euretina InSight

OCT Choroidal Imaging
Indications & Value

Multimodal OCT

Click Next button to begin module

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Prof Paulo E. Stanga

The editor for this module is:

Prof Paulo E. Stanga
Professor of Ophthalmology & Retinal Regeneration, University of Manchester.
Consultant Ophthalmologist && Vitreoretinal Surgeon, Manchester Royal Eye Hospital.
Director, Manchester Vision Regeneration (MVR) Lab.

Click each tab below to see Copyright Notices and Financial Disclosures.

Copyright Notices | Financial Disclosures

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Objectives

Two principle imaging modalities are available that allow imaging of the choroid: angiographic imaging (of choroidal circulation with ICG) which is invasive, and tomographic imaging (of choroidal vessels with OCT) which is non-invasive. This module examines **OCT choroidal imaging** (tomographic imaging of the choroidal vessels), focusing on the technology currently available to clinicians, the indications for use, and its value.

Having completed this module, you will be able to:

- ✓ Identify why OCT is considered such an important imaging technology for diagnosis, assessment and therapy follow up
- ✓ List the key applications of SD-OCT in the retina clinic
- ✓ Identify how enhanced depth imaging SD-OCT differs from SD-OCT, and its clinical applications
- ✓ List and describe the features that can be imaged using swept source OCT, and its clinical applications
- ✓ Outline how OCT angiography works, and list its applications and its clinical applications

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Overview

This module is divided into the topics listed below; each is followed by a quiz if you chose this option on the first screen. Click next to begin. Revisit any section by clicking it here.

- SD-OCT
- SS-OCT
- OCT Angiography
- Summary
- Knowledge Check

Click the buttons above to visit a specific topic or the next button below to visit all topics in order

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Module Progress:

- Welcome ✓
- SD-OCT
- SS-OCT
- OCT Angiography
- Summary
- Knowledge Check

Spectral Domain OCT

SD-OCT

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Tomographic Imaging: SD-OCT

The development and evolution of OCT imaging means the retinal pigment epithelium (RPE) is no longer the "outer boundary" in OCT imaging.

Clinicians can now **image choroidal vessels** in a **non-invasive** manner. SD-OCT has been the primary method used to date. This has a **central wavelength of 800-870nm**. The technology has evolved with Enhanced Depth Imaging (EDI) OCT (a software development).

SD-OCT | EDI SD-OCT

Click the tabs to learn more about these OCT methods.

- **SD-OCT:**
  - Can visualise the choroidoscleral interface in **65%-75%** of healthy and diseased eyes in several studies. Example devices include: Cirrus® SD-OCT and the Topcon® SD-OCT systems

Given these improvements in imaging and detail, do you think EDI SD-OCT can be used alone to visualise the retina and understand what is happening in cases of AMD?

- ○ No, it does not provide enough information, so must be used in association with other imaging technology
- ○ Yes, the technology provides good visualisation of the retina, so can be used on its own

Submit

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Tomographic Imaging: SD-OCT

The development and evolution of OCT imaging means the retinal pigment epithelium (RPE) is no longer the "outer boundary" in OCT imaging.

Clinicians can now **image choroidal vessels** in a **non-invasive** manner. SD-OCT has been the primary method used to date. This has a **central wavelength of 800-870nm**. The technology has evolved with Enhanced Depth Imaging (EDI) OCT (a software development).

SD-OCT | EDI SD-OCT

Click the tabs to learn more about these OCT methods.

- **SD-OCT:**
  - Can visualise the choroidoscleral interface in **65%-75%** of healthy and diseased eyes in several studies. Example devices include: Cirrus® SD-OCT and the Topcon® SD-OCT systems

Given these improven visualise the retina and understand what i

- No, it does not ging technology
- Yes, the techno

That's not it.

Even though EDI SD-OCT can show us more than SD-OCT, it still needs to be used in association with other imaging technology to understand the situation at the retina.

The reasons for this will be discussed in more detail on the next screen.

Continue

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

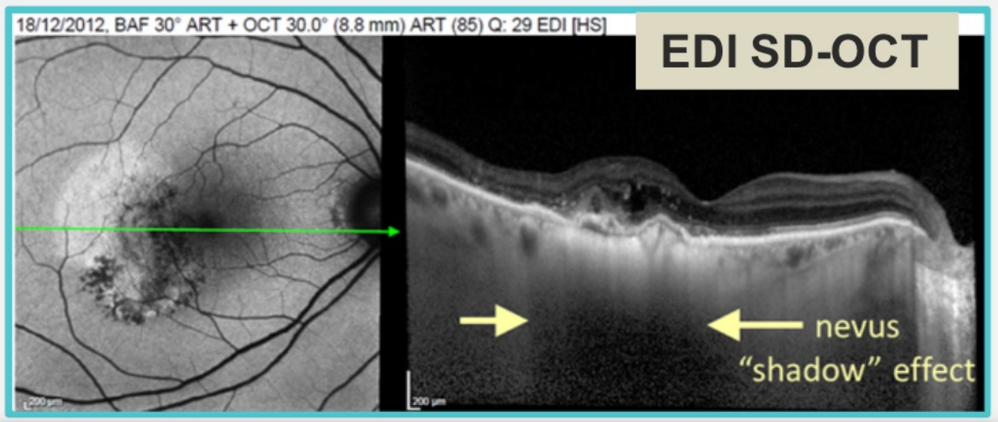
Multimodal: ICGA and EDI SD-OCT in PCV with Nevus

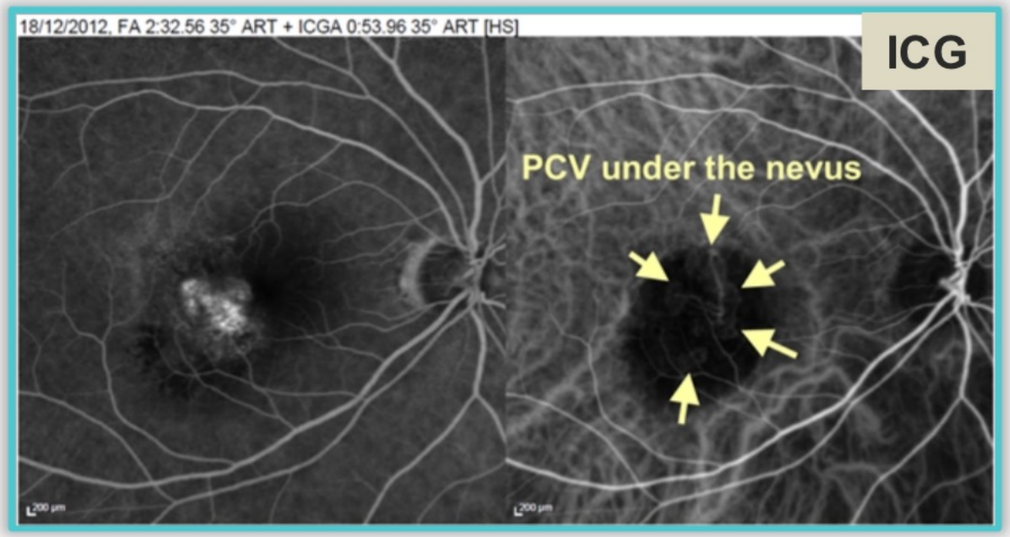
It is important to remember a clinician cannot rely on a single imaging modality alone. C**omplementary imaging modalities are required** - this is especially true at presentation. In the case below, OCT choroidal imaging was used in association with dye tests.

In this example, **EDI SD-OCT** imaging shows leakage, intraretinal fluid and retinal thickening, in conjunction with a choroidal nevus. A worrying set of signs.

ICGA is used to "complete the picture" for diagnosis.

Use the arrows to scroll through images and explore this case.





euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

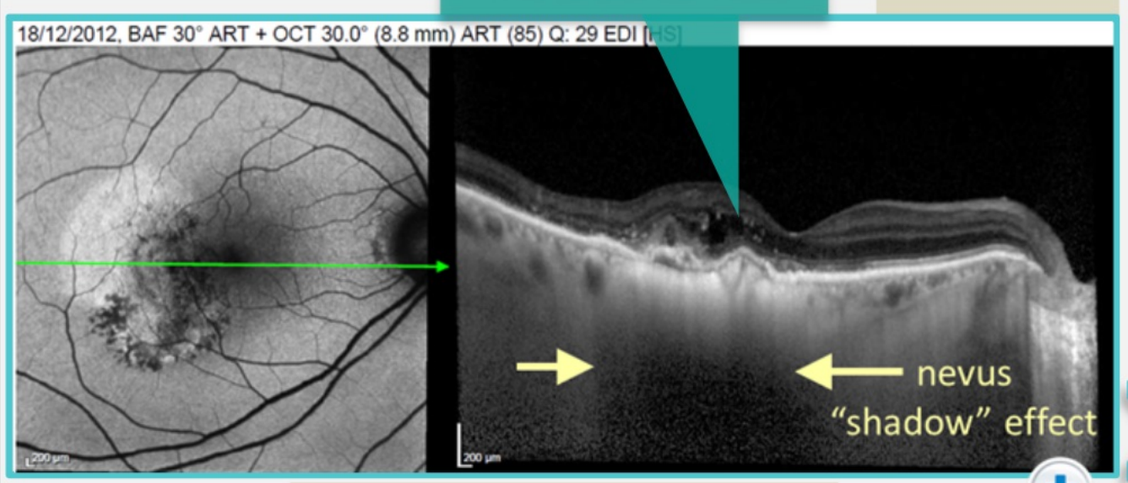
Multimodal: ICGA and EDI SD-OCT in PCV with Nevus

It is important to remember a clinician cannot rely on a single imaging modality alone. C**omplementary imaging modalities are required** - this is especially true at presentation. In the case below, OCT choroidal imaging was used in association with dye tests.

EDI SD-OCT shows the **shadowing effect caused by the choroidal nevus**.

Intraretinal fluid is also seen, as well as **thickening of the outer retina** (several biomarkers used in diagnosis).

These issues raise a concern: *Is the fluid and retinal thickening secondary to the nevus?* If they are, this may indicate malignancy. Without other imaging, this case would be referred to an ocular oncologist.



Nevus "shadow" effect

However, ICGA was used in this case to provide more detail. Tap > to learn more.

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

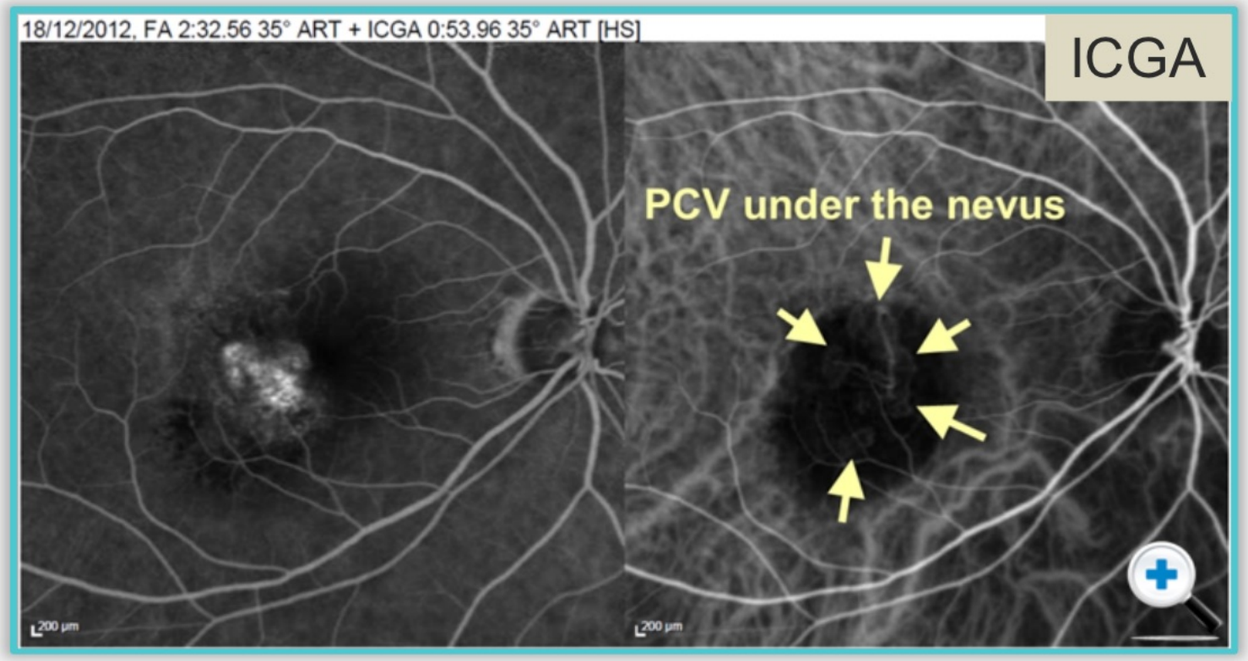
Multimodal: ICGA and EDI SD-OCT in PCV with Nevus

It is important to remember a clinician cannot rely on a single imaging modality alone. C**omplementary imaging modalities are required** - this is especially true at presentation. In the case below, OCT choroidal imaging was used in association with dye tests.

Using indocyanine green angiography (ICGA) at this stage can reassure the patient that the nevus is not the issue.

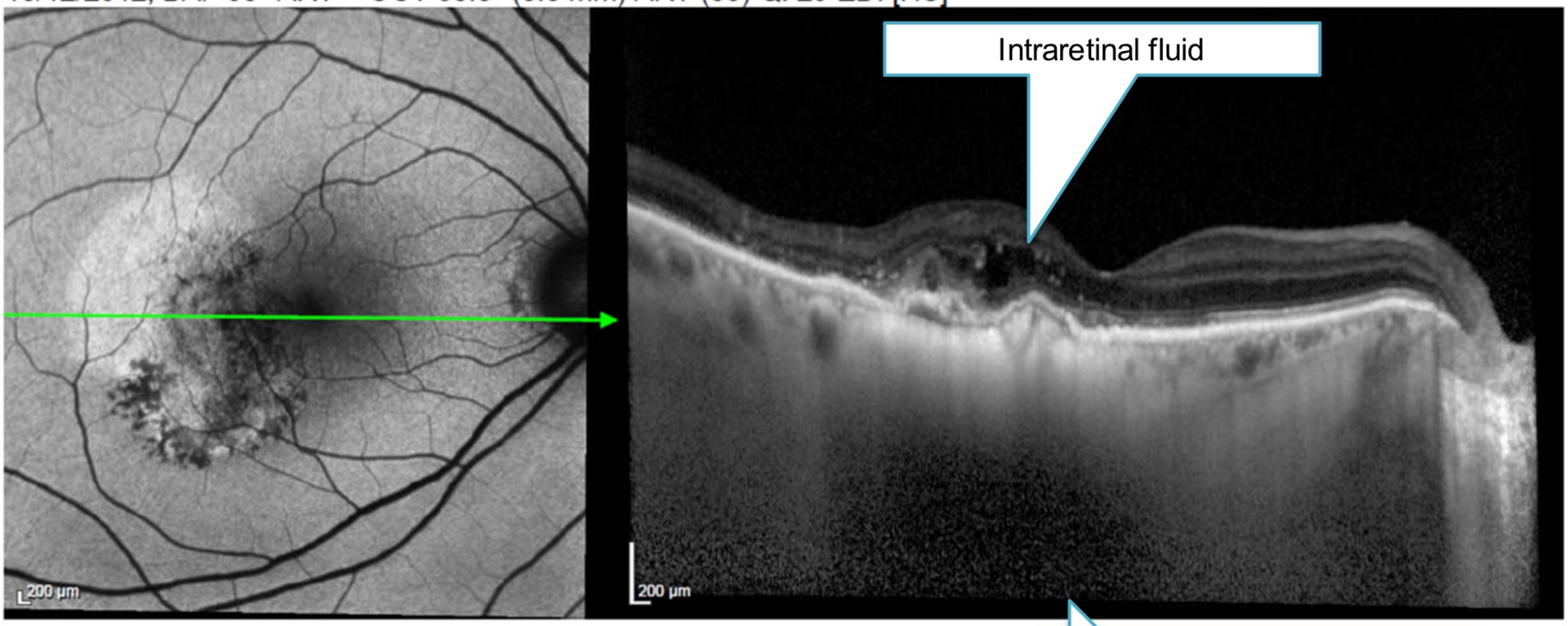
As seen here, ICGA can show **idiopathic polypoidal changes under the choroidal nevus**.

This example illustrates the importance of **multimodal imaging**.



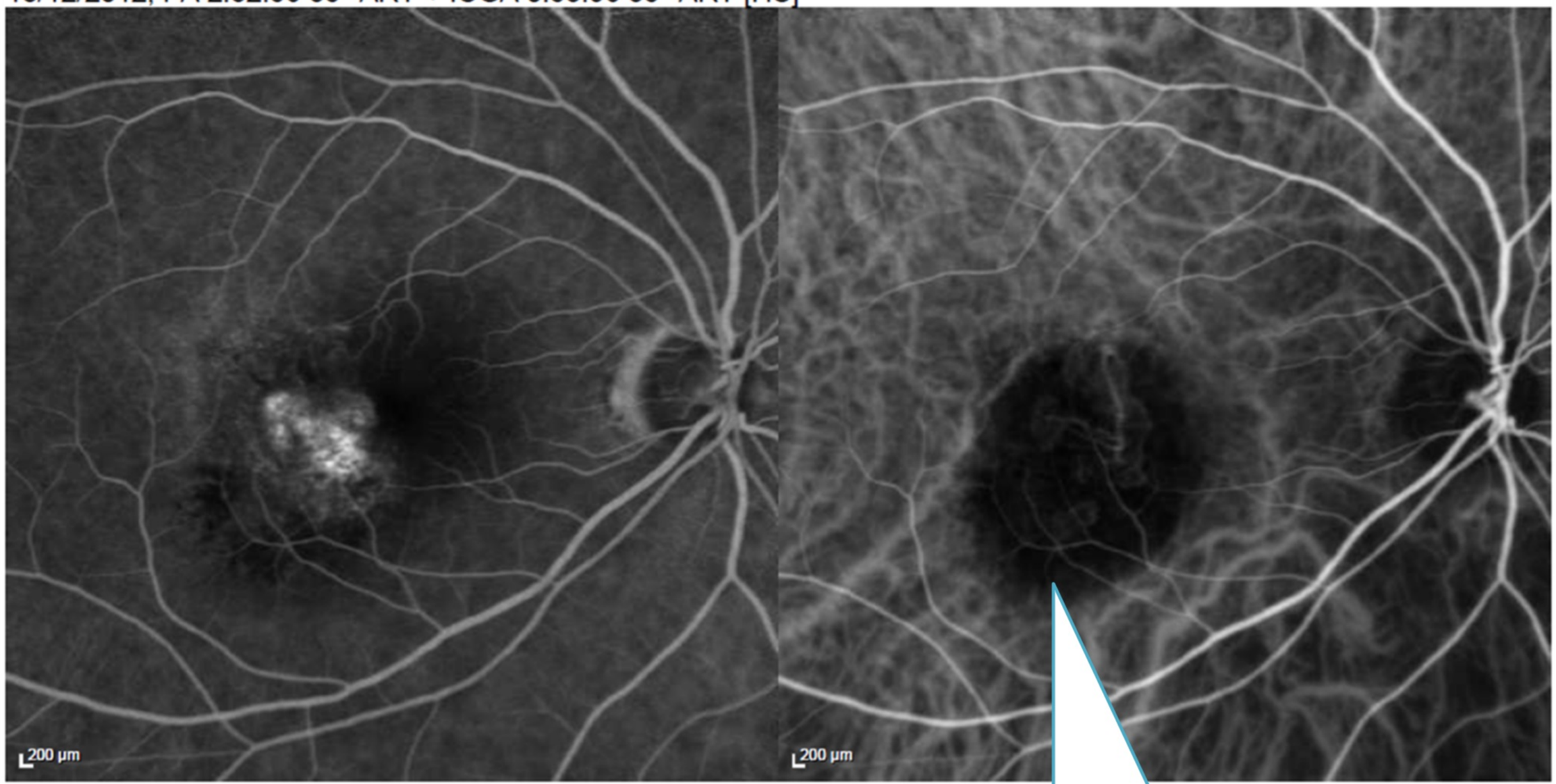
Polypoidal choroidal vasculopathy (PCV) under the nevus

EDI SD-OCT

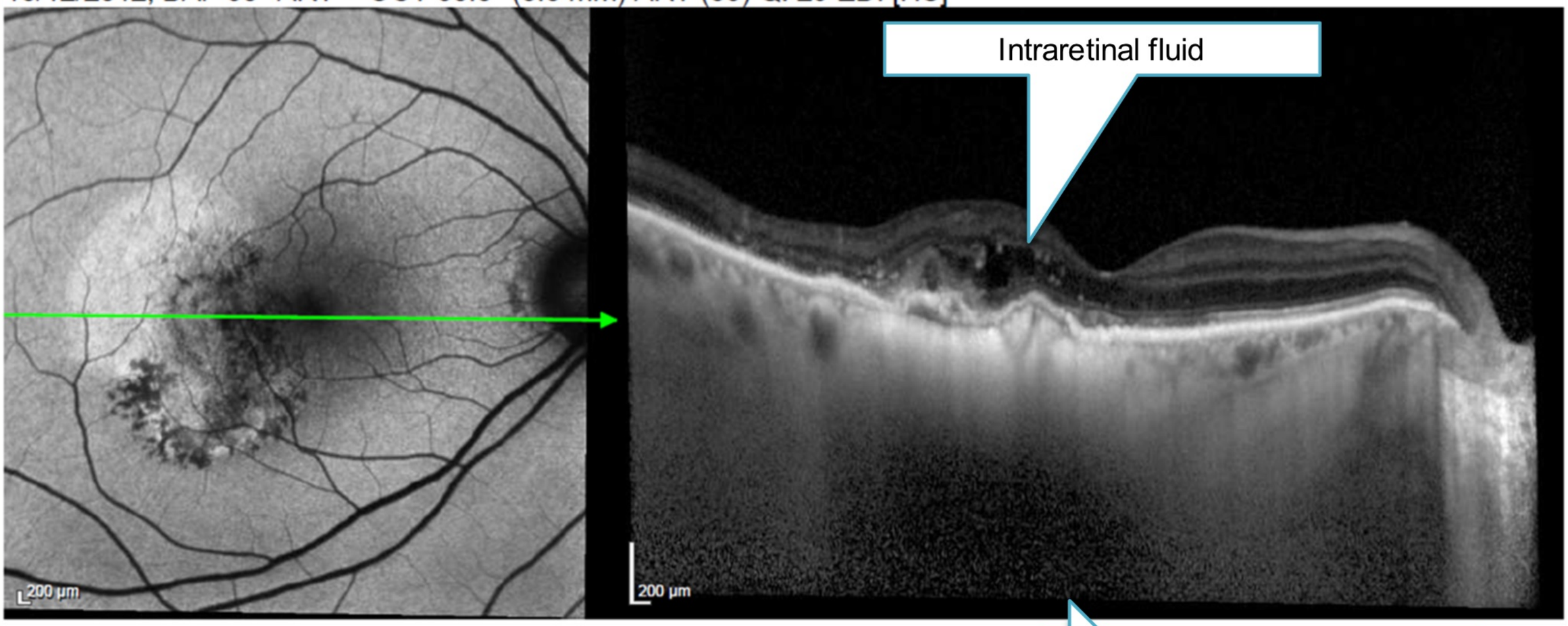

18/12/2012, BAF 30° ART + OCT 30.0° (8.8 mm) ART (85) Q: 29 EDI [HS]
Intraretinal fluid
200 µm
200 µm
Nevus "shadow" effect.

ICGA

18/12/2012, FA 2:32.56 35° ART + ICGA 0:53.96 35° ART [HS]

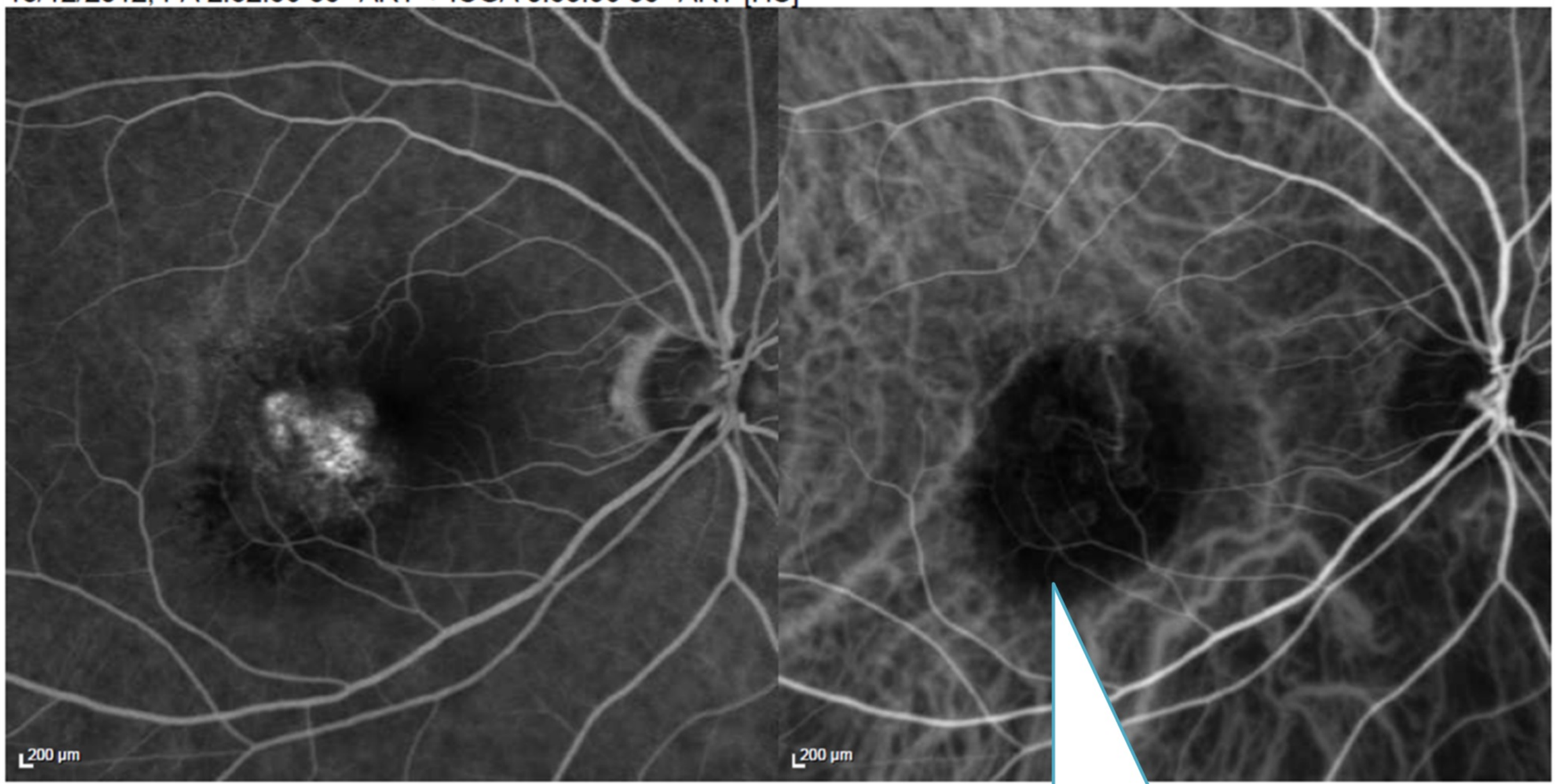


EDI SD-OCT


18/12/2012, BAF 30° ART + OCT 30.0° (8.8 mm) ART (85) Q: 29 EDI [HS]
Intraretinal fluid
200 µm
200 µm
Nevus "shadow" effect.

ICGA

18/12/2012, FA 2:32.56 35° ART + ICGA 0:53.96 35° ART [HS]



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Choroidal Thickening

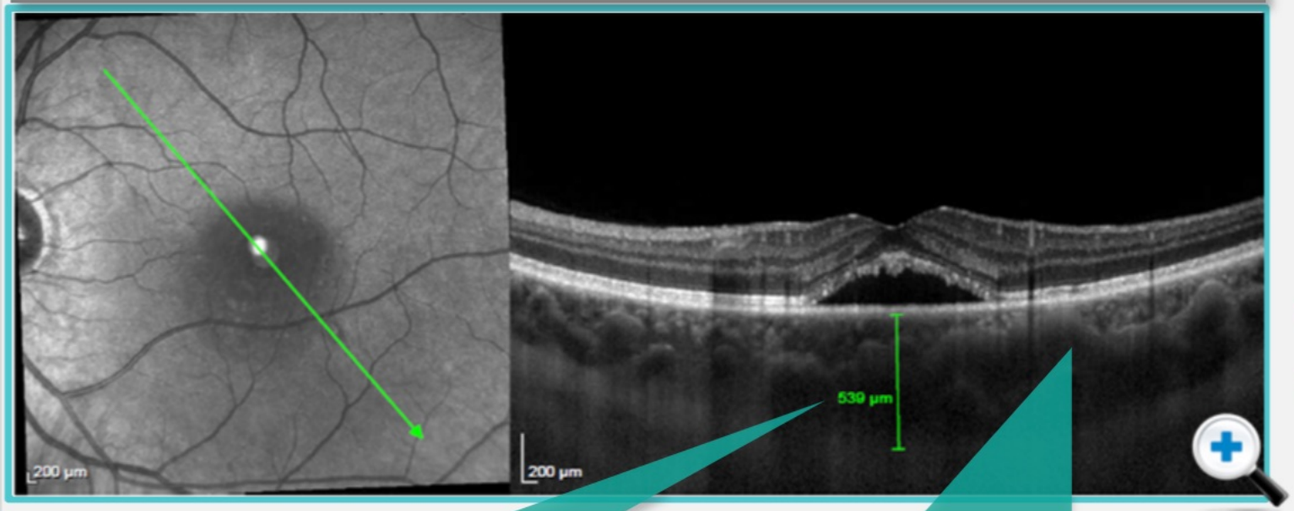
A benefit of EDI SD-OCT is that it **allows clinicians to measure choroidal thickness**. Choroidal thickness is a new **biomarker** for diagnosis as well as assessment and guidance of clinical management in uveal disorders.

This is an example of central serous retinopathy.

EDI SD-OCT clearly shows **increased choroidal thickness**.

An **abnormal choroidal vascular network** can also be seen. The choroidal vessels have uneven diameters (the difference is quite considerable in this example).

EDI SD-OCT scans may show an "abnormal choroidal vascular network"

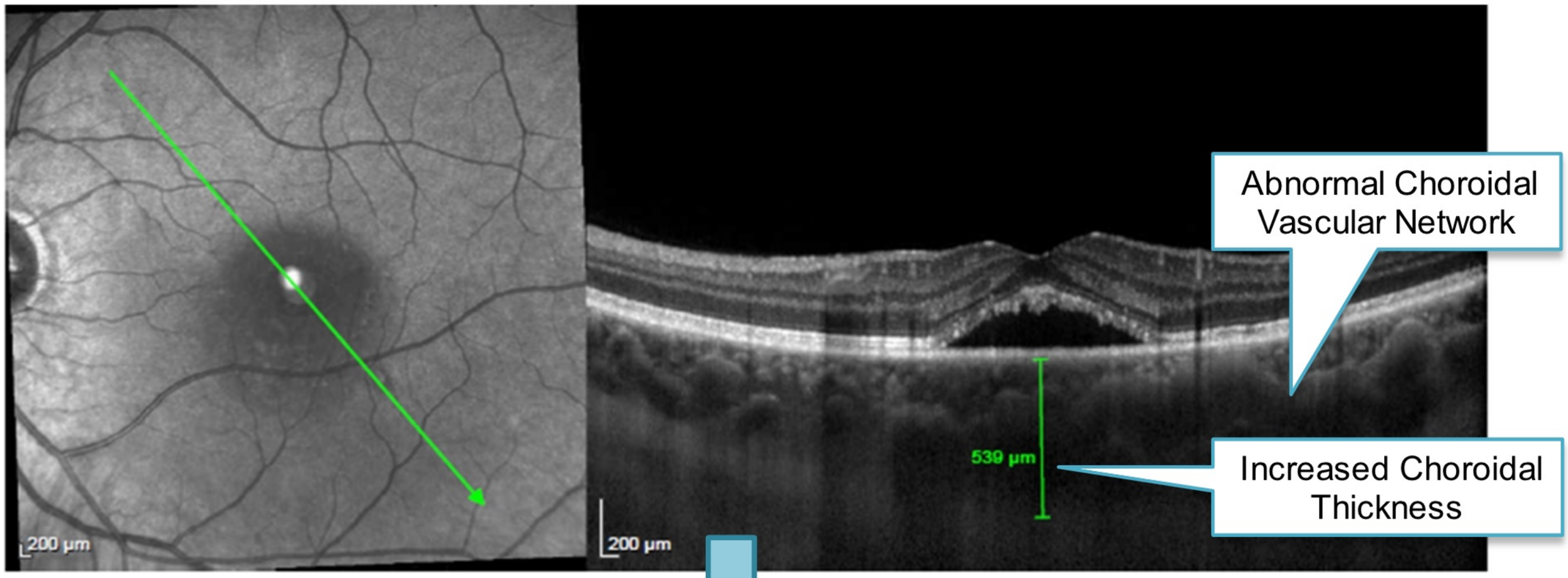


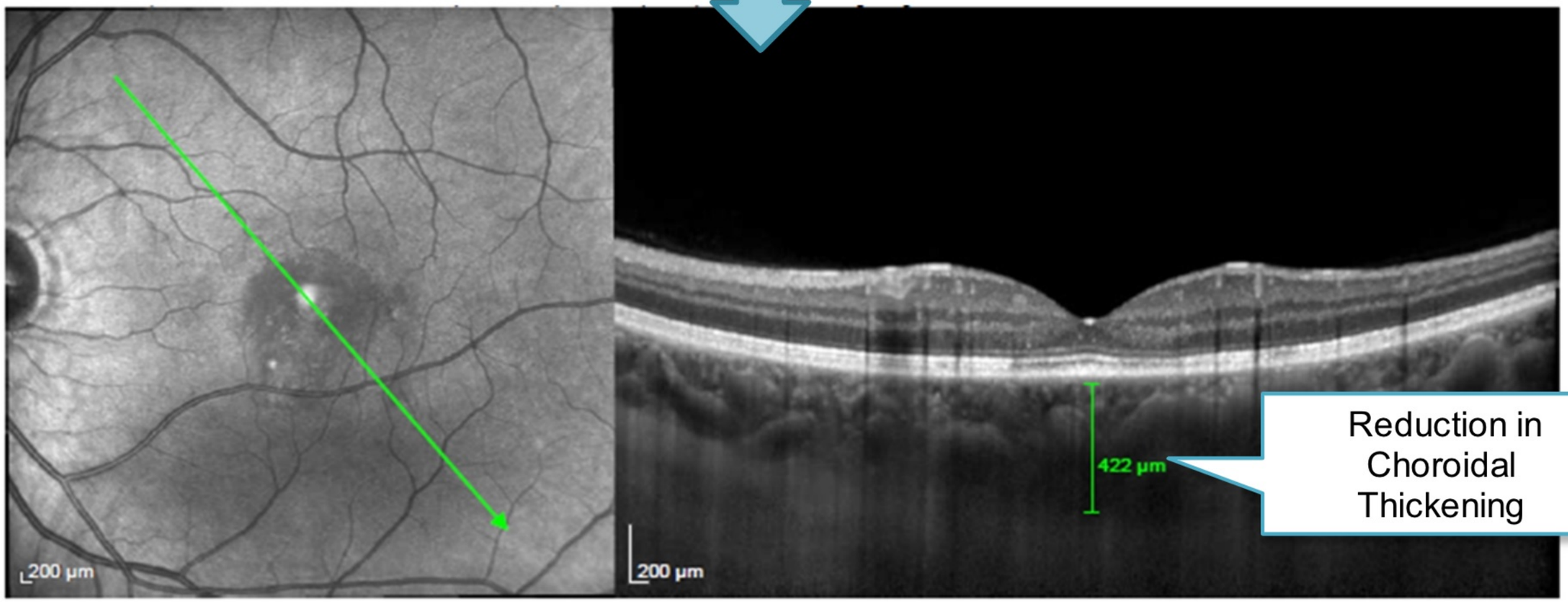
Increased Choroidal Thickness

Abnormal Choroidal Vascular Network

Tap > to see how this CSR resolved.

