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Introduction

Digital Fundus Retinography represents an important tool in the diagnosis and monitoring of retinal disorders. Certain eye pathologies, as those described in this Atlas, can benefit from a non-invasive retinal imaging, able to show in a wide field of view, with detail and sharpness, the retinal lesions.

Very high quality retinal photos allow accurate observation of the fundus, and ensures the possibility to have precise, storable documentation of retinal diseases, improving the follow-up process when monitoring the evolution of pathologies. Extensive amplitude of the field of view provides a wide overview of the fundus, allowing the clinician a detailed evaluation of the peripheral retina, also facilitating the process of addressing to further investigations.

The purpose of this Atlas is to collect a series of interesting cases, showing Eye Care professionals some examples of Eidon imaging capabilities. Each case is organized in order to show the quality of Eidon imaging, presented through a comparison with traditional fundus camera images of the same eye, taken on the same day. Each case is also provided with one or more additional imaging supports (Optical Coherence Tomography, Autofluorescence, Fluorangiography), correlated to the fundus imaging, that time by time may support or improve the diagnostic process.

All the clinical cases gathered in this Atlas have been collected by a group of retina specialists who have found in Eidon a useful tool to support their clinical activities.
Eidon Imaging Basic Principles

Eidon is the first TrueColor Confocal Scanner on the market and it is unique in its kind. It represents the first system to combine the advantages of Scanning Laser Ophthalmoscope (SLO), with the fidelity of real color imaging, providing unsurpassed image quality of 60° field in a single exposure, without pupil dilation (min. pupil size down to 2.5 mm). The device is also provided with a built-in software that allows to create the so-called “Mosaic” with a 110° fundus panoramic view, in automatic mode (up to 150° in manual mode). A Wide Field view of the retina is an essential support for the detection, the analysis and the monitoring of pathologies which involve fundus periphery. An overall perspective of the fundus makes possible to appreciate the whole extension of lesions that are not localized in a specific, limited region of the retina (Fig 1). This may also facilitate the follow-up process in the pathological evolution of several diseases affecting the peripheral retina (genetic pathologies, retinal vascular diseases, diabetic retinopathies). Peripheral viewing is an essential tool to detect, image and document lesions that typically arise and develop eccentrically. This may be relevant in addressing to further investigations (Fig 2).

Wide Field Imaging

Eidon provides 60° images of the retina in a single exposure, without pupil dilation (min. pupil size down to 2.5 mm). The device is also provided with a built-in software that allows to create the so-called “Mosaic” with a 110° fundus panoramic view, in automatic mode (up to 150° in manual mode). A Wide Field view of the retina is an essential support for the detection, the analysis and the monitoring of pathologies which involve fundus periphery. An overall perspective of the fundus makes possible to appreciate the whole extension of lesions that are not localized in a specific, limited region of the retina (Fig 1). This may also facilitate the follow-up process in the pathological evolution of several diseases affecting the peripheral retina (genetic pathologies, retinal vascular diseases, diabetic retinopathies). Peripheral viewing is an essential tool to detect, image and document lesions that typically arise and develop eccentrically. This may be relevant in addressing to further investigations (Fig 2).

Confocal Imaging

Differently from traditional fundus camera, Eidon is a confocal optical system. Confocal imaging is well known in ophthalmology as standard of high image quality. The main characteristic of confocality is to reduce or suppress any scattered or reflected light outside the focal plane. Thanks to this feature, it guarantees increased image sharpness, better optical resolution and greater contrast when compared to traditional fundus camera imaging. This technology allows to obtain retinal images of preserved quality even in cases of media opacity (Fig 3).

TrueColor Imaging

Traditional SLO systems use one or more monochromatic laser source to image the retina, resulting in greyscale or pseudo-colour images. Eidon, instead, uses a white light LED source, which includes the entire visible spectrum, to illuminate the retina and to capture fundus images. This feature creates retinal images characterized by colours close to reality, giving the most accurate perception of fundus anatomy, enhancing confidence in retinal assessment. Another interesting aspect of Eidon illumination system, is that no saturation of the red channel is evident, as in traditional fundus camera imaging (Fig 4 - 5). This characteristic, together with the confocal sharpness of the photo, can help in distinguishing details not evident in red-saturated images, which, on the contrary, may appear homogeneous or washed out.

Retinal Images:

1. Figure 1: A case of Branch Retinal Vein Occlusion (case 11), where Eidon Mosaic allows to document a wide, panoramic view of the retina, showing the presence of a peripheral lesion.
2. Figure 2: A case of Choroidal metastasis (case 16) affecting a peripheral region of the retina.
3. Figure 3: A case of Asteroid Hyalosis (case 8), showing Eidon capability of surpassing media opacities, Eidon (left) vs. Fundus camera (right).
4. Figure 4 - 5: A case of Choroidal Neovascularization due to Age related Macular Degeneration (case 4), where colours fidelity provides a useful key to discern different aspects of the pathology, Eidon (down) vs. Traditional fundus camera (up).
The unique instrument providing TrueColor, Confocal, Wide Field Imaging.
Case 1 • Age-related Macular Degeneration, Dry Form

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 70-year-old caucasian male referred to our institute for a regular eye exam. He reported progressive visual loss in the left eye over the last five years. Best-corrected visual acuity was 20/25. Ocular and systemic medical history was unremarkable. Intraocular pressure was 14 mmHg. Anterior segment findings were normal.

Pathology description
Dry Age related Macular Degeneration (AMD) is the most common type of AMD, affecting the 90% of people that present this kind of pathology. The most common early sign of AMD is represented by drusen: subretinal pigment epithelial deposits between the basement membrane of the Retinal Pigment Epithelium (RPE) and Bruch’s membrane, or within Bruch’s membrane itself. Other typical features of Dry AMD includes RPE disturbances such as granularity and atrophy of the RPE. The late stage is characterized by the form of Geographic Atrophy.

Image Comments:
By using Eidon TrueColor Confocal Scanner, thanks to its confocal optical system, drusen can be seen individually as high-intensity objects. Eidon allows to clearly identify the presence of multiple yellow deposits in the macular region. Drusen are poorly distinguishable one from the other with a conventional fundus camera.

Retinal Images:
1. Eidon 60° image of Dry Age-Related Macular Degeneration in left eye.
2. Eidon 60° image of Dry Age-Related Macular Degeneration in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
To prove the presence of macular drusen, Swept Source Optical Coherence Tomography (SS-OCT) detects multiple drusenoid pigment epithelium detachments in the macular region with no evidence of sub-retinal or intra-retinal fluid.
Case 2 • Age-related Macular Degeneration, Dry Form - Geographic Atrophy

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi / Prof. G. Staurenghi.

Patient Description:
A 62-year-old caucasian female patient was followed up by medical retinal service for bilateral Geographic Atrophy (GA) secondary to Age related Macular Degeneration (AMD). After pupil dilation, clinical examination and multimodality imaging were performed. Best-corrected visual acuity was 20/62.5 in the right eye and 20/32 in the left eye.

Pathology description
Geographic Atrophy is a typical manifestation of advanced stages of Dry Age-related Macular Degeneration (Dry AMD), although it could be present also in other pathological conditions, such as Stargardt disease. The early stage of Dry AMD is typically characterized by the presence of drusen (dots of yellow crystalline deposits within the macula) and other abnormalities, including granularity and atrophy of the Retinal Pigment Epithelium. Geographic Atrophy can be defined as a sharply delineated area of hypopigmentation. This condition involves degeneration of the Retinal Pigment Epithelium cells, that tends to create an island of lost photoreceptors, related to visible underlying choroidal vessels.

www.centervue.com 1-OD 1-OS
Correlation

Fundus autofluorescence (FAF) image of the right eye is characterized by a marked decrease of autofluorescence signal corresponding to Retinal Pigment Epithelium (RPE) atrophic areas, with a perilesional diffuse hyper-autofluorescence pattern.

Image Comments:

Multifocal Retinal Pigment Epithelium (RPE) atrophic lesions are well detectable using Eidon TrueColor Confocal Scanner with the possibility to demarcate exactly the edges of areas affected by the disease. Despite the good quality of traditional fundus camera photos in both eyes, lesion boundaries are not clearly detectable.

Best-corrected visual acuity preservation on the left eye can be explained by the presence of a ring surrounding the intact and still functioning fovea; this phenomenon has been described as foveal sparing.

Retinal Images:

1. 1-OD. Eidon 60° image of Dry Age related Macular Degeneration in right eye.
2. 2-OD. Eidon 60° image of Dry Age related Macular Degeneration in right eye; the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OD. Traditional 45° fundus camera image of the same eye (taken on the same day).

