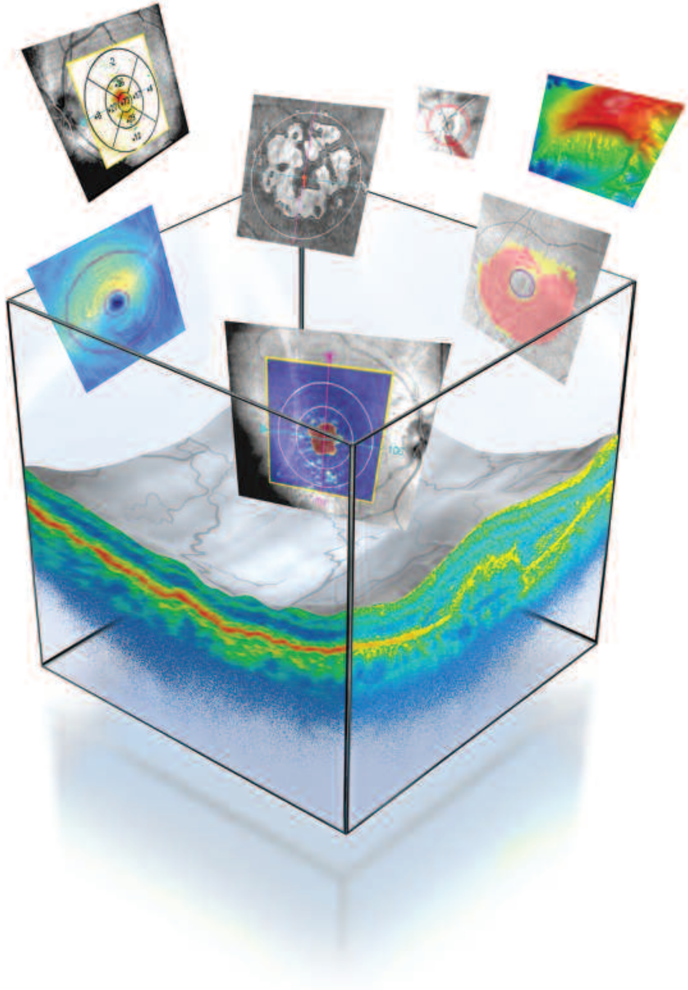
OCT EnFace

An Atlas of Cases



Dr Ali ERGINAY

Hôpital Lariboisière,
Paris

Preface by Prof Alain GAUDRIC

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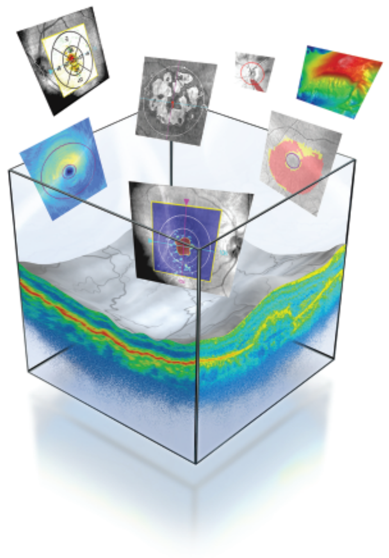

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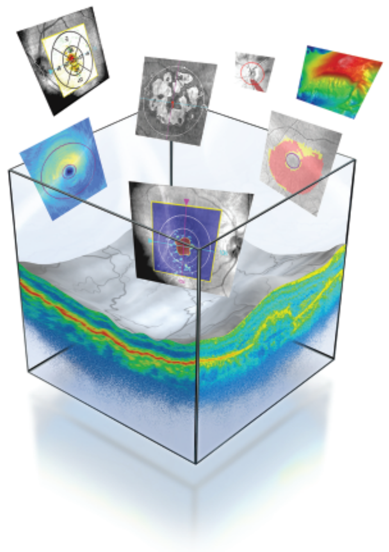

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OCT
EnFace

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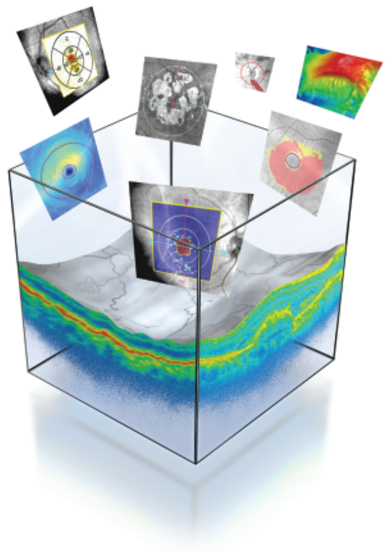

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01 Preface

The first "time-domain" OCT, which only provided 6 radial scans, have accustomed us to look at OCT images from cross-sectional views (B-scans). However, "spectral-domain" OCT (SD-OCT), whose acquisition speed and spatial resolution have improved, has enabled acquiring "volumes" or "cubes" containing a large amount of information. The 128 scans of 512 pixels of the Cirrus provide a detailed topography of the macular region. When needed, it is possible to scroll rapidly the 128 lines to make sure not to miss a pathological detail.

Moreover, additional high-resolution scans provide more detailed results on any area of interest.

In addition, the Cirrus software is able to do more than that. The image of the segmentation at the retinal pigment epithelium (RPE map), which is generated automatically with the mapping of the macular thickness, is an enface image of the RPE which immediately gives an idea of its abnormalities. It is the same for the segmentation at the inner limiting membrane (ILM).

However, in recent years the interest has focused on coronal scans (slab) which are derived from the routine acquisition of the data cube. It is actually possible to determine the scan plane (ILM, inner/outer segment junction or ellipsoid zone, RPE or any other structure).

The relatively large pixel density of the Cirrus enables obtaining very meaningful images of the topography of abnormalities observed on B-scans and to easily link them with fundus images.

Although there is, strictly speaking, no new information on these enface images, showing the lesion topography can facilitate diagnosis.

Moreover, enface images enable automatically delineating pathological surfaces as geographic atrophy in atrophic AMD for example.

This atlas of cases selected for their high-quality information is not intended to be exhaustive, but it aims at showing what can already be achieved with the current SD-OCT technique. This work is happening in large part because Dr Ali Erginay has selected and formatted these sometimes complex cases which are presented through a variety of imaging modalities, including enface OCT images.

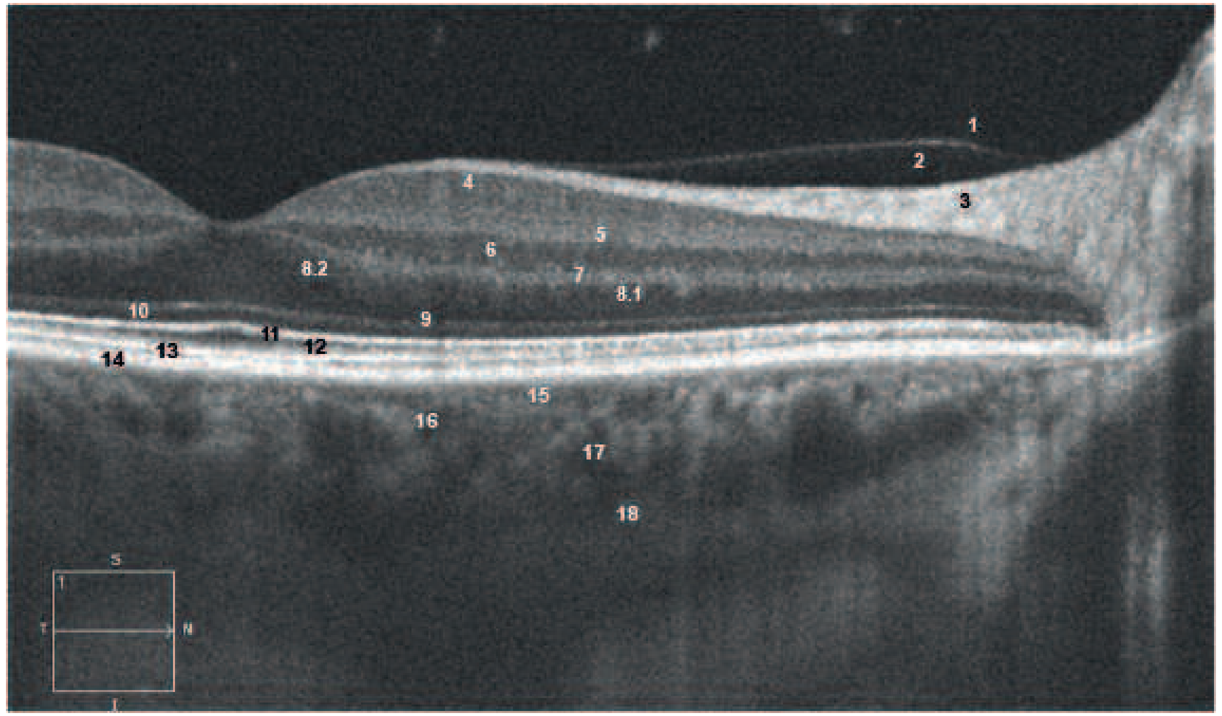
The OCT technology continues to evolve rapidly. The increasing acquisition speed of SD-OCT B-scans and the new software generations are about to improve the quality of enface images and pave the way to OCT angiography. The development of swept-source OCT will further improve the acquisition speed and generate enface images of larger dimensions.

Therefore, this Atlas only represents a step in the expected developments of all types of OCT imaging.

Alain Gaudric

Emeritus Professor of Ophthalmology
Université Paris Diderot
Hôpital Lariboisière, Paris

Retinal layer segmentation
Of macular SD-OCT image in healthy eye



1 Posterior vitreous cortex
2 Preretinal space
3 Optic nerve fiber layer
4 Ganglion cell layer
5 Inner plexiform layer
6 Inner nuclear layer
7 Outer plexiform layer
8.1 Outer nuclear layer
8.2 Henle fiber layer
9 External limiting membrane
10 Myoid zone
11 Ellipsoid zone or Inner/outer segment junction [1]
12 Photoreceptor outer segments
13 Interdigitation zone or Cone outer segment tips [1]
14 PE/Bruch's membrane complex
15 Choriocapillaris
16 Sattler's layer
17 Haller's layer
18 Choroidoscleral junction

From: Proposed Lexicon for Anatomic Landmarks in Normal Posterior Segment Spectral-Domain Optical Coherence Tomography, The INOCT Consensus
by Giovanni Staurenghi, Srinivas Sadda, Usha Chakravarthy, Richard F. Spaide Ophthalmology 2014; Aug;121(8):1572-8.
(1) The cellular origins of the outer retinal bands in optical coherence tomography images. by Jonnal RS, Kocaoglu OP, Zawadzki RJ, Lee SH. Invest Ophthalmol Vis Sci. 2014. doi:10.1167/iovs.14-14907

Cirrus OCT offers multiple enface image modalities.

A. Screen capture of the “Advanced Visualization” tool which produces coronal scans (or C scans), which generates frontal or “enface” images in 4 interactive windows.

The drop-down menu “Layer” allows selecting the layer to be used on the fundus image.

The “Configure layers” tool (1 and 2) allows selecting the layer colors for the ILM, RPE and RPEfit modes, and deciding to display them or not.
Scans can be generated following the profile of the retinal (ILM mode) or retinal pigment epithelium surface (RPE mode for real RPE or RPEfit mode for the theoretical plane of the retinal pigment epithelium). Horizontal scans or sections can also be generated. Subsequent images are normal enface scans.

B. Enface image ILM mode – Optic nerve fibers

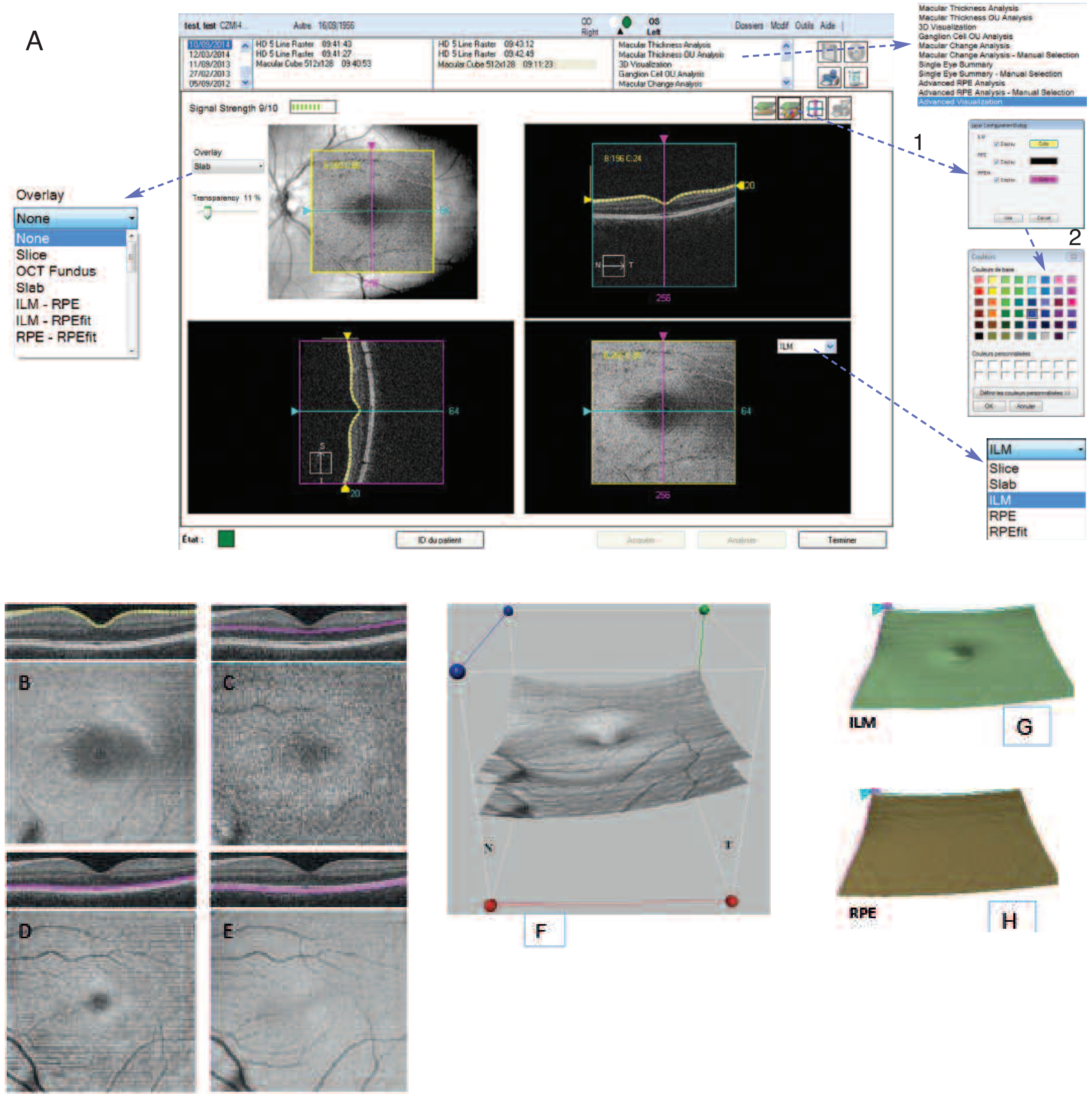
C. Enface image RPE mode – Inner plexiform layer

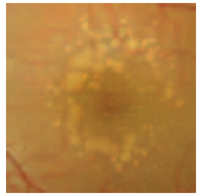
D. Enface image RPE mode – Ellipsoid zone

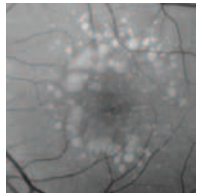
E. Enface image RPE mode – PE/Bruch’s membrane complex

F. Overlay of the segmentation of the inner limiting membrane and retinal pigment epithelium planes in 3D mode.

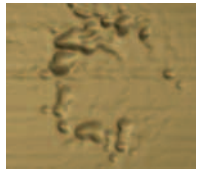
G. and H. The Cirrus also provides automatically a segmentation of the retinal pigment epithelium and retinal surface which are enface images of both planes.



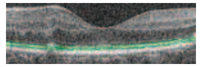


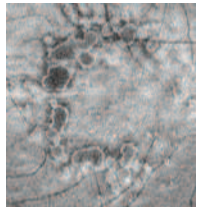


Color photo and red-free filter image:
Ring-shaped serous drusen around the fovea.

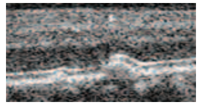


OCT:
Retinal pigment epithelium mapping showing the elevation of more or less prominent serous drusen.

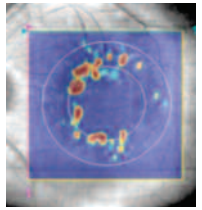




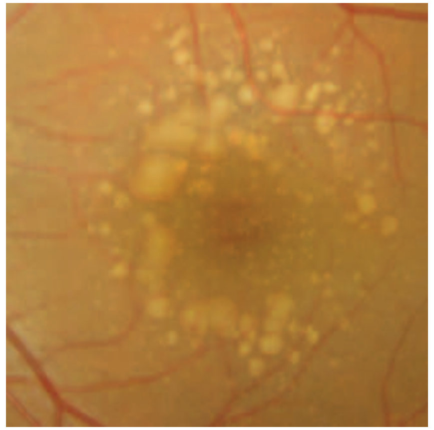
Enface OCT: Segmentation at the retinal pigment epithelium (RPEfit mode):
Showing precisely the drusen contours.

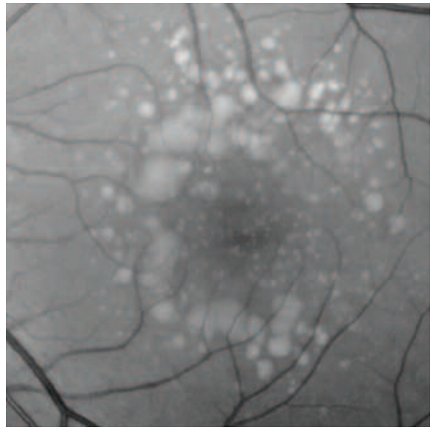


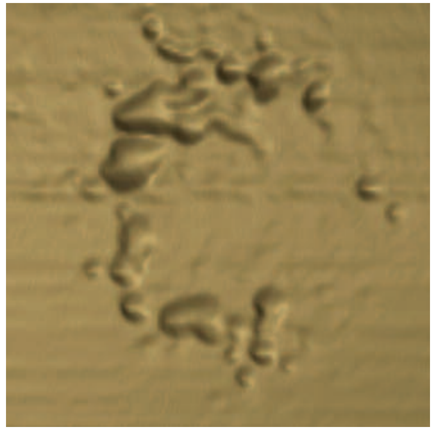
OCT B-scan:
Detail of a serous drusen.

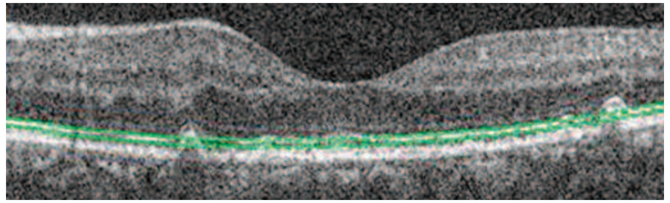


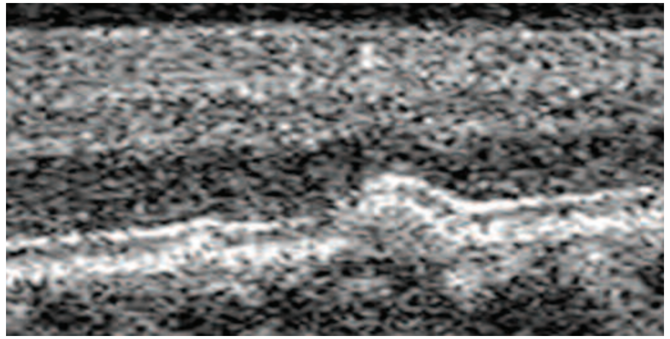
Enface OCT, “advanced RPE analysis” mode:
Mapping of drusen (“mapping of RPE elevations”) enabling automated drusen monitoring.

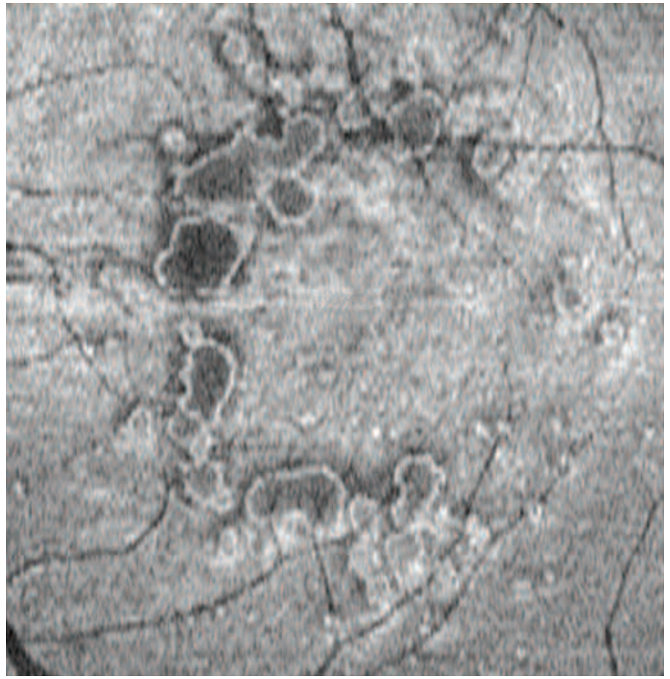


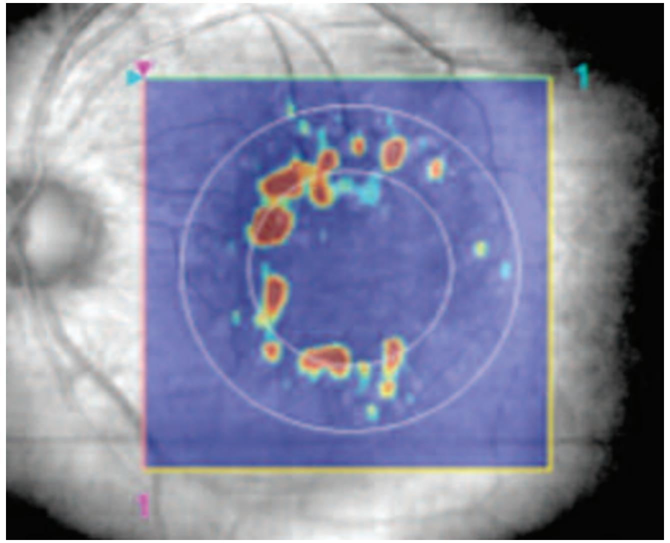






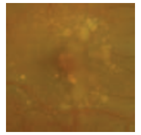






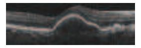
04

Drusenoid retinal pigment epithelium detachment
Evolution

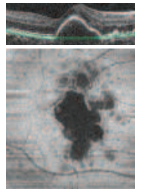


Color photos:
Drusenoid retinal pigment epithelium detachment (PED) and serous drusen.

OCT:
Mapping of the retinal pigment epithelium showing the elevation of the drusenoid PED and adjacent serous drusen.



OCT B-scan:
Detail of the retrofoveolar drusenoid PED and adjacent serous drusen.

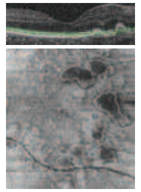


Enface OCT: Segmentation at the retinal pigment epithelium (RPEfit mode):
Showing precisely the drusen contours and the polylobed pattern of the drusenoid PED.

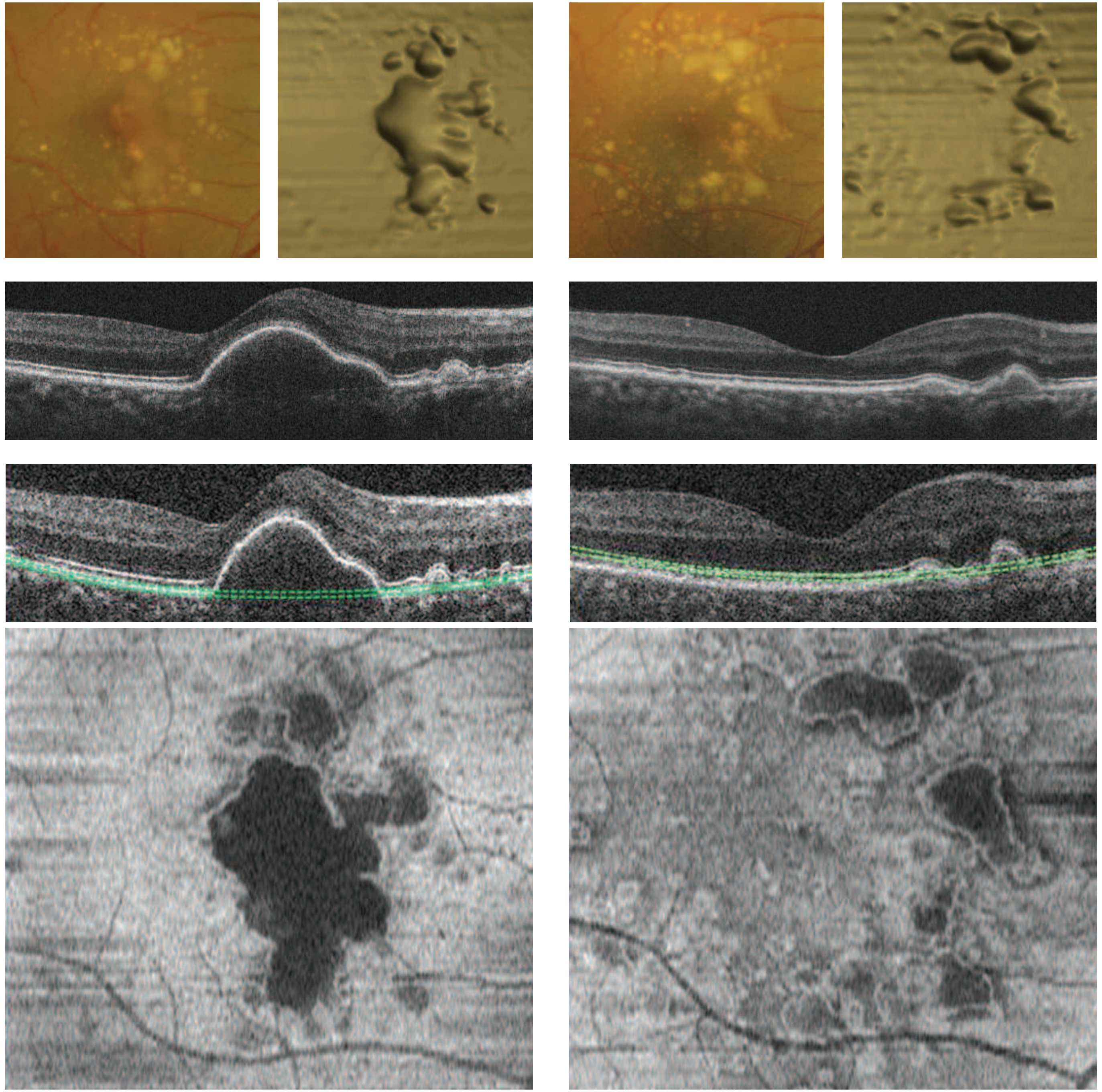
Color photos:
Regression of the central PED and progression of perimacular serous drusen two years later.

OCT:
Mapping of the retinal pigment epithelium showing the disappearance of the central PED and progression of adjacent serous drusen.

OCT B-scan:
Disappearance of the central PED.



Enface OCT: Segmentation at the retinal pigment epithelium (RPEfit mode):
Showing the disappearance of the central PED while perimacular serous drusen progress.

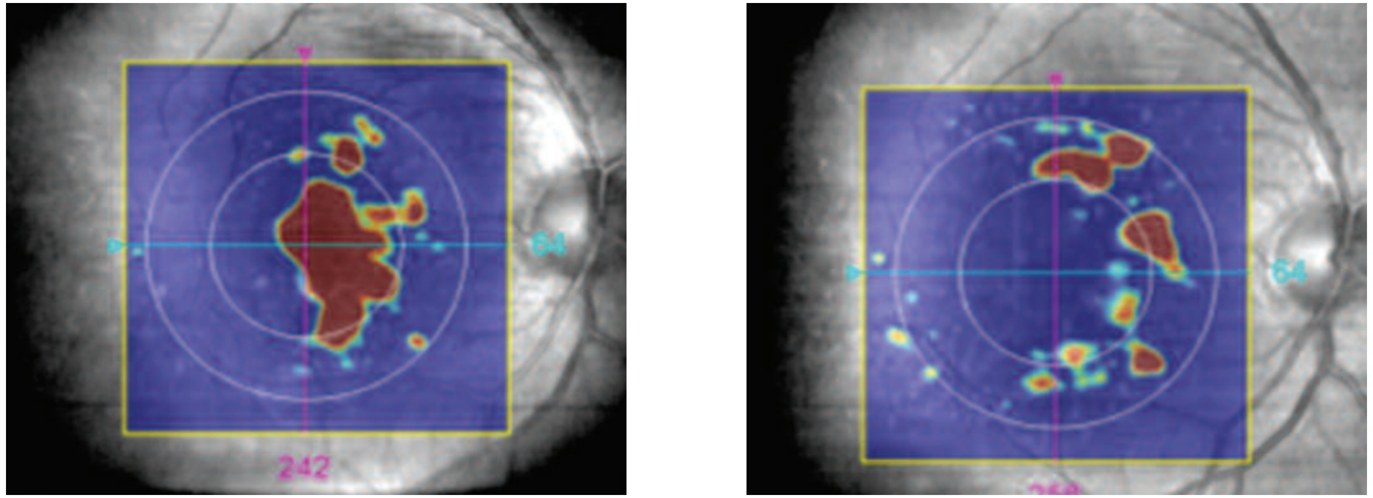


Drusen monitoring:
Advanced analysis of the retinal pigment epithelium

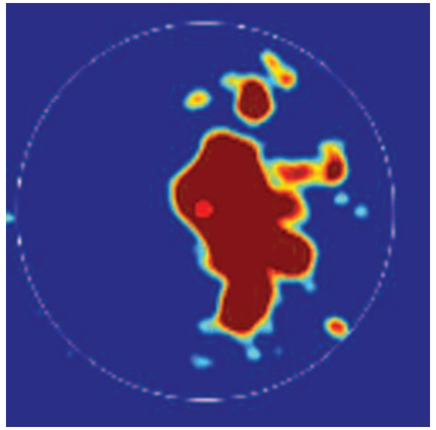
The “map of RPE elevations” shows the projection of drusen and their evolution over time in 3-5-mm concentric circles overlaid on the fundus photography.

