



Ultra-wide Filed Imaging Daily Practice

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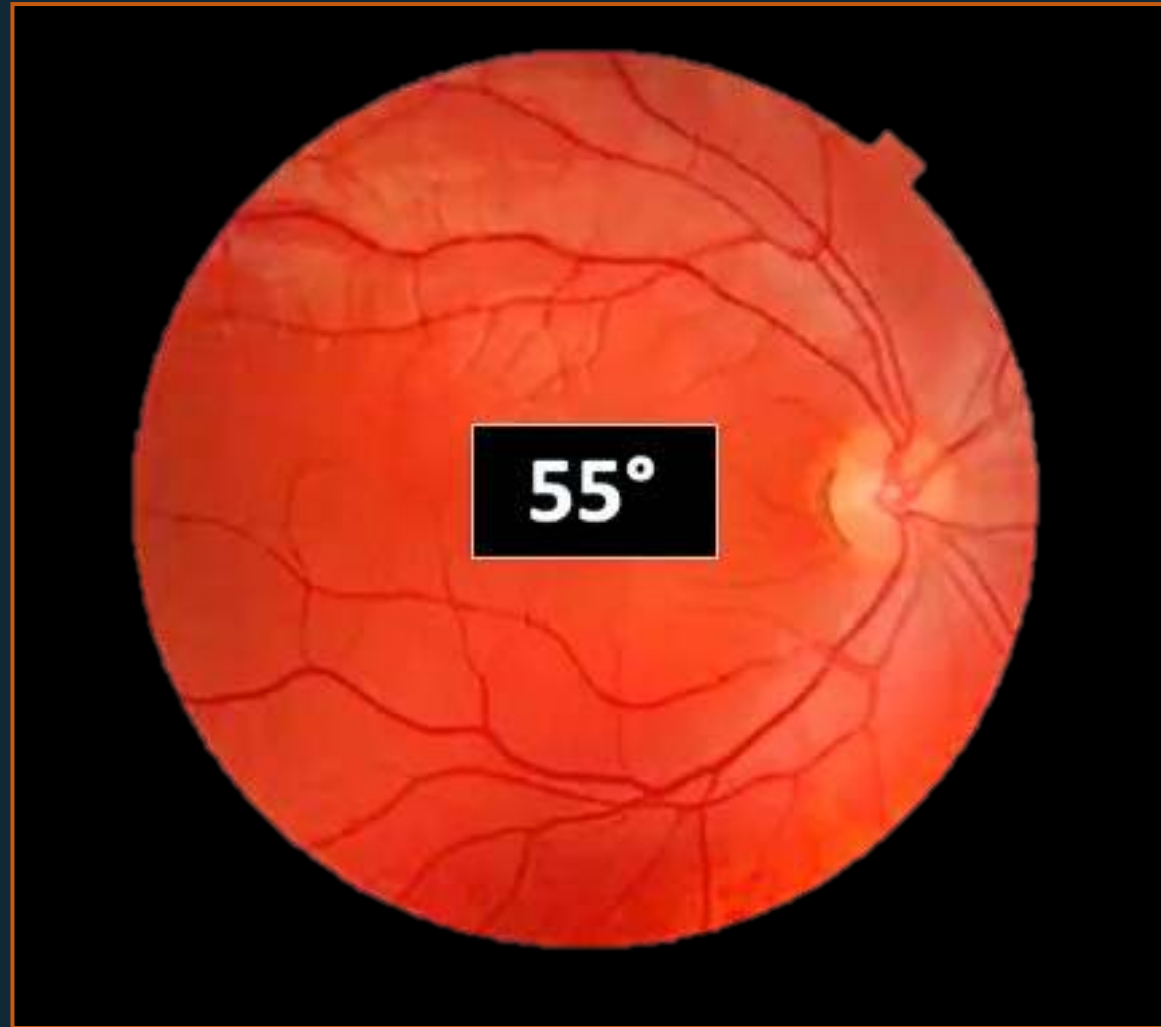
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Objectives

- ❖ Objectives of this presentation:
 - Knowing what is 7 field ETDRS
 - Advantages of wide field over 7 field
 - Pro's and Con's of Ultra Wide Field and 7 Field

