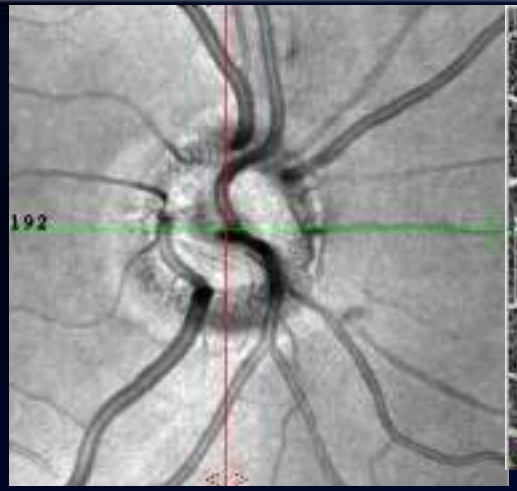
Severe

Structural

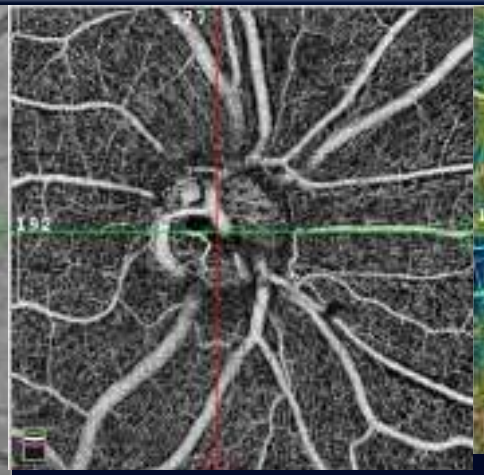
Vascular

Function

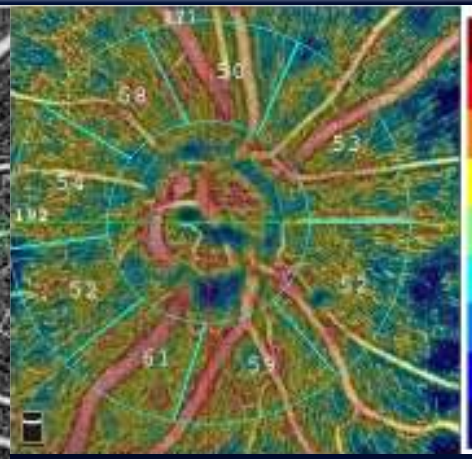
OD



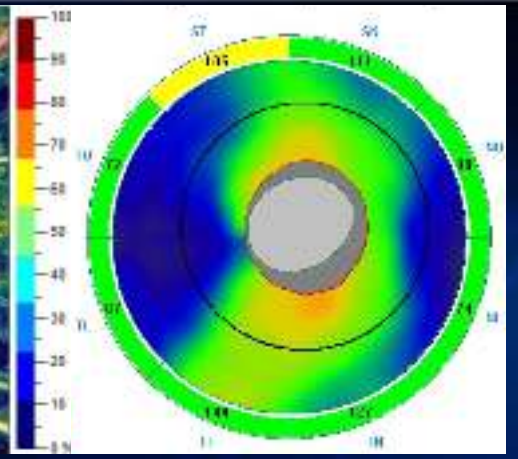
