

ASL Roma 1  
DIPARTIMENTO DI OFTALMOLOGIA  
UOC OFTALMOLOGIA CHIRURGICA E DI PRONTO SOCCORSO  
Ospedale Oftalmico di Roma  
Dir. Prof. Ciro Tamburrelli



Centro Italiano Macula – Rome

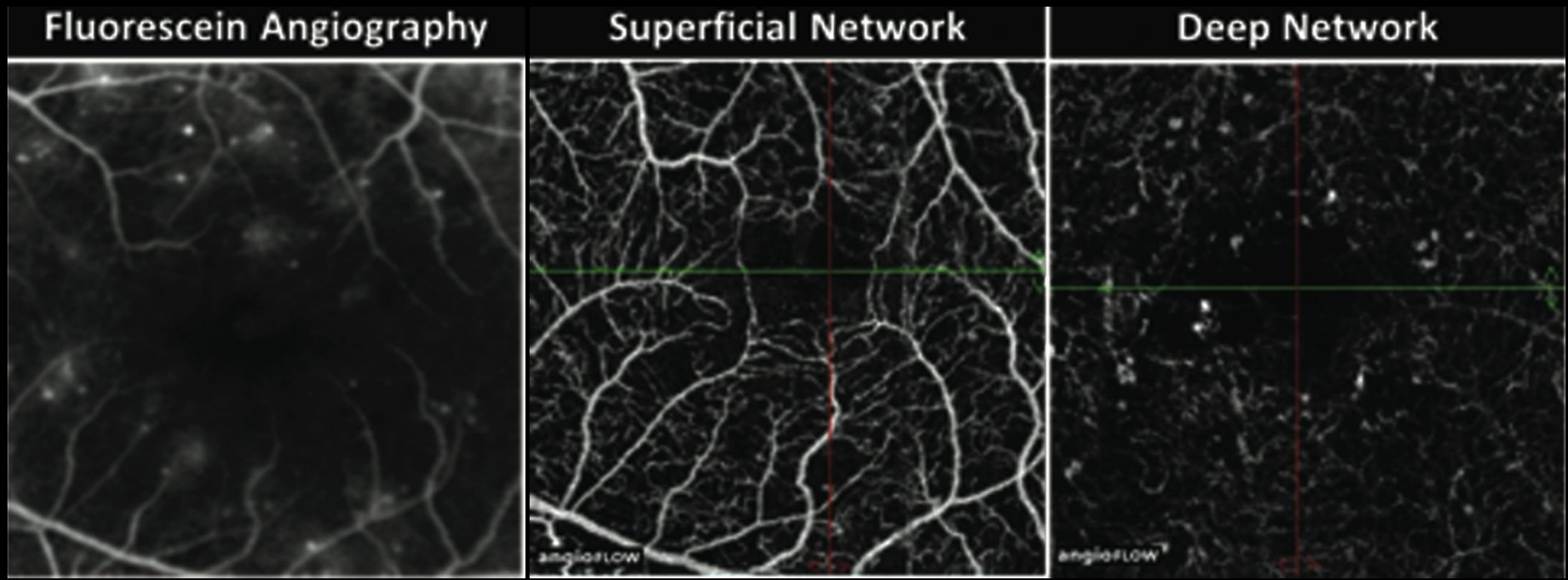


# OCTA in Diabetic Retinopathy

Marco Rispoli, Maria Cristina Savastano, Bruno Lumbroso

Rome - Italy

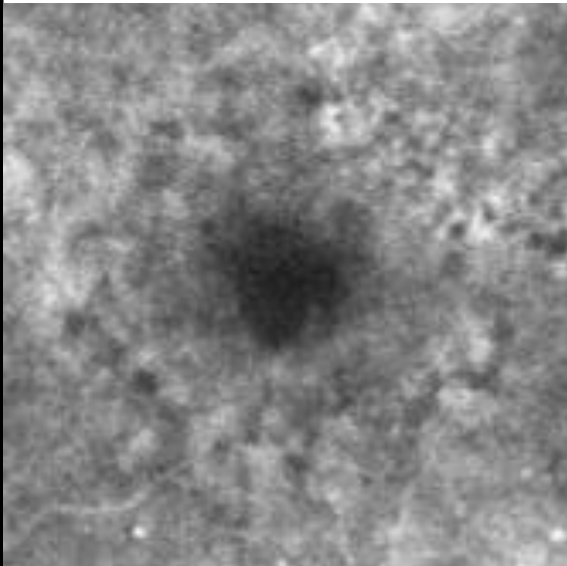
# Fluorescein angiography vs OCT-angiography



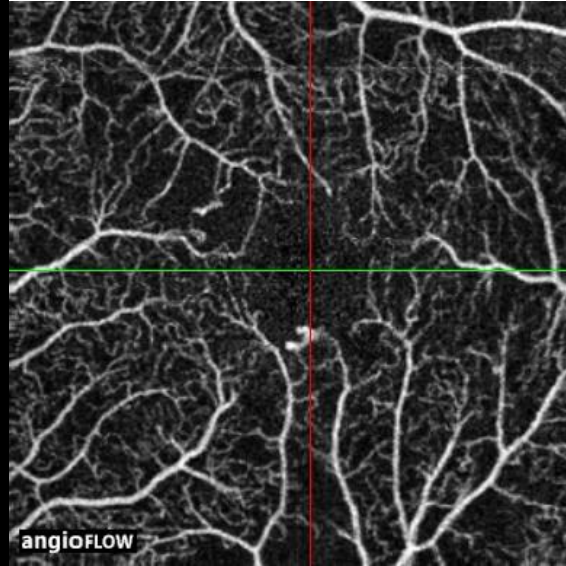
# Macular ischemia and OCT Angiography

Non-perfused areas (drop-out area) are better seen by OCTA than with FA, but OCTA does not show leakage

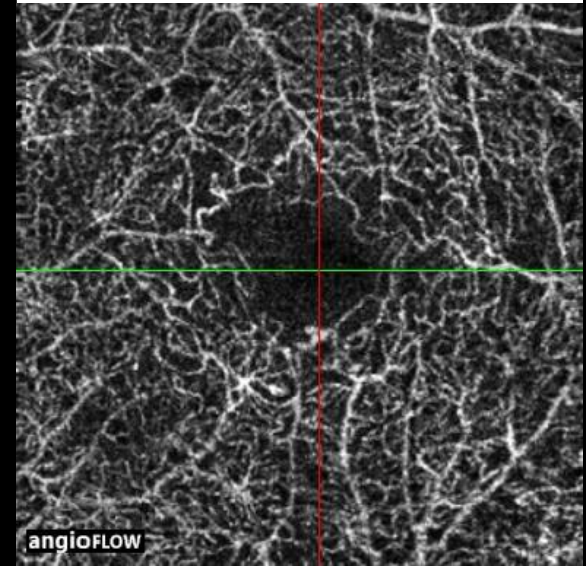
Fluorescein angiography



OCT-A superficial network



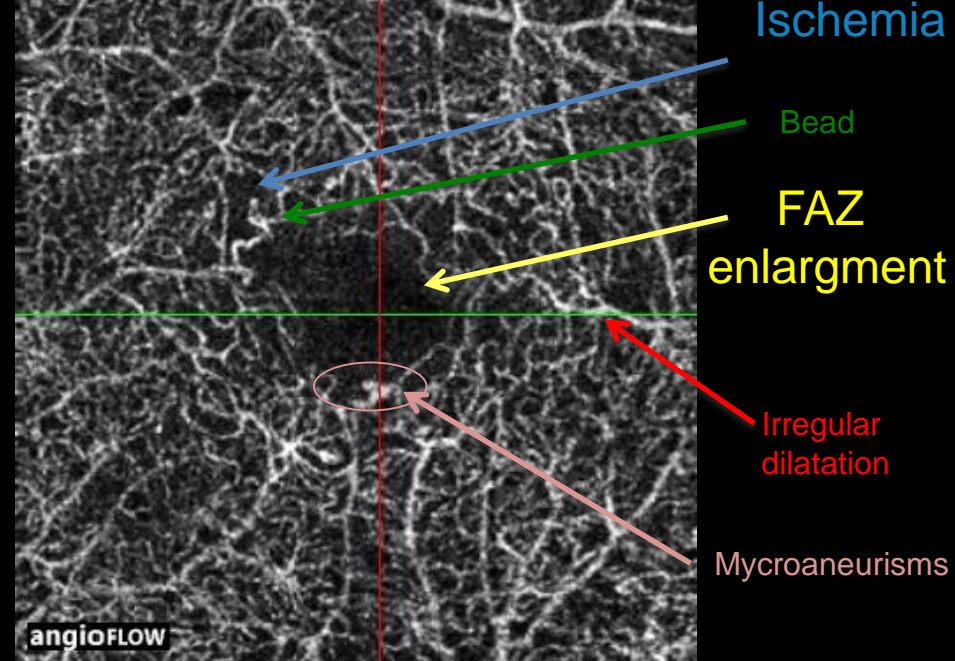
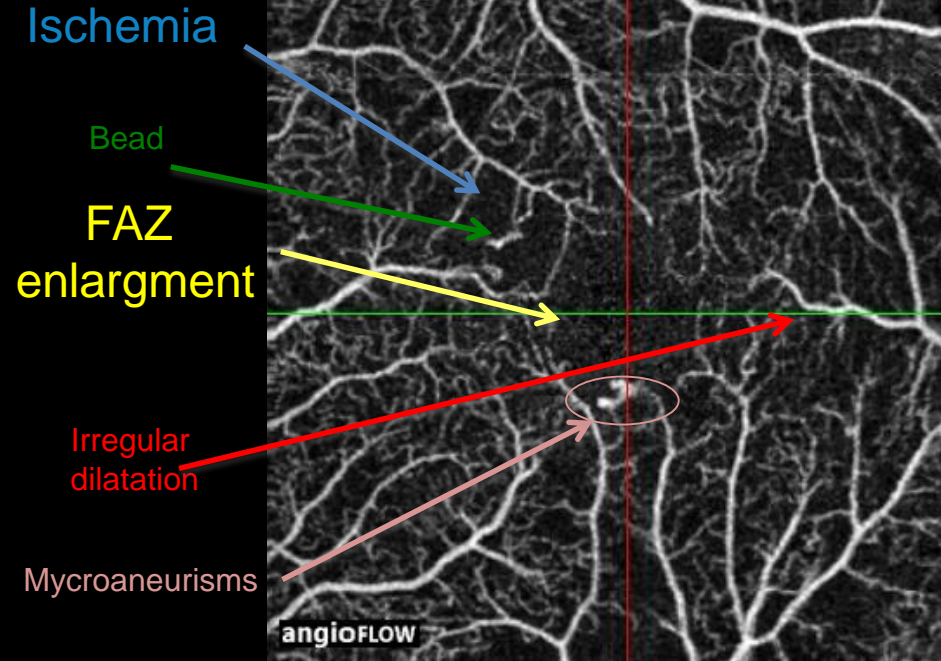
OCT-A deep network



# Macular ischemia and OCT Angiography

OCT-A superficial network

OCT-A deep network

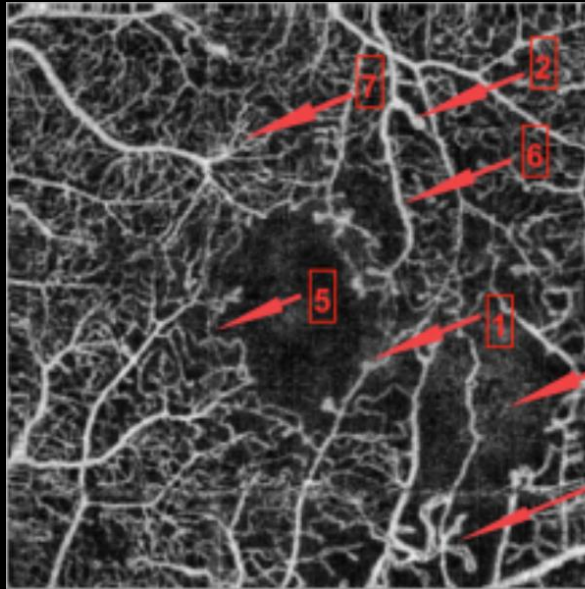


# Diabetic Retinopathy and OCTA

Curr Diab Rep. 2016 Dec;16(12):123.

