The Influence of Ultra-Wide Field Fluorescein Angiography on the Diagnosis and Management of Diabetic Retinopathy

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The Influence of FA on the Diagnosis and Management of DR

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Summary

- To better understand the role of Ultra-wide field fluorescein angiography (UWF FA) in the diagnosis and management of diabetic retinopathy (DR), we directed experts to an online survey where they were asked to diagnose and treat 20 DR cases with and without an UWF FA.
- Diagnostic sensitivity increases when UWF FA is available compared to using the UWF color fundus and red-free images alone.
- Intergrader agreement and subjective diagnostic confidence also improves with the UWF FA.
- The UWF FA allowed for better detection of proliferative DR. Consequently we saw a shift in management towards a higher rate of treatment when the UWF FA was available.
- While some experts report that FA is not required, and may not use it commonly in clinical practice, a majority of experts found it useful when it was provided.

The Influence of FA on the Diagnosis and Management of DR

Introduction

- The EDTRS established the gold standard for diagnosing DR severity using 7 standard field 35-mm 30˚ color fundus photographs.
- Ultra-wide field (UWF) (pseudo) color fundus and fluorescein angiography (FA) images are easier methods for evaluating DR (virtually and in the clinic) compared to standard images.
- While used clinically, no guidelines exist for using FA or UWF imaging for the diagnosis and management of DR.

Nguyen *et al. Int J Retin Vitr (2019) 5:51*

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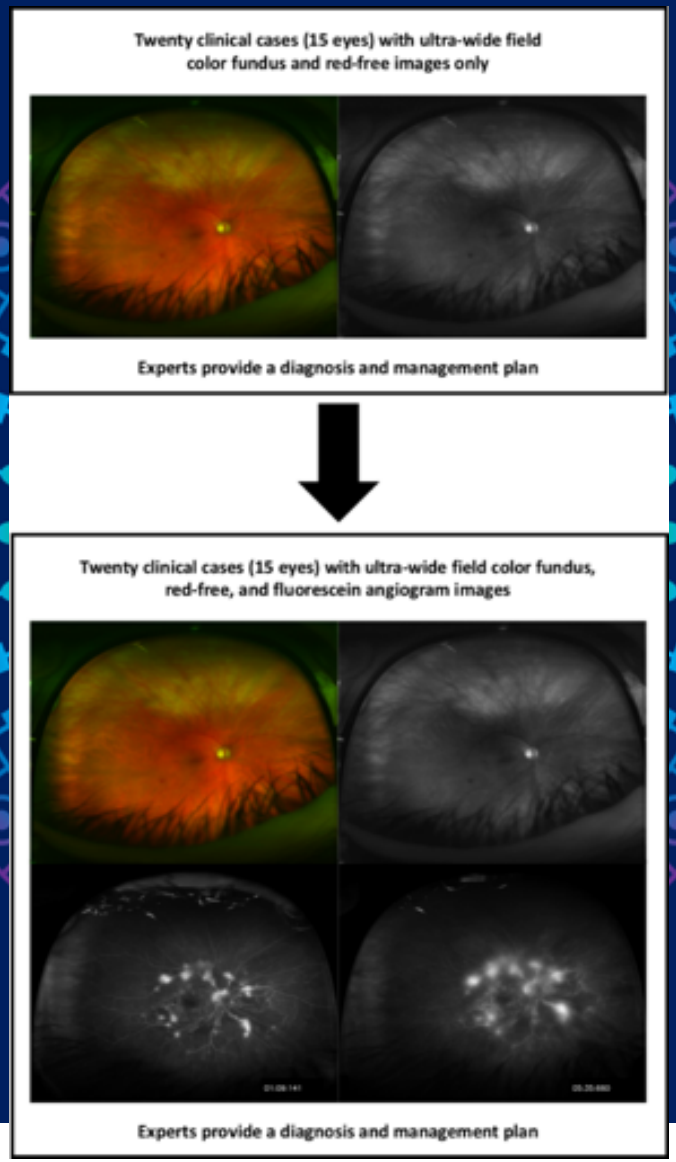
Purpose

- To study the influence of UWF FA on the diagnosis and management of DR when used in addition to UWF color fundus and red-free(CF/RF) images.
- To better understand the role of FA in current clinical practice.

Methods

- Experts were directed to take an online survey where they were asked to diagnose and treat 20 DR cases - first using UWF CF/RF images, and again with the addition of the corresponding UWF FA.