The software automatically calculates the drusen surface and volume which are expressed in mm^2 and mm^3. Pseudocolors help identifying bumps and hollows in the RPE. At the side of the map, the legend indicates how colors correspond to the elevation height.

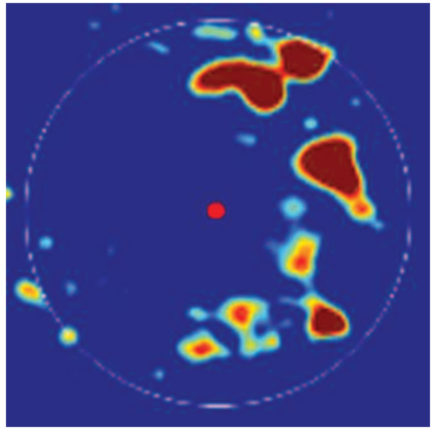
A rule is available to measure distances on the profile map of the RPE.



Regression of drusen on the RPE Elevation Map



RPE elevation profile

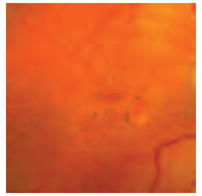


RPE elevation profile

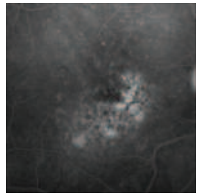
RPE Elevations	Prior	Current	Difference*	% Change
Area in 3 mm Circle (mm^2)	3.50	1.00	-2.50	-71.4%
Area in 5 mm Circle (mm^2)	4.90	3.70	-1.20	-24.5%
Volume in 3 mm Circle (mm^2)	0.52	0.06	-0,46	-88.5%
Volume in 5 mm Circle (mm^2)	0.60	0.26	-0.34	-56.7%

Table showing spontaneous evolution of drusen volume, and the area of RPE elevations. Here, the analysis shows a diminution of drusen volume more than 88% in 3 mm circle.

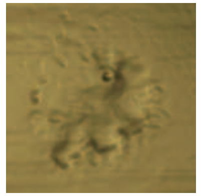
Retroepithelial choroidal new vessels



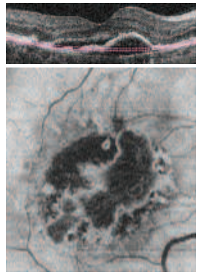
Color photo:
Retinal pigment epithelium atrophy, subretinal pigment, drusen located at the periphery of the macula.



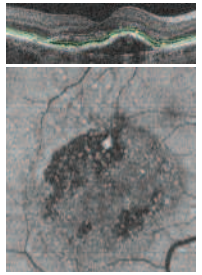
Fluorescein angiography:
Late, non-homogeneous and moderate hyperfluorescence with irregular contours in the macula.



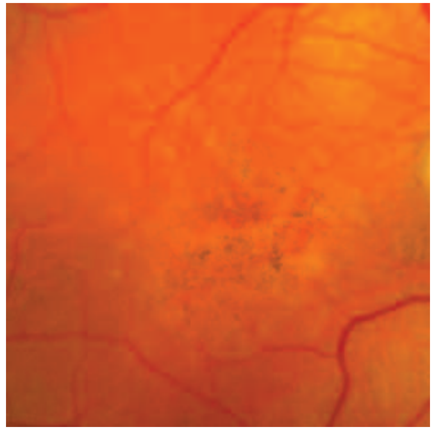
OCT:
Mapping of the retinal pigment epithelium showing the irregular elevation of the retinal pigment epithelium surrounded by a few drusen.

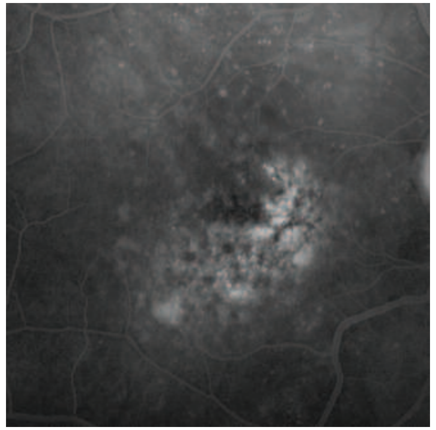


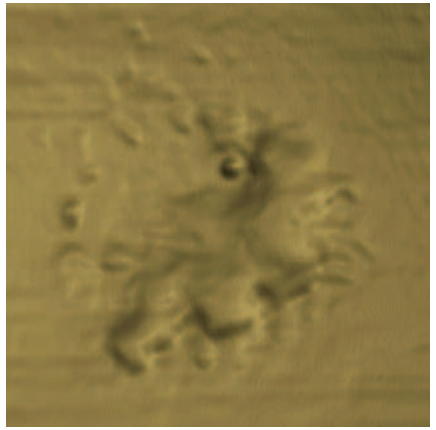
Enface OCT: Segmentation in the plane of the retinal pigment epithelium (RPEfit mode):
The horizontal scan shows the irregular, vascularized retinal pigment epithelium detachment (yellow arrows), a small serous retinal detachment (white arrows) and a localized retinal thickening (star). The enface image shows the topography of the vascularized multi-lobed retinal pigment epithelium detachment (yellow arrows) and serous retinal detachment (white arrows), and choroidal new vessel networks (red arrows).

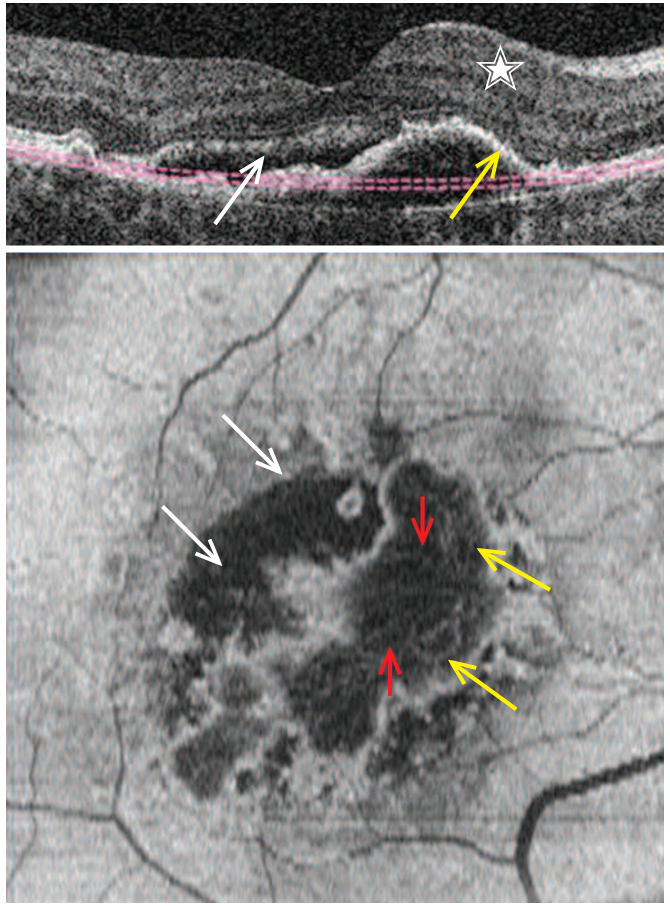


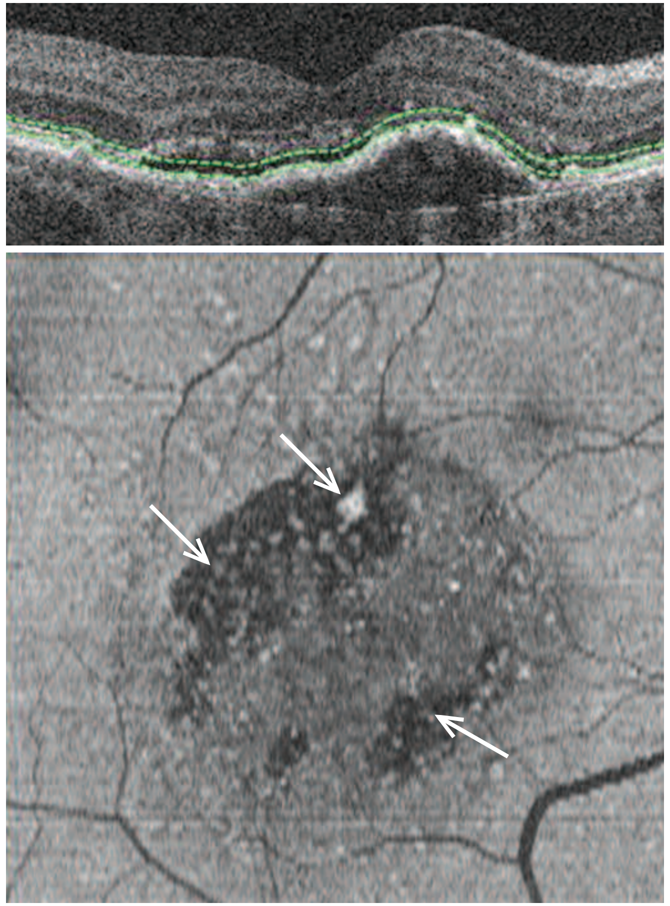
Enface OCT: Segmentation immediately in front of the retinal pigment epithelium detachment (RPE mode):
White arrows indicate the contours of the serous retinal detachment.



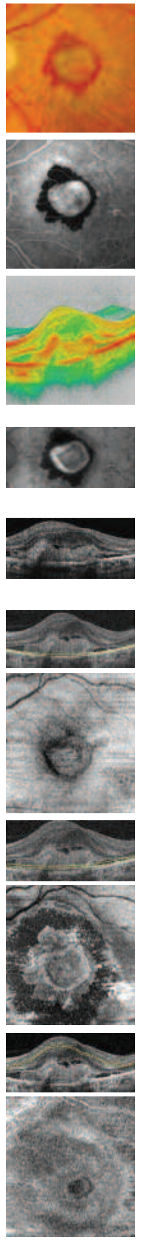








07 AMD
Pre-epithelial choroidal new vessels



Color photo:
Subretinal fibrovascular membrane surrounded by a subretinal hemorrhage.

Fluorescein angiography:
Showing fluorescent choroidal new vessel.

3D OCT:
The fibrovascular membrane raises the macular retina.

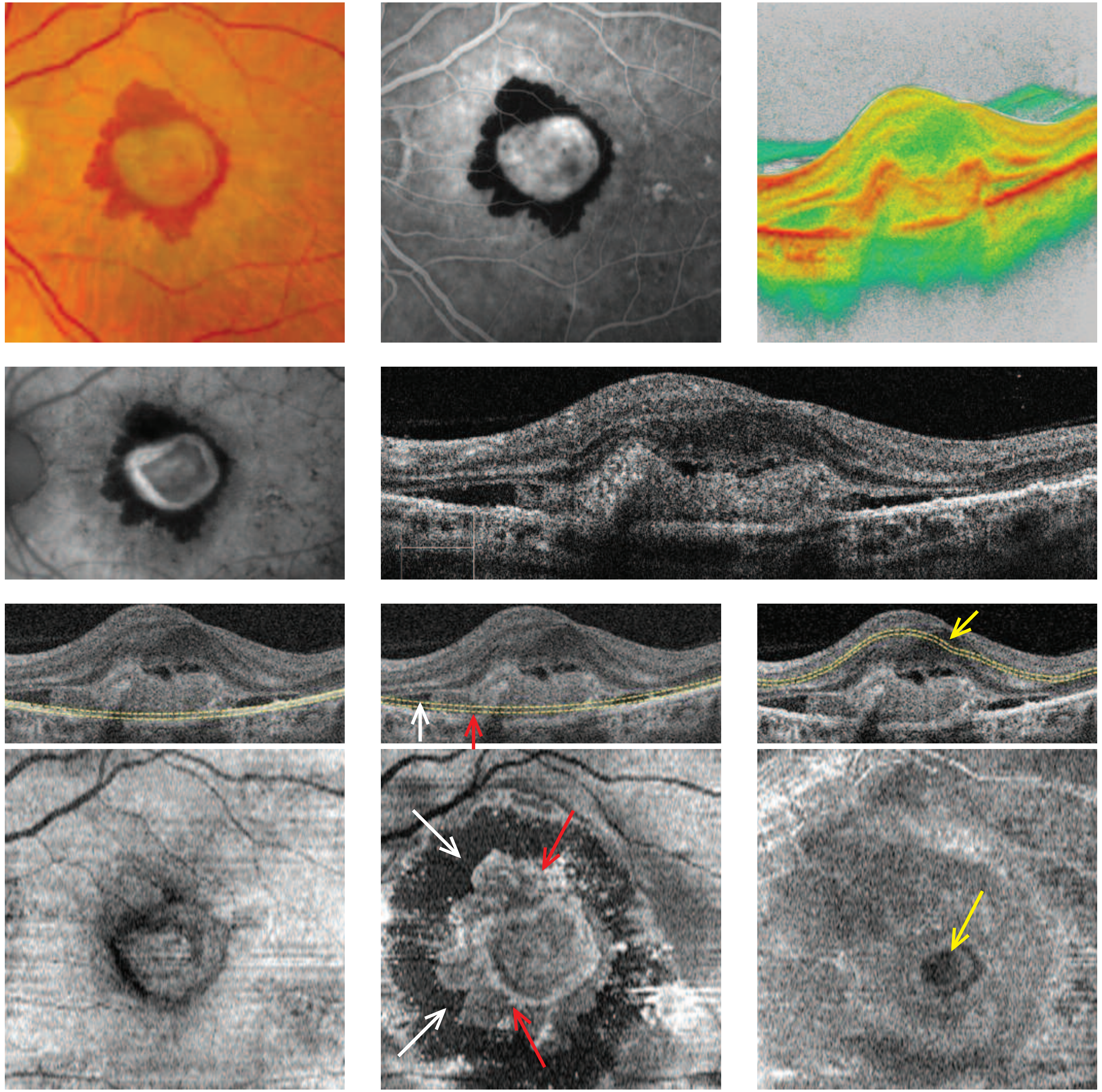
Red-free filter image showing the contrast between the neovascular membrane and the hemorrhage.

OCT B-scan:
Hyper-reflective fibrovascular membrane, prolonged by a subretinal hemorrhage. Subretinal fluid and macular thickening.

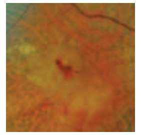
Enface OCT: Segmentation at the retinal pigment epithelium (RPEfit mode):
The base of the neovascular membrane passes through the retinal pigment epithelium.

Enface OCT: Pre-epithelial segmentation:
The serous retinal detachment forms a hypo-reflective ring (white arrows) and the hyper-reflective subretinal hemorrhage (red arrows) is distinguishable from the central fibrovascular membrane.

Enface OCT: Intraretinal segmentation:
Paracentral hypo-reflective space (yellow arrow).

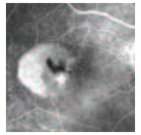


AMD
Choroidal new vessels with retinal angiomatous proliferation

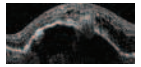


Color photo:
Serous drusen and macular intraretinal hemorrhage next to a retinal pigment epithelium detachment.

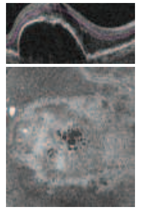
Mapping of the retinal pigment epithelium:
Dome-shaped protrusion of a retinal pigment epithelium detachment (PED), with spicule (arrow) projecting into the retina.



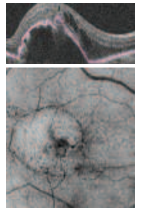
Fluorescein angiography:
Late hyperfluorescence of the PED with hyperfluorescent dot adjacent to the hemorrhage.



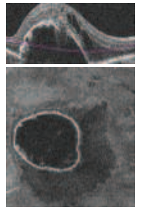
OCT B-scan:
Retinal angiomatous proliferation crossing the retinal pigment epithelium (arrow) and cystoid retinal edema (star).



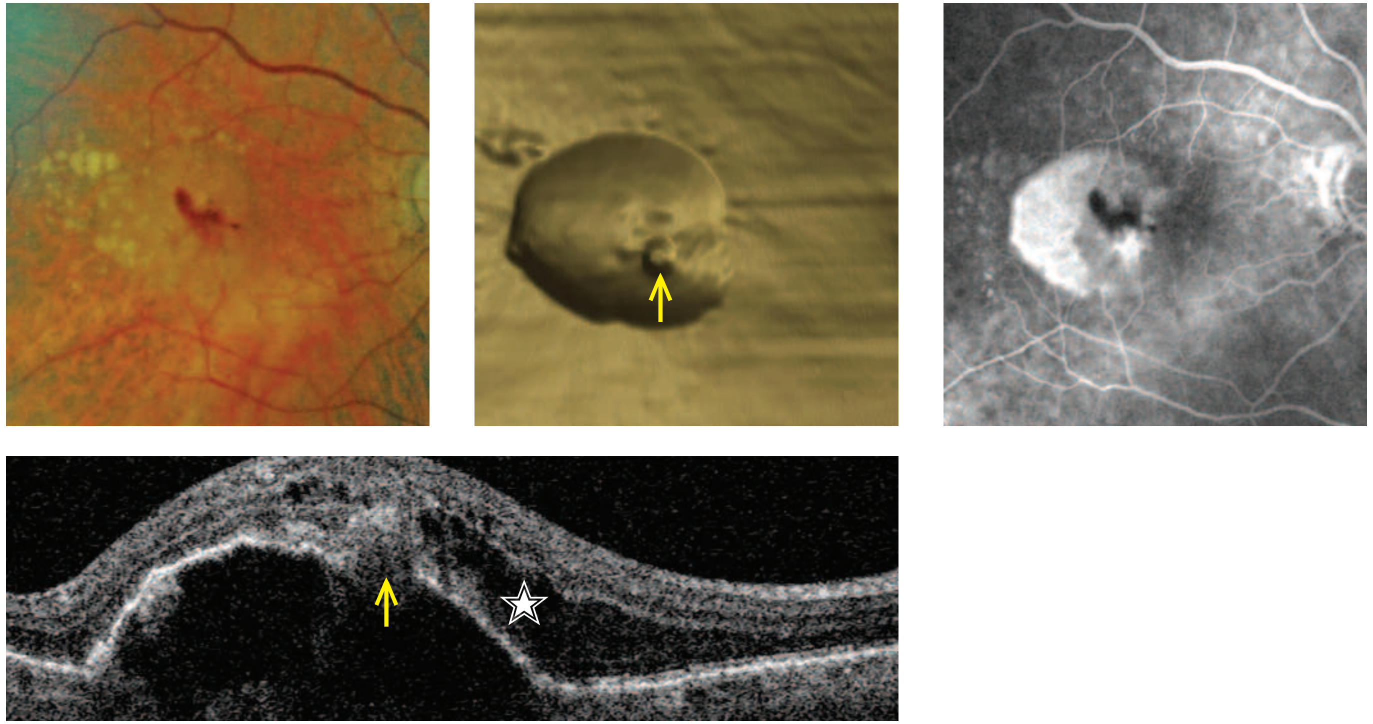
Enface OCT: Retinal segmentation (ILM mode):
Cystoid macular edema.

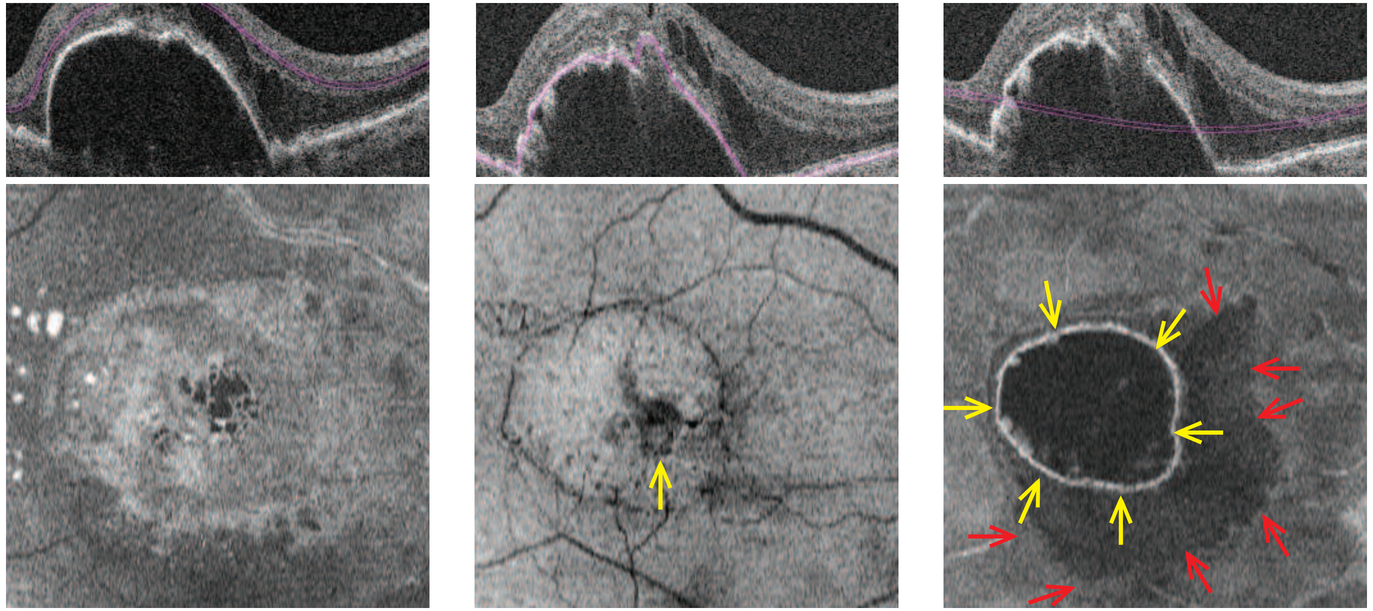


Enface OCT: Segmentation at the retinal pigment epithelium (RPE mode):
The retinal angiomatous proliferation is visible (arrow).

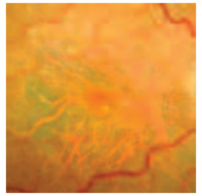


Enface OCT: Segmentation through the PED (RPEfit mode):
PED limits (yellow arrows) and retinal edema limits (red arrows).



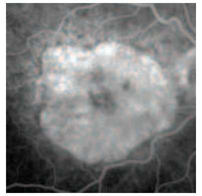


Geographic atrophy

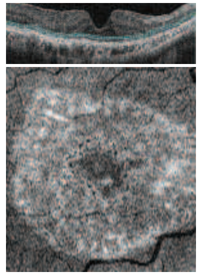


Color photo:
Zone of macular atrophy revealing abnormal large choroidal vessels (arrows).

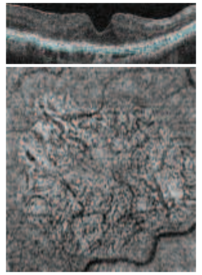
Mapping of the retinal pigment epithelium:
Retinal pigment epithelium atrophy and choriocapillaris atrophy (arrows).



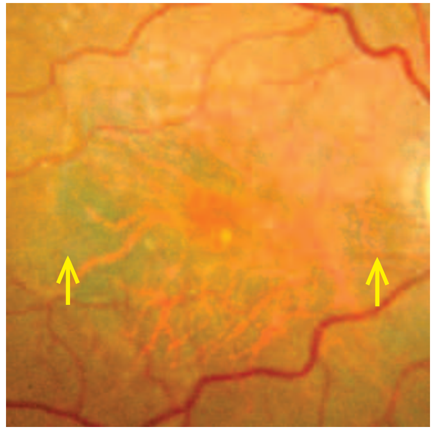
Late phase of the fluorescein angiography:
Hyperfluorescence with abnormal visibility of the choroid and sclera.

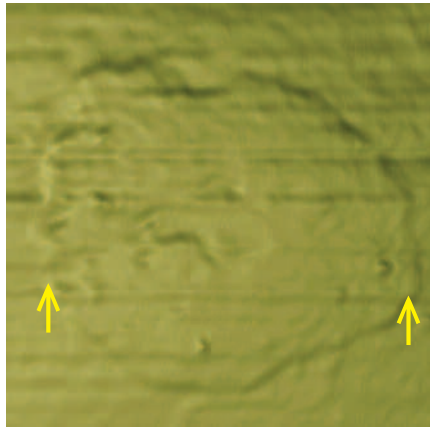


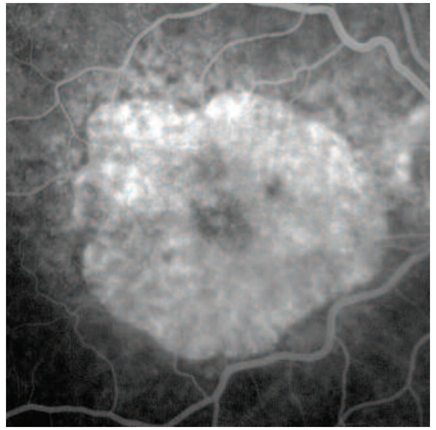
Enface OCT: Pre-epithelial segmentation (RPE mode):
Bright zone corresponding to the disappearance of the outer nuclear layer and ellipsoid zone on B-scan images.

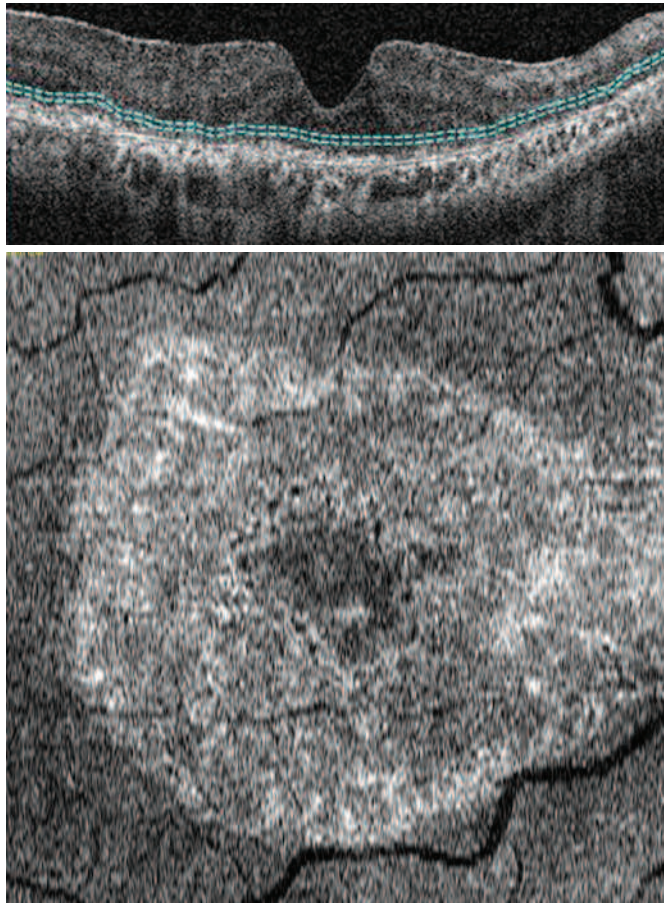


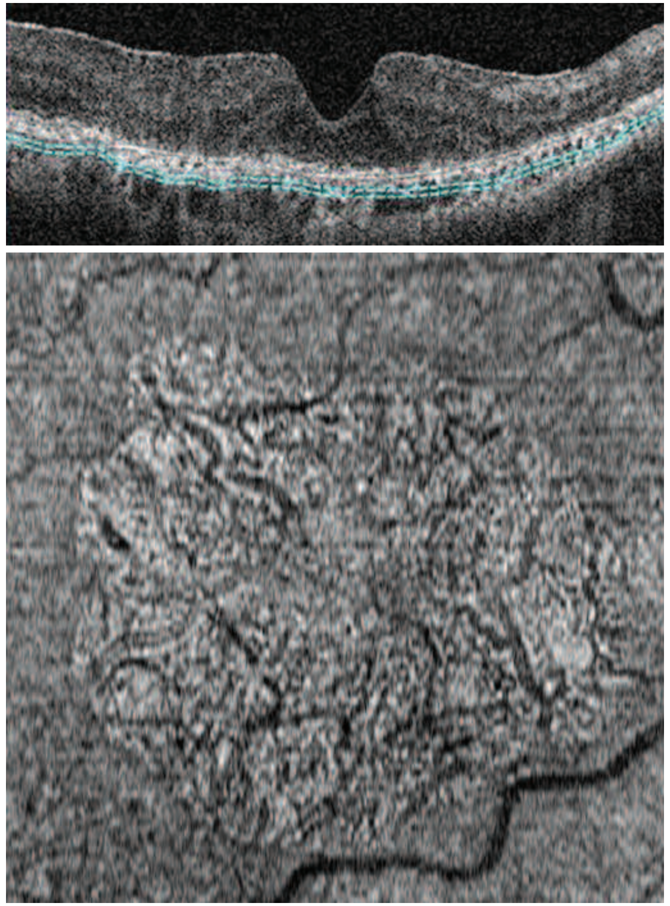
Enface OCT: Segmentation at the retinal pigment epithelium/choriocapillaris complex (RPE mode):
Abnormal visibility of large choroidal vessels due to the retinal pigment epithelium and choriocapillaris atrophy.



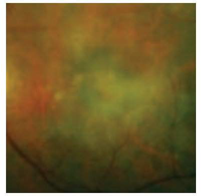




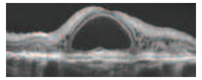




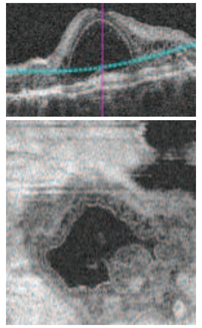
10 AMD
Outer retinal tubulation



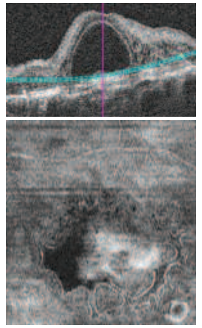
Color photo:
Fibrovascular choroidal new vessels.