Retinal Images:

1. 1-OS. Eidon 60° image of Dry Age related Macular Degeneration in left eye.
2. 2-OS. Eidon 60° image of Dry Age related Macular Degeneration in left eye; the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OS. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation

Fundus autofluorescence (FAF) image of the left eye presents an evident decrease of autofluorescence signal related to Retinal Pigment Epithelium (RPE) atrophic areas, no involving the foveal area.
Case 3 • Age-related Macular Degeneration, Dry Form - Geographic Atrophy

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 71-year-old caucasian male was presented with metamorphopsia and progressive visual loss in the right eye over the past two years. Best-corrected visual acuity was 20/200 in the right eye. Intraocular pressure in the right eye was 15 mmHg. Anterior segment findings were normal.

Pathology description
Geographic Atrophy (GA) can be defined as a sharply delineated area of hypopigmentation. This condition involves degeneration of the Retinal Pigment Epithelium cells, that tends to create an island of lost photoreceptors, related with visible underlying choroidal vessels.

Image Comments:
By using Eidon confocal optical system, drusen can be seen individually as high-intensity objects, while the fundus camera photograph looks overexposed by comparison. Unlike conventional red-saturated fundus camera photos, Eidon TrueColor image allows to better highlight the Retinal Pigment Epithelium (RPE) changes and to precisely detect the edges of the macular Geographic Atrophy (GA), distinguishing it from drusen deposits. This accuracy in the evaluation of lesions area is very interesting in the monitoring of disease progression.

Retinal Images:
1. Eidon 60° image of Geographic Atrophy due to Age-Related Macular Degeneration in right eye.
2. Eidon 60° image of Geographic Atrophy due to Age-Related Macular Degeneration in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera image of the same eye (taken on the same day).

Correlation
The presence of macular atrophic lesion is confirmed by the Fundus Autofluorescence (FAF) image and by Swept Source Optical Coherence Tomography (SS-OCT). Geographic Atrophy (GA) is characterized by a decreased autofluorescence signal with sharp borders corresponding to the area of atrophy on Eidon TrueColor fundus image. SS-OCT in atrophic areas reveals Bruch’s membrane thickening due to increase of Bruch’s membrane and to the choroidal. Fundus Autofluorescence (FAF) shows a hypofluorescent area centrally in the fovea.
Case 4: Age-related Macular Degeneration, Exudative Form- Choroidal Neovascularization

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IED, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 78-year-old caucasian male referred to our institute for a 15-day visual loss and metamorphopsia in the right eye. Past ocular history was unremarkable. Best-corrected visual acuity was 20/200 in the right eye. Anterior segment findings were normal.

Pathology description
Choroidal Neovascularization (CNV) indicates the abnormal growth of new choroidal vessels into the sub-retinal space through breaks in the Bruch’s membrane, invading the space above and beneath the Retinal Pigment Epithelium (RPE). Fundus analysis may show a more or less visible greenish-gray subretinal lesion. Other signs related to the defective vasculature typical of this pathology could be submacular fluid, hemorrhages and lipid exudation.

Image Comments:
Eidon TrueColor Confocal Scanner reveals multiple drusen at the posterior pole and an area of Geographic Atrophy in the macular region. In the retinal zone temporal to the fovea, Eidon is able to detect a subretinal hemorrhage and, interestingly, to distinguish it from subretinal fibrosis (located inferiorly) and from a close area of desaturated blood. All these details are poorly visible with a conventional fundus camera.

Retinal Images:
1. Eidon 60° image of Choroidal Neovascularization due to Age-Related Macular Degeneration in right eye. Arrow A highlights the desaturated blood area, arrow B underlines the red blood neighbouring area, arrow C shows the subretinal fibrosis, square D the atrophic area.
2. Eidon 60° image of Choroidal Neovascularization due to Age-Related Macular Degeneration in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Macular Swept Source Optical Coherence Tomography (SS-OCT) detects a thinning of the macular profile, consistent with the development of Geographic Atrophy.
The presence of CNV is confirmed by Optical Coherence Tomography Angiography (OCT-A). The c-scan reveals a well circumscribed lesion with a clear hyper-intense signal close to the fovea. The evidence of a finely branching pattern with richly anastomosed vessels suggests the diagnosis of an active lesion.

Image Comments:
Eidon TrueColor Confocal Scanner reveals multiple drusen at the posterior pole and a macular area of Retinal Pigment Epithelium (RPE) dystrophy. Eidon confocal optical system allows identifying a neovascular membrane, nasal to the fovea, that appears as a grey-green lesion underneath the retina with overlaying thickening of the retina.

Retinal Images:
1. Eidon 60° image of Choroidal Neovascularization Due To Age-Related Macular Degeneration in left eye. Arrow A highlights the area of the grey-green lesion underneath the retina.
2. Eidon 60° image of Choroidal Neovascularization Due To Age-Related Macular Degeneration in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Pathology description
Choroidal Neovascularization (CNV) indicates the abnormal growth of new choroidal vessels into the subretinal space through breaks in the Bruch’s membrane, invading the space above and beneath the Retinal Pigment Epithelium (RPE). Fundus analysis may show a more or less visible greenish-gray subretinal lesion. Other signs related to the defective vasculature typical of this pathology could be submacular fluid, hemorrhages and lipid exudation.

Patient Description:
An 88-year-old caucasian male referred to our institute for a 7-day visual loss and metamorphopsia in the left eye. Past ocular history was unremarkable. Best-corrected visual acuity was 20/63 in the left eye. Anterior segment findings were normal.
Case 6 • Age-related Macular Degeneration, Dry Form (cataract)

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi/ Prof. G. Staurenghi

Patient Description:
This case shows both eyes of a 83-year-old caucasian male patient followed up by medical retinal service for bilateral Age related Macular Degeneration (AMD). The patient presented Nuclear Cataract 2 and initial subcapsular cataract 1 (LOCS III scale). After pupil dilation, clinical examination and multimodality imaging were performed. Best-corrected visual acuity was 20/200 in the right eye and 20/80 in the left eye.

Pathology description
Age-related Macular Degeneration (AMD) identifies a common degenerative condition of the retina that can affect the central part of the fundus, producing central vision loss. As evocated by the term used for its identification, AMD occurs in the older population and its prevalence increases with age. Age-related Macular Degeneration could be divided into two forms, of increasing severity: Dry (or Non-Exudative) AMD and Wet (or Exudative) AMD. Dry Age-related Macular Degeneration is characterized in the early stage by typical features, as the presence of drusen (dots of yellow crystalline deposits that develop within the macula) and other abnormalities, including granularity and atrophy of the Retinal Pigment Epithelium. The late stage is characterized by the form of Geographic Atrophy. Wet Age-related Macular Degeneration may cause Choroidal Neovascularization (CNV) with the presence of subretinal fluid, haemorrhages or lipid exudation.

Case 6 • Age-related Macular Degeneration, Exudative Form (cataract)
Correlation

Right eye Optical Coherence Tomography (OCT) shows presence of macular atrophy associated with wide thinning of retinal layers likewise seen in the ETDR thickness map.

Image Comments:

Conventional fundus camera photos of both eyes barely show bilateral lesions affected the macula due to presence of nuclear lens opacities in both eyes. Thanks to Eidon confocal optical system, the white-light illumination is able to avoid back scattering of the tissue, to pass through lens opacity and to obtain a clearer view of the retina. As clearly visible, the right eye is affected by central retinal pigment epithelium atrophy. Left eye is under treatment for choroidal neovascularization (CNV) secondary wet AMD.

Retinal Images:

1. 1-OD. Eidon 60° image of AMD through cataract opacity in right eye, showing central retinal pigment epithelium atrophy.
2. 2-OD. Eidon 60° image of AMD through cataract opacity in right eye; the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OD. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation

Left eye Optical Coherence Tomography (OCT) shows presence of retinal pigment epithelium detachment with subretinal fluid in a case of active choroidal neovascularization (CNV).

Retinal Images:

1. 1-OS. Eidon 60° image of AMD through cataract opacity in left eye.
2. 2-OS. Eidon 60° image of AMD through cataract opacity in left eye; the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OS. Traditional 45° fundus camera image of the same eye (taken on the same day).
Patient Description:
A 71-year-old male patient referred to our clinic, showing Asteroid Hyalosis in the right eye. Macula was affected by presence of Epiretinal Membrane (ERM) and of Choroidal Neovascularization (CNV) in the right eye.

Pathology description
Asteroid hyalosis is a benign condition of the eye involving the vitreous humor. This condition is characterized by the formation of small spherical white opacities, mainly composed of calcium-phosphate, attached to the vitreous collagenous framework. Clinically, these asteroid bodies are quite refractile and show the appearance of stars (or asteroids) that shine in the sky.