Choroidal Thickening & Resolution





euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

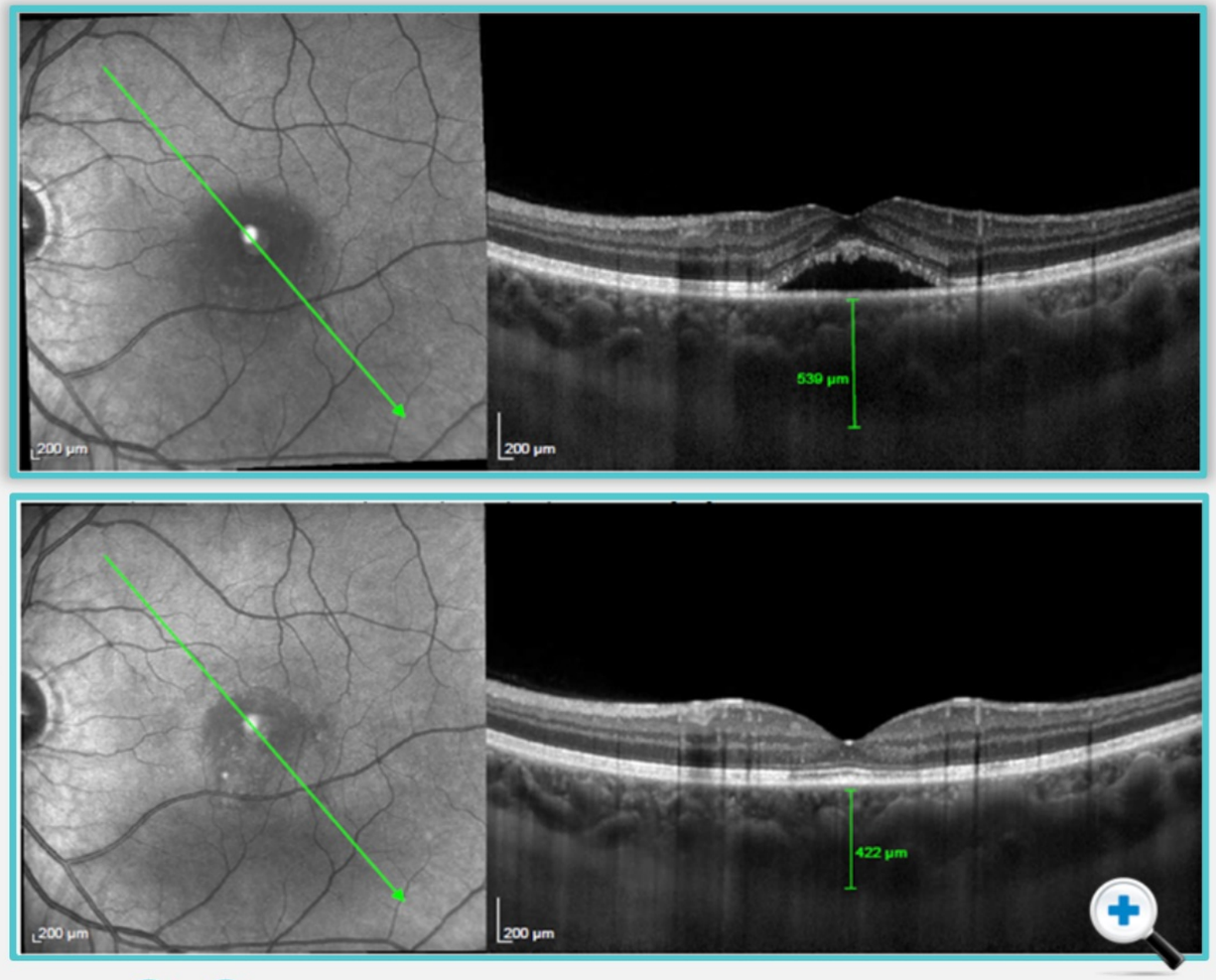
Choroidal Thickening

A benefit of EDI SD-OCT is that it **allows clinicians to measure choroidal thickness**. Choroidal thickness is a new **biomarker** for diagnosis as well as assessment and guidance of clinical management in uveal disorders.

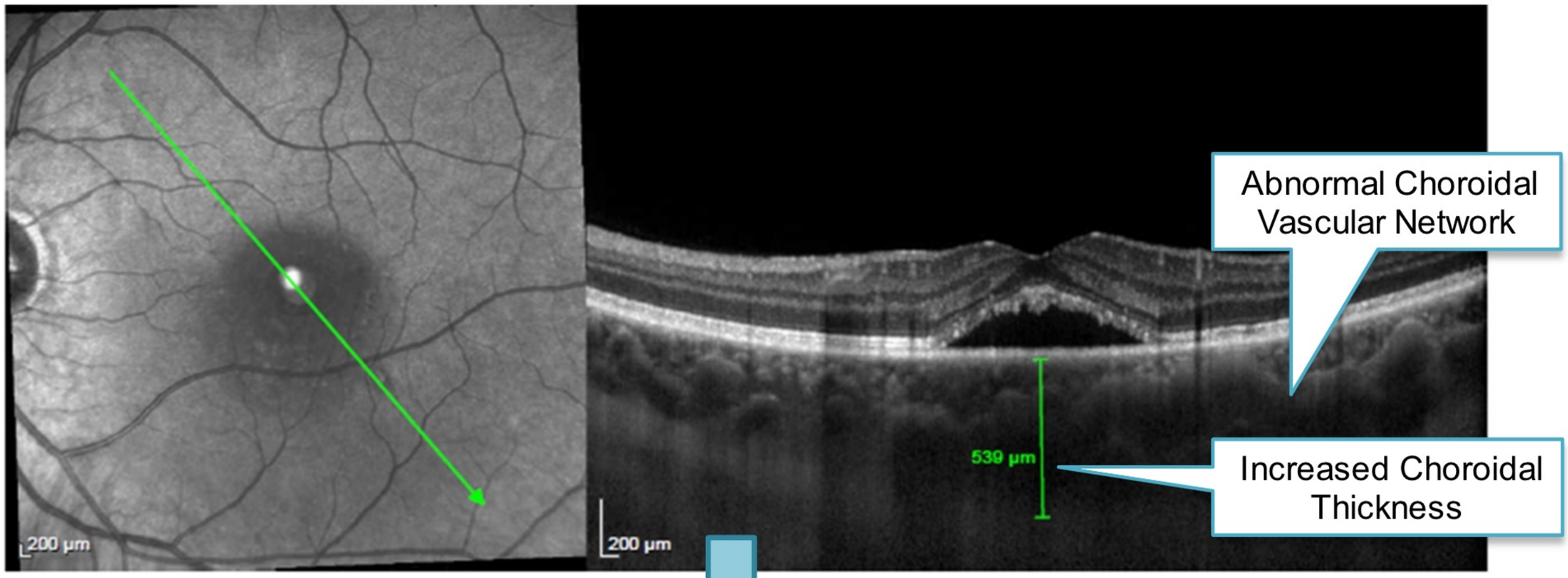
Resolution of the subretinal fluid was accompanied by **reduction in the choroidal thickening**.

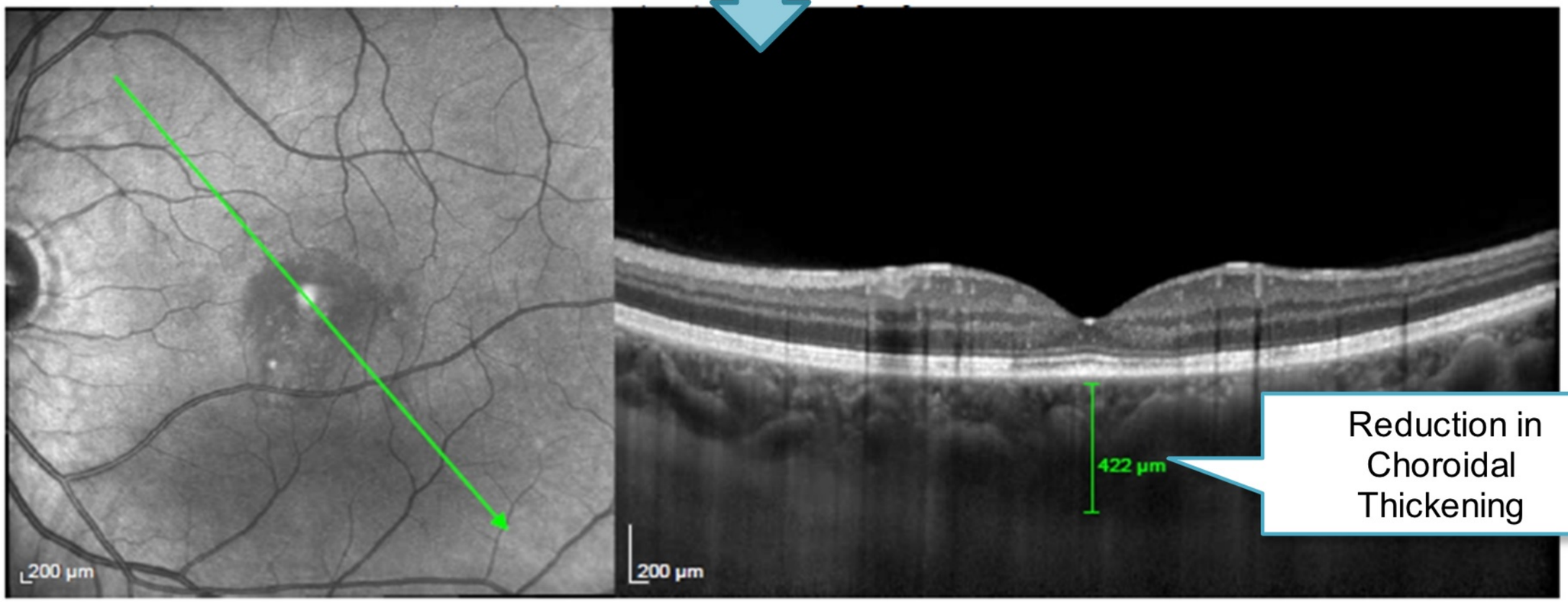
There was spontaneous reduction of the diffuse, abnormal choroidal thickness (from **539 µm to 422 µm**).

This was associated with the resolution of the serous retinal detachment (SRD) (**- 20%**)



Choroidal Thickening & Resolution





euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Pigment Epithelial Detachment

The visual assessment of PEDs is another benefit of using EDI SD-OCT.

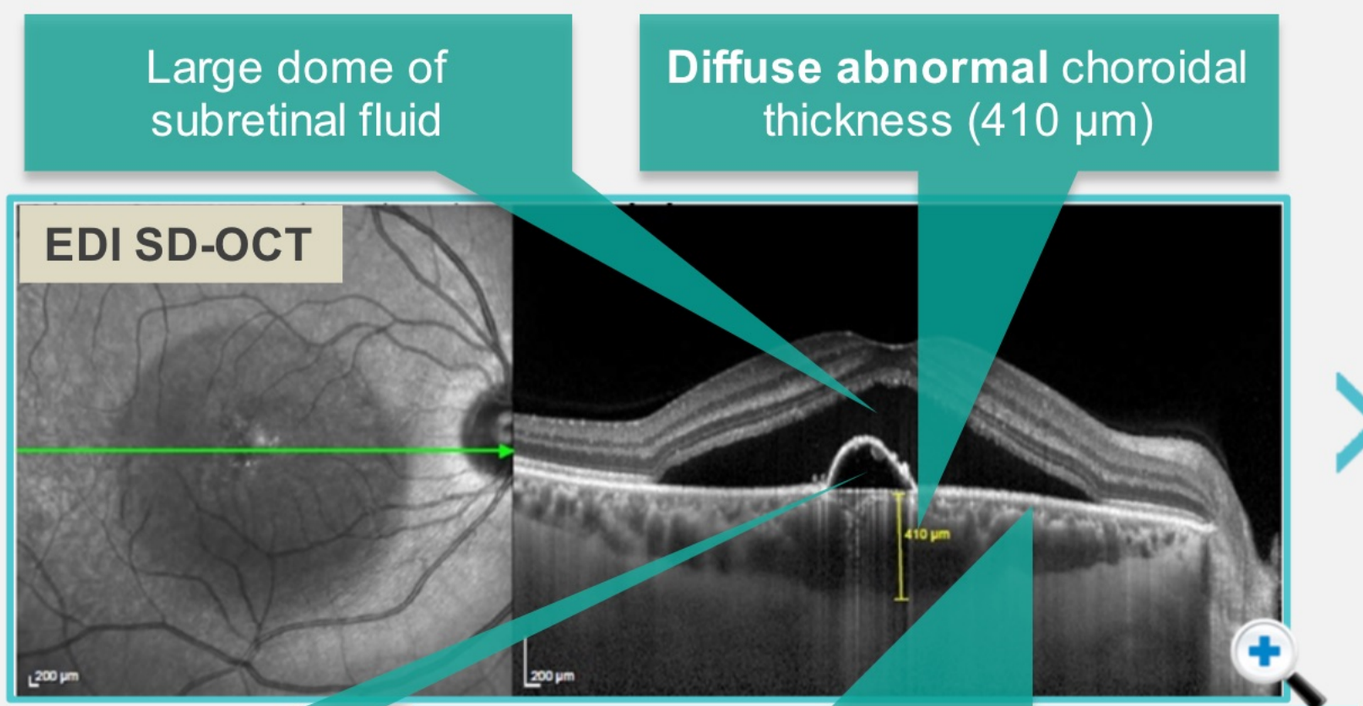
Use the arrows to scroll through example

Underneath the large dome of subretinal fluid, a **pigment epithelial detachment** (PED) is visible in this example.

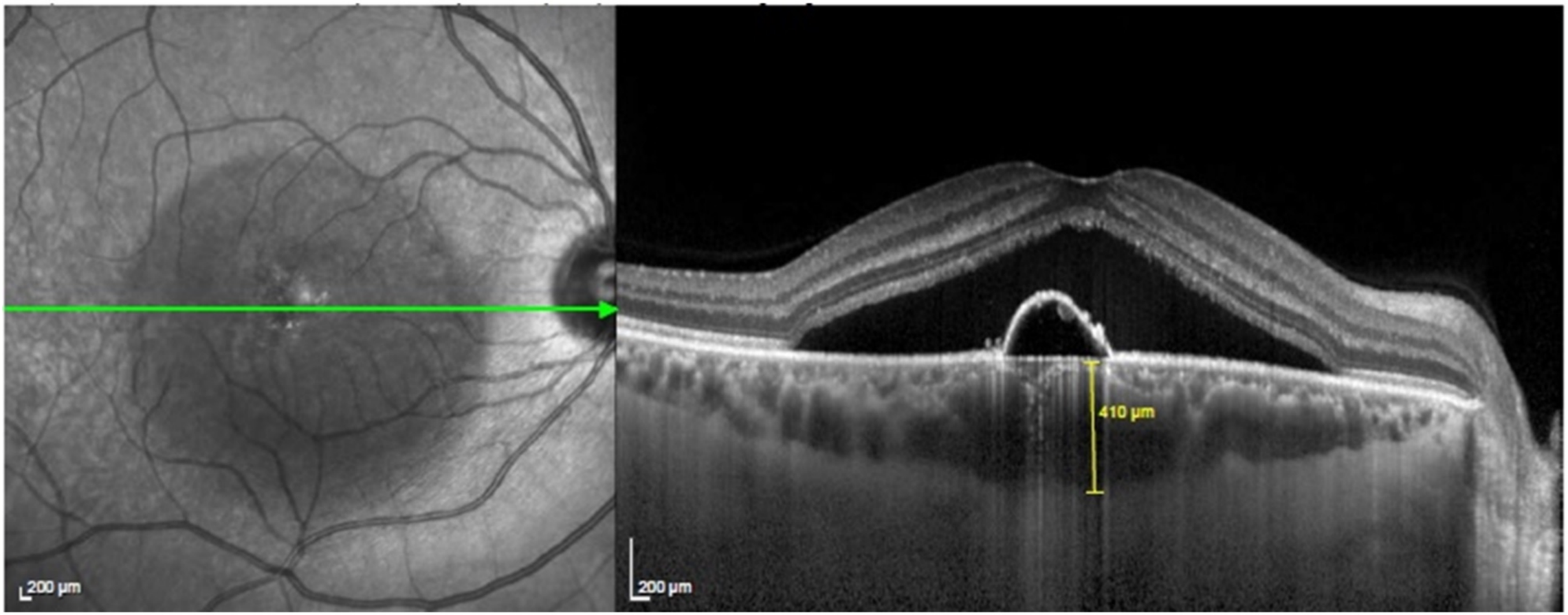
What is the cause?
It seems there is adequate outer blood-retinal barrier (i.e. the RPE is normal in this respect).

Therefore, choroidal pressure may be elevated.

That in turn forces the PED to develop.



Pigment Epithelial Detachment



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

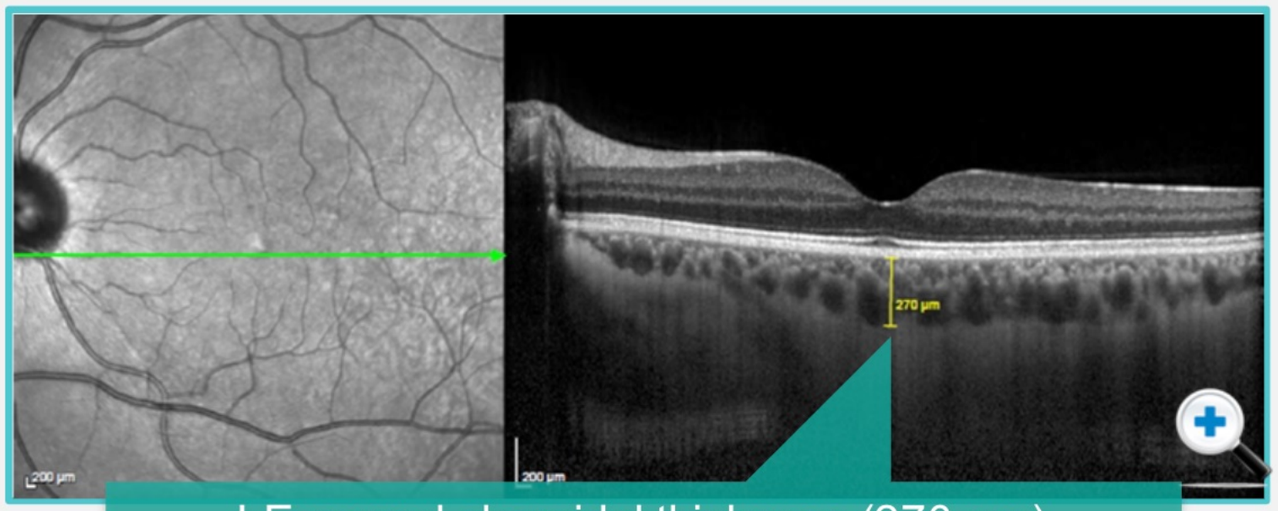
Pigment Epithelial Detachment

The visual assessment of PEDs is another benefit of using EDI SD-OCT.

Use the arrows to scroll through examples

The **contralateral eye** of the patient does not show any intra/ subretinal changes.

However, it does show significantly thinner ("normal") choroid.

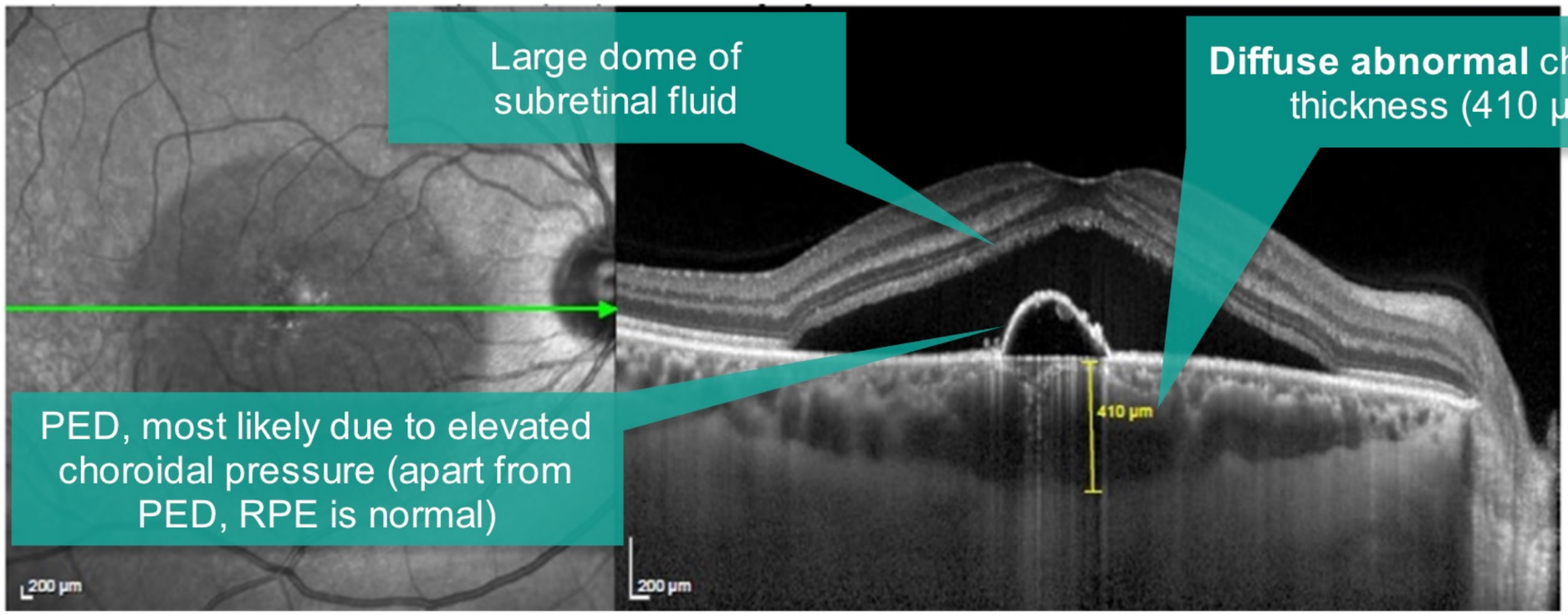


LE normal choroidal thickness (270 µm)

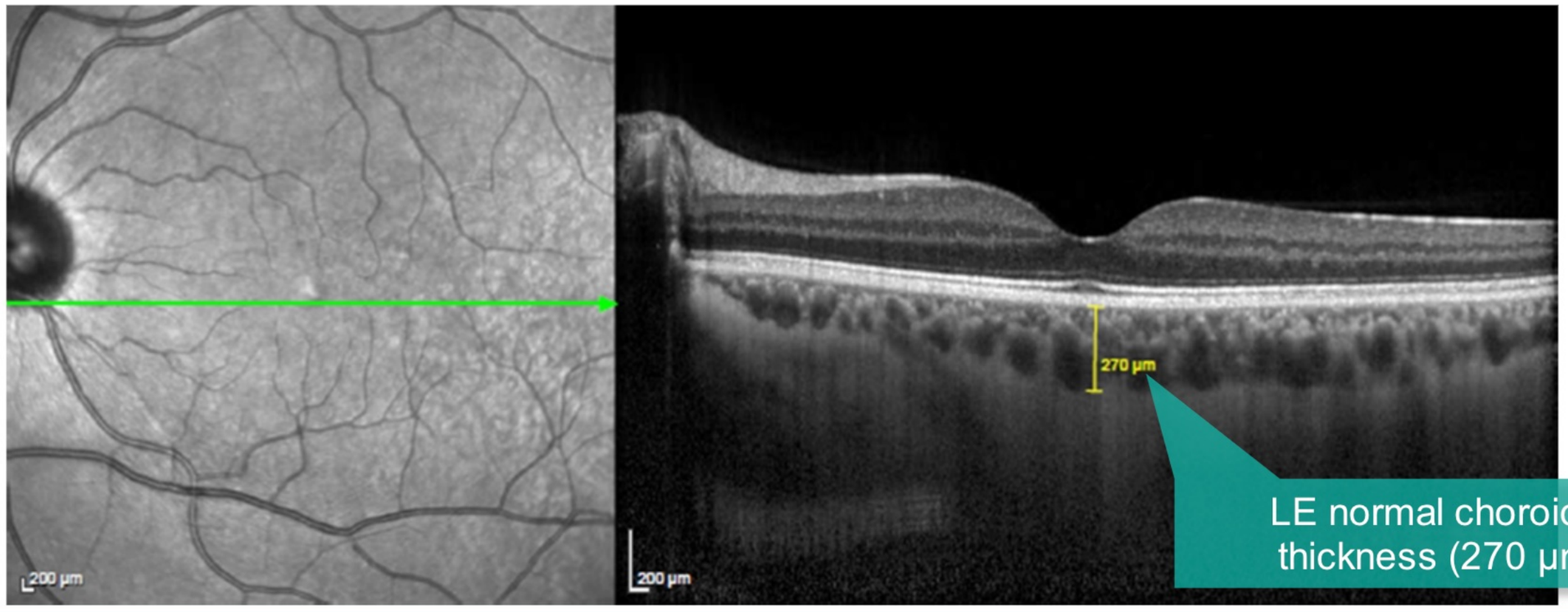
Presence of a PED associated with a thick choroid and abnormally large choroidal vessels may indicate the need for choroidal therapy (perhaps anti-VEGF or PDT) rather than RPE therapy.

PED associated with thick choroid and abnormally large choroidal vessels may indicate choroidal therapy (anti-VEGF or PDT) rather than RPE therapy.

Pigment Epithelial Detachment in Right Eye



Contralateral (left) Eye



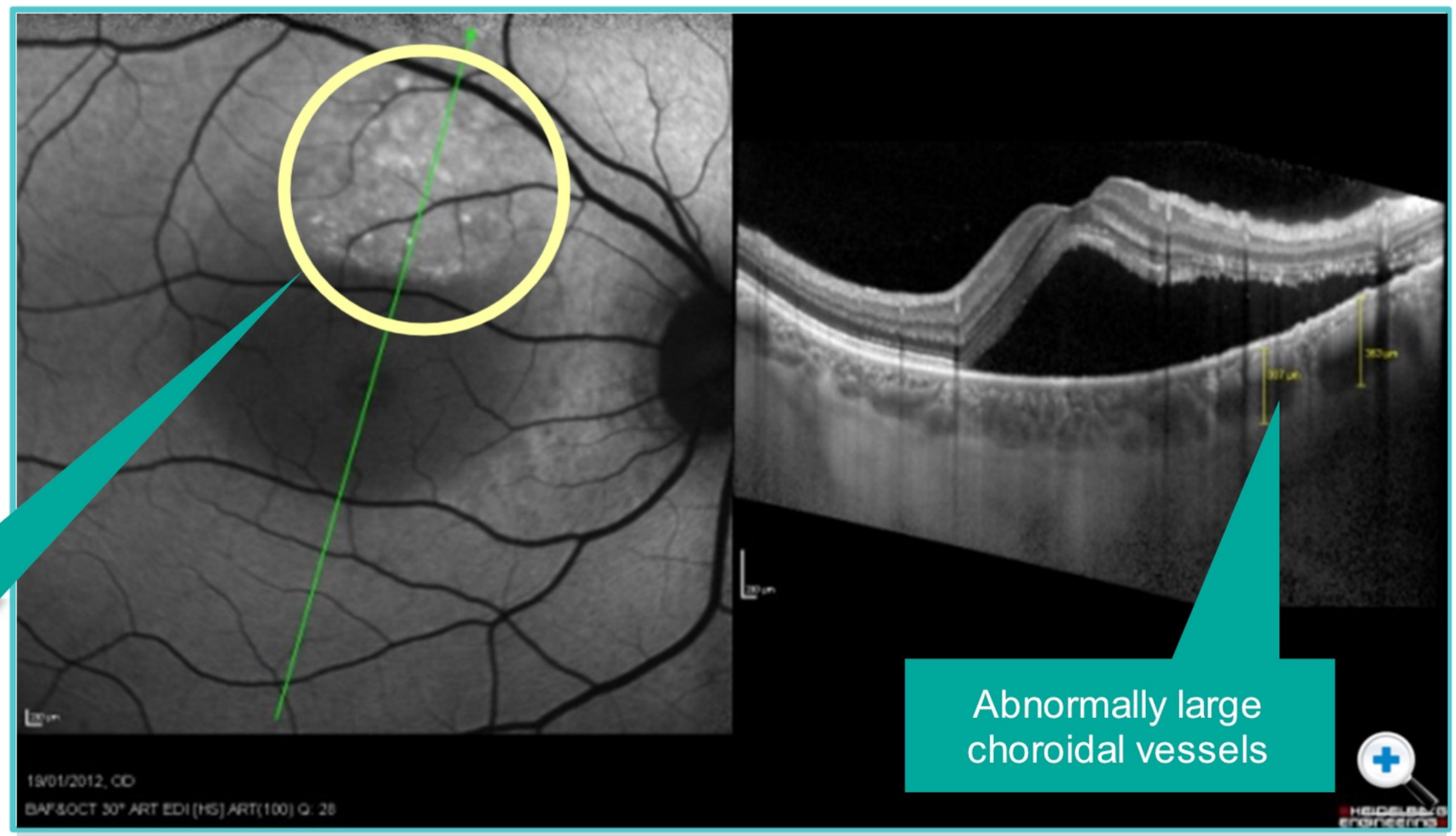
euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Abnormally Large Choroidal Vessels

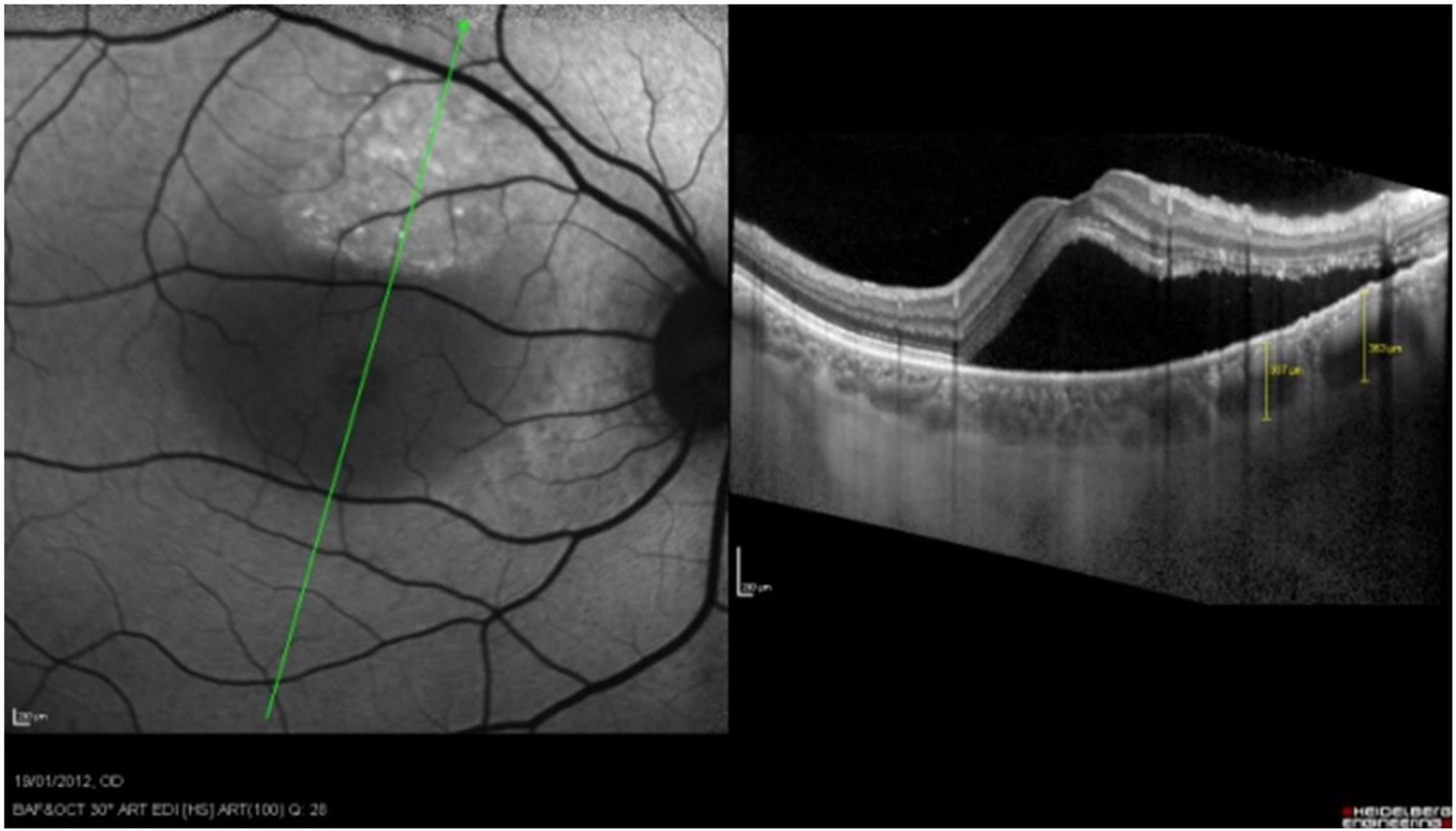
The presence of **abnormally large choroidal vessels** can be seen on EDI SD-OCT, associated with areas of RPE disease as seen on infrared autofluorescence, along with the areas of leakage on fundus fluorescence angiography.