SLO



RPC

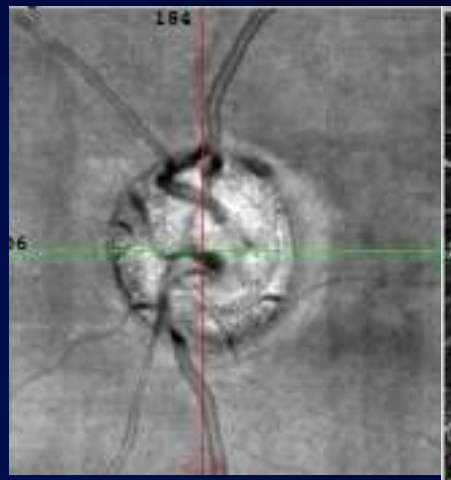


RPC Density

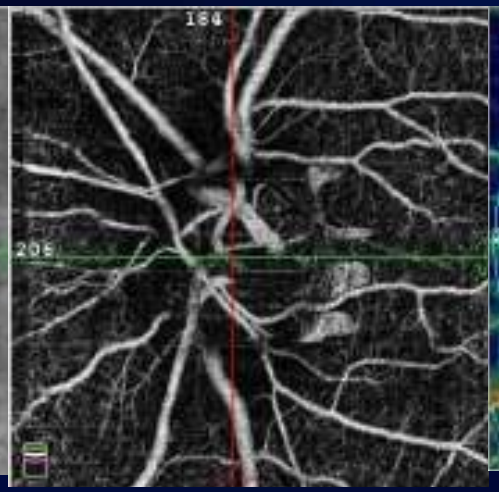


pRNFL

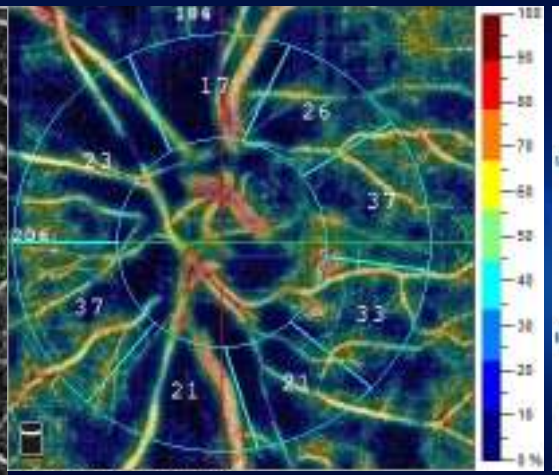
OS



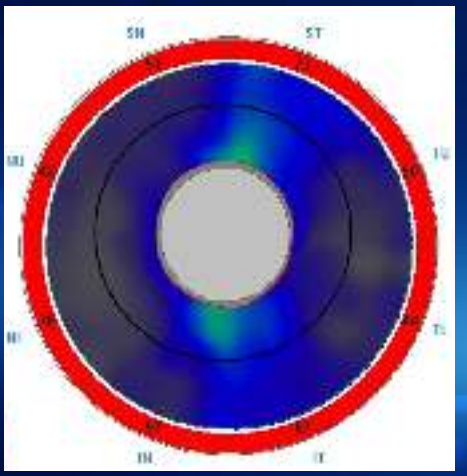