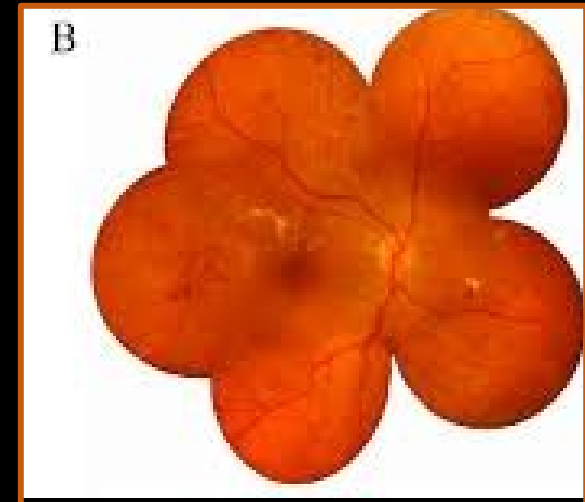
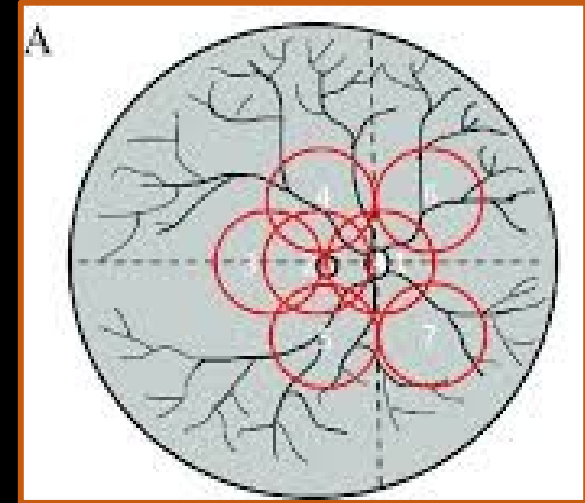
Conventional Fundus Camera



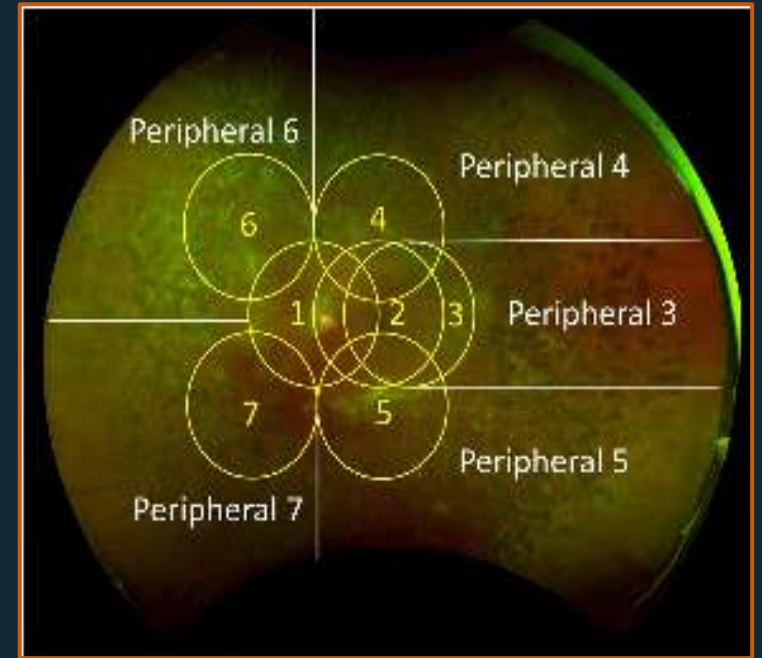
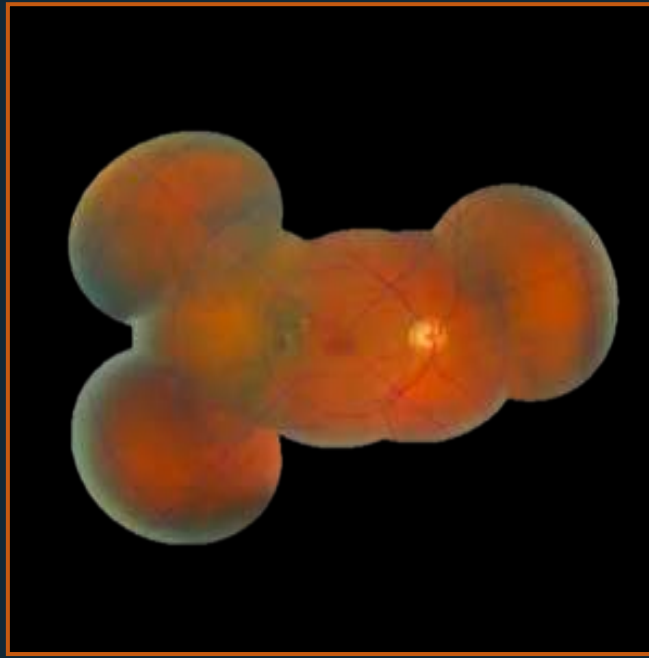
What is 7-Field Imaging?