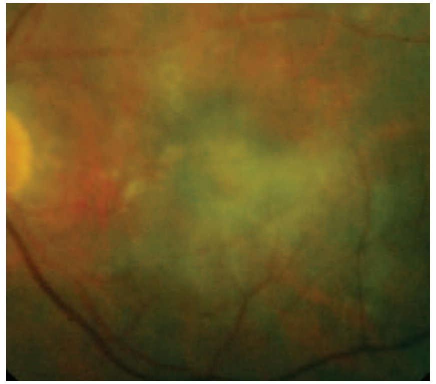
OCT B-scan:
Choroidal new vessels under an important macular edema with large central cystic spaces, a few microcystic spaces, and tubular formations in the outer nuclear layer (arrows). Note the thickness of the subretinal fibrosis.

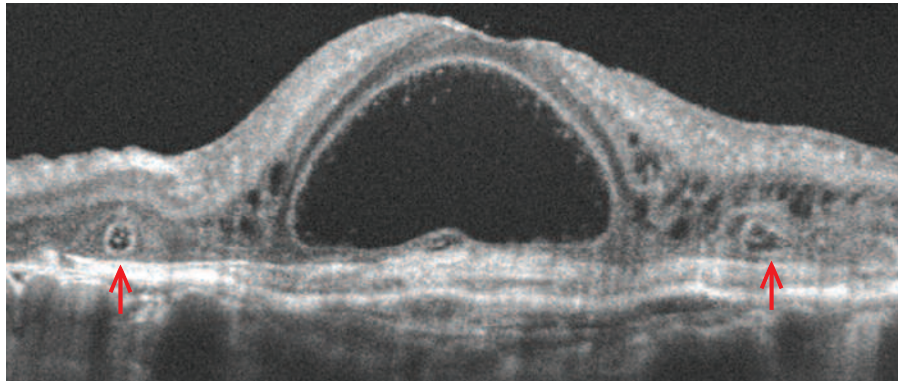


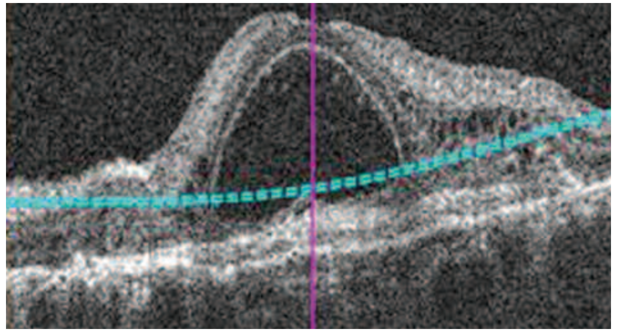
Enface OCT: Segmentation in front of the neovascular fibrosis (RPEfit mode):
Showing the central cystic space.

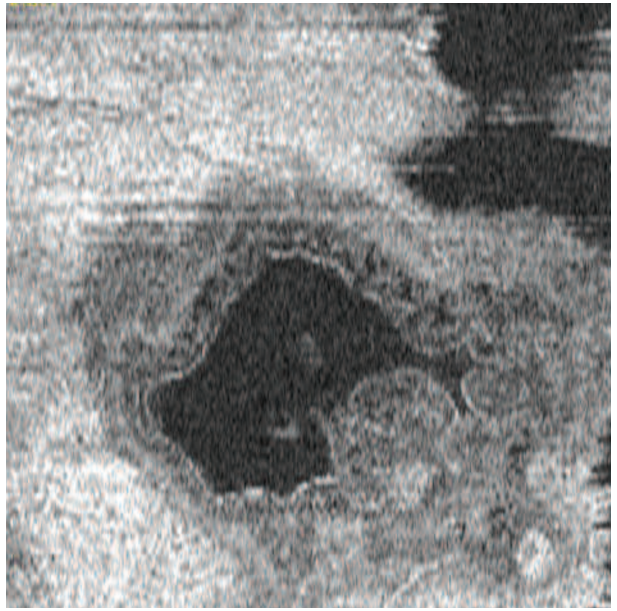


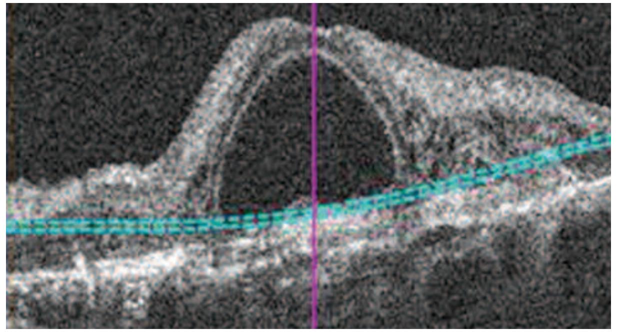
Enface OCT: Segmentation at the outer retina (RPEfit mode):
Highlighting the tubular formations (arrows), indicating outer retina atrophy.

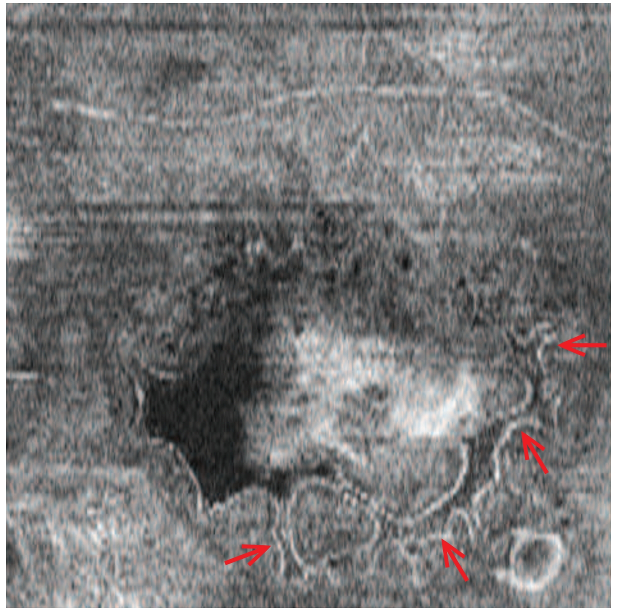






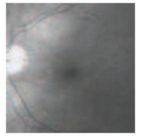




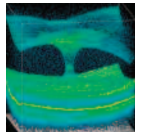


11 Vitreomacular traction

Color photo:
No macular anomaly is detected.

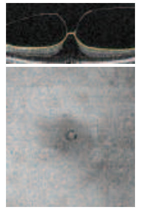


Red-free filter image:
No macular anomaly is detected.

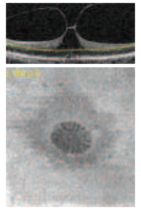


3D OCT:
Obvious vitreofoveolar traction.

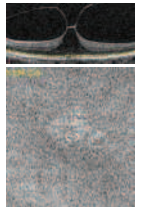
Horizontal OCT scan:
Tractional cystoid maculopathy.



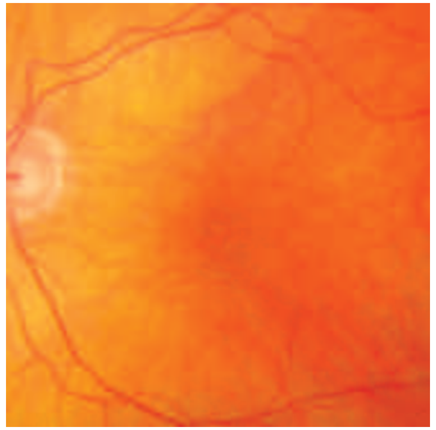
Enface OCT: Segmentation at the inner limiting membrane (ILM mode):
There are no folds at the retina surface, no epiretinal membrane associated with the narrow vitreomacular traction.

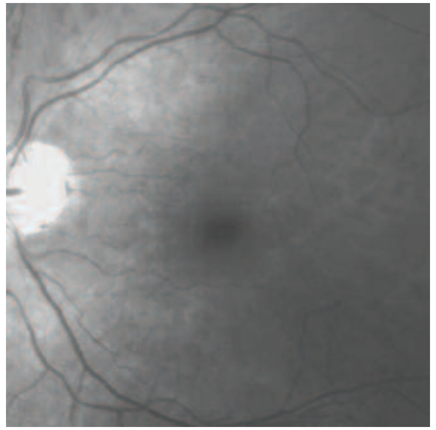


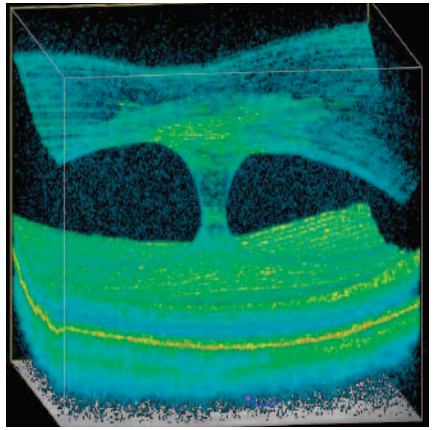
Enface OCT: Segmentation at the outer plexiform layer (RPE mode):
Tractional cystoid maculopathy.

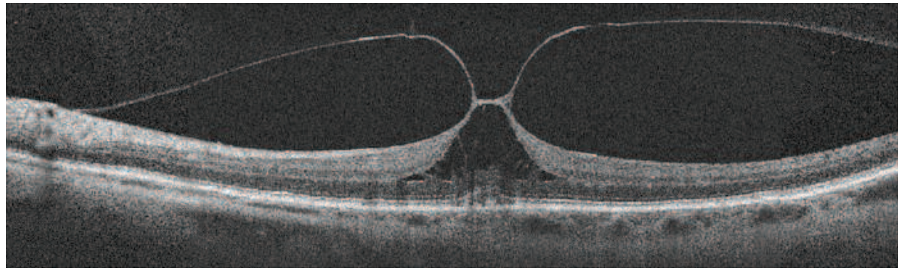


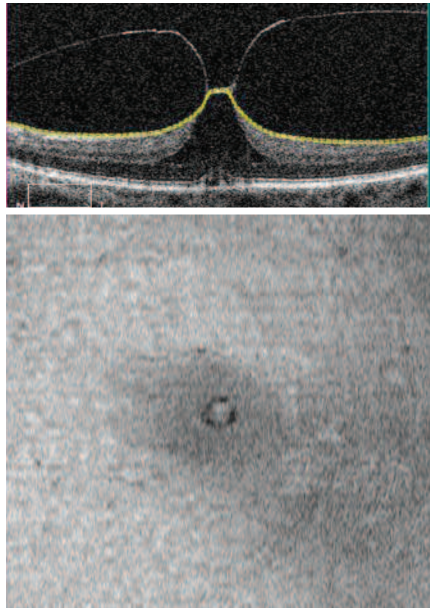
Enface OCT: Segmentation at the external limiting membrane (RPE mode): Showing the slight tractional foveolar elevation.

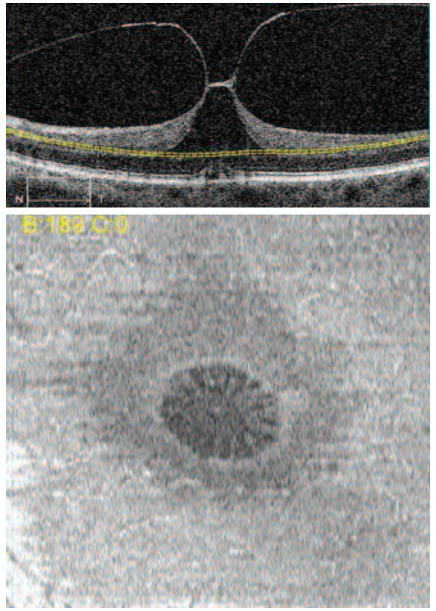


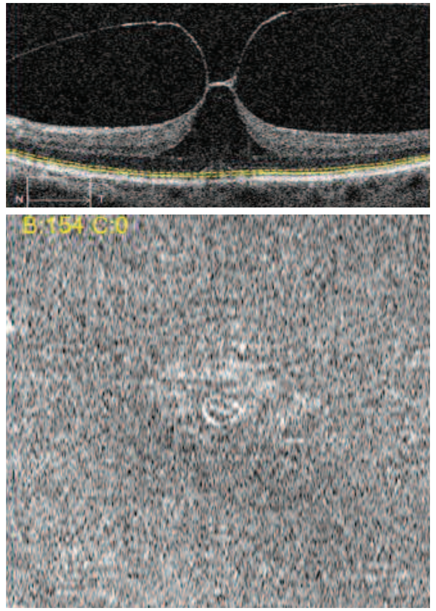






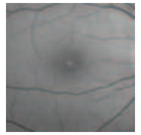




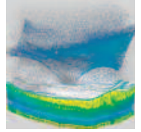


12 Early stage 1A impending macular hole

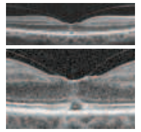
Color photo:
Showing a centro-foveolar yellow dot.



Red-free filter image:
Confirming the centro-foveolar yellow dot.



3D OCT:
Insertion of the partially detached vitreous cortex at the fovea center.

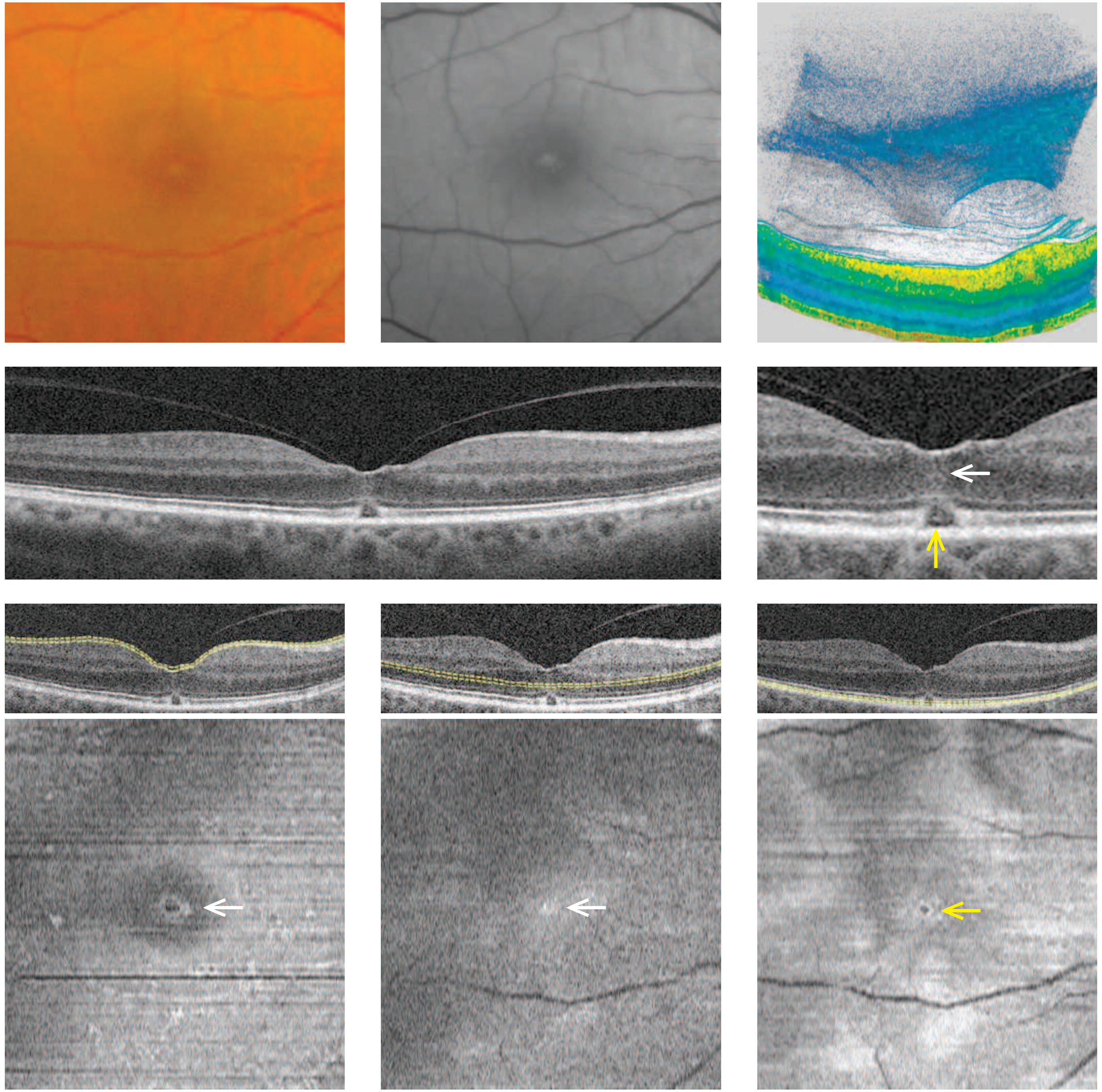


6-mm horizontal OCT scan and detail:
Partial vitreous cortex detachment, which is still attached to the bottom of the foveolar pit. Minimal impairment of the foveolar contour.
Hypo-reflective course at the center of the Henlé fiber layer (white arrow); minimal foveolar elevation distorting the ellipsoid zone (yellow arrow).

Enface OCT: Segmentation at the inner limiting membrane (ILM mode):
Small round defect (arrow) corresponding to the minimal vitreofoveolar traction.

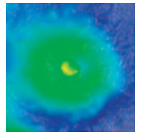
Enface OCT: Segmentation at the outer nuclear layer (RPE mode):
Showing the central hyporeflectivity in the Henlé fiber layer (arrow).

Enface OCT: Segmentation at the ellipsoid zone (RPE mode):
Showing the slight central foveolar elevation in the vitreomacular traction axis (arrow).

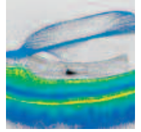


13 Stage 1A
impending macular hole

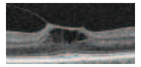
Color photo:
Showing a centro-foveolar yellow dot.



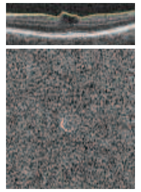
OCT:
Mapping of the macular thickness showing an elevation of the fovea center corresponding to the top of the tractional cystic space.



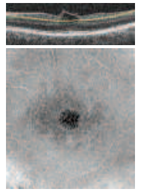
3D OCT:
Insertion of the partially detached vitreous cortex at the fovea center on the top of the cystic space.



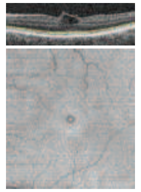
6-mm horizontal OCT scan, detail:
Partial detachment of the vitreous cortex which is still attached to the top of the foveolar cystic space. Several spans are seen in the space corresponding to the course of distended Henlé fibers.



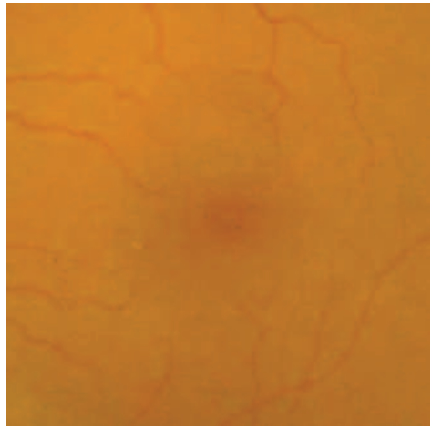
Enface OCT: Segmentation at the inner limiting membrane (ILM mode):
Small crescent-shaped defect (arrow) corresponding to the vitreofoveolar traction.

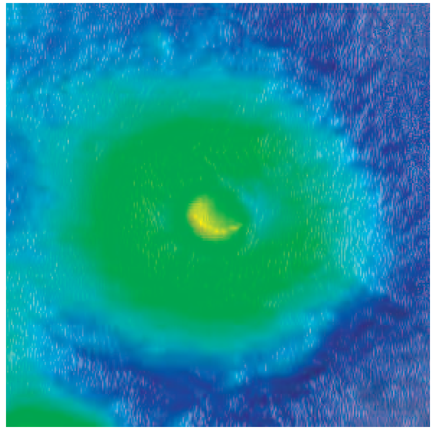


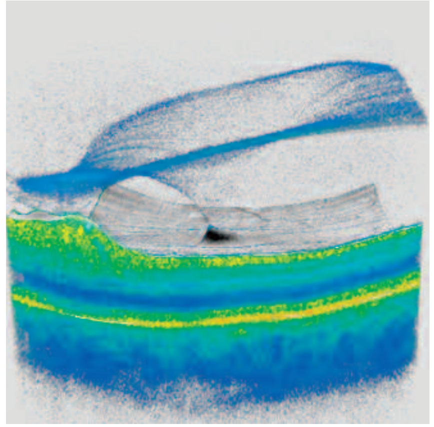
Enface OCT: Segmentation at the inner nuclear layer (RPE mode):
Showing the central hypo-reflectivity in the cystic space area, segmented by radial spans (arrow).

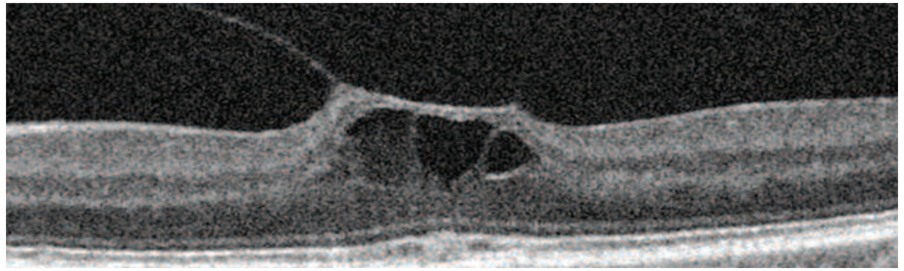


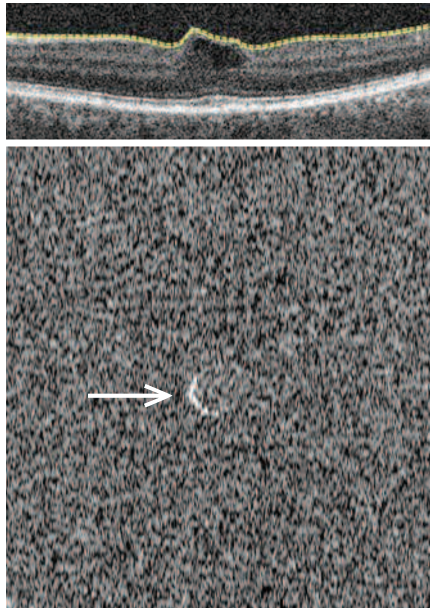
Enface OCT: Segmentation at the interdigitation zone (RPE mode):
Showing a discrete central hyper-reflectivity corresponding to an anomaly which is visible on the horizontal scan (arrow).

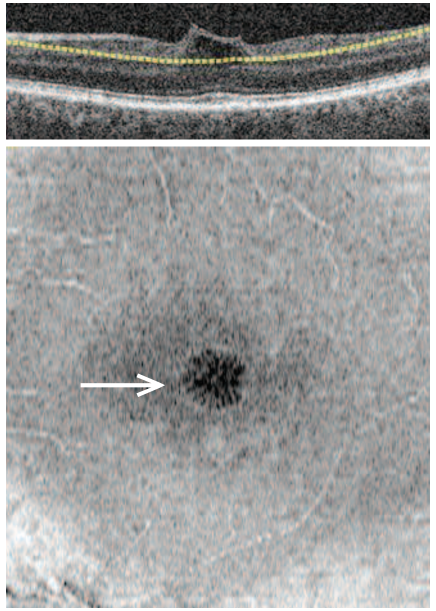


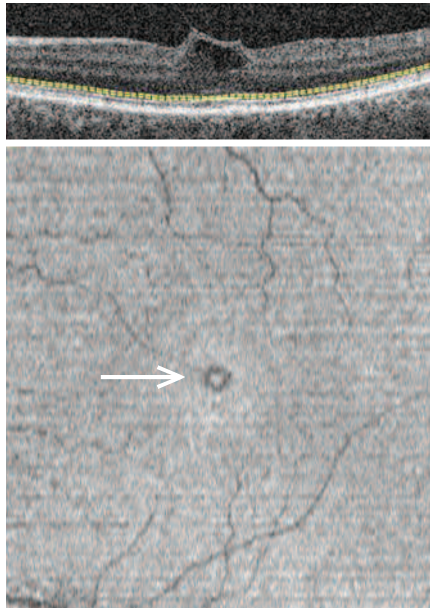




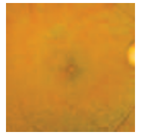




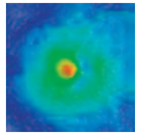




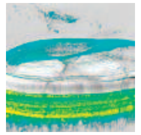
Stage 1B
impending macular hole



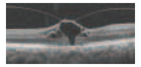
Color photo:
Showing a centro-foveolar yellow ring.



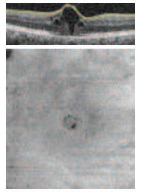
OCT:
Mapping of the macular thickness showing an important elevation of the fovea center corresponding to the top of the tractional cystic space.



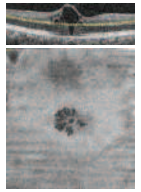
3D OCT:
Insertion of the partially peeled off vitreous cortex at the fovea center on the top of the cystic space.



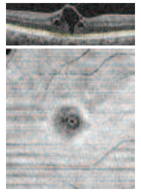
6-mm horizontal OCT scan:
Vitreofoveolar traction. The vitreous cortex is still attached to the top of the foveolar cystic formation. Large cystic space prolonged backward through an aperture in the outer retina. Note the gap between the outer and inner retina on both sides of the cystic space. It is in fact already an “occult” macular hole.



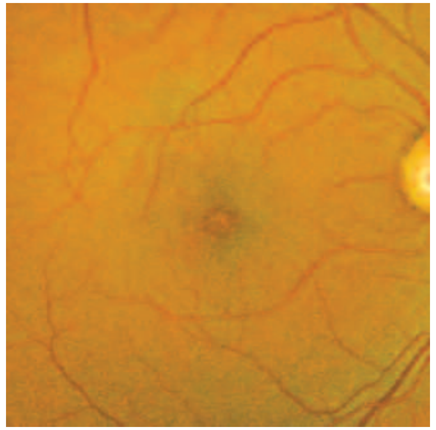
Enface OCT: Segmentation at the inner limiting membrane (ILM mode):
Small hypo-reflective contour (arrow) corresponding to the insertion of the vitreofoveolar traction.

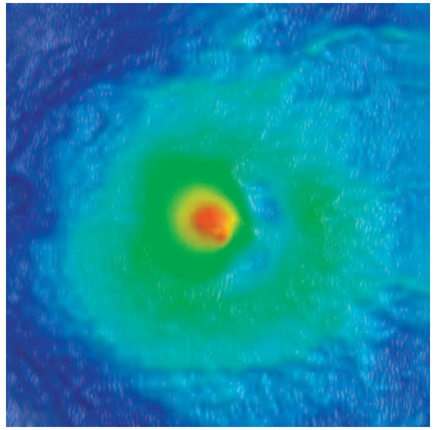


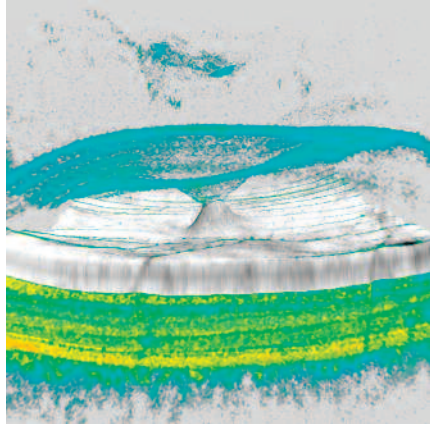
Enface OCT: Segmentation at the inner nuclear layer (RPE mode):
Showing the hypo-reflective cystoid space (arrow).

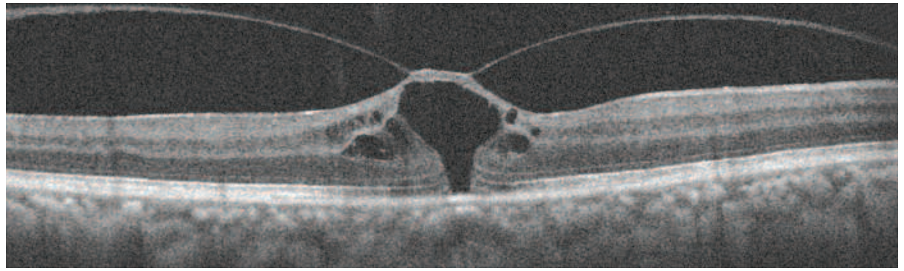


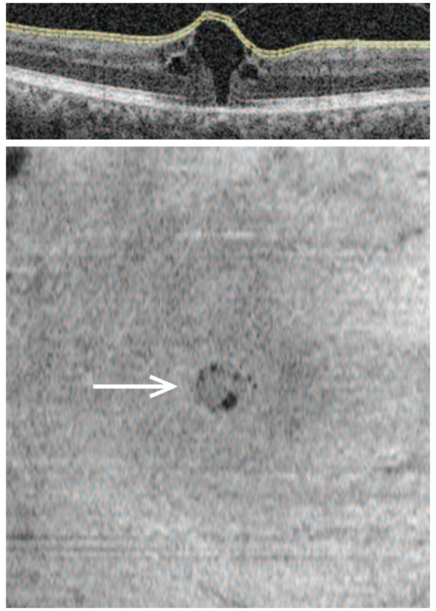
Enface OCT: Segmentation at the ellipsoid zone (RPE mode):
Showing the central aperture of the photoreceptor layer (arrow).

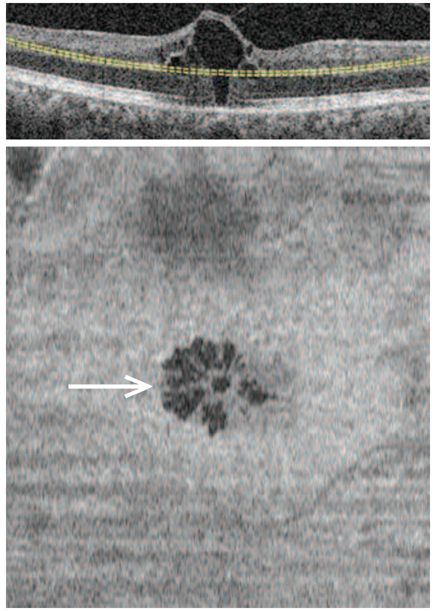


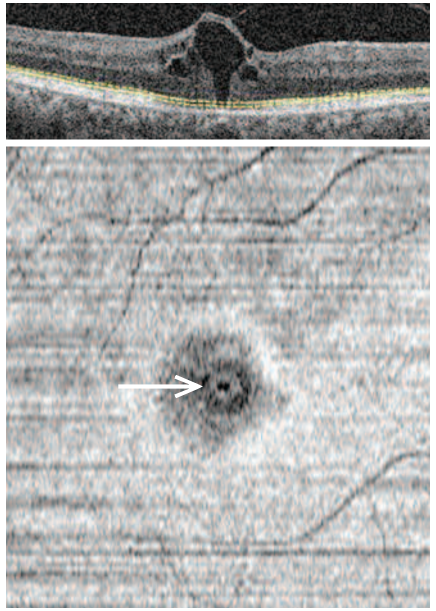








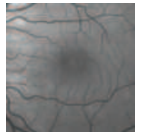




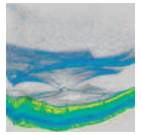
15

Stage 2 macular hole

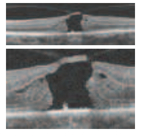
Color photo:
Showing a centro-foveolar yellow ring.



