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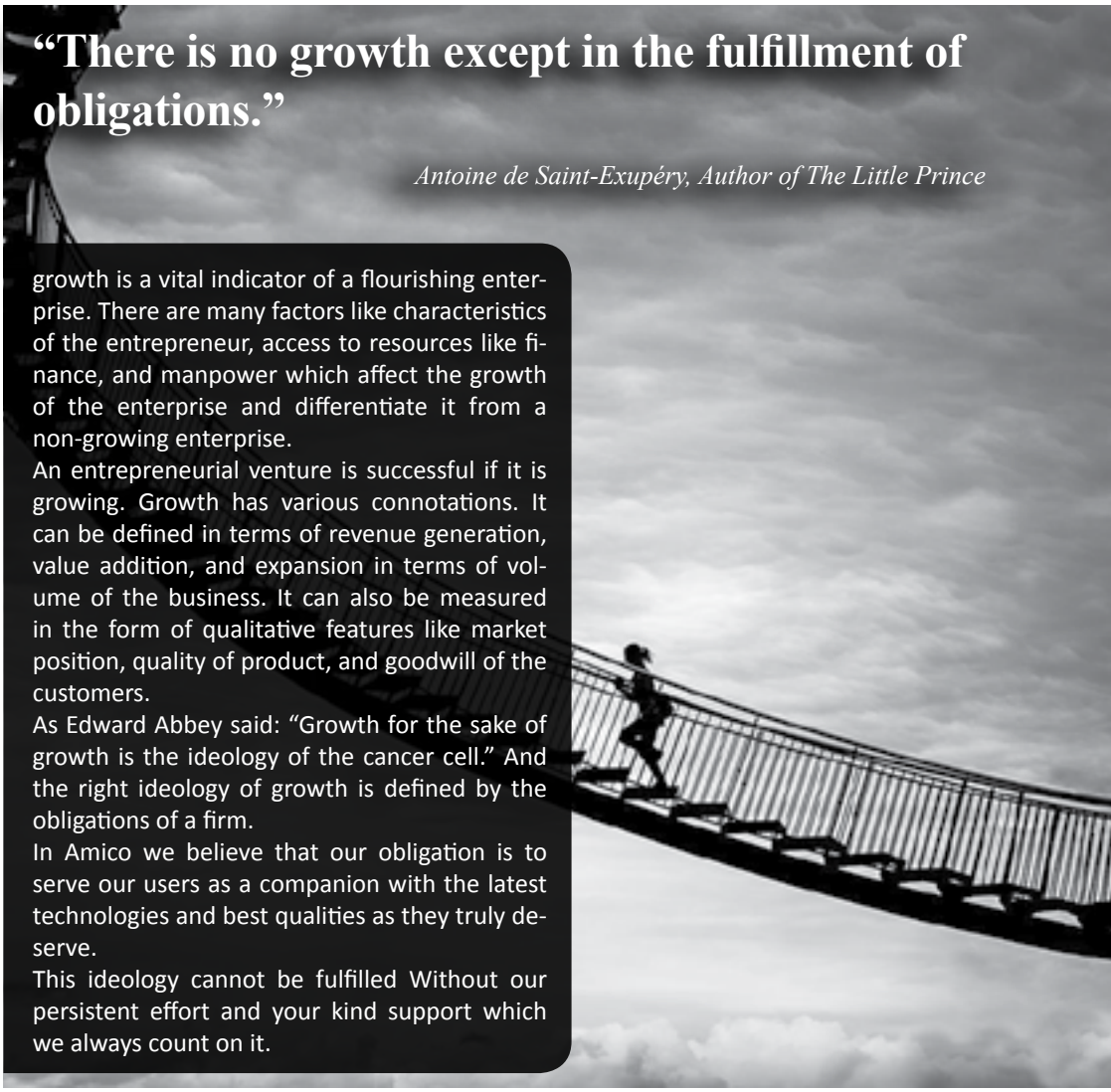

"There is no growth except in the fulfillment of obligations."