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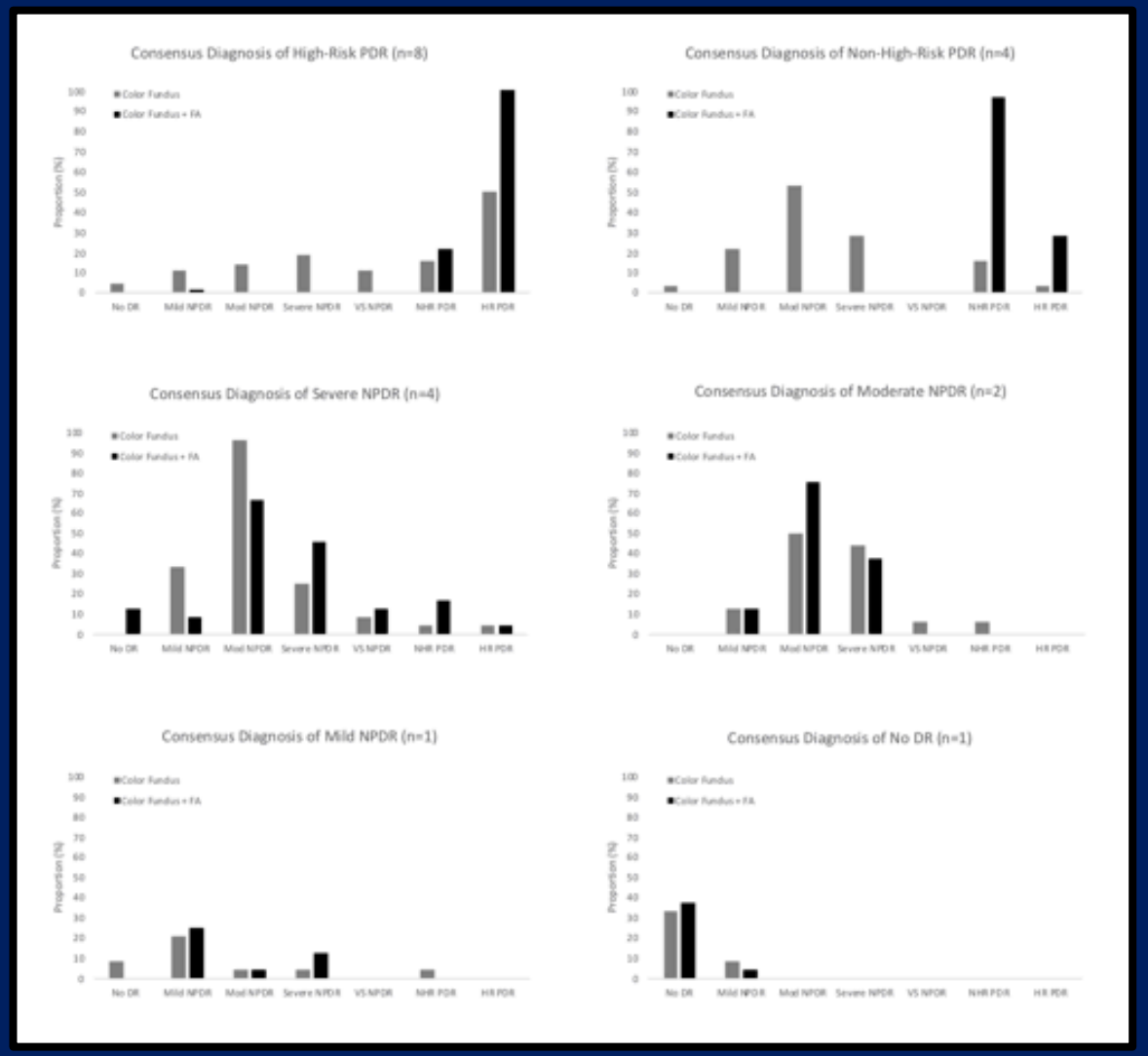
Results

- 10 experts participated
- Individual graphs for each DR grade (based on a reference standard diagnosis) are shown here, displaying responses from the experts with and without the fluorescein angiogram
- Reference standard diagnosis was established using clinical data along with the web-based diagnoses of multiple experienced readers
- Increased diagnostic accuracy was more frequently associated with the use of UWF FA
- Without the FA, cases were often under-diagnosed as compared to with the FA where a few cases were over-diagnosed.



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Results

	Sensitivity (95% CI)		*p* value	Specificity (95% CI)		*p* value
DR Grade	Color Fundus Only	Color Fundus and FA		Color Fundus Only	Color Fundus and FA	
All DR	35.5% (28.9 –42.1%)	68.5% (62.1 – 75.1%)	<0.05*			
NPDR	42.5% (31.5 –54.1%	51.3% (39.8 –62.6%)	0.32	30.8% (22.7 – 39.9%)	80.0% (71.7 – 86.8%)	<0.05*
PDR	30.8% (22.7 – 39.9%)	80.0% (71.7 – 86.8%)	<0.05*	42.5% (31.5 –54.1%	51.3% (39.8 –62.6%)	0.32