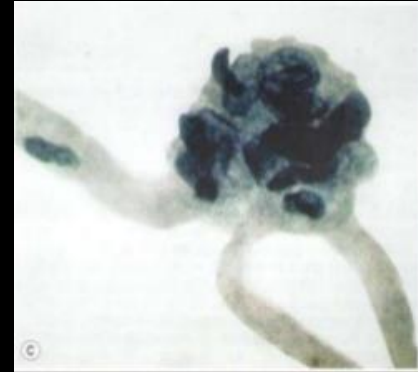
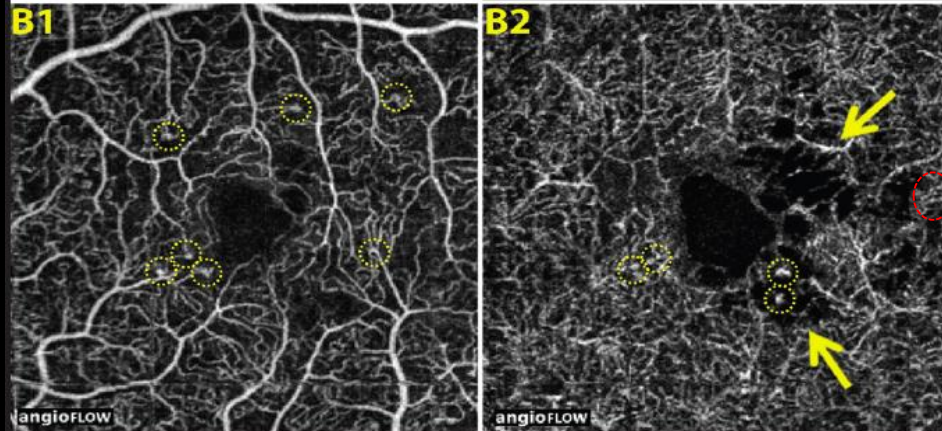
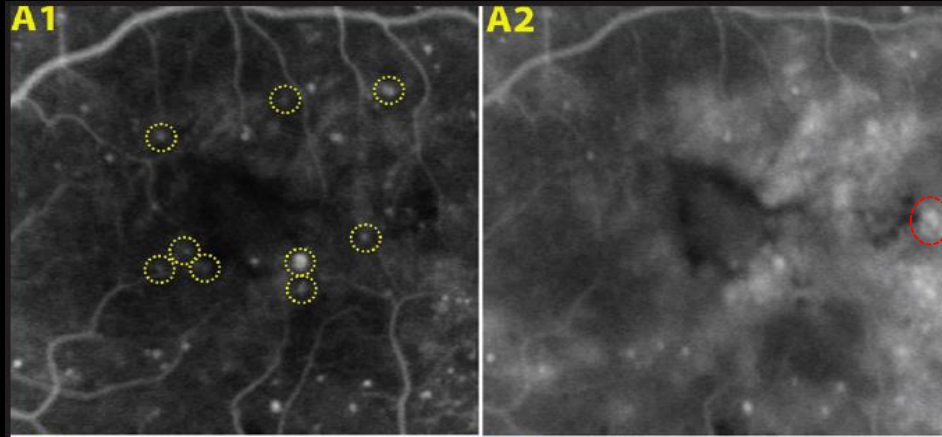
## **Optical Coherence Tomography Angiography in Diabetes.**

Lee J<sup>1</sup>, Rosen R<sup>2</sup>.



1. Microaneurysms
2. Vascular loops
3. Non - perfusion
4. Neovascularization
5. FAZ Erosion
6. Venous beading
7. Multiple capillary beds

# Microaneurysms



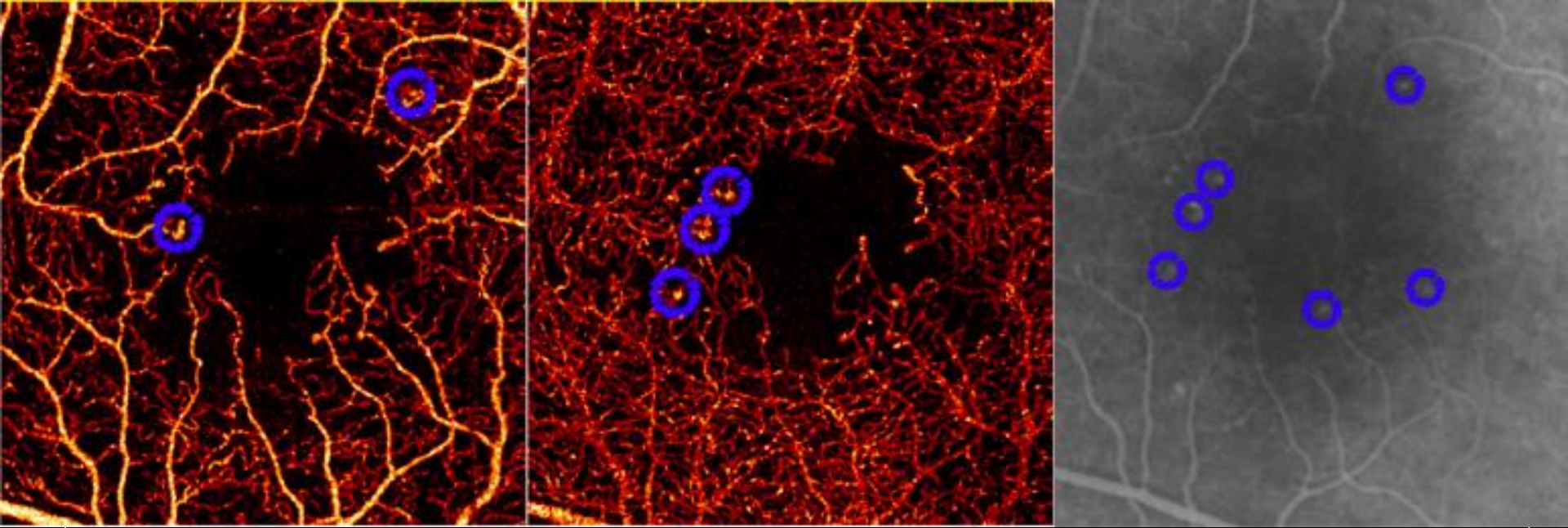
MICRO ANEURYSM



THROMBOSED  
MICRO ANEURYSM

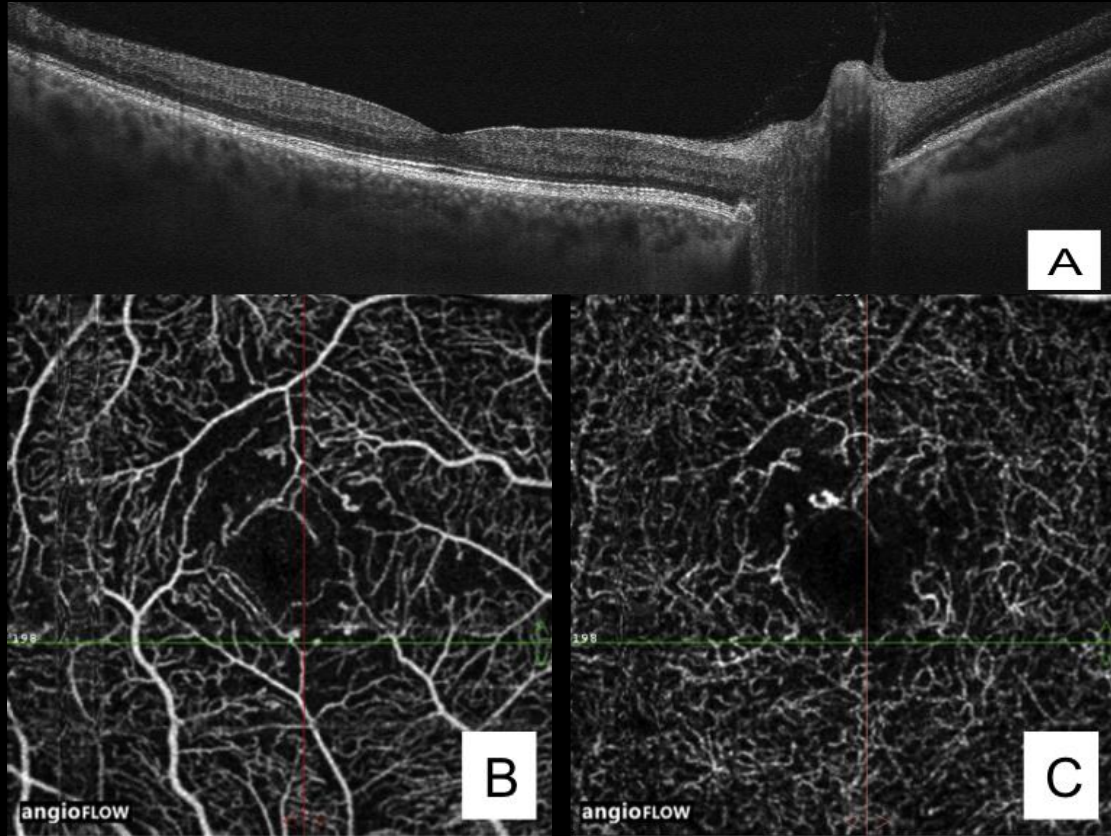
Thrombosed microaneurysms and low flow microaneurysms are not seen with OCT A

# Microaneurysms



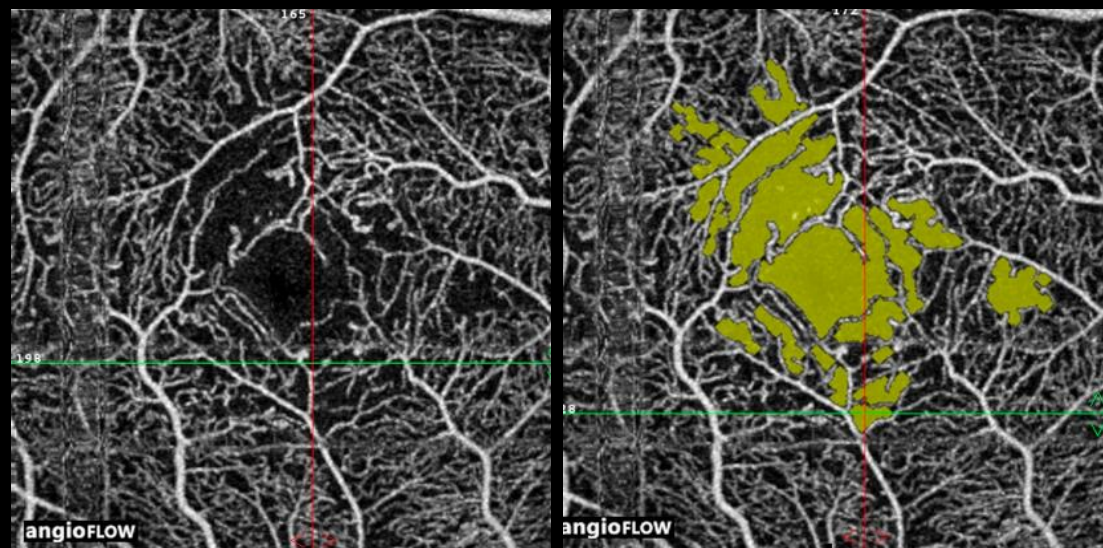
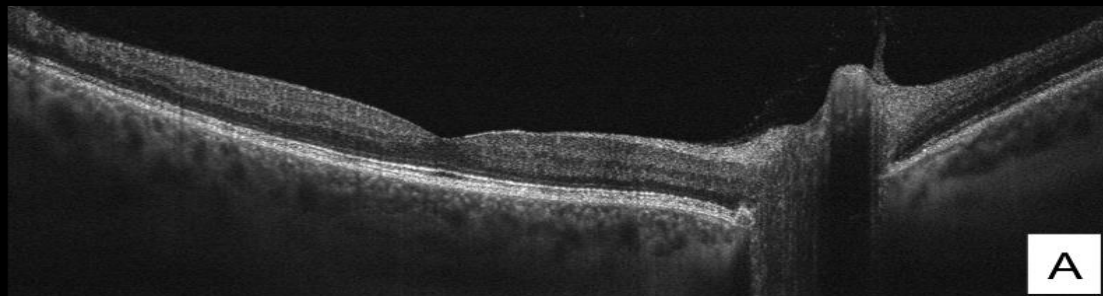
Perifoveal microaneurysms are better visualized by 3x3 scan than larger