Antoine de Saint-Exupéry, Author of The Little Prince

growth is a vital indicator of a flourishing enterprise. There are many factors like characteristics of the entrepreneur, access to resources like finance, and manpower which affect the growth of the enterprise and differentiate it from a non-growing enterprise.

An entrepreneurial venture is successful if it is growing. Growth has various connotations. It can be defined in terms of revenue generation, value addition, and expansion in terms of volume of the business. It can also be measured in the form of qualitative features like market position, quality of product, and goodwill of the customers.

As Edward Abbey said: "Growth for the sake of growth is the ideology of the cancer cell." And the right ideology of growth is defined by the obligations of a firm.

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The Innovative Optics of the Extended Range of Vision IOL

Leonard Borrmann PhD

The TECNIS® Symfony IOL was designed with the aims of providing cataract patients a presbyopia-correcting implant able to deliver a full range of high-quality uncorrected vision with the same low incidence of halos and glare associated with monofocal IOLs.

As presented by Leonard Borrmann PhD, USA, findings from laboratory and clinical studies provide conclusive evidence that the optical engineers at Abbott Medical Optics who developed the TECNIS® Symfony IOL successfully achieved these goals.

"Traditional IOL options for correcting presbyopia after cataract surgery have bifocal or trifocal optics that work on the principle of simultaneous vision by splitting light into more than one focal point, or are accommodating IOLs depending on ciliary muscle contraction to alter optic shape or position to change the power. With these designs, functional vision was evaluated based on discrete distances – far, intermediate or near," said Dr Borrmann.

"The aims for developing a novel IOL optic were to create a lens that would provide a continuous range of vision while simultaneously addressing the problems of reduced contrast sensitivity and bothersome dysphotopsias that patients may experience with multifocal IOLs that distribute light to different, discrete foci," he explained.

The science of the Symfony

The TECNIS® Symfony IOL achieves its performance goals by merging two complementary, enabling diffractive optics technologies – a proprietary echelette design that elongates depth of focus and a proprietary design that corrects chromatic aberration.

Dr Borrmann explained that the shape, height and spacing of the echelettes in a diffractive lens determine the phase shift of transmitted light. Whereas the design of a multifocal IOL results in two or three distinct focal points, the height and profile of the echelettes in the TECNIS® Symfony IOL are optimised to achieve constructive interference of light from different zones, thereby elongating the focus.

Recognising that reduction in image quality comes as a tradeoff with focus elongation, proprietary achromatic technology combined with spherical aberration correction were incorporated in the optic design as compensating features. The achromatic technology corrects the eye's intrinsic positive chromatic aberration that causes blur and loss of contrast.

Proof of performance

Modulation transfer function (MTF) calculations from bench studies demonstrate that the combination of spherical and chromatic aberration correction in an IOL enhances contrast and retinal image quality compared with spherical correction alone. Dr Borrmann presented bench testing data showing that the MTF at distance vision for the TECNIS® Symfony IOL was very similar to that of the TECNIS® aspheric monofocal IOL and significantly higher than that of multifocal IOLs lacking chromatic aberration correction.

Laboratory assessment was also undertaken to investigate dysphotopsia potential, and the results showed reduced halo intensity with the TECNIS® Symfony IOL compared with a +4.0D multifocal IOL.