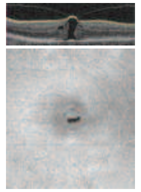
Red-free filter image:
Showing the same bright centro-foveolar ring.



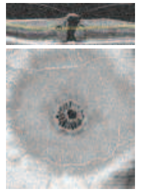
3D OCT:
Showing the insertion of the partially peeled off vitreous cortex at the fovea center on the operculum which still adheres to the macular hole edge.



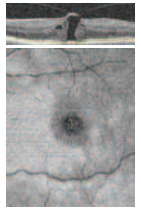
6-mm horizontal OCT scan and detail:
Vitreofoveolar traction. The vitreous cortex is still attached to the operculum which still adheres to the macular hole edge. Note the cystoid spaces on the macular hole edges.



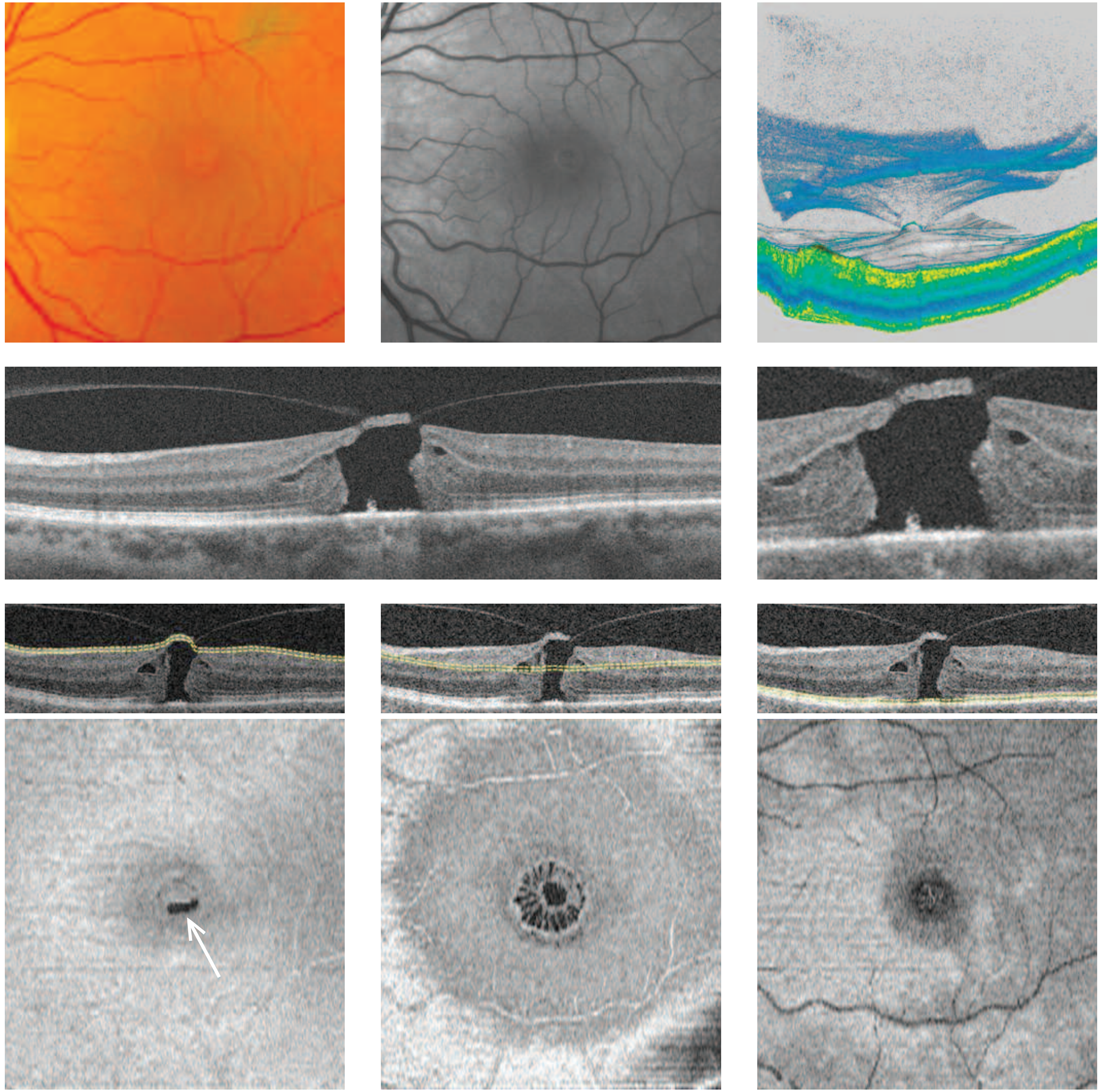
Enface OCT: Segmentation at the inner limiting membrane (ILM mode):
Small crescent-shaped hypo-reflectivity (arrow) corresponding to the partial aperture of the macular hole.



Enface OCT: Segmentation at the inner nuclear layer (RPE mode):
Showing the hypo-reflectivity of cystoid spaces surrounding the central full-thickness aperture.

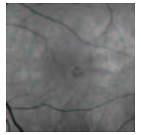


Enface OCT: Segmentation at the ellipsoid zone (RPE mode):
Showing the hypo-reflective central aperture in the photoreceptor ellipsoid layer.

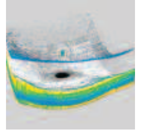


16 Stage 3 macular hole

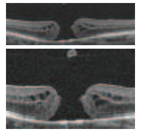
Color photo:
Showing the red central round aperture of the macular hole.



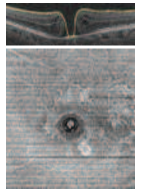
Red-free filter image:
Showing the same centro-foveolar contour.



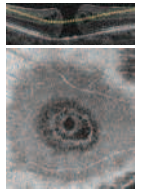
3D OCT:
Showing the insertion of the vitreous cortex detached from the posterior pole, above the posterior pole, containing the operculum (arrow).



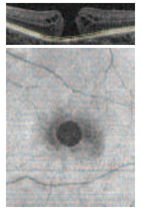
6-mm horizontal OCT scan and detail:
The detached posterior vitreous cortex contains the peeled off operculum (arrow). Note the cystoid spaces on the macular hole edges.



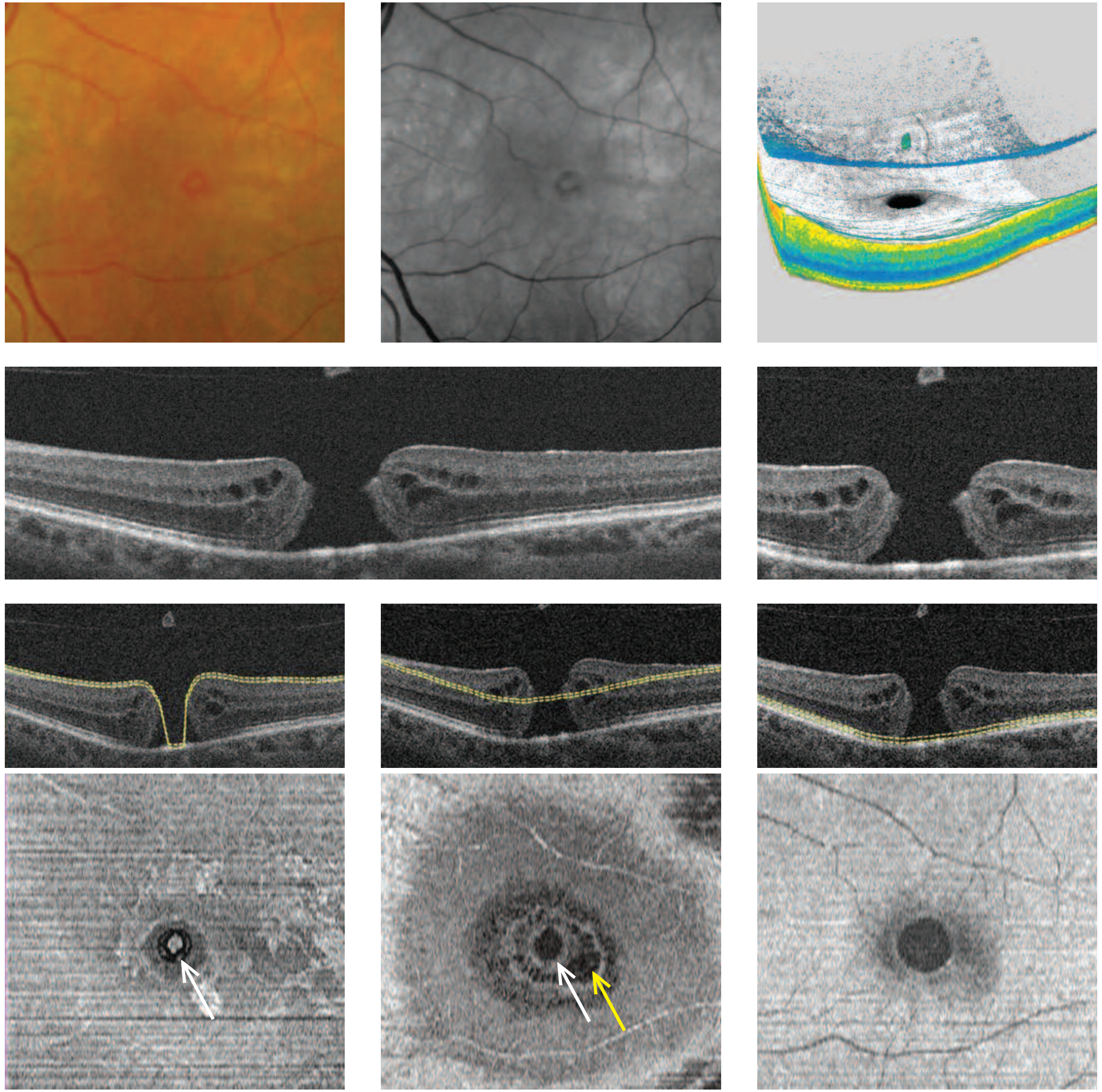
Enface OCT: Segmentation at the inner limiting membrane:
Round defect of the macular hole, with hypo-reflective ring corresponding to the exposed retinal pigment epithelium. Note also the hyper-reflectivity projected onto the macula surface by the slightly offset operculum (arrow).



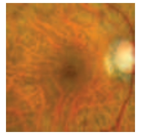
Enface OCT: Segmentation at the macular hole collar (RPE mode):
Showing its aperture (white arrow) and hypo-reflective cystoid spaces (yellow arrows) surrounding the full-thickness central aperture.



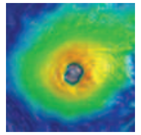
Enface OCT: Segmentation in front of the retinal pigment epithelium (RPE mode):
Showing the hypo-reflective macular hole basis diameter.



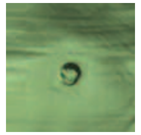
17 Lamellar macular hole



Color photo:
Showing a rounded reddish fovea.

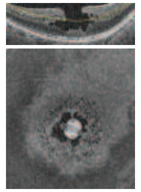


OCT:
Mapping of the macular thickness showing a bilobed central crater-like hole corresponding to the lamellar macular hole. Macular hole edges are slightly thickened.

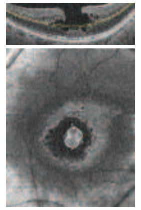


OCT:
Mapping of the retinal surface. The surface is smooth and the bilobed appearance, which is characteristic of the lamellar macular hole, is clearly visible.

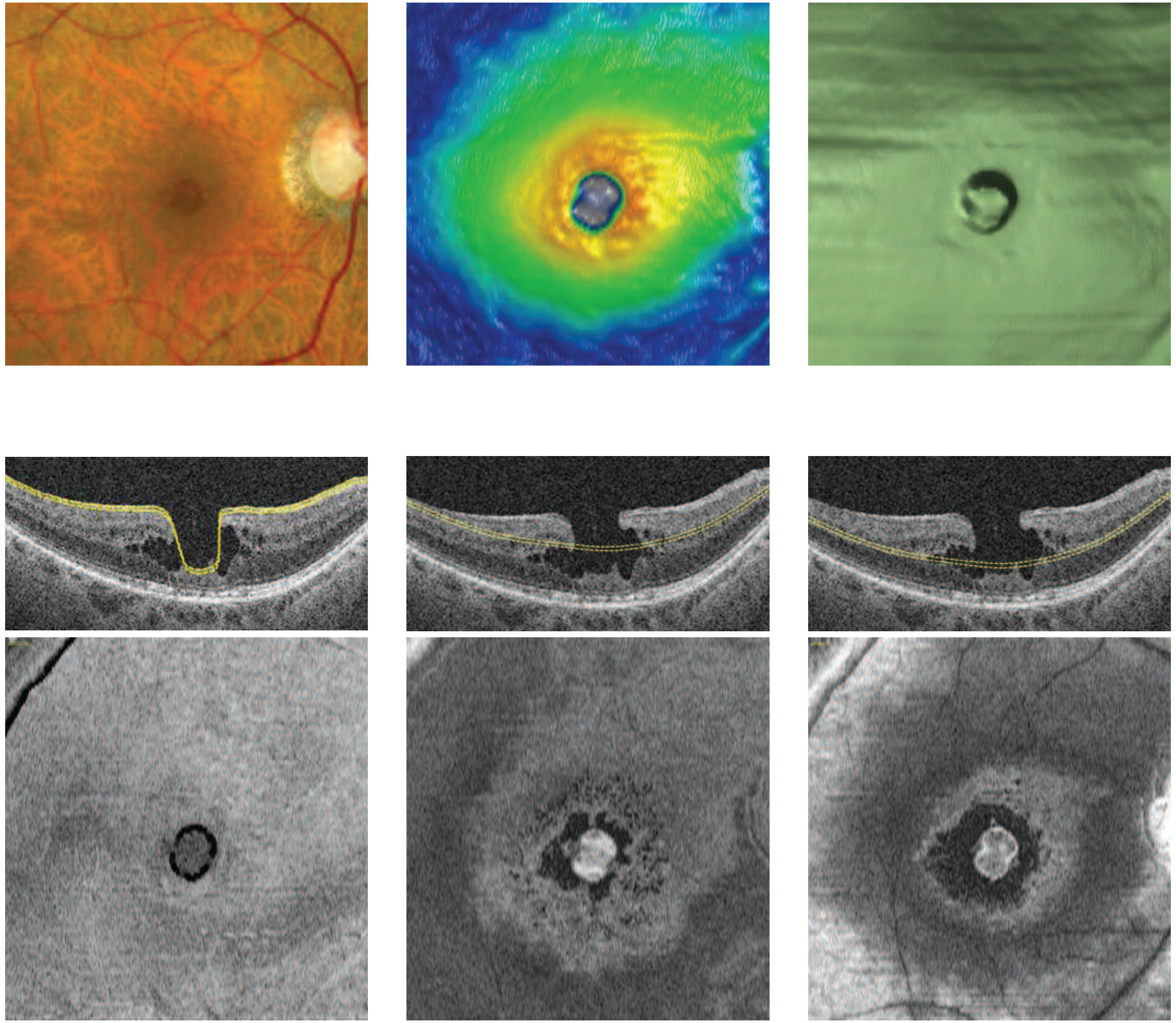
Enface OCT: Segmentation at the inner limiting membrane:
There are no folds at the retina surface.



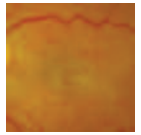
Enface OCT: Segmentation at the inner nuclear layer (RPE mode):
Showing the cystoid spaces on the macular hole edges.



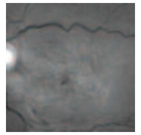
Enface OCT: Segmentation at the outer plexiform layer (RPE mode):
Showing the enlargement of the cystoid spaces.



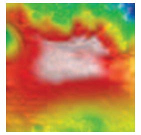
18 Macular epiretinal membrane



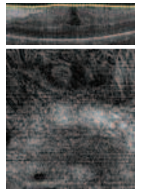
Color photo:
Important folding of large vessels at the posterior pole due to the contraction of an opaque and shiny macular epiretinal membrane.



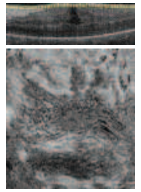
Blue reflectance image:
Reflectivity of the membrane, retinal folds and extreme contraction of the xanthophyll pigment (arrow).



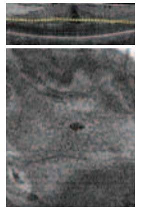
Mapping of the macular thickness:
Irregular thickening of the macula indicating irregular retraction forces exerted by the membrane at the macula surface.



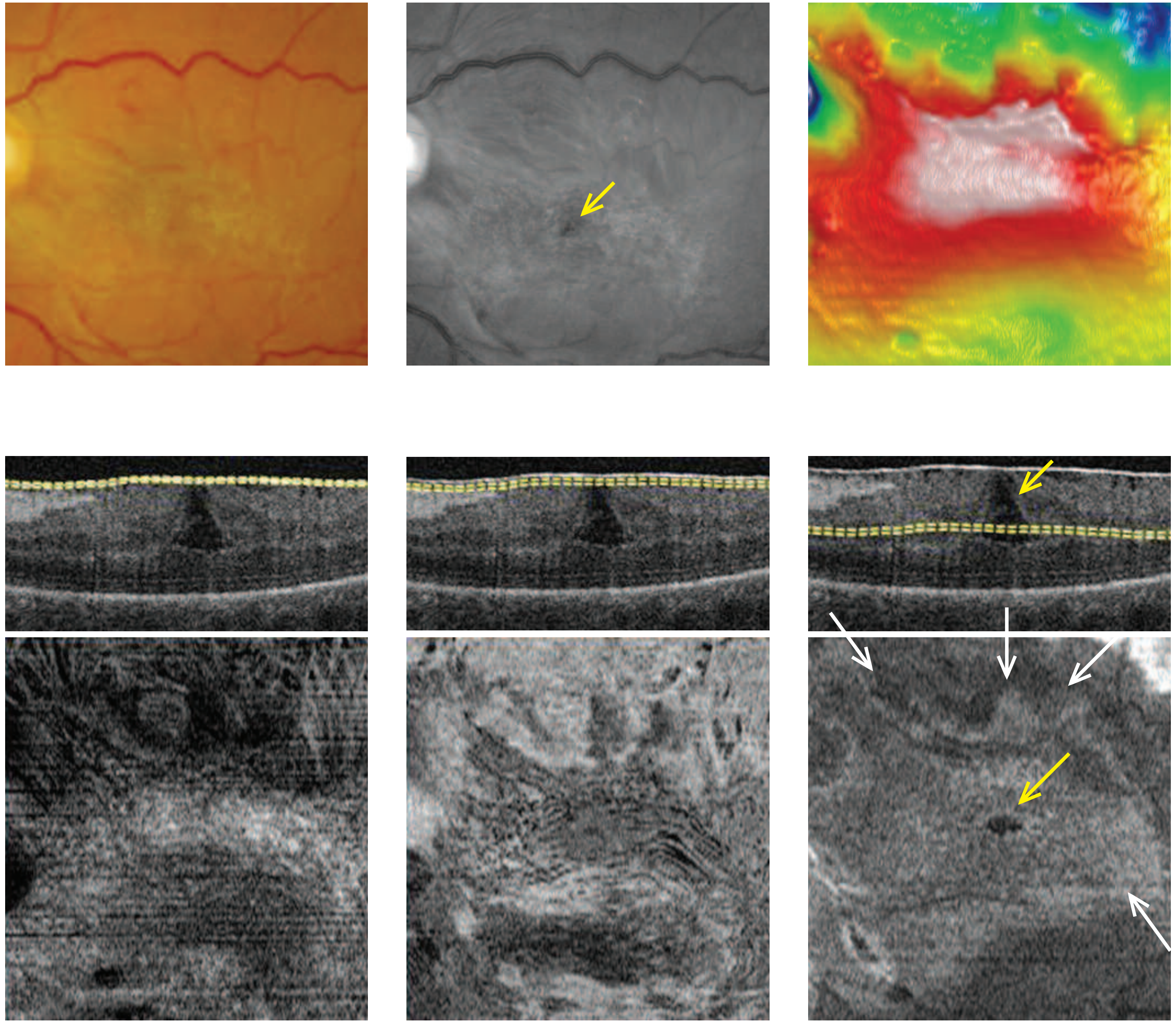
Enface OCT:
Segmentation at the membrane (ILM mode) showing a smooth membrane at the center causing retinal contraction folds at its periphery.



Enface OCT:
Segmentation at the retinal surface (ILM mode) showing irregular and superficial retinal folds induced by the membrane contraction.

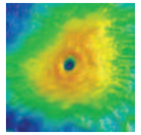


Enface OCT:
Segmentation at the inner nuclear layer (ILM mode) cutting off the full-thickness folds at the fovea periphery (white arrows). Note the almost complete closure of the foveal pit due to the membrane contraction (yellow arrows).

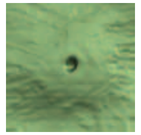


19 Typical macular pseudohole

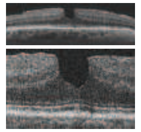
Color photo:
Showing the typical round reddish aspect of the macula, suggestive of macular hole.



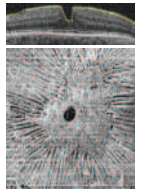
Mapping of the macular thickness:
Showing the overall thickening of the macula and the foveolar crater-like hole.



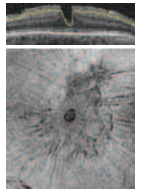
Mapping of the macular surface: Segmentation at the inner limiting membrane:
The foveolar depression is deep and slightly oval. The folds of the retinal surface, which converge towards the fovea are clearly visible.



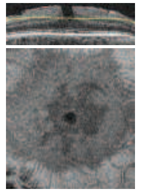
6-mm horizontal OCT scan and detail:
Overall thickening of the macula. Verticalization of the fovea edges, which takes a U-like pattern. The hyper-reflective epimacular membrane is visible at the macula surface (arrows).



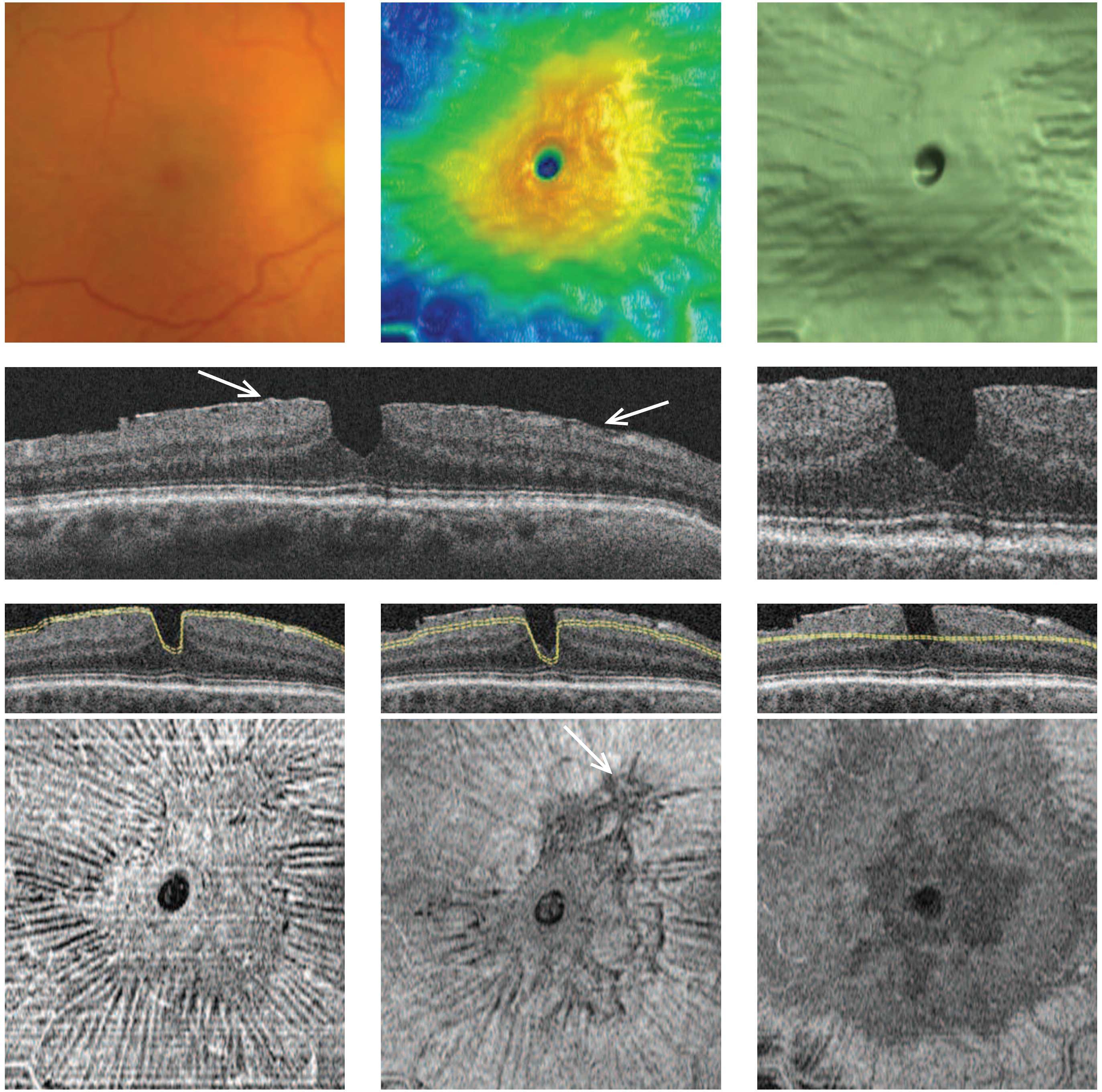
Enface OCT: Segmentation at the retinal surface (ILM mode):
Superficial radial retinal folds converge towards the macula center, caused by the centripetal contraction of the epiretinal membrane.



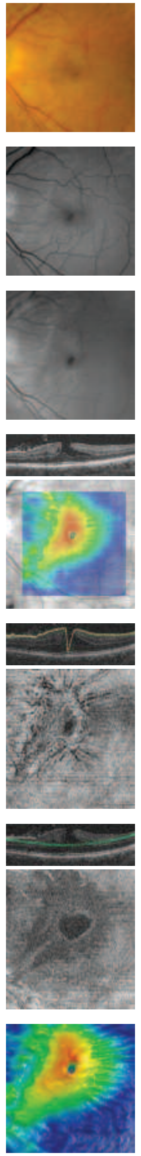
Enface OCT: Segmentation at the ganglion cell layer (ILM mode):
Radial retinal folds also affect the ganglion cell layer. Note a small offset contraction site (arrow) explaining the ovalization of the macular pseudohole.



Enface OCT: Segmentation at the inner plexiform and inner nuclear layers (RPE mode):
The radial retinal folds are significantly reduced at this level.



20 Macular pseudohole with stretched edges



Color photo:
Vessel contraction and tortuosity at the posterior pole with rounded oval-like red defect in the macula suggestive of macular hole.

Red-free filter image:
The vessel contraction at the posterior pole is more visible.

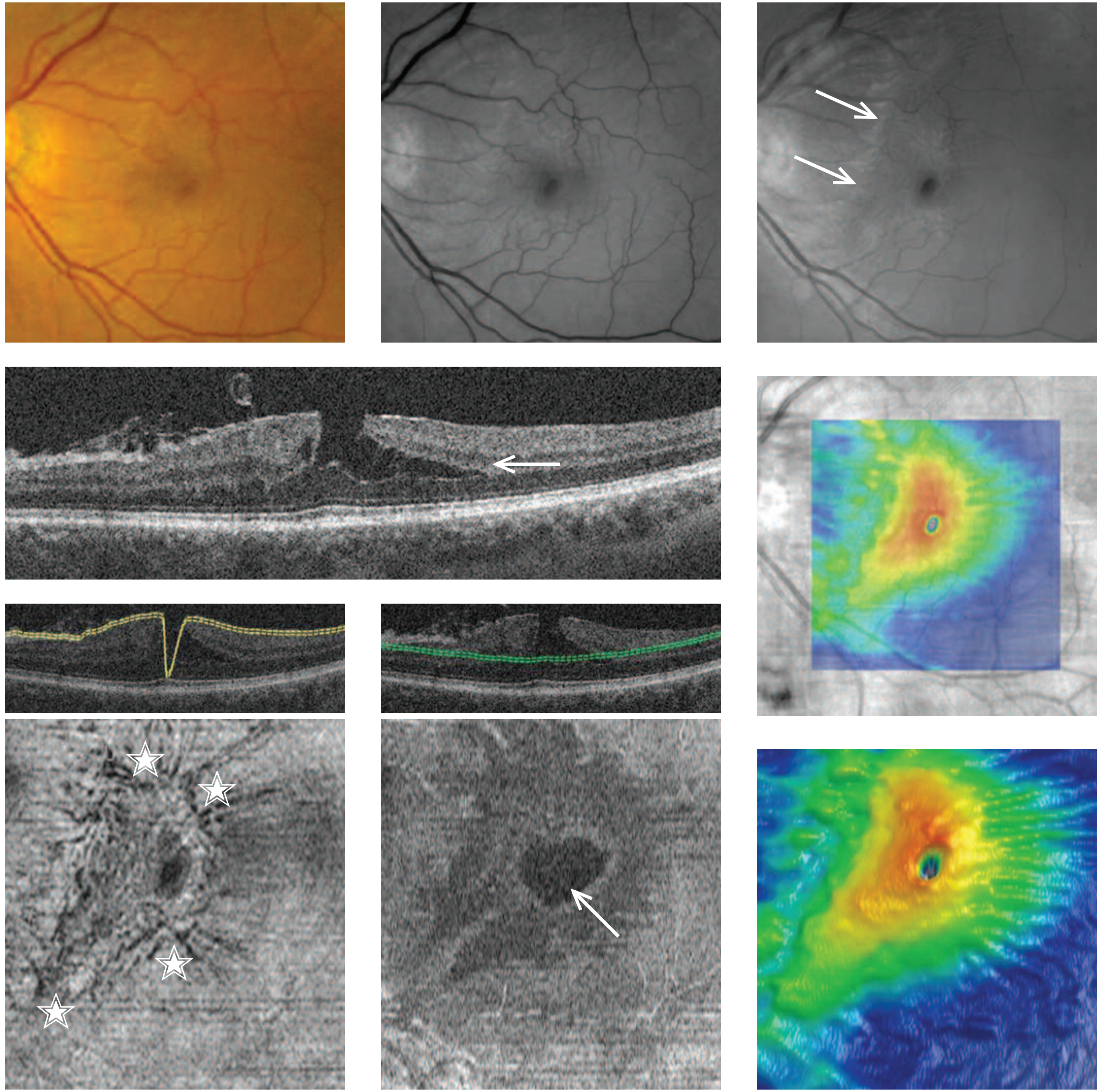
Blue reflectance image:
Oval and oblique contraction of the xanthophyll pigment. The reflectivity of the epimacular membrane responsible for the contraction is visible. Note the presence of a vertical interpapillomacular retinal fold (arrows).