Image Comments:
When Asteroid Hyalosis, characterized by spherical, small, reflective, white bodies floating in the vitreous humor, is mainly present in the central part of the vitreous, retinal images are subsequently affected. This aspect is more relevant in conventional fundus camera imaging, due to light scattered by vitreous opacities. Using Eidon confocal optical system, once decided the focal plane, it is possible to eliminate the contribution of light reflected by objects not located on it. In this way, focusing on the retina, you can clearly image the eye fundus: Eidon photo shows irregular macular region secondary to Epiretinal Membrane (ERM) and to Choroidal Neovascularization (CNV).

Retinal Images:
1. Eidon 60° image of the central retina beneath the opacities of the vitreous humor in right eye. Arrow A shows the irregularity of the macular region (typical macular cellophane appearance of ERM) through the opacities.
2. Eidon 60° image of the central retina beneath the opacities of the vitreous humor in right eye.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Optical Coherence Tomography (OCT) confirms presence of ERM and clearly shows signs of Pigment Epithelium Detachment (PED) and subretinal fluid in active choroidal neovascularization (CNV).
Case 8 • Asteroid Hyalosis

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi / Prof. G. Staurenghi

Patient Description:
A 69-year-old caucasian male patient was followed up by medical retinal service for bilateral Age related Macular Degeneration (AMD). Right eye was affected by choroidal neovascularization (CNV), with Best-corrected visual acuity of 20/200. Left eye diagnosed of early AMD and asteroid hyalosis with vision of 20/40.

Pathology description
Asteroid hyalosis is a benign condition of the eye involving the vitreous humor. This condition is characterized by the formation of small spherical white opacities, mainly composed of calcium-phosphate, attached to the vitreous collagenous framework. Clinically, these asteroid bodies are quite refractile and show the appearance of stars (or asteroids) that shine in the sky.

Image Comments:
Based on conventional fundus camera, left eye macula results completely ungradable secondary to presence of numerous spherical white bodies moving along vitreous humor (asteroid hyalosis). With traditional fundus camera, it is nearly impossible to image the back of the eye in such situations, due to considerable back scattering involving the light passing through vitreous humor. Using Eidon confocal optical system it’s possible to exceed this pathological condition, obtaining acceptable real color images, and making possible to guess the presence of drusen in the central region of the retina.

Retinal Images:
1. Eidon 60° image of central retina beneath the opacities of the vitreous humor in left eye. Zoom on the macula highlights the presence of drusen through the hyalosis.
2. Eidon 60° image of central retina beneath the Asteroid Hyalosis.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Subsequently to Eidon imaging, Optical Coherence Tomography (OCT) can be used, as in this case, for structural evaluation of central retina, confirming presence of subfoveal drusen.
Case 9 • Best’s Disease

Pathology description
Best’s disease, also known as Vitelliform Macular Dystrophy, is an inherited form of macular degeneration, characterized by an oval egg-yolk-like lesion, at the level of the Retinal Pigment Epithelium (RPE), usually in the posterior pole. This disease progresses through various stages, and could lead to macular atrophy with loss of central vision. Generally, symptoms related to this disease develop in infancy. Vitelliform characteristics presenting after childhood is called Adult Vitelliform Macular Dystrophy.

Image Comments:
Eidon reveals a yellow circumscribed subretinal lesion of one disk diameter in the foveal center of the right eye. Unlike the conventional fundus photograph, Eidon TrueColor Confocal Scanner allows to better delineate the contour of the lesion, whose aspect is consistent with accumulation of lipofuscin-like material in the macular region.

Retinal Images:
1. Eidon 60° image of Adult Vitelliform Macular Dystrophy (Best’s Disease) in right eye.
2. Eidon 60° image of Adult Vitelliform Macula Dystrophy in the right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Swept Source Optical Coherence Tomography (SS-OCT) demonstrates an hyperreflective subretinal lesion. Central foveal thickness is 283 μm in the right eye. Fundus Autofluorescence (FAF) shows a hyperfluorescent area centrally in the fovea.

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 42-year-old caucasian female reported decreased distance vision in the right eye for at least the past one year. Previous ocular and family histories were inconclusive. Best-corrected visual acuity was 20/50 in the right eye. Anterior segment findings were normal.
Case 10 • Best’s Disease

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi/ Prof. G. Staurenghi

Patient Description:
A case characterized by bilateral vitelliform lesion found in a 21 year-old female patient. Corrected vision acuity was 20/25 in the right eye and 20/50 in the left eye.

Pathology description
Best’s disease, also known as Vitelliform Macular Dystrophy, is an inherited form of macular degeneration, characterized by an oval yolk-like lesion in the Retinal Pigment Epithelium (RPE), usually in the posterior pole. This disease progresses through various stages, and could lead to macular atrophy with loss of central vision. In the pseudohypopyon stage, lesions break through the RPE, and the yellow material accumulates in the inferior macula, simulating hypopyon.
Correlation
Right eye Fundus Autofluorescence (FAF) shows hyper-autofluorescence pattern inferiorly the fovea, representing lipofuscin-like material accumulation between neurosensory retina and retinal pigment epithelium (RPE). These features are typically represented in Pseudohypopyon stage of Best disease.

Correlation
Left eye Fundus Autofluorescence (FAF) shows macular irregular appearance with patchy areas of retinal pigment epithelium (RPE) atrophy. No lipofuscin-like material is observable in this advanced disease stage.
Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi/ Prof. G. Staurenghi

Patient Description:
Left eye of a 62-year-old caucasian male patient followed up by medical retinal service for Branch Retinal Vein Occlusion (BRVO). After pupil dilation, clinical examination and multimodality imaging were performed. Best-corrected visual acuity was 20/40 in the left eye.

Pathology description
Branch Retinal Vein Occlusion (BRVO) is a common retinal vascular disease caused by the blockage of blood flow within a branch retinal vein. BRVO often occurs at a retinal arteriovenous crossing, where turbulent flow could lead to thrombus formation within the branch retinal vein. This disease is typically characterized by venous engorgement and tortuosity and by retinal hemorrhages and edema, along the distribution of occluded vessel.

Retinal Images:
1. Eidon 110° x 60° Mosaic Image of BRVO (three fields: Central, Nasal and Temporal) in left eye.
2. Eidon 110° x 60° Mosaic Image of BRVO in left eye the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken the same day).

Image Comments:
Eidon fundus image of the left eye presents the typical features of Branch Retinal Vein Occlusion (BRVO). Superficial flame-shaped hemorrhages with dilated tortuous retinal venous system can be appreciated inferiorly, involving the area around inferior-nasal arcade. Lesion appearance is spreading out in multiple fields, therefore a composite fundus image (Mosaic) is necessary to image the whole disease. Cotton-wool spots are also present and clearly visible in the central part of the fundus image. Following these patients with Eidon three fields fundus Mosaic, during routine follow up visits, means to have a significantly easy way to monitor disease progression.

Correlation
Additionally to fundus imaging, Optical Coherence Tomography (OCT) shows central macular edema (CME) with an increase of central retinal thickness and presence of subretinal fluid.
Case 12 · Branch Retinal Vein Occlusion - Laser Treated

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-EMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 66-year-old caucasian female was presented with a history of blurred vision in the left eye caused by a known Branch Retinal Vein Occlusion occurred in the previous one year and treated with peripheral laser photocoagulation. Best-corrected visual acuity was 20/32 in the left eye. Intraocular pressure in the left eye was 15 mmHg. Anterior segment findings were normal.

Pathology description
Branch retinal vein occlusion (BRVO) is a common retinal vascular disease, caused by the blockage of blood flow within a branch retinal vein. BRVO often occurs at a retinal arteriovenous crossing, where turbulent flow could lead to thrombus formation within the branch retinal vein. This disease is typically characterized by venous engorgement and tortuosity, and by retinal hemorrhages and edema, along the distribution of occluded vessel.

Image Comments:
Eidon TrueColor Confocal Scanner reveals vascular tortuosity along the superotemporal retinal vascular arcade, ghost vessels and peripapillar collateral vessels. It is possible to appreciate the presence of drusen in the periphery and a Macular Epiretinal Membrane. Unlike the conventional fundus camera, Eidon allows to better detect the wrinkling of the macular profile, consistent with the development of an Epiretinal Membrane. By using Eidon confocal optical system it is possible to precisely visualize laser burns located in the superior quadrant of the retina.