SLO



RPC



RPC Density



pRNFL

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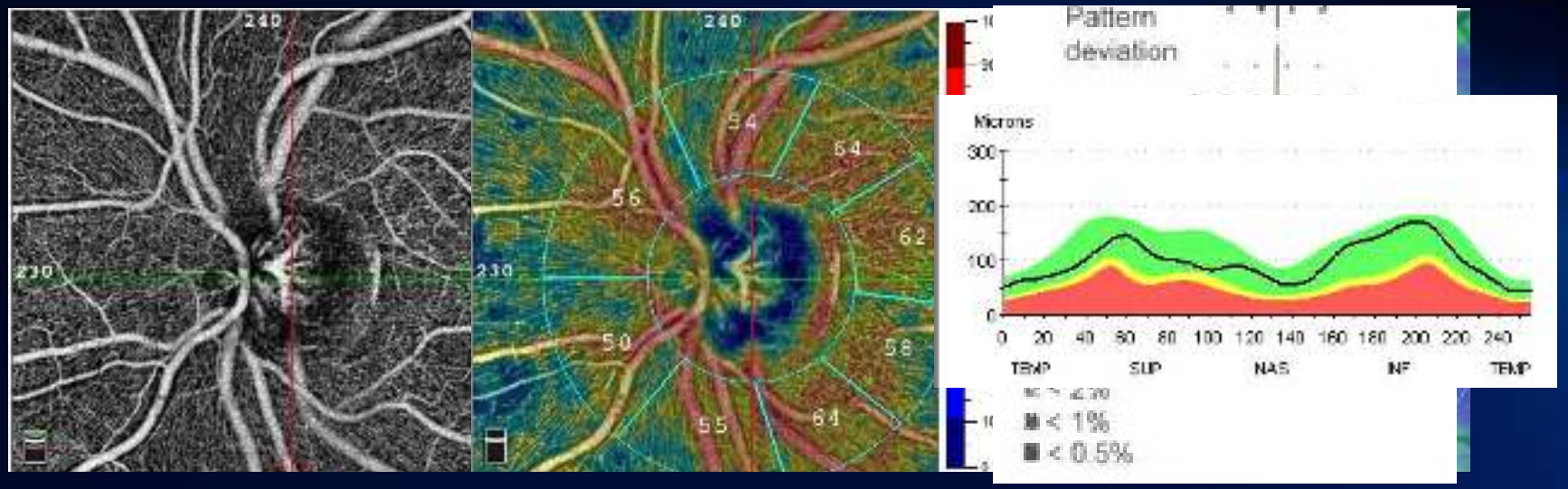
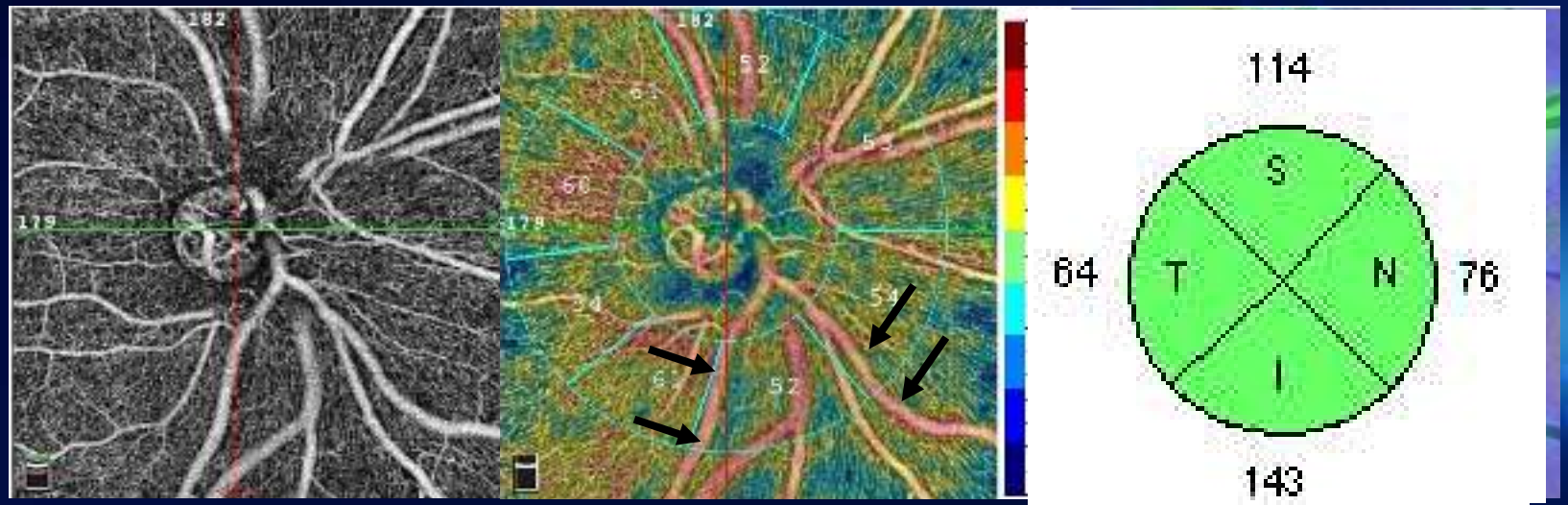
Asymmetry ; hallmark of diagnosis