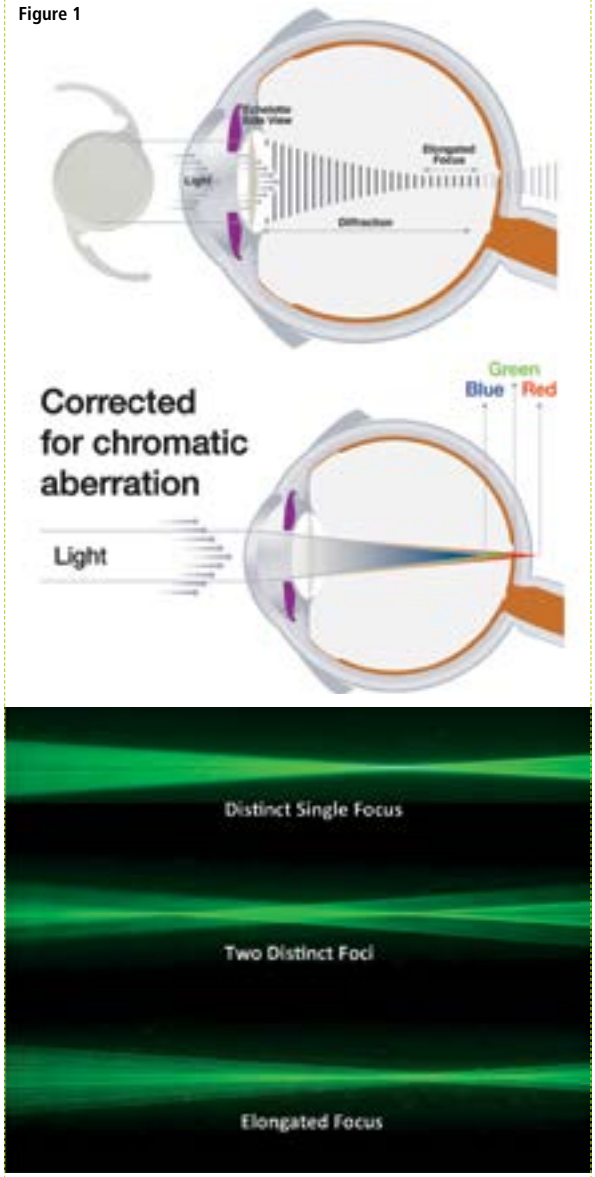
"We would predict from these data that experience with bothersome halos after implantation of the TECNIS® Symfony IOL would be less than with a multifocal IOL and similar to what occurs with a monofocal IOL. Findings in clinical trials and clinical experience with the TECNIS® Symfony IOL corroborate those predictions. Other results from early clinical trials are also consistent with the outcomes of laboratory evaluations," he said.

A defocus curve constructed from testing of 31patients bilaterally implanted with the TECNIS® Symfony IOL showed that the lens had an extended depth of focus that was suitable to generate functional near, intermediate, and far vision in a continuous fashion. The TECNIS® Symfony IOL sustained uncorrected visual acuity of 20/25 or better over more than 1.5D of defocus and mean visual acuity of 20/32 or better through more than 2.2D of defocus.

Results from contrast sensitivity testing performed at 3 months post-surgery provided clinical substantiation that the TECNIS® Symfony IOL affords high-quality distance contrast vision. Even under mesopic conditions with glare, monocular contrast sensitivity was similar across all frequencies comparing eyes implanted with the TECNIS® Symfony IOL (n=23) and controls implanted with an aspherical monofocal IOL (n=24).

How the echelette design works

Figure 1



Data on File:TECNIS® Symfony Green Light Bundle Bench Test DOF2014CT005. Abbott Medical Optics Inc. 2014

TECNIS Symfony TORIC Extended Range of Vision IOL FDA APPROVED

A New IOL to Treat Astigmatism and Presbyopia

Oliver Findl MD

The TECNIS® Symfony Extended Range of Vision Toric Intraocular Lens (TECNIS® Symfony Toric IOL) (Figure 1) is a valuable new option for treating presbyopia and astigmatism in cataract surgery patients, said Oliver Findl MD, Austria.

His conclusion considered the advantages of both the TECNIS® Symfony IOL for addressing presbyopia and of a toric IOL for astigmatism correction along with early clinical results with the TECNIS® Symfony Toric IOL.

Goals and options for presbyopia correction

Dr Findl said that when it comes to presbyopia correction, good uncorrected intermediate VA that would allow spectacle-freedom for activities such as computer work, shopping, and hobbies is a more important priority than spectacle-free near vision for many cataract surgery patients today. Multifocal IOLs, however, may fall short in addressing that desire. Furthermore, they can be associated with bothersome visual symptoms (blur, halo, glare, starbursts), especially at night, and potentially relevant contrast sensitivity loss.