Retinal Images:
1. Eidon 60° image of BRVO in left eye. Arrow A highlights the Epiretinal Membrane, arrow B indicates a ghost vessel and arrow C points out a peripapillar collateral vessel.
2. Eidon 60° image of BRVO in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera, Eidon allows to better detect the wrinkling of the macular profile, consistent with the development of an Epiretinal Membrane. By using Eidon confocal optical system it is possible to precisely visualize laser burns located in the superior quadrant of the retina.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
The development of an Epiretinal Membrane is confirmed by Swept Source Optical Coherence Tomography (SS-OCT). Central foveal thickness is 256 μm in the left eye. Fundus Autofluorescence (FAF) shows laser burns located in the superior quadrant of the retina.
Case 13 • Central Retinal Vein Occlusion associated with Ocular Ischemic Syndrome

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 70-year-old caucasian female, with history of uncontrolled hypertension, referred to our clinic complaining about a sudden vision loss in the right eye upon awakening. Her blood pressure was 140/90 mmHg. Best-corrected visual acuity was counting fingers at one meter in the right eye. Intraocular pressure was 15 mmHg. Anterior findings were normal with no relative afferent pupillary defects in the right eye.

Pathology description
Central Retinal Vein Occlusion (CRVO) is a common retinal vascular disorder related to blockage of blood flow within the central retinal vein. This disease can be divided into two clinical types, ischemic and non-ischemic. Ischemic CRVO is the severe form of the disease. CRVO may be presented initially as the ischemic type, or it may progress from non-ischemic. Usually, ischemic CRVO presents with severe visual loss, extensive retinal hemorrhages generally involving all four quadrants around the optic disc, cotton-wool spots and poor perfusion to retina.

Image Comments:
Eidon TrueColor Confocal Scanner shows in detail optic disc swelling with blurred margins, venous engorgement and tortuosity, multiple dot-blot and flame-shaped hemorrhages in all quadrants. Interestingly, Eidon better highlights a different aspect of the retina compared to conventional fundus camera images.

Retinal Images:
1. Eidon 60° image of Central Retinal Vein Occlusion (CRVO) with Ocular Ischemic Syndrome in right eye.
2. Eidon 60° image of CRVO with Ocular Ischemic Syndrome in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Swept Source Optical Coherence Tomography (SS-OCT) supports the presence of intra-retinal and sub-retinal fluid. Central foveal thickness is 354 µm.
Case 14 • Central Serous Chorioretinopathy

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 38-year-old caucasian male referred to our institute complaining of a 1-month history of decreased visual acuity in the left eye. Best-corrected visual acuity was 20/40 in the left eye. Intraocular pressure was 15 mmHg. Anterior segment findings were normal. The patient had no past history of steroid use or other systemic diseases.

Pathology description
Central Serous Chorioretinopathy is a disorder characterized by a circumscribed serous detachment (fluid blister) of the neurosensory retina, generally related to the posterior pole. This condition could also be associated to a serous detachment of the Retinal Pigment Epithelium (RPE). Signs of CSC include mono/pauci-focal RPE lesions with prominent elevation of the neurosensory retina, reflecting the loss of contact between the photoreceptors layer and the RPE.

Image Comments:
Using Eidon confocal optical system, the serous detachment has a well-defined margin of 1 disc diameter in the posterior pole. Some hard exudates in the foveal region can be captured with Eidon, while this detail is not visible with conventional fundus camera imaging.

Retinal Images:
1. Eidon 60° image of Central Serous Chorioretinopathy in left eye: Zoom on the macula highlights the presence of CSC, as a darker ring, surrounded by hard exudates (small yellowish dots).
2. Eidon 60° image of Central Serous Chorioretinopathy in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye [taken on the same day].

Correlation
Macular Swept Source Optical Coherence Tomography (SS-OCT) validates the presence of a serous neurosensory detachment. Central foveal thickness is 302 μm in left eye.
Case 15 • Choroidal Metastasis

Retinal Center / Dr:
Eye Clinic Luigi Sacco Hospital, University of Milan, Milan, Italy. Authors: M. Cozzi/ M.Pellegrini/ Prof. G. Staurenghi

Patient Description:
A 51-year-old caucasian female referred to our clinic for bilateral choroidal metastasis. After pupil dilation, clinical examination and multimodality imaging were performed. Best-corrected visual acuity was 20/20 in the right eye and 20/25 in the left eye.

Pathology description
The choroid is the most common ocular site for metastatic disease, conceivable due to the abundant, high flow vasculature of this region. Choroidal metastasis is a seed of cancer which has started in a cancer elsewhere in the body and migrated to the eye through the bloodstream. This metastatic seed typically appears as yellow subretinal masses, characterized by a round or oval shape, posterior to the equator. The majority of choroidal metastases originates from breast cancer in women and lung cancer in men. They are generally unilateral when associated to lung cancer, and multifocal and bilateral when related to breast cancer.
Correlation

Optical Coherence Tomography (OCT) of the right eye allows to visualise the whole disease extension in deep, with presence of subretinal fluid located inferiorly to the lesion.

Correlation

Optical Coherence Tomography (OCT) of the left eye shows a typical lumpy bumpy pattern with presence of sub-retinal fluid and a folded retina corresponding to the appearance appreciable in Eidon TrueColor image.

Image Comments:

Multiple 60 degrees Field images are acquired using Eidon TrueColor Confocal Scanner. A composite Mosaic, created using built-in software, shows multiple non-pigmented lesions, inferiorly and temporally to the fovea, on the left eye and an individual infero-nasal lesion located on the right eye.

Lesions can be visualised integrally by Eidon fundus photos with clear and sharp boundaries, furthermore a whole visualization of entire retina is possible in both eyes with automated multi-field exam. This tool is essential for following patients and imaging lesions evolution over the time.

Retinal Images:

1. 1-OD. Eidon 110° x 85° Mosaic Image (four fields: Nasal, Central, Temporal and Inferior) of a Choroidal Metastasis in right eye.
2. 2-OD. Eidon 110° x 85° Mosaic Image of a Choroidal Metastasis in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OD. Traditional 45° fundus camera image of the same eye (taken on the same day).

Retinal Images:

1. 1-OS. Eidon 110° x 85° Mosaic Image (four fields: Nasal, Central, Temporal and Inferior) of multiple Choroidal Metastases in left eye.
2. 2-OS. Eidon 110° x 85° Mosaic Image of multiple Choroidal Metastasis in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OS. Traditional 45° fundus camera image of the same eye (taken on the same day).
Case 16 • Choroiditis Serpiginosa

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare – IEMO, Udine, Italy. Authors: Dr. V. Sarao/Dr. D. Veritti/ Prof. P. Lanzetta.

Patient Description:
A 40-year-old caucasian male was presented to our institute with metamorphopsia and a progressive blurred vision in the right eye. Best-corrected visual acuity was 20/40 in the right eye. Past medical history was unremarkable. Intraocular pressure was 16 mmHg. Anterior segment findings were normal.

Pathology description
Choroiditis Serpiginosa, also called geographic helicoid peripapillary choroidopathy, is a rare, chronic, progressive, recurrent inflammatory disease affecting the choroid and the Retinal Pigment Epithelium (RPE). The name of this pathology is evocative of its typical appearance (in the active stage): a centrifugally spreading pattern with serpentine-shaped, extending from the juxtapapillary choroid.

Image Comments:
Eidon TrueColor Confocal Scanner reveals a yellow-to-gray lesion with well-defined borders. The lesion arises from the peripapillary region and extends progressively towards the posterior pole in a helicoidal shape. Unlike the conventional fundus camera, Eidon confocal optical system allows to better detect the contour of the lesion.

Retinal Images:
1. Eidon 110° image of Choroiditis Serpiginosa in right eye
2. Eidon 60° image of Choroiditis Serpiginosa in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Swept Source Optical Coherence Tomography (SS-OCT) shows the typical hyperreflectivity of both the outer retina and the choroid, along with disruption of the IS/OS junction. Central retinal thickness is 258 um.
Case 17 • Diabetic Macular Edema

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi / Prof. G. Staurenghi.

Patient Description:
A 76 year old Caucasian male patient followed up by medical retinal service for macular edema secondary to diabetic maculopathy. After pupil dilation, clinical examination and multimodality imaging were performed. Best corrected visual acuity was 20/40 in the right eye.

Pathology description
Diabetic Macular Edema (DME) is one of the most common microvascular complications in patients with Diabetic Retinopathy (DR). In more advanced stages of DR, infact, there is generally a growth of abnormal retinal vessels secondary to ischemia, that attempt to supply oxygen to the hypoxic retinal tissue. In this context, DME occurs when the blood-retinal barrier breaks down, because of leakage of dilated hyperpermeable capillaries and microaneurysms. This pathological event typically involves retinal thickening in the macular area.

Image Comments:
A single 60° field Eidon TrueColor fundus image highlights presence of hard exudates temporally to the fovea. Few microaneurisms are present in mid periphery without any other signs of diabetic retinopathy. A pseudocolor image acquired with a confocal instrument based on three different wavelengths reveals less contrasted details with totally different background fundus image color.