Control



Early Diagnosis

Glaucoma Suspect



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Triolo G et. al , 2017

Correlation between OCTA , OCT and visual function Parameters

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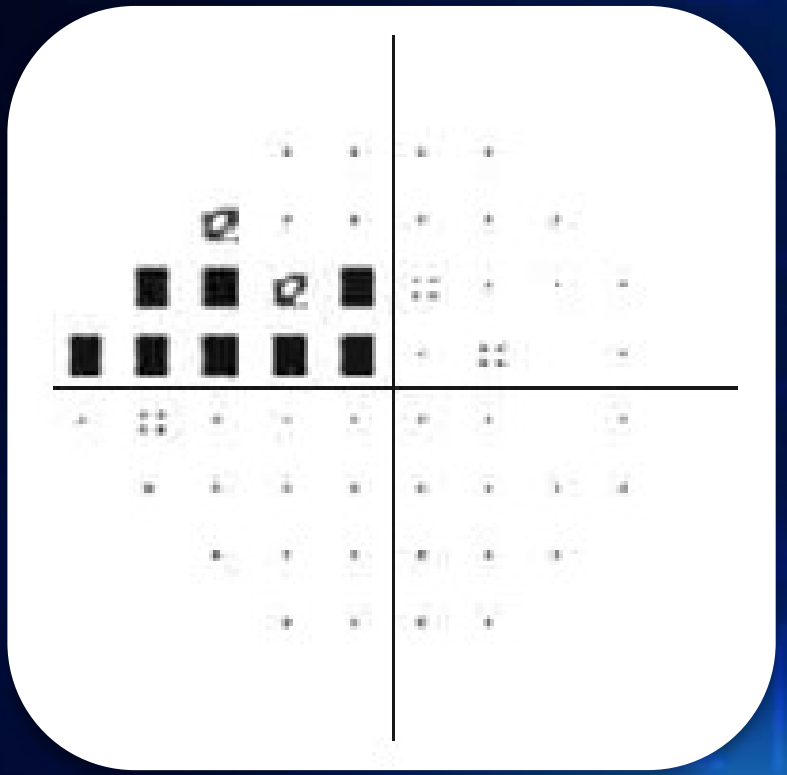
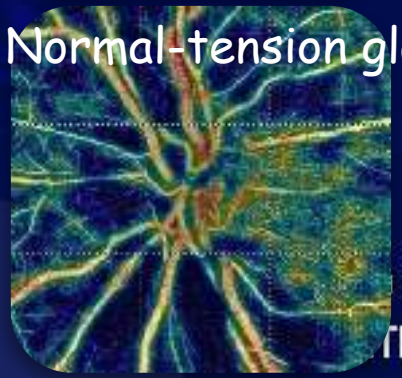
Vascular / Function

RPC Density



Pattern Deviation

Normal-Tension Glaucoma



Graefe's Archive for Clinical and Experimental Ophthalmology

Comparison of retinal microvascular changes in eyes with high-tension glaucoma or normal-tension glaucoma: a quantitative optic coherence tomography angiographic study

Conclusions

The retinal perfused vessel density is significantly reduced in HTG and NTG eyes, and more prominently in the peripapillary region in NTG eyes.

OCT Angiography Can Detect Microvascular Changes Predictive Of Normal-Tension Glaucoma