As support for his statements, Dr Findl cited a study of dissatisfied multifocal IOL patients that documented blurred vision in 95 per cent of the 76 implanted eyes and photic phenomena in 38 per cent.1 Mini-monovision with monofocal IOLs targeting emmetropia in one eye and -1.25D to -1.50D in the other is another approach to pseudophakic presbyopia correction. However, the idea of a difference in refraction between eyes is intimidating to some patients, and as reported in a recently completed randomised trial, mini-monovision reduces stereopsis.

Dr Findl said the TECNIS® Symfony IOL overcomes the limitations of the above alternatives for presbyopia correction. It is the first commercially available IOL providing a continuous range of functional vision from far to near, and it does so while maintaining good contrast at distance and with a low incidence of photic phenomena. Its unique clinical performance is the result of an innovative optic design that optimises the echelettes and integrates correction of chromatic and spherical aberration. (See Page 1)

"Results from an open-label study enrolling 150 patients at 14 European sites, showed the TECNIS® Symfony IOL provided a high degree of spectacle independence and patients reported little to no dysphotopsias. Use of a micro-monovision approach with refractive targets of emmetropia and -0.50D in fellow eyes improved uncorrected near vision without compromising visual performance at intermediate and far," Dr Findl said.

"And, because the TECNIS® Symfony IOL provides functional vision over a broad defocus range, it seems to be more tolerant of deviations from target refraction than multifocal IOLs."

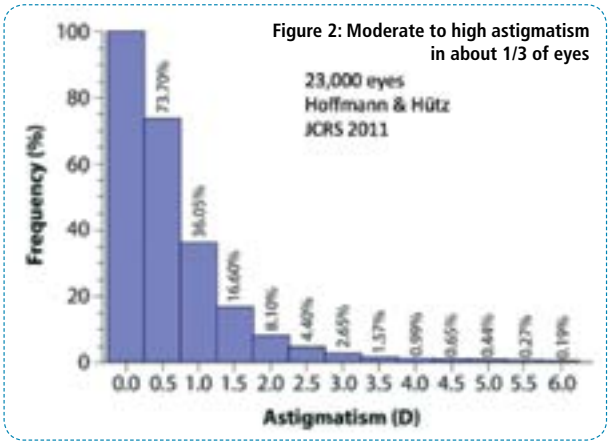
Astigmatic correction options

The importance of treating astigmatism when using a presbyopia-correcting IOL is underscored by data on its prevalence and impact on vision. An investigation of more than 23,000 eyes found astigmatism ≥1D in about one-third of eyes (Figure 2).[2] In other studies, 1D of astigmatism was identified as the cut-off for achieving good presbyopic correction with a multifocal IOL, and residual astigmatism was identified as a leading etiology for patient dissatisfaction with a multifocal IOL.[1,2]

"Limbal relaxing incisions can be used to correct astigmatism with multifocal IOL implantation, but results of a randomised controlled trial showed much better predictability in astigmatism reduction with implantation of a toric multifocal IOL[4]," Dr Findl said.

Optical Characteristics of TECNIS® Symfony Toric IOL — Figure 1

SE Power	+5.0 D to +34.0 D in 0.5 diopter increments							
Model number	ZXT100	ZXT150	ZXT225	ZXT300	ZXT375	ZXT450	ZXT525	ZXT600
Cylinder Powers - IOL Plane	1.00 D	1.50 D	2.25 D	3.00 D	3.75 D	4.50 D	5.25 D	6.00 D
Cylinder Powers - Corneal Plane	0.69 D	1.03 D	1.54 D	2.06 D	2.57 D	3.08 D	3.60 D	4.11 D



The TECNIS® Symfony Toric IOL

The TECNIS® Symfony Toric IOL adds toricity on the anterior aspheric surface of the TECNIS® Symfony IOL (available cylinder powers 1D to 6D) and provides an optimal solution for treating presbyopia and astigmatism because it combines the advantages of both the Symfony and AMO toric IOL technologies.