EDI SD-OCT scan through the area of leakage showing localised "abnormally large" choroidal vessels

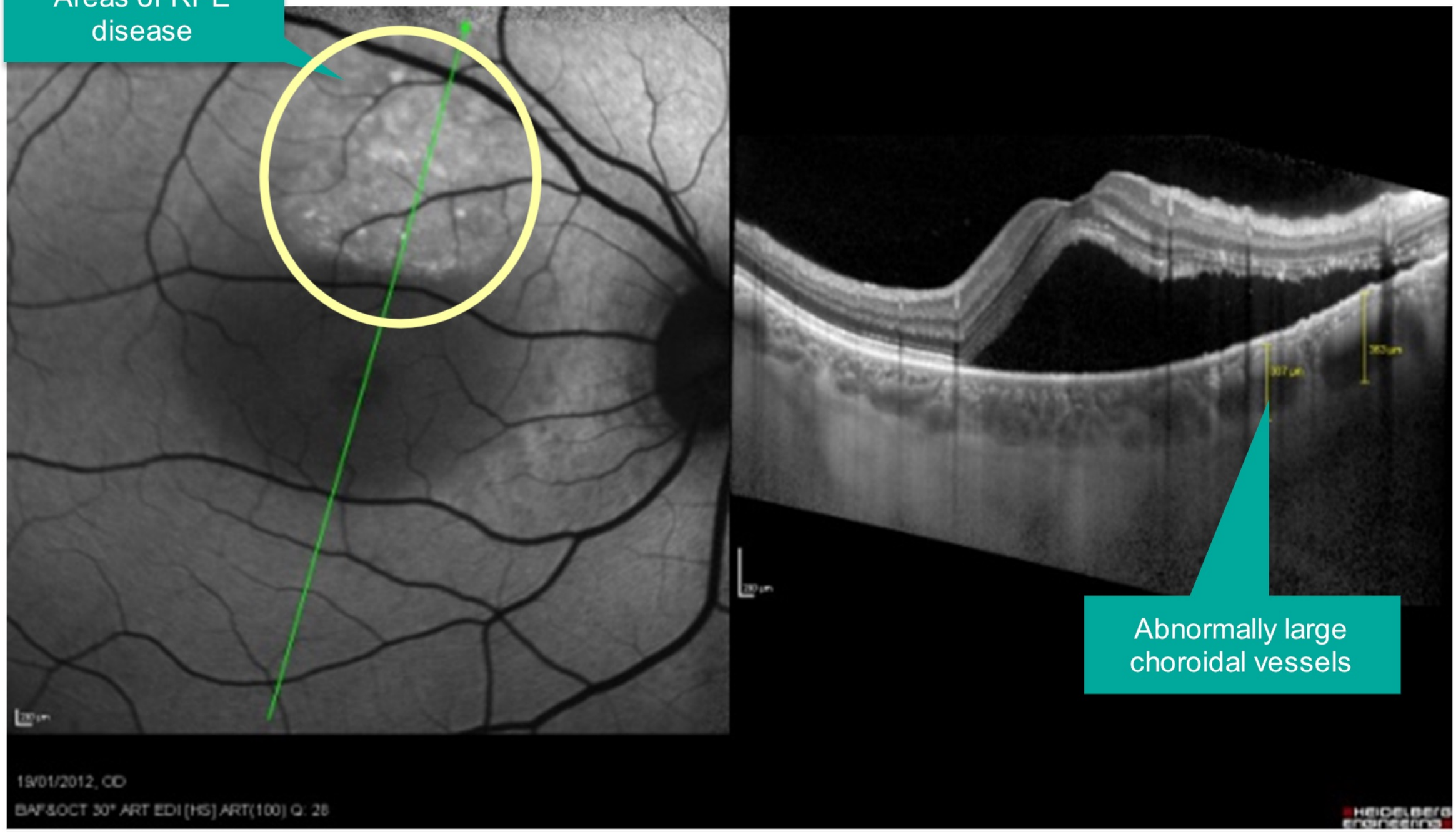
Iacono P, Battaglia PM, Papayannis A, La Spina C, Varano M, Bandello F. Acute central serous chorioretinopathy: a correlation study between fundus autofluorescence and spectral-domain OCT. *Graefes Arch Clin Exp Ophthalmol*. 2015; 253(11): 1889-97

Abnormally Large Choroidal Vessels



EDI SD-OCT scan through the area of leakage showing localised “abnormally large” choroidal vessels

Abnormally Large Choroidal Vessels



EDI SD-OCT scan through the area of leakage showing localised “abnormally large” choroidal vessels

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Module Progress:

- Welcome ✓
- SD-OCT ✓
- SS-OCT
- OCT Angiography
- Summary
- Knowledge Check

Swept Source OCT

SS-OCT

euretina InSight

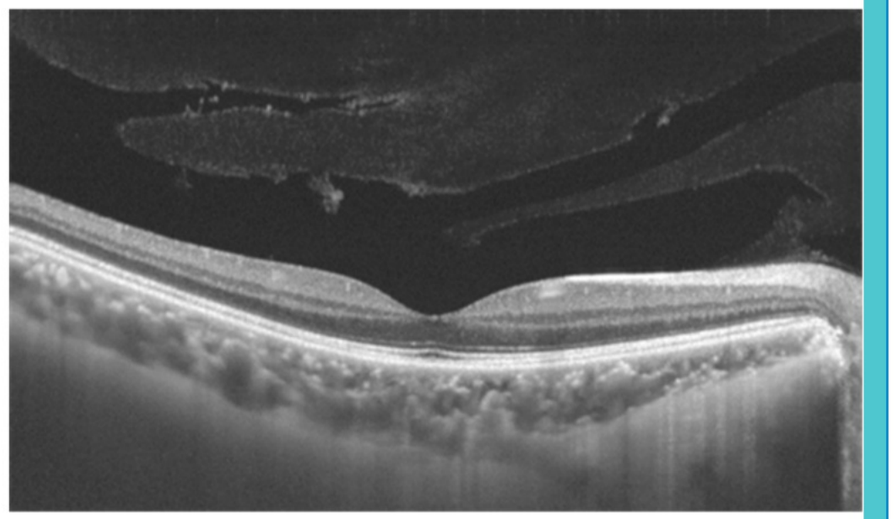
OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Overview

Swept source OCT (SS-OCT) derives from Spectral Domain OCT, and has the following characteristics and advantages:

- Wavelength-sweeping laser and a dual-balanced photo detector
- 2x faster imaging speed (100,000 A-line/s; in SD-OCT, Spectralis uses 70,000 A-line/s)
- Uniform image quality
- Improved vitreous visualisation
- Longer wavelength (1,050nm) [SD-OCT uses 830/ 850nm wavelength]
- Increased penetration and visibility of choroid and sclera
- Reduced light scattering



What is the benefit of longer wavelength and higher speed?

The **vitreous**, even though it is transparent, **produces significant light scattering.** SS-OCT **reduces this light scattering** - the longer wavelength has increased penetration. The **fast scanning speed counteracts** not only the **vitreous movement**, but also the **ocular movement**.

Click here to learn more about in vivo imaging with SS-OCT

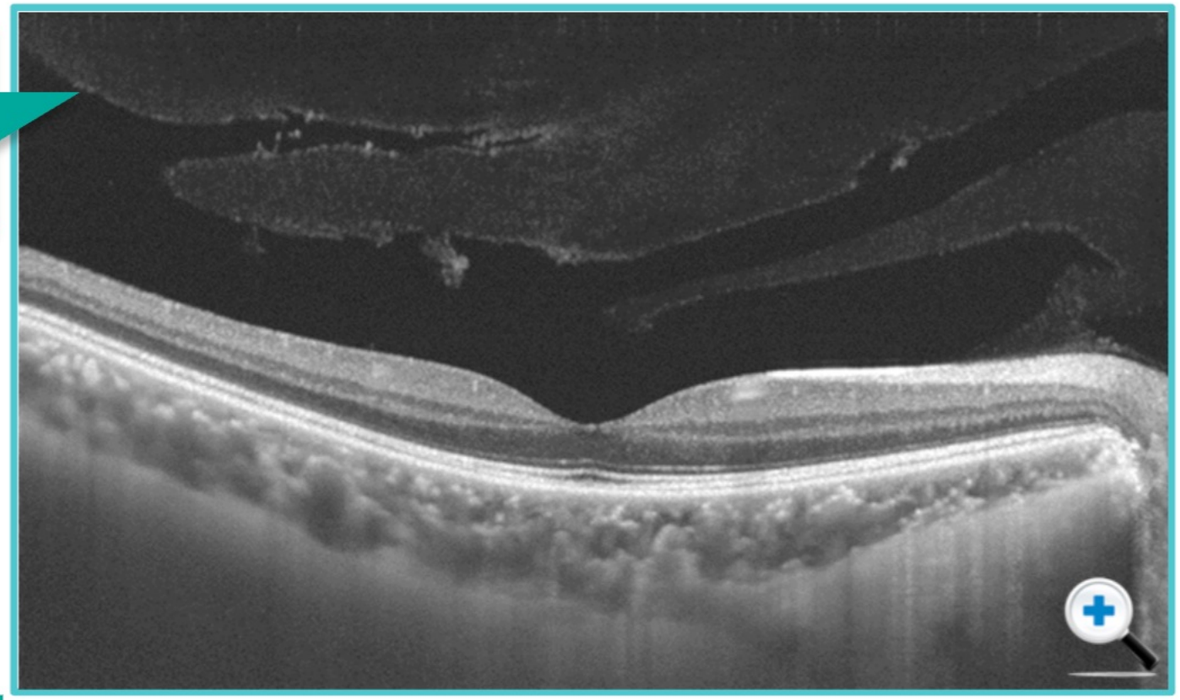
Example Study

These images are from a study published by the module editor (Prof Paulo E. Stanga) et al in 2014.

This study imaged, for the first time, the **vitreoretinal interface** (the famous "Macdonald's" sign that vitreoretinal surgeons and now medical retina specialists look for), and also the **cortical vitreous**.

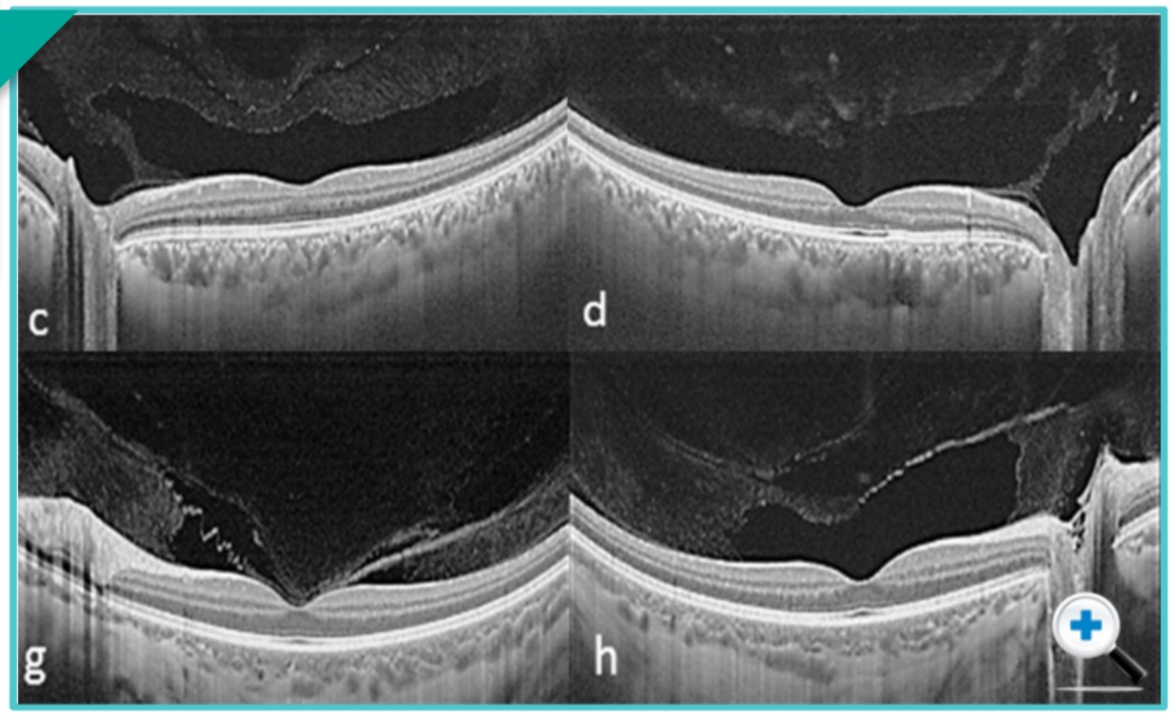
With SS-OCT, the following features can be imaged in vivo for the first time:

Cortical vitreous



12mm (40 deg) long scans

With swept source OCT, various features can be imaged in vivo for the first time



Cortical vitreous

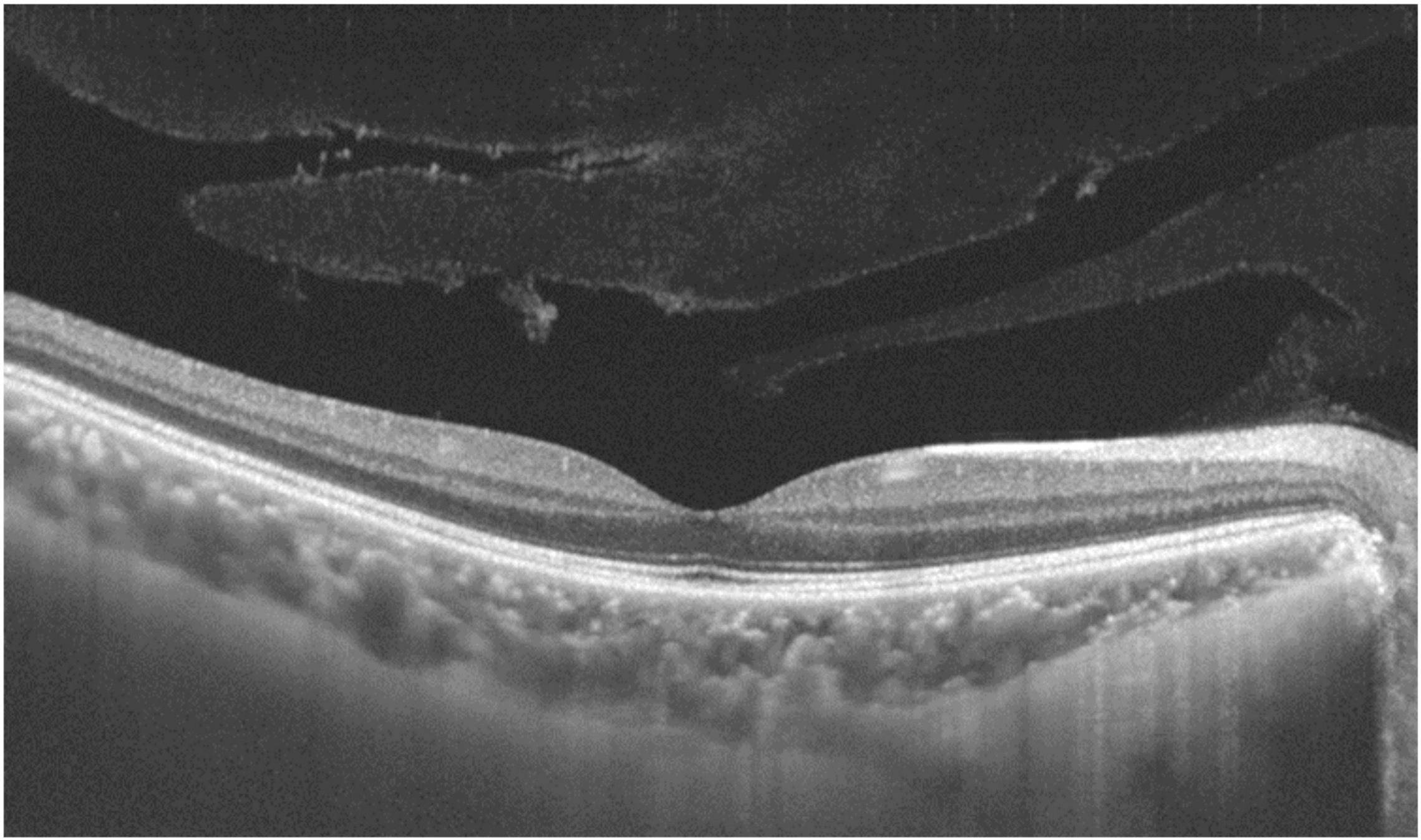
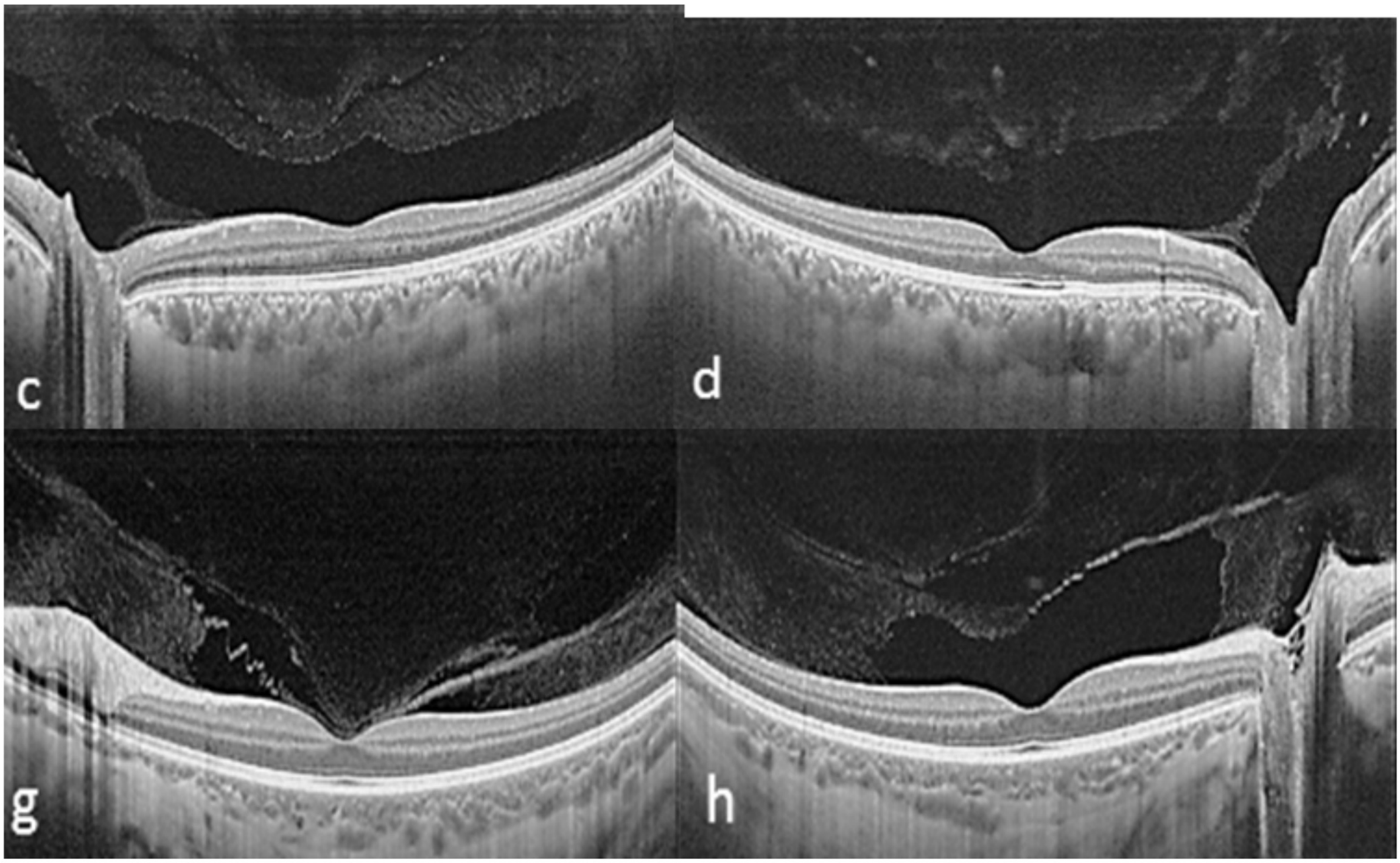


Image in vivo



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

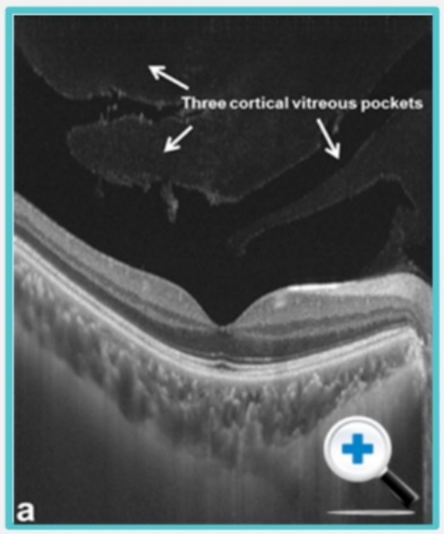
SS-OCT in Clinical Practice

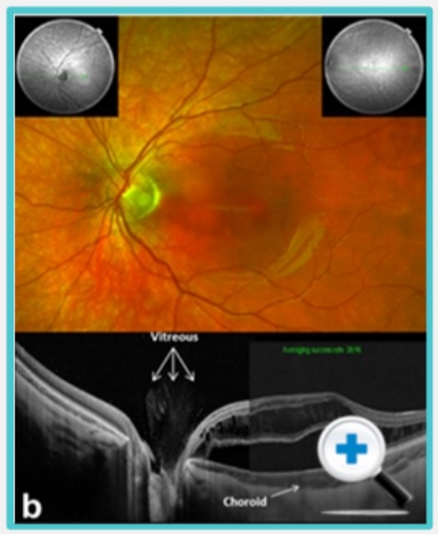
Click here for references

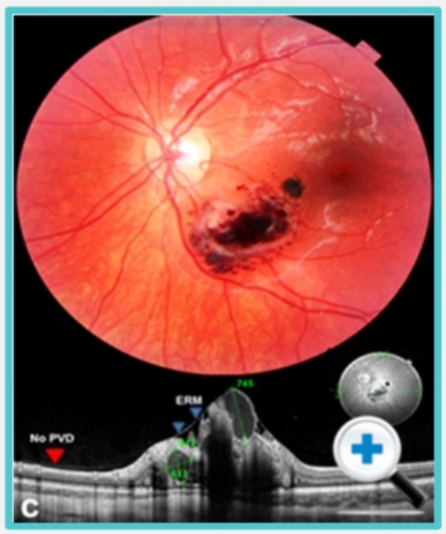
Prof Paulo Stanga (editor of this module) started using SS-OCT in his clinical practice in 2012 - some examples from his practice are shown below:

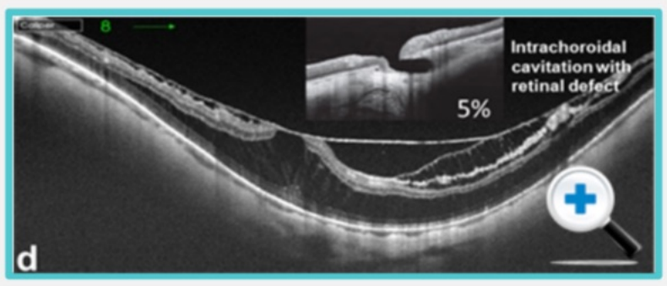
Use the arrows to scroll through example

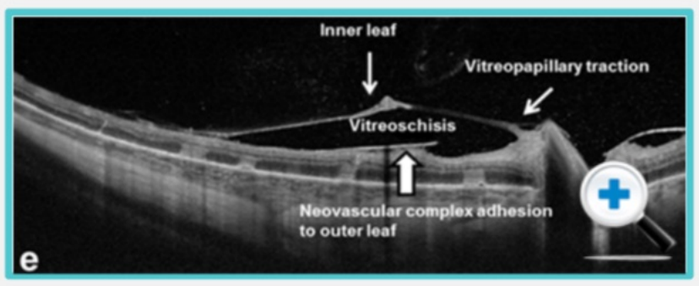
These images highlight some of the features that are now visible to a clinician by using SS-OCT.