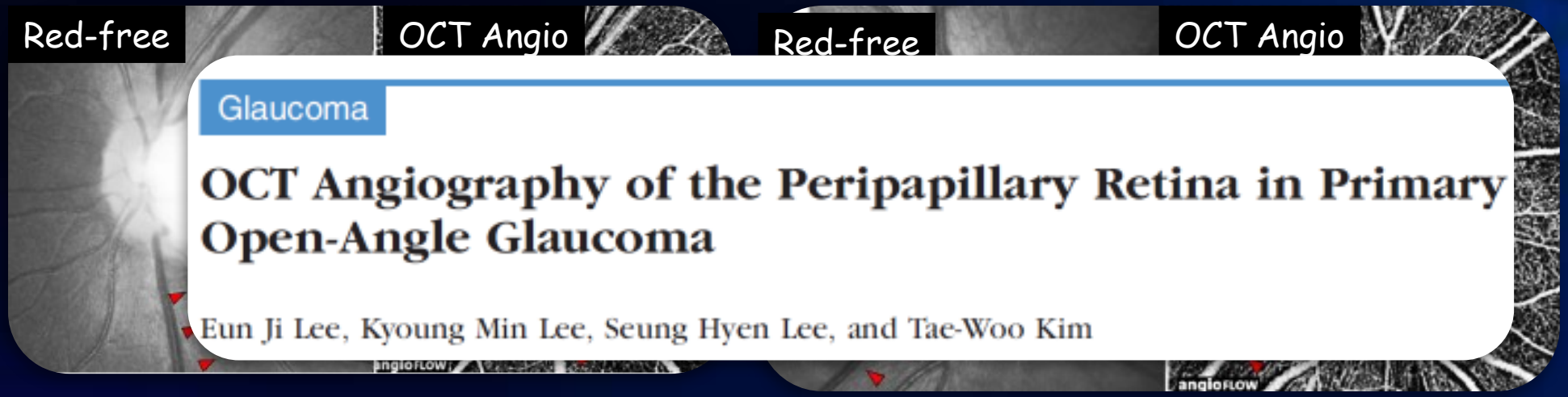
Written By : Dr. Shravani Dali | Medically Reviewed By : Dr. Kamal Kant Kohli

Published On 26 Aug 2022 5:30 PM | Updated On 26 Aug 2022 5:30 PM

Thus, Normal tension glaucoma suspects with baseline MvD or a lower laminar deep vessel density on OCT-A had a higher risk of conversion.

Which comes first ?!

Cause or Effect ?!



Follow the territory of retinal vessels

CONCLUSIONS. Decreased parapapillary microvasculature of the retina determined by OCTA was found at the location of RNFL defect in POAG patients. This finding suggests that the decreased retinal microvasculature is likely secondary loss or closure of capillaries at the area of glaucomatous RNFL atrophy.

Areas of RNFL defects

Lee EJ et al. , 2016

Structural (pRNFL) / Micro-vascular (RPC - VD)