# B-Scan does not show ischemia

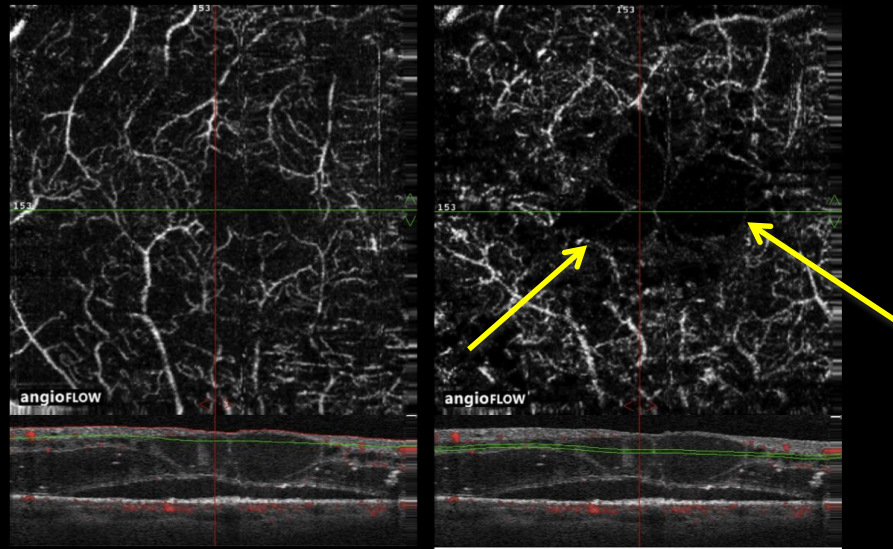
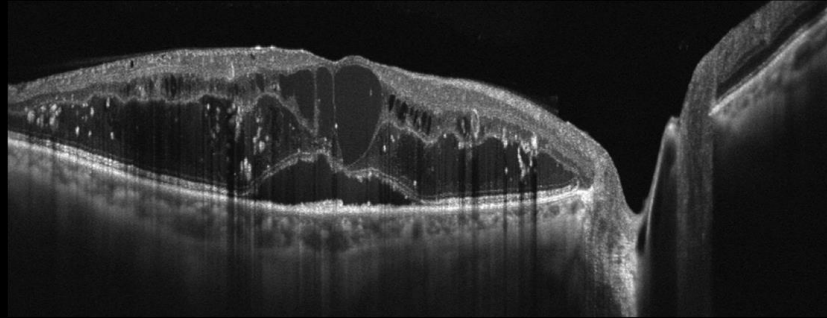




# Macular ischemia can be assessed automatically by software

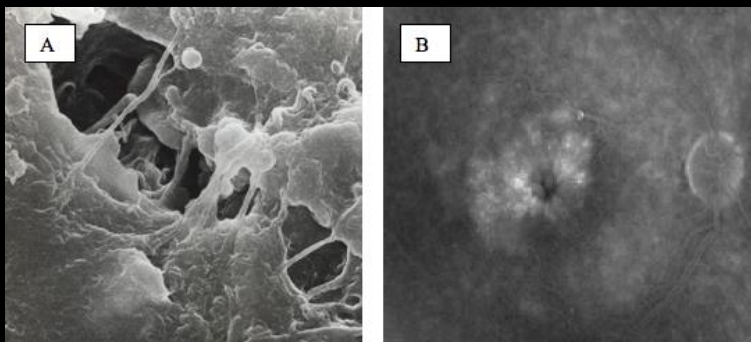


# Cystoid Macular Edema

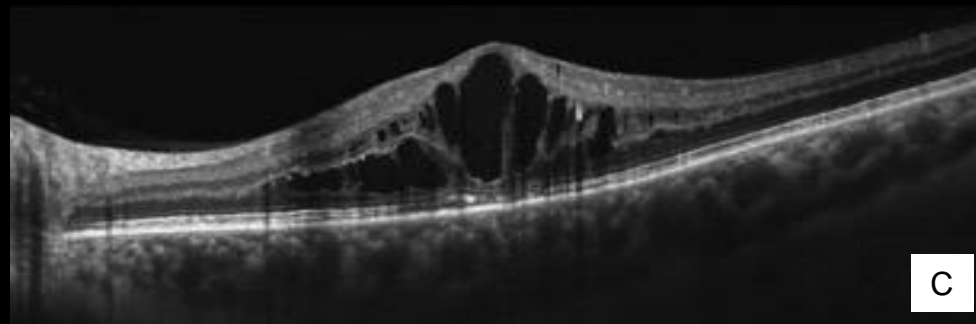


Cystic cavities are better seen in deep network

# Diabetic macular edema



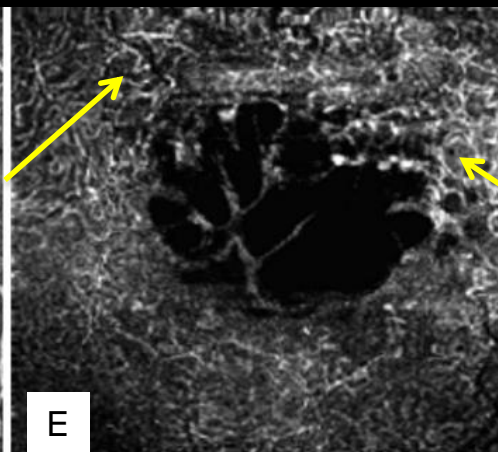
Superficial network



Deep network



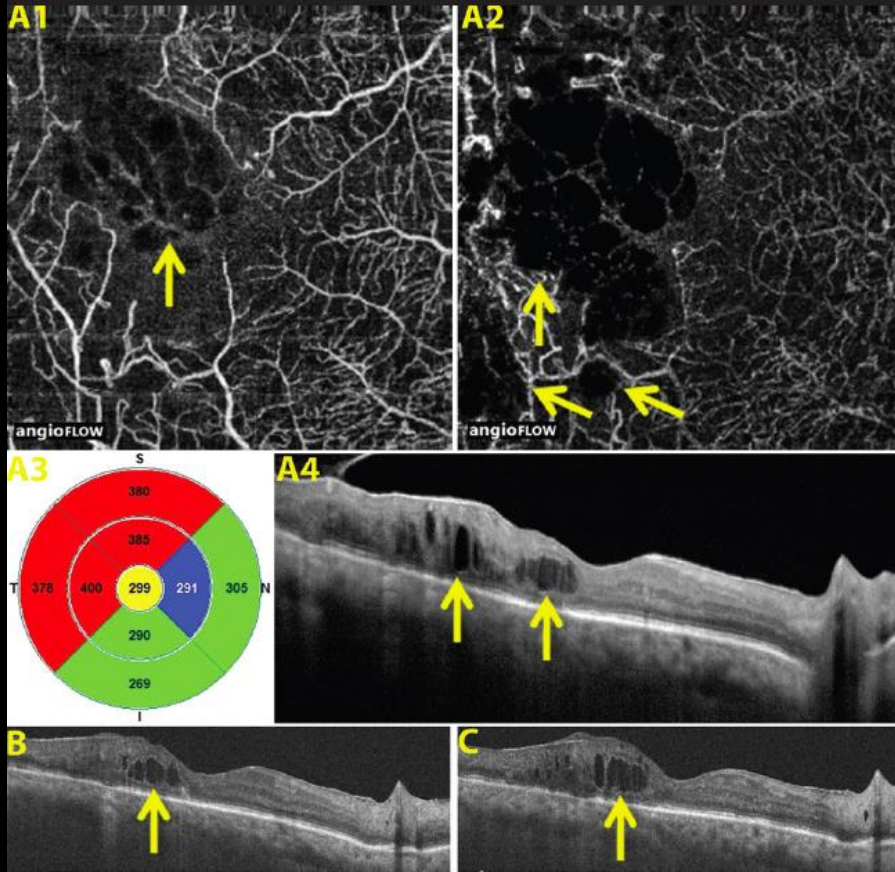
D



E

Mainly vascular  
congestion of  
deep network

# In OCT-A Cystoid edema $\neq$ Macular ischemia



## Cystoid edema

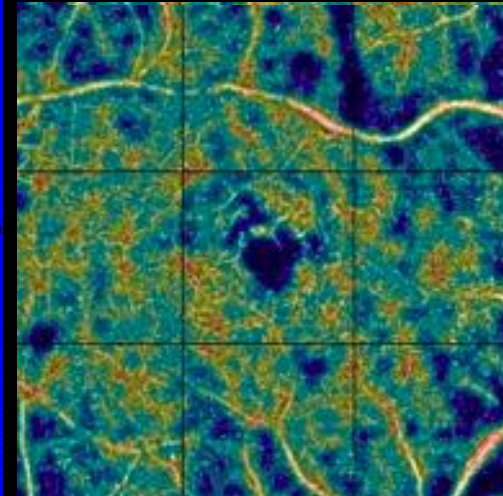
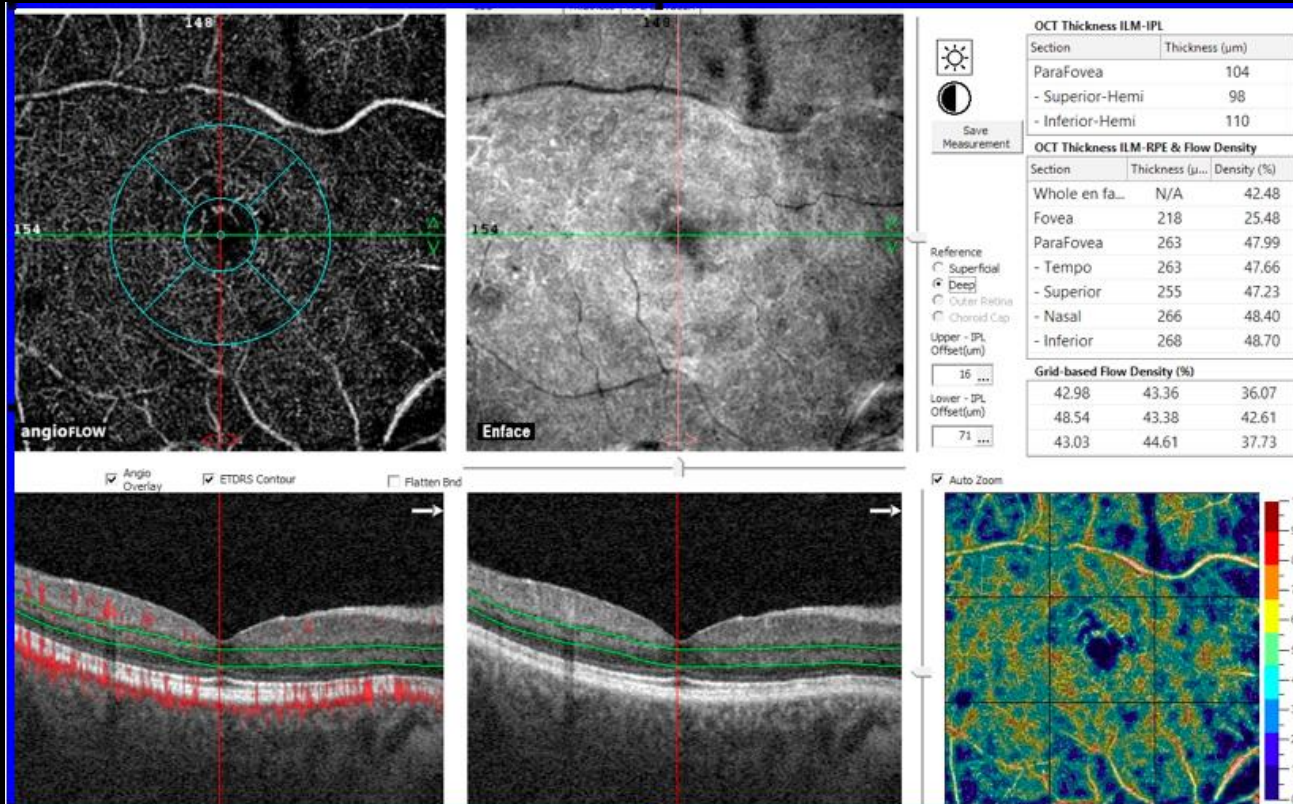
- Devoid of flow (totally black)