Horizontal OCT scan:
Macular thickening, verticalization of the edges of the foveolar pit. The temporal edge of the macula is distended by the epiretinal membrane contraction with Henle fiber stretching and cleavage between the inner and outer retina (arrow). The macular mapping shows the retinal folds.

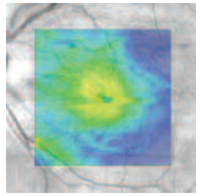
Enface OCT:
Segmentation at the retinal surface (ILM mode). The retinal folds converge towards several epicenters (stars) explaining the stretching of the temporal edge of the macula.

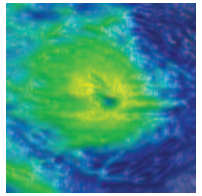
Enface OCT:
Segmentation at the inner nuclear layer and passing through the umbo of the foveal pit (RPEfit mode). Full-thickness retinal folds are still visible at this level. The central area corresponds to the fovea floor (arrow).

Mapping of the macular thickness with 3D:
Effect showing converging retinal folds and persistent distorted foveal depression in a thickened retina.



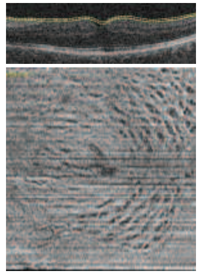
21 Postoperative macular pseudohole with stretched edges



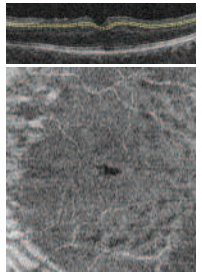


Mapping of the macular thickness after removal of the epiretinal membrane and inner limiting membrane, without gas injection (same case as on the previous page):
Note the decrease in macular thickness and disappearance of traction retinal folds.

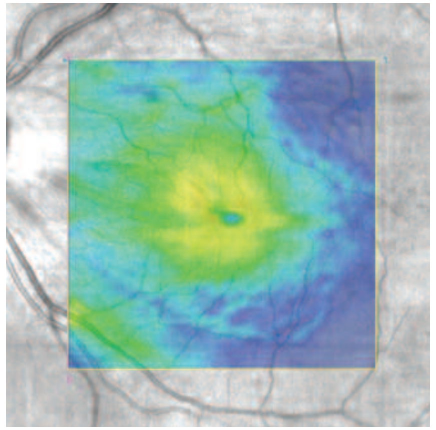
Mapping of the macular surface:
Segmentation at the inner limiting membrane. Retinal folds have been replaced by arcuate hollows, corresponding to a Dissociation of the Optic Nerve Fiber Layer (DONFL).

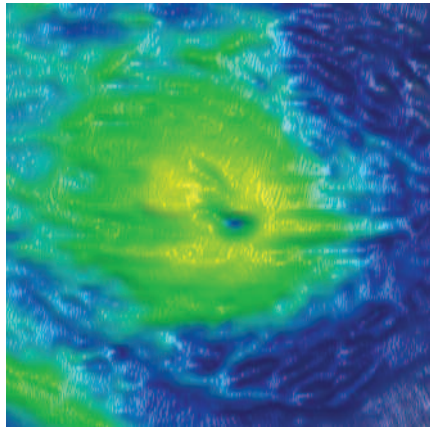


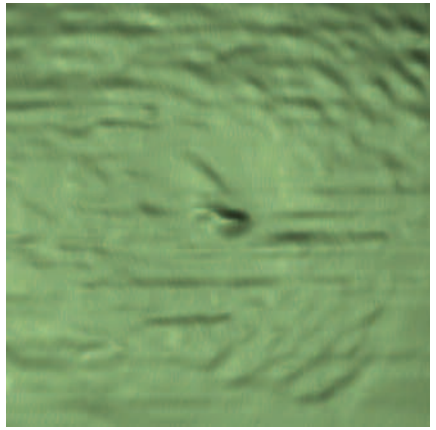
Enface OCT: Segmentation at the retinal surface (ILM mode):
The macular profile is almost back to normal. The enface image shows arcuate striae characteristic of DONFL.

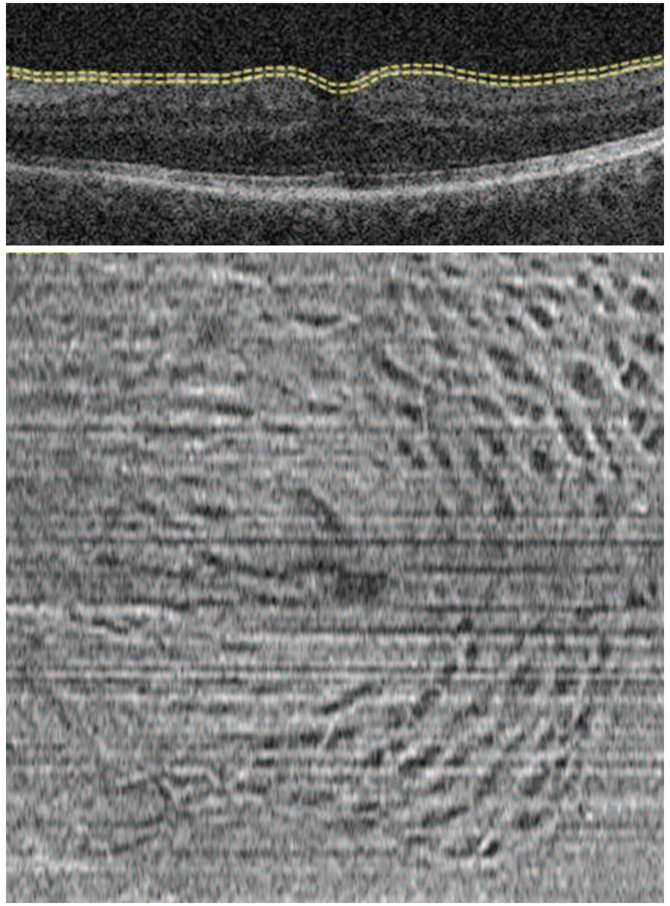


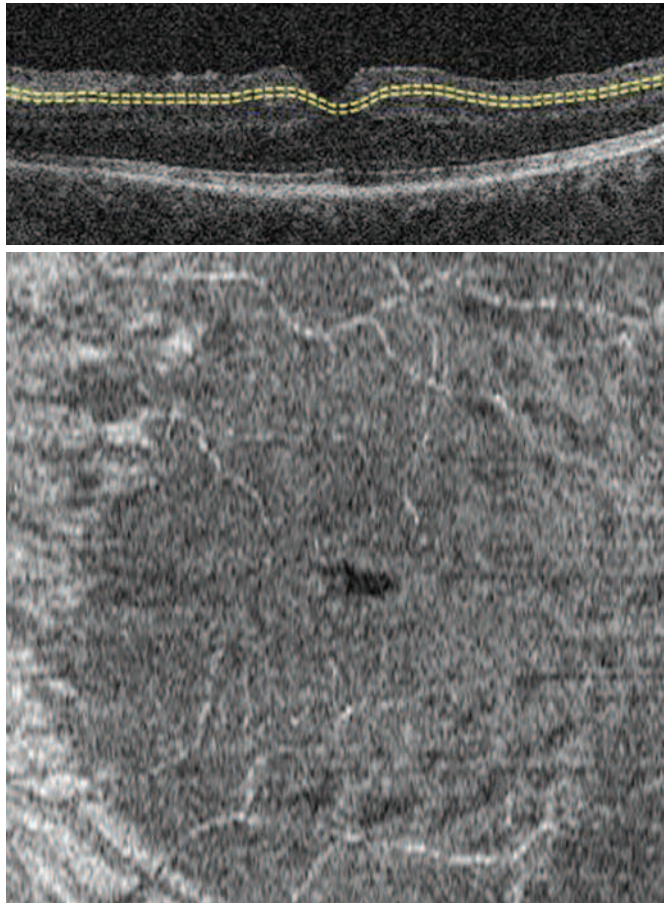
Enface OCT: Segmentation at the ganglion cell layer (ILM mode):
The enface image still shows the imprint of arcuate striae characteristic of DONFL.



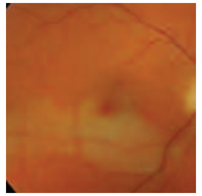




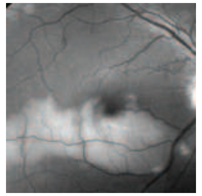




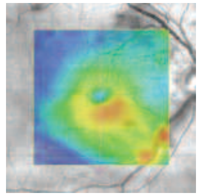
Branch occlusion of the central retinal artery
Acute phase



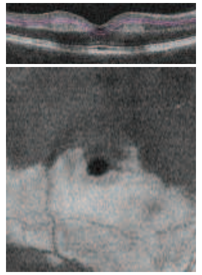
Color photo:
Ischemic retinal edema in the area of the occluded inferior temporal artery.



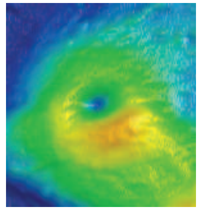
Red-free filter image:
The area of the ischemic retinal edema is better defined.



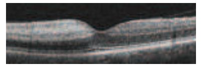
Mapping of the macular thickness:
The retinal thickness is increased in the macular area affected by the ischemic edema.



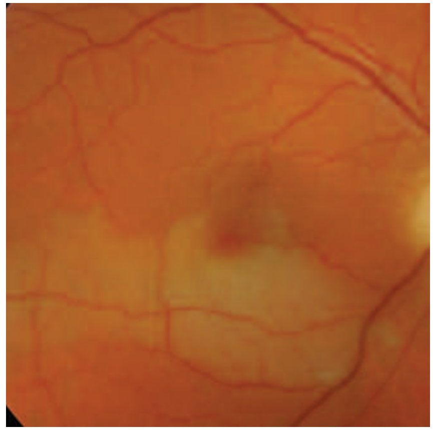
Enface OCT:
Segmentation at the inner retina showing the hyper-reflectivity of the ischemic inner retina.

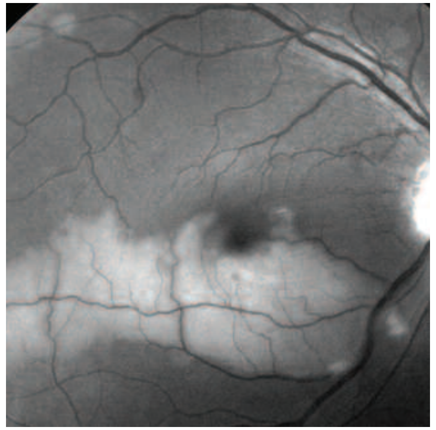


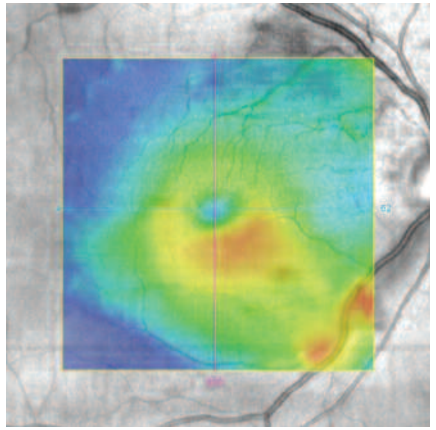
3D OCT:
Retinal thickening in the lower part of the macula corresponding to the ischemic edema.

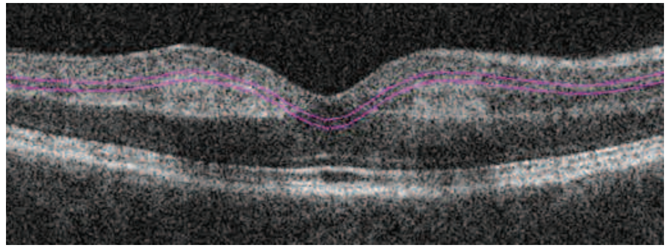


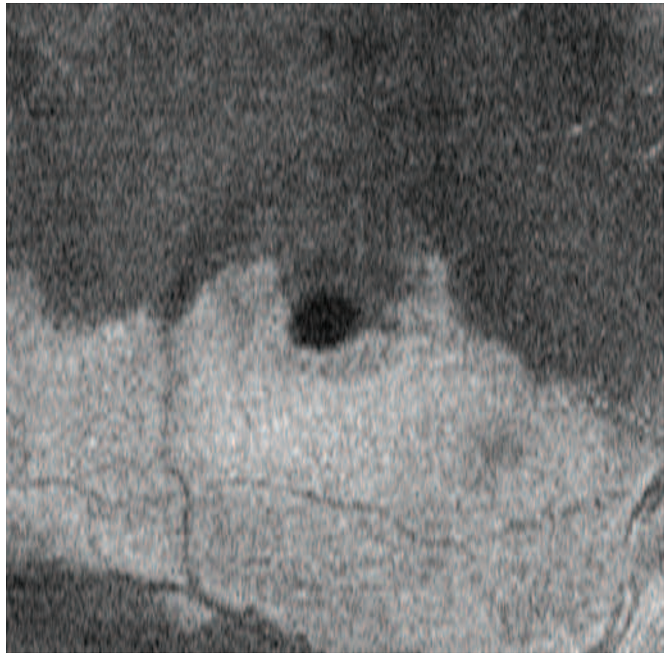
Vertical OCT scan passing through the macula:
Showing the difference in inner retinal thickness and reflectivity between the upper and lower part of the macula.

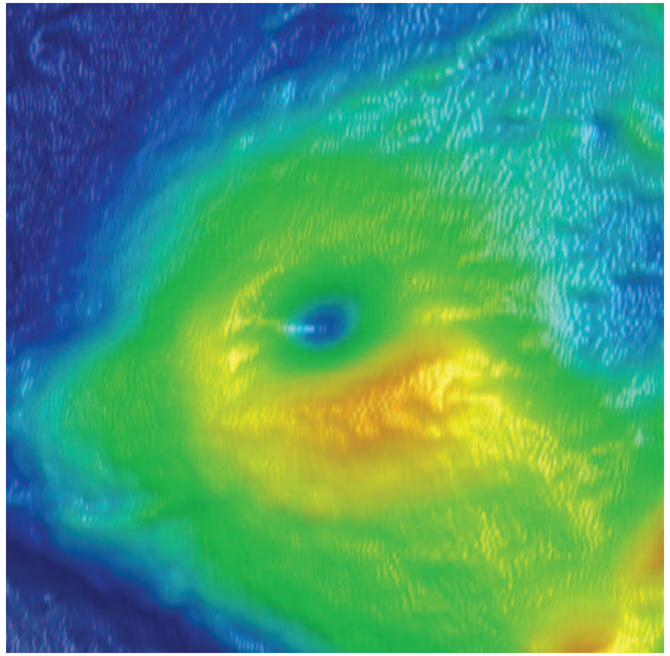


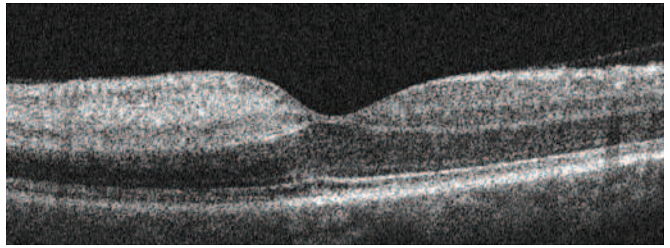




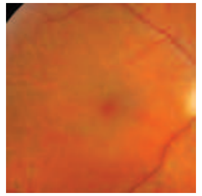




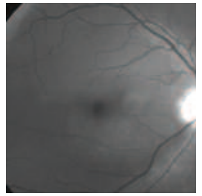




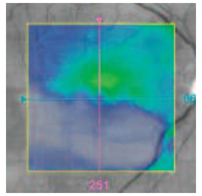
23 Sequelae of branch retinal artery occlusion



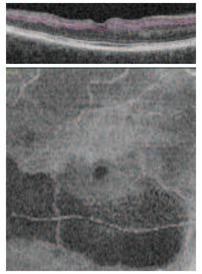
Color photo:
Disappearance of the ischemic retinal edema. The retina appears normal.



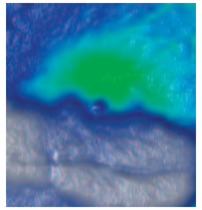
Blue reflectance image:
The occlusion area appears somewhat darker.



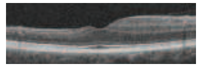
Mapping of the macular thickness:
The retinal thickness is dramatically decreased in the part of the posterior pole which is affected by the arterial occlusion.



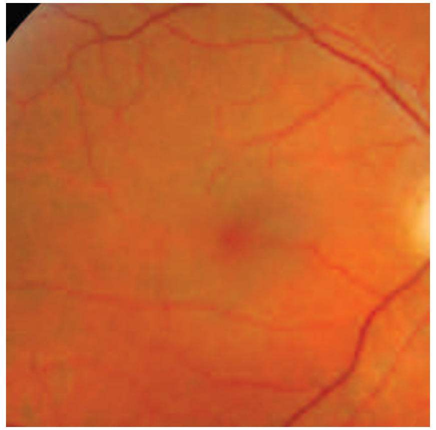
Enface OCT: Segmentation at the inner retina:
Showing the hypo-reflectivity of the atrophic inner retina.

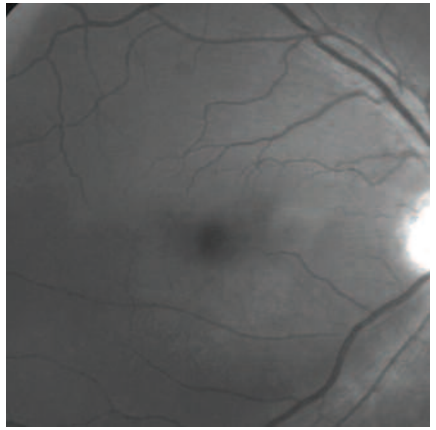


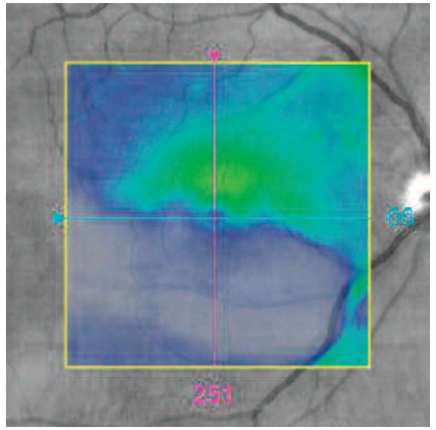
3D OCT:
Retinal thinning in the lower part of the macula corresponding to the atrophic retina.

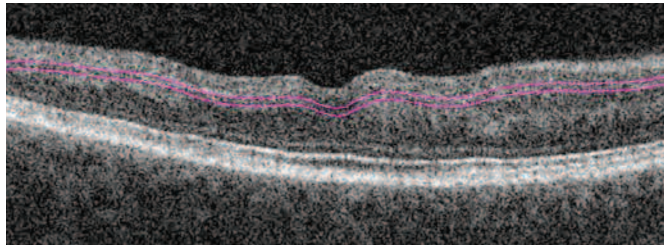


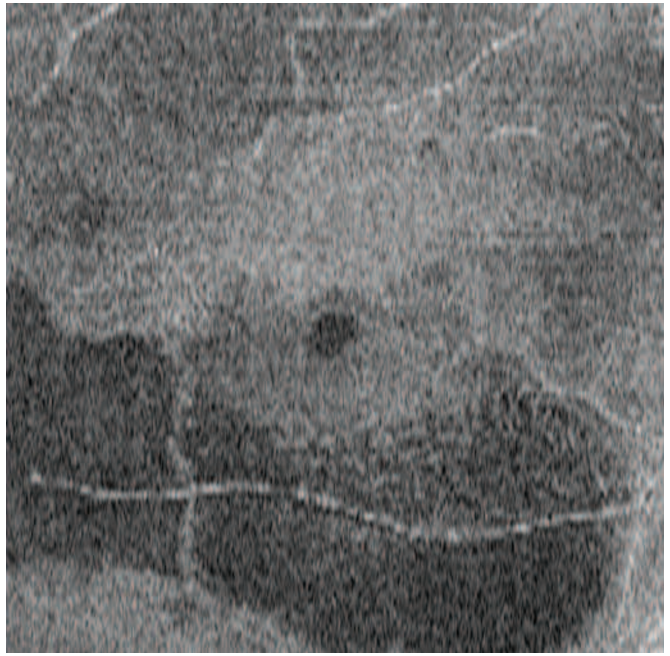
Vertical OCT scan passing through the macula:
Showing the inner retina atrophy in the lower part of the macula.

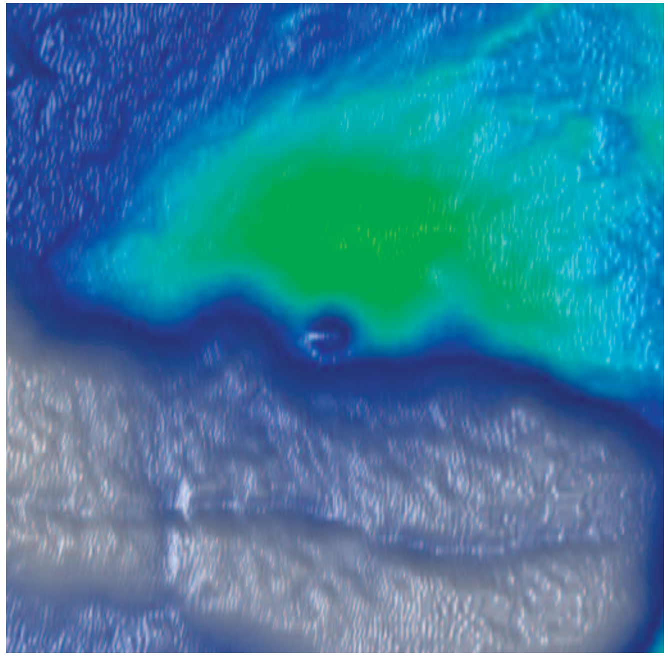


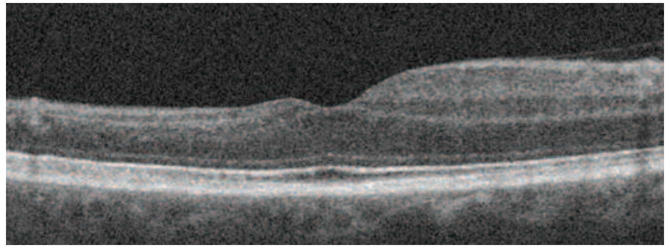




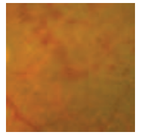




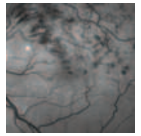




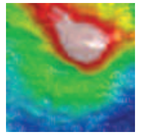
24 Branch retinal vein occlusion



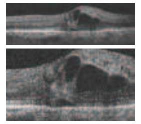
Color photo:
Showing a recent superotemporal branch vein occlusion.



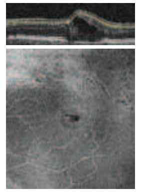
Red-free filter image:
Enhancing the visibility of retinal hemorrhages.



Mapping of the macular thickness:
Showing the retinal thickening in the superotemporal part of the macula.

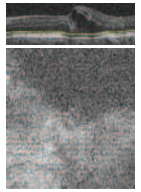


6-mm horizontal OCT scan and detail:
Partial cystoid macular edema in the temporal part of the macula associated with a small serous retinal detachment.

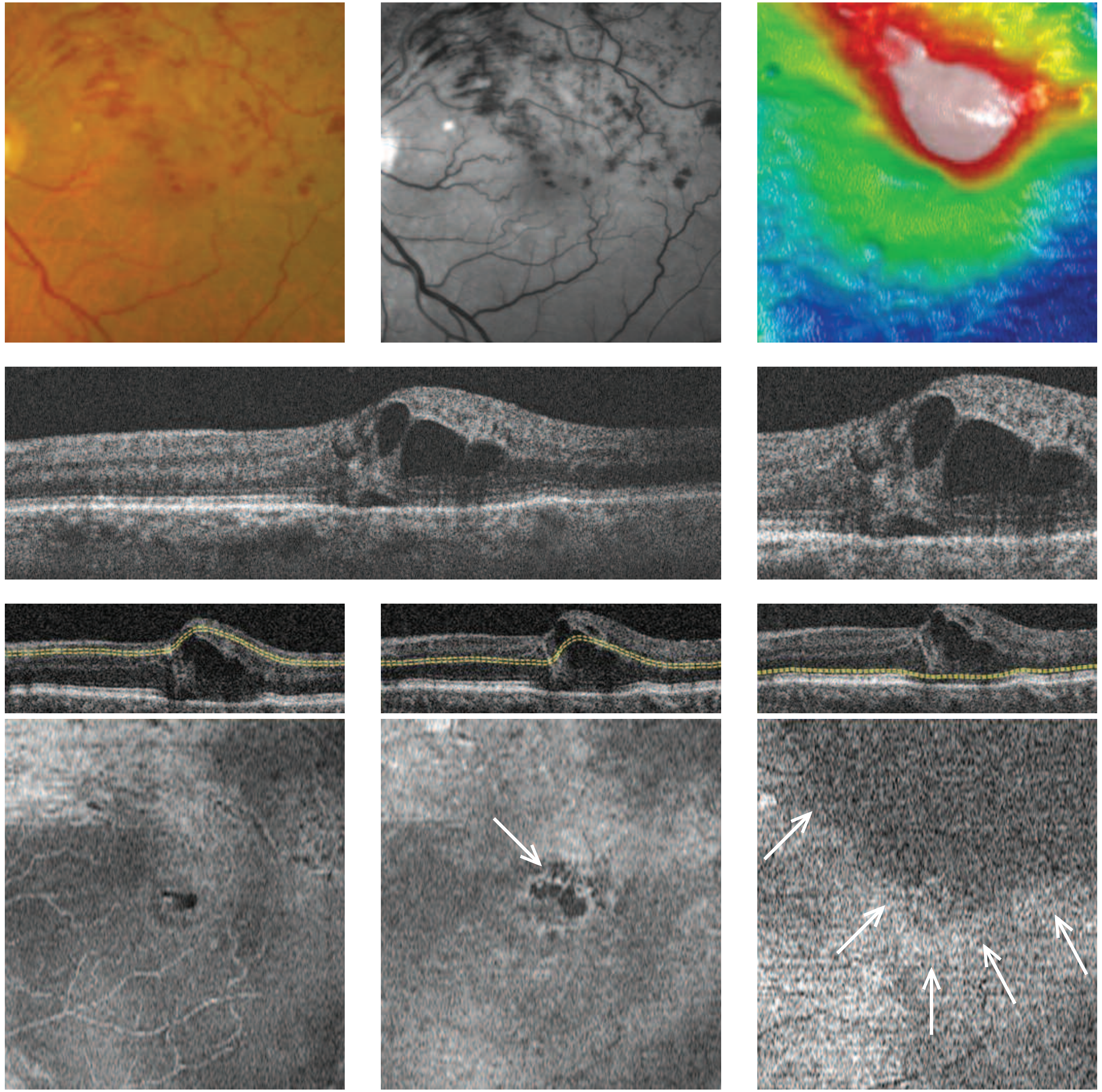


Enface OCT: Segmentation at the ganglion cell layer (ILM mode):
Microcystic spaces (hypo-reflective) and striate hemorrhages (hyper-reflective).

Enface OCT: Segmentation at the inner nuclear layer (ILM mode):
Central cystoid macular edema spaces (arrow).

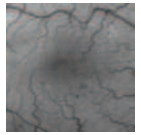


Enface OCT: Segmentation at the outer nuclear layer (RPE mode):
The hypo-reflective area (arrows) is caused by the signal alleviation in the retina outer layers due to either the shadow of the overlying edema or to the progression of the edema in the retina outer layers.

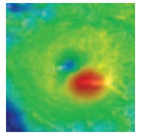


25 Focal diabetic macular edema

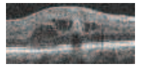
Color photo:
Showing a site of microaneurysms in the lower part of the macula (yellow arrow).
The green arrow shows the direction of the OCT B-scan.



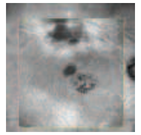
Red-free filter image:
Enhancing the visibility of microaneurysms.



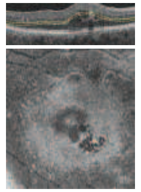
Mapping of the macular thickness:
Showing the focal retinal thickening in the lower part of the macula, sparing the foveal depression.



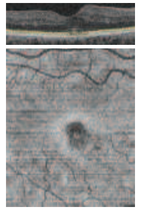
6-mm horizontal OCT scan:
Focal cystoid macular edema in the lower part of the macula.
A large microaneurysm with thickened wall (arrow) is visible in the outer nuclear layer.