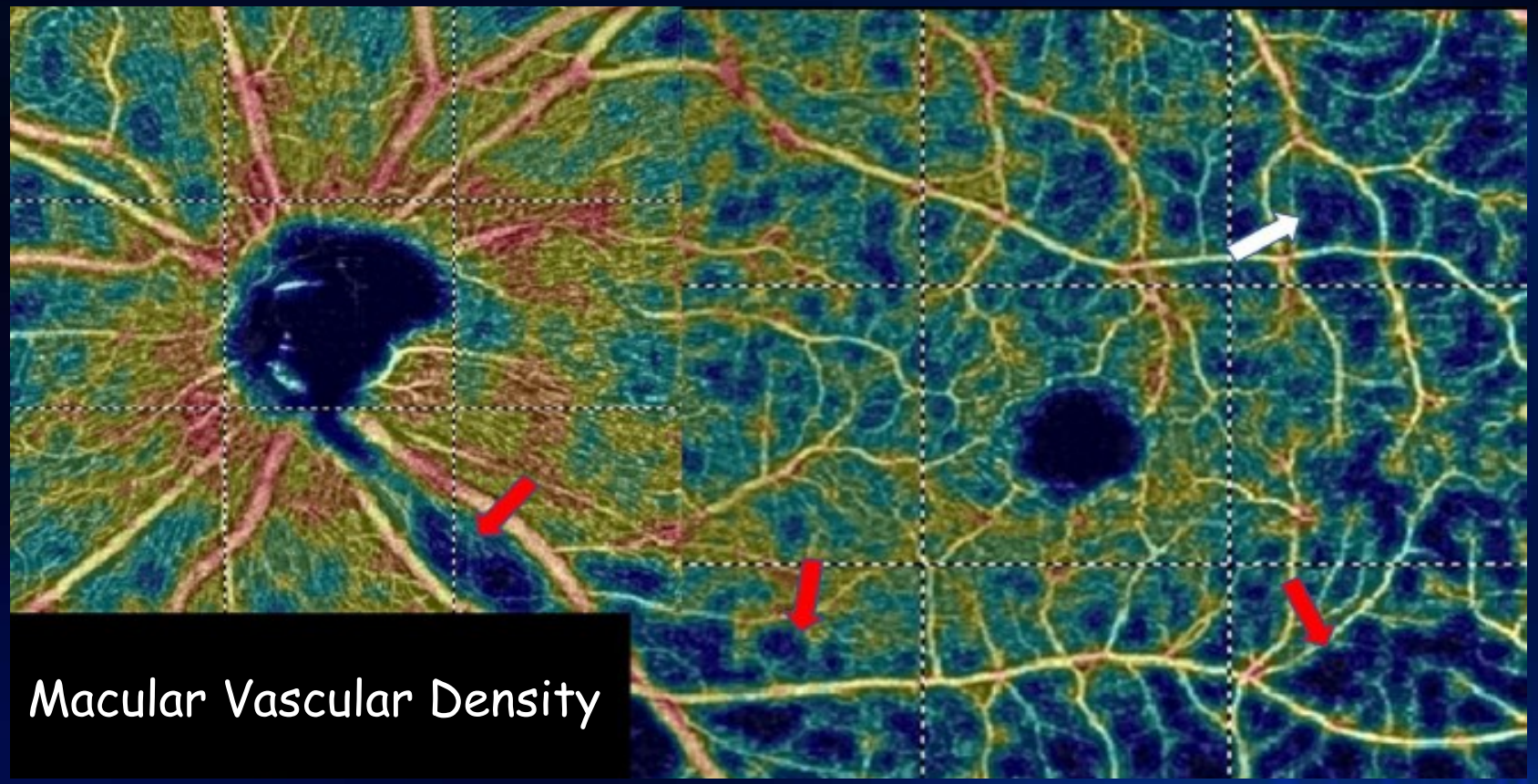
Cause / Effect !!

Neuro-degeneration occur prior to vascular damage.
Capillary dropout secondary to RNFs Loss