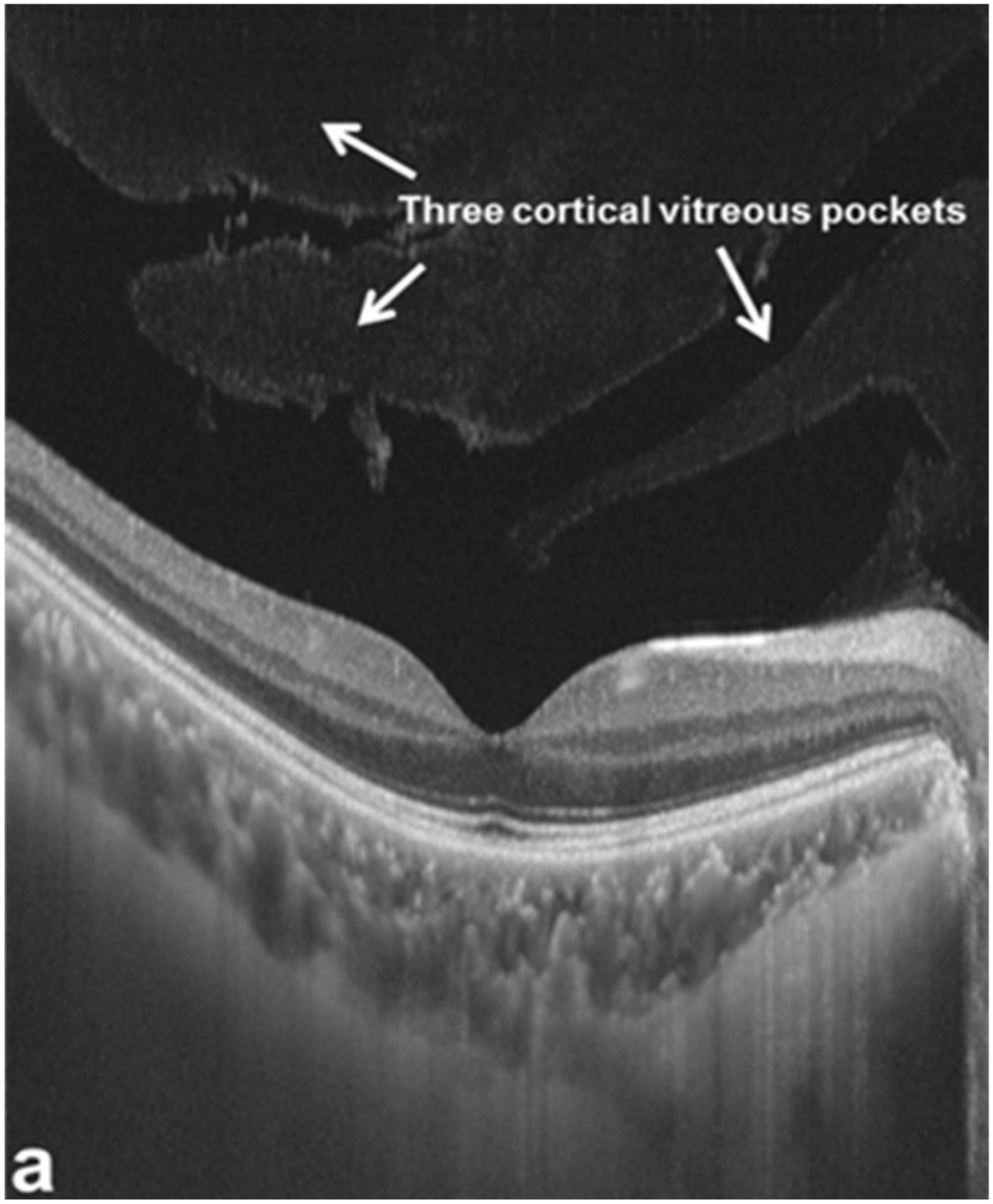




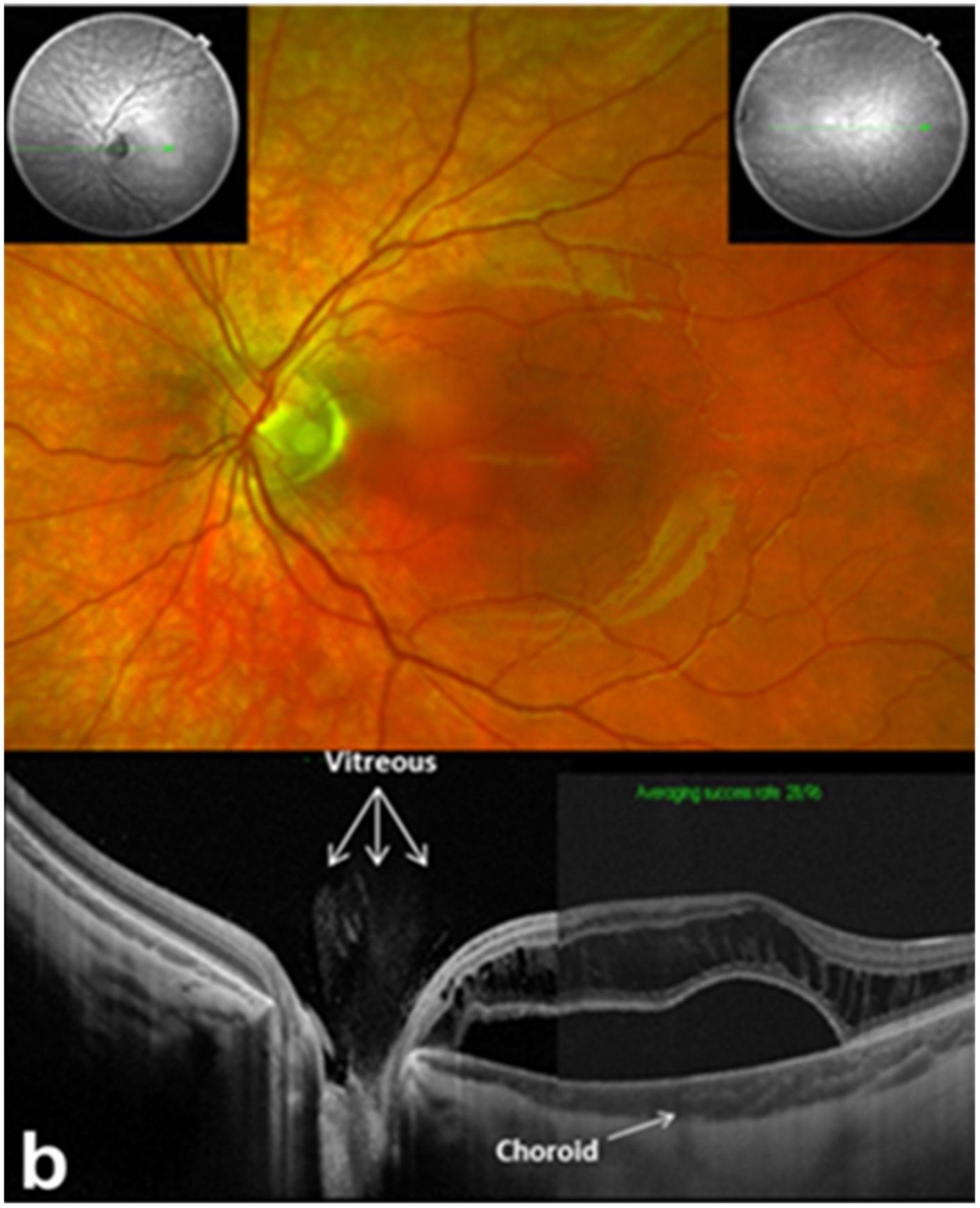




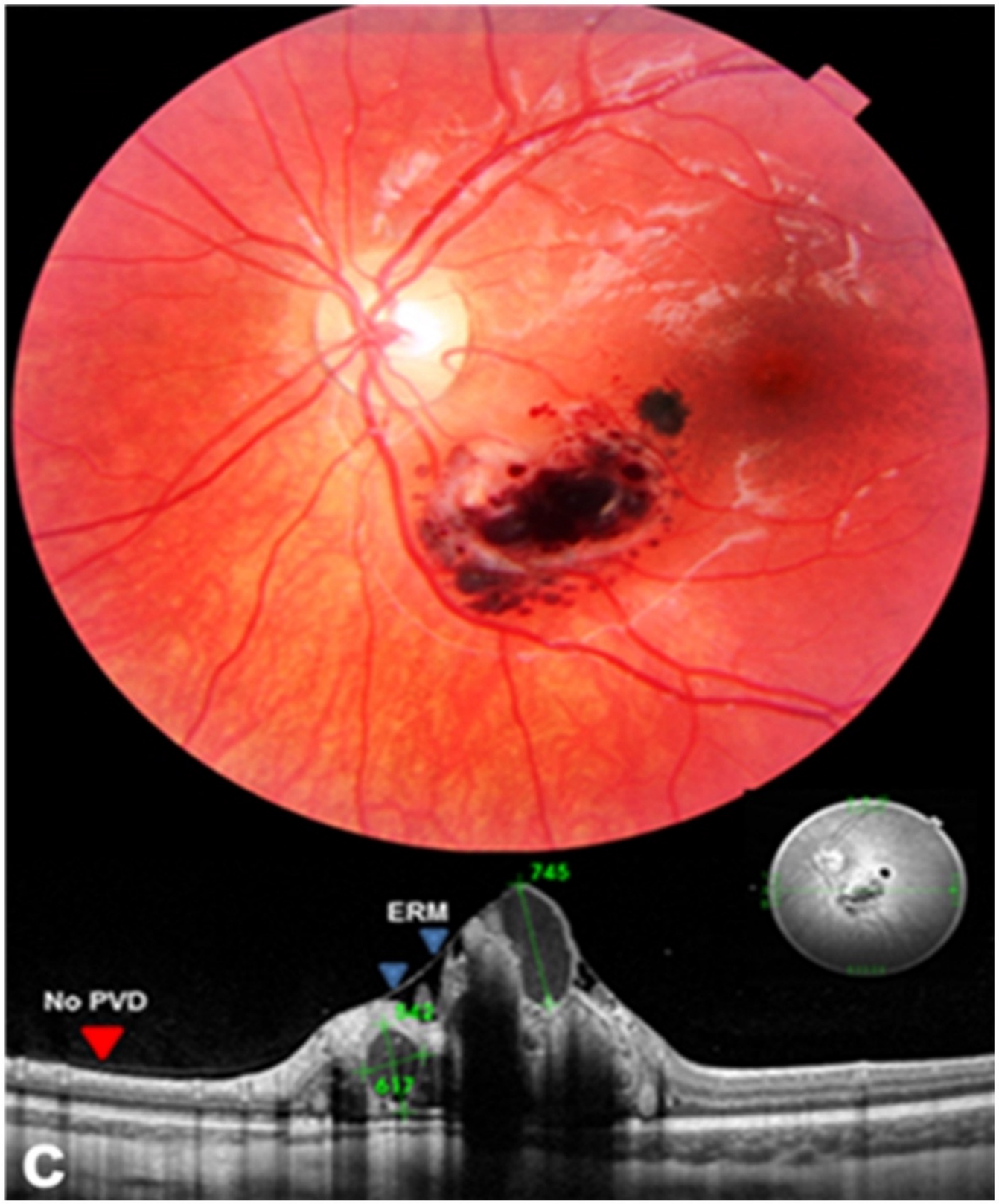
Cortical vitreous pockets



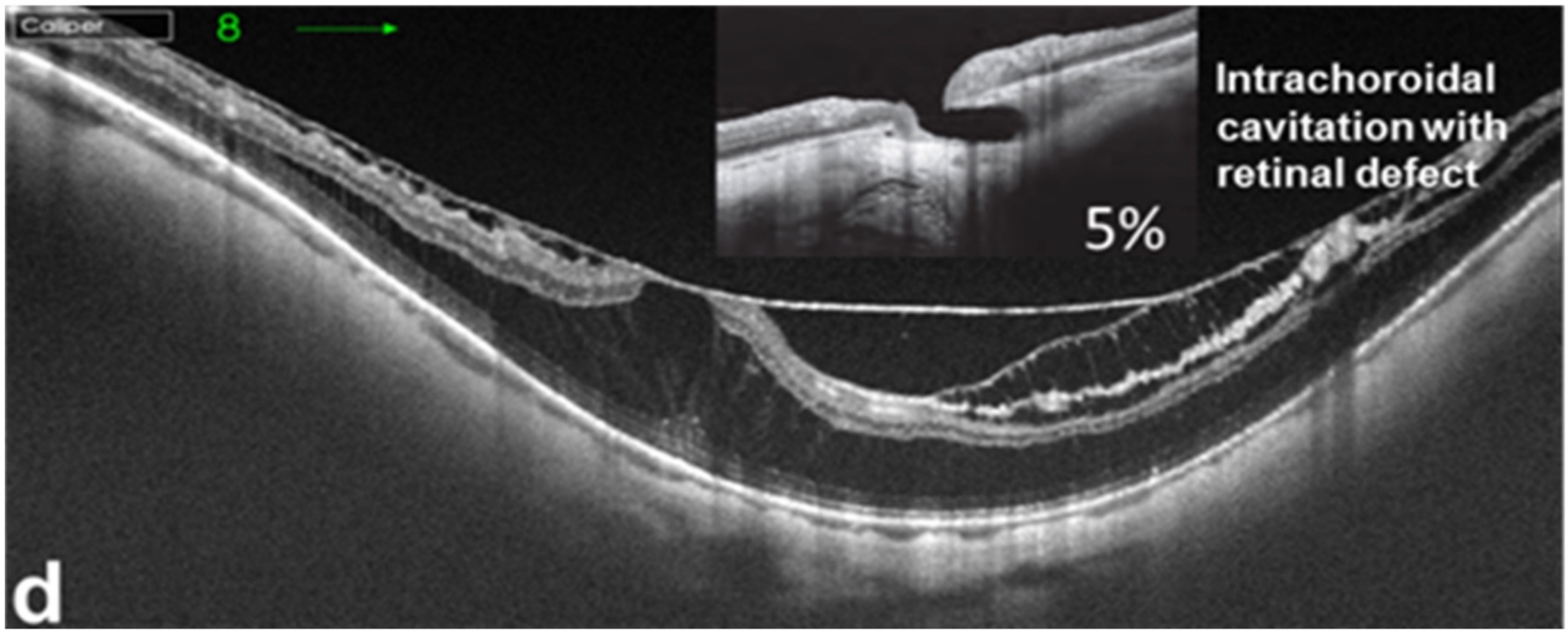
Vitreous and the Choroid



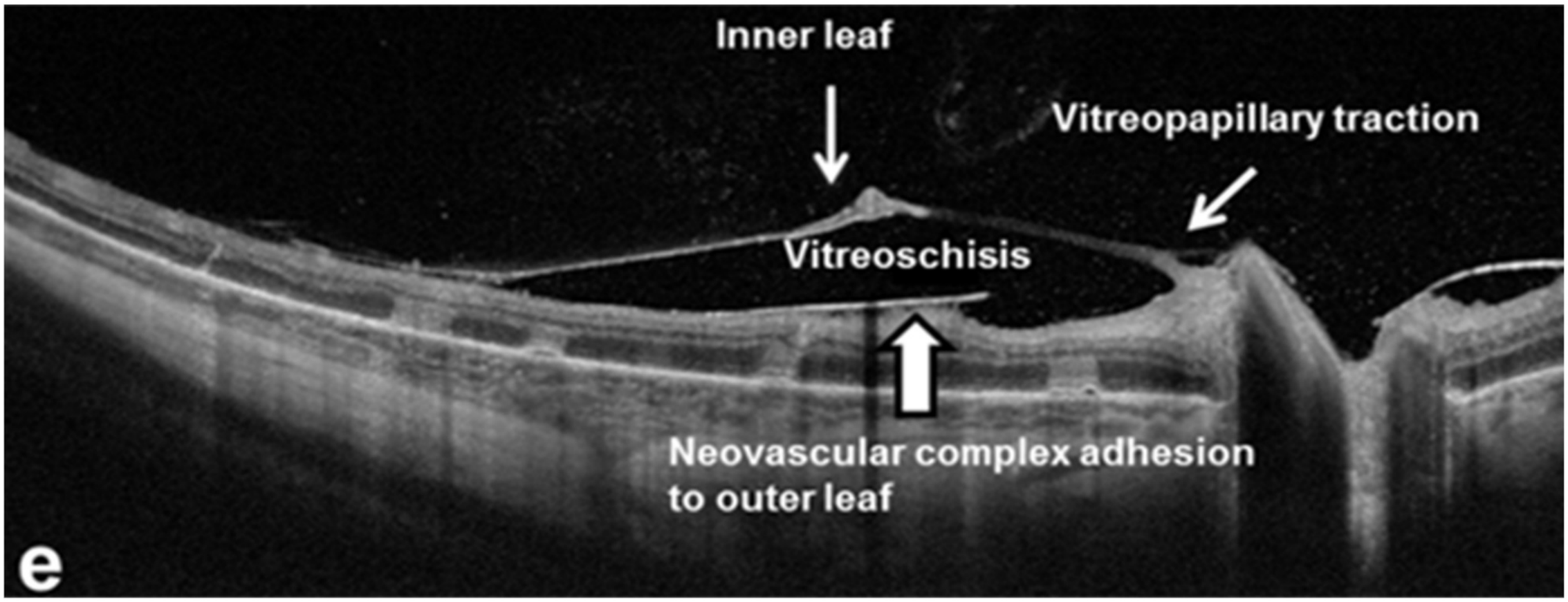
Fundus and SS-OCT



Taut internal limiting membrane



Assess vitreoschisis



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

SS-OCT in Clinical Practice

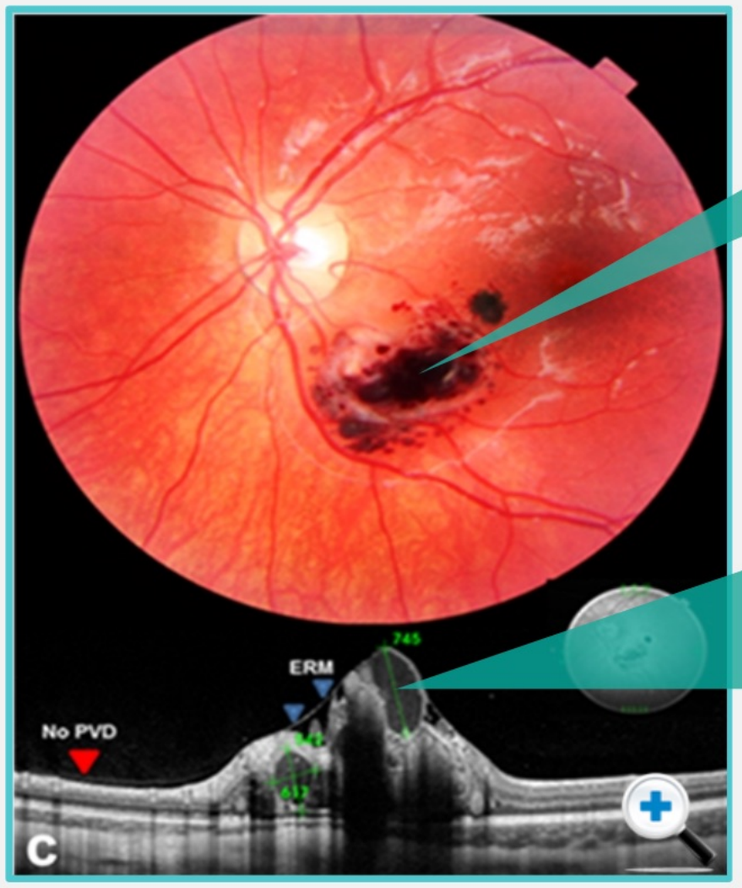
Click here for references

Prof Paulo Stanga (editor of this module) started using SS-OCT in his clinical practice in 2012 - some examples from his practice are shown below:

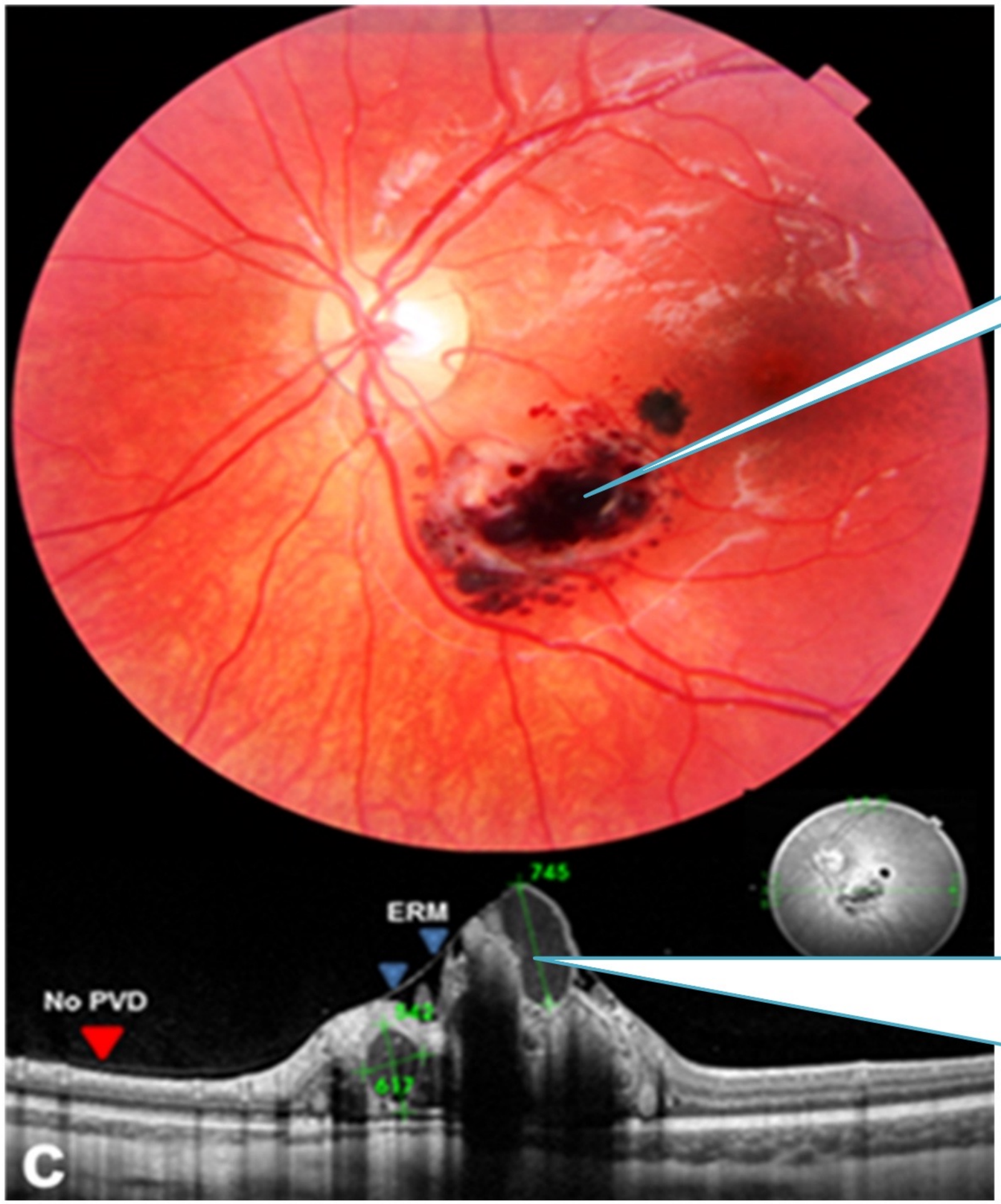
Use the arrows to scroll through examples

A **retinal cavernous hemangioma** can be seen in this fundus image.

The OCT image is a good example showing the superior penetration of SS-OCT. The **diameter of one of the saccular formations can be measured**, even though they are covered in haemorrhage.



Fundus and SS-OCT



Retinal cavernous hemangioma

SS-OCT can even measure the diameter of one of the saccular formations (even when they are covered in haemorrhage)

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

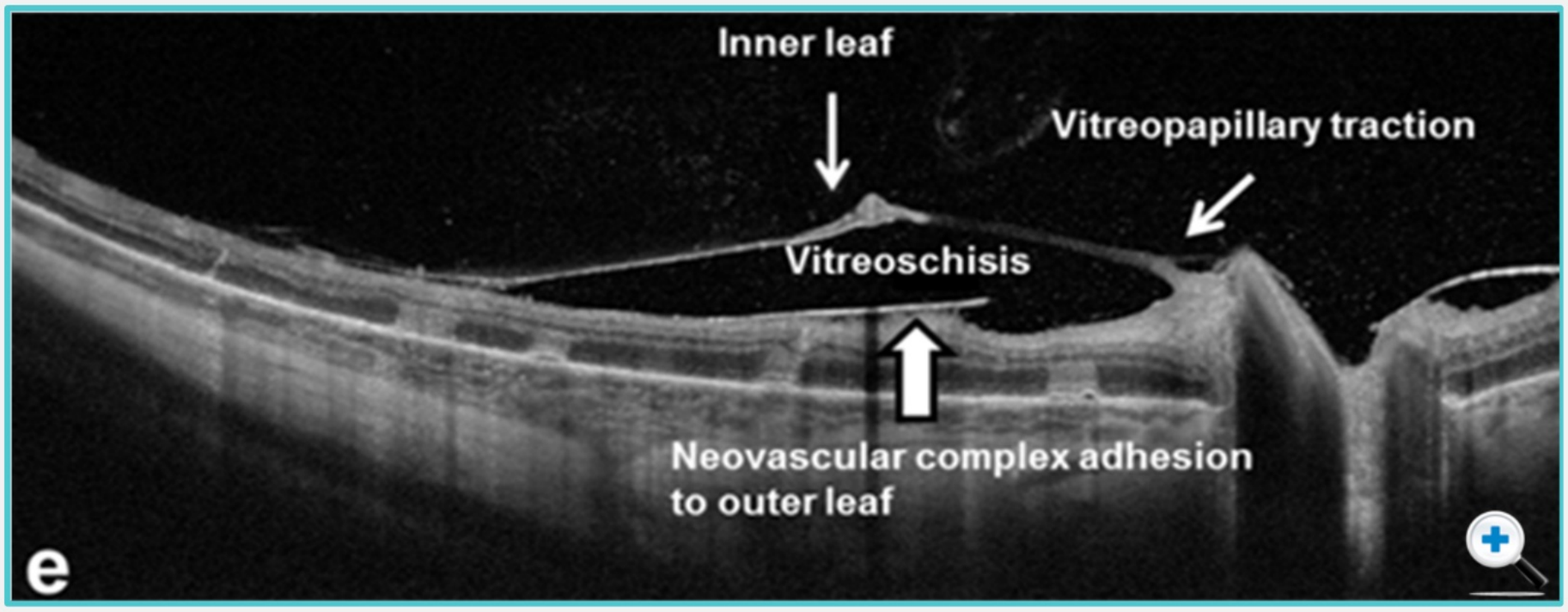
SS-OCT in Clinical Practice

Click here for references

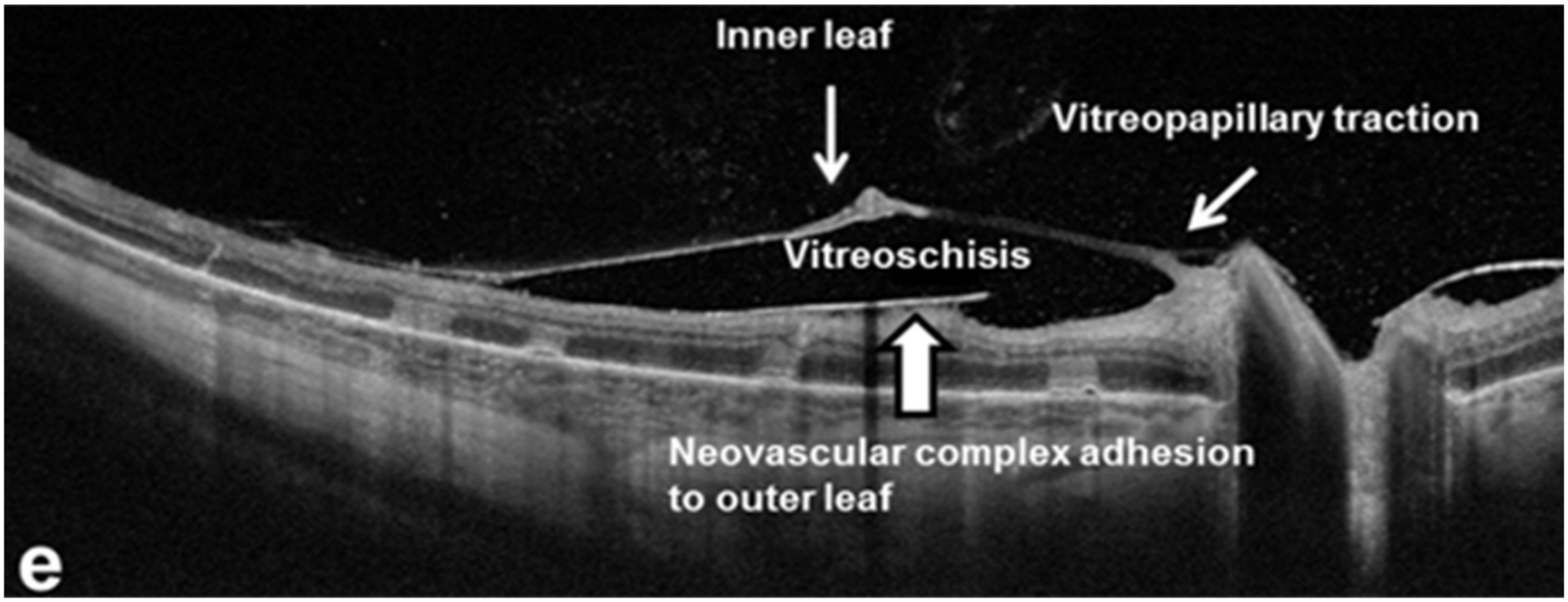
Prof Paulo Stanga (editor of this module) started using SS-OCT in his clinical practice in 2012 - some examples from his practice are shown below:

Use the arrows to scroll through examples

Swept source OCT is extremely useful to assess **vitreoschisis** (splitting of vitreous body) in a diabetic patient, prior to surgery.



Assess vitreoschisis



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

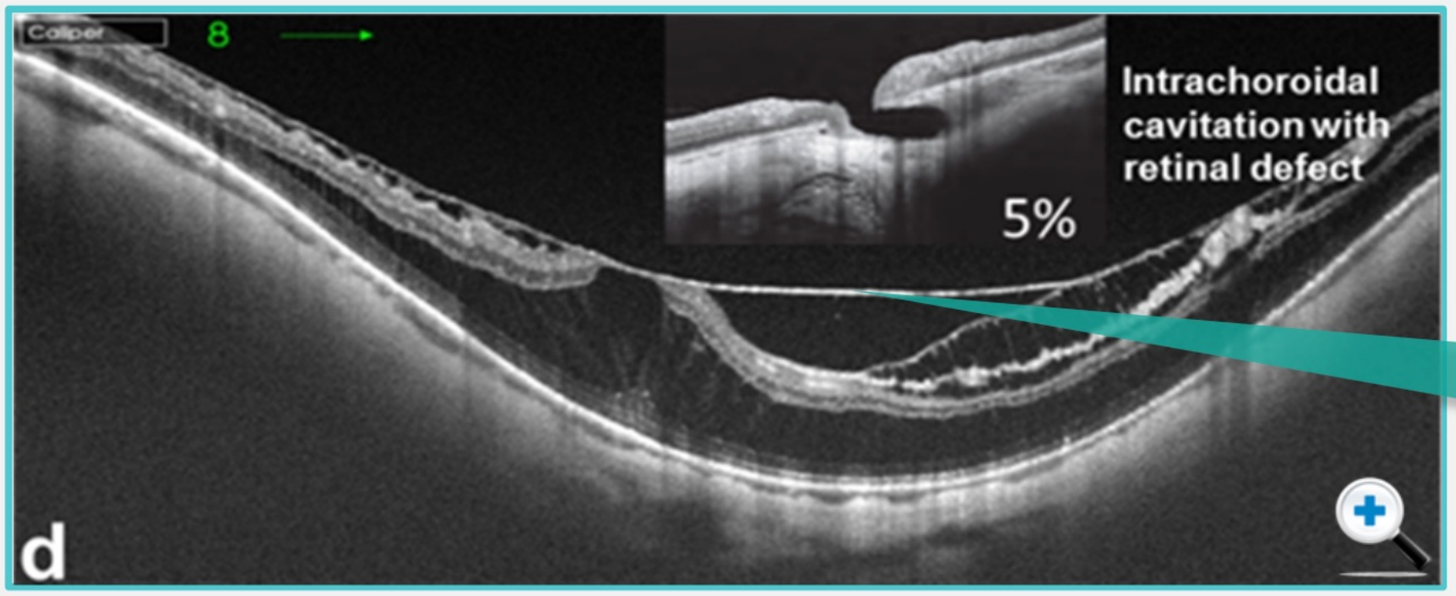
SS-OCT in Clinical Practice

Click here for references

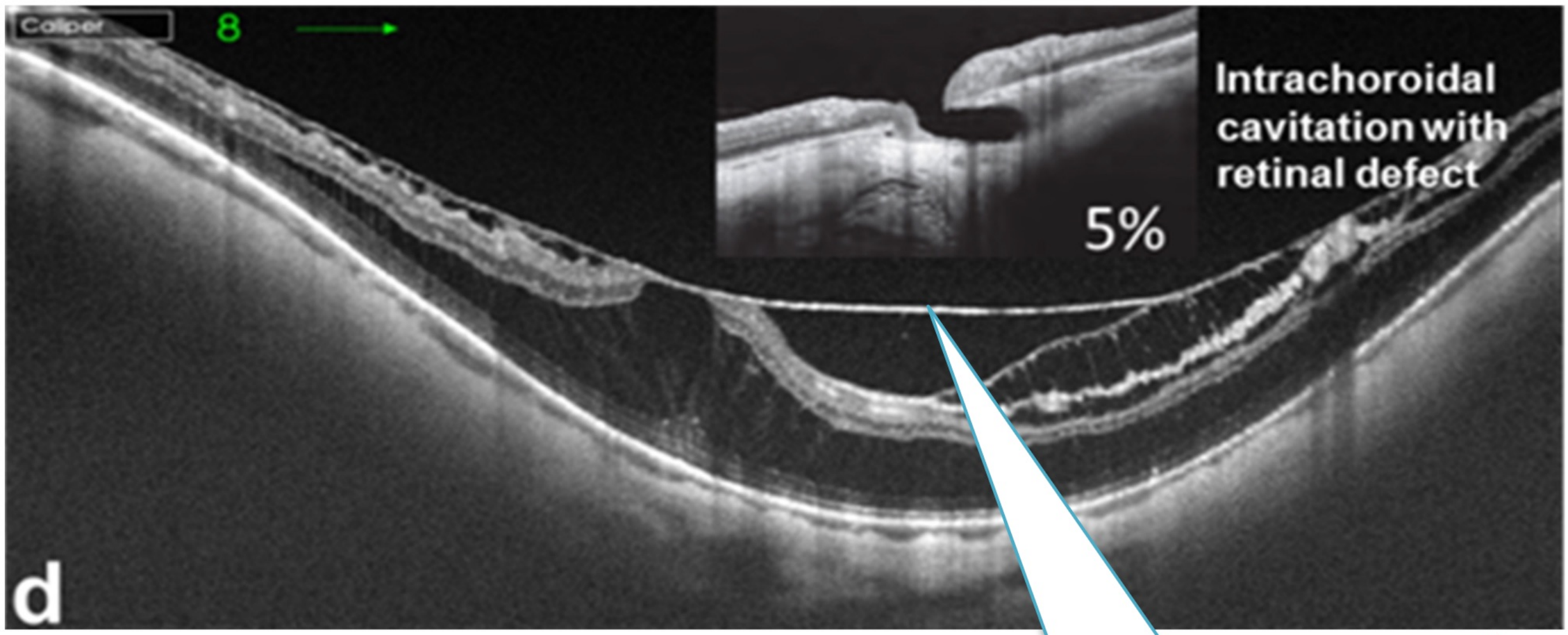
Prof Paulo Stanga (editor of this module) started using SS-OCT in his clinical practice in 2012 - some examples from his practice are shown below:

Use the arrows to scroll through examples

The presence of a **taut internal limiting membrane** in a **high myope suffering from metamorphopsia** is very important. With no changes in biomicroscopy or fundus fluorescein angiography this patient can undergo surgery with the disappearance of metamorphopsia.



Taut internal limiting membrane



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Examples of SS-OCT Imaging

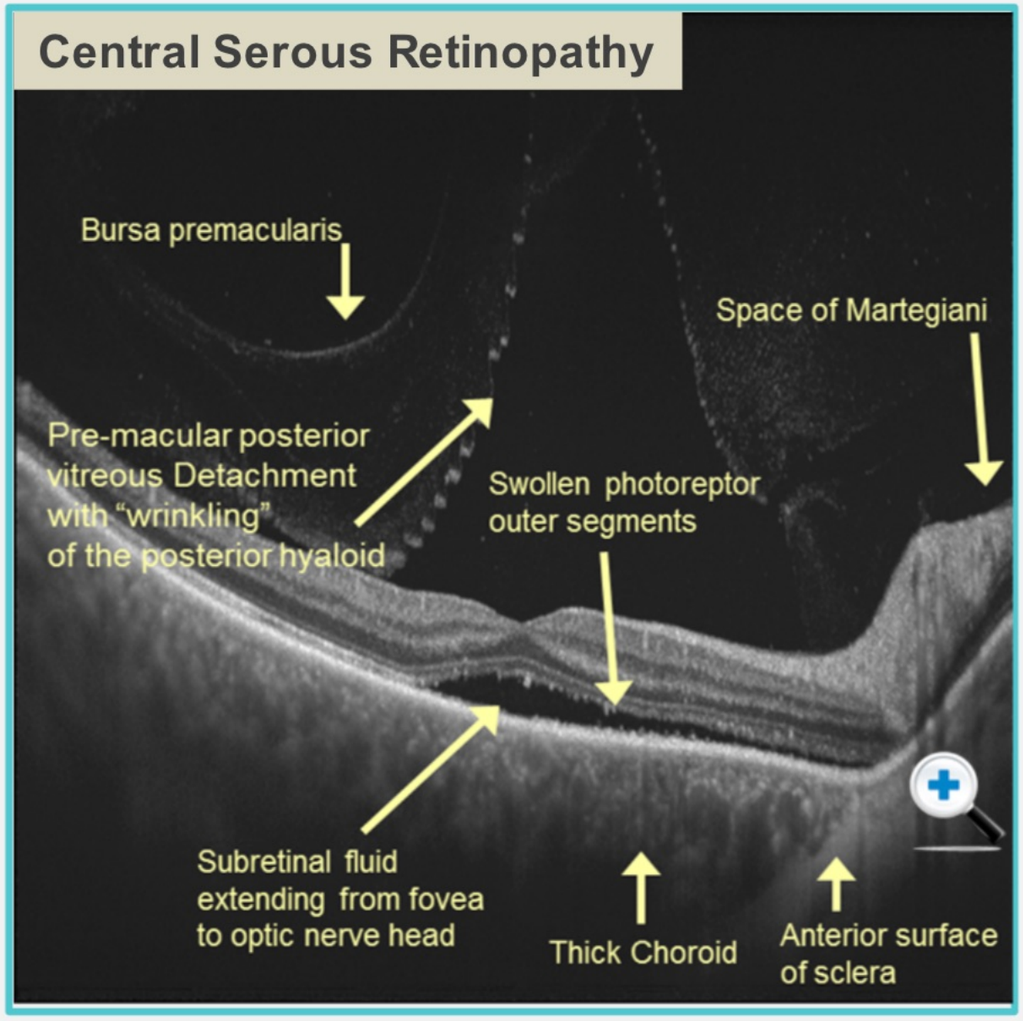
The examples below show the type of images that can be obtained with swept source OCT, in 2 different conditions - **central serous retinopathy** and **pathologic myopia**.

Central Serous Retinopathy

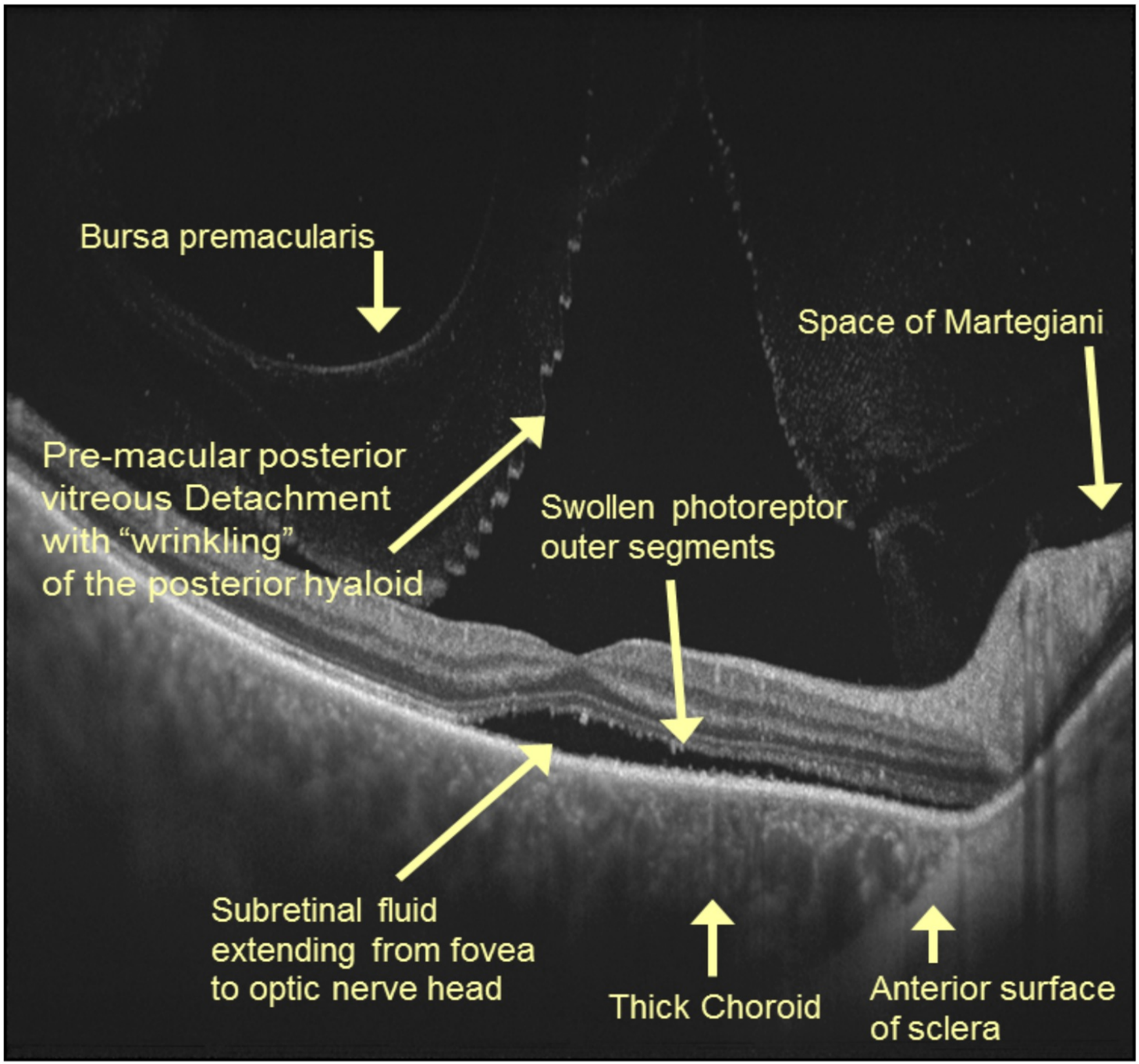
SS-OCT shows uniform quality from the cortical vitreous to the choroid.

Also seen are:

- the bursa macularis
- the space of Martegiani
- the wrinkles in the posterior hyaloid
- the swollen photoreceptor outer segments
- the chorio-scleral interface
- a thick choroid



Central Serous Retinopathy



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

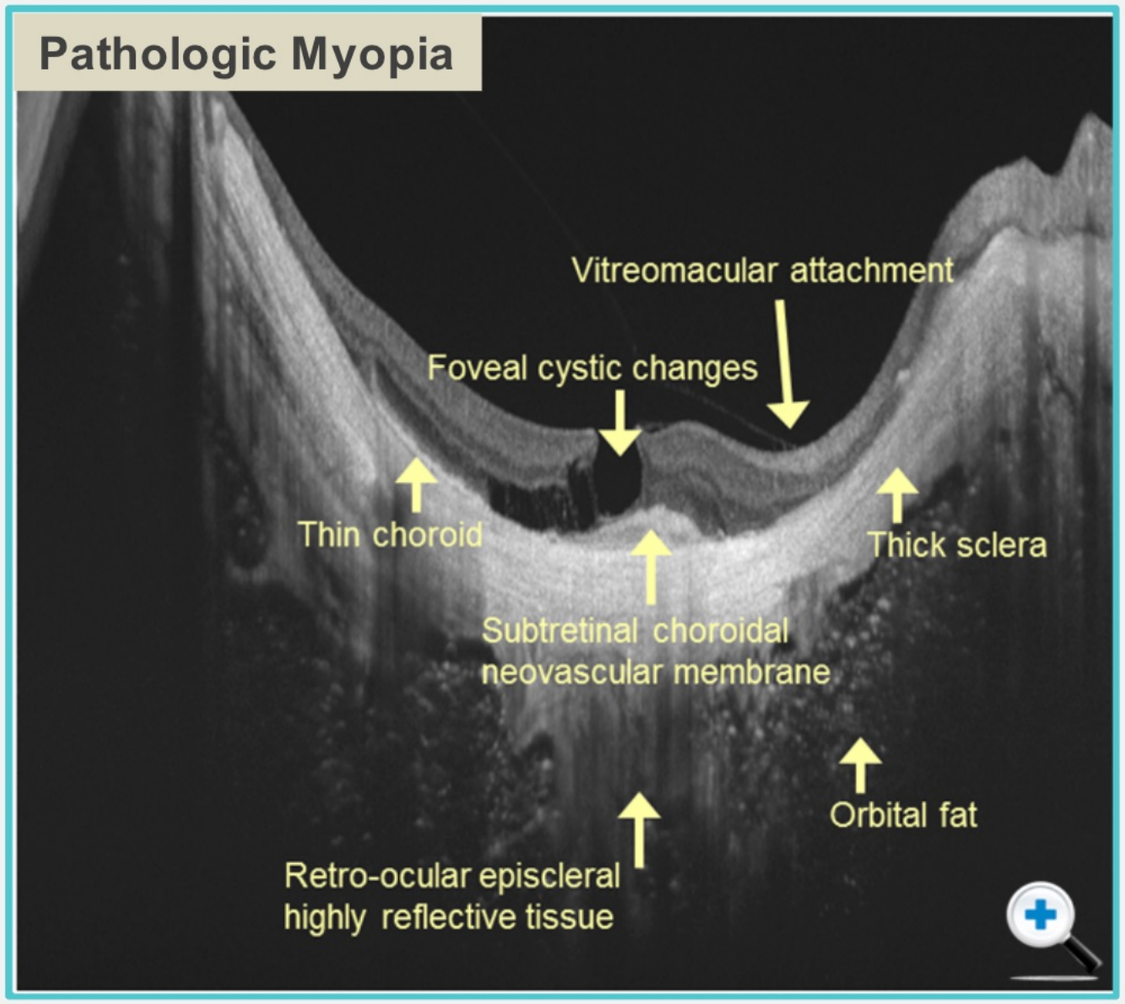
Examples of SS-OCT Imaging

The examples below show the type of images that can be obtained with swept source OCT, in 2 different conditions - **central serous retinopathy** and **pathologic myopia**.