## Capillary non perfusion (drop-out)

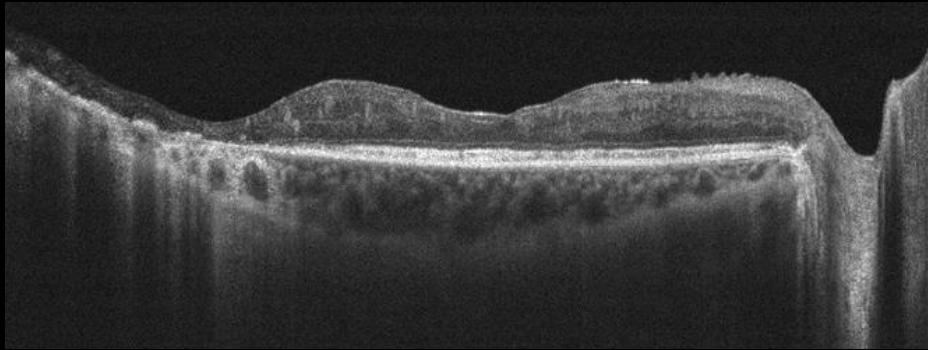
- Grey
- Irregular border

# Macular ischemia: map density

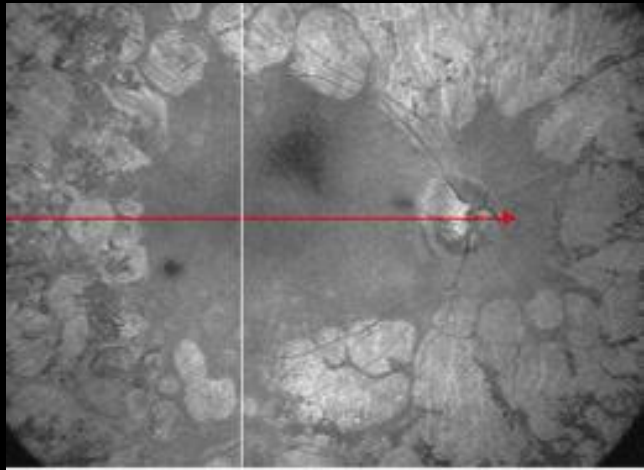
## Deep network



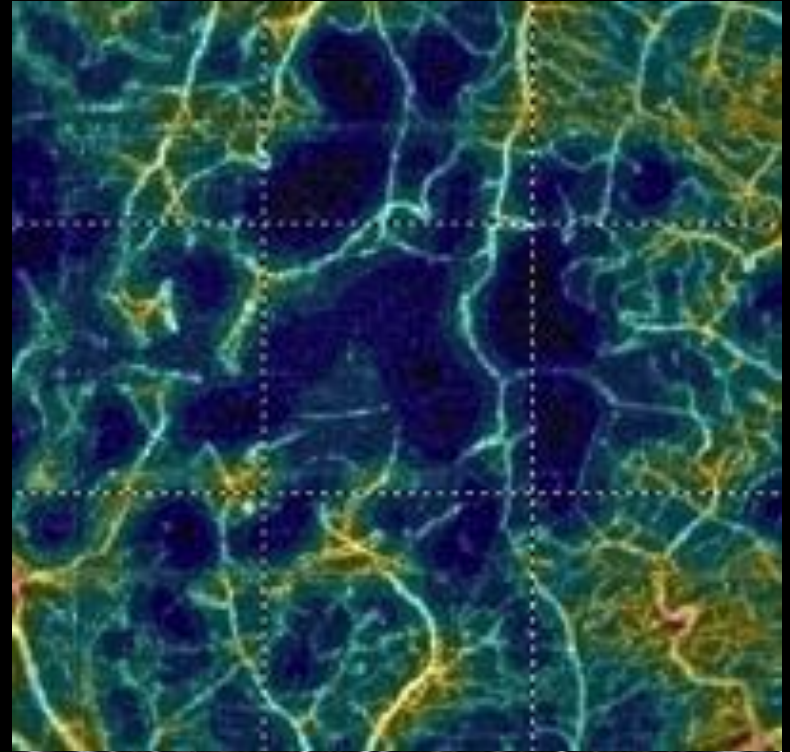
# Severe diabetic macular ischemia



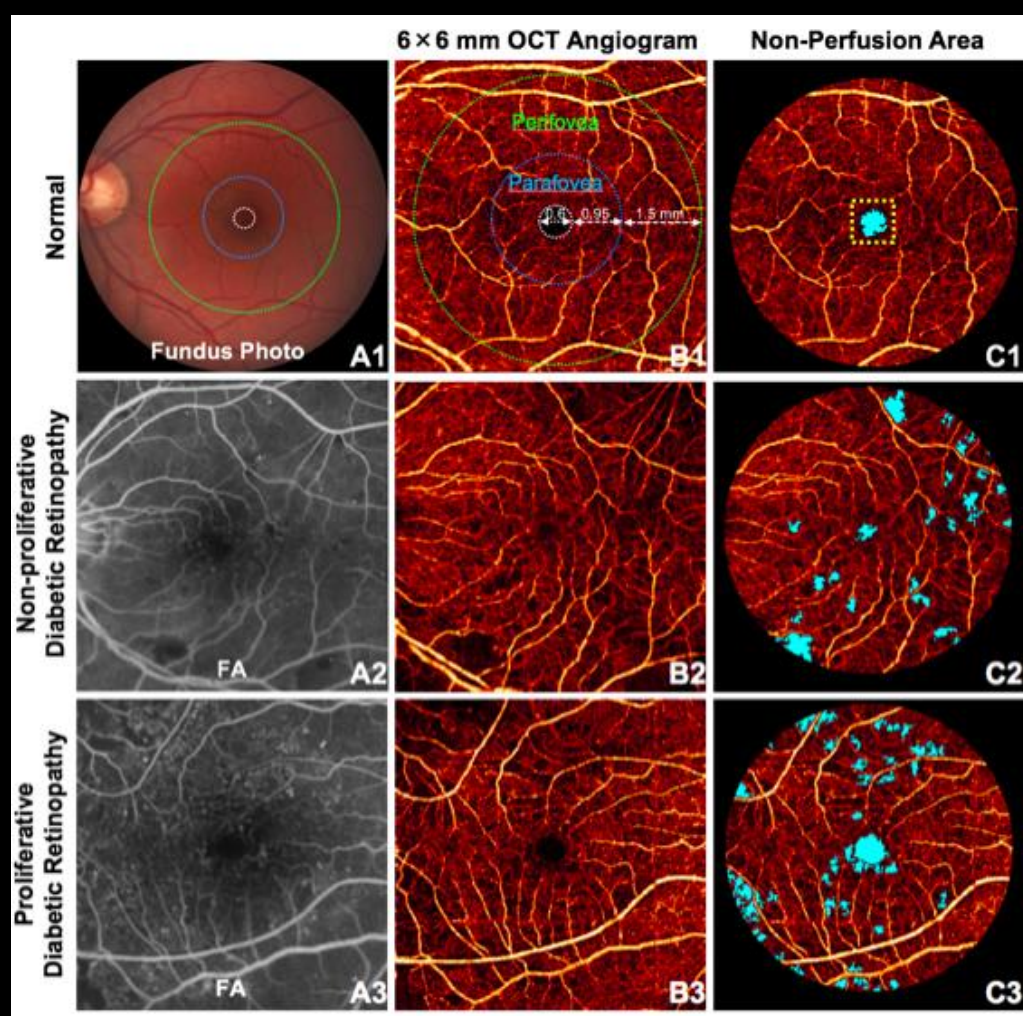
Visual Acuity: **20/200**



Flow  
Density



There was a reasonable agreement in the area of nonperfusion detected with OCT angiography and FA



Book Authors:  
Thomas S. Hwang  
Yali Jia  
Zhang, PhD  
David J. Wilson

Chapter 21.  
Nonproliferative  
Diabetic  
Retinopathy

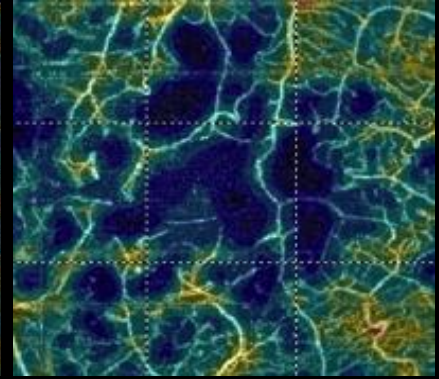
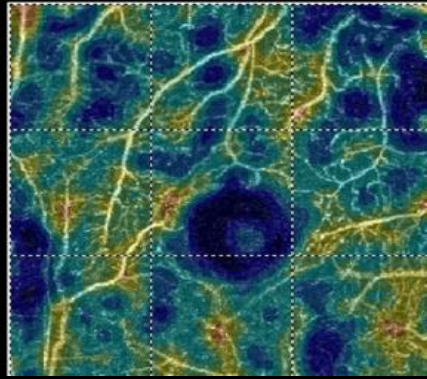
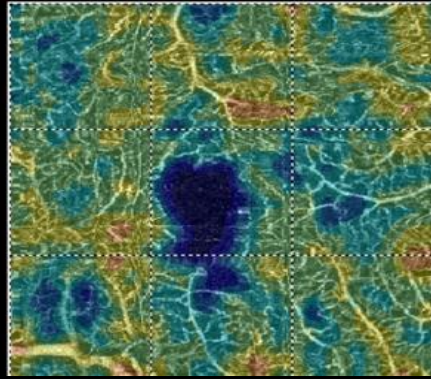
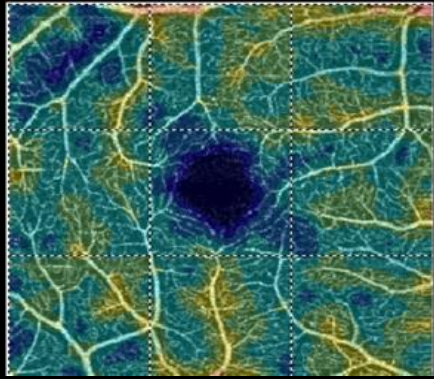
# Macular ischemia “map density” evolution of diabetic retinopathy