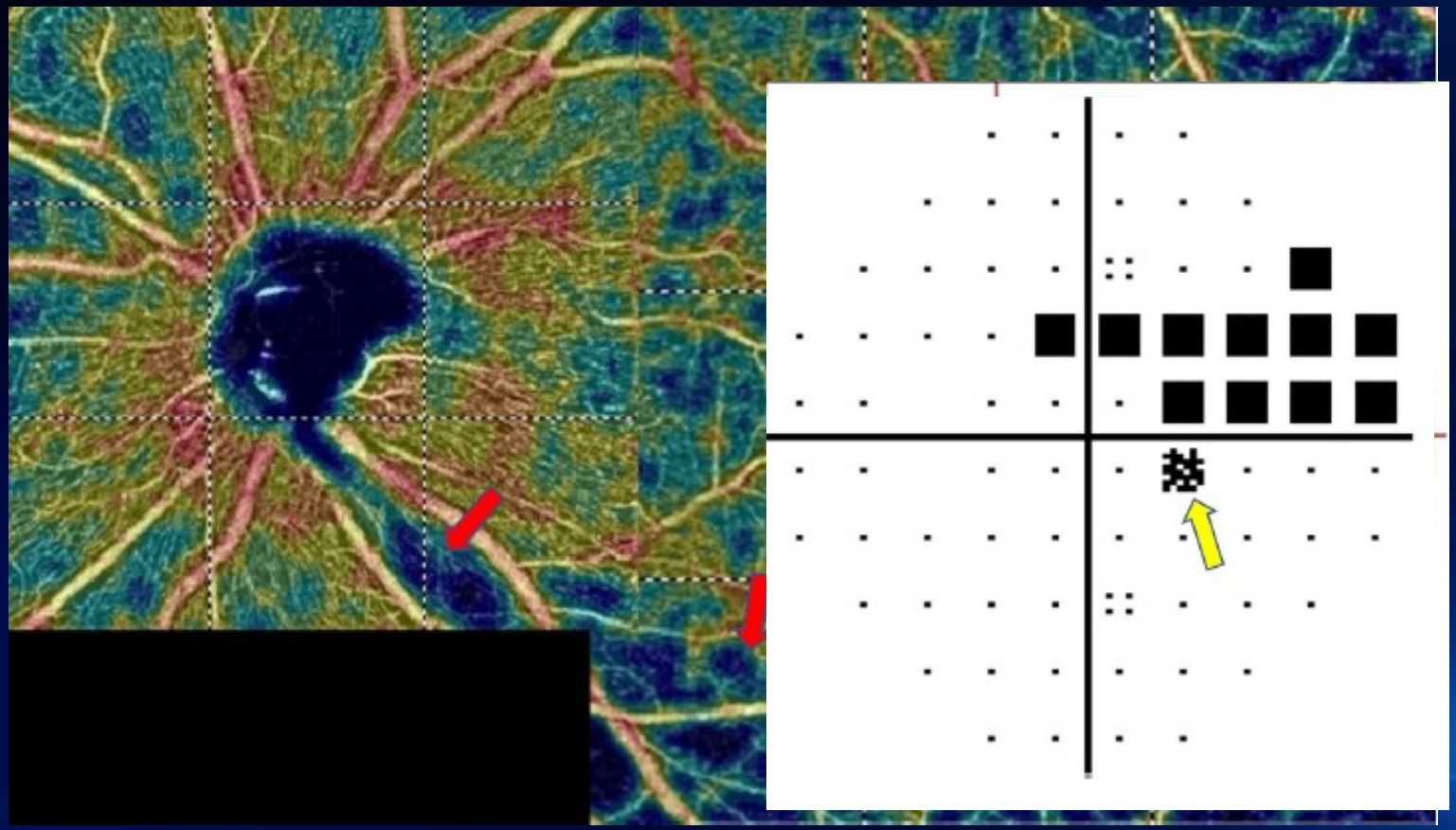
Triolo G et. al , 2017

GC - NFL dysfunctional, less metabolically active require less perfusion.
Capillary dropout precedes NFL thinning

Jia Y. et. al , 2017

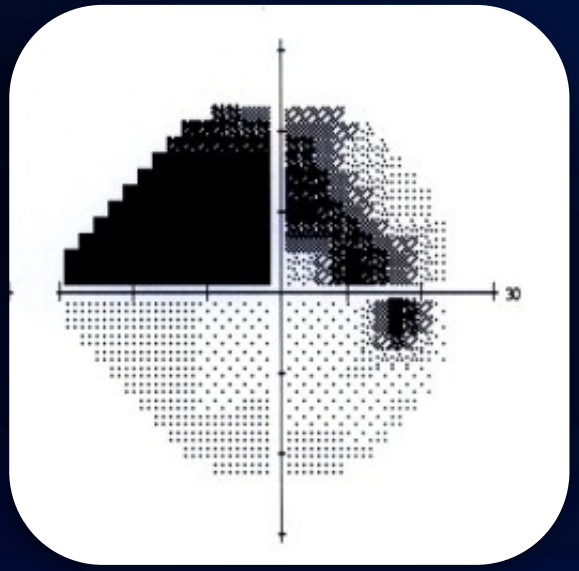


- Differentiate Glaucomatous from Healthy eyes.
- Similar diagnostic accuracy as pRNFL , mGCC.
- Not related to disc size.
- Useful in high myopia.
- Useful in early disease.