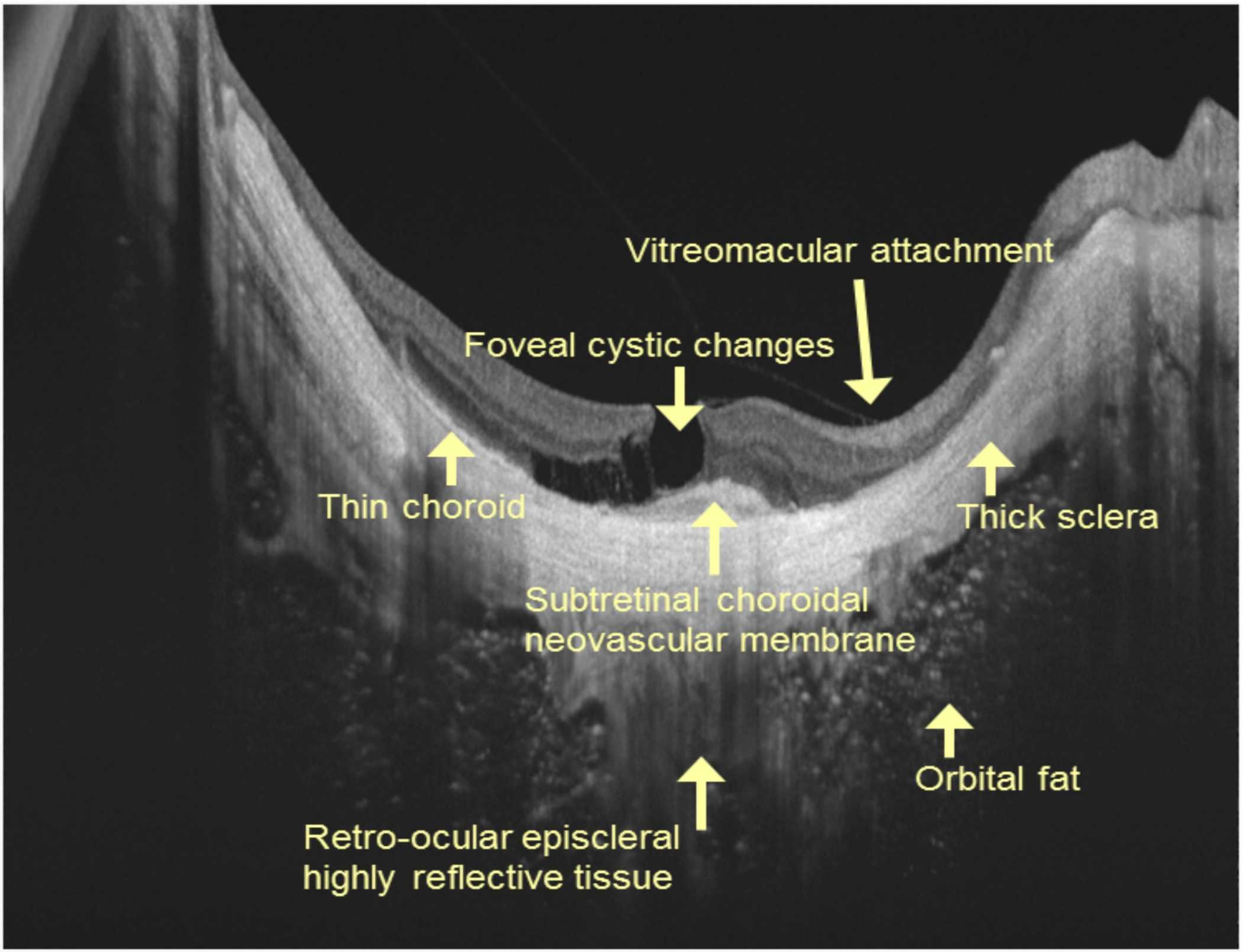
Pathologic Myopia

Retro-ocular hyperreflective tissue can be seen in this patient, and also (what appears to be) the orbital fat.

The sclera is noticeably uneven, and the almost non-existent choroid (thin choroid) is visible.



Pathologic Myopia



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

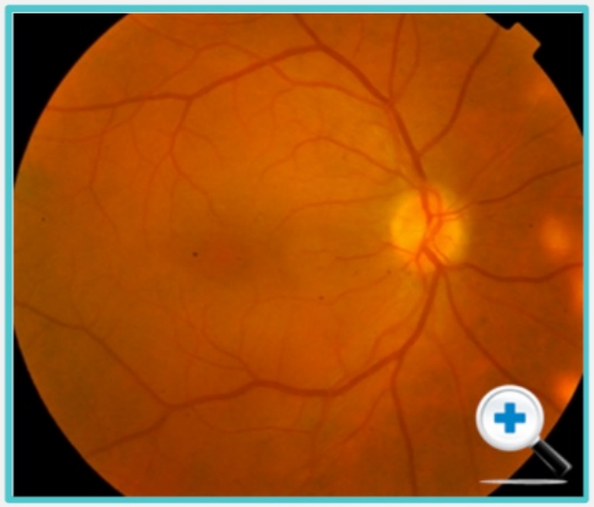
OCT in Uveitis: Evaluation

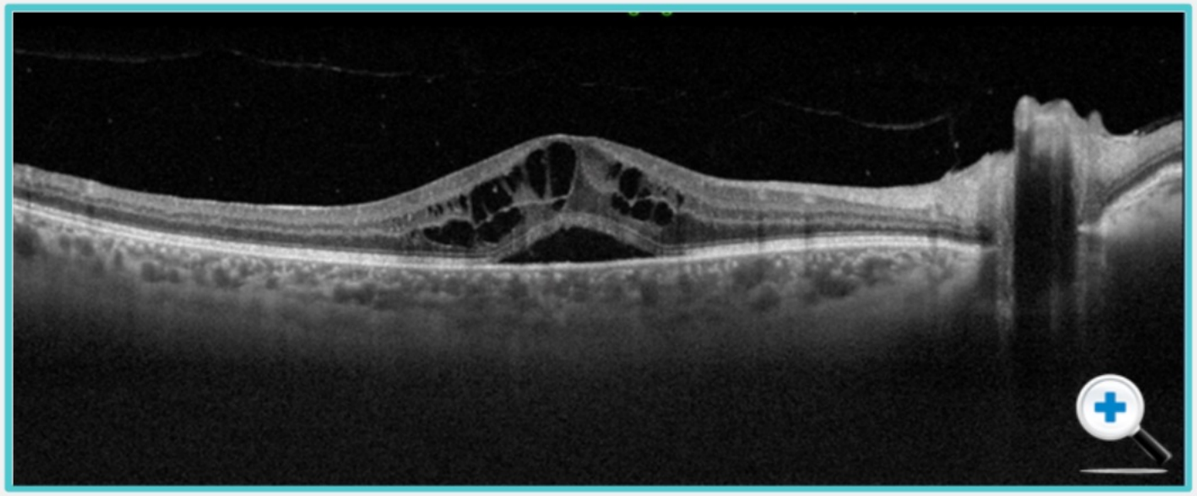
OCT has become a useful tool in the **evaluation of retinal complications associated with posterior uveitis** (as there is media opacity in these patient), and is used to confirm or rule out the presence of:

- Macular edema and sensory retinal detachment (RD)
- Epiretinal membrane (ERM) formation
- Choroidal neovascularisation (CNV)

Choroidal OCT may be particularly helpful when image quality is affected by media opacities (i.e. cataract, uveitis)

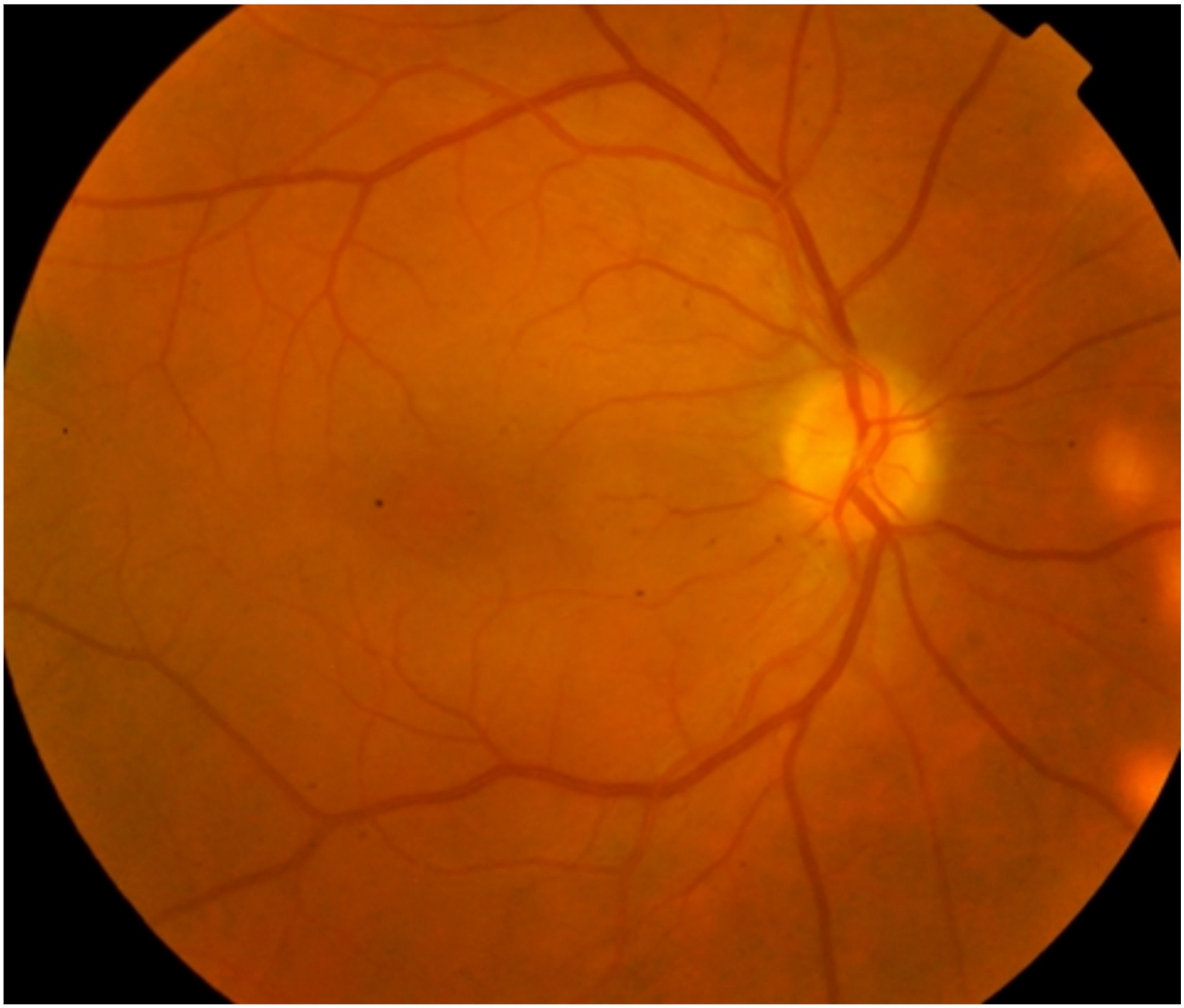
Macular edema and sensory retinal detachment (RD)



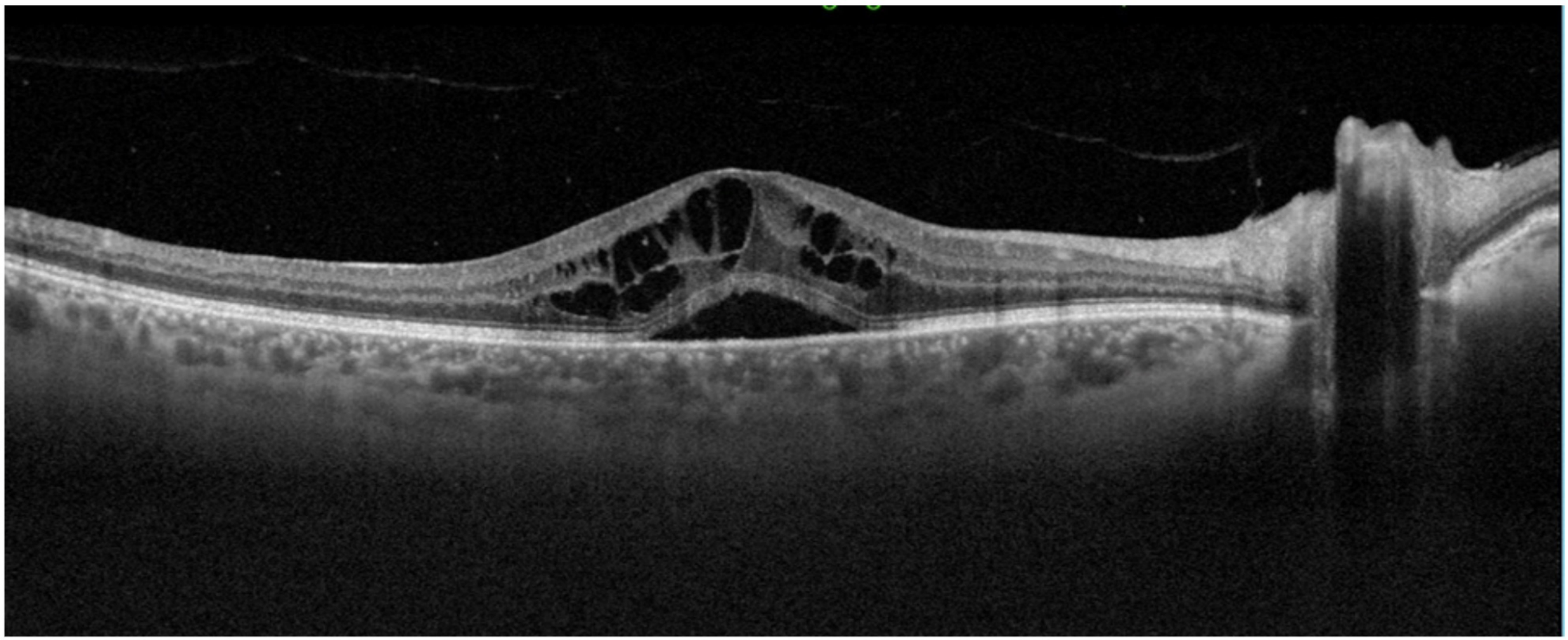


Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

Macular edema and sensory retinal detachment (RD)



Macular edema and sensory retinal detachment (RD)



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

OCT in Uveitis: Evaluation

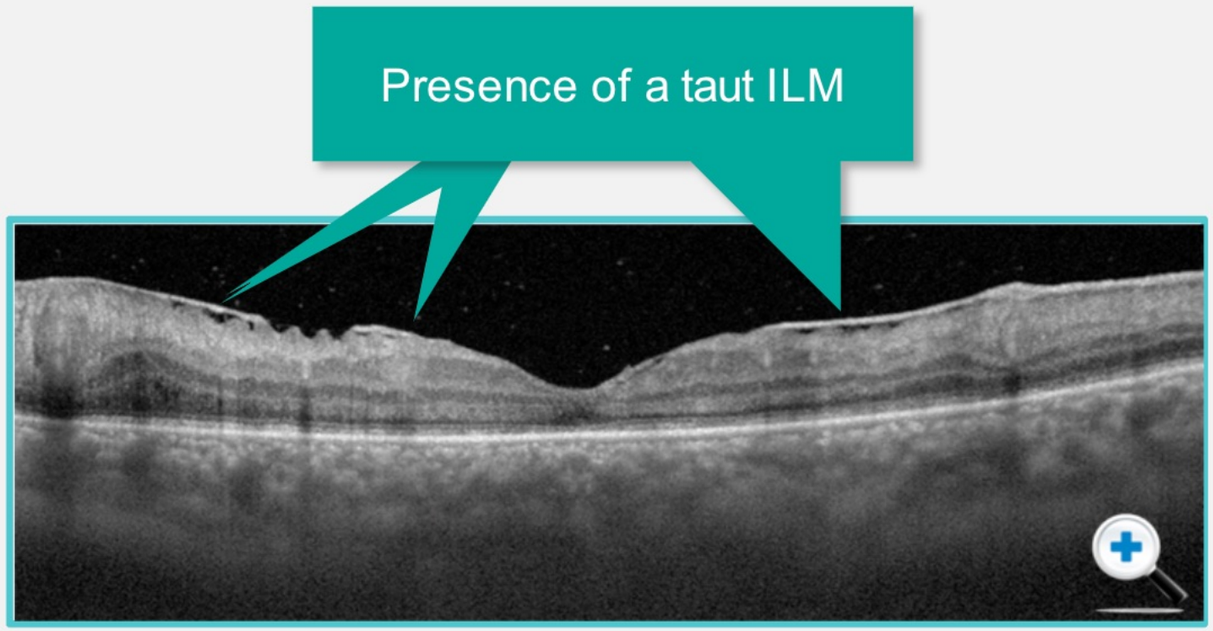
OCT has become a useful tool in the **evaluation of retinal complications associated with posterior uveitis** (as there is media opacity in these patient), and is used to confirm or rule out the presence of:

- Macular edema and sensory retinal detachment (RD)
- Epiretinal membrane (ERM) formation
- Choroidal neovascularisation (CNV)

Choroidal OCT may be particularly helpful when image quality is affected by media opacities (i.e. cataract, uveitis)

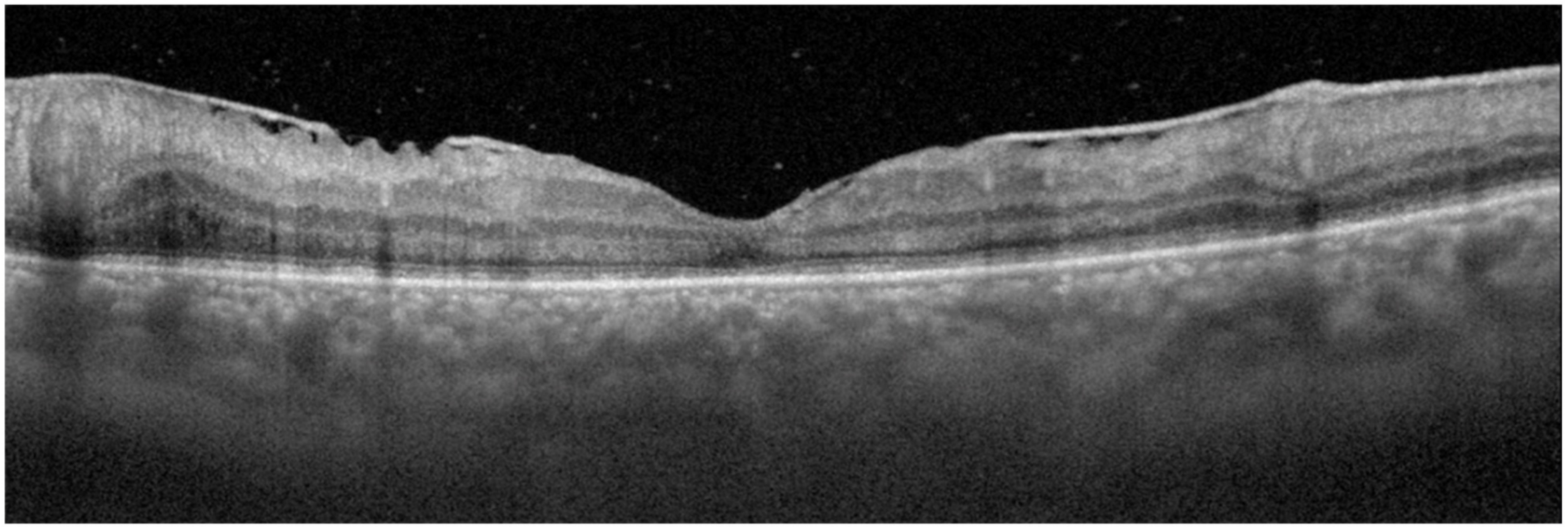
Epiretinal membrane (ERM) formation

OCT is useful in posterior uveitis to see the presence of a taut ILM (internal limiting membrane), which (in this case) appears to be in the process of becoming a thickened epiretinal membrane.



Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

Epiretinal membrane (ERM) formation



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

OCT in Uveitis: Evaluation

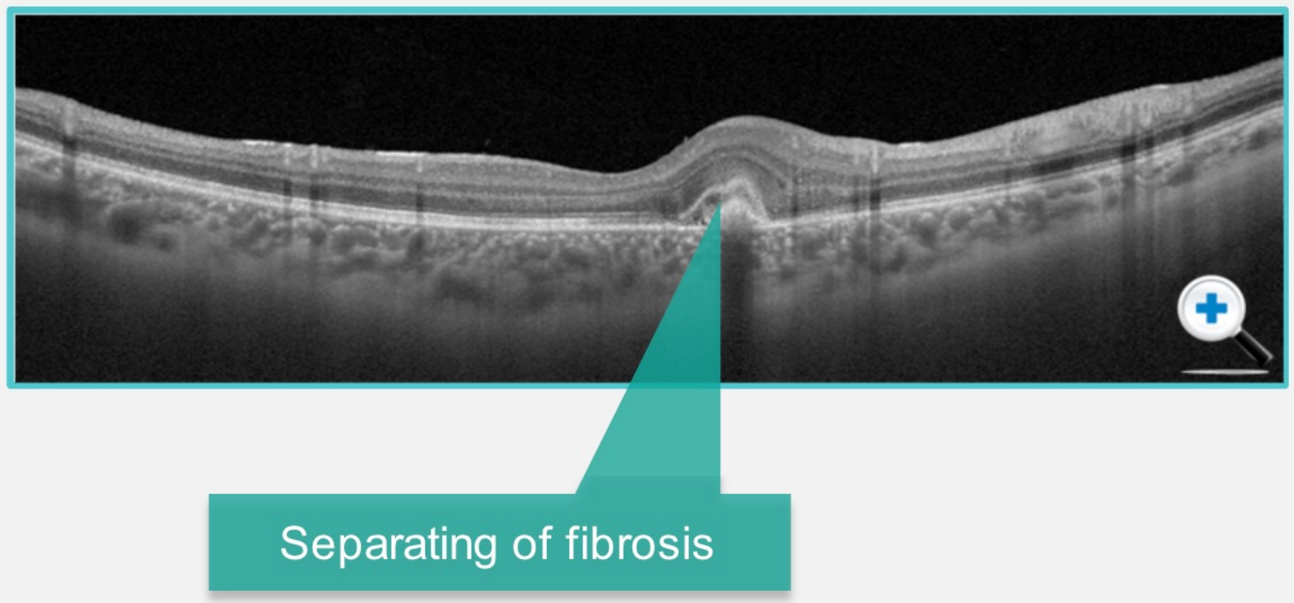
OCT has become a useful tool in the **evaluation of retinal complications associated with posterior uveitis** (as there is media opacity in these patient), and is used to confirm or rule out the presence of:

- Macular edema and sensory retinal detachment (RD)
- Epiretinal membrane (ERM) formation
- Choroidal neovascularisation (CNV)

Choroidal OCT may be particularly helpful when image quality is affected by media opacities (i.e. cataract, uveitis)

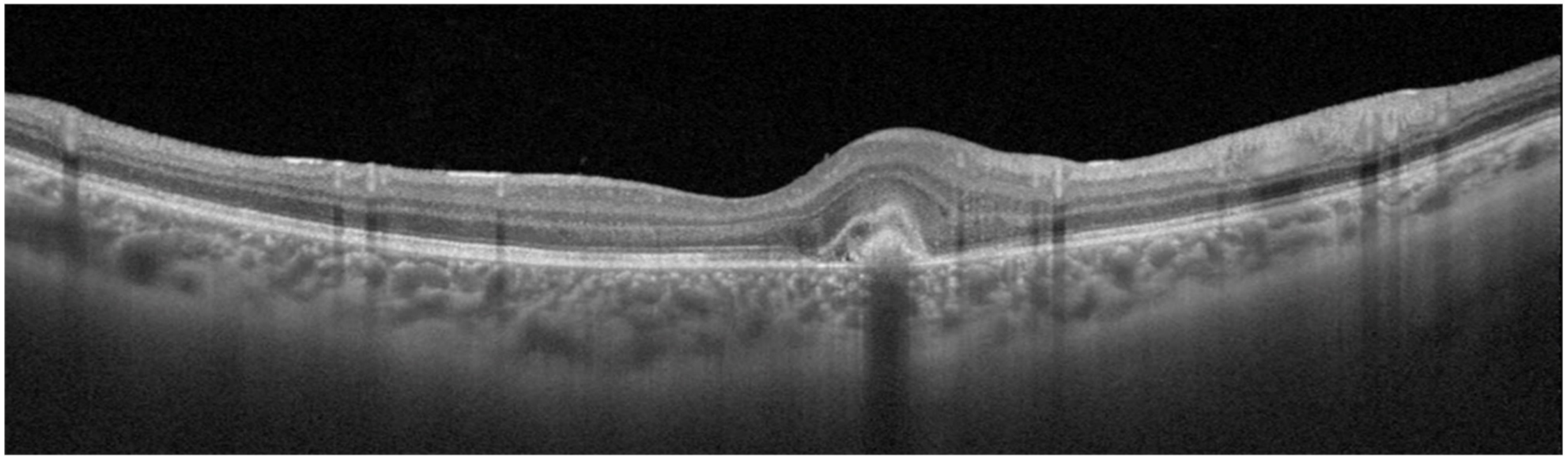
Choroidal neovascularisation (CNV)

This OCT image shows the separating of fibrosis.



Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

Choroidal neovascularisation (CNV)



euretina InSight

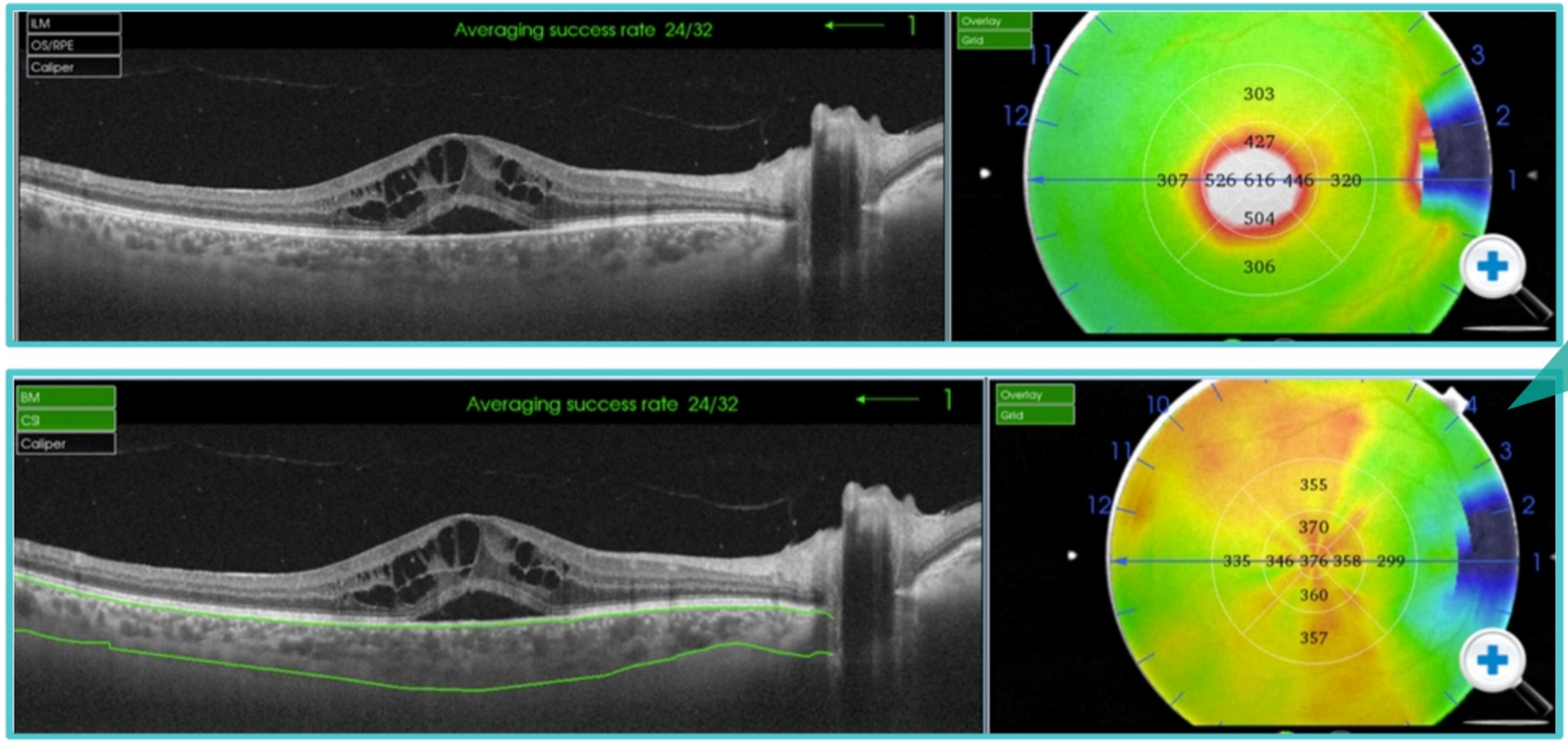
OCT Choroidal Imaging: Indications & Value

Multimodal OCT

OCT in Uveitis: Management

SS-OCT is useful in the **management of posterior uveitis** by assisting in the:

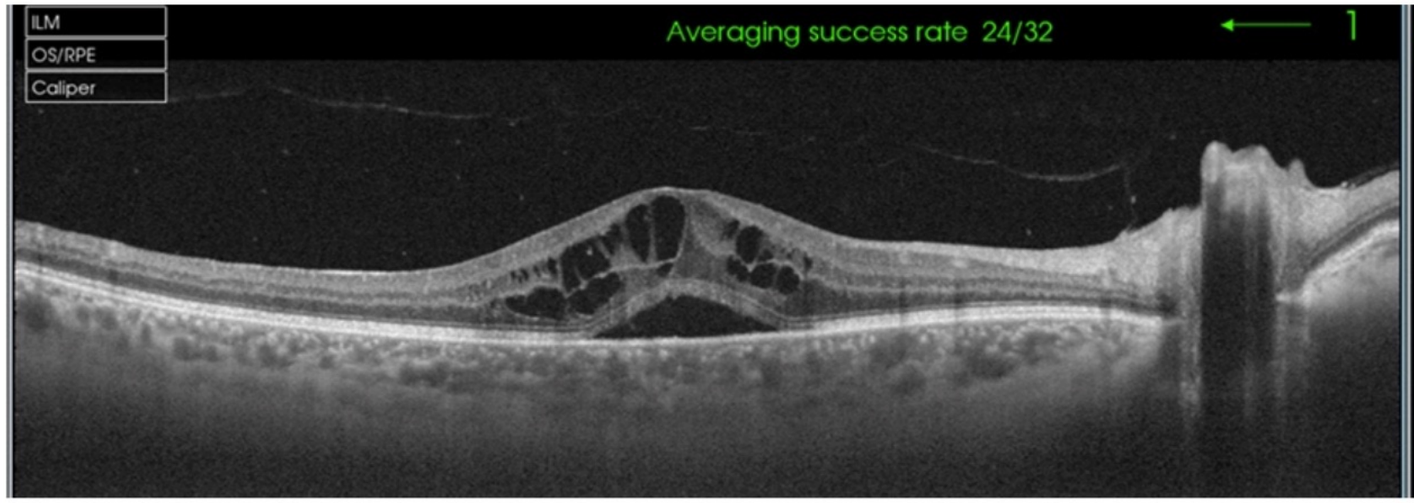
- **Quantification (measuring) of the retinal and choroidal thickness**
  The ability to measure the choroidal thickness (a new biomarker of diagnosis and management in uveal disorders) is very important for clinicians because choroid is the uvea, and their interest is in uveitis. Clinicians have mainly relied on fundus fluorescein angiography to date, assessing macular edema. However, **choroidal thickness maps** can now be obtained, which **sometimes do not correlate with linear thickness of the choroid** - so be careful and assess all of the information available.
- **Monitoring of the therapeutic response**
  Choroidal OCT may be particularly helpful for assessing response to treatment and monitoring relapse of disease (i.e. CSR, uveitis).