Retinal Images:
1. Eidon 60° image of Diabetic Macular Edema in right eye
2. Eidon 60° image of Diabetic Macular Edema in right eye; the dashed square highlights the 30° size of the pseudocolor image.
3. SLO 30° pseudocolor image of the same eye (taken on the same day)

Correlation
Spectral Domain Optical Coherence Tomography (SD OCT) of right eye confirm presence of hard exudates as hyper reflective material located inner retinal layers with presence of central macular edema.
Case 18 · Diabetic Retinopathy, Non Proliferative

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi / Prof. G. Staurenghi

Patient Description:
A 65-year-old caucasian male patient was followed up by medical retinal service for Diabetic Retinopathy. After pupil dilation, clinical examination and multimodality imaging were performed. Best-corrected visual acuity was 20/50 in the right eye.

Pathology description
Diabetic Retinopathy (DR) is a retinal vascular disease which includes a wide range of ocular fundus manifestation of diabetes mellitus. Non-Proliferative Diabetic Retinopathy could lead to hemorrhages of different types and severity: intraretinal (small and dot-shaped), blot (larger with fuzzy borders), flame-shaped (superficial in the nerve fiber layer). Microaneurysms, hard yellow exudates and macular edema could also be present. In the late stage, capillary occlusive disease could be seen, developing as cotton-wool spots, venous dilation, flat intraretinal irregular vessels.

Image Comments:
Eidon fundus photo shows the presence of hard exudates involving the macula and the retinal area nasal to the optic nerve; multiple superficial flame-shaped hemorrhages and microaneurysms are seen in all the three central 60 degrees fields composing the Mosaic (central, nasal and temporal). Traditional fundus camera photo shows poor resolution of retinal details due to small pupil size, despite pharmacological pupillary dilation. In this case a single conventional 45° degrees field of view does not allow to appreciate the extension of the lesion and to document the whole width of the pathology.

Retinal Images:
1. Eidon 110° x 60° Mosaic Image (three fields: Central, Nasal and Temporal) of Non Proliferative Diabetic Retinopathy in right eye.
2. Eidon 110° x 60° Mosaic Image of Non Proliferative diabetic retinopathy in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Left eye Optical Coherence Tomography (OCT) reveals absence of photoreceptor layer with a significant thinning of retinal tissue at the fovea level.
Case 19 • Diabetic Retinopathy, Proliferative - Complicated by Ischemic Maculopathy

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 46-year-old caucasian male referred to our institute for progressive visual loss in the left eye over the last one year. Patient was affected by type I diabetes for 20 years. HbA1c was 8%. Best-corrected visual acuity was 20/50 in the left eye. Anterior segment findings were normal.

Pathology description
Diabetic Retinopathy (DR) is a retinal vascular disease that includes a wide range of ocular fundus manifestation of diabetes mellitus. Proliferative Diabetic Retinopathy (PDR) represents the most severe manifestation of diabetes in eyes. This condition involves the loss of normal retinal perfusion, that leads to the development of neovascular proliferative tissue.

Image Comments:
Unlike conventional fundus photographs, hard exudates, intraretinal hemorrhages and microaneurysms are better defined in Eidon TrueColor Confocal Scanner images. Confocal wide-angle images allow to show and clearly document the presence of mid-peripheral retinal hemorrhages, not detectable in the 45° fundus camera photo.

Retinal Images:
1. Eidon 60° image of Proliferative Diabetic Retinopathy in left eye.
2. Eidon 60° image of Proliferative Diabetic Retinopathy in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Late phase Fluorescein Angiography (FA) and Optical Coherence Tomography Angiography (OCT-A) reveal retinal capillary network abnormalities with an enlargement of foveal avascular zone (FAZ) and ischemic maculopathy.
Diabetic Retinopathy (DR) is a retinal vascular disease that includes a wide range of ocular fundus manifestation of diabetes mellitus. Proliferative Diabetic Retinopathy (PDR) represents the most severe manifestation of diabetes in eyes. This condition involves the loss of normal retinal perfusion, that leads to the development of neovascular proliferative tissue. New vessel growth is present along the vitreoretinal interface, causing preretinal fibrosis, bleeding into the vitreous cavity and subhyaloid space, traction retinal detachment and severe visual loss. Panretinal Photocoagulation (PRP) is the standard treatment for this condition.

Case 20 • Diabetic Retinopathy, Proliferative - Laser Treated

Pathology description

Diabetic Retinopathy (DR) is a retinal vascular disease that includes a wide range of ocular fundus manifestation of diabetes mellitus. Proliferative Diabetic Retinopathy (PDR) represents the most severe manifestation of diabetes in eyes. This condition involves the loss of normal retinal perfusion, that leads to the development of neovascular proliferative tissue. New vessel growth is present along the vitreoretinal interface, causing preretinal fibrosis, bleeding into the vitreous cavity and subhyaloid space, traction retinal detachment and severe visual loss. Panretinal Photocoagulation (PRP) is the standard treatment for this condition.

Patient Description:
A 55-year-old caucasian female referred to our institute for a gradual vision loss in both eyes over the past one year. She was diagnosed with type 2 diabetes mellitus 8 years before and, since then, she is taking metformin hydrochloride 500 mg orally twice a day. At presentation, HbA1c value was 8.5%. No history of renal or cardiac disease was reported. Previous ophthalmic therapy included bilateral grid and panretinal laser photocoagulation.

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare–IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Best-corrected visual acuity (BCVA) was 20/80 in the right eye and 20/20 in the left eye. Anterior segment findings were normal in both eyes and intraocular pressure was 14 mmHg in the right eye and 15 mmHg in the left eye. No evidence of neovascularization on the iris was noted and minimal lens opacities were present in both eyes.
Correlation
Fundus autofluorescence (FAF) image of the right eye shows the spatial distribution of the intensity of the FAF signal. Autofluorescence imaging confirms the presence of laser treatment at the posterior pole and in mid retinal periphery in right eye.

Correlation
Fundus autofluorescence (FAF) image of the left eye reveals a decreased FAF signal that corresponds to laser scars in the posterior pole and in mid retinal periphery.

Image Comments:
Hemorrhages and microaneurysms scattered throughout the posterior pole are evident in both eyes. Moreover, Eidon TrueColor Confocal Scanner provides high-resolution views of the retina. Laser spots can be better distinguished using a TrueColor confocal optical system, rather than a conventional fundus camera.
Case 21 • Epiretinal Membrane in Diabetic Retinopathy

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi/ Prof. G. Staurenghi.

Patient Description:
A 61-years-old caucasian female patient was followed up by medical retinal service for proliferative diabetic retinopathy. Patient underwent panretinal photocoagulation on the left eye years ago. Best-corrected visual acuity was 20/32.

Pathology description
Epiretinal membrane (ERM), also known as Macular Pucker, is a pathologic condition consisting in the formation of a semitransparent fibrocellular tissue (a membrane) attached to the inner surface of the retina. Initially, it appears as a translucent film, while maturing it becomes more opaque. As this thin layer of tissue shrinks centrally, it introduces a tension on the underlying retina, causing its distortion and wrinkling (that’s way this pathology is also called cellophane maculopathy).

Image Comments:
Multiple fields Mosaic image obtained by Eidon TrueColor Confocal Scanner highlights the extension of peripheral scar tissue treated with panretinal photocoagulation for proliferative diabetic retinopathy. Thanks to Eidon confocal white-light optical system, it is possible to appreciate an initial epiretinal membrane (ERM) without foveal involvement. Conventional fundus camera photo barely shows the extension of ERM.

Retinal Images:
1. Eidon 85° x 110° Mosaic Image (five fields: Central, Superior, Inferior, Temporal and Superior-Temporal) of ERM in left eye. Arrow A highlights a clearly visible detail of the typical cellophane appearance of the ERM.
2. Eidon 85° x 110° Mosaic Image of ERM in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Standard Optical Coherence Tomography (OCT) confirms the presence of the initial epiretinal membrane (ERM), as an hyper-reflective tissue above the retina, revealing also the presence of central macular edema (CME).
Case 22 • Fundus Albipunctatus

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Oldani/ A. Acquistapace/ Prof. G. Staurenghi.

Patient Description:
7-years-old caucasian young female with normal vision referred to medical retinal service for fundus oculi alteration. Best-corrected visual acuity was 20/20 in the right eye and 20/20 in the left eye.

Pathology description
Fundus Albipunctatus (FA) is a disorder that belongs to the heterogeneous group called Congenital Stationary Night Blindness, characterized by non-progressive impaired night vision. Specifically, Fundus Albipunctatus is a disorder related to an abnormal rate of the visual photoreceptors pigment regeneration process. This condition is clinically visible as a multitude of yellow-white, tiny dots in the posterior pole, generally concentrated in the midperiphery.