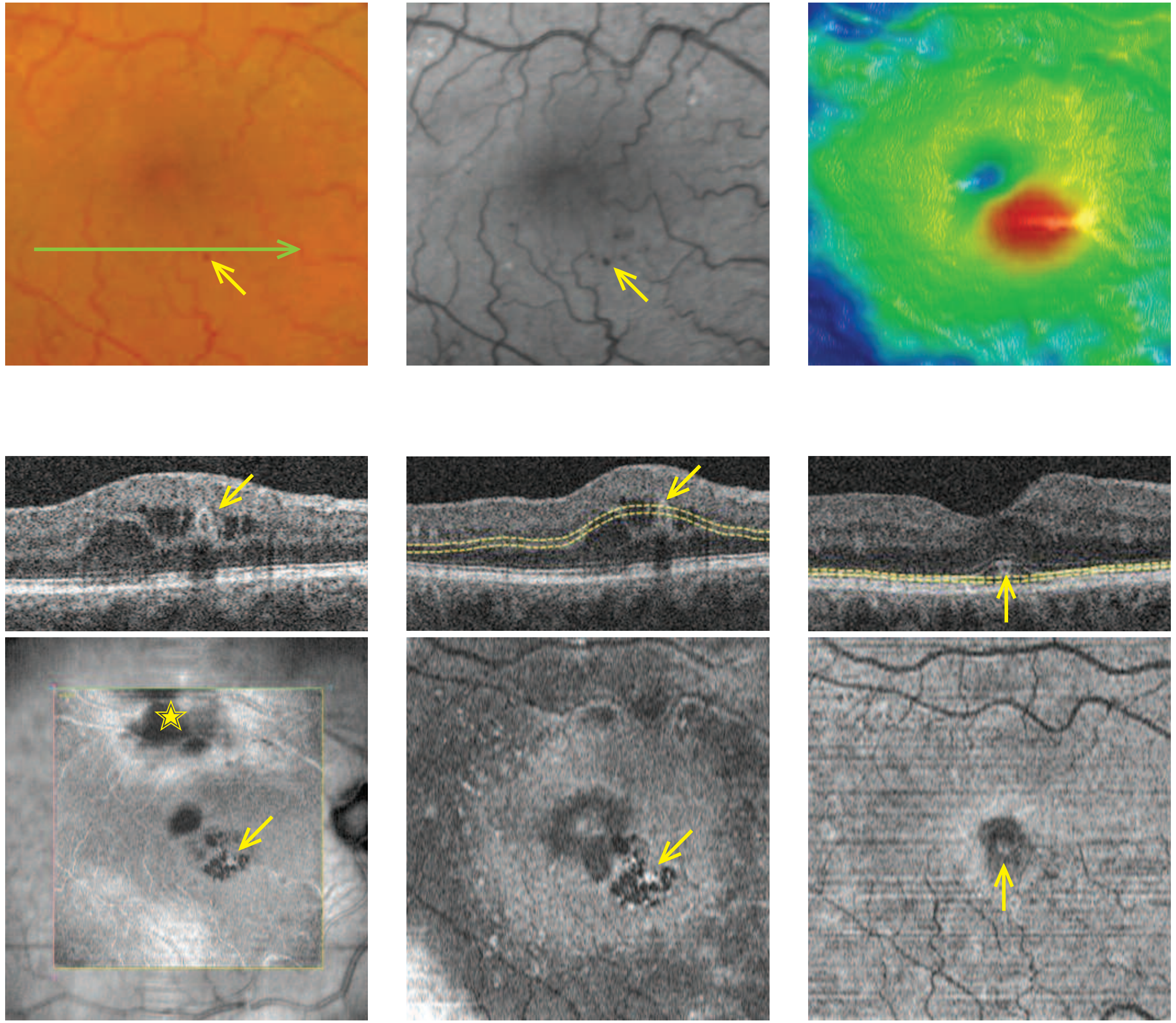
Fundus OCT:
Showing the area of focal retinal thickening (arrow).
Note the presence of an artifact (star) due to floaters.



Enface OCT: Segmentation at the outer nuclear layer (ILM mode):
A large microaneurysm appears hyper-reflective (arrow) within the edema.

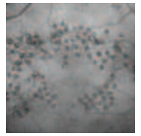


Enface OCT: Segmentation at the ellipsoid zone (RPE mode) at the fovea center:
Showing the hypo-reflectivity of a minimal serous retinal detachment extended from the focal edema area.

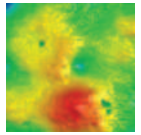


26 Recurrent focal diabetic macular edema after laser photocoagulation

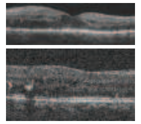
Color photo:
Showing several hemorrhages and hard exudates at the posterior pole.



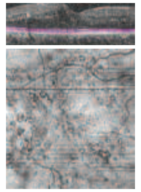
Fundus autofluorescence:
Showing previous laser-induced scars.



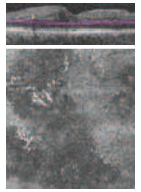
Mapping of the macular thickness:
Showing the focal retinal thickening, especially in the lower part of the macula.



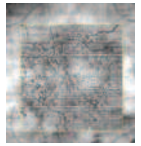
6-mm horizontal OCT scan and detail:
Focal cystoid macular edema in the lower part of the macula.
Hard exudates are present (arrow) in the outer plexiform layer.



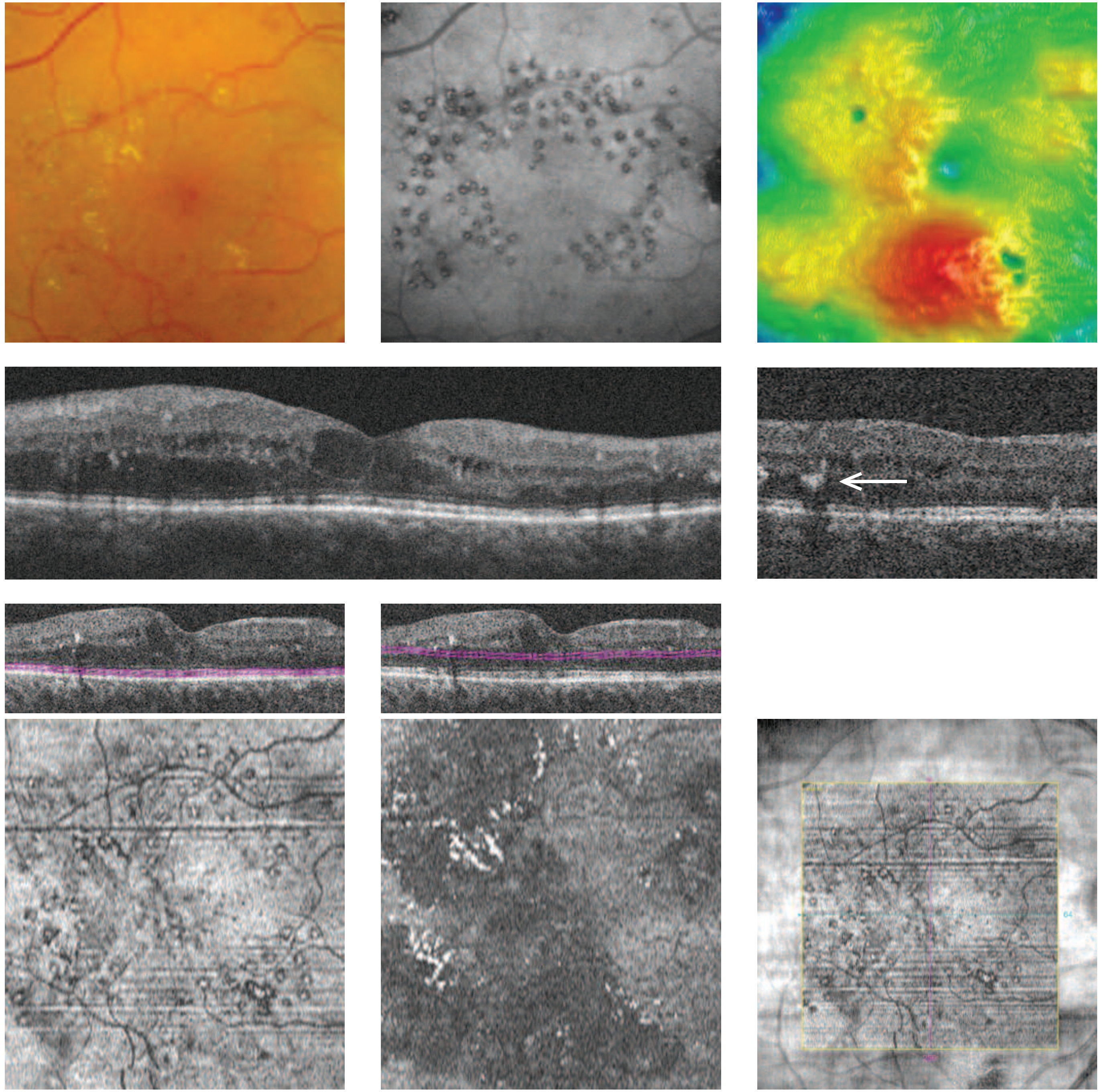
Enface OCT: Segmentation at the ellipsoid zone (RPE mode):
Showing laser-induced scars.



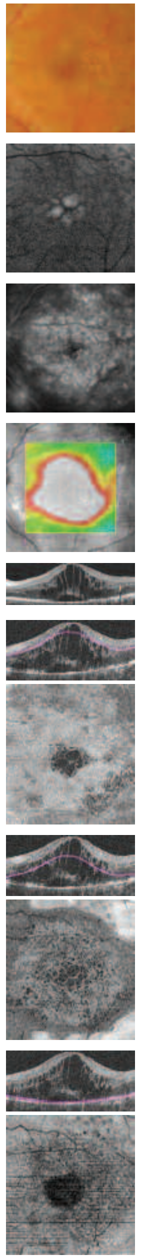
Enface OCT: Segmentation at the outer plexiform layer (RPE mode):
Exudates are hyper-reflective within the hypo-reflective localized edema
where there is no laser-induced scar.



Fundus OCT:
Exudates and laser-induced scars are visible.



27 Diffuse diabetic macular edema



Color photo:
Showing several hemorrhages and laser-induced scars in the temporal part of the macula.

Fundus autofluorescence:
Showing autofluorescent central spaces.

Fluorescein angiography:
Showing a large cystoid macular edema.

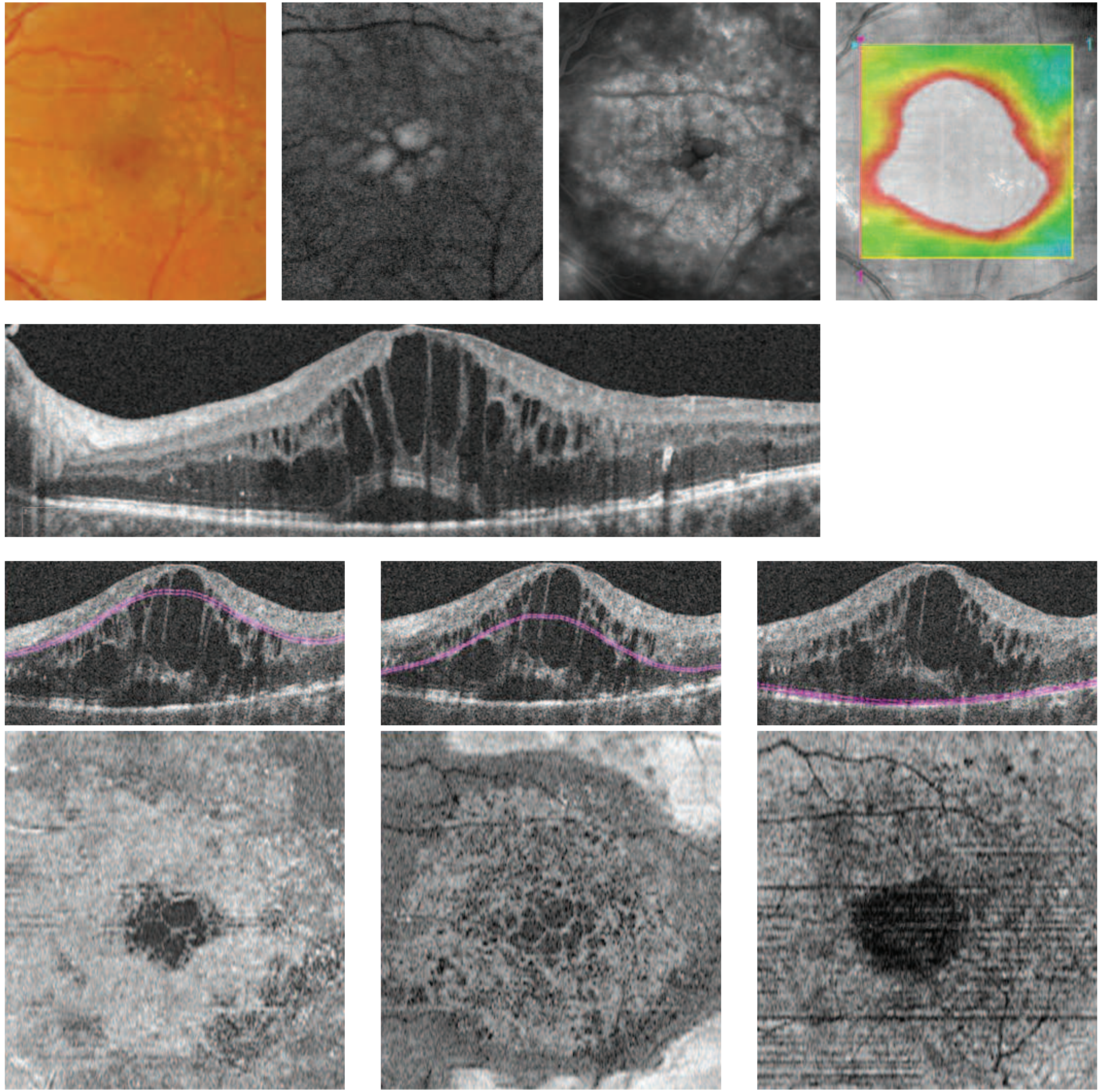
Mapping of the macular thickness:
Showing the diffuse retinal thickening throughout the macula.

6-mm horizontal OCT scan:
Diffuse cystoid macular edema and foveolar detachment.

Enface OCT: Segmentation at the inner plexiform layer (ILM mode):
Showing centro-foveolar cystoid spaces.

Enface OCT: Segmentation at the outer plexiform layer (ILM mode):
Showing the cystoid space extent.

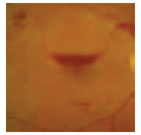
Enface OCT: Segmentation at the ellipsoid layer (RPE mode):
Showing the hypo-reflectivity of the foveolar detachment and a few laser-induced scars.



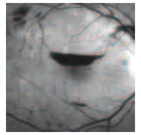
28

Proliferative diabetic retinopathy

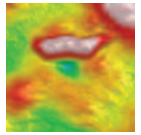
Retrohyaloidal hemorrhage



Color photo:
Showing a retrohyaloidal hemorrhage with horizontal plane.

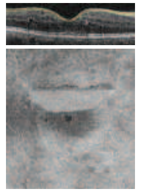


Red-free filter image:
Showing the retrohyaloidal hemorrhage originating from preretinal new vessels (arrow).

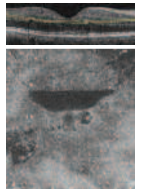


Mapping of the macular thickness:
Showing the irregular retinal thickening in the macula reflecting the macular edema and the elevation due to the preretinal hemorrhage (arrow).

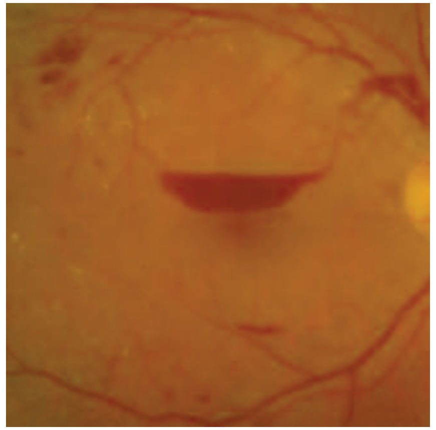
6-mm vertical OCT scan:
Showing the underlying retina whose fluorescence is blocked by the retrohyaloidal hemorrhage covered with an optically empty space of partial vitreous detachment (star).

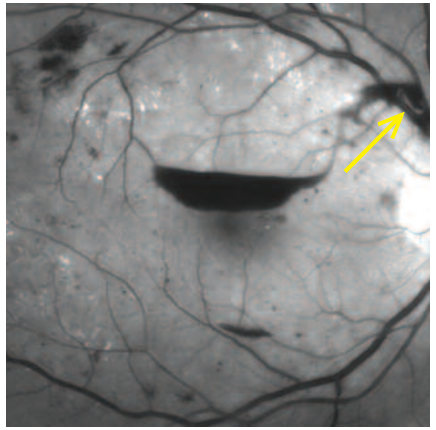


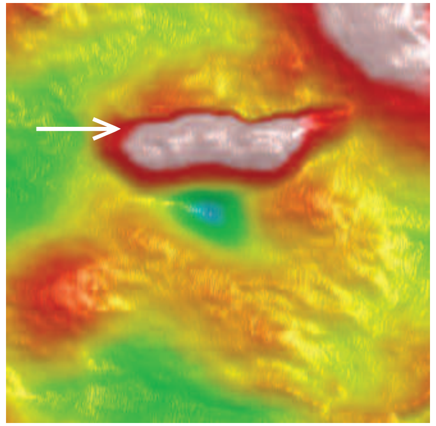
Enface OCT: Segmentation at the inner limiting membrane (ILM mode):
Integrating the retrohyaloidal hemorrhage (artifact due to the non-differentiation of the ILM at the hemorrhage) which blocks the optic nerve fiber fluorescence.

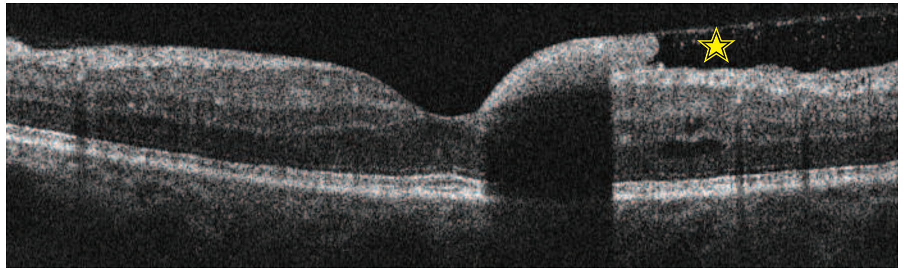


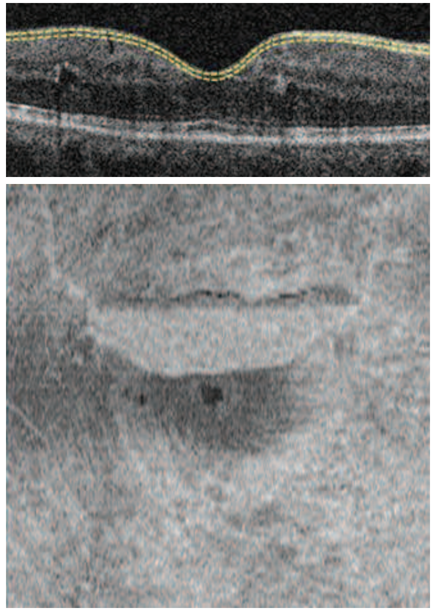
Enface OCT: Segmentation at the outer nuclear layer (RPE mode):
Shadow due to the hemorrhage. Note the numerous hyper-reflective dots corresponding to microexudates.

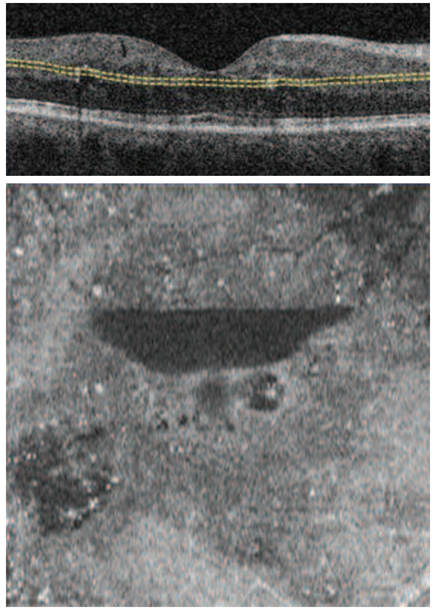




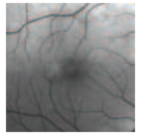






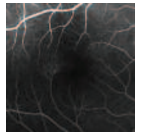


Type 2 macular telangiectasia



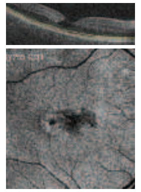
Red-free filter image:
Showing capillary dilations in the temporal part of the fovea.

Blue reflectance image:
Showing inner retina opacification in the temporal part of the fovea.

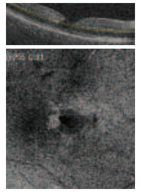


Fluorescein angiography:
Showing telangiectasia in the temporal part of the fovea.

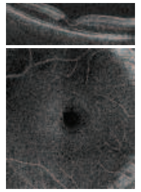
6-mm horizontal and vertical OCT scans:
Showing a foveolar cystic space in the retina which is not thickened. Hyper-reflectivity of the inner retina (blue arrow); hyper-reflectivity of telangiectasia projecting into the outer nuclear layer (white arrow); disruption of the ellipsoid zone (red arrow); alteration of the interdigitation zone (yellow double arrow).



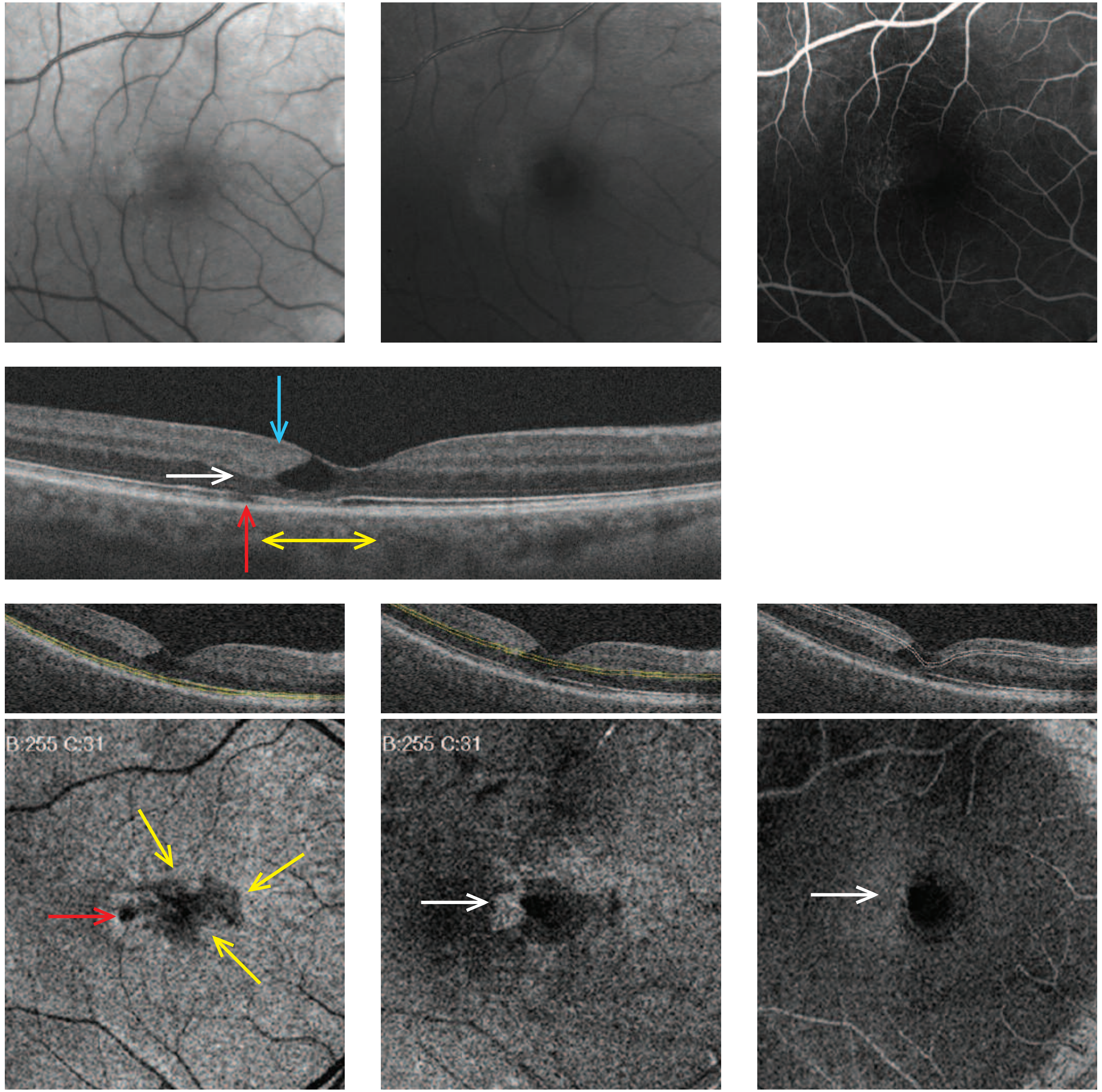
Enface OCT: Segmentation at the ellipsoid and interdigitation zones (RPE mode):
Showing the impaired surface (yellow and red arrows).



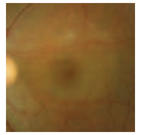
Enface OCT: Segmentation at the outer plexiform layer (RPE mode):
Showing the hyper-reflectivity of telangiectasia in the temporal part of the fovea (arrow).



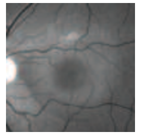
Enface OCT: Segmentation at the inner nuclear layer (ILM mode):
Showing a discrete hyper-reflectivity in the temporal part of the fovea (arrow), which corresponds to that seen on blue reflectance image.



30 Central serous chorioretinopathy

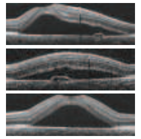


Color photo:
Showing a bullous serous retinal detachment, with indication of OCT B-scan lines.

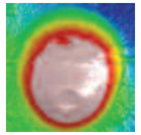


Blue reflectance image:
With the bullous limits (arrows).

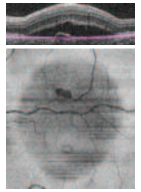
Fluorescein angiography:
With subretinal leaking point (arrow).



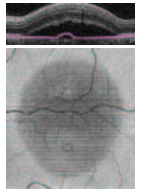
6-mm horizontal and vertical OCT scans:
Showing the retinal pigment epithelium detachment (arrow) at the leaking point (1 & 2).



Mapping of the macular thickness:
Showing the dome-shaped elevation of the macular retina. By substraction, the retinal pigment epithelium detachment appears as a “hollow“.

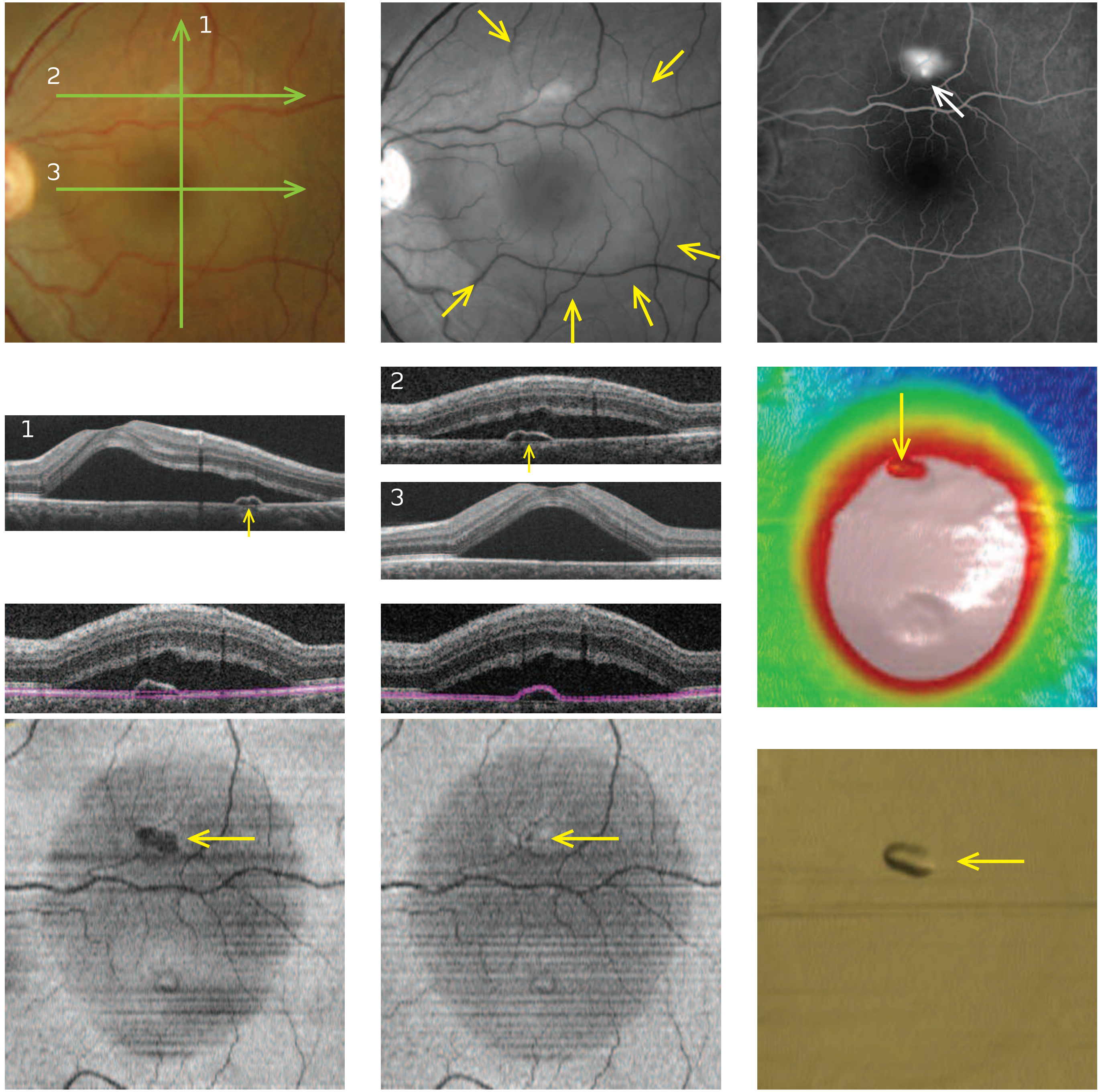


Enface OCT: Segmentation at the retinal pigment epithelium (RPEfit mode): Showing the retinal pigment epithelium detachment (arrow).