Dr Findl is evaluating the effectiveness and safety of correcting presbyopia and astigmatism with the TECNIS® Symfony Toric IOL in a study including 30 bilaterally implanted patients with regular corneal astigmatism of 0.75D to 2.6D. He presented data from the one-week visit (follow-up to three months is planned), and the functional and refractive results were consistent with the expectations.

Mean distance VA was 0.16 ± 0.14 logMAR uncorrected and 0.02 ± 0.11 logMAR best-corrected.

"Keep in mind that this is monocular VA and a mini-monovision approach was sometimes used so that the refractive target in some eyes was -0.5D or -0.75D," Dr Findl said.

Analysis of cylinder reduction showed a mean vector difference of 0.63 ± 0.4D.

"This is a very good outcome that translates to about 0.3D to 0.4D of manifest refractive cylinder," said Dr Findl.

Discussion

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Review

Ultra-wide-field imaging in diabetic retinopathy; an overview

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Abstract

Purpose: To present an overview on ultra-wide-field imaging in diabetic retinopathy.
Methods: A comprehensive search of the pubmed database was performed using the search terms of "ultra-wide-field imaging", "ultra-wide-field fluorescein angiography" and "diabetic retinopathy". The relevant original articles were reviewed.
Results: New advances in ultra-wide-field imaging allow for precise measurements of the peripheral retinal lesions. A consistent finding amongst these articles was that ultra-wide-field imaging improved detection of peripheral lesion. There was discordance among the studies, however, on the correlation between peripheral diabetic lesions and diabetic macular edema.
Conclusions: Visualization of the peripheral retina using ultra-wide-field imaging improves diagnosis and classification of diabetic retinopathy. Additional studies are needed to better define the association of peripheral diabetic lesions with diabetic macular edema.
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Keywords: Ultra-wide-field imaging; Diabetic retinopathy; Diabetic macular edema; Fluorescein angiography

Introduction

Since the introduction of human flash fundus photography in 1886, significant advances have occurred in the field of fundus imaging. Traditional fundus cameras take the images from the posterior pole (the macula and optic nerve), covering a 20–50 degree of field of view (Fig. 1). This part of fundus is the place for the most important ocular diseases including macular degeneration, glaucoma, and optic neuropathy. In addition, the images obtained from the optic nerve and macula, have been routinely used for the diagnosis, management and follow up of retinal vascular occlusions and diabetic retinopathy. We present a brief review on the utility of the ultra-wide-field imaging in the management of diabetic retinopathy. The relevant articles were extracted following a comprehensive search of the pubmed database using the search terms; "ultra-wide-field imaging", "ultra-wide-field fluorescein angiography" and "diabetic retinopathy".

Single-field versus wide-field imaging

Single-field fundus photography has been used to detect retinal and optic nerve disease whose primary site of involvement is the posterior pole. The advantages of single-field fundus photography are largely related to convenience to the patient, requiring less time, less light exposure, and in many cases no need for mydriasis. A report by the American Academy of Ophthalmology in 2004 noted that there is a sufficient level of evidence to suggest single-field fundus

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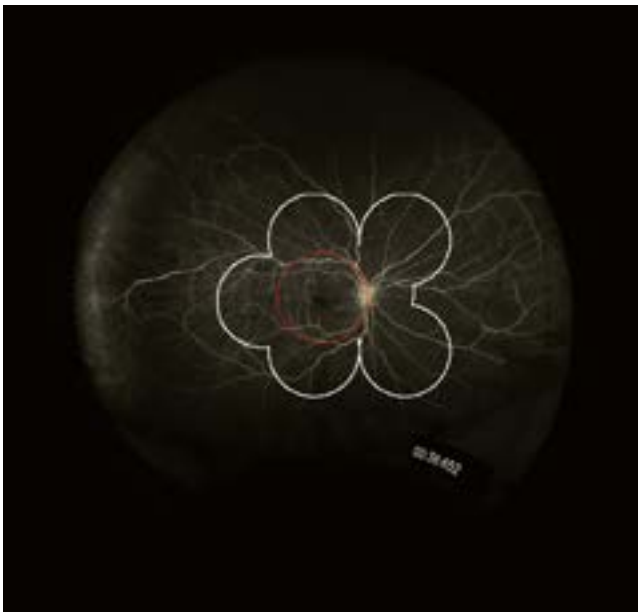

