

Agreement between OPTOMAP and conventional digital imaging in the macula in the Reykjavik Eye Study.

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PURPOSE: To establish the agreement between ultra wide-angle (OPTOMAP) and conventional digital imaging of the macula for retinal grading. As there is little data published addressing the sensitivity and specificity of OPTOMAP our main purpose was to determine the feasibility to use ultra wide-angle (200°) digital imaging to record phenotypic variation of AMD in the macula from eyes from the 12 years follow up of Reykjavik Eye study and compared this to clinical diagnoses.

METHODS: In 2008 the 12 year follow-up was conducted on 573 participants of the Reykjavik Eye study. This study included the use of OPTOMAP, an ultra-wide angle (200°) camera alongside conventional (45°) Zeiss FF 450 digital fundus camera. 121 eyes with or without age related macular degeneration (AMD) were selected for grading corresponding conventional digital and OPTOMAP images using the International Classification System (IC). Of these detailed grading was carried out on five cases each with hard drusen, geographic atrophy (GA) and chorioretinal neovascularization (CNV) and six cases of soft drusen. Tenets of the Declaration of Helsinki were followed. Ethical approvals were obtained from the Data Protection Authority and the National Bio-Ethics Committee in Iceland. Signed informed consent was obtained from each participant. Results from the IC grading and the clinical analysis were compared, and agreement was assessed by means of cross-tabulations, percentages of agreement / disagreement, and kappa statistic.

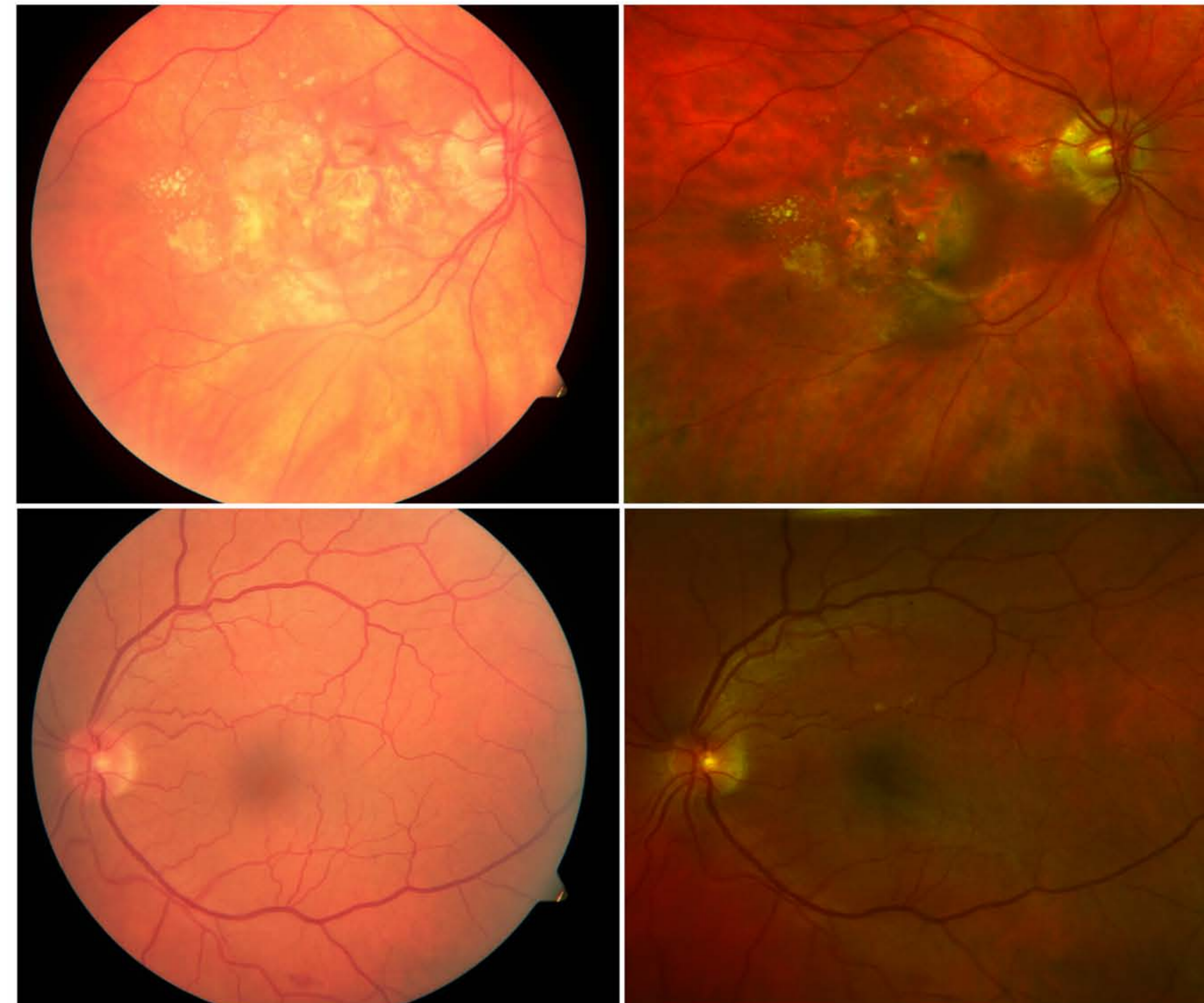


Figure 1. The upper two images showing geographic atrophy on colour and Optos image, while the lower ones demonstrate the difference between the clinically normal vs. colour & Optos images graded hard and soft drusen.

RESULTS: Comparison of the conventional digital and OPTOMAP images in the macula showed an overall 96.43% agreement (kappa 0.93) with no disagreement at end stage disease, although in one eye GA secondary to CNV was graded as primary GA. The detailed grading showed no clinically significant disagreement between the conventional digital and OPTOMAP images ($p < 0.05$ for all categories). Correlation between phenotype and clinical diagnoses was 55.36% (kappa: 0.34). This low correlation was due to judgments made at normal and early AMD cases at the clinic where 44 out of 77 cases were graded as normal, while drusen were detected by image grading on both imaging modalities.

Colour image of the macula	Optos image of the macular				Total
	Normal macula	Drusen	Geographic Atrophy	Choroidal Neovascular Membrane	
Normal macula	16	0	0	0	16
Drusen	3	74	0	0	77
Geographic Atrophy	0	0	8	0	8
Choroidal Neovascular Membrane	0	0	1	10	11
Total	19	74	9	10	112

Expected					
Agreement	Agreement	Kappa	Std. Err.	Z	Prob>Z
96.43%	49.30%	0.93	0.06	14.80	0.00

Table 1. The table shows the agreement between the primary grading conventional digital and OPTOMAP images in the macula.

Clinical diagnosis	Colour image				Total
	Normal macula	Drusen	Geographic Atrophy	Choroidal Neovascular Membrane	
Normal macula	12	44	0	1	57
Drusen	4	33	0	1	38
Geographic Atrophy	0	0	8	0	8
Choroidal Neovascular Membrane	0	0	0	9	9
Total	16	77	8	11	112

Expected					
Agreement	Agreement	Kappa	Std. Err.	Z	Prob>Z
55.36%	31.90%	0.34	0.05	6.84	0.00

Table 2. The table shows that grading of fundus transparencies is more reliable and provides more objective measures than ophthalmoscopy, especially in the early stage of maculopathy.

DISCUSSION: Based upon our results there is a good agreement between grading conventional digital and OPTOMAP images in the macula. Similarly, there is a good agreement between identified phenotype in grading and clinical diagnosis at late stages of AMD.

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