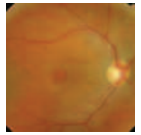


Enface OCT: Segmentation at the retinal pigment epithelium (RPE mode):
Showing the leaking point at the retinal pigment epithelium detachment (arrow).

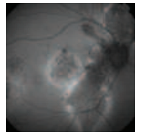
Mapping of the retinal pigment epithelium:
Showing the elevation of the retinal pigment epithelium detachment.



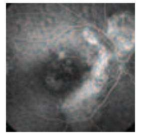
31 Diffuse retinal epitheliopathy



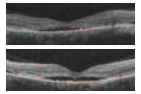
Color photo:
Showing depigmented retinal pigment epithelium with vertical gravitating tract.



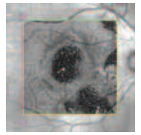
Fundus autofluorescence:
Showing hypofluorescent atrophic lesions and relative hyperfluorescent serous macular detachment.



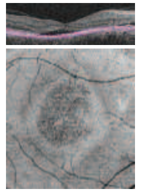
Fluorescein angiography:
Without defined leaking point.



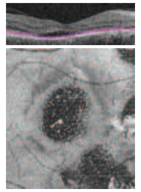
6-mm horizontal and vertical OCT scans:
Showing the serous retinal detachment.



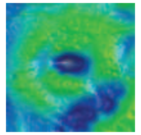
Enface OCT: Segmentation at the ellipsoid zone (RPE mode):
In the context of fundus autofluorescence.



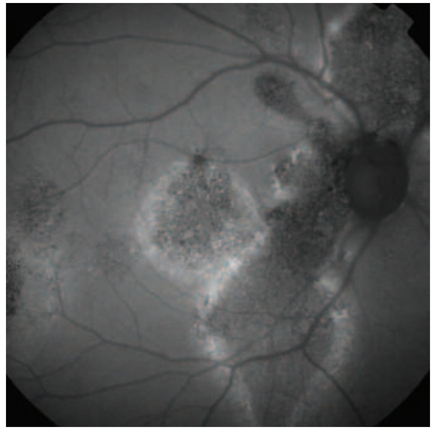
Enface OCT: Segmentation at the retinal pigment epithelium (RPE mode):
Showing a somewhat alleviated central reflectivity of the retinal pigment epithelium.

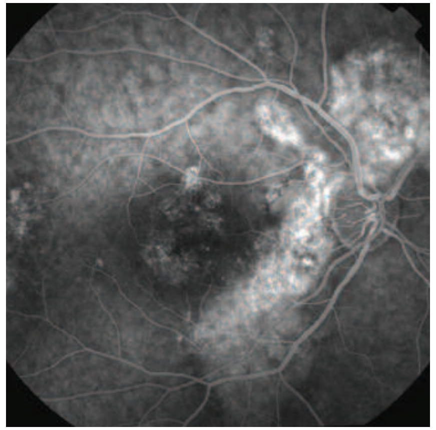


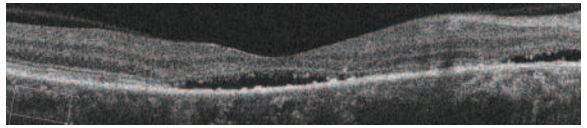
Enface OCT: Segmentation at the ellipsoid zone (RPE mode):
Showing the serous retinal detachment and retinal pigment epithelium granulations (hyper-reflective).

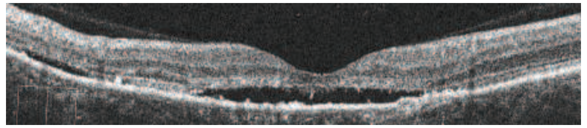


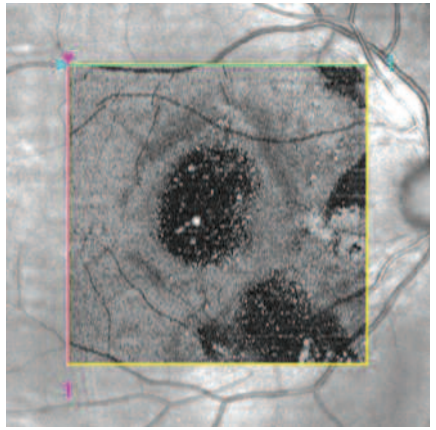
Mapping of the macular thickness:
Showing the macular atrophy and gravitating pigmented and atrophic tract.

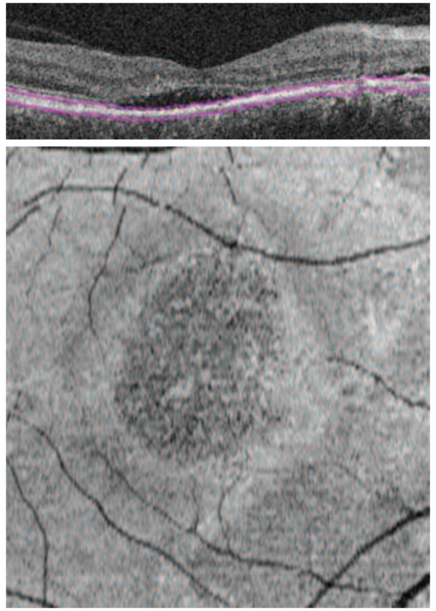


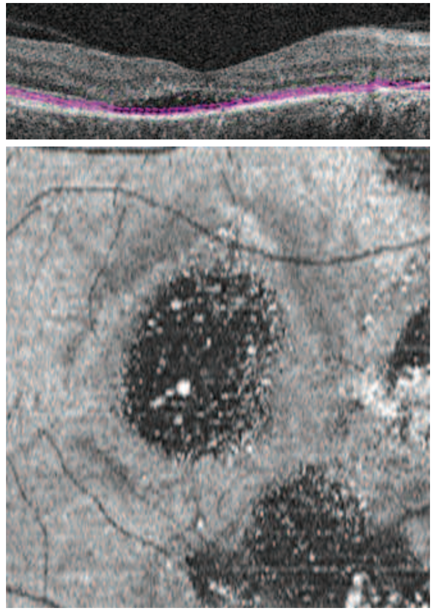


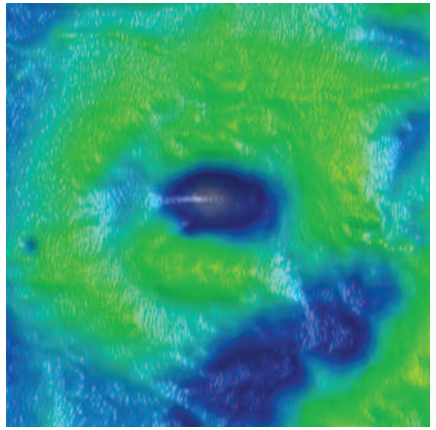




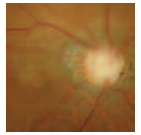




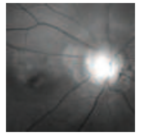




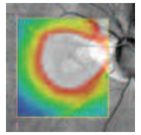
Optic disc coloboma with macular detachment



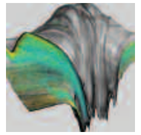
Color photo:
Showing optic disc coloboma.



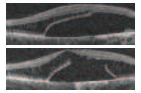
Red-free filter image:
With OCT B-scan directions.



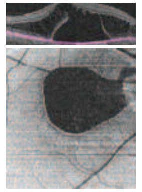
Mapping of the macular thickness:
Showing the dome-shaped elevation of the macular retina which is prolonged to the optic disc.



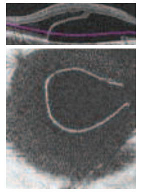
3D reconstruction of the optic disc edge:
Showing the communication of the subretinal space with the optic nerve sheath (arrow).



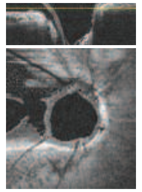
6-mm horizontal OCT scans:
Showing the serous retinal detachment, intraretinal microcystic edema and disruption of the photoreceptor layer (arrows).



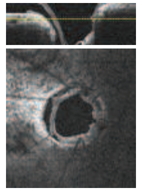
Enface OCT: Segmentation at the interdigitation zone (RPE mode):
Showing the area of retinal elevation and the pit which communicates with the optic disc edge (arrow).



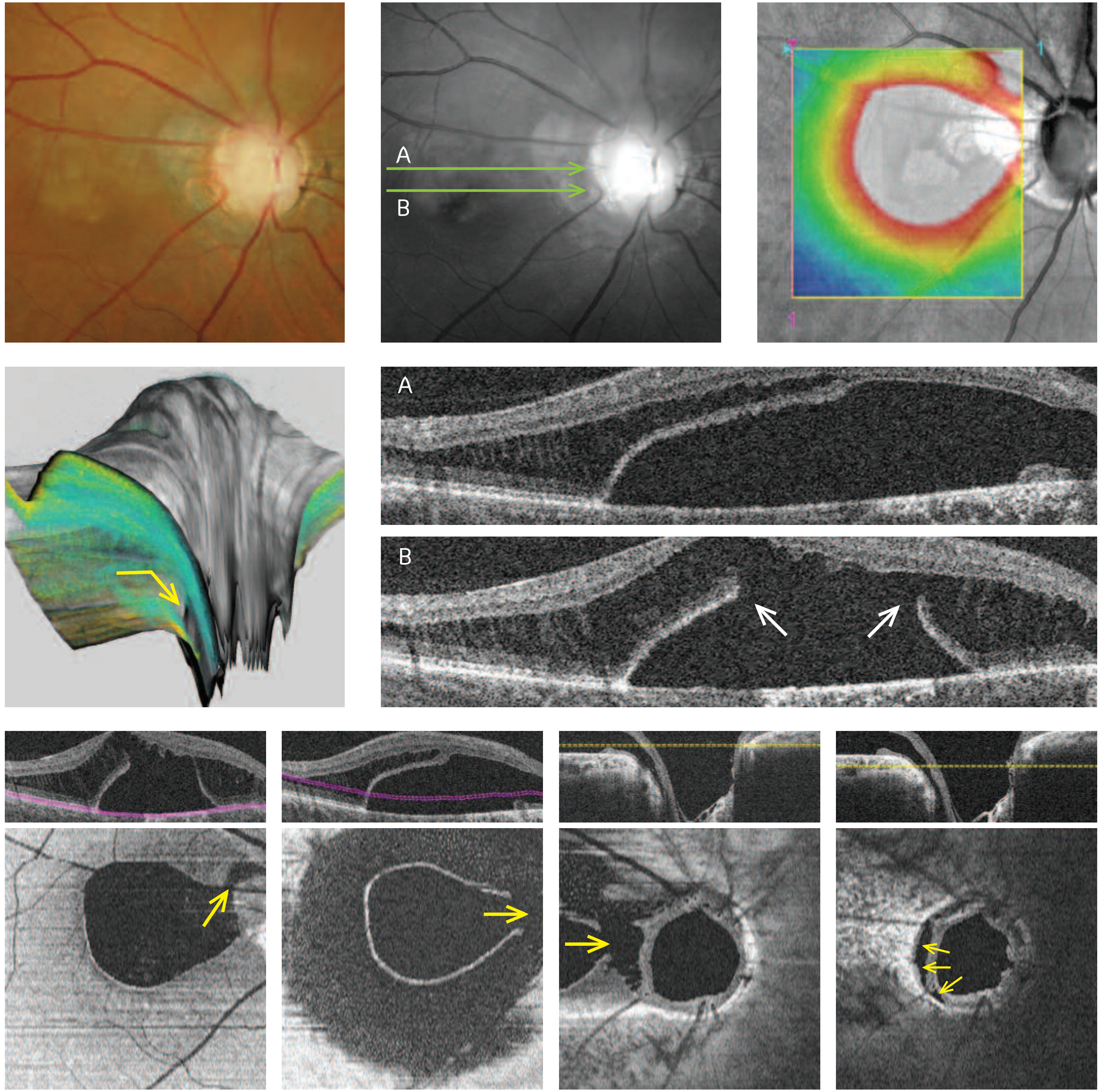
Enface OCT: Segmentation at the outer nuclear layer (RPE mode):
Showing the area of retinal elevation which opens towards the optic disc edge (arrow).



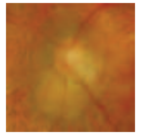
Enface OCT: Optic disc, segmentation in front of the retinal pigment epithelium (B-scan mode):
Showing the aperture of the retinal elevation towards the optic disc edge (arrow).



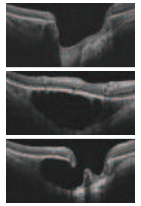
Enface OCT: Optic disc, segmentation at the choroid (B-scan mode):
Showing the communication of the retinal elevation with an arcuate pit in the meningeal sheath of the optic nerve (arrow).



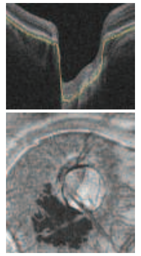
33 Peripapillary choroidal cavitation in high myopia



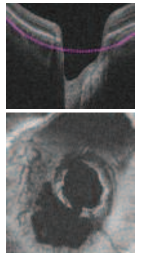
Color photo:
Showing the optic disc, peripapillary myopic conus (arrow), and choroidal cavitation (star). Lines A, B, C represent the B-scan lines shown on the right.



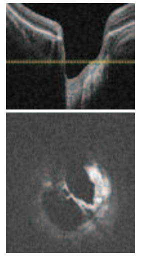
6-mm horizontal and vertical OCT scans passing through the optic disc:
A : Cupping of the optic disc and peripapillary myopic conus (arrow).
B : Choroidal cavitation (star).
C : Aperture of the choroidal cavitation in the retrovitreous space (arrow).



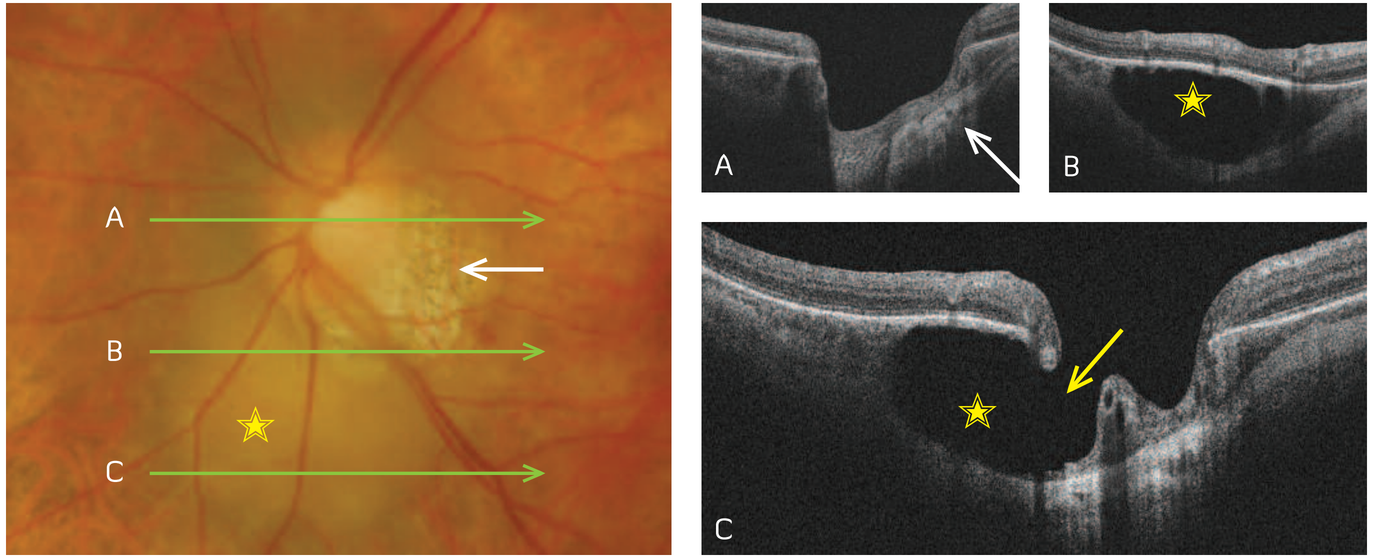
Enface OCT: Segmentation at the retinal pigment epithelium and lamina cribosa (RPE mode):
Showing the transition of the titled disc and myopic conus (arrow) and the nasal part of the choroidal cavitation (star).

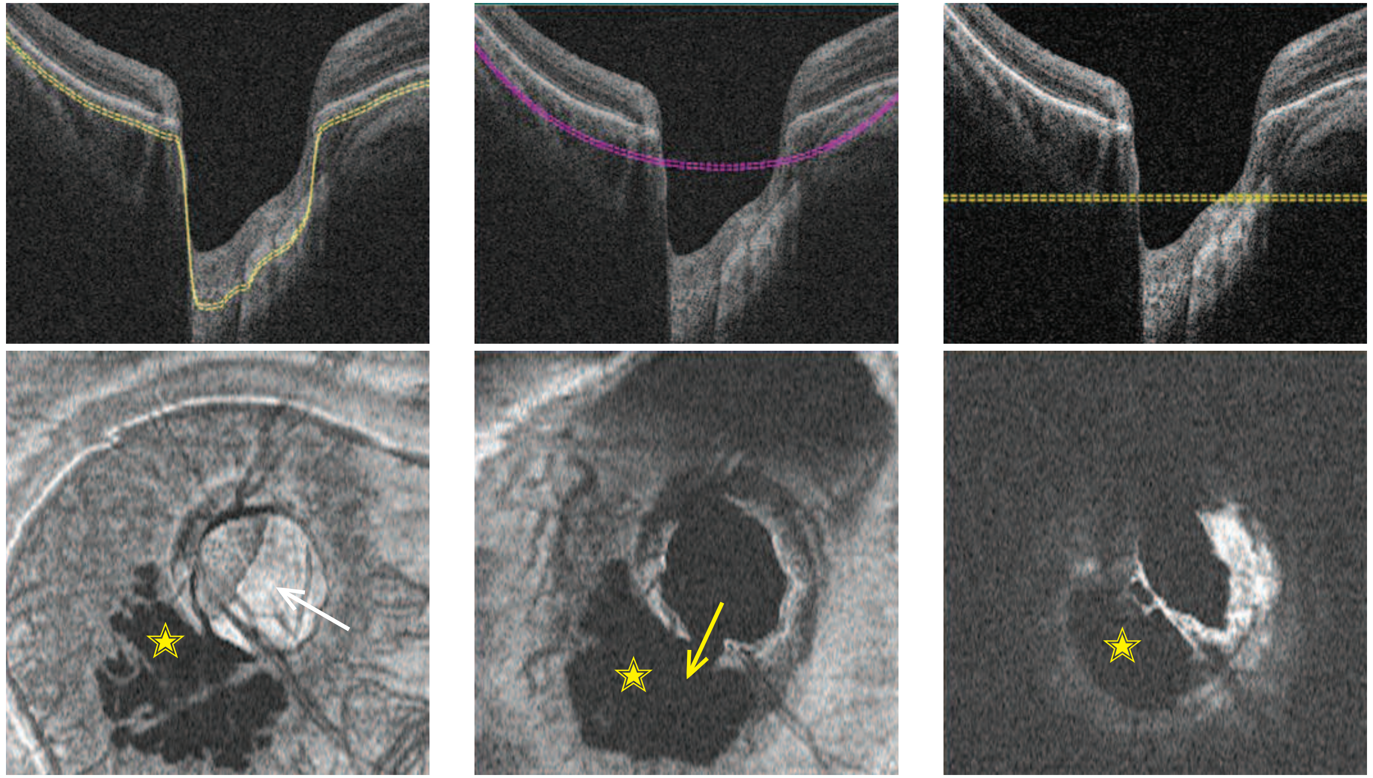


Enface OCT: Segmentation at the choroid (RPEfit mode):
Showing the communication (arrow) between the cupping of the optic disc and the choroidal cavitation (star).

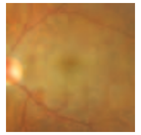


Enface OCT: Horizontal segmentation tangent to the sclera (slab mode):
Showing the bottom of the choroidal cavitation (star).

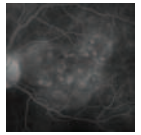




Harada's disease



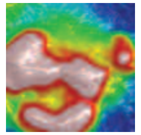
Color photo:
Showing serous retinal detachments next to yellow spots spread to the posterior pole.



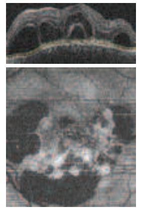
Late phase of the fluorescein angiography:
showing dye leaking widespread to the entire posterior pole, some dots being more fluorescent than others.

Late phase of the indocyanine green angiography:
Showing dark spots corresponding to inflammatory choroidal granulomas.

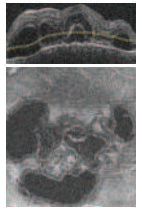
9-mm OCT B-scan:
Showing an irregular elevation of the retinal pigment epithelium due to an intense inflammatory choroidal edema. There are 3 areas of serous retinal detachments (arrows) and one intraretinal cystic edema (stars).



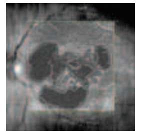
Mapping of the macular thickness:
Showing the areas of elevation and retinal edema.



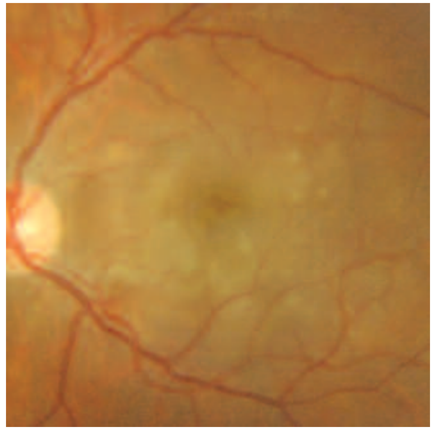
Enface OCT: Segmentation at the ellipsoid zone (RPE mode):
Showing the areas of serous retinal detachments (arrows) while the retina is still attached at the center.

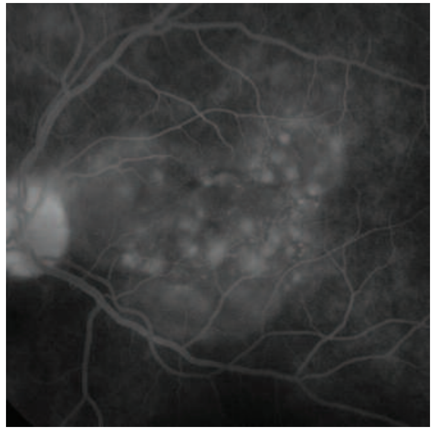


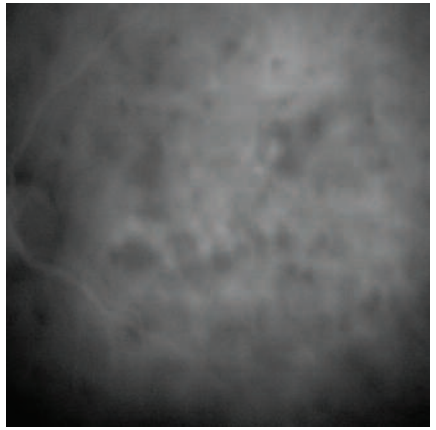
Enface OCT: Segmentation at the outer nuclear layer (RPE mode):
Showing the areas of serous retinal detachments and less hypo-reflective areas of intraretinal edema (stars).

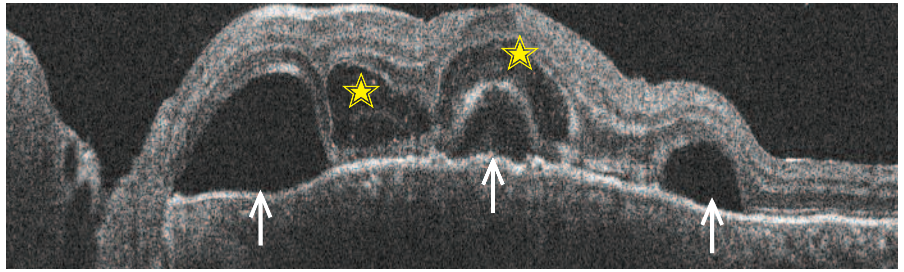


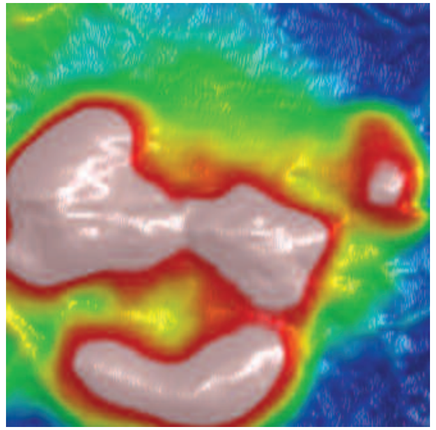
Enface OCT: Segmentation at the outer nuclear layer (RPE mode):
On OCT fundus imaging.

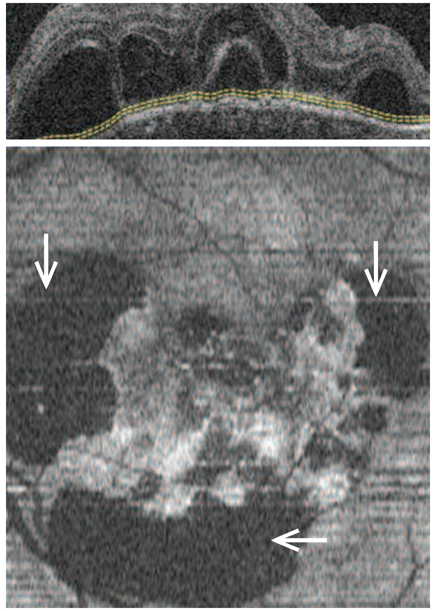


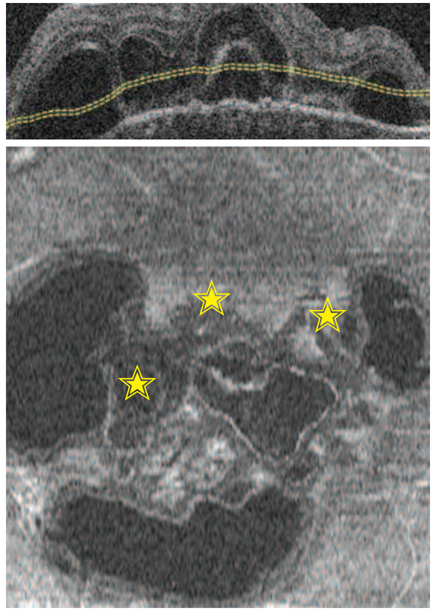


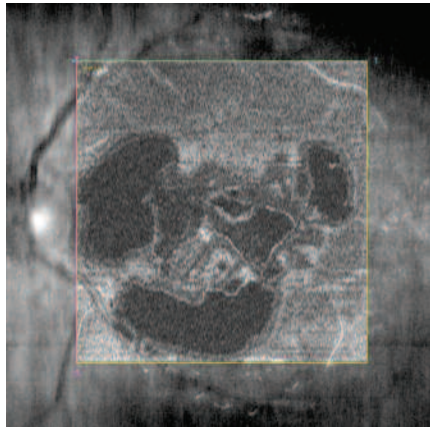




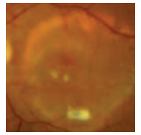




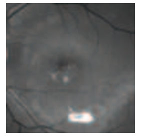




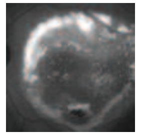
35 Best disease



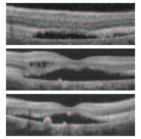
Color photo:
Showing a large vitelliform lesion at a stage of deposit fragmentation, which is mostly located at the periphery of the macular lesion.
Arrows indicate the location of OCT B-scans.



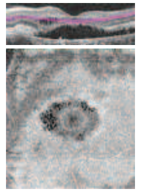
Red-free filter image:
Showing the contours of the lesion.



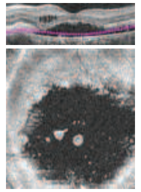
Fundus autofluorescence:
Showing the hyper-autofluorescence of the lesion periphery.



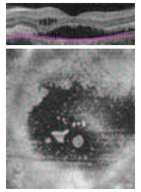
6-mm horizontal and vertical OCT scans:
Elongation of photoreceptor outer segments and subretinal deposits (yellow arrows) at the periphery of the retinal elevation. At the center of the elevation, the photoreceptor outer segments have disappeared (white arrow).



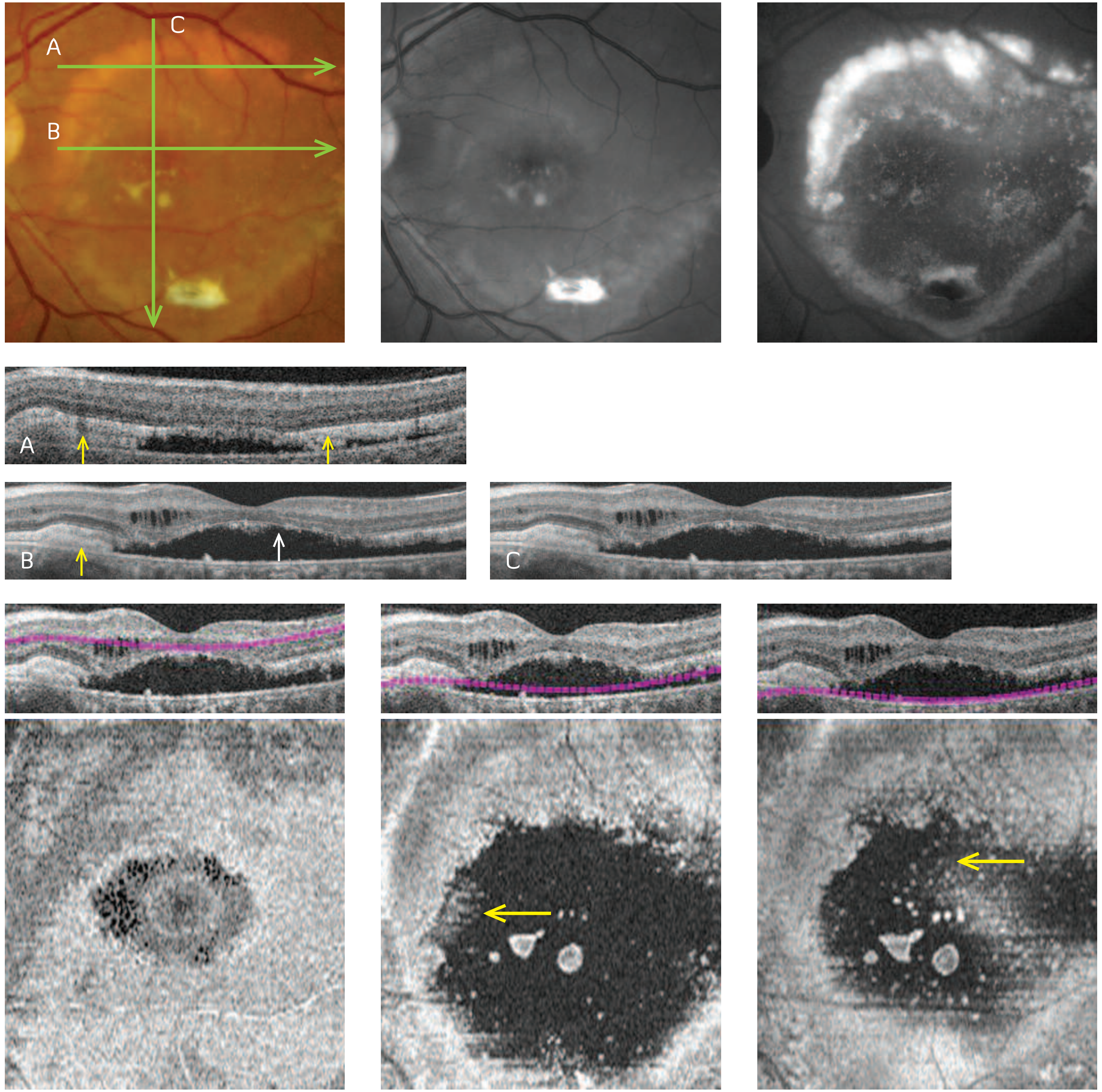
Enface OCT: Segmentation at the inner nuclear layer (ILM mode):
Showing a microcystic edema which can be associated with the subretinal deposit in advanced disease.