Image Comments:
Eidon shows numerous small white-yellowish retinal dotted lesions throughout the whole retina except for the posterior pole. Vitreous cortex reflexes are visible in all the posterior pole, as typically seen during routine clinical examination in younger patients. Eidon confocal optical system guarantees optimized contrast capacities and ensures excellent details definition. In this way white-yellowish retinal lesions seem to be sharper and more evident with Eidon TrueColor Confocal Scanner compared to traditional fundus camera.

Retinal Images:
1. Eidon 85° x 60° Mosaic image (2 fields: Central and Nasal) of Fundus Albipunctatus in right eye.
2. Eidon 85° x 60° Mosaic image of Fundus Albipunctatus in right eye. The dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Optical Coherence Tomography (OCT) presents typical features of healthy retina without any signs of retinal alteration in central 30° horizontal B-scan.
Correlation
The presence of the hemorrhage is detected by Fundus Autofluorescence (FAF) as a well-defined hypofluorescent area along the superotemporal arcade. CWS is identified as a mild decrease in FAF intensity.

Image Comments:
Compared to conventional fundus camera, Eidon TrueColor Confocal Scanner is able to better define a cotton-wool spot with a splinter hemorrhage along the superotemporal arcade. Thanks to the sharpness of the image, due to the confocal optical system of the device, it is possible to localize the lesions within the retinal nerve fiber bundle. No disc swelling or pallor is noted.

Retinal Images:
1. Eidon 110° Mosaic image (3 60° fields: Temporal, Central and Nasal) of a focal infarct of the retinal nerve fiber layer in right eye.
2. Eidon 110° Mosaic image of a focal infarct of the retinal nerve fiber layer in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Case 23 • Focal Infarct of the Retinal Nerve Fiber Layer

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare–IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 42-year-old caucasian female referred to our clinic complaining about a sudden painless visual disturbance in the right eye. Past systemic history was remarkable only for a diagnosis of hypercholesterolemia. Best-corrected visual acuity was 20/20 in right eye. Intraocular pressure was 14 mmHg. Anterior segment findings and vitreous body were normal in the right eye.

Pathology description
Cotton-wool spots (CWS) are the clinical manifestation of focal infarcts of the retinal nerve fiber layer, caused by exploded retinal ganglion cells axons. CVS appear as superficial areas of retinal opacifications, with a typical size of less than one quarter disc area. Their aspect is characterized as fluffy white patches on the retina.
Case 24 • Non-Arteritic Anterior Ischemic Optic Neuropathy

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-EMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 51-year-old caucasian male referred to our clinic complaining of a sudden painless visual loss in the right eye. Past systemic history was remarkable only for a diagnosis of hyperlipidaemia. Best-corrected visual acuity was 20/63 in the right eye. A relative afferent pupillary defect was present in the right eye.

Pathology description
Ischemia of the optic nerve can occur in different anatomical locations. When the damage refer to the anterior portion of the optic nerve (the optic nerve head, ONH), the phenomenon is called Anterior Ischemic Optic Neuropathy (AION). Non-Arteritic Anterior Ischemic Optic Neuropathy (NAION) is a variety of AION, secondary to non-inflammatory small vessel diseases. NAION results in visible disc swelling, with peripapillary splinter hemorrhages.

Image Comments:
Compared to conventional fundus camera imaging, Eidon TrueColor Confocal Scanner is able to better define a markedly swollen optic disc with peripapillary flame hemorrhages in the superior rim of the optic disc. A marked narrowing of retinal arteries is noted, especially inferiorly.

All the details related to the aspect of the optic disc are less evident in the fundus camera image.

Retinal Images:
1. Eidon 60° image of NAION in right eye: zoom on the peripapillary flame haemorrhage in the superior rim of the optic nerve head.
2. Eidon 60° image of NAION in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Spectral Domain Optical Coherence Tomography (SD-OCT) shows a nerve fiber layer thickening of the optic disc. Optical Coherence Tomography Angiography (OCT-A) shows a filling defect in the superior area of peripapillary choroid.
Case 25 • Pigment Epithelium Detachment Due to Age-related Macular Degeneration

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 65-year-old caucasian female referred to our clinic complaining of decreased vision and metamorphopsia in the left eye for 7 days. She reported family history of age-related macular degeneration. Best-corrected visual acuity was 20/63 in the left eye. Anterior segment findings and vitreous body were normal.

Pathology description
Retinal pigment epithelium (RPE) detachment is associated to disruption of the junction between the basement membrane of the RPE and the inner collagenous Bruch’s membrane. Typically, RPE detachment is described as one or more focal, dome-shaped, elevation(s) of the retina and of the RPE, and may be related to other signs of AMD including drusen and subretinal hemorrhage.

Image Comments:
Eidon TrueColor Confocal Scanner allows to precisely identify areas of retinal pigment epithelium (RPE) that are elevated, macular drusen and two subretinal hemorrhages.
Thanks to Eidon confocal optical system, it is possible to highlight the RPE detail and to provide more information about the RPE changes. Through the sharpness of the image, drusen can be seen individually as high-intensity objects, while the fundus camera photographs look overexposed by comparison.

Retinal Images:
1. Eidon 60° image of Pigment Epithelium Detachment due to Age-related Macular Degeneration in left eye.
2. Eidon 60° image of Pigment Epithelium Detachment due to Age-related Macular Degeneration in left eye. The dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Swept Source Optical Coherence Tomography (SS-OCT) image confirms the presence of both intraretinal fluid and subretinal fluid associated with a regular, dome-shaped elevation of the RPE. Central retinal thickness is 393 um.
Case 26 • Primary Open-Angle Glaucoma

Retinal Center / Dr:
Istituto Européo di Microcirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 38-year-old African male referred to our clinic with a history of gradual, painless vision loss in both eyes. Best-corrected visual acuity was 20/200 in right eye and counting fingers at one meter in left eye. Intraocular pressure was 32 mmHg (right eye) and 30 mmHg (left eye) by applanation tonometry. Gonioscopy showed open angles in both eyes. Anterior segment findings were normal. Past ocular and medical history was unremarkable.

Pathology description
Glaucoma describes a group of conditions, related to abnormal ocular hydrodynamics, that damage the optic nerve. This pathology is characterized by cupping of the optic disc, with corresponding visual field restriction, due to retinal ganglion cell loss. Primary Open Angle Glaucoma (POAG) is a form of Glaucoma defined by an open, normal appearing anterior chamber angle and raised intraocular pressure (IOP).

Image Comments:
Eidon confocal optical system provides a clearly interpretable information about the cup, the neuroretinal rim and the contour of the nerve fiber layer. These details are less visible with conventional fundus imaging. By confocal optics, the optic disc appears with a well-defined edge and bright central optic cup. This is at variance with the appearance of the optic disc of the fundus camera photo. Eidon TrueColor Confocal Scanner, thanks to the sharpness of its images, allows to turn the visual information of the Optic Nerve Head (ONH) into a quantitative evaluation of the cup-to-disc ratio, revealing a 0.9 vertical value.

Retinal Images:
1. Eidon 60° image of Primary Open-Angle Glaucoma in left eye. Arrow A highlights the detail of the optic disc, where the increased cup-to-disc ratio is evident.
2. Eidon 60° image of Primary Open-Angle Glaucoma in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Optical Coherence Tomography (OCT) confirms the peripapillary retinal nerve fiber loss, as highlighted by the curve in the TSNIT map and by the fully red coloured quadrant/clock hour maps.
Case 27 • Bilateral Macular Pucker

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-EMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 72-year-old caucasian male was examined for decreased vision and metamorphopsia in both eyes over the last eight months. Best-corrected visual acuity was 20/63 in the right eye and 20/40 in the left eye. Anterior segment findings were normal.

Pathology description
Macular Pucker, also known as Epiretinal membrane (ERM), is a pathologic condition consisting in the formation of a semitransparent fibrocellular tissue (a membrane) attached to the inner surface of the retina. Initially, it appears as a translucent film, while maturing it becomes more opaque. As this thin layer of tissue shrinks centrally, it introduces a tension on the underlying retina, causing its distortion and wrinkling (that’s why this pathology is also called cellophane maculopathy).
Correlation

Swept Source Optical Coherence Tomography (SS-OCT) confirms the macular distortion in right eye, showing a highly reflective layer on the surface of the retina. Central retinal thickness is 326 µm in right eye.

Correlation

Swept Source Optical Coherence Tomography (SS-OCT) of the left eye shows different degrees of macular thickening and irregular alterations of the retinal architecture. Central retinal thickness is 348 µm in left eye.

