

# Peripheral retinal changes in the Reykjavik Eye Study

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**PURPOSE:** There is extensive drusen deposition and atrophy visible at the retinal periphery in flat-mounted aged donor tissues. Our understanding of the relevance of these peripheral pathologies in Age Related Macular Degeneration (AMD) is limited by the lack of detailed peripheral imaging studies. Imaging retinal periphery in clinical setting is now available; thus the purpose of this study was to develop imaging and grading protocols suited to wide-angle imaging in an aged population.

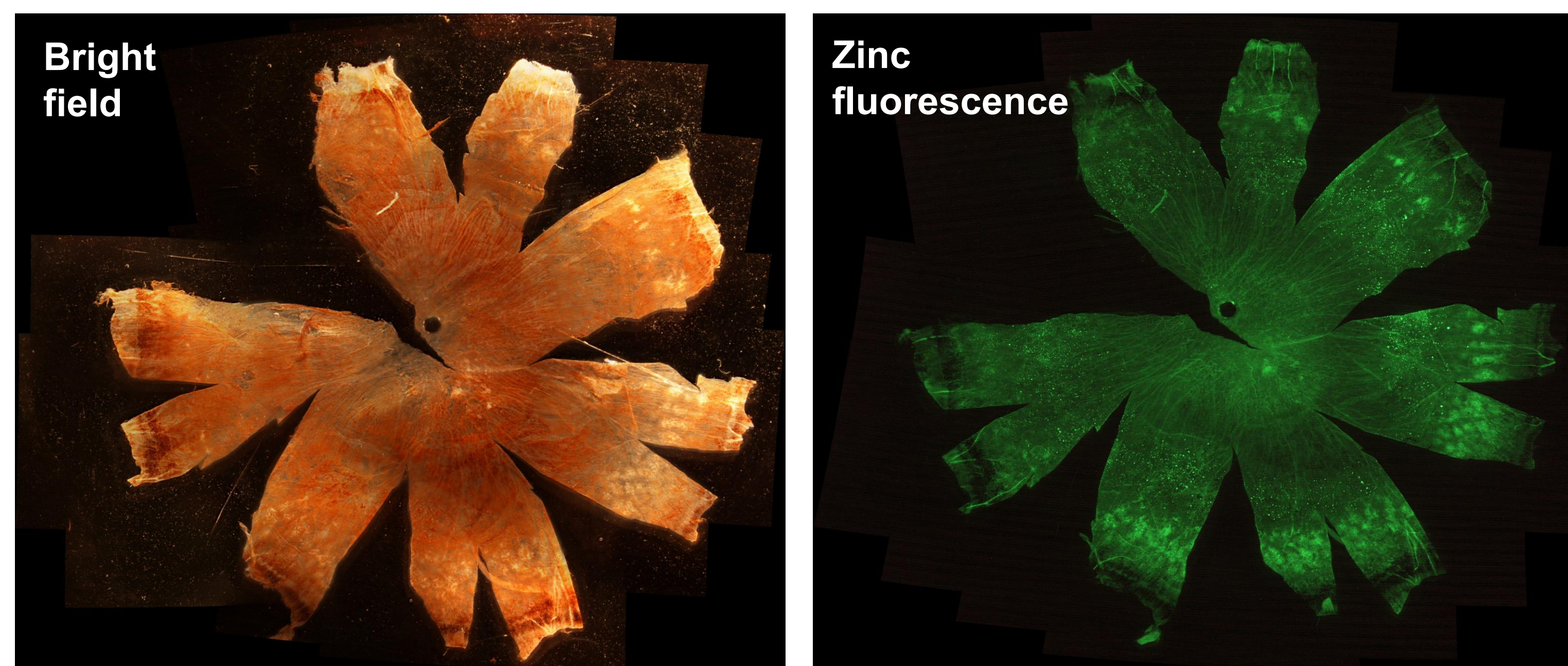
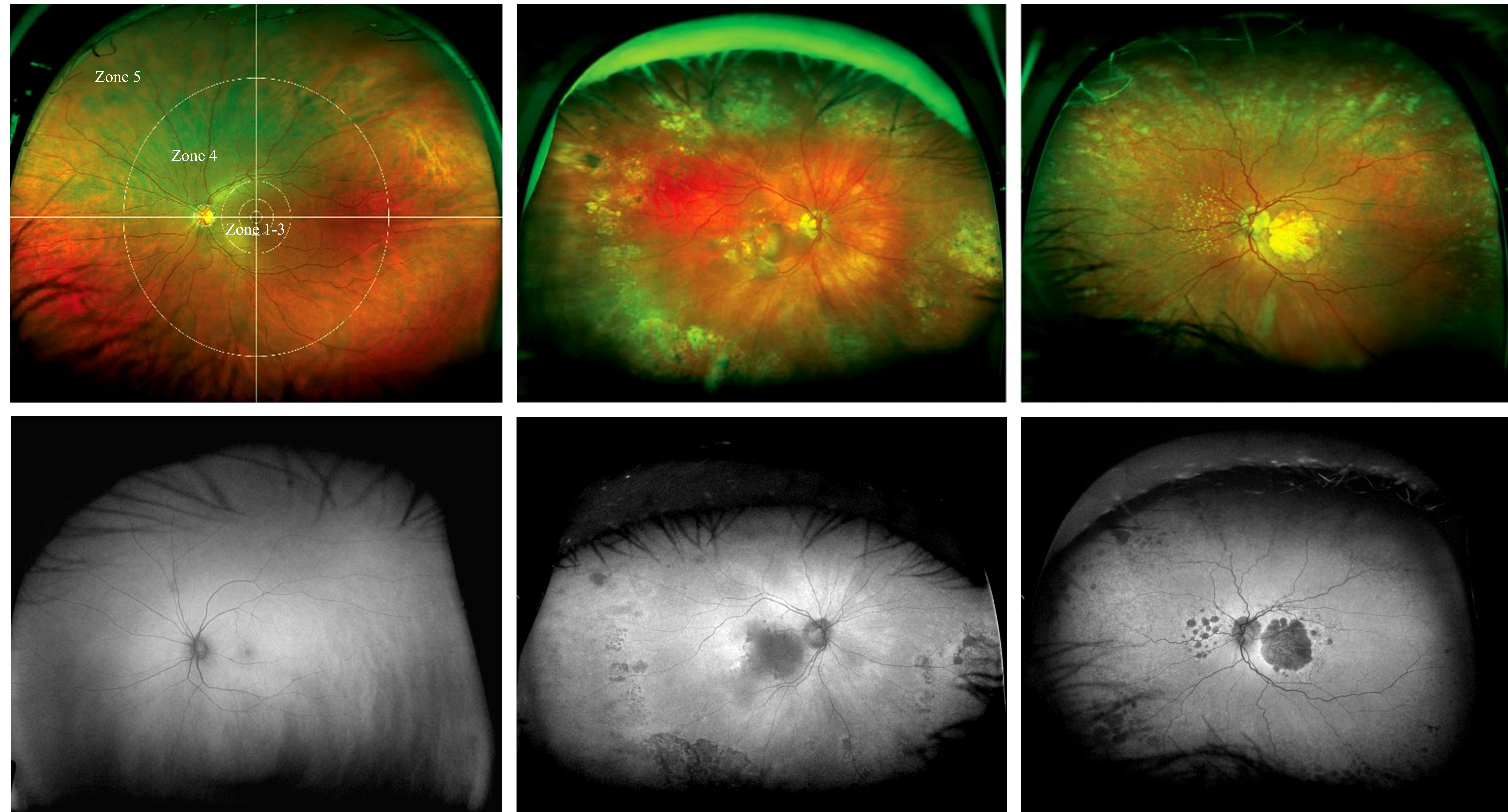