FA Fluorescein angiogram, CI Confidence Interval, DR diabetic retinopathy, NPDR non proliferative diabetic retinopathy, PDR proliferative diabetic retinopathy, * statistically significant (p<0.05)

- Sensitivity statistically significantly improved overall when the corresponding UWF FA was available
- This was also true for PDR cases
- The trend was similar, but not significant, for NPDR cases

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- **Results**
  - Along with sensitivity, inter grader agreement also improved with the addition of the UWF FA
  - Fleiss Kappa statistic improved from 0.24 (0.21-0.27) to 0.44 (0.40-0.47, p<0.05) with the UWF FA

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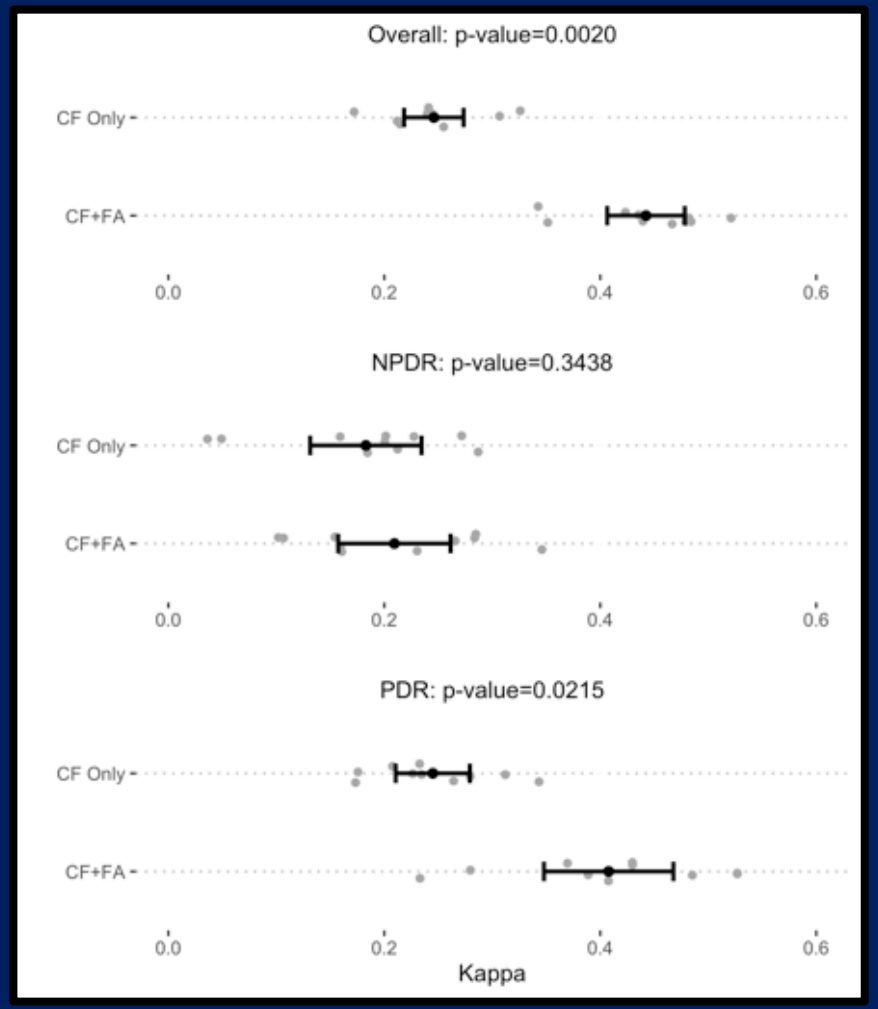

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Results

- In evaluating the rate of correct diagnosis/responses with and without the UWF FA:
  - Overall 71/200 (35.5%) responses were correct without and 137/200 (68.5%) with the FA
  - NPDR had highest rate of correct responses without the FA (34/80 [42.5%] correct responses). With the FA rates improved to 41/80 (51.3%) correct responses
  - Not-high risk PDR had the lowest rate of correct responses without the FA (5/40 [12.5%], correct responses), which improved to 31/40 (77.5%) correct responses with the FA
  - Experts modified their diagnosis after viewing the UWF FA in 132/200 (66%) responses
  - Subjective diagnostic confidence also increased

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Results

- In evaluating management choices:
  - Overall management changed in 82/200 responses (43%) with the addition of the FA
  - PDR was the most common diagnosis to have treatment modification (87.8%)
    - *PDR was commonly underdiagnosed with the CF alone and correctly diagnosed with the addition of the UWF FA.*
  - The other 12.2% of management changes were in severe NPDR cases. In 5/10 (50%) of these cases they were misdiagnosed as PDR when the UWF FA was provided
    - *The FA was more likely to result in mild overtreatment or overdiagnosis*