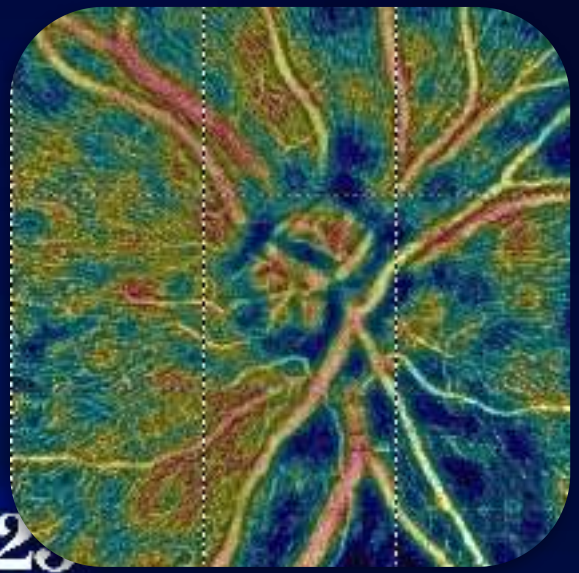
Vascular - Structural - Functional Correlation

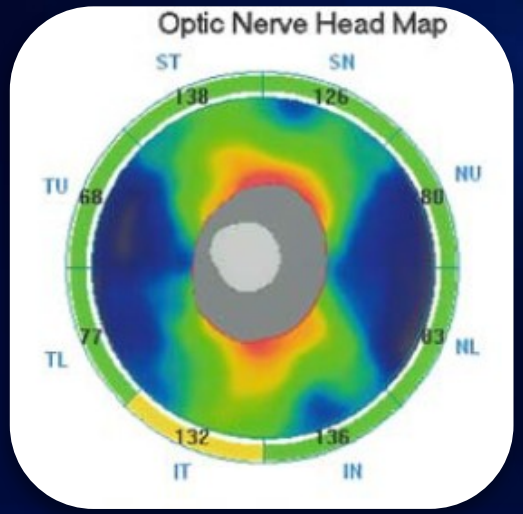
Stronger Correlation

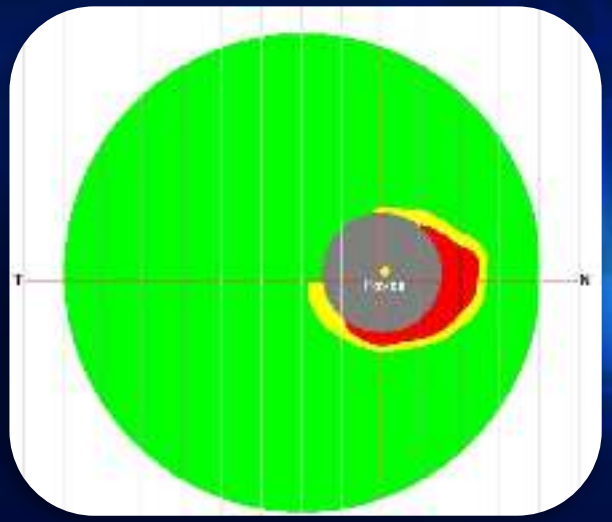


Functional

Vascular







Structural

AMERICAN ACADEMY OF OPHTHALMOLOGY

Ophthalmic Technology Assessment

OCT Angiography for the Diagnosis of Glaucoma

A Report by the American Academy of Ophthalmology

Conclusions: Vessel density loss associated with glaucoma can be detected by OCTA. Peripapillary, macular, and choroidal vessel density parameters may complement visual field and structural OCT measurements in the diagnosis of glaucoma. *Ophthalmology 2021;128:1222-1235*

Vascular parameters appear to be a useful new noninvasive adjunct tool to evaluate/diagnose glaucoma. They appear to correlate well with functional and structural clinical parameters. It is not clear at this time if vascular changes are a cause or effect of glaucoma. Longitudinal studies are needed to determine the usefulness of this tool in early detection of disease and prognostication.

Improves risk stratification , Earlier detection of the disease.

Unique biomarkers that correlate with established functional and structural metrics.

Advantage in highly myopic eyes and advanced disease.

VD reduction is secondary rather than a primary effect.(GC , RNFL loss so, less tissue to supply) .

Thank you