Healthy

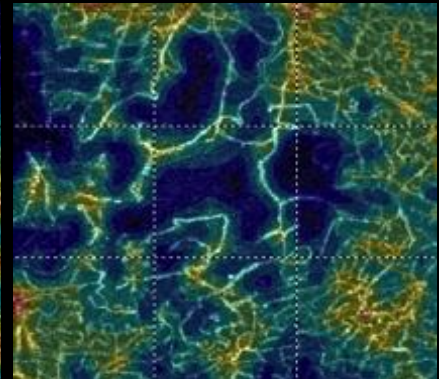
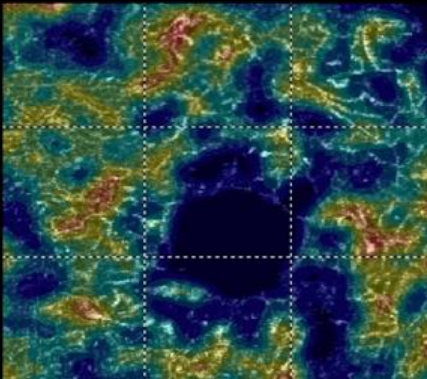
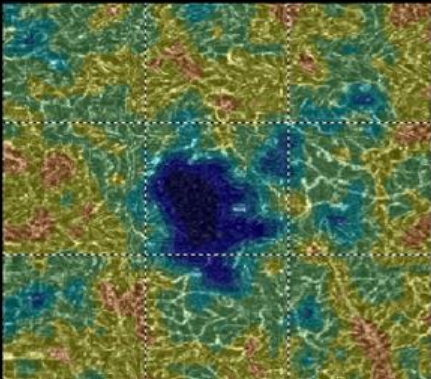
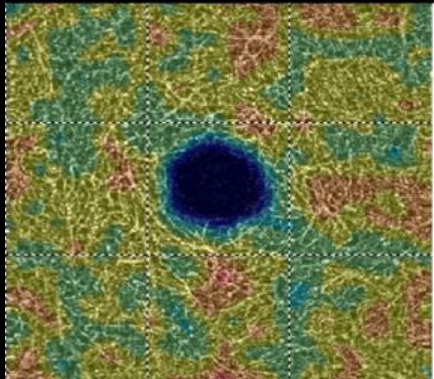
Intermediate

Moderate

Severe



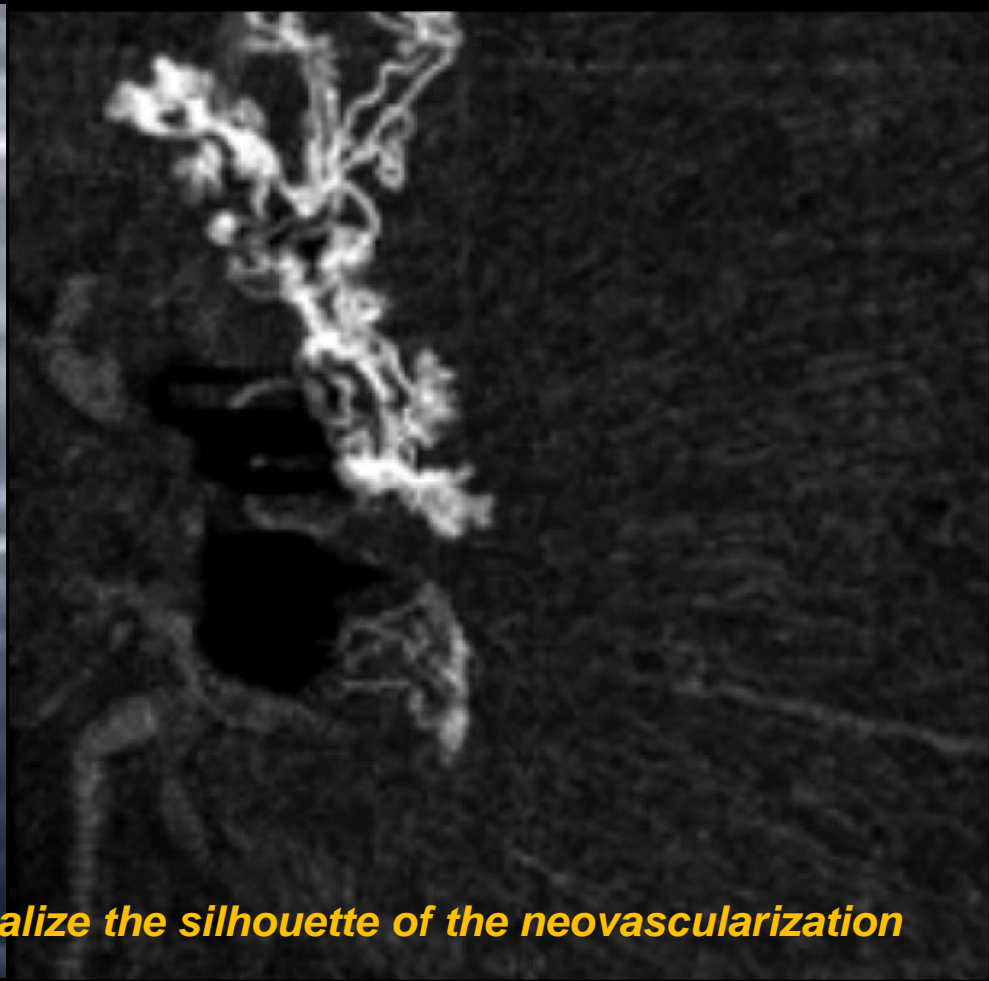
Superficial network



Deep network

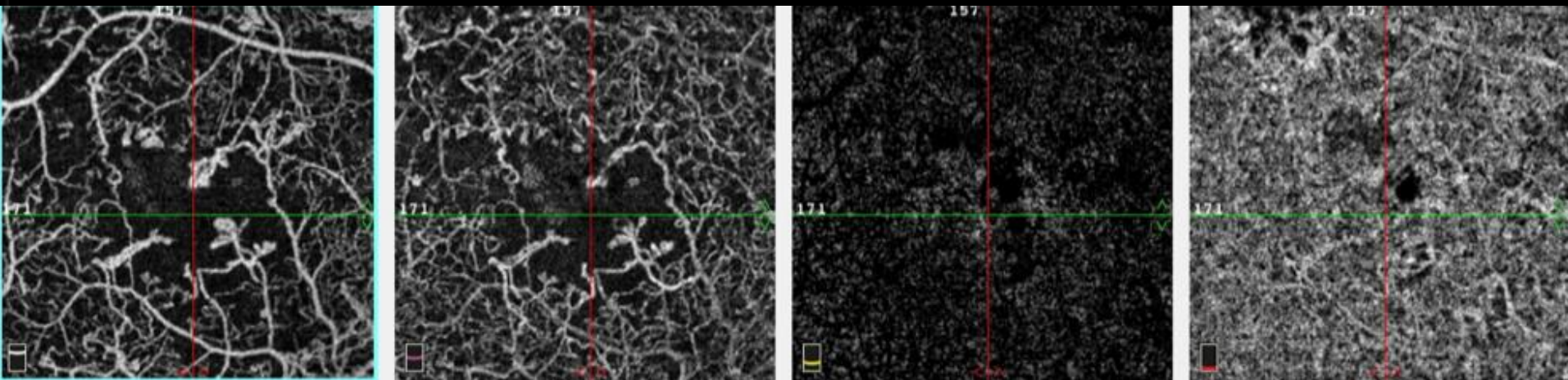


# Proliferative Diabetic Retinopathy

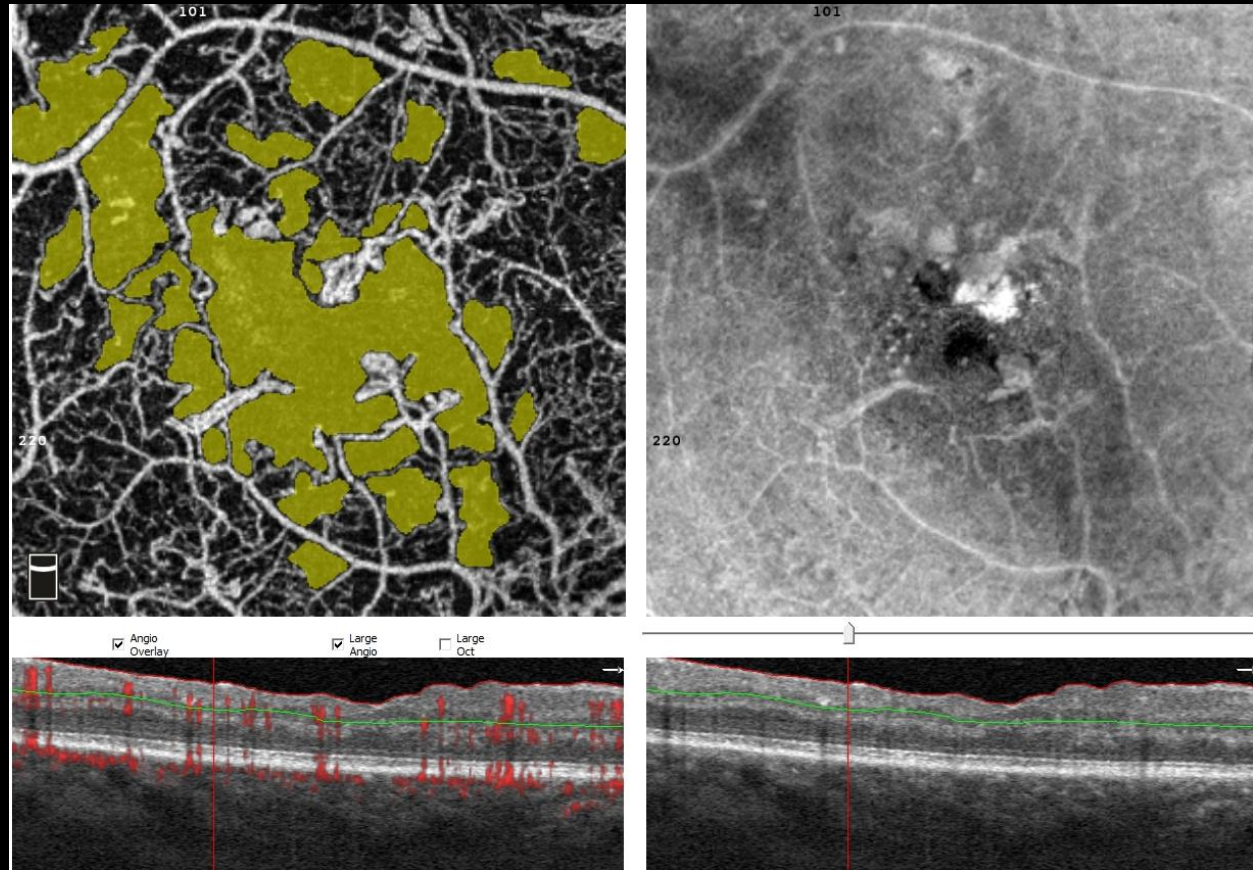


*The absence of the leakage allows to visualize the silhouette of the neovascularization*