7-field Imaging:

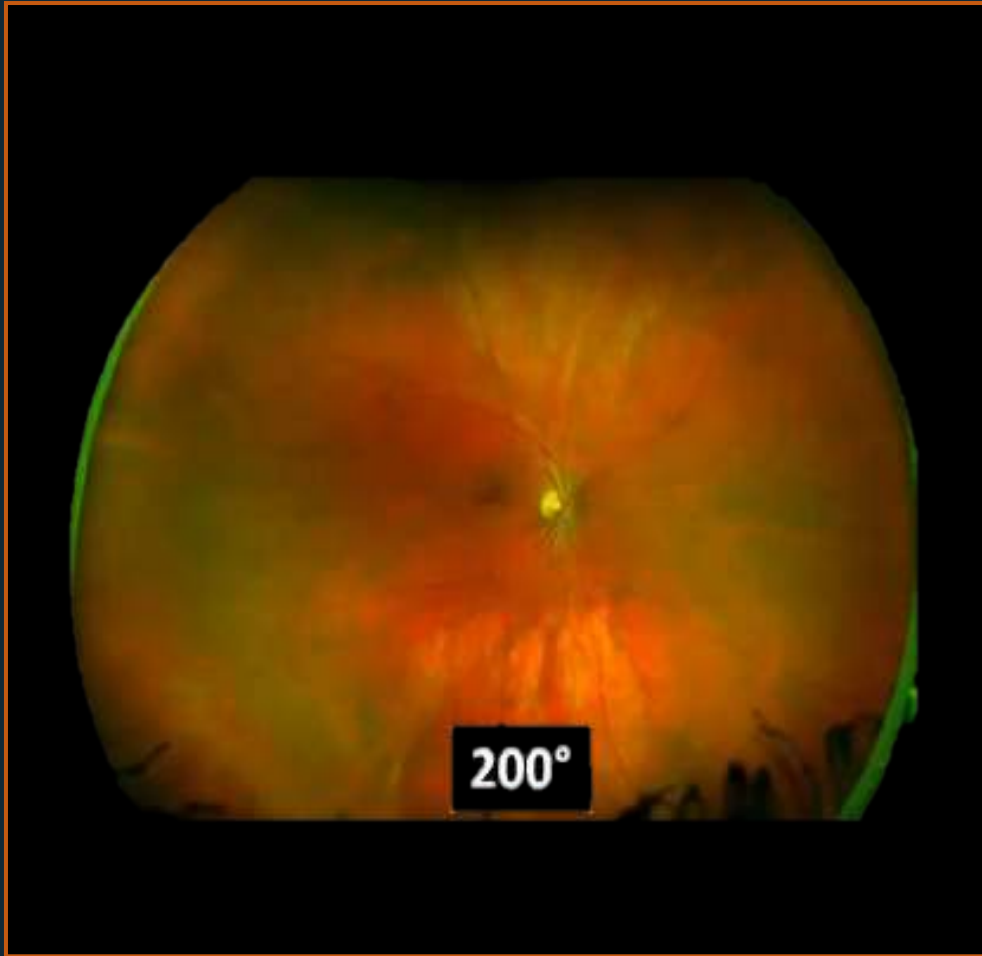
- ❖ Seven distinct images combined together
- ❖ High-resolution image
- ❖ Panoramic view of the retina.
- ❖ This approach was developed to address the limitations of traditional fundus photography, which often failed to capture the full extent of the retina in a single image.



7- Field Photograph



Ultra-wide imaging (wide-field)



- ❖ Broader field of view compared to traditional fundus photography.
- ❖ Visualize up to 200 degrees of the retina,
- ❖ Providing a more comprehensive assessment of the eye's
- ❖ Detection of pathologies that may be missed with standard techniques.

UWF Imaging Options

Ultra Wide Field: Optos (200°)

Limitations:

- Pseudocolour imaging,
- peripheral distortion
- lash artifact,
- peripheral magnification.