Fig. 1. Central/axial ultra-wild-field fluorescein angiography image obtained with Optos instrument from a patient with superotemporal branch retinal vein occlusion. Red circle shows a 30° image centered on the macula, the white line delineates the field covered by a montage of 7 field ETDRS image. With a central 30° and 7 field montage image, the areas of non-perfusion in the temporal periphery remain undetected.

photography as a screening tool for diabetic retinopathy to identify patients with retinopathy for referral for ophthalmic evaluation and management.[1] Non-mydriatic retinal photographs have been shown to allow easy, reliable and reproducible imaging of the optic nerve and retina in non-ophthalmologic settings such as the emergency department.[2]

Wide-field images can be obtained by three methods; creating montage images, using a special lens with a traditional fundus camera and using a specially-designed wide-angle camera. Montage image, that is a combination of 30-degree images, visualizes about 75 degrees of retina. Early Treatment Diabetic Retinopathy Study (ETDRS) group introduced the stereoscopic color fundus photography in 7 standard fields as the gold standard for the detection and classification of diabetic retinopathy.[3] Although 7-field photography is a reliable method for assessment of diabetic retinopathy, it is a time-consuming examination requiring skilled photographers and pharmacological pupil dilation. Consequently, other modalities including 2-field 45° retinal photographs (1 macular-centered field and 1 disc/nasal field), and non-mydriatic cameras were evaluated as user-friendly alternatives to standard 7-filed imaging.[4]

Pomerantzeff developed the first wide-angle camera system, known as the Equator-Plus camera, in 1975. He used a contact lens and fiber optic scleral transillumination to take fundus images up to 148°.[5] The Staurenghi lens is a contact lens system that provides a 5-fold increase (150°) in the fundus fields of view. Clarity Medical Systems introduced the Retcam contact imaging system that gives a maximum field of view of 130°. This technology utilizes a portable camera with a fiberoptic cable light source connected to a computer and is particularly useful for the imaging of pediatric patients.

The Heidelberg Spectralis non-contact ultra-wide-field module offers a wide-field of view of 120° with a scanning laser ophthalmoscopy. Optos (Optos, Dunfermline, United Kingdom) introduced retinal imaging with non-contact scanning laser technology to take the ultra-wide field images. The 200° field of view of the Optos images covers 82% of the retinal surface (compared to 15% for the 45° images). A recent study comparing these two systems showed that on a single non-steered image, the Optos covers a significantly larger total retinal surface area. The Optos images show a wider view of the retina temporally and nasally, however, the Heidelberg Spectralis images show the superior and inferior retinal vasculature more peripherally and overall, the images from Spectralis system seemed to have less peripheral distortion.[6] These initial comparative studies were performed using the Optos 200Tx and not with the newer Optos California device which purports to provide better visualization of the inferior and superior periphery as well as new software for stereographic projection to address peripheral distortion.

