

# Widefield Retinal Imaging with Auto Fluorescence Technology in the Optometric Practice

This course will define ultra-widefield retinal imaging and autofluorescence for the attendee. Will show how it is important to use in screening of patients on an everyday basis to enhance patient care. Numerous examples of widefield retinal imaging and auto-fluorescent scans will be shown to educate the attendee about how to read them and when a referral is needed.

## Overview

1. What is UWF Retinal Imaging?
2. What is Autofluorescence?
3. Devices
  - a. Optos Daytona – 200 degrees
  - b. Optos California – 200 degrees
  - c. Heidelberg Spectralis Non-Contact Ultra-widefield Module – cSLO – 100 degrees
  - d. Eidon Confocal Scanner - 110-150 degrees
  - e. Zeiss Clarus 500
4. Why UWF?
  - a. Image modalities
  - b. Practice benefits
  - c. Clinical evidence and testimonials

- d. Today, 8,500 practices and hospitals worldwide use UFW imaging technology and more than 49 million patients have received this imaging.
5. Why UFW with Autofluorescence?
    - a. Early signs of many ocular pathologies and diseases are evident on the retina, long before the patient notices any symptoms
    - b. These signs may first present in the periphery and can initially go undetected using traditional examination techniques and equipment
    - c. Shows activity of a lesion leading to more timely referrals
  6. Summary of Technology
    - a. A 200° retinal image of the retina, in a single capture
    - b. Images can be taken through most cataracts and vitreous opacities
    - c. Non-mydratiac through 2mm pupils
    - d. Fast, comfortable and convenient for all patients
    - e. Multiple imaging modalities
    - f. Comparison overlay for monitoring eye health
    - g. Images available immediately for review
    - h. 3D wrap for patient education
  7. The Importance of Screening
    - a. Diagnose eye disease earlier
    - b. Systemic disease may present first in the retina
    - c. Routine exams confirm ocular and systemic health or identify retinal abnormalities and diseases
    - d. Most causes of vision loss are preventable if discovered, counseled and treated early
  8. How images are taken
    - a. Virtual Point Position
    - b. Dual Frequency Laser Imaging
    - c. Resolution: 14  $\mu$ m
    - d. Green Laser: 535 nm, Red Laser 635 nm
    - e. Eye steering
    - f. Stereo imaging
  9. Image Modalities
    - a. UFW captures of up to 200°, through 2mm pupils, resolution 14  $\mu$ m
    - b. Guided Eye Steering
    - c. Red and green laser: Channels can be viewed separately
    - d. Auto Fluorescence
  10. Auto Fluorescence Imaging
    - a. Non-invasive study of the fluorescent properties of lipofuscin in the RPE
    - b. Provides clinical information not available using conventional imaging techniques

- c. It allows visualization of the metabolic changes at the level of the RPE and helps to identify areas that may be at high risk (eg: of developing geographic atrophy or CNV)

#### 11. Auto-Fluorescence

- a. UFW autofluorescence captures of the retina using fundus autofluorescence and green laser light (532nm)
- b. Visualization of RPE changes
- c. Both color and autofluorescence imaging can be carried out in one exam

#### 12. Where AF Offers Diagnostic or Therapeutic Advantage

- a. Hydroxychloroquine toxicity (Plaquenil)
- b. Geographic atrophy
- c. Inherited retinal diseases
- d. Optic nerve head drusen
- e. CME
- f. Uveitis
- g. Multifocal choroiditis
- h. Idiopathic vasculitis
- i. Pigmentary retinopathy
- j. Multifocal central serous retinopathy
- k. Tumors
- l. Inflammatory diseases

#### 13. Interpreting AF Images

- a. The normal RPE yields a slightly granular grey AF glow in contrast to the optic disc and retinal blood vessels which appear black
- b. Hyperautofluorescence: identifies stressed cells that result in a bright white signal
- c. Hypoautofluorescence: dead cells give off no signal which appear dark grey or black
- d. **UFW- AF reveals abnormalities which cannot be viewed with other imaging modalities**

#### 14. Hyper and hypo AF

Four Examples

#### 15. See What You are Missing without AF?

Six examples of AF vs White Light Simulation

#### 16. Practice Benefits

- a. Allows for efficient exams and precise diagnosis
- b. Allows for guided treatment and can provide additional diagnostic information to prompt needed treatment
- c. Easy documentation of results for comparison with future images and efficient disease management
- d. Patient-friendly, fast to operate and suitable for the majority of patients
- e. Easy to handle, imaging can be delegated

- f. Practice differentiation and positioning
- g. Enhances the overall patient experience
- h. Increases patient loyalty and recommendation

#### 17. Patient Benefits

- a. Comprehensive exams for the whole family
- b. Comfortable – the eye is not touched, fast and painless
- c. Early protection from vision impairment or blindness
- d. Can enable early detection of life-threatening diseases like cancer, stroke and cardiovascular disease
- e. More targeted treatment can be less stressful for the patient

#### 18. Traditional Private Practice Model

- a. Benchmark:
- b. 65% acceptance rate at \$39
- c. Example:
- d. **200** exams per month
- e. \$39 USD for optomap
- f. 65% acceptance rate
- g. That is \$5,070 month!
- h. 30 scans (15%) a month covers cost

#### 19. Key to Higher Acceptance Rates

- a. Effectively present clinical benefits, patients accept the screening fee. 90%+ acceptance rates.
- b. Action Points
- c. Present as part of the pretest
- d. Explain the importance
- e. Train staff to discuss

#### 20. High Volume Medicaid Based Practice Model

- a. Benchmark
- b. 75% acceptance rate at \$15
- c. Example:
- d. 450 exams per month
- e. \$15 for screening
- f. \$5062 / Month
- g. Seeing more scans improves patient care
- h. Cost – 75 scans (17%) a month covers cost.

