

Prospective validation of AI-Driven Fundus Camera: A paradigm shift in Referable AMD Screening

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Abstract

Purpose : To evaluate the performance of a novel offline AI-driven AMD screening algorithm against a fundus-image only grading of AMD and combined grading of SD-OCT and fundus images (standard of care).

Methods : A prospective study was conducted in a tertiary eye hospital's retina clinic. For AI analysis, macula-centred images were captured using a smartphone-based fundus camera (Remidio FOP NM-10). Reference standard was fundus images captured using table-top fundus camera (Zeiss Clarus 700) and a line scan across the macula using Spectralis SD-OCT. Blinded adjudicated AMD diagnoses were conducted by three retina specialists, adhering to predefined criteria. Their assessment involved grading (1) fundus images solely from the Zeiss Clarus 700 fundus camera and (2) combined grading using both SD-OCT and fundus images (standard of care). Referable AMD was defined as intermediate and advanced AMD. The analysis considered the diagnosis at the patient level, defined by the worse eye diagnosis

Results : The study included 984 eyes of 492 patients with a mean age was 61.9 ± 9.9 years and 55% had referable AMD. Cohen's Kappa agreement was 0.82 (grader 1 vs 2), 0.84 (grader 1 vs 3) and 0.76 (grader 2 vs 3). The diagnostic performance of AI in detecting referable AMD against reference standard from (1) fundus image grading (n=492) and (2) combined OCT and fundus image grading by the specialists (n=489) is depicted in Figure 1. Against standard of care, the sensitivity of AI in picking advanced AMD further increased to 96.07%. Class activation maps are presented in Figure 2. The majority of false positives included early AMD (58%).

Conclusions : This prospective study is among the first to evaluate the effectiveness of an AI-assisted tool integrated into a portable fundus camera, against a combined assessment of OCT and fundus photographs. Our findings reveal that this innovative approach is highly effective in detecting cases of Referable AMD. This indicates its promising utility in conducting accurate and reliable AMD screening.

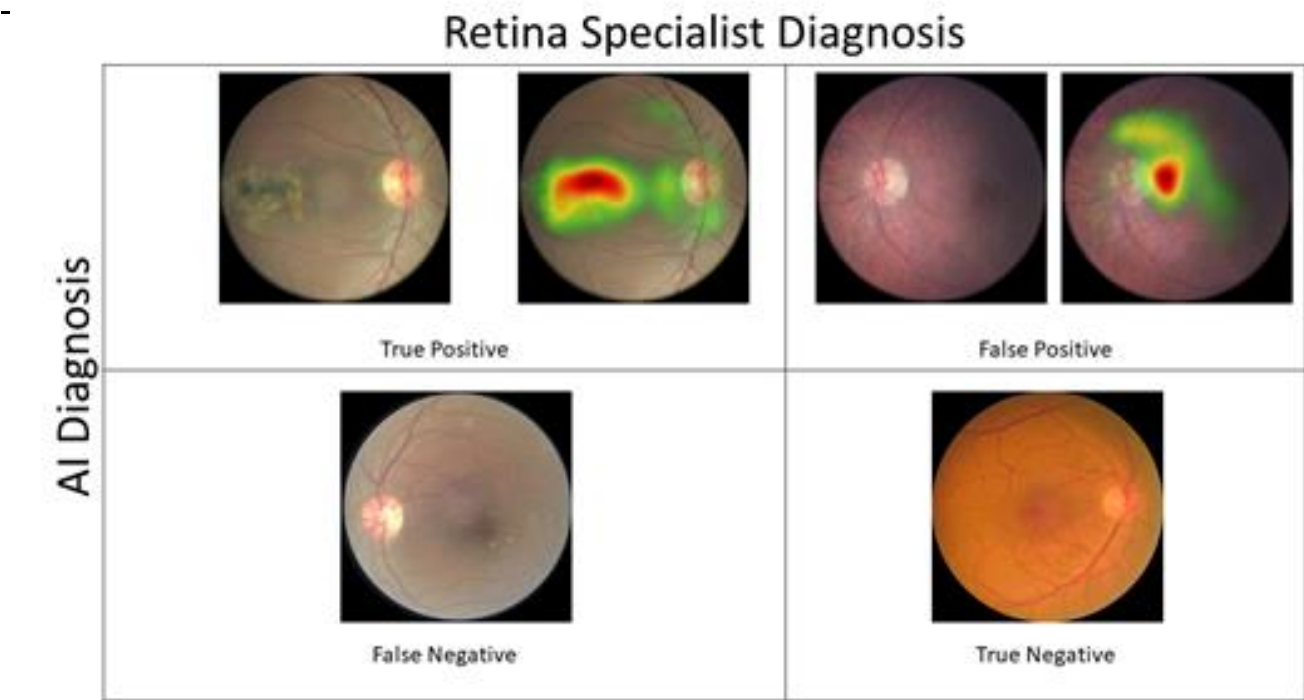
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		Referable AMD (intermediate & advanced)	
		Sensitivity	Specificity
	Fundus image grading (n=492)	88.48% (84.04% to 92.03%)	87% (81.86% to 91.11%)
Retina Specialist Consensus Grading (standard of care)	Combined image grading using OCT and Fundus images (n=489)*	90.62% (86.37% to 93.90%)	85.41% (80.21% to 89.68%)

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Diagnostic performance of AMD AI against blinded adjudicated retina specialists



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Class activation maps by offline AI

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