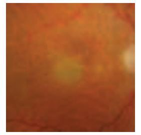
Enface OCT: Segmentation at the photoreceptor outer segments (RPE mode):
Showing the subretinal deposit (arrow).



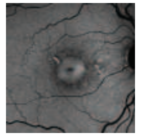
Enface OCT: Segmentation at the retinal pigment epithelium (RPE mode):
Showing vitelliform deposits at the surface of the retinal pigment epithelium.



36 Adult onset pseudovitelliform dystrophy

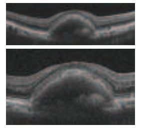


Color photo:
Showing a centro-macular vitelliform lesion.



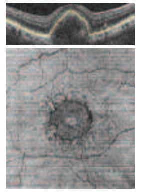
Fundus autofluorescence:
Showing the hyper-autofluorescence of the lesion and other secondary defects.

Enface OCT: Segmentation of the retinal pigment epithelium falsely:
Showing its elevation. Actually, the vitelliform deposit is located in front of the retinal pigment epithelium, but it blocks its fluorescence which disrupts the segmentation.

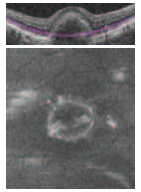


6-mm OCT B-scan and detail:
Showing a hyper-reflective subretinal deposit causing a backward shadow cone which blocks the fluorescence of the retinal pigment epithelium (arrows).

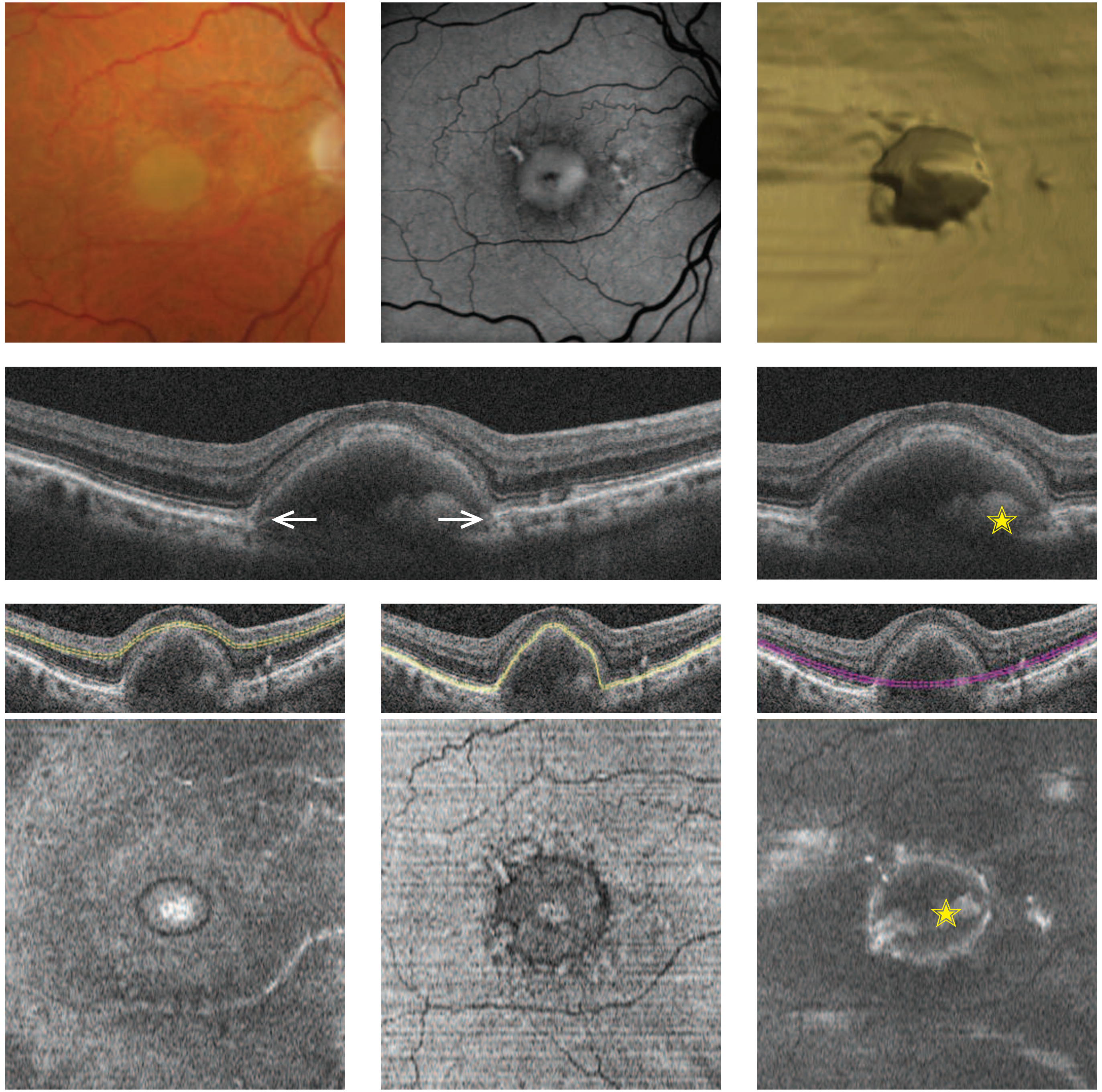
Enface OCT: Segmentation at the inner nuclear layer (ILM mode):
Passing through the top of the highly hyper-reflective subretinal deposit.



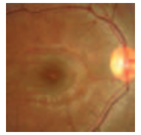
Enface OCT: Segmentation at the retinal pigment epithelium (RPE mode):
Falsely following the contour of the subretinal deposit. The reliability of the enface image depends partly on the reliability of the automatic “segmentation”. Although it is highly reliable on the Cirrus, some diseases mislead the automatic segmentation.



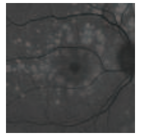
Enface OCT: Segmentation at the outer nuclear layer (RPE mode):
Showing that the subretinal deposit is not homogeneous and shows more reflective zones (star).



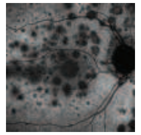
37 Multiple evanescent white dot syndrome



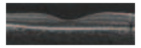
Color photo:
Showing discrete subretinal white dots at the posterior pole and the granite pattern of the fovea.



Fundus autofluorescence:
Showing a discrete fluorescence of the white dots.

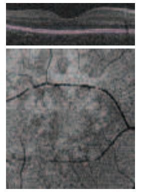


Late phase of the indocyanine green angiography:
Showing numerous hypofluorescent dots which are more numerous than the visible white dots.



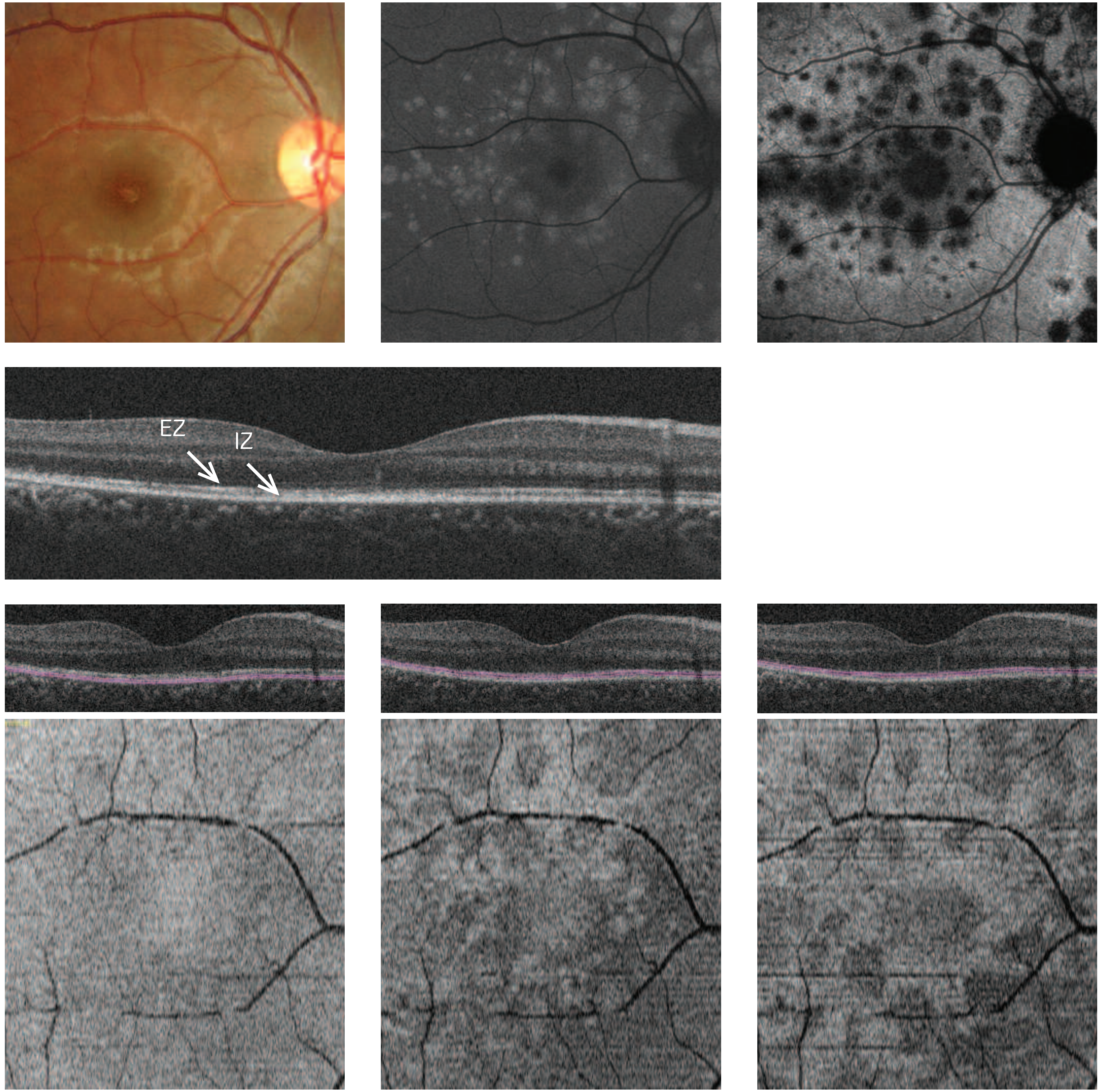
Horizontal OCT scan:
Heterogeneous pattern of the ellipsoid and interdigitation zones, corresponding to the photoreceptor inner and outer segments.

Enface OCT: Segmentation at the retinal pigment epithelium (RPE mode):
Showing no anomaly.

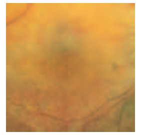


Enface OCT: Segmentation at the interdigitation zone (RPE mode):
Appearance of hypo-reflective dots corresponding to the white dots.

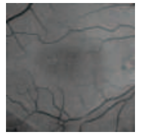
Enface OCT: Segmentation at the ellipsoid zone (RPE mode):
Better delineation of the hypo-reflective dots corresponding to the white dots.
The pathogenesis of multiple evanescent white dot syndrome is poorly understood.
The retinal pigment epithelium is involved, but structural abnormalities are more visible on OCT at the photoreceptors.



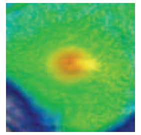
38 X-linked juvenile retinoschisis



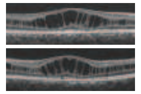
Color photo:
showing a microcystic pattern of the macula. Arrows indicate OCT B-scan directions.



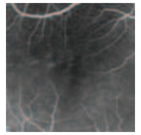
Red-free filter image
enhancing the microcystic pattern of the macula.



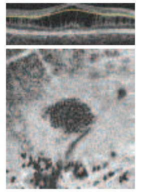
Mapping of the macular thickness:
showing a foveolar and macular thickening.



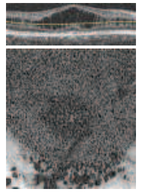
Horizontal and vertical OCT scans:
Microcystic degeneration extended throughout the macular area.



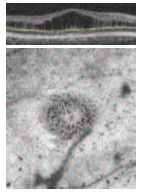
Fluorescein angiography:
showing the absence of dye accumulation into the microcystic spaces.



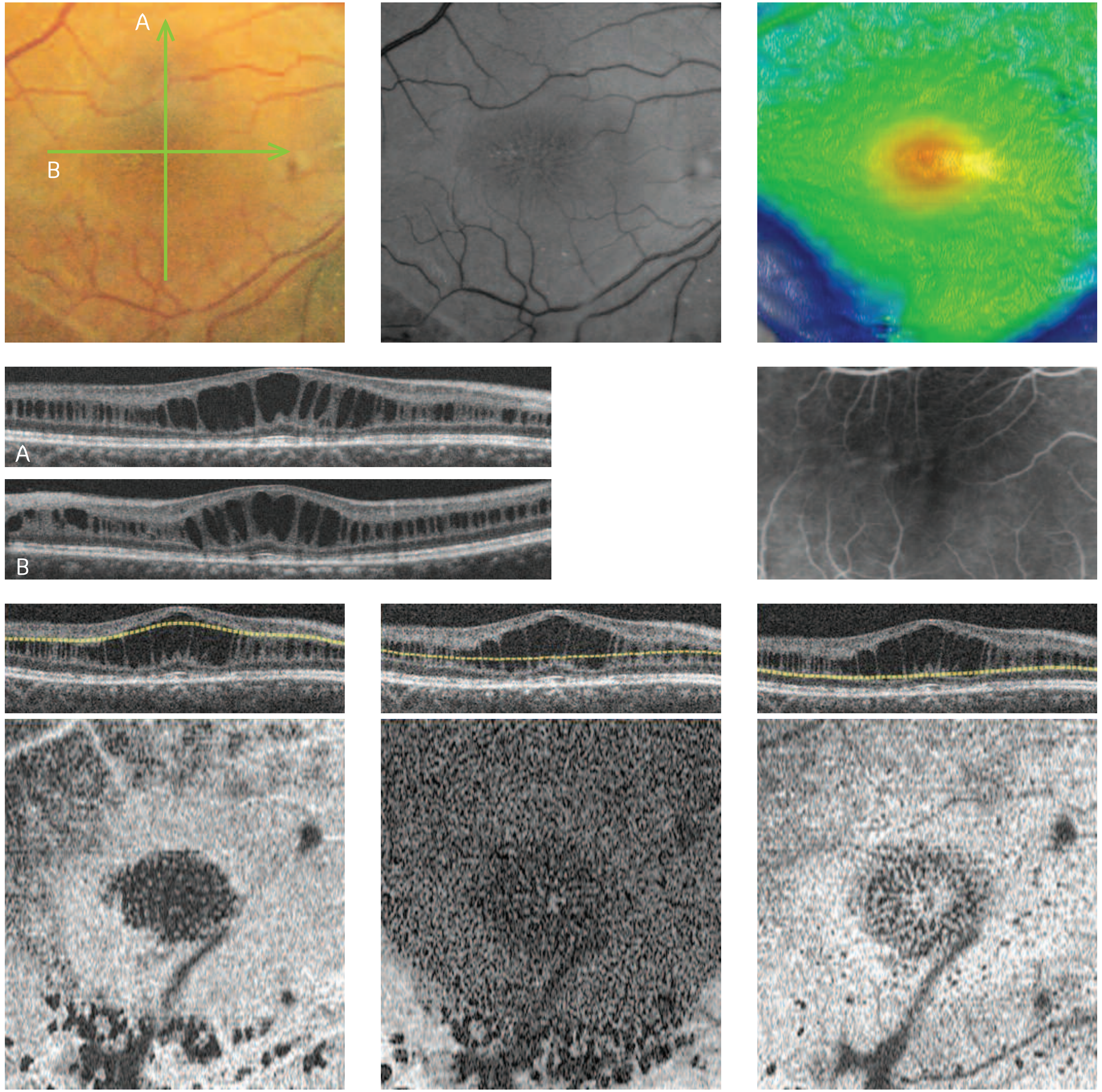
Enface OCT: Segmentation at the outer plexiform layer (ILM mode):
showing central microcystic spaces.



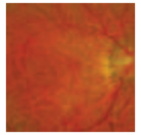
Enface OCT: Segmentation at the outer nuclear layer (ILM mode):
showing microcystic spaces extended throughout the macula.



Enface OCT: Segmentation at the external limiting membrane (ILM mode):
showing the most voluminous microcystic spaces at the macula center.

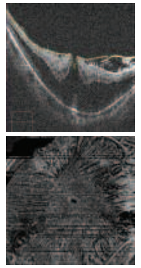


Myopic foveoschisis

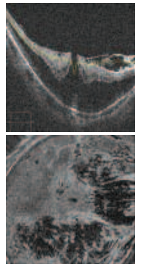


Color photo:
Showing the stretched aspect of the vessels at the macula and posterior pole in myopic staphyloma.

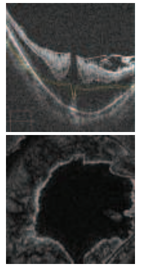
Horizontal OCT scan:
Microcystic thickening of the macula to the detriment of the outer and inner nuclear layers. Note the presence of a densified vitreous cortex or epiretinal membrane at the macula surface (arrows). Tearing of optic nerve fibers (star) due to epiretinal contraction.



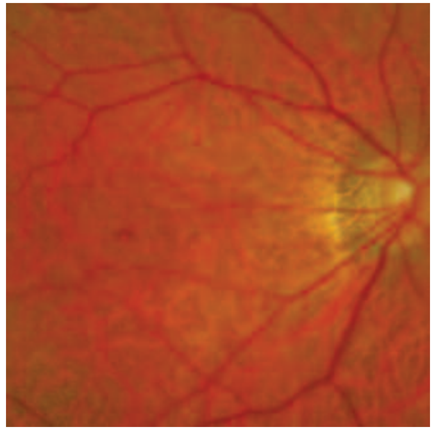
Enface OCT: Segmentation at the inner limiting membrane (ILM mode):
Showing retinal folds converging towards the macula center due to the contraction of the vitreous cortex or epiretinal membrane (arrow) at the macula surface.

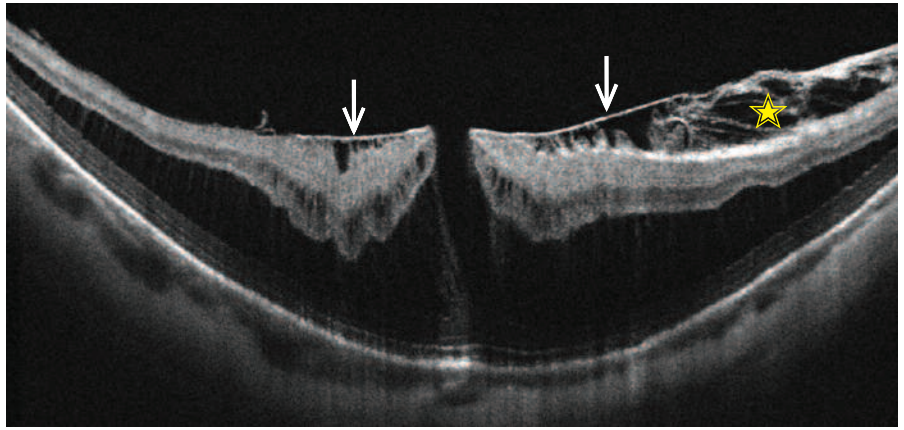


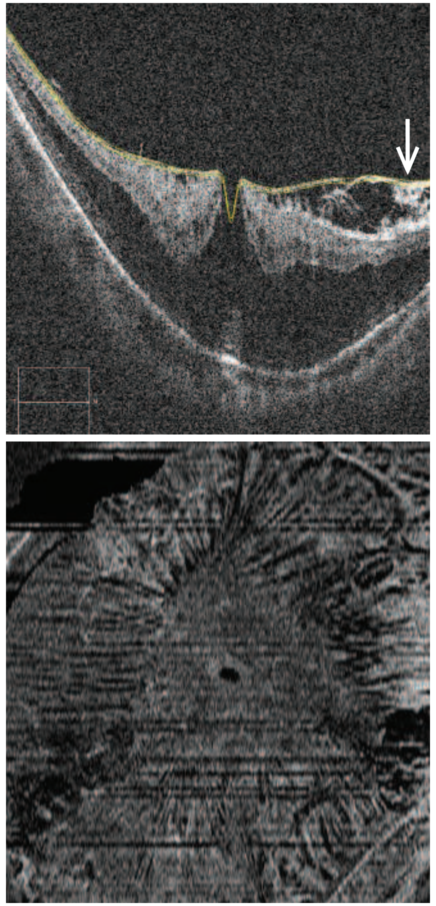
Enface OCT: Segmentation at the optic nerve fiber layer (ILM mode):
Showing their tearing due to the contraction of the epiretinal membrane in the nasal part of the macula.

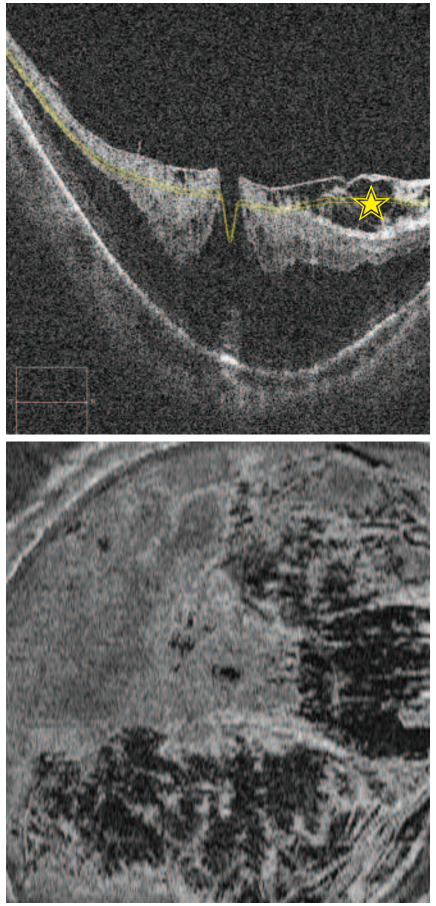


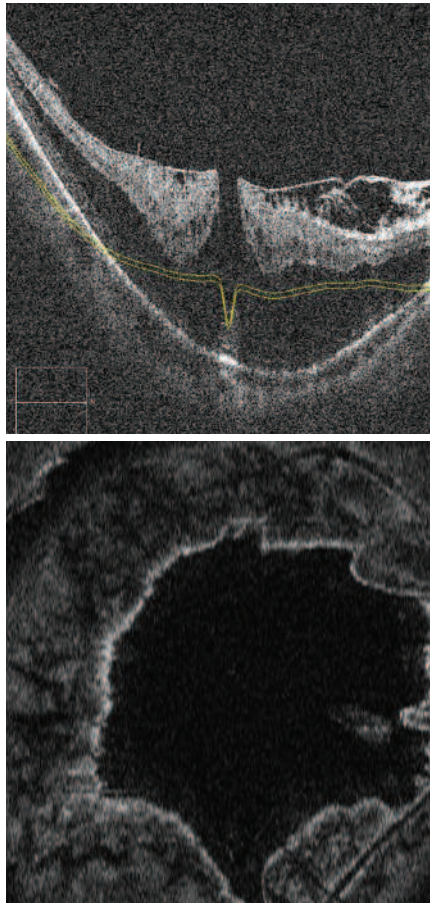
Enface OCT: Segmentation at the outer nuclear layer (ILM mode):
Showing a large hypo-reflective space corresponding to the extreme distension of the outer nuclear and Henle fiber layers in the myopic staphyloma; cell spans, slightly visible on B-scan, are not visible on enface OCT.



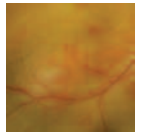




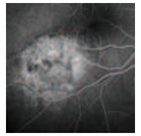




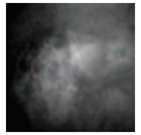
40 Choroidal hemangioma



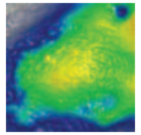
Color photo:
Showing the red elevation of the choroidal hemangioma at the inferior temporal vessels. Green arrows indicate the axis of OCT B-scans.



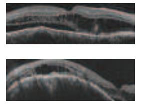
Early phase of the fluorescein angiography:
Showing the network of large choroidal vessels supplying the angioma.



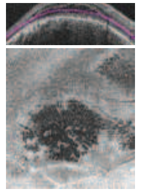
Early phase of the indocyanine green angiography:
Showing large choroidal vessels into the angioma.



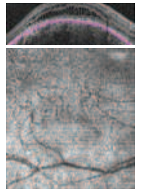
OCT mapping:
Showing the elevation of the retina and its thickening.



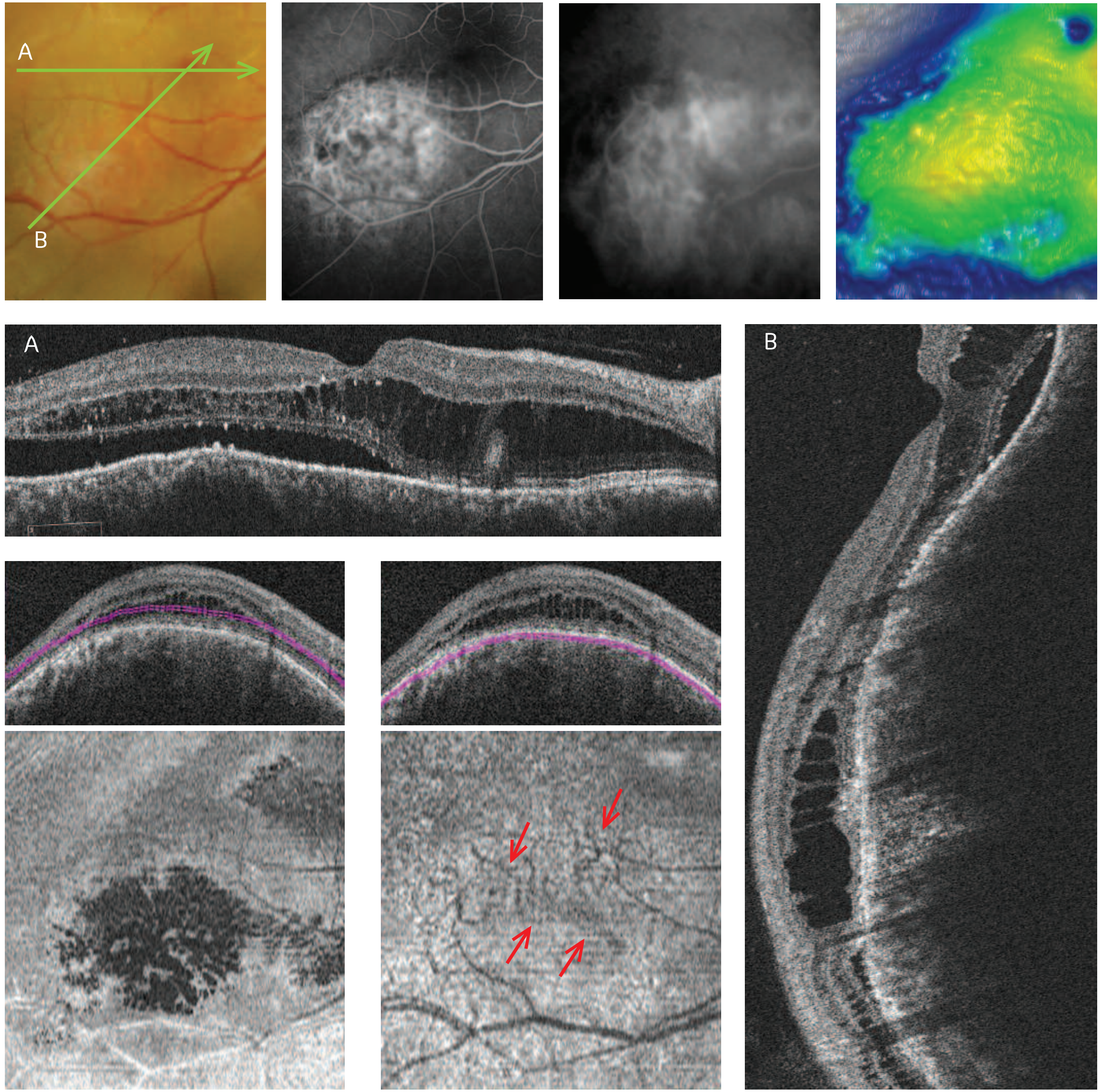
6-mm horizontal and oblique OCT scans:
Showing the elevation of the retinal pigment epithelium due to the hemangioma, cystoid macular edema and serous retinal detachment.



Enface OCT: Segmentation at the outer nuclear layer (RPE mode):
Showing the cystoid macular edema.



Enface OCT: Segmentation at the choroid (RPE mode):
Showing abnormal and dilated choroidal vessels into the hemangioma.



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