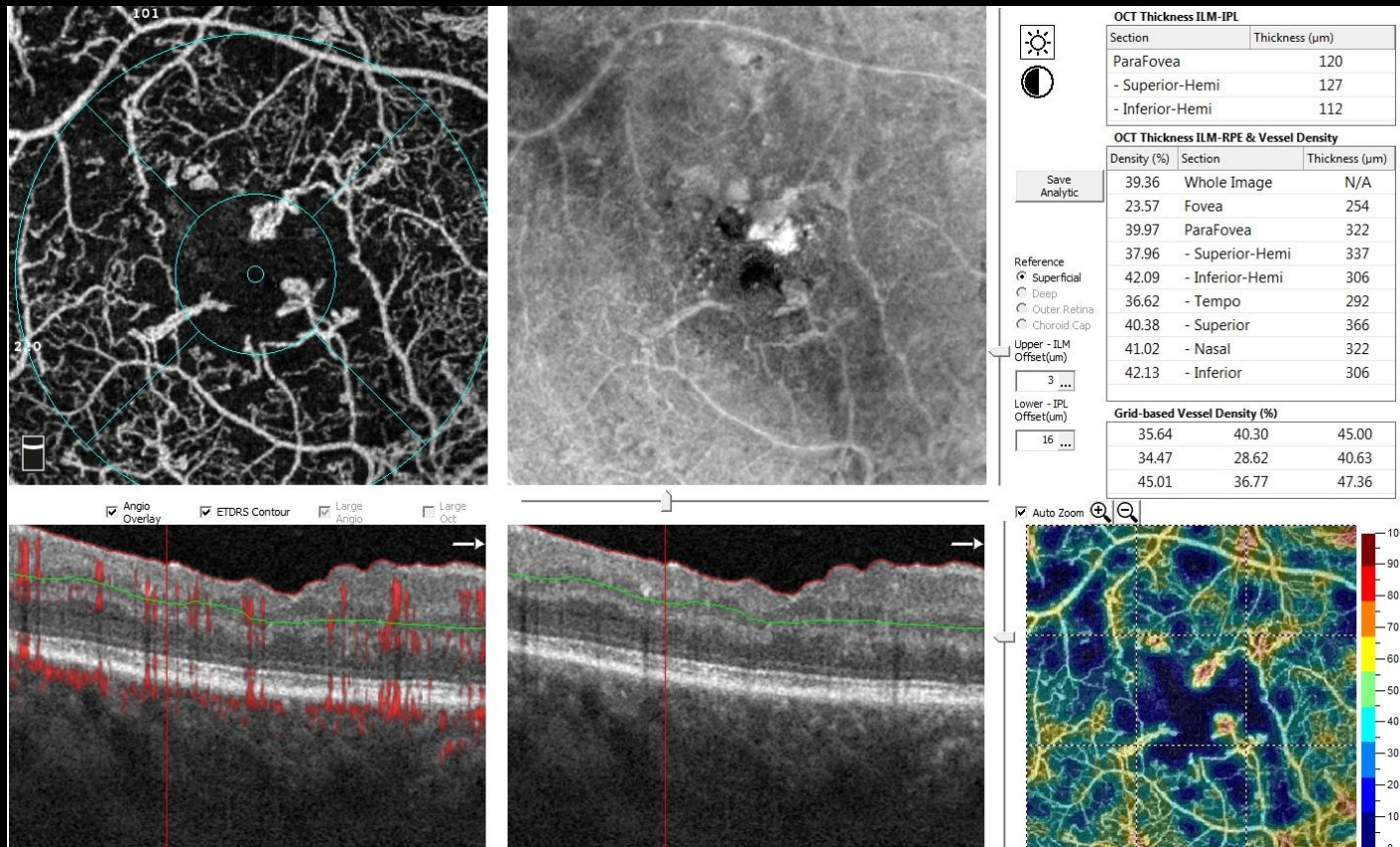
# Proliferative diabetic retinopathy: young lady Right EYE



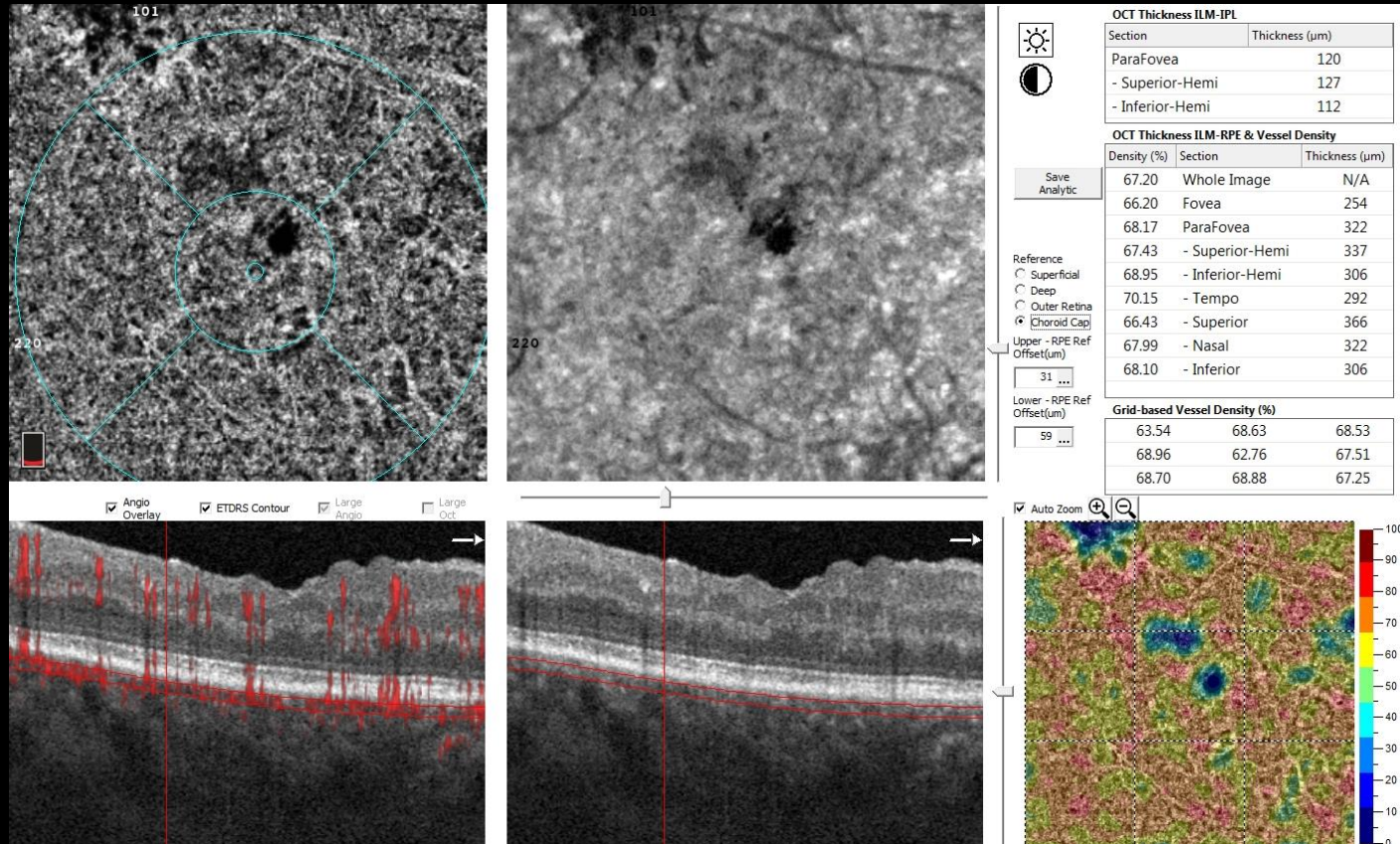
# Proliferative diabetic retinopathy: young lady Right EYE



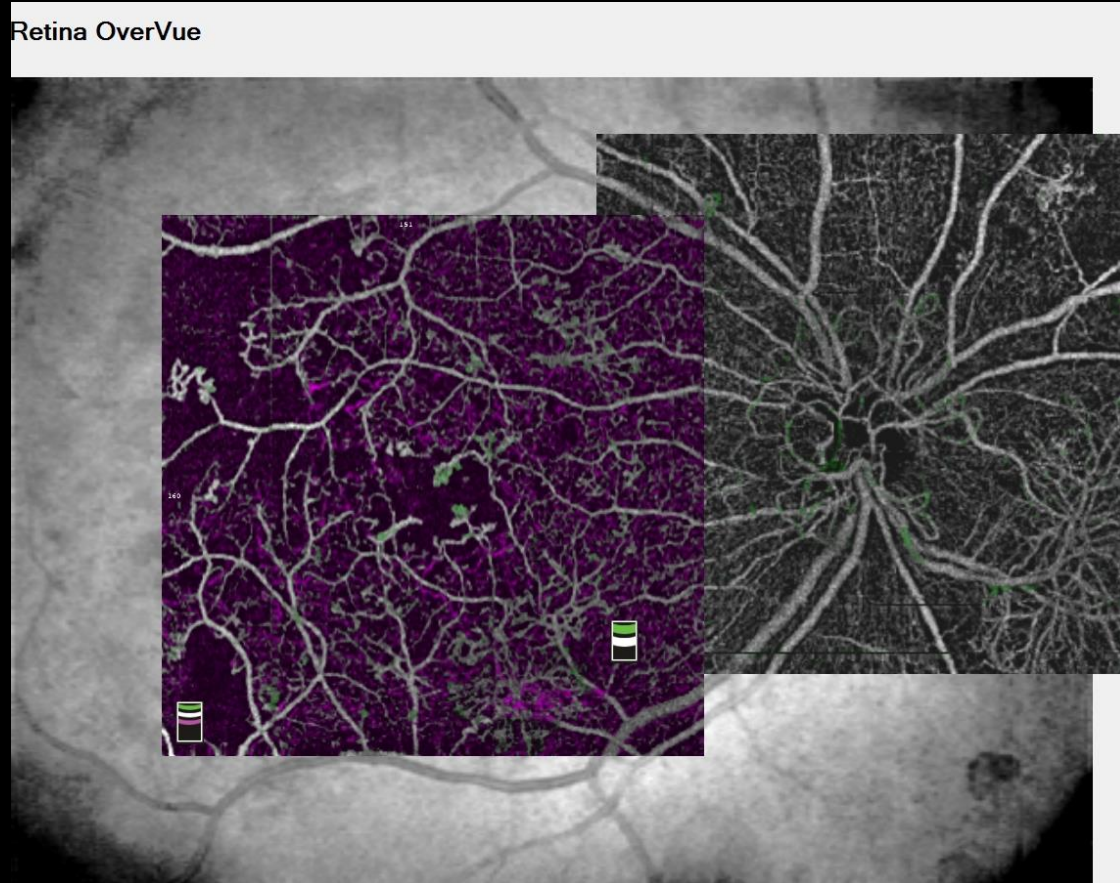
# Proliferative diabetic retinopathy: young lady **Right EYE**