Ultra-wide-filed versus montage ultra-wide-field imaging

Despite a wide field of view achieved by the Optos optomap images, a small but important part of the peripheral retina may be obscured in the axial images, particularly in the vertical meridian as noted previously. This may be due to the inherent limitation in the imaging of the peripheral retina, obscuration by the lids or pupil, or a combination thereof. Consequently, Optos developed a special software to combine the axial images with those obtained with steering to different gazes. This montage image covers the entire field of the retina (Fig. 2). Using this software, Singer et al[7] evaluated the extent of the peripheral retinal vasculature in normal fluorescein angiography (FA) images and provided the normative data as a potential reference for future studies. They found significant difference in distance from the optic disc to the periphery based on the quadrant (with temporal being larger than inferior being larger than superior being larger than nasal) and age (shorter in older individuals). The stereographic projection software is also able to address the problem of the peripheral non-linear warp and difference in the size of the measurements in relation to the angle of view. Thus, the lesion areas can be calculated in anatomically correct physical units.[8]

Ultra-wide-field imaging in diabetic retinopathy

Visualization of the peripheral retina using ultra-wide-field imaging has led to new era in the assessment of diabetic retinopathy. Several studies evaluated the utility of the ultra-wide-field imaging in grading diabetic retinopathy. Price et al[9] compared diabetic retinopathy severity grading between Optomap ultra-wide-field images and an ETDRS seven-standard field view. Although severity grades were identical in 85% of the images and within one severity level in 100% of

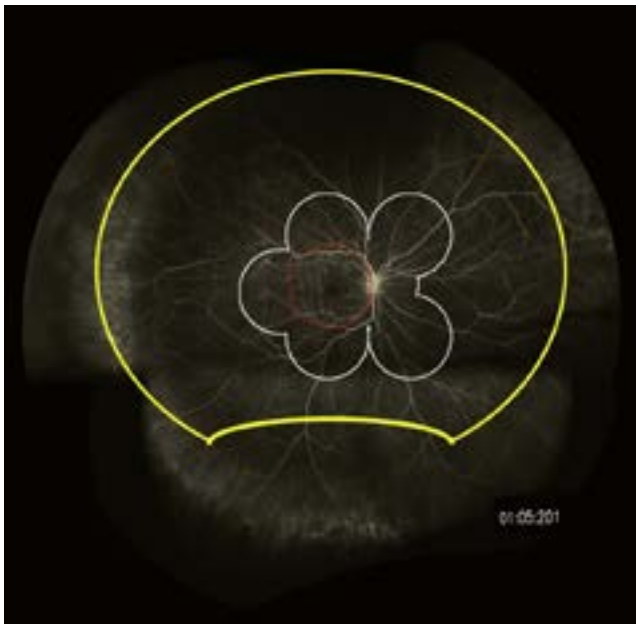

Fig. 2. A montage ultra-wild-field fluorescein angiography of a central/axial image with images steered inferiorly, temporally and nasally, from the same patient shown in Fig. 1. Yellow line shows the border of the central/axial image. The montage allows more detailed evaluation of the peripheral vasculature in all steered quadrants.

the images, 19% of the images were assigned a higher retinopathy level in the ultra-wide-field view compared to the ETDRS seven-field view. Similarly, Weiss et al[10] showed 3.9 times more non-perfusion, 1.9 times more neovascularization, and 3.8 times more panretinal photocoagulation scars in the ultra-wide-field FA images view compared to the 7-standard field ETDRS images. They reported that ultra-wide-field FA demonstrated retinal pathology (including non-perfusion and neovascularization) not evident in a 7-standard field overly in 10% of eyes. Talks et al[11] showed that Optomap ultra-wide-field images detected approximately 30% more peripheral neovascularization than standard two-field imaging in patients referred from a UK diabetic retinopathy screening service. Silva et al[12] reported that diabetic retinopathy severity differs in 20% of eyes when comparing ultra-wild-field imaging and ETDRS 7-standard field images. They showed that the additional peripheral lesions identified by ultra-wild-field images resulted in a more severe assessment of diabetic retinopathy (DR) in 10% of eyes than was suggested by the lesions within the ETDRS fields. Silva et al[13] evaluated the ultra-wild-field images to correlate the diabetic retinopathy progression with the predominantly peripheral lesions. Predominantly peripheral lesions were defined as hemorrhages, microaneurysms, venous beading, intraretinal microvascular abnormalities, and new vessels elsewhere with more than 50% of the graded lesion located outside the ETDRS field in each of the 5 extended fields. They found that the presence and increasing extent of predominantly peripheral lesions were associated with increased risk of progression of the diabetic retinopathy (i.e. a 4.7-fold increased risk for progression to proliferative diabetic retinopathy) over 4 years, independent of baseline diabetic retinopathy severity and HbA1c levels.