Heidelberg Spectralis – Contact (105°)

Limitations:

- Limited view of superior and inferior periphery.



UWF Imaging Options

Clarus (133°)

- True colour imaging.



Staurenghi (Contact) (150°)

- Topical anesthesia, contact lens requiring skilled photographer.



Retcam (Contact) (130°)



UWF Imaging Options

Available Platforms/Devices	Type of lens system	Principle	Field of view	Facilities available
WFI	Heidelberg Spectralis	Non-contact	SD-OCT with CSLO	55° (up to 105° with HRA 2) FFA, ICGA, FAF (BAF and IRAF)
	Staurenghi Lens	Contact	SD-COT with CSLO using Staurenghi Lens	150° FFA, ICGA, FAF (BAF and IRAF)
	RetCam 3	Contact	Optical light source to obtain high resolution	Field depends on lens used among the five changeable lens systems: -130° (pediatric retina and adult anterior chamber) -120° (pediatric and young adult) -80° (high contrast pediatric and adult) -30° (high magnification) Portrait (external imaging) FFA, ICGA
	Clarus 500	Noncontact	Slit Scanning Ophthalmoscope also referred to as Broad Line Fundus Imaging (BLFI)	133° Widefield (one image) 200° Ultra-widefield (two images) up to 267° Montage (up to six images) FAF (BAF, GAF and IRAF)
UWFI	Optos Optomap	Noncontact	CSLO-based	200° FFA, FAF (GAF, IRAF)

Diagnostic Accuracy: Detecting Pathologies

1 Ultrawide Imaging Advantages

The expansive field of view offered by ultrawide imaging enhances the detection of peripheral retinal pathologies, such as retinal tears, detachments, and certain types of diabetic retinopathy. This comprehensive coverage can lead to earlier diagnosis and more effective treatment interventions.

2 7-field Imaging Advantages

The higher resolution and detailed imagery provided by 7-field imaging excel at identifying subtle macular changes, which are crucial for the management of conditions like age-related macular degeneration and diabetic macular edema. This level of detail can be instrumental in guiding treatment decisions.

3 Complementary Approaches

While each imaging modality has its strengths, clinicians often find that a combination of ultrawide and 7-field imaging provides the most comprehensive assessment, allowing for the detection of a wider range of pathologies and the development of more personalized treatment plans.



Comparative Study Findings: Sensitivity and Specificity

Imaging Modality	Sensitivity	Specificity
Ultrawide Imaging	92%	88%
7-field Imaging	87%	92%

Recent comparative studies have highlighted the respective strengths of ultrawide and 7-field imaging in terms of sensitivity and specificity. Ultrawide imaging has demonstrated a higher sensitivity in detecting peripheral retinal pathologies, while 7-field imaging has shown superior specificity in identifying macular and central retinal abnormalities. These findings underscore the importance of considering the specific clinical needs and diagnostic goals when selecting the appropriate imaging modality.

Ultrawide Field Imaging Vs ETDRS 7 Field in Diabetic Retinopathy

UWF Imaging Captures
Large area of Periphery
Including NVE and CNP
Areas that would have been
Missed in ETDRS 7 Fields



(Wessel MM, Nair N, Aaker GD, et al.
Peripheral retinal ischaemia, as evaluated by ultra-widefield fluorescein angiography
Br J Ophthalmol. 2012;96:694-698.)

Main Advantages of UWF Imaging if done with assistance of dedicated image grading centre

- Increase DR (Diabetic Retinopathy) identification frequency by 2-fold
- Reduces acquisition time by more than half
- **BETTER IMAGES** since it:
 - Cuts ungradable image rate by 71%
 - To <3%
 - Image evaluation time by 28%
- **Relevant for very large busy centres with huge patient flow**

Post Laser-PDR



BRVO with Peripheral Ischemia & CME



PDR (with NVD)



Peripheral vascular leakage with Disk leakage in late phase



Telemedicine for diabetic retinopathy screening using an ultra-widefield fundus camera

Conclusions: The present study has shown the effectiveness of DR screening using UWF fundus camera. It has shown the effectiveness of trained nursing personnel taking fundus images. This model can be replicated in any private multi-specialty hospital and reduce the burden of DR screening in the retina clinic and enhance early detection of treatable DR.