Figure 1. Extensive drusen deposition in the macula and periphery of flat-mounted human donor eye.

**METHODS:** Ultra wide field (200°) color and autofluorescence (AF) images were taken using Optos P200C AF ultra-wide angle laser scanning ophthalmoscope as part of the 12 year follow-up of the Reykjavik Eye Study and then graded at Moorfields Eye Hospital Reading Centre. Peripheral changes were graded using a standardised grid developed for this imaging modality. Presence or absence of hard and soft drusen, peripheral retinal pigment epithelial changes, atrophy or neovascularisation was graded on the false-color images and then the presence or absence of hypo- and hyperfluorescence using autofluorescent images. All peripheral grading results were tabulated and then the presence of the same changes were examined for the macula and the peripheral grading.

**RESULTS:** Fifty six percent of patients had peripheral pathology that are normally associated with AMD. Of these, more patients had both soft and hard drusen in the far periphery (zone 5) compared to the mid-periphery (Zone 4). In addition, more Drusen was observed in the superior two quadrants, compared to the inferior ones. There was no isolated AMD like CNV or PED in the periphery, but 7 patients had atrophy, drusen and RPE changes at the periphery without end-stage disease in the macula. No patient with end-stage disease in the macula had normal periphery.



Normal macular appearance is accompanied by drusen on the periphery.

CNV and atrophy in the macula with extensive drusen deposition and atrophy in the periphery.

GA in the macula with extensive drusen deposition and GA in the periphery.

Hard drusen		Soft drusen	
33.65%	19.97%	13.05%	9.12%
20.94%	16.19%	14.15%	12.26%
	Z1-3		Z1-3
19.65%	12.11%	7.23%	6.13%
22.52%	8.96%	5.35%	3.14%
Hypo AF		Hyper AF	
7.08%	2.36%	14.15%	6.76%
5.97%	2.83%	7.55%	4.25%
	Z1-3		Z1-3
4.09%	2.36%	4.87%	3.46%
5.35%	1.89%	10.06%	4.25%

**DISCUSSION:** Phenotyping peripheral changes on Optos P200C AF ultra-wide angle laser scanning ophthalmoscope imaging confirmed that there are wide ranging pathological changes in the periphery even in those who have no central pathologies. The predictive values for these peripheral pathological changes are yet to be determined. The value of this imaging technique will be greatly enhanced when the relationships between macular and peripheral smallest resolvable features become available.

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