#### 21. Keys to Implement in Practice

- a. Never include in exam fee
- b. Inform that insurances do not cover this procedure
- c. Front office/technicians should educate patient that UFW retinal imaging allows the doctor give the best exam possible – without dilation / drops

- d. Medical bill when possible
- e. Show patients their scans and describe even if normal

## 22. Clinical Studies

- a. More than 300 completed and ongoing clinical studies support our belief that a UFW view of the retina helps you provide the best care for your patients.

## 23. Literature Review

- a. All peer-reviewed publications were reviewed from a 3 year period (2010-2013) to determine if prevalence of peripheral pathology was reported
- b. Peripheral pathology was defined as lesions outside of 60° of the optic nerve head
- c. 33 studies were included in final results and the analysis included 3602 eyes
- d. UWF imaging found 66.43% of retinal findings were outside of the central pole

## 24. Demonstrating UFW Clinical Need

- a. 100% faster capture. Outperformed all other previous digital systems and equivalent to diabetic screening gold standard
  - i. Study in American Journal of Ophthalmology, 2012
- b. 56% more age related macular degeneration findings
  - i. Moorfields Eye Hospital & UCL Institute of Ophthalmology, London
- c. 30% more retina lesions identified than gold standard
  - i. New England College of Optometry
- d. 62% more peripheral non perfusion in diabetic retinopathy
  - i. Weill Cornell University
- e. 76% more abnormal findings than standard exam
  - i. Doheny Eye Institute, USC
- f. 67% more disease detected and 51% change in patient management
  - i. Johns Hopkins University

## 25. The Importance of the Periphery – Increasing our Clinical Evidence

- a. Publication rate has increased with improvements to the technology which demonstrate our ability to detect more pathology and support better treatment outcomes. 74 peer reviewed papers and 22 articles were published in 2015.
- b. 212 Scientific Meeting podium presentations on new research findings. Including UWF focused courses presented at A A Ophthalmology and WOC. 91 studies accepted for presentation at ARVO from 94 Institutions in 22 countries in 36 disease areas.
- c. UWF AF imaging has been employed to identify several distinct patterns of peripheral abnormalities in AMD that correlate with clinical findings and risk factors for the diseases progression.
- d. UWF AF has shown utility in the characterization and management in rhegmatogenous retinal detachments.

## 26. Diabetes: Changing the Standard of Care

- a. A number of clinical studies have compared UFW imaging with ETDRS imaging with many showing that UFW imaging compares well with ETDRS imaging in screening and grading of DR1, 2
- b. The most comprehensive study thus far has found:
- c. Sensitivity and specificity of UFW images for detecting and identifying DR on ETDRS photographs were 99% and 100%<sup>1</sup>
- d. Nonmydriatic UFW images compare favorably with dilated ETDRS photography in determining DR and DME severity. Exact DR severity agreement between UFW 100-degree imaging and ETDRS photography occurred in 84%, with agreement within 1 level in 91%<sup>1</sup>
- e. UFW imaging acquisition time was less than half that of dilated ETDRS photography<sup>1</sup>
- f. One study identified that 1/3 of lesions were in the area outside of ETDRS and that in 10% of patients these lesions suggested a more severe grade of retinopathy. <sup>2</sup>
- g. In a standardized DR ocular telehealth program, UFW reduced the ungradable rate by 92% (to less than 2%) and reduced image evaluation time by 28%. DR was identified 17% more frequently after UFW imaging was implemented and DR peripheral lesions may have suggested a more severe DR level in 9%. <sup>4</sup>
- h. Undilated UFW images had excellent agreement with both dilated ETDRS photos and dilated fundus examination in determining severity level of DR and DME.
- i. In grading DR severity, UFW images demonstrated high agreement and substantial to almost-perfect correlation with both lesion level and clinical level grading of ETDRS photos.
- j. UFW digital imaging for DR was also noted to outperform other digital non-mydriatic cameras when compared with the gold standard by 12-15%
- k. Eyes with predominantly peripheral lesions (defined as outside of ETDRS 7 standard field) had a 4.7 fold increased risk of progression to proliferative diabetic retinopathy (PDR).
- l. Eyes with predominantly peripheral lesions had a 3.2 fold risk of 2 step progression in DR.
- m. UFW imaging has demonstrated that diabetic lesions occur in the retinal periphery in up to 40% of eyes and these lesions might result in a more severe grade of retinopathy in 10% of eyes

## 27. Optomap UFW v Heidelberg Spectralis UFW Non-Contact Module

- a. Comparison of UFW fluorescein angiography with the Heidelberg Spectralis® noncontact ultra-widefield module versus the Optos® optomap®
- b. Supports the clinical importance of UFW imaging, particularly in fluorescein angiography.

## 28. AJO Study - Wide-field Retinal Imaging in the Management of Noninfectious Posterior Uveitis

- a. 48 % of patients' treatment changed after UFW imaging

29. Reykjavik Eye Study

- a. 573 patients imaged over 12 years
- b. Color and AF imaging
- c. The peripheral retina was analyzed

30. NECO Study

- a. 31% improvement in lesion identifying sensitivity with UWF assisted ophthalmoscopy

31. Grand Rounds - Refer or Monitor? Case Studies' Images Discussed