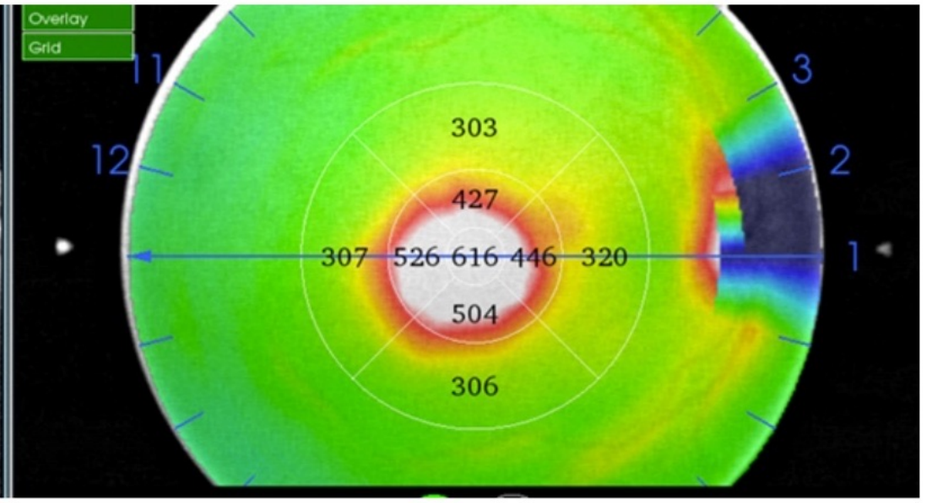


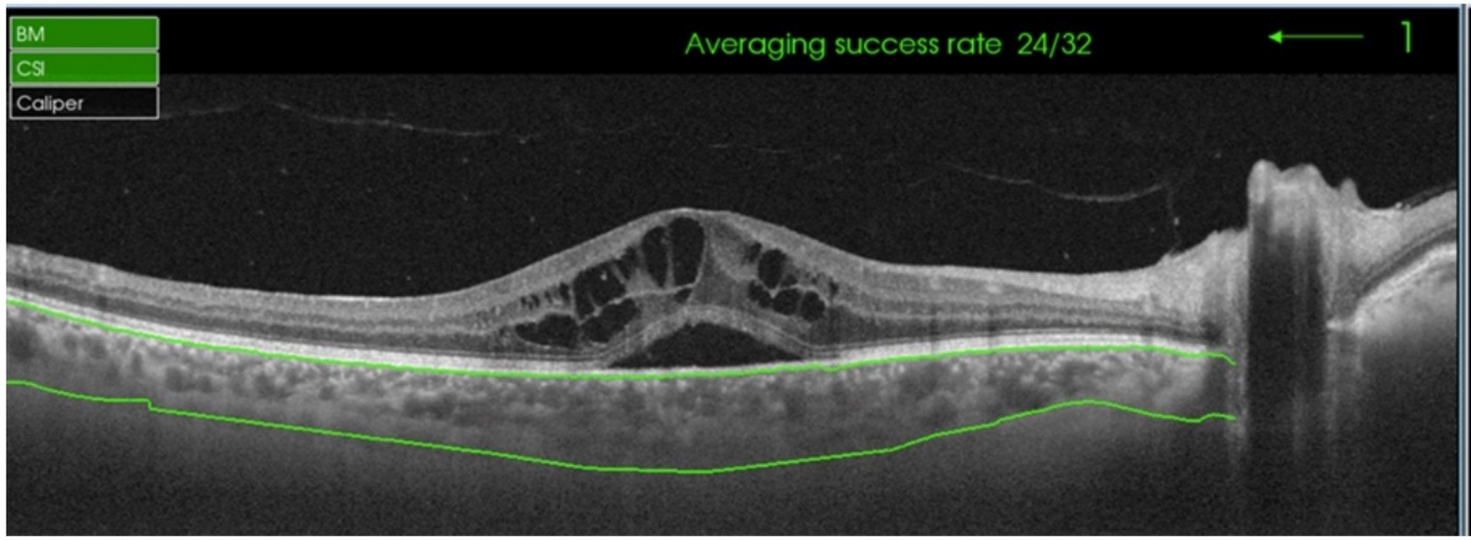
Note: Choroidal thickness maps do not always correlate with linear thickness of the choroid

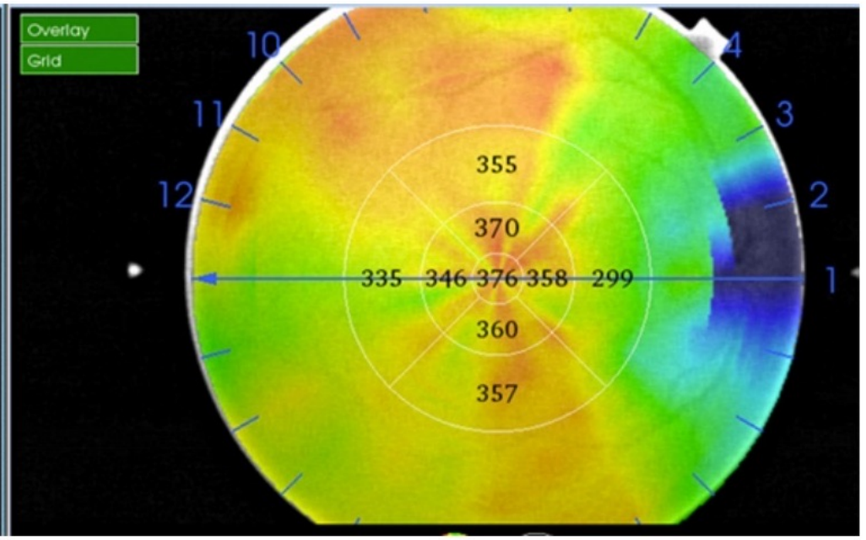
Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

SS-OCT


ILM
OS/RPE
Caliper
Averaging success rate 24/32
1


Overlay
Grid
11
12
1
2
3
303
427
307
526
616
446
320
504
306


BM
CSI
Caliper
Averaging success rate 24/32
1


Overlay
Grid
10
11
12
1
2
3
4
355
370
335
346
376
358
299
360
357

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Pan Uveitis (White Dot Syndrome)

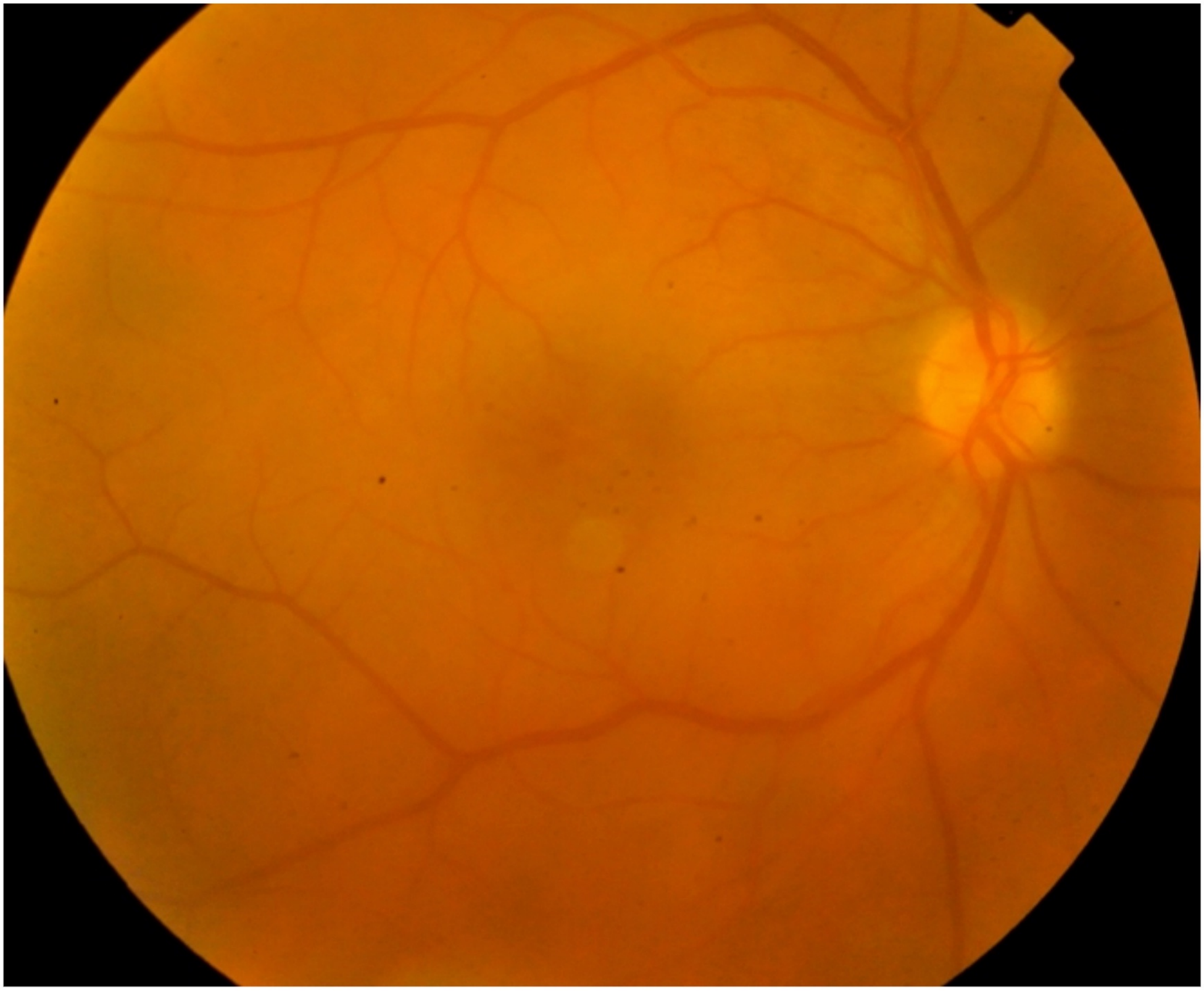
This is another example showing the benefits of using OCT. This is a patient with panuveitis, white dot syndrome.

- Male patient aged 48 years
- Right recent diminution of vision
- VA Rt. Eye 6/36 and Left eye 6/6
- Past history of medical treatment for glaucoma
- SLE: anterior uveitis
- Posterior segment: vitreous cells

Fundus Image

Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

Fundus Image



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Pan Uveitis (White Dot Syndrome)

This is another example showing the benefits of using OCT. This is a patient with panuveitis, white dot syndrome.

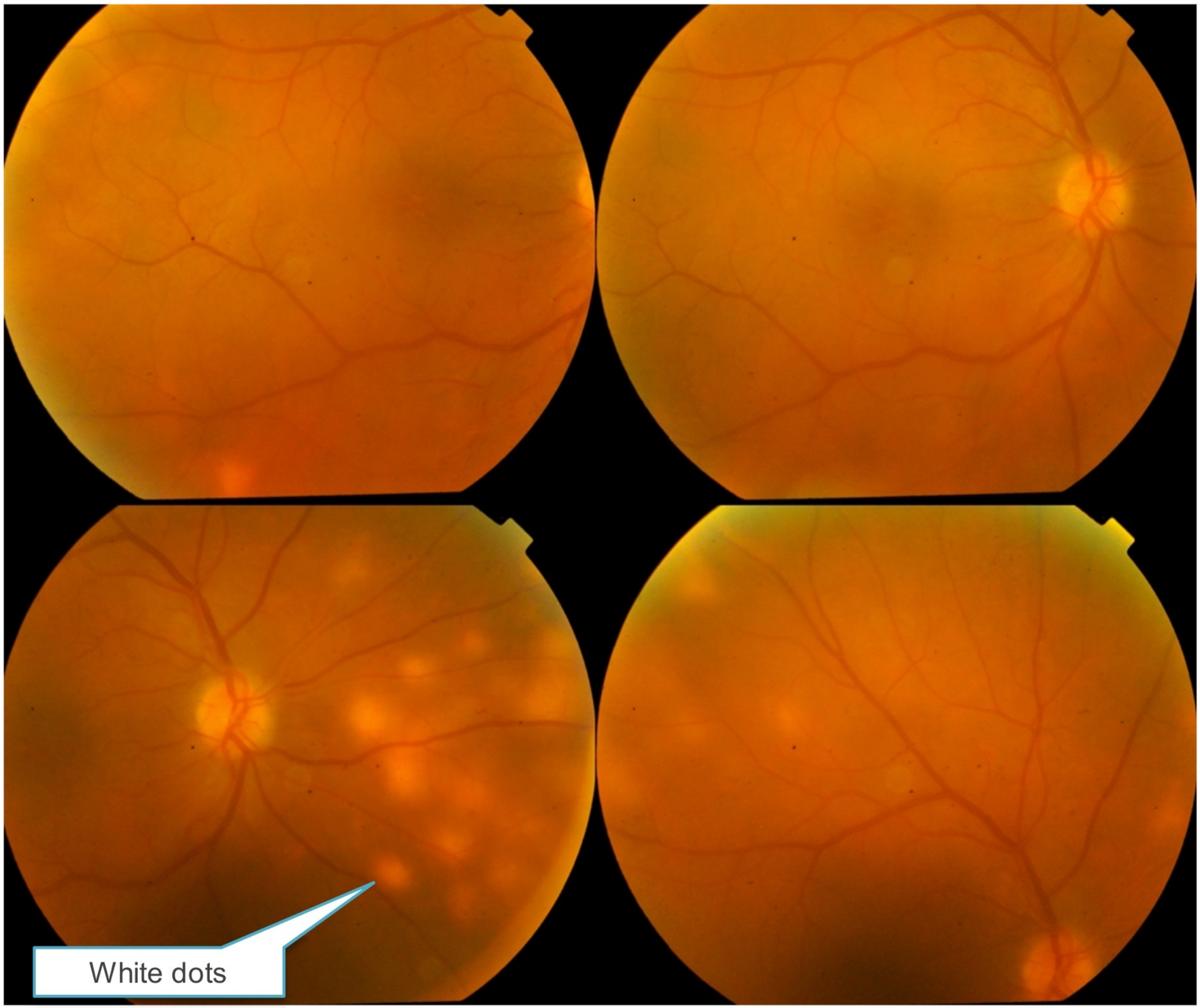
- Male patient aged 48 years
- Right recent diminution of vision
- VA Rt. Eye 6/36 and Left eye 6/6
- Past history of medical treatment for glaucoma
- SLE: anterior uveitis
- Posterior segment: vitreous cells

Fundus Images

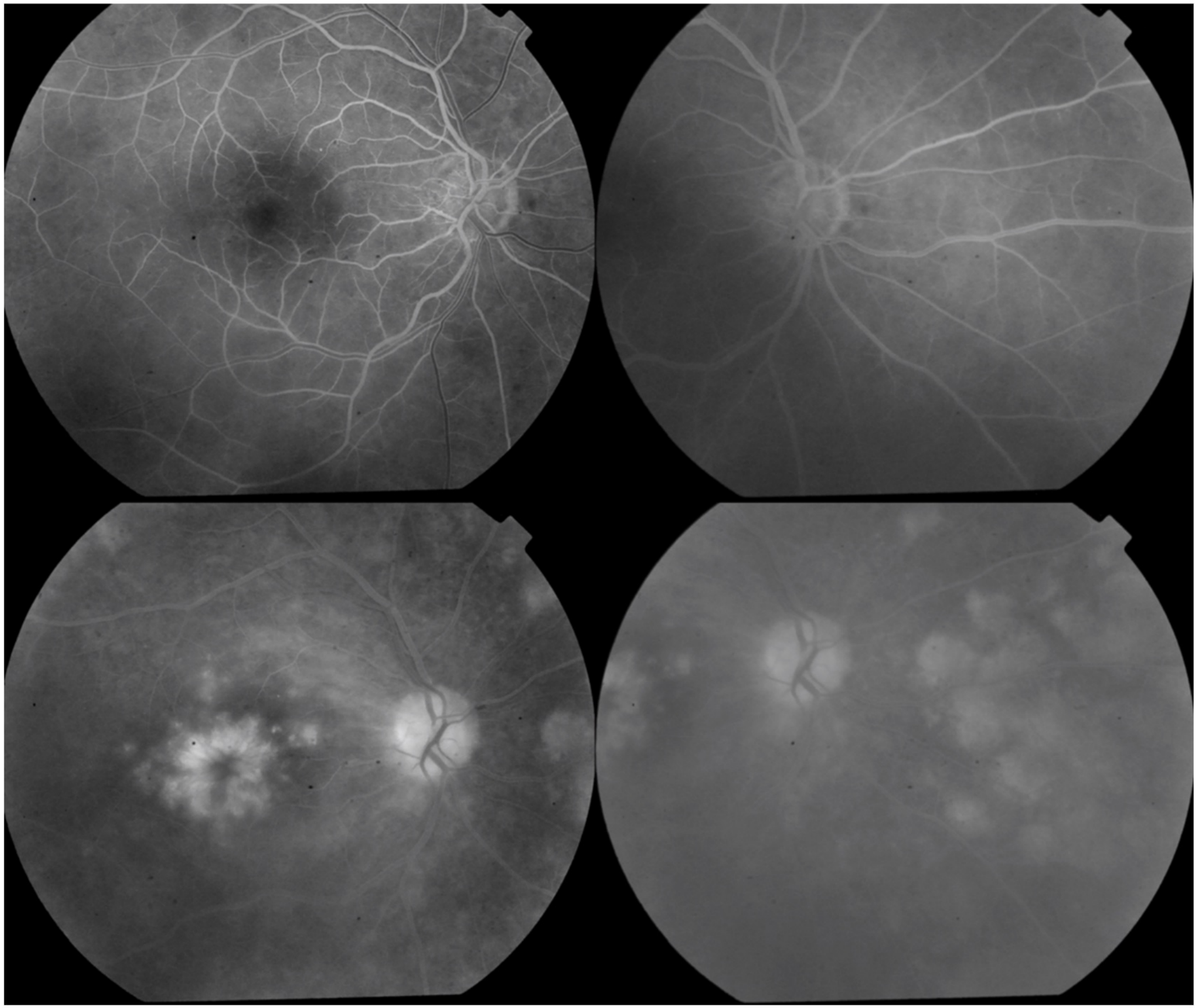
Fundus images showing **white dots**.

Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

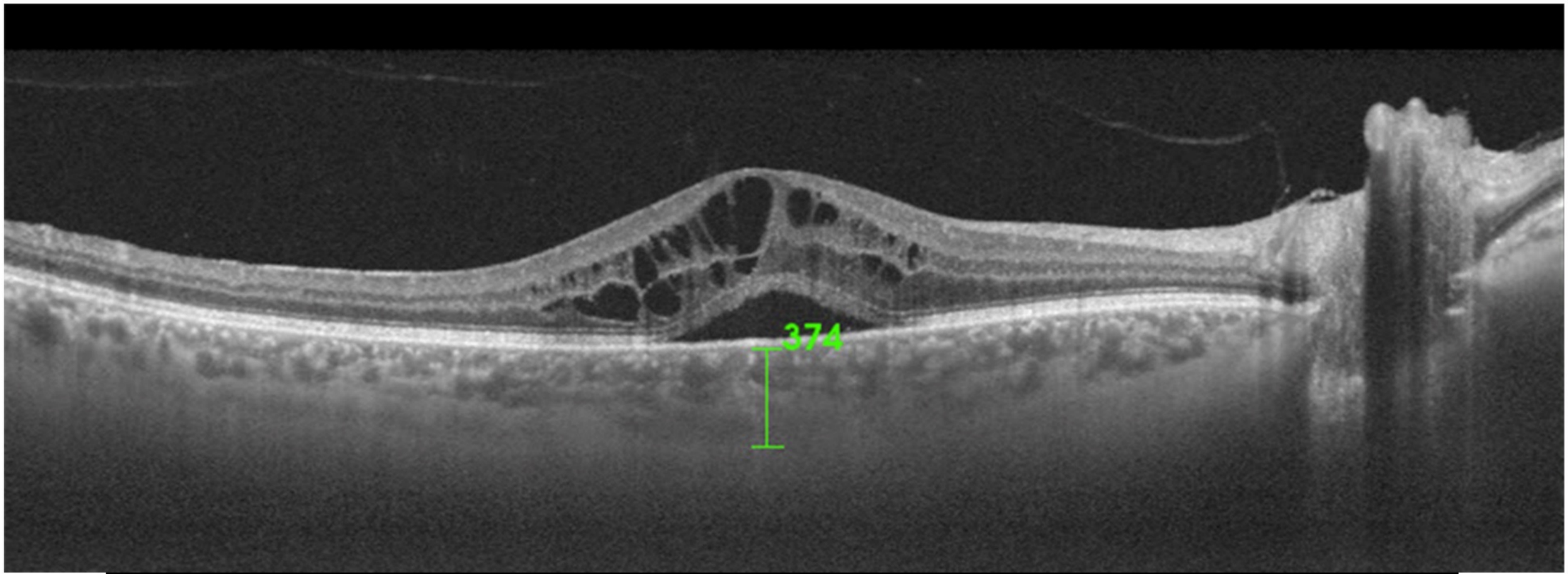
Fundus Images, with white dots

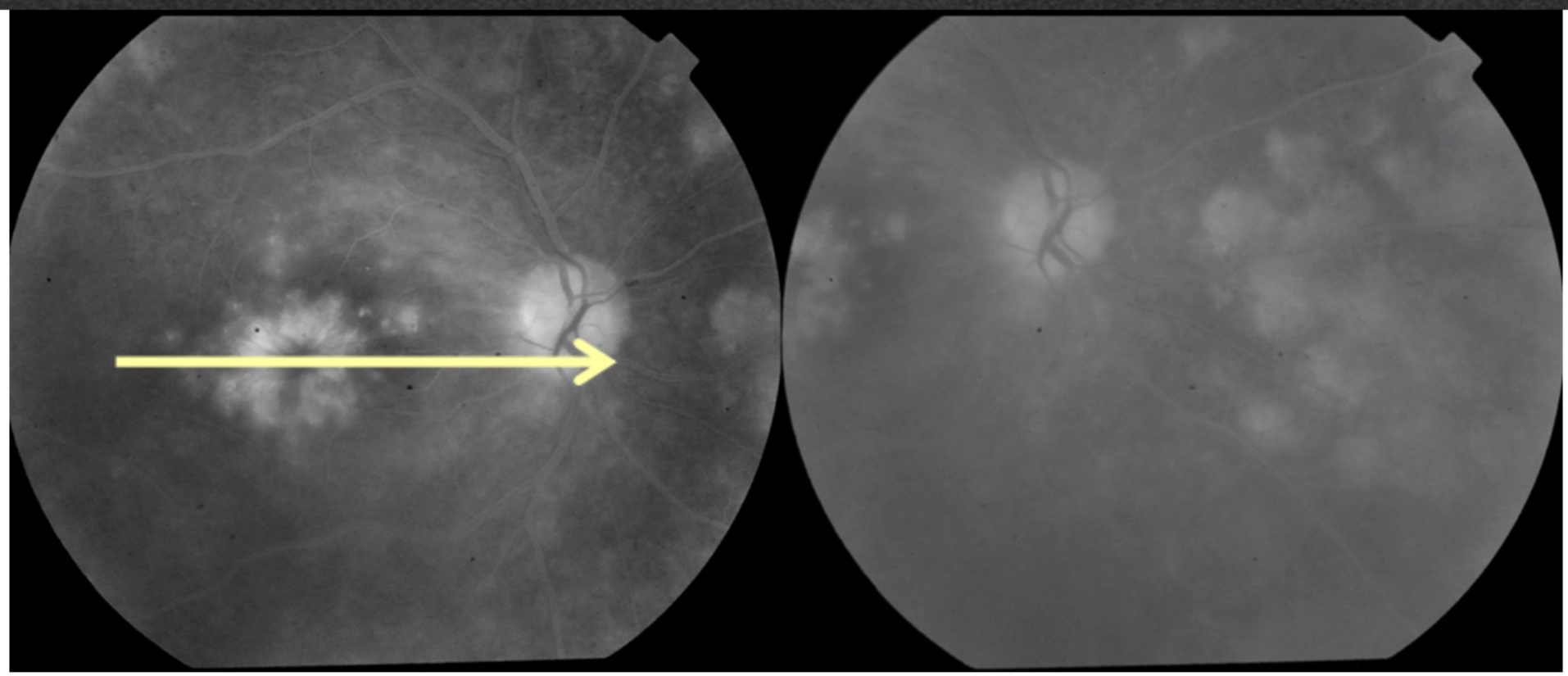


Macular edema



Macular edema and sensory retinal detachment (RD)





euretina InSight

OCT Choroidal Imaging: Indications & Value

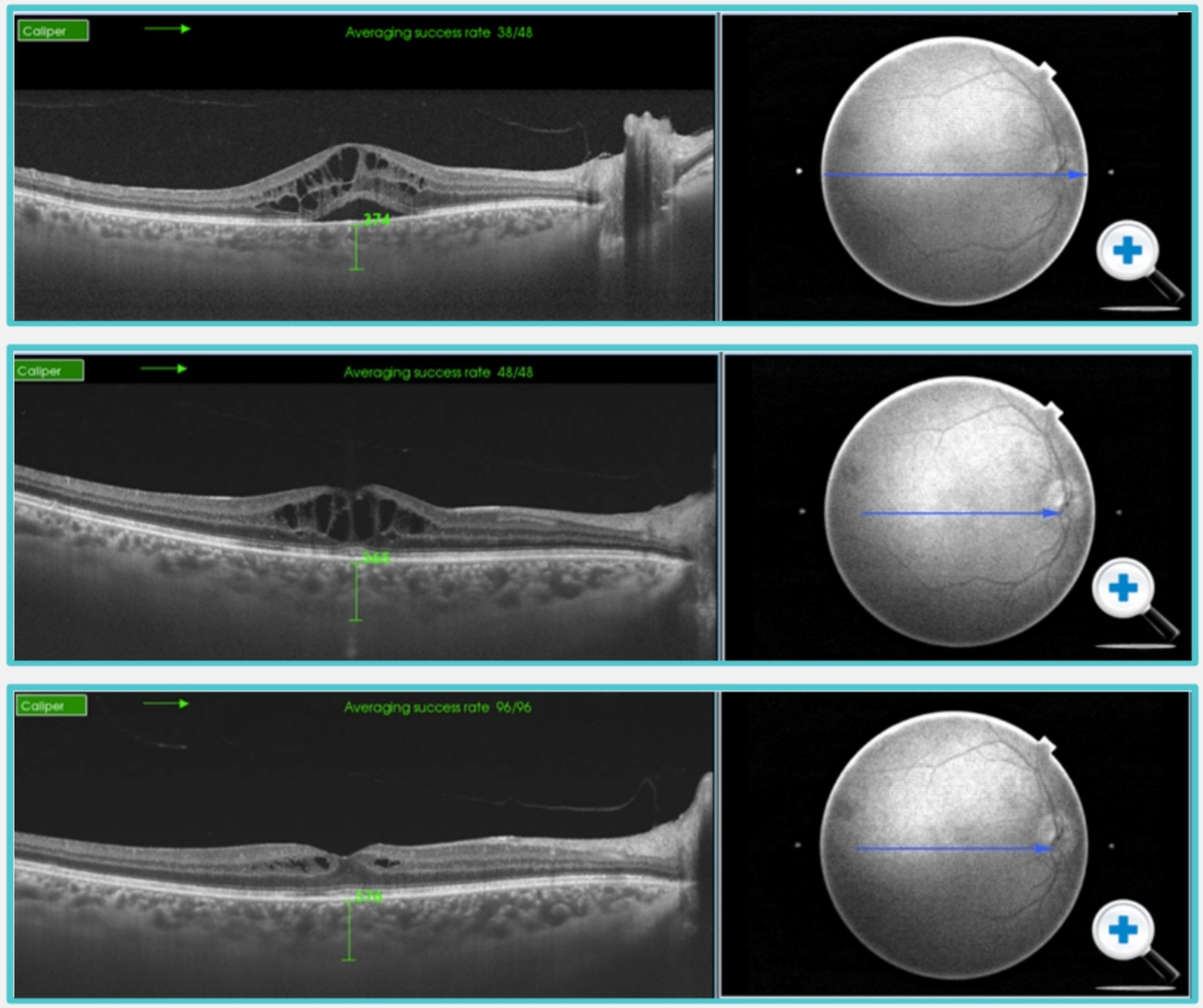
Multimodal OCT

Measuring Choroidal Thickness

As stated previously, **choroidal thickness can now be measured using OCT**, and this measurement information can be used in patient follow up.

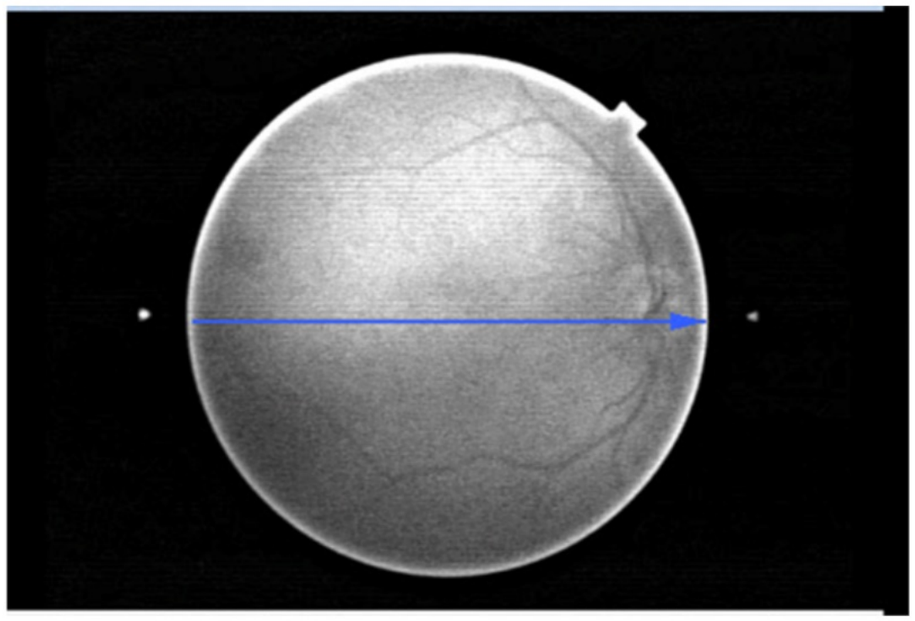
Measuring Choroidal Thickness | **Choroidal Thickness Maps** | **Vertical Axis Map**

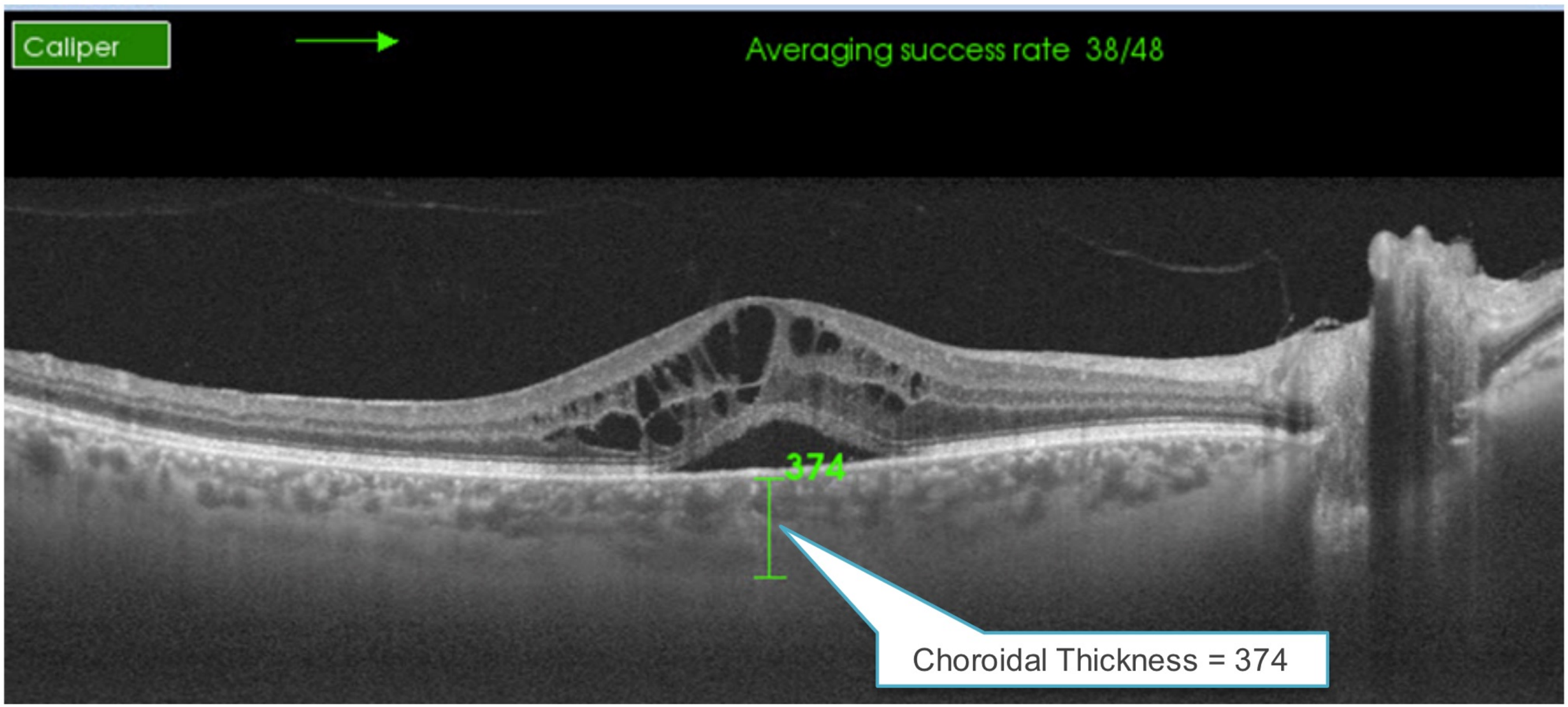
Click the tabs to learn more about choroidal thickness maps



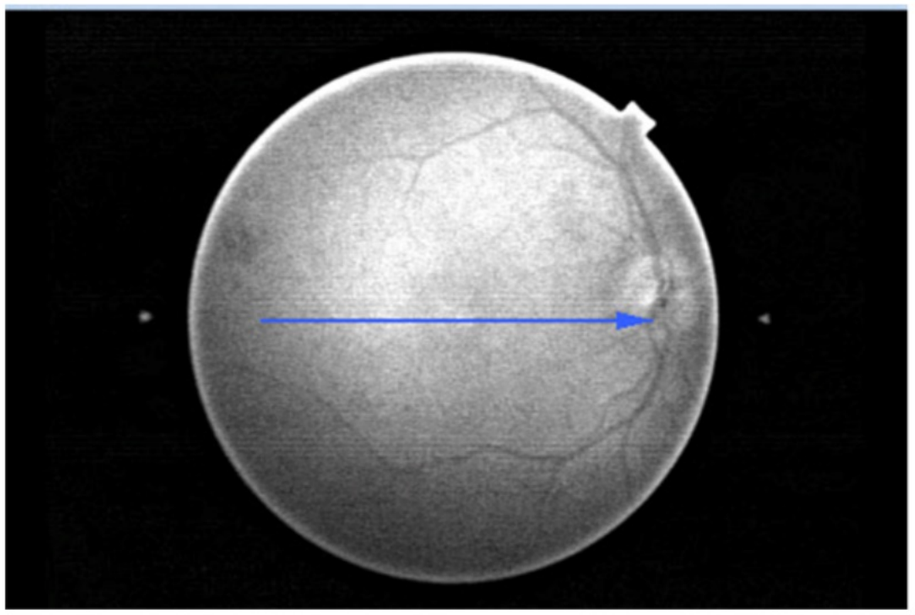
Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