Recent studies assessed the role of ultra-wide-field FA imaging in eyes with diabetic macular edema. Wessel et al[14] reported a significant correlation between diabetic macular edema and peripheral retinal ischemia in the ultra-wide-field FA images. They found that eyes with retinal ischemia had 3.75 times increased odds of having macular edema compared with those without retinal ischemia. Patel et al[15] reported a correlation between recalcitrant diabetic macular edema with larger areas of retinal non-perfusion in ultra-wide-field FA and greater severity of diabetic retinopathy. Sim et al[16] evaluated the association between peripheral retinal ischemia in ultra-wide-field FA images and central ischemia in diabetic retinopathy. They observed moderate correlations between the peripheral ischemic index and foveal avascular zone area, and between the peripheral leakage index and foveal avascular zone area. Oliver and Schwartz[17] observed an association of late peripheral vessel leakage in ultra-wide-field FA images with focal diabetic macular edema. In contrast to the above-mentioned studies, Silva et al[18] did not find an association between clinically significant diabetic macular edema and non-perfusion area and non-perfusion index. They also assessed the association of predominantly peripheral lesions in ultra-wide-field FA images of eyes with diabetic retinopathy and severity of diabetic retinopathy. Presence of predominantly peripheral lesions was associated with increased non-perfusion area and non-perfusion index.

Few studies evaluated ultra-wide-field FA-guided targeted laser photocoagulation of the peripheral non-perfusion in eyes with diabetic retinopathy. Reddy et al[19] reported 2 patients with proliferative diabetic retinopathy in which targeted retinal photocoagulation resulted in regression of retinal neovascularization. Muqit et al[20] assessed the effect of single-session targeted laser photocoagulation guided by ultra-wide-field FA in 28 eyes. At 24 weeks, complete disease regression was found in 37% and additional panretinal laser photocoagulation was planned for active proliferative diabetic retinopathy in 30%.

Future directions

Future researches may further elucidate the association of peripheral diabetic lesions with the stage of diabetic retinopathy and macular edema. The relationship between the presence and extent peripheral non-perfusion with different types of diabetic macular edema (focal versus diffuse and acute versus chronic) may also be a topic of further study. This is especially important for the eyes with chronic persistent macular edema. Varying results have been reported after laser photocoagulation of the ischemic area in eyes with retinal vein occlusion and diabetic retinopathy.[19–22] Additional well-designed studies are needed to show the role of ultra-wide-field-guided peripheral laser photocoagulation in diabetic macular edema.

Automated detection of diabetic retinopathy using standard fundus photography has been evaluated before with high

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sensitivity and specificity for posterior lesions.[23] Future studies may focus on the automated detection of the peripheral lesions on the ultra-wide-field images as well.

Ultra-wild-field imaging improves the detection of the peripheral diabetic retinopathy lesions. Diabetic Retinopathy Research Network protocol AA aims to evaluate the association of the peripheral findings on ultra-wide-field color and FA images with the progression of the diabetic retinopathy.[24] The study results are expected to be available in 2020.

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26th Annual Congress of the Iranian Society of Ophthalmology

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AMICO YASNA PARS like the past years had the honor of gold sponsorship, hosting valuable customers and introducing new products in different fields.
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Upcomming Events

2-3 February 2017
Annual Seminar of Ahvaz University of Medical Science
Ahvaz, Iran

14-16 February 2017
9th Annual Seminar of Zahedan University of Medical Science
Zahedan, Iran

22-23 February 2017
12th Annual Meeting "Advances and Innovations in Ophthalmology" Shahid Beheshti University of Medical Science
Tehran, Iran

26 February - 1 March 2017
American-European Congress of Ophthalmic Surgery Winter Symposium 2017
Aspen, United States

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