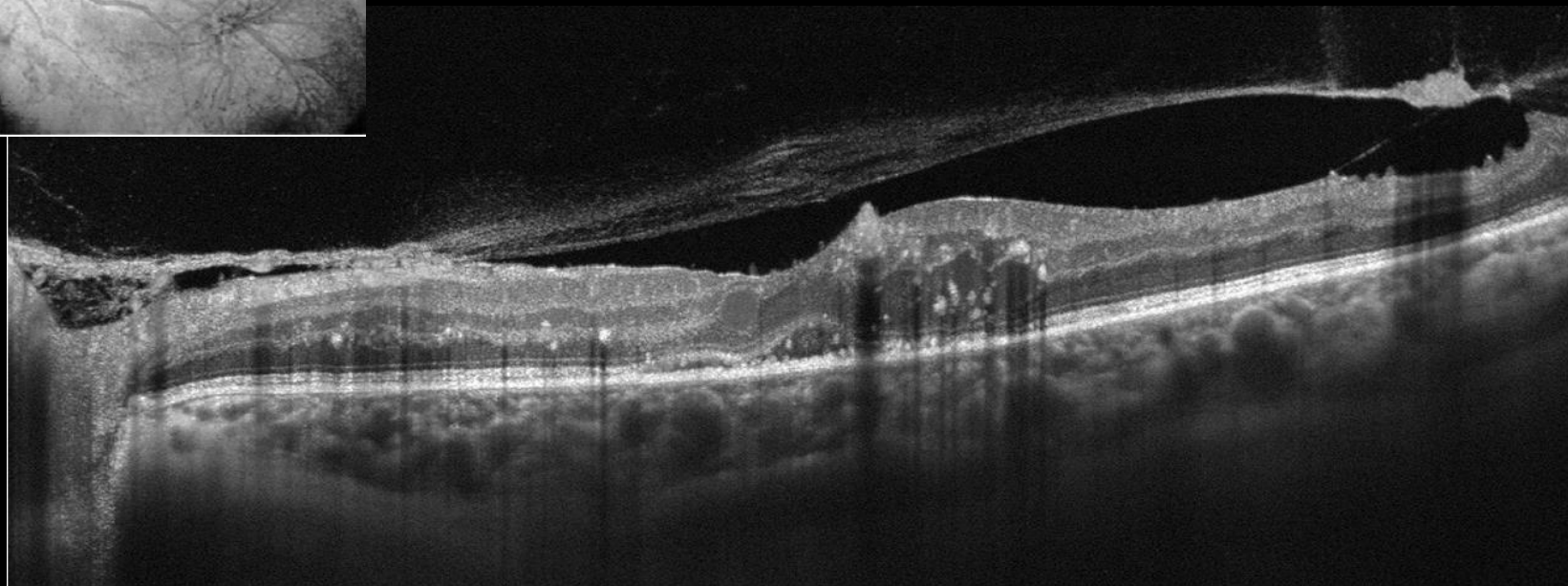
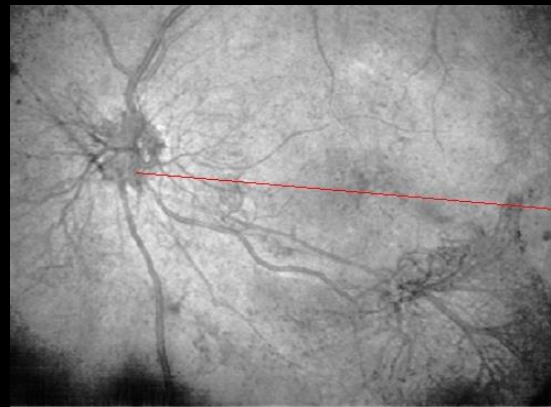
# Proliferative diabetic retinopathy: young lady **Right EYE**



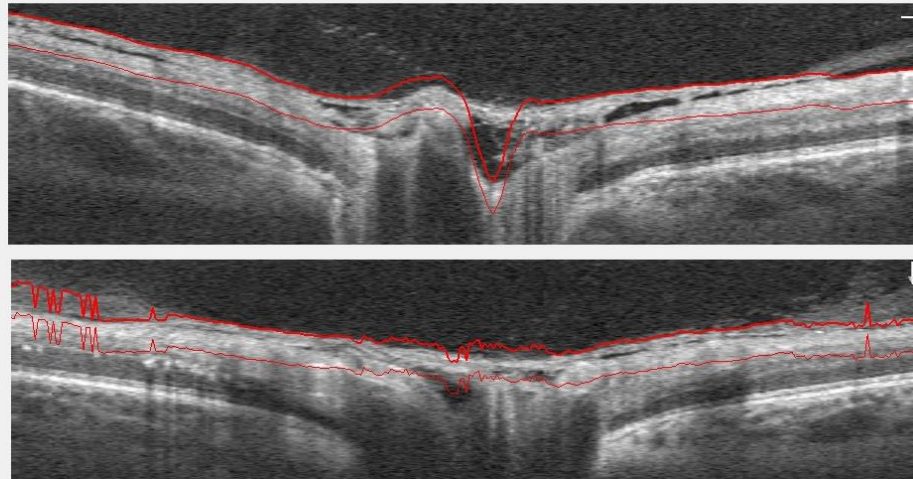
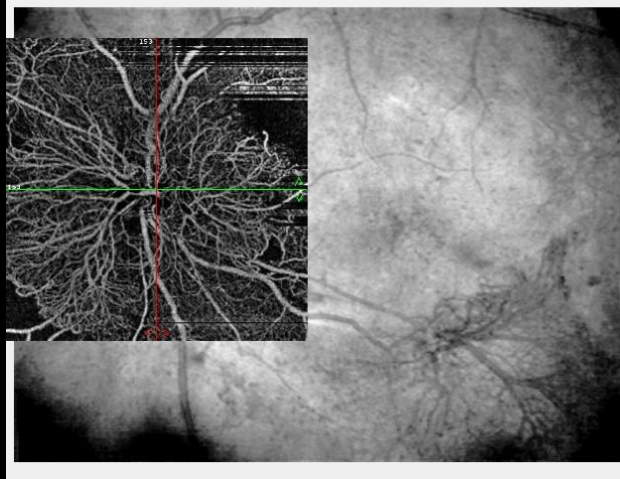
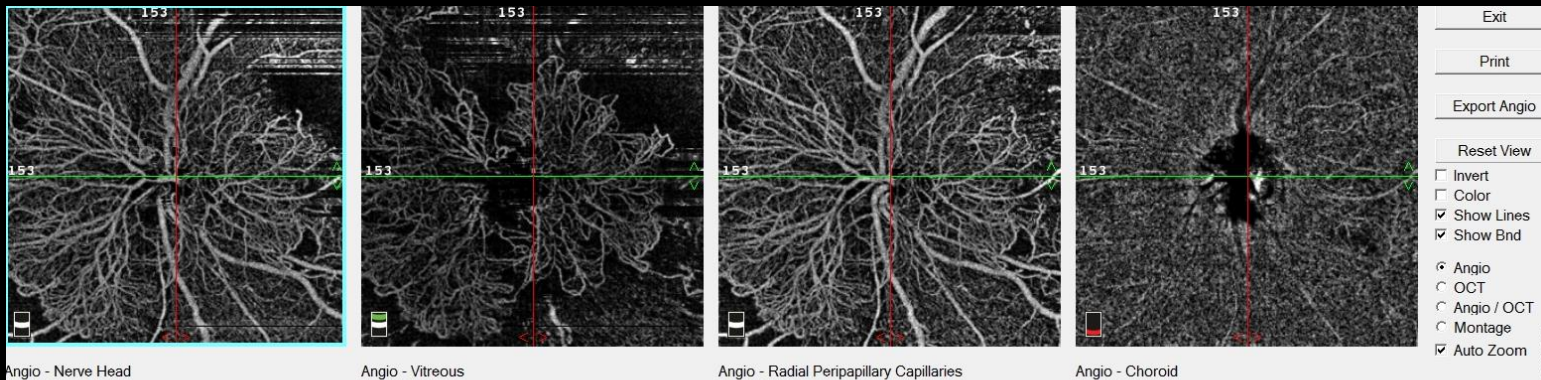
# Proliferative diabetic retinopathy: young lady Right EYE