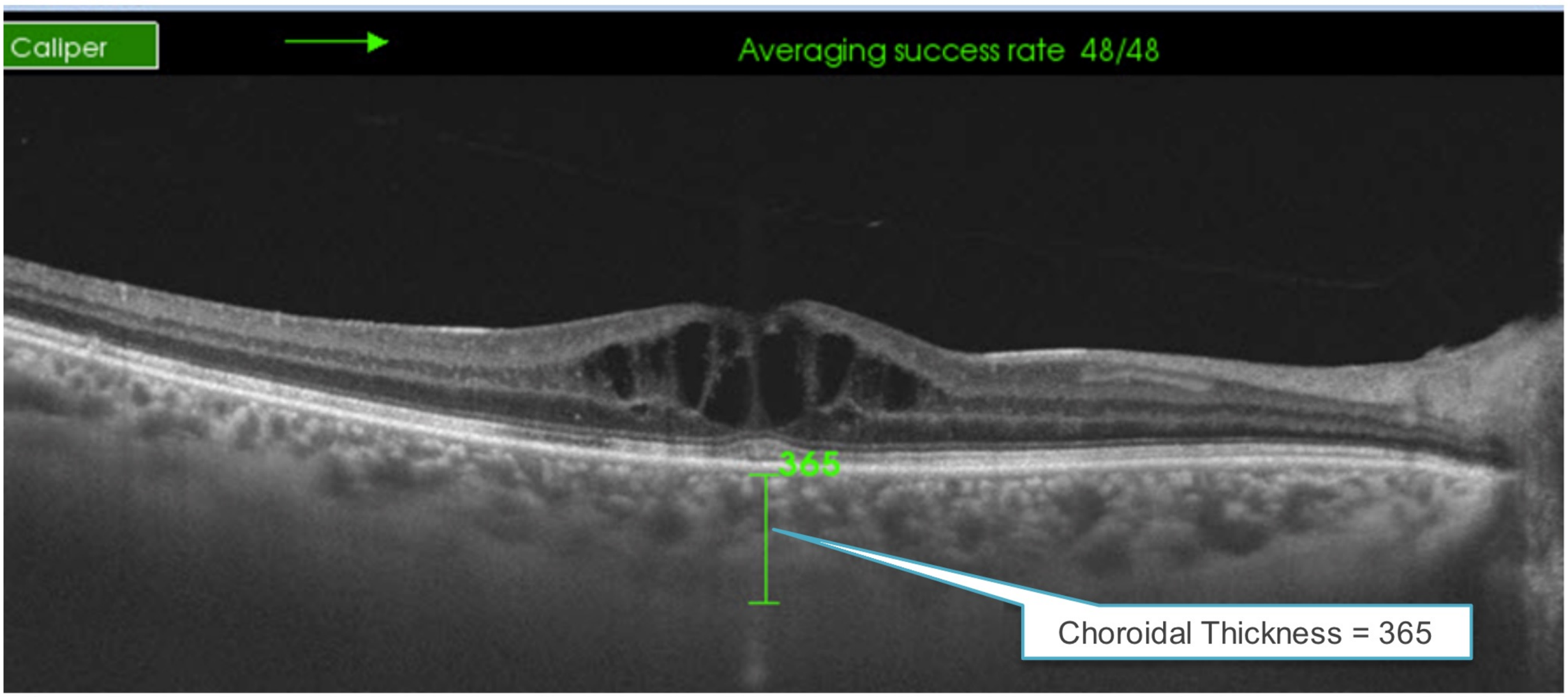
Measuring Choroidal Thickness



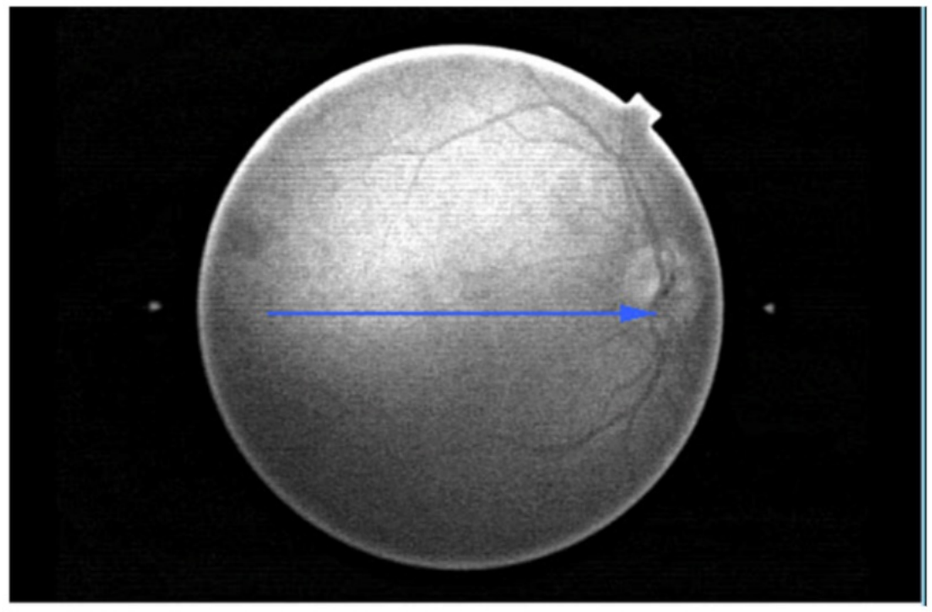


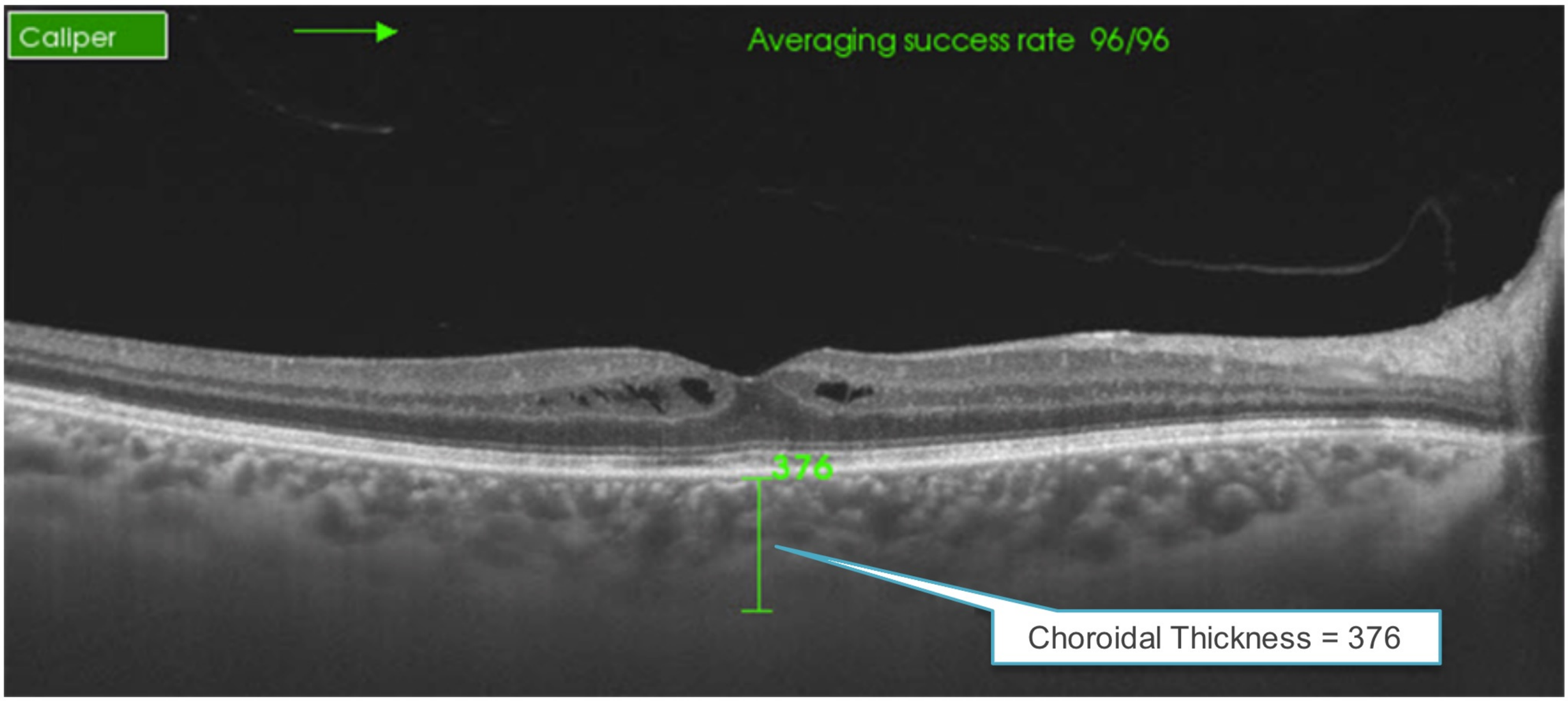
Measuring Choroidal Thickness





Measuring Choroidal Thickness





euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Measuring Choroidal Thickness

As stated previously, **choroidal thickness can now be measured using OCT**, and this measurement information can be used in patient follow up.

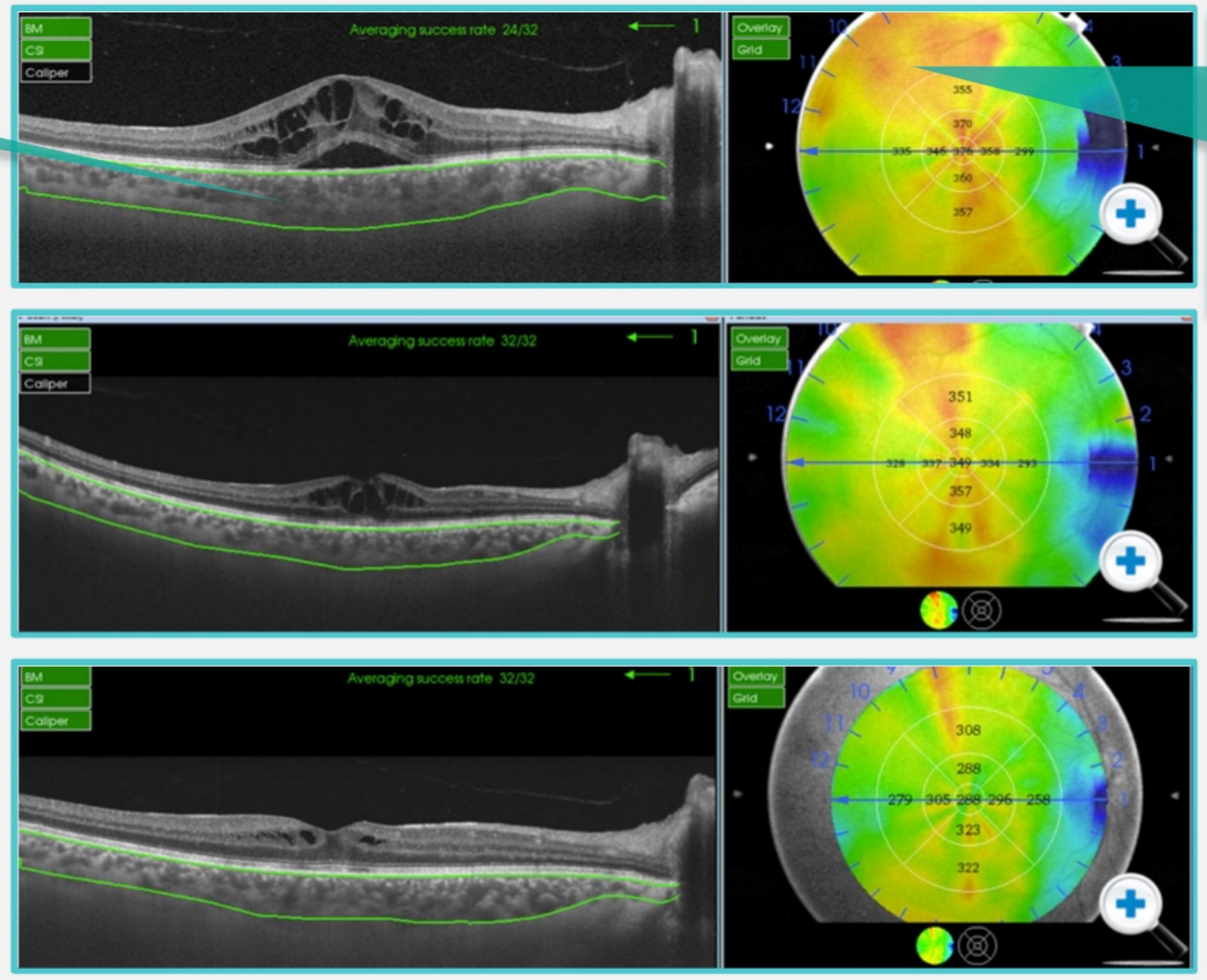
Measuring Choroidal Thickness | **Choroidal Thickness Maps** | **Vertical Axis Map**

Choroidal thickness unchanged on linear scan

Choroidal thickness maps are more important than monitoring subfoveal thickness, as (in this example) the map shows improvement but the linear scan does not.

Response to treatment can be assessed this way.

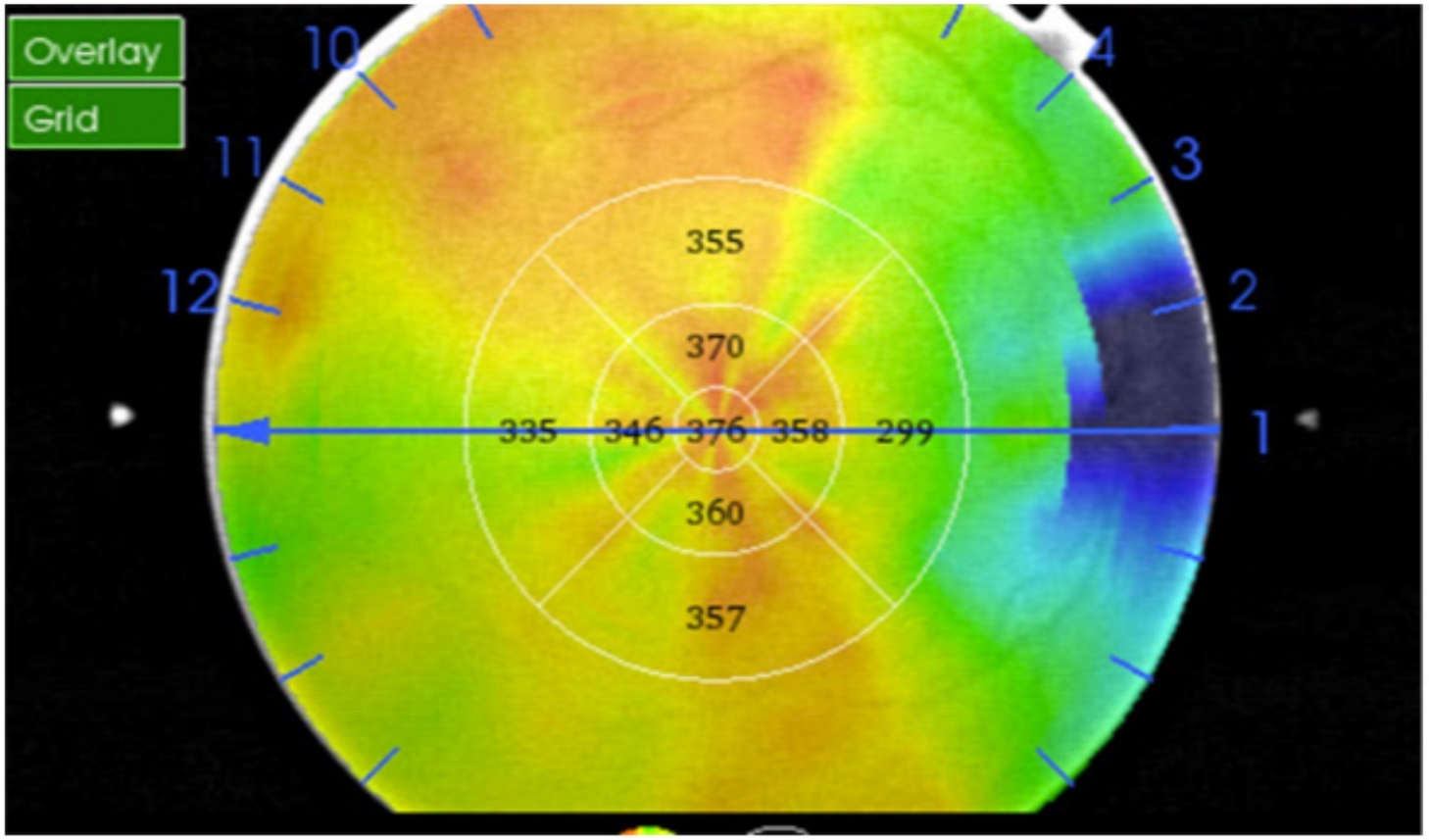
The choroidal thickness on the linear scans remains unchanged - however, the choroidal maps show a significant difference.

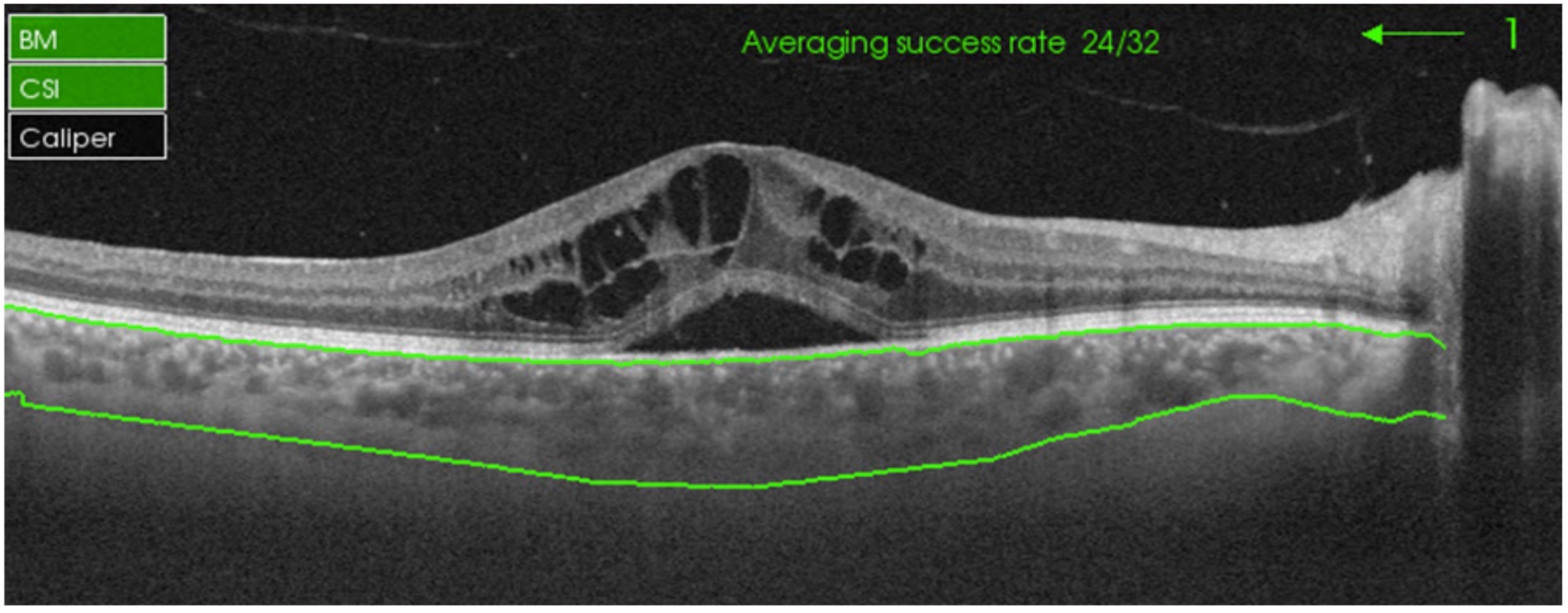


The choroidal map shows a significant difference

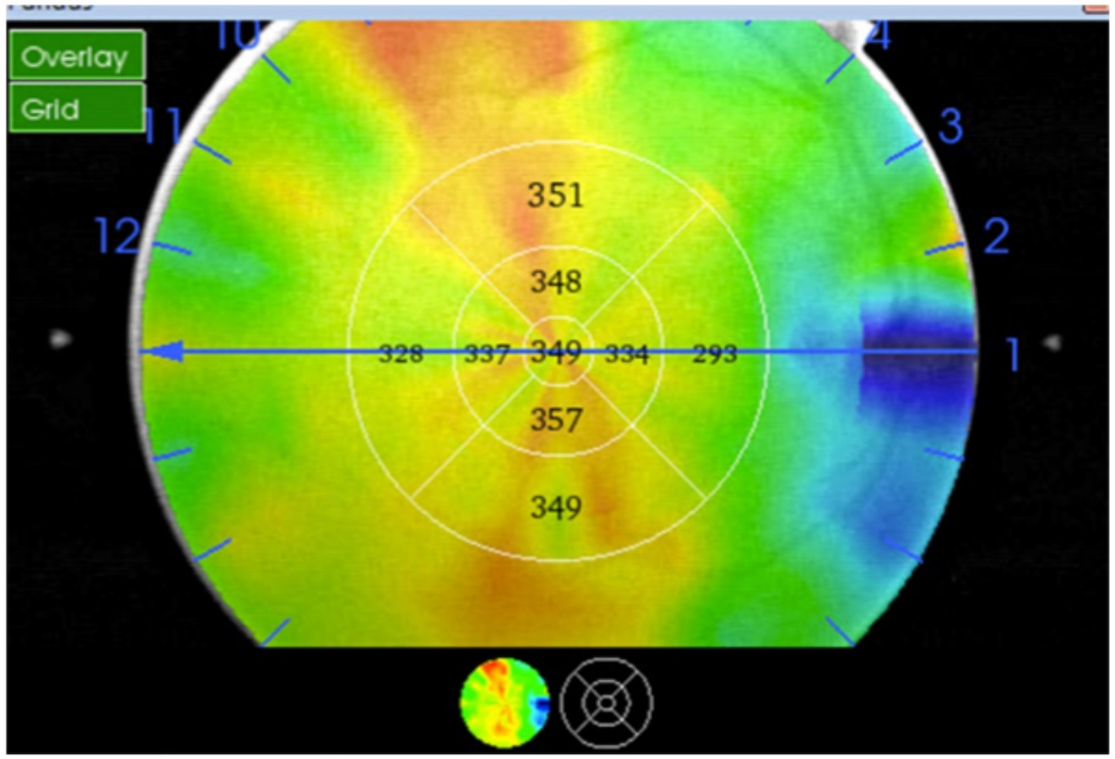
Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

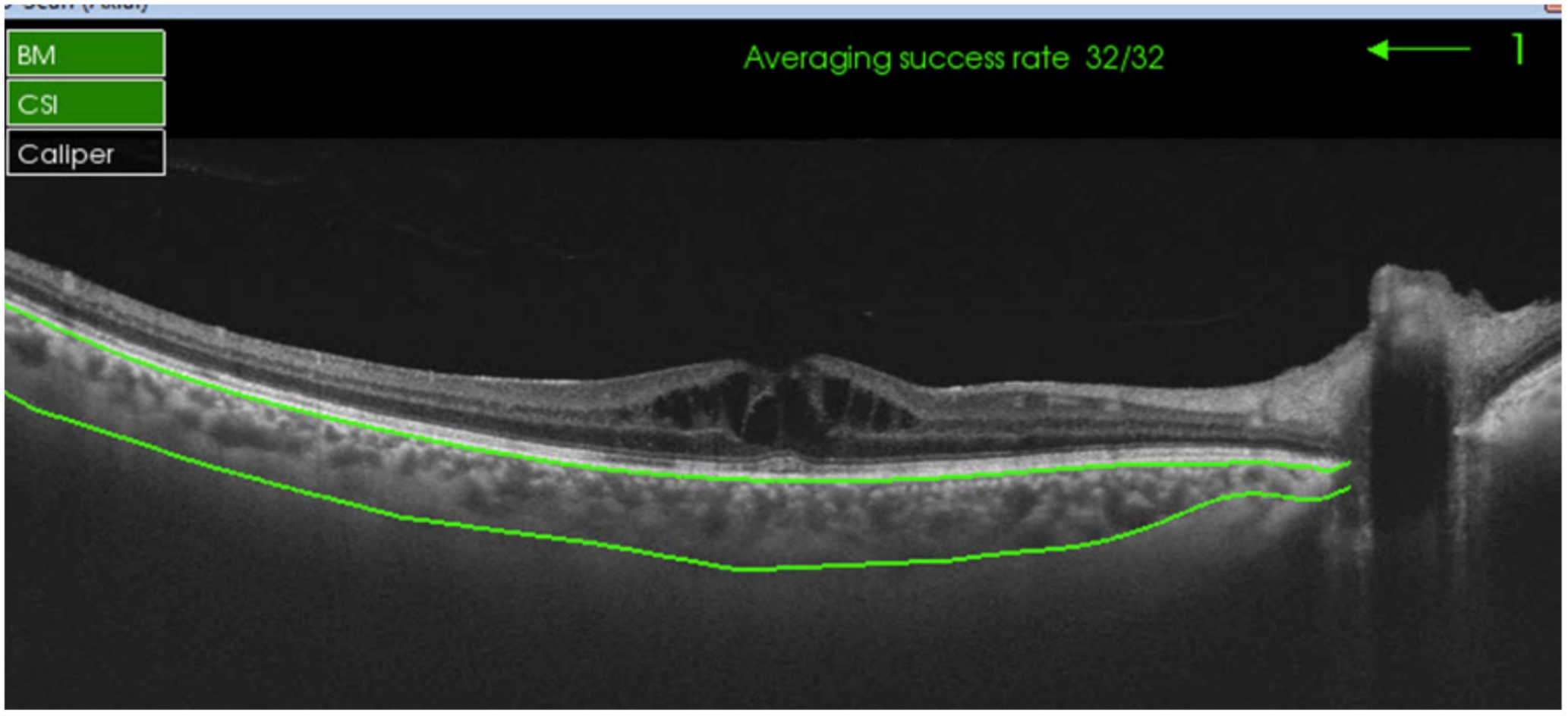
Choroidal Thickness Maps



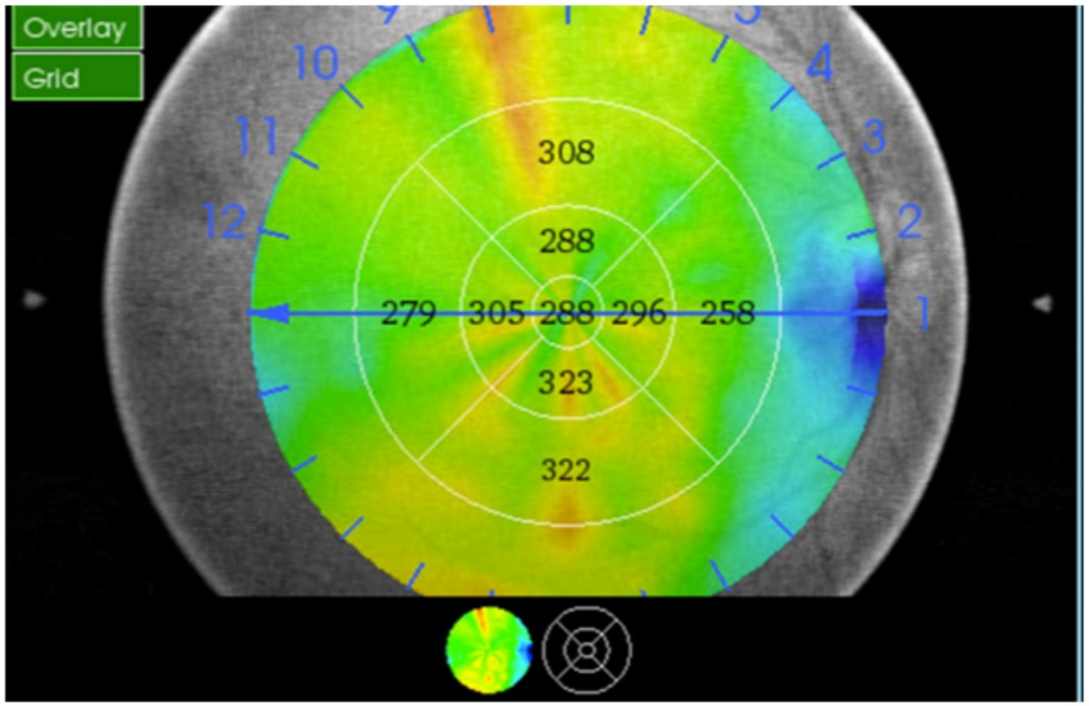


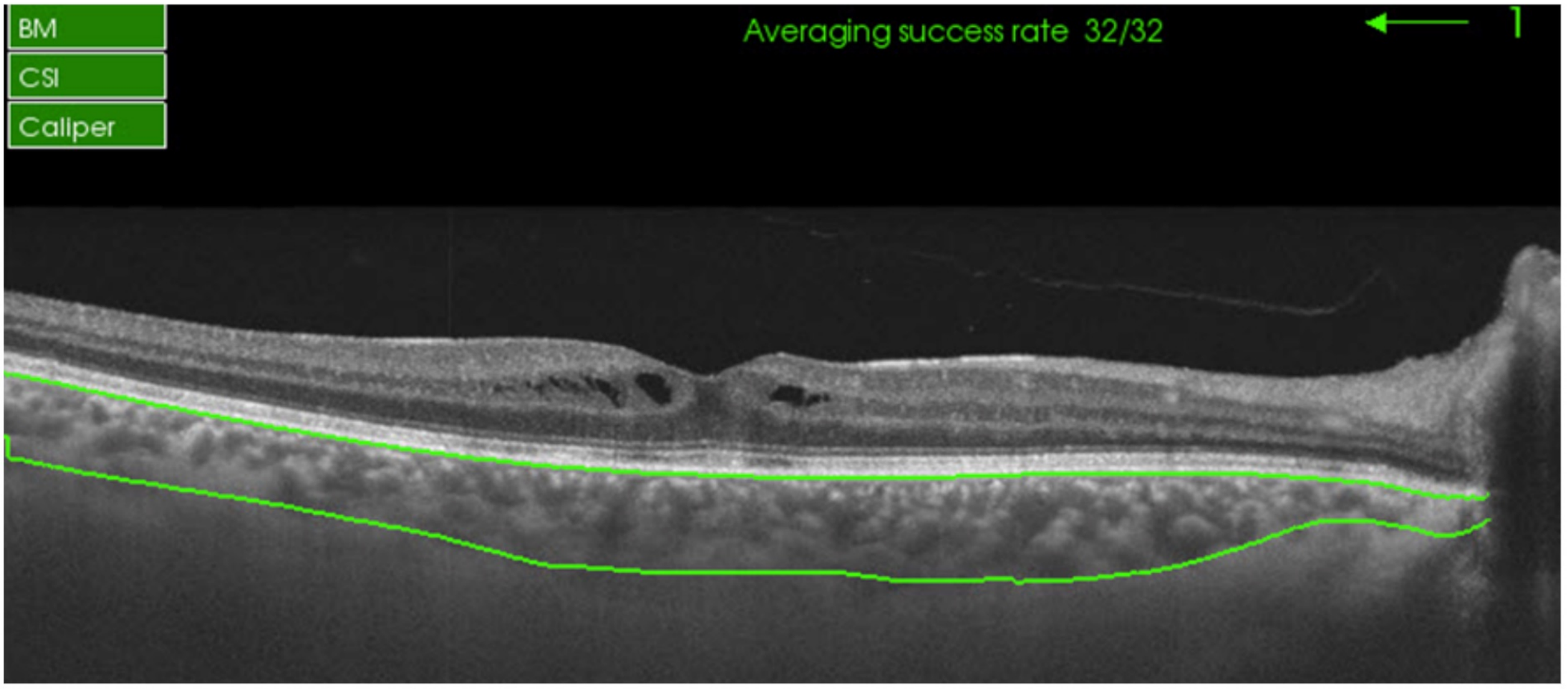
Choroidal Thickness Maps





Choroidal Thickness Maps





euretina InSight

OCT Choroidal Imaging: Indications & Value

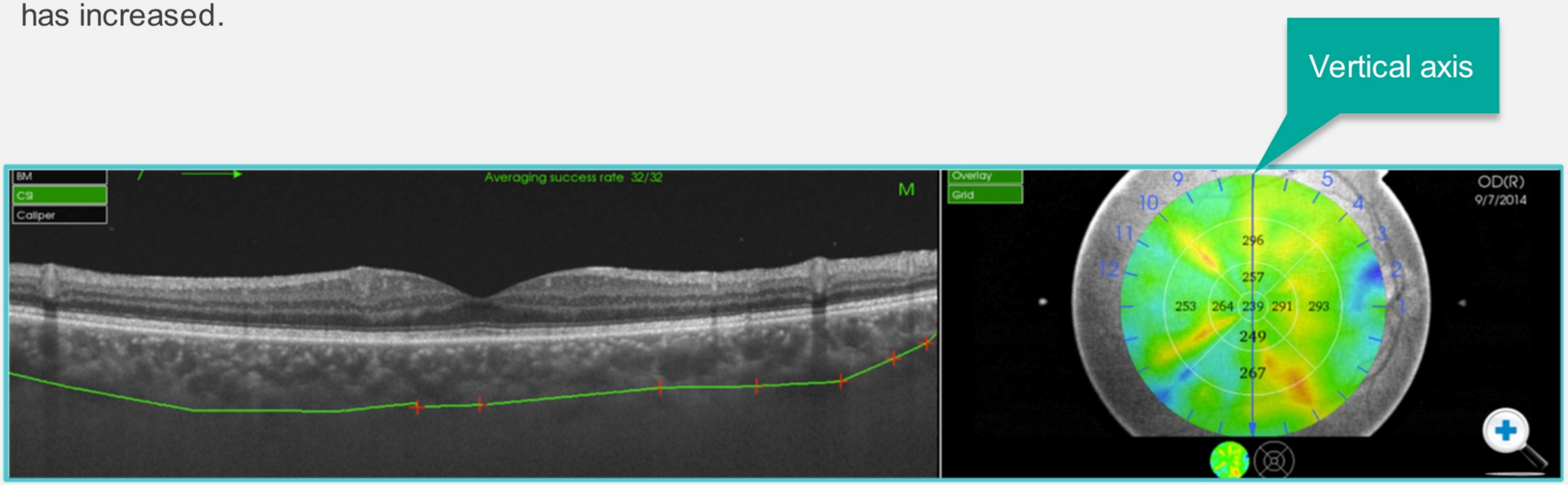
Multimodal OCT

Measuring Choroidal Thickness

As stated previously, **choroidal thickness can now be measured using OCT**, and this measurement information can be used in patient follow up.