Individuals were screened for DR from April 2015 to January 2016. Rate of DR was 9.27%; 165 eyes of 95 individuals were diagnosed to have some form of DR. Mild non-proliferative DR (NPDR) was seen in 114 of 165 eyes (69.09%), moderate NPDR in 32 eyes (19.39%), severe NPDR in six eyes (3.64%), and proliferative DR (PDR) in 13 eyes (7.88%). The secondary outcome measure of poor image acquisition was seen in one individual who had an image acquired in one eye that could not be graded due to bad picture quality.

Conclusions: The present study has shown the effectiveness of DR screening using UWF fundus camera. It has shown the effectiveness of trained nursing personnel taking fundus images. This model can be replicated in any private multi-specialty hospital and reduce the burden of DR screening in the retina clinic and enhance early detection of treatable DR.

Keywords: telemedicine, ultra-widefield camera, diabetic retinopathy screening

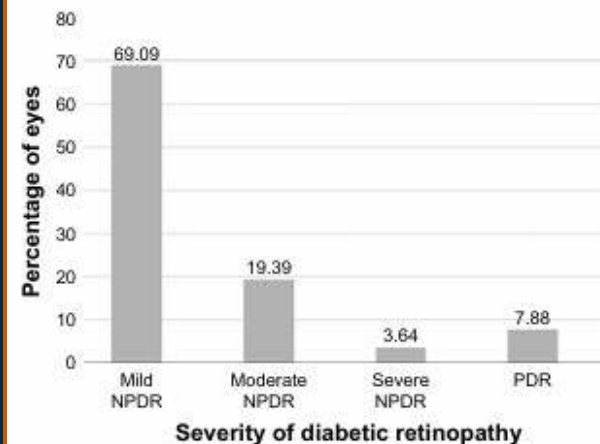


Figure 2 Distribution of percentage of eyes (n=165) using diabetic retinopathy severity scale.

Abbreviations: NPDR, non-proliferative diabetic retinopathy; PDR, proliferative diabetic retinopathy.

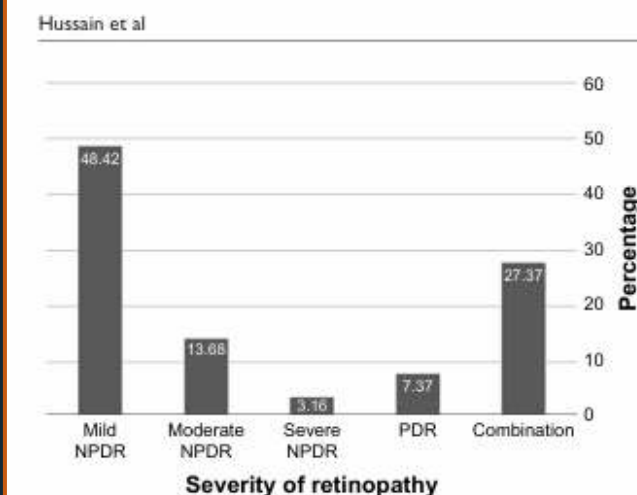


Figure 3 The distribution of severity of diabetic retinopathy in 95 individuals with similar grading in both eyes or combination of severity scale.

Abbreviations: NPDR, non-proliferative diabetic retinopathy; PDR, proliferative diabetic retinopathy.

Ultra-wide-field fundus photography: can it replace Early Treatment Diabetic Retinopathy Study 7 field photography?

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Comment on: Aiello LP, Odia I, Glassman AR, *et al.* Comparison of

Ultrawide-Field Imaging for Determining Severity of Diabetic

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The potential implications of the study by Aiello *et al.* (3) using UWF images are the following:

(I) detection of increased DR severity of about 11% of the eyes by 2 steps or more in unmasked UWF images;

2 imaging methods are comparable according to the study protocol, to determine the DR severity; maximizing image quality is of paramount importance and;

importance to study the progression of DR severity based on the additional peripheral lesions seen outside the ETDRS field.

In conclusion, ETDRS standard and UWF photography may have potential acceptable agreement on DR grading of severity and effectively can detect DR lesions outside the area of ETDRS 7 field adding to its advantage of understanding of progression of DR.

Ultrawide Field Imaging Vs ETDRS 7 Field

Take Home Message

- **UWF:** Demonstrates need to image periphery; could improve management in up to 5-10% of cases.
- **Conventional fundus imaging** with 30-degree camera - ETDRS 7 Field images - Never designed to evaluate the periphery but misses significant lesions in only 15% of cases.
- **Current Generation Fundus Cameras:** Visualization beyond the equator possible in most cases.
- **Likelihood of missing clinically significant lesions:** Very low.



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