# Proliferative diabetic retinopathy: young lady LEFT EYE

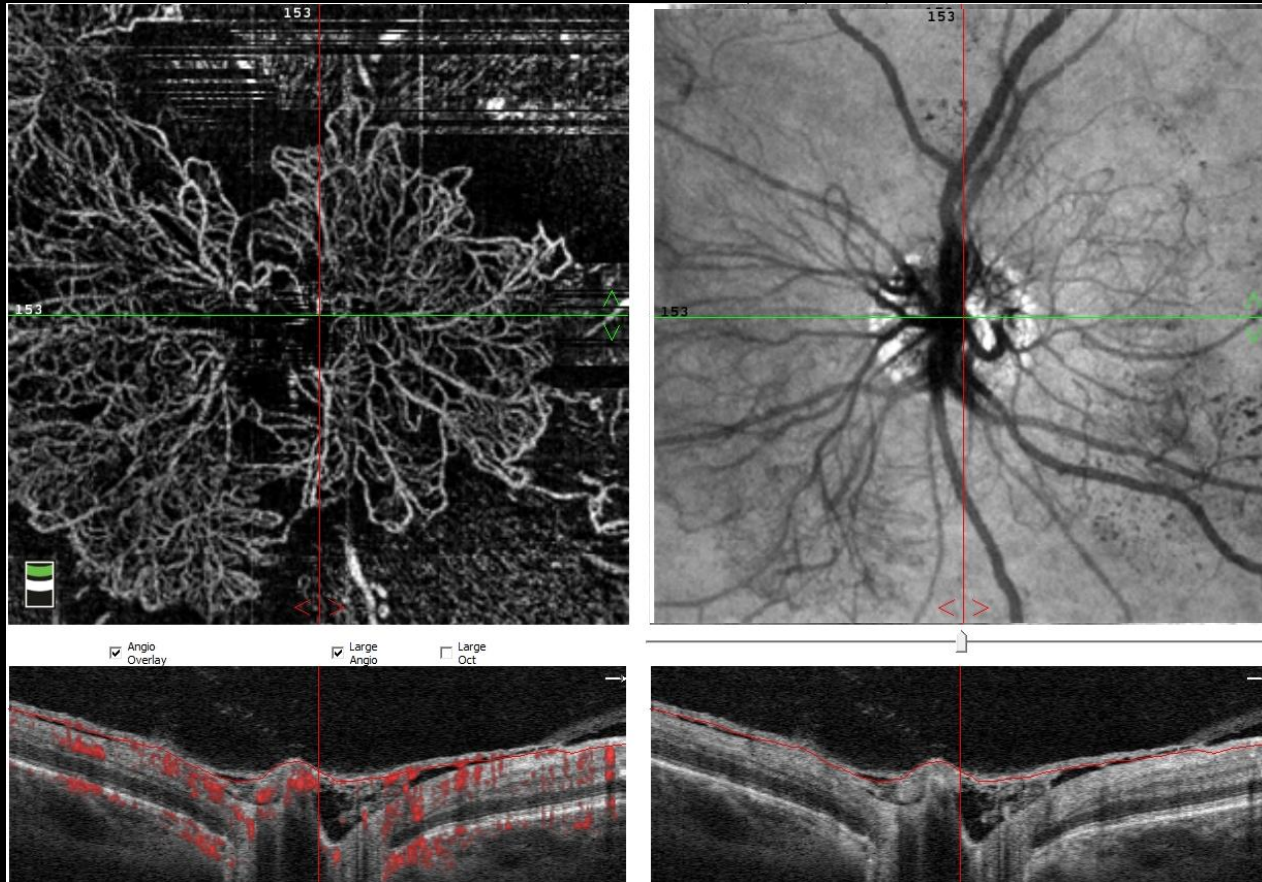


# Proliferative diabetic retinopathy: young lady LEFT EYE





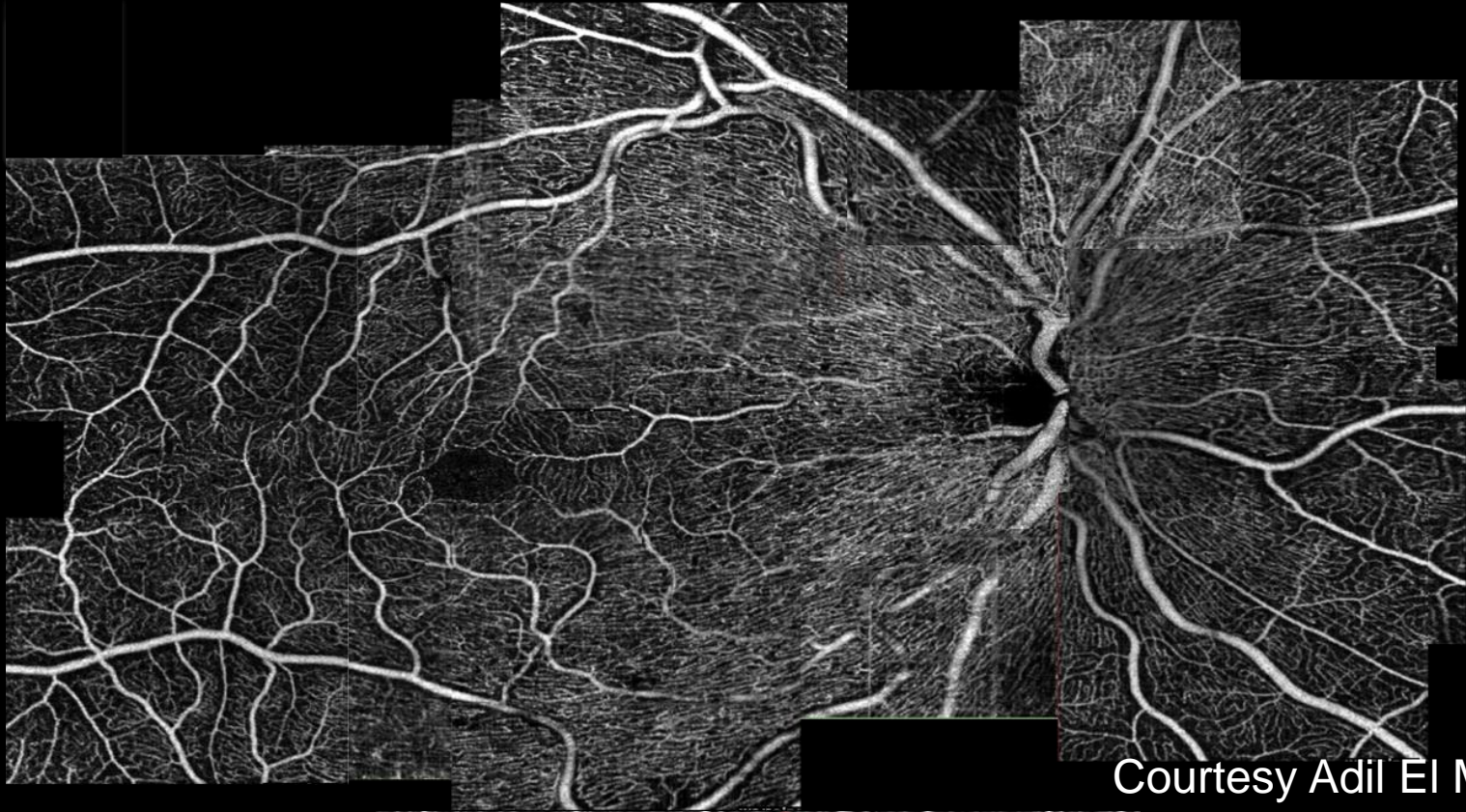
# Proliferative diabetic retinopathy: young lady LEFT EYE



# Proliferative diabetic retinopathy: young lady LEFT EYE



# Composite OCTA

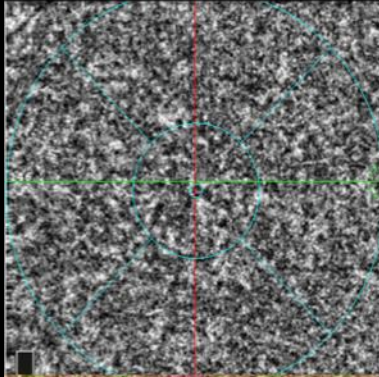


Courtesy Adil El Maftouhi

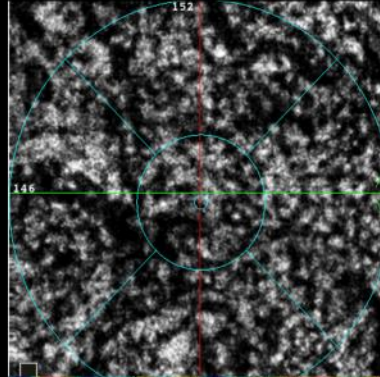
What about the choroid?

# Choroid Vasculature by OCT-Angiography SSADA

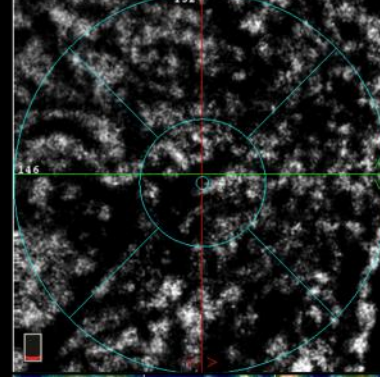
Choriocapillaris



Sattler layer



Haller layer

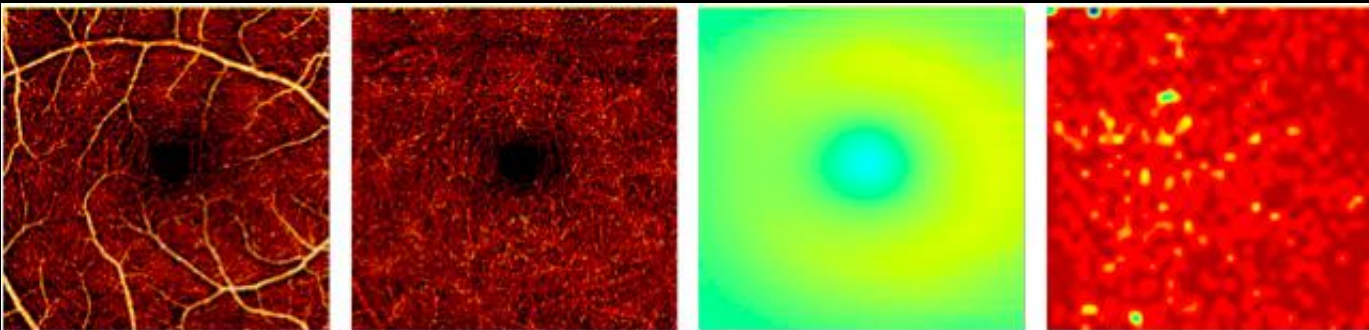


OCT-Angiography has saturation limit (to slow or too fast to generate a decorrelation signal)  
And threshold limit (due to reduce noise)

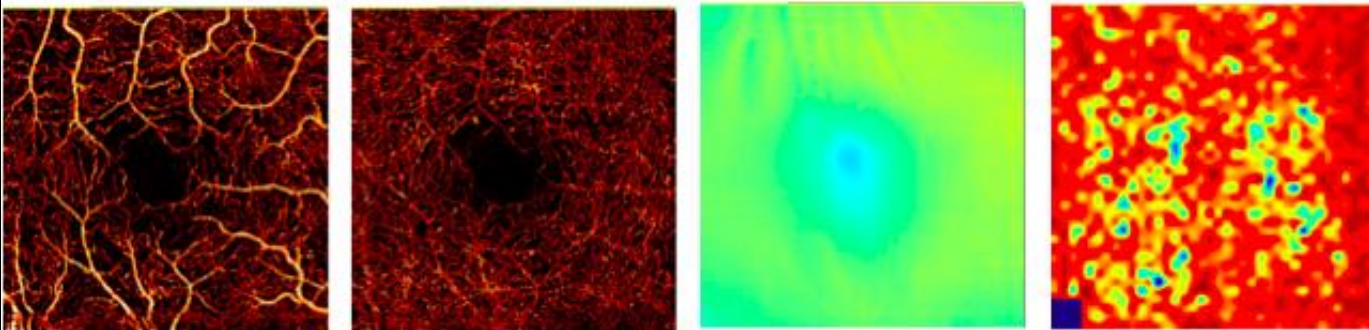
angioFLOW

Flow Density

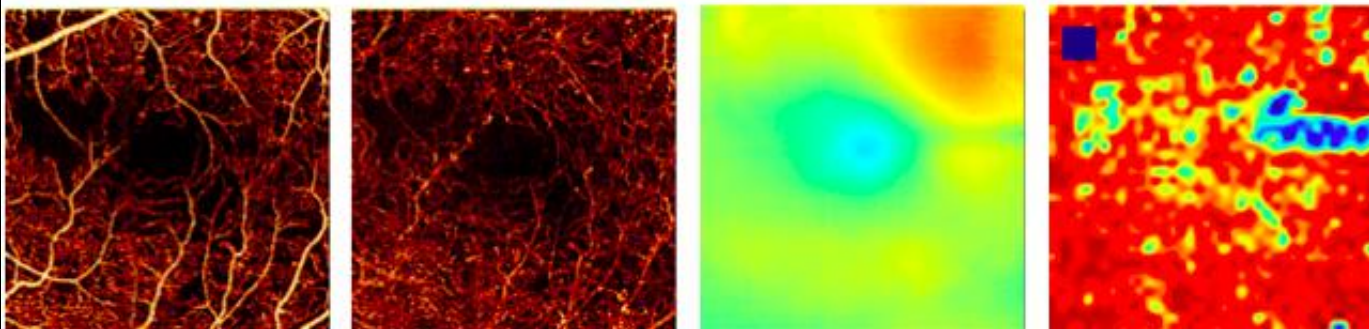
Healthy



Intermediate



Moderate



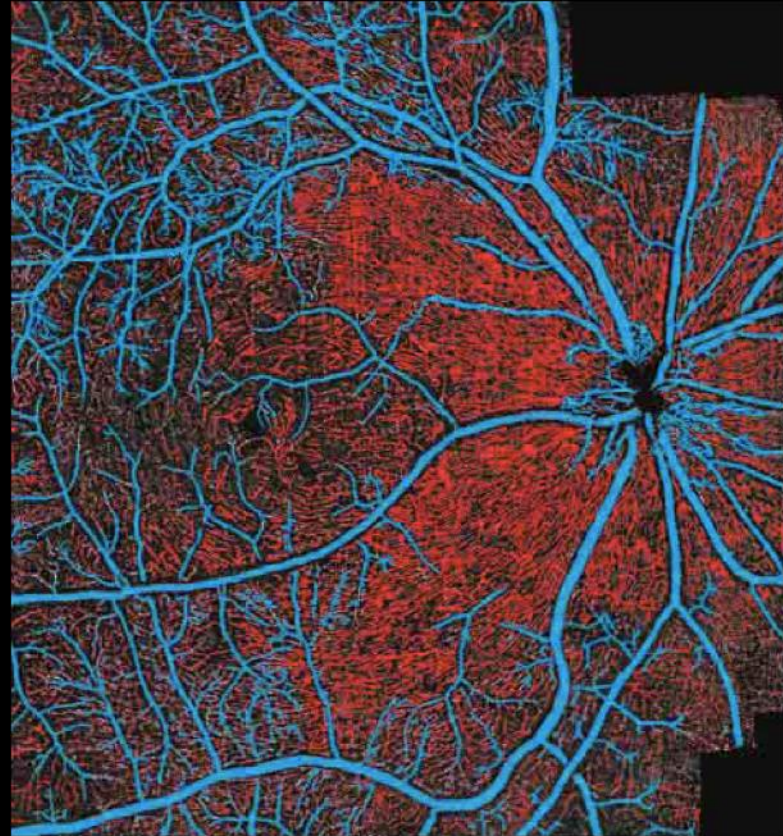
Book Authors:  
Thomas S.  
Hwang  
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Zhang, PhD  
David J. Wilson

Chapter 21.  
Nonproliferative  
Diabetic  
Retinopathy

# Conclusions

## OCT-Angiography advantages in diabetic retinopathy

- Vascular analysis *in vivo*
- No dye injection
- High details of retinal vasculature
- 2 separate networks at 2 separate levels not observable in fluorescein angiography
- Vascular Drop-out (ischemia)
- Easy, faster, no side effects
- Can readily incorporated in clinical practice*



Blu:  
superficial  
network

Red :  
deep  
network

# Thank you



Marco Rispoli

Bruno Lumbroso

Maria Cristina Savastano



Rome, December 15 and 16, 2017  
Ergife Palace Hotel – Via Aurelia, 619

*Fifth International*  
**Congress on**  
**OCT Angiography, “en face”**  
**OCT and advances in OCT**