Image Comments:

Compared to conventional fundus camera imaging, Eidon TrueColor Confocal Scanner, thanks to the image sharpness due to the confocal optical system, is able to clearly detect in both eyes a wrinkling of the retinal surface associated with superficial radiating retinal folds, extended outward from the margins of the contracted membrane. Fundus camera photos look more homogeneous and washed out and this appearance makes difficult to distinguish all these details. In the right eye, the pucker is located centrally to the macula, and retinal folds, creating 360° radial pattern, are perfectly visible. In the left eye, the pucker is located in the inferior part of the macula, and retinal folds are more evident superiorly to the contracted membrane.

Retinal Images:

1. 1-OD. Eidon 60° image of Macular Pucker in right eye: zoom on radiating pucker originated from the contracted membrane.
2. 2-OD. Eidon 60° image of Macular Pucker in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OD. Traditional 45° fundus camera image of the same eye (taken on the same day).

Retinal Images:

1. 1-OS. Eidon 60° image of Macular Pucker in left eye. Arrow A shows the cellophane shaped contracted membrane.
2. 2-OS. Eidon 60° image of Macular Pucker in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OS. Traditional 45° fundus camera image of the same eye (taken on the same day).
Patient Description:
A 86-year-old caucasian female patient was followed up by medical retinal service for bilateral Choroidal neovascularization (CNV) secondary to Age related Macular Degeneration (AMD). Patient was seen 1 month following Intravitreal Anti–Vascular Endothelial Growth Factor Therapy in the right eye. She complained about vision drop and presence of central scotoma. After pupil dilation, clinical examination and multimodality imaging were performed. Best-corrected visual acuity was 20/80 in the right eye and 20/200 in the left eye.

Pathology description:
Retinal pigment epithelium (RPE) tears (or rip) may be generally observed in association with Pigment Epithelium Detachment (PED). RPE rip occurs when the RPE cells layer tears and rolls to the opposite margin of the PED, demonstrating an area of bare choroid juxtaposed to the area of hyperpigmented, rolled-up RPE.

Image Comments:
The fundus image acquired using Eidon TrueColor Confocal Scanner reveals in the right eye the absence of Retinal Pigment Epithelium (RPE) tissue, temporal to the fovea, with an increased pigmentation of foveal retinal tissue. Reticular pseudo-drusen, with typical appearance, are present mainly supero-temporal to the lesion. Conventional fundus image of the right eye shows less sharp details of the above described macular lesions.

Retinal Images:
1. Eidon 60° image of Retinal Pigment Epithelium Tear in right eye. Arrow A highlights the RPE absence and arrow B shows an area of reticular pseudo-drusen.
2. Eidon 60° image of Retinal Pigment Epithelium Tear in right eye. The dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation:
Optical Coherence Tomography (OCT) passes through the lesion and confirms the presence of RPE tear with enhanced signal at the level of the tear corresponding to retracted and folded RPE. Fundus Autofluorescence (FAF) shows absence of RPE layer as an hypo-autofluorescence (black) area. This area corresponds exactly to the RPE tear located next to an area of hyper-autofluorescence pattern consistent with folded RPE tissue.
Case 29 • Retinal Pigment Epithelium Tear

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 68-year-old caucasian female referred to our clinic with sudden onset blurring of vision and metamorphopsia in the right eye. Best-corrected visual acuity was 20/40 in the right eye. Anterior segment findings were normal. One month before, she received an injection of anti-VEGF agent in the right eye for the treatment of exudative Age-Related Macular Degeneration.

Pathology description
Retinal pigment epithelium (RPE) tears (or rip) may be generally observed in association with Pigment Epithelium Detachment (PED). RPE rip occurs when the RPE cells layer tears and rolls to the opposite margin of the PED, demonstrating an area of bare choroid juxtaposed to the area of hyperpigmented, rolled-up RPE.

Image Comments:
Eidon TrueColor Confocal Scanner clearly detects a well-demarcated area of bare choroid (half-moon shaped), visible immediately adjacent to a hyper-pigmented area which represents the redundant and retracted Retinal Pigment Epithelium (RPE) towards the optic nerve.

Retinal Images:
1. Eidon 60° image of Retinal Pigment Epithelium Tear in right eye. Arrow A highlights the bare choroid area, while the retracted RPE is indicated by arrow B.
2. Eidon 60° image of Retinal Pigment Epithelium Tear in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Fundus Autofluorescence (FAF) imaging supports the diagnosis, showing the RPE defect as an hypo-autofluorescence area. This area corresponds to a deficit of the RPE line visible on Spectral Domain Optical Coherence Tomography (SD-OCT).
Case 30 · Retinitis Pigmentosa

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 66-year-old caucasian male referred to our institute, complaining about nyctalopia and progressive visual acuity loss in both eyes. At 7 years of age he was diagnosed with bilateral Retinitis Pigmentosa. His past medical history was unremarkable and there was no family history of ocular or systemic diseases. Best-corrected visual acuity was 20/40 in right eye and 20/50 in left eye. Anterior segment findings were normal in both eyes.

Pathology description
Retinitis Pigmentosa is a group of hereditary disorders in which abnormalities of the photoreceptors (rods first) lead to night blindness and gradual loss of peripheral vision, that over time advances from mid-periphery toward the macula. Classic signs of this pathology are represented by arteriolar narrowing, waxy optic disc pallor and pigmentary changes (bone spicules, diffuse granularity or stippling and pigment clumping) causing its distortion and wrinkling (that’s way this pathology is also called cellophane maculopathy).

Image Comments:
Eidon can clearly visualize the presence of bone spicule-shaped pigment deposits in the midretinal periphery in the left eye along with retinal atrophy. Retinal vessels are very thin and the optic disc is pale. The macula region is preserved. Compared to conventional fundus camera, Eidon is able to clearly detect a wrinkling of the retinal surface located above the fovea.

Retinal Images:
1. Eidon 110° x 60° Mosaic image (three fields: Nasal, Central and Temporal) of Retinitis Pigmentosa in left eye: zoom on the wrinkled retinal surface above the fovea.
2. Eidon 110° x 60° Mosaic image of Retinitis Pigmentosa in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Swept Source Optical Coherence Tomography (SS-OCT) confirms the macular distortion showing a highly reflective layer on the surface of the retina. As shown by the grey scale map aside, Visual Field testing reveals a significant constriction in the left eye, consistent with diagnosis of Retinitis Pigmentosa.

Correlation
Swept Source Optical Coherence Tomography (SS-OCT) confirms the macular distortion showing a highly reflective layer on the surface of the retina. As shown by the grey scale map aside, Visual Field testing reveals a significant constriction in the left eye, consistent with diagnosis of Retinitis Pigmentosa.
Correlation

Autofluorescence (FAF) image, taken to have an initial functional information, shows decreased autofluorescence in the inferior sector of pigmentary change.

Image Comments:

Eidon TrueColor Confocal Scanner reveals the presence of retinal atrophy, bone spicule-shaped pigment deposit in the mild inferior periphery and an overall narrowing of peripheral vessels. Thanks to its confocal optical system, the sharpness of the image allows to analyze these details with great precision, highlighting the atrophy of retina and making the bone spicule much more visible than in images taken with traditional fundus camera.

Retinal Images:

1. Eidon 110° Mosaic Image (5 fields: Central, Nasal, Temporal, Superior and Inferior) of Sectorial Retinitis Pigmentosa in right eye: zoom on a detail of peripheral vessel narrowing.
2. Eidon 110° Mosaic Image of Sectorial Retinitis Pigmentosa in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Pathology description

Sectorial Retinitis Pigmentosa is an atypical form of Retinitis Pigmentosa (RP). Similarly to classic RP, it is characterized by abnormalities of the photoreceptors (rods first), leading to night blindness and gradual loss of vision. This specific form of RP is defined by localized extension of bone spicule pigmentation, usually in the inferior quadrants of the retina.

Patient Description:

57-year-old caucasian female referred to our clinic with mild night blindness, progressive loss in the superior peripheral visual field and family history of Retinitis Pigmentosa (RP). Best-corrected visual acuity was 20/25 in the right eye and 20/25 in the left eye.
Case 32 • Soft Drusen (cataract)

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi/ Prof. G. Staurenghi.

Patient Description:
A 65 year old Caucasian female patient followed up by medical retinal service for bilateral drusen. Anterior segment examination revealed presence of Cortical Cataract 3 (LOCS III scale). After pupil dilation, clinical examination and multimodality imaging were performed. Best-corrected visual acuity was 20/40 in the right eye and 20/50 in the left eye.