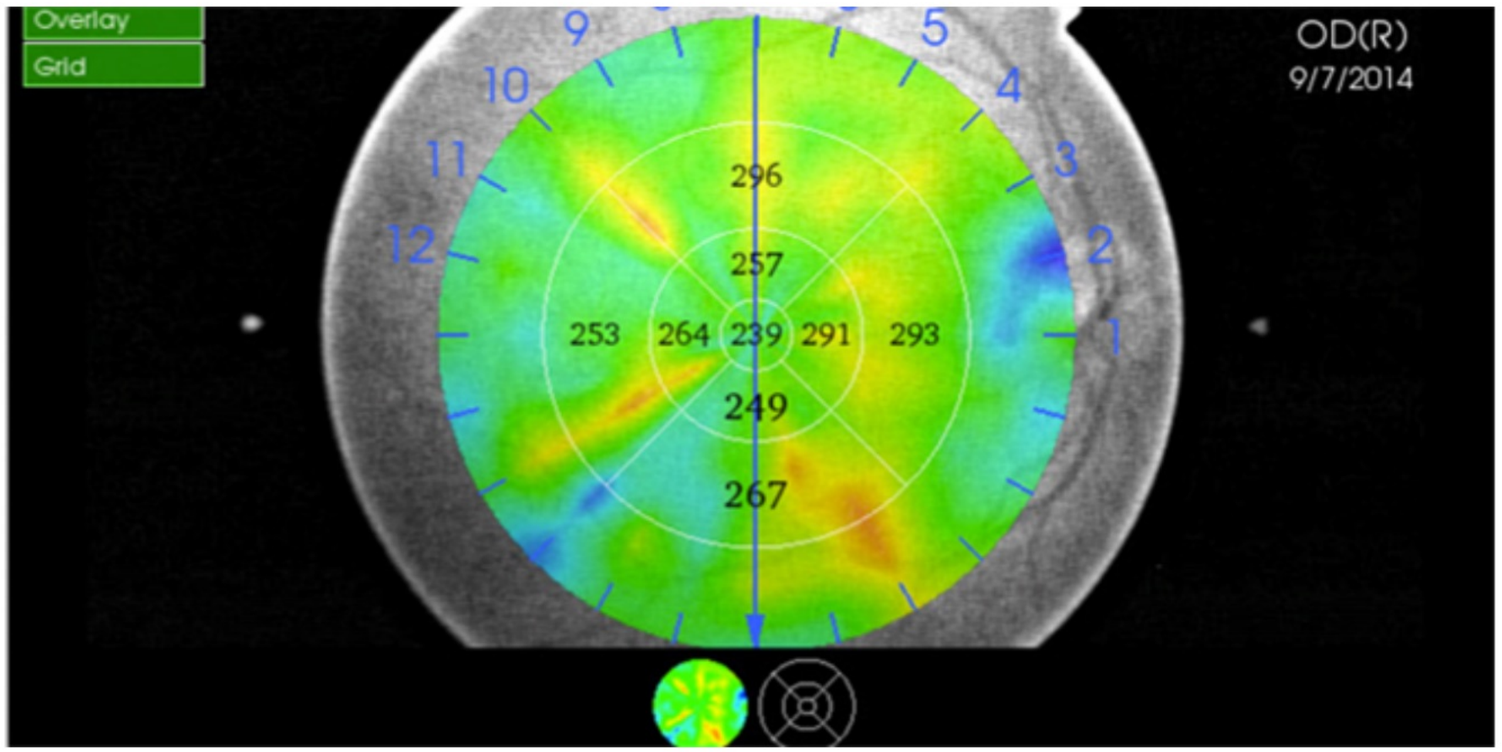
Measuring Choroidal Thickness | Choroidal Thickness Maps | Vertical Axis Map

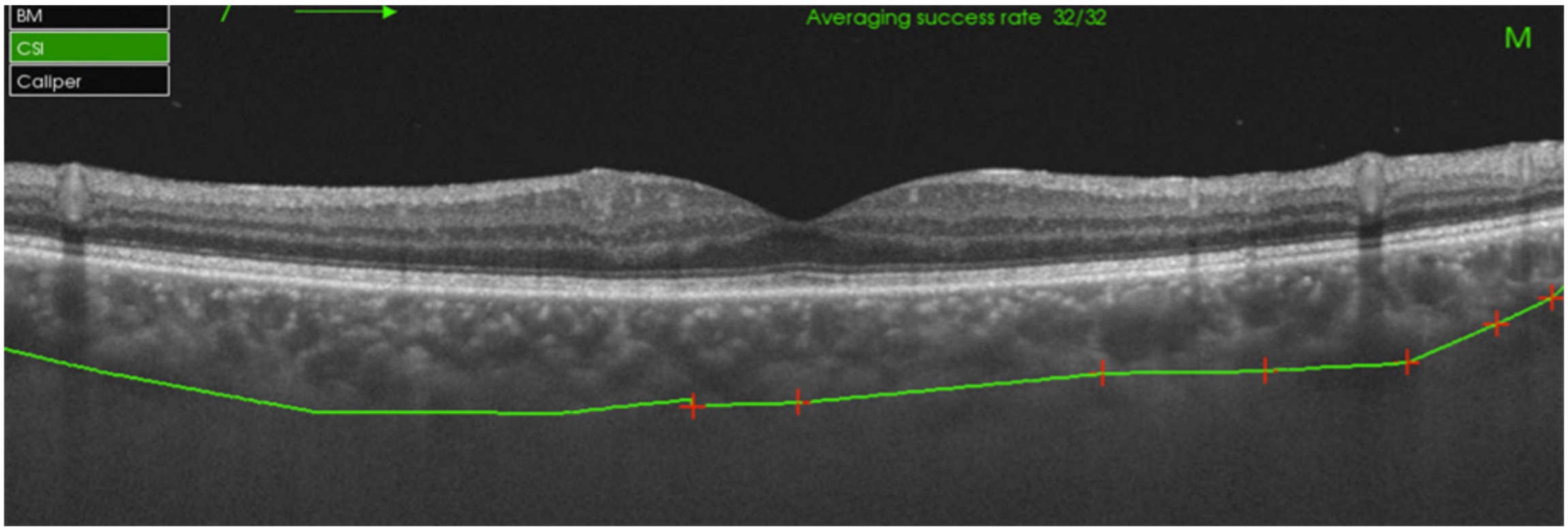
It is important to look at the choroidal maps - because the vertical axis indicates that the choroidal thickness has increased.



Courtesy Prof. Magdy Moussa (Tanta Univ., Egypt)

Choroidal Thickness Maps - Vertical Axis





euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Module Progress:

- Welcome ✓
- SD-OCT ✓
- SS-OCT ✓
- OCT Angiography
- Summary
- Knowledge Check

OCT Angiography

euretina InSight

OCT Choroidal Imaging: Indications & Value

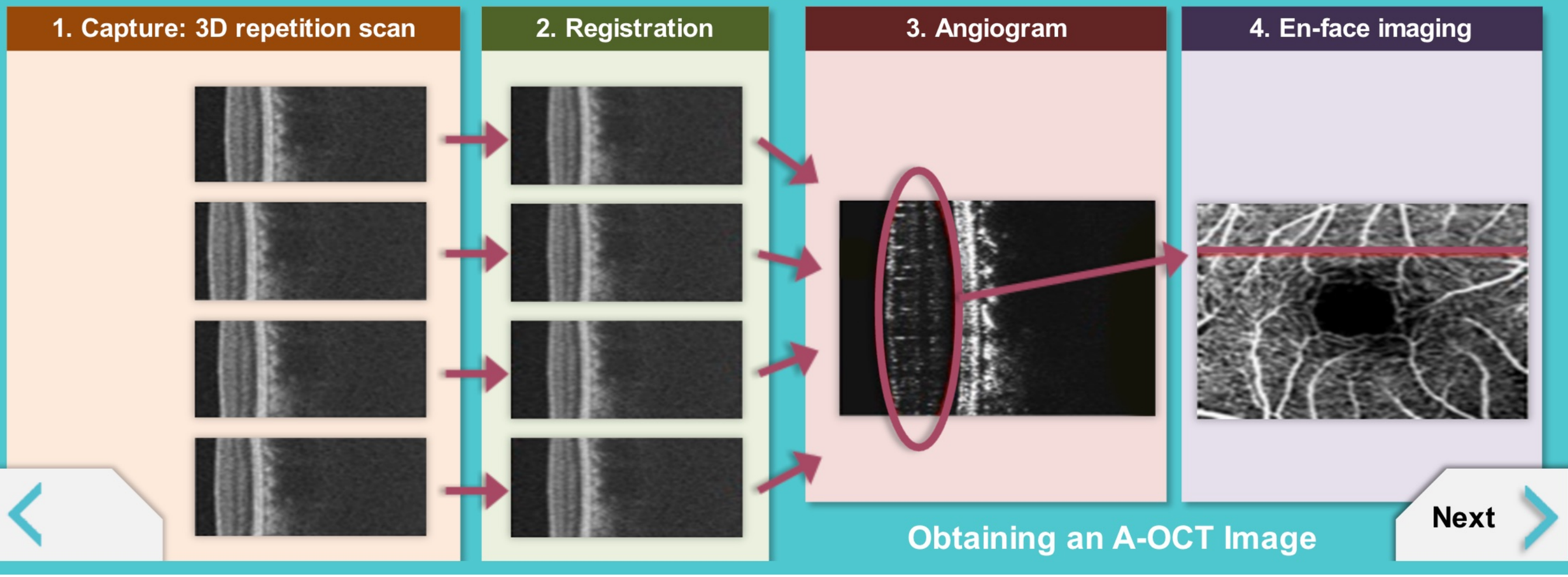
Multimodal OCT

OCT Angiography

While fluorescein angiography (FA) provides dynamic visualisation of blood flow, OCT angiography (A-OCT) acquires volumetric angiographic information non-invasively (i.e. without dye) - allowing for visualisation of the "vascular network" including the **architecture of the choroidal vessels**, the **choriocapillaris**, the **optic disc**, and the **retina macular capillary network**.

Features include:

- Approximately 5-6 seconds to obtain the 3-D scans
- Acquisition areas ranging from 2 x 2 mm to 12 x 12 mm
  - The higher the area, the lower the quality
  - 3 x 3 mm appear to be higher resolution than FFA images



Obtaining an A-OCT Image

Next

euretina InSight

OCT Choroidal Imaging: Indications & Value

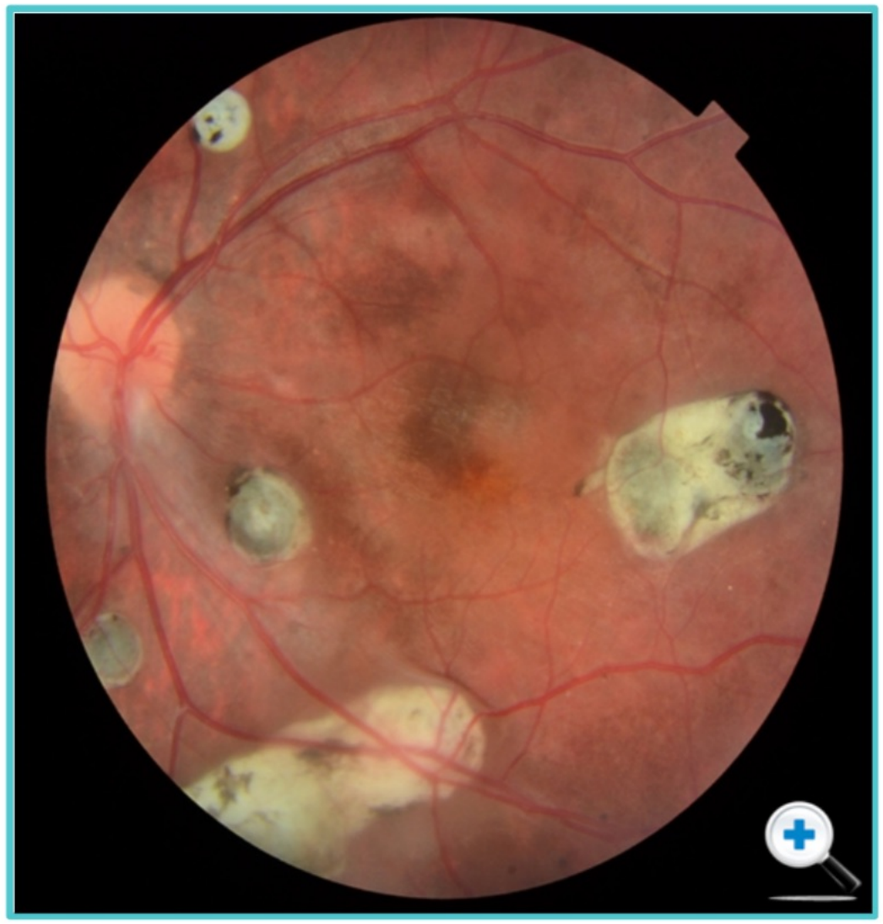
Multimodal OCT

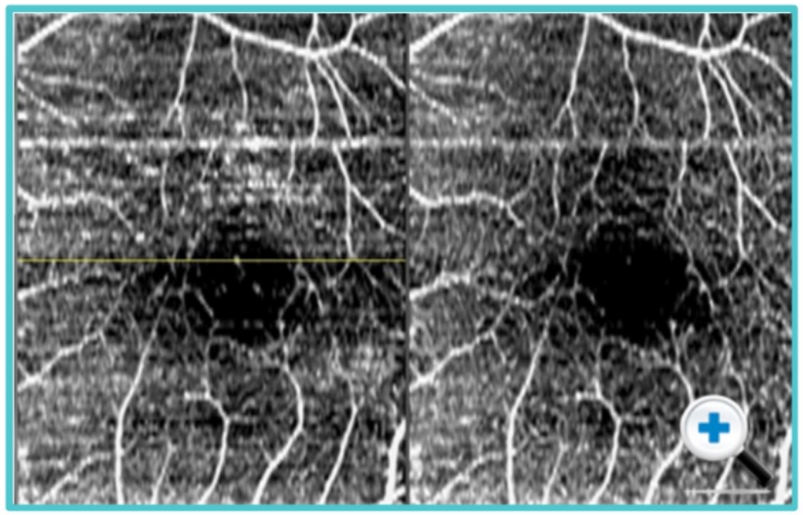
In Practice

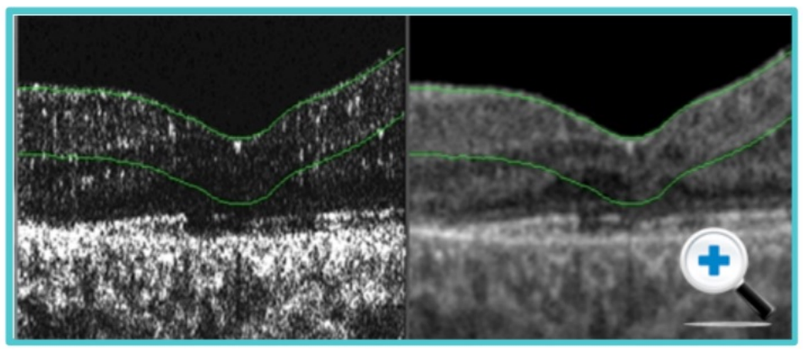
This is a study published by the module editor (Prof Paulo E. Stanga) et al. in 2015, involving a new technique they developed.

This involved transscleral draining of subretinal fluid in exudative retinal detachments in Coates' disease.

These images highlight how OCT angiograms can be obtained in children even younger than 5 years old.



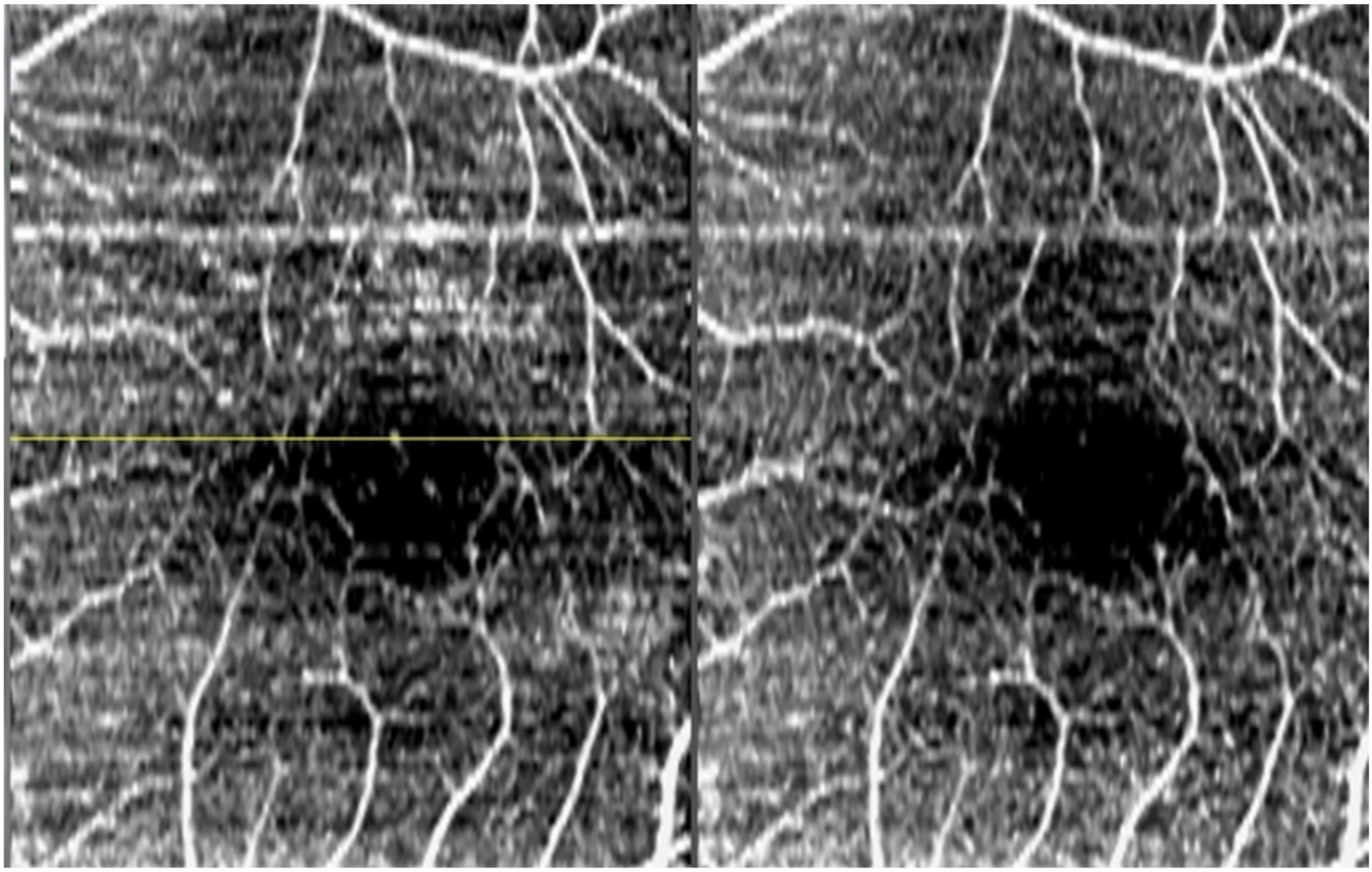




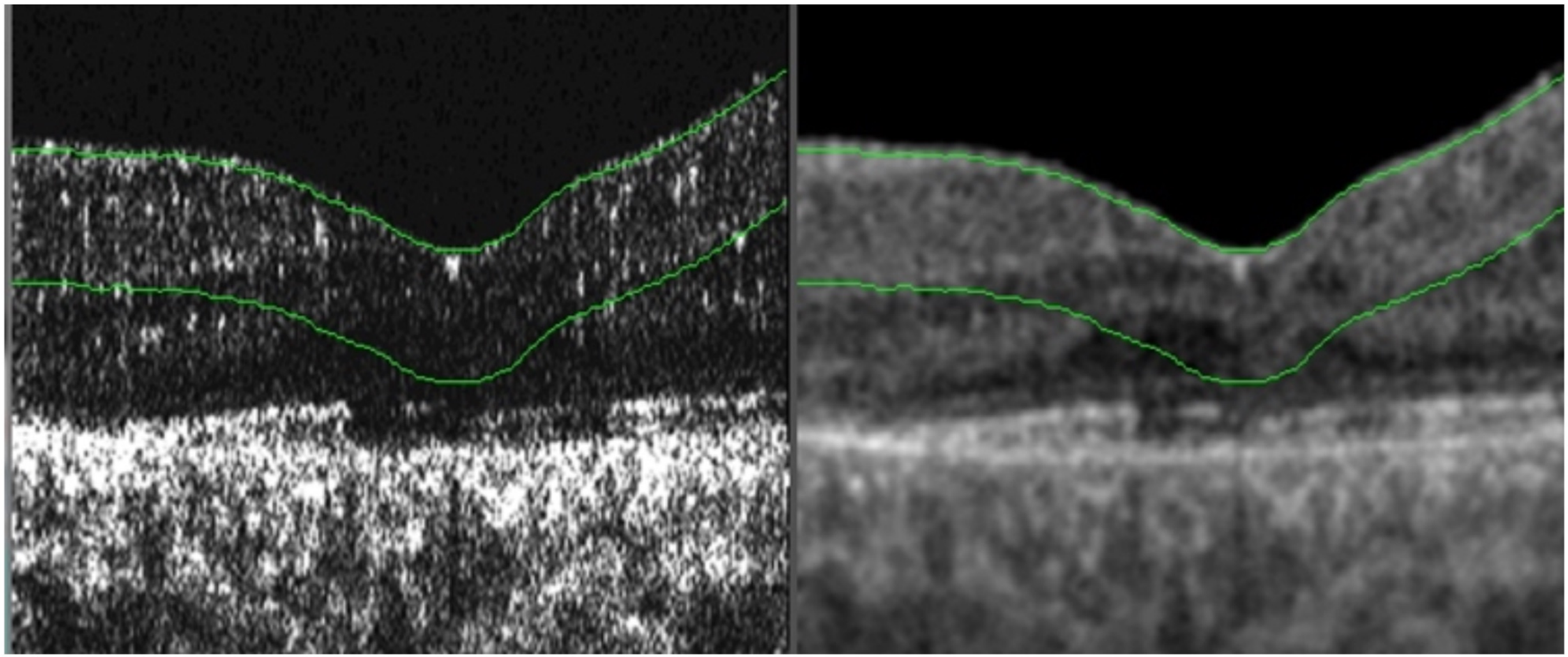
Stanga PE, Jaberansari H, Bindra MS, Gil-Martinez M, Biswas S.
Transcleral drainage of subretinal fluid, anti-vascular endothelial growth factor, and wide-field imaging-guided laser in coats exudative retinal detachment. *retina*. 2015 sept 9; [epub ahead of print].

Stanga PE, Jaberansari H, Bindra MS, Gil-Martinez M, Biswas S. Transcleral drainage of subretinal fluid, anti-vascular endothelial growth factor, and wide-field imaging-guided laser in coats exudative retinal detachment. retina. 2015 sept 9; [epub ahead of print].

Stanga PE, Jaberansari H, Bindra MS, Gil-Martinez M, Biswas S. Transcleral drainage of subretinal fluid, anti-vascular endothelial growth factor, and wide-field imaging-guided laser in coats exudative retinal detachment. retina. 2015 sept 9; [epub ahead of print].



Stanga PE, Jaberansari H, Bindra MS, Gil-Martinez M, Biswas S. Transcleral drainage of subretinal fluid, anti-vascular endothelial growth factor, and wide-field imaging-guided laser in coats exudative retinal detachment. retina. 2015 sept 9; [epub ahead of print].



euretina InSight

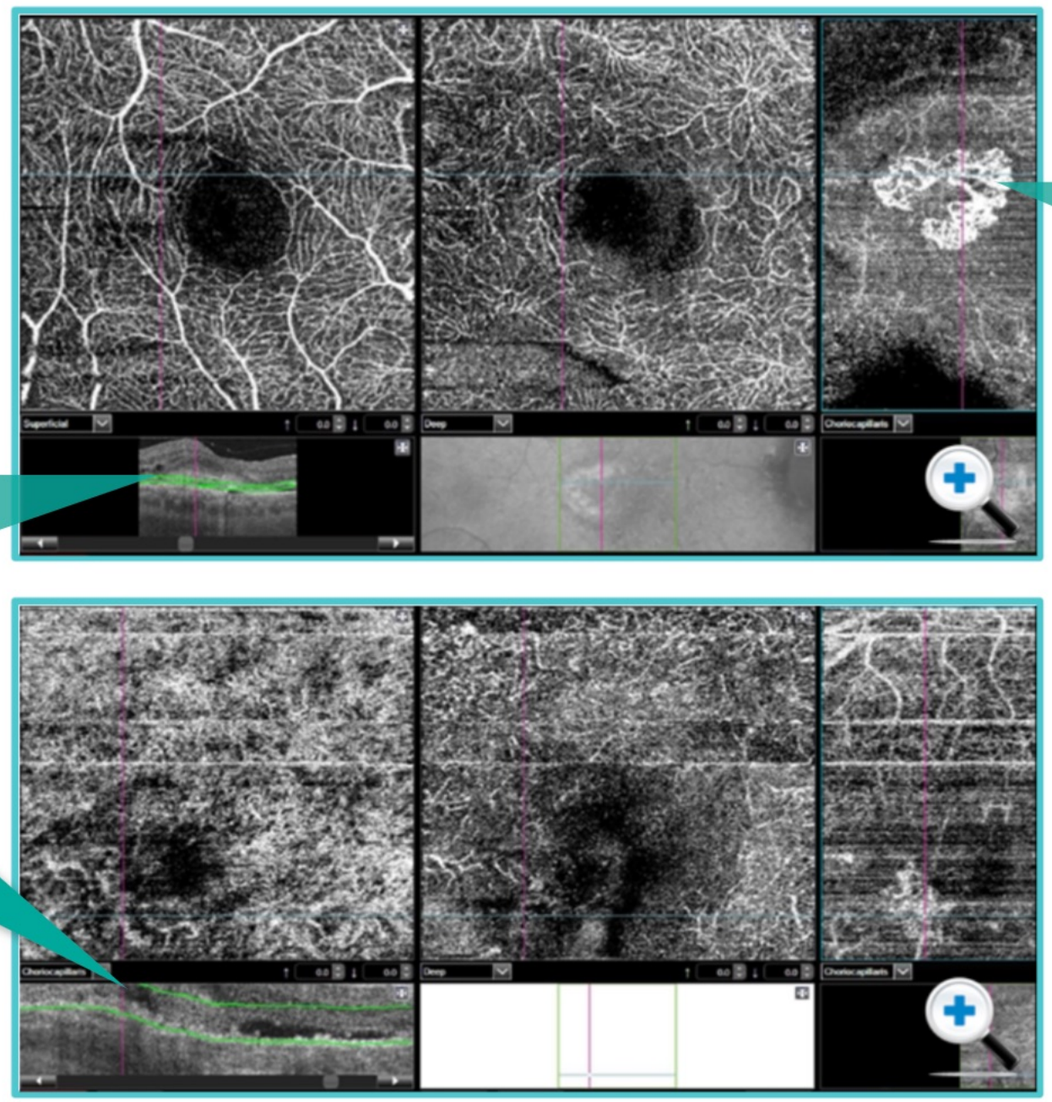
OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Choroidal Imaging

OCT angiography is now possible at **deeper planes** which may lead us into a new era in terms of deeper imaging.

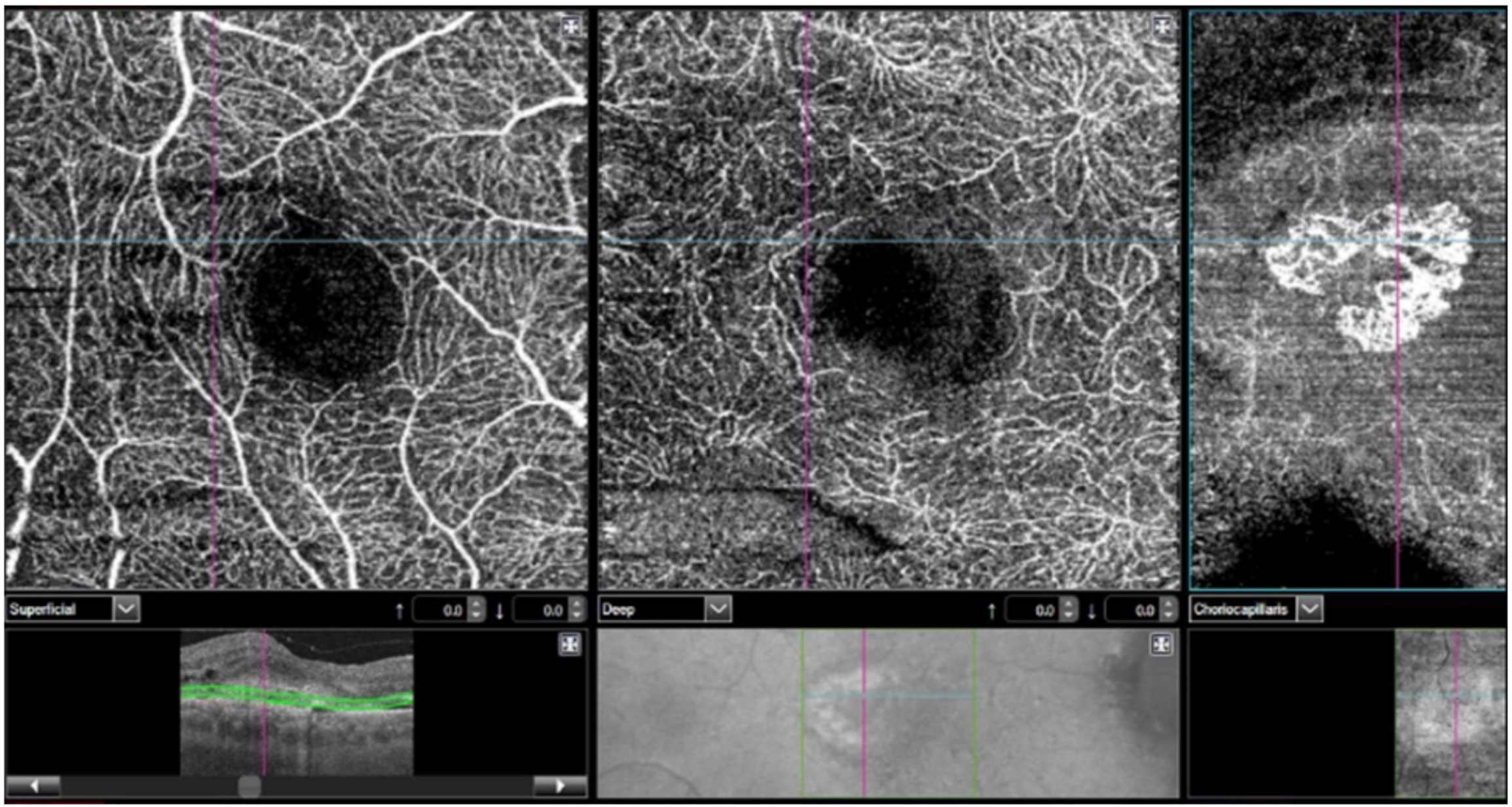
The images below show A-OCT imaging **choroidal neovascularisation**. This patient presented choroidal neovascularisation secondary to a laser burn.



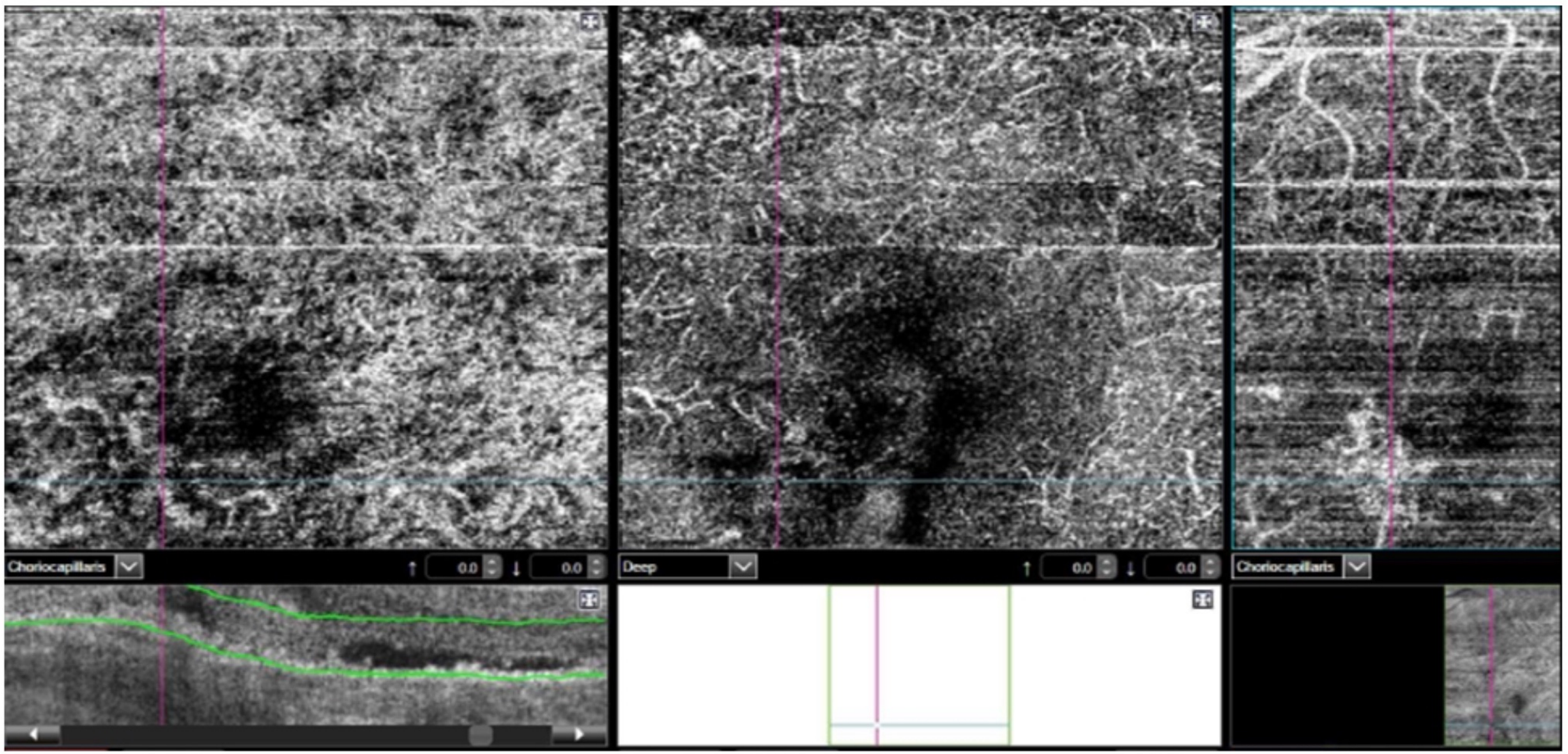
Imaging the choroidal neovascularisation

OCT Angiography allows non-invasive visualisation of choroidal neovascular networks located next to the RPE and choriocapillaris

Choroidal Imaging



Choroidal Imaging



euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Module Progress:

- Welcome ✓
- SD-OCT ✓
- SS-OCT ✓
- OCT Angiography ✓
- Summary
- Knowledge Check

Summary

euretina InSight

OCT Choroidal Imaging: Indications & Value

Multimodal OCT

Summary & Conclusions

- RPE is no longer the “outer boundary” in OCT imaging
- OCT choroidal imaging should complement dye tests (it should not be done on its own - at least at presentation)
- Choroidal OCT may be particularly helpful when image quality is affected by media opacities (i.e. cataract, uveitis)
- Choroidal OCT may be particularly helpful for assessing response to treatment and monitoring relapse of disease (i.e. CSR, uveitis)
- OCT Angiography allows for visualisation of “vascular network” including the:
  - Macula
  - Optic Disc
  - Choroid (we are starting to see now)
- In vivo evaluation of choroidal structural changes may help clinicians to determine the pathogenesis and progression of macular disorders
- Choroidal thickness is a new biomarker for diagnosis, as well as assessment and guiding of clinical management in uveal disorders
- Establishing normative data for choroidal thickness is imperative. Clinicians need to know what is normal choroidal thickness and what is not. This date may vary according to the age, patient's refraction, and race. Presently, all a clinician can do is to compare choroidal thickness and the response to treatment.