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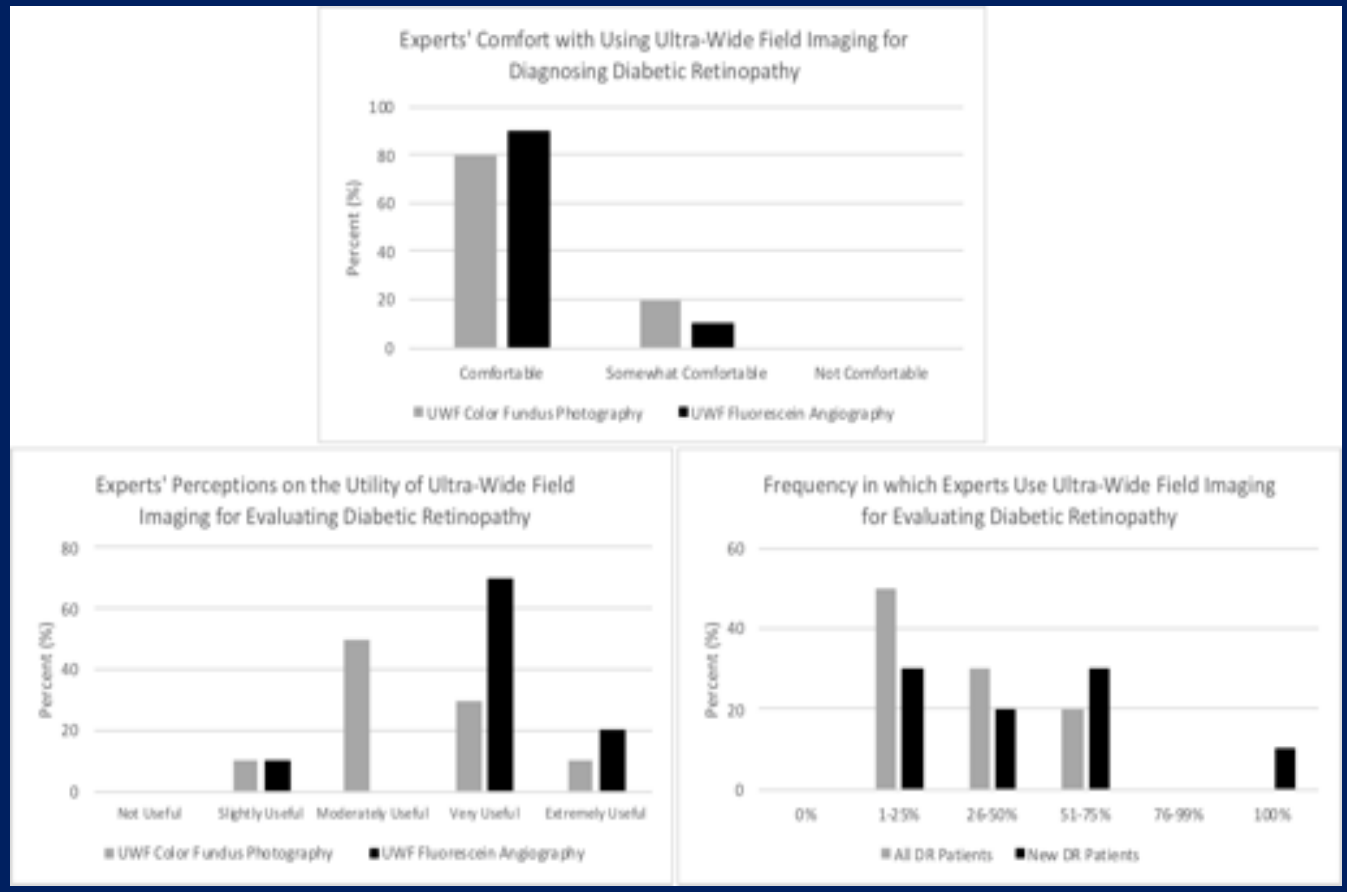
Results

- A brief questionnaire was included at the start of the survey
- Notably, a majority of experts report they use UWF FA for less than half of their DR patients
- When asked specifically for new DR patients, this rate increased slightly



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Results

- After diagnosing and treating each case, experts were asked in Part 1 if they would order an FA, and in Part 2 if they found the FA provided clinically useful information
  - *80/200 responses (40%) stated in Part 1 that they would not require an FA to diagnose and treat the patient*
  - *However, in Part 2 when experts were provided the FA, 160/200 responses (80%) reported it provided clinically useful information*

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Conclusions

- Diagnostic sensitivity increased when UWF FA is available compared to using the UWF color fundus and red-free images alone.
- Intergrader agreement and subjective diagnostic confidence also improves with the UWF FA.
- The UWF FA allowed for better detection of proliferative DR. Consequently we saw a shift in management towards a higher rate of treatment when the UWF FA was available.
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