Pathology description
Drusen are subretinal pigment epithelial deposits between the basement membrane of the Retinal Pigment Epithelium (RPE) and Bruch’s membrane, or within Bruch’s membrane itself. They can be categorized as “hard” or “soft”, based on their appearance. Hard drusen are small, round, with very sharp borders, they become more common with age and may or may not indicate the early development of Age related Macular Degeneration (AMD). Soft drusen, on the contrary, are larger, closer together, with less defined borders and “cotton-ball” appearance, and they are generally associated to a greater risk for developing AMD.

Image Comments:
Thanks to the confocal optical system present on Eidon TrueColor Confocal Scanner, images of the back of the eye with a relevant Cortical Cataract are well gradable. Macular Soft Drusen are located close to the fovea area and retinal vascular details present sharp and focused despite the same area acquired with conventional fundus camera reveals blurred retinal image.

Retinal Images:
1. Eidon 60° image of Macular Soft Drusen in left eye
2. Eidon 60° image of Macular Soft Drusen in left eye; the dashed circle highlights the 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Spectral Domain Optical Coherence Tomography (SD-OCT) confirms presence of Macular Soft Drusen as homogeneous hyper reflective material beneath retinal pigment epithelium (RPE).
Case 33 • Subretinal Drusenoid Deposits

Retinal Center / Dr:
Eye Clinic, Department of Biomedical and Clinical Sciences “Luigi Sacco”, Luigi Sacco Hospital, University of Milan, Italy. Authors: M. Cozzi/ Prof. G. Staurenghi.

Patient Description:
A 85-year-old caucasian female patient was followed up by medical retinal service for bilateral Age related Macular Degeneration (AMD). Best-corrected visual acuity was 20/20 in the right eye and 20/20 in the left eye affected by a choroidal neovascularization (CNV).

Pathology description
Subretinal Drusenoid Deposits (SDD) are space-filling lesions located in the subretinal space, between the photoreceptors layer and the Retinal Pigment Epithelium (RPE). They are visible on the fundus as multiple yellowish-white lesions organized in reticular network patterns. Their appearance is similar to soft drusen, which are larger deposits under the RPE. SDD have been associated with the progression to late age-related macular degeneration.

Image Comments:
Eidon fundus confocal image of the right eye shows presence of intermediate Age related Macular Degeneration (AMD) with no sign of Choroidal Neovascularizations (CNVs). An extended area of subretinal drusenoid deposits, also called reticular pseudodrusen, is highlighted by the sharpness of the image. These deposits are shown spreading out mid periphery, corresponding to mid-reflective material above the retinal pigment epithelium (RPE). Also traditional fundus camera photo reveals presence of subretinal drusenoid deposits affecting the back of the eye, however the extension of this typical finding is restricted to a 45 degrees field of a single shot.

Retinal Images:
1. Eidon 60° image of subretinal drusenoid deposits in right eye (inset).
2. Eidon 60° image of Subretinal drusenoid deposits in right eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Optical Coherence Tomography (OCT) section confirms the appearance of canalicular deposits sited beneath neurosensory retina. Fundus Autofluorescence (FAF) reveals distinctive reticular pattern at the posterior pole excluding fovea region as shown in the other imaging modalities.
Patient Description:
A 17-year-old caucasian male referred to medical retinal service for symptomatic blurred vision in both eyes. After pupil dilation, clinical examination and multimodality imaging were performed. Best-corrected visual acuity was 20/62.5 in the right eye and 20/62.5 in the left eye.

Pathology description
Stargardt’s disease is a macular dystrophy, usually autosomal recessive, related to the mutation of several genes, that leads to bilateral, symmetric loss of visual acuity. This disease, differently from other macular degenerations, generally involves children and young patients. The pathology is characterized by the presence of discrete, yellow, pisiform flecks at the level of the Retinal Pigment Epithelium (RPE), that may or may not interest the macular region.
Correlation

In right eye Fundus Autofluorescence (FAF) image, the yellowish flecks noted in the TrueColor fundus image correspond to increased autofluorescence pisciform areas. Foveal atrophic photoreceptors alterations are also detectable explaining bilateral vision reduction.

Correlation

Left eye Optical Coherence Tomography (OCT) reveals absence of photoreceptor layer with a significant thinning of retinal tissue at the fovea level.

Image Comments:
Eidon confocal images of both eyes show irregular yellowish flavimaculatus flecks, spread to the mid-peripheral retina. Conventional 45 degrees traditional fundus camera is not able to provide an image of the whole retinal manifestation of the pathology, and to follow the entire disease progression.
Case 35 • Stargardt Disease/Fundus Flavimaculatus

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-IEMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 35-year-old caucasian female referred to our clinic with a history of gradual vision loss in both eyes. Best-corrected visual acuity was 20/40 in right eye and 20/32 in left eye.

At 5 years of age she was diagnosed with bilateral Stargardt disease. Genetic analysis revealed the presence of mutations in ARCA4 gene. No family history of ocular or systemic diseases was reported. Anterior segment findings and vitreous body were normal in both eyes.

Pathology description
Stargardt’s disease is a macular dystrophy, usually autosomal recessive, related to the mutation of several genes, that leads to bilateral, symmetric loss of visual acuity. This disease, differently from other macular degenerations, generally involves children and young patients. The pathology is characterized by the presence of discrete, yellow, pisciform flecks at the level of the Retinal Pigment Epithelium (RPE), that may or may not interest the macular region.
Correlation

Right eye Fundus Autofluorescence (FAF) image shows well-defined spots with bright FAF signal corresponding to the flecks. Right eye Swept Source Optical Coherence Tomography (SS-OCT) allows visualization of small hyper-reflective dots located at the level of the outer nuclear layer, confirming and matching the location of the retinal flecks. Central retinal pigment epithelium atrophy is also present, showing a very decreased of FAF intensity.

Image Comments:

Compared to conventional fundus camera imaging, Eidon TrueColor Confocal Scanner is able to give a better and more complete view of retinal flecks, detected as fusiform yellowish-white deposits widely distributed in the midretinal periphery in both eyes. Wide-field imaging is particularly interesting in documenting clearly and completely the whole distribution of these flecks on the fundus.

Thanks to Eidon confocal optical system, macular atrophy is precisely detected in the right eye.

Retinal Images:

1. 1-OD, Eidon 110°x 60° Mosaic Image (three fields: Nasal, Central and Temporal) of Stargardt disease in right eye.
2. 2-OD, Eidon 110°x 60° Mosaic Image of Stargardt disease in right eye; the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OD, Traditional 45° fundus camera image of the same eye (taken on the same day).

Retinal Images:

1. 1-OS, Eidon 110°x 60° Mosaic Image (three fields: Nasal, Central and Temporal) of Stargardt disease in left eye.
2. 2-OS, Eidon 110°x 60° Mosaic Image of Stargardt disease in left eye; the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. 3-OS, Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation

In early stages, Fundus Autofluorescence (FAF) imaging shows a central foveal area of reduced signal surrounded by small disseminated spots of reduced and increased intensity. In mid retinal periphery, retinal flecks are identified as increased FAF signals and as small hyper-reflective dots at the level of the outer nuclear layer by Swept Source Optical Coherence Tomography (SS-OCT).
Case 36 • Vitreomacular Traction

Retinal Center / Dr:
Istituto Europeo di Microchirurgia Oculare-EMO, Udine, Italy. Authors: Dr. V. Sarao/ Prof. P. Lanzetta.

Patient Description:
A 35-year-old caucasian female referred to our clinic complaining about visual loss and metamorphopsia in the left eye over the last one year. Best-corrected visual acuity was 20/32 in left eye. Anterior segment findings were normal.

Pathology description
Vitreomacular traction is a disorder of the vitreo-retinal interface. This condition is characterized by an incomplete posterior vitreous detachment (PVD), where the vitreous presents an abnormal strong adherence to the macula. In the classic form of this VMT the vitreous is separated from the peripheral retina, remaining adherent posteriorly, creating anteroposterior traction of the macula and optic nerve region.

Image Comments:
Compared to conventional fundus camera, Eidon True Color Confocal Scanner is able to visualize in detail a marked distortion of the retinal surface. The retinal distortion is more pronounced along the supero-temporal retinal vascular arcade and it extends towards the macula. The thick membrane appears opaque, with greyish appearance. It produces a tangential traction throughout the thickness of the retina, causing distortion of the retinal surface and tortuosity and straightening of para-macular vessel. These details are less clearly visualizable in the traditional fundus camera image.

Retinal Images:
1. Eidon 60° image of Vitreomacular Traction in left eye.
2. Eidon 60° image of Vitreomacular Traction in left eye: the dashed circle highlights the standard 45° size of a traditional fundus camera.
3. Traditional 45° fundus camera image of the same eye (taken on the same day).

Correlation
Swept Source Optical Coherence Tomography (SS-OCT) confirms the retinal distortion, showing a highly reflective layer on the surface, superior to the macula. Central foveal thickness is 263 μm in left eye.
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