

Quantitative Analysis of Peripheral Perfusion and/or Ischemia in Patients With Wet Age Related Macular Degeneration Using Ultra-Wide Field Angiography

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Purpose

To assess and quantify the vascular and peripheral angiographic findings of patients with Age Related Macular Degeneration (AMD).

Methods

Analysis was performed on 170 subjects: 80 with wet AMD, 60 with dry AMD and 30 controls who had undergone imaging with ultra-widefield fluorescein angiography (Optos plc). Angiographic gamma normalization and luminance analysis was numerically quantified to determine differences in the study population.

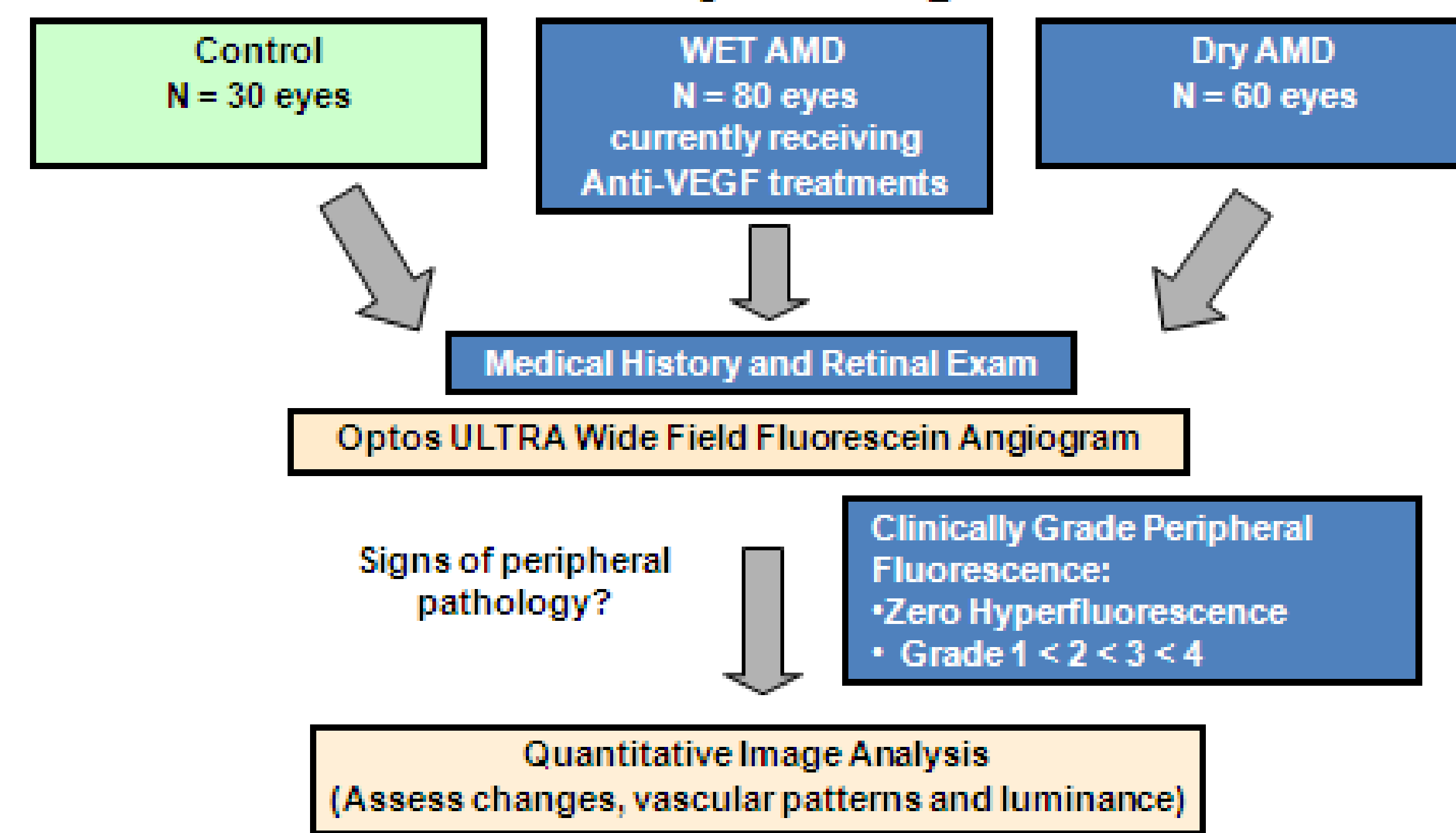
Results

Quantitative Image Analysis was performed on the images of 170 patients to assess changes, vascular patterns and luminance. In order to clinically grade the amount of peripheral vascular changes calculations were made based on fixed area luminance quantification. Each image was normalized for luminance gamma and the maximum first order vessel luminance was calculated to give a baseline measurement. The area of evaluation was determined using a circular grid and the maximum luminance value was determined within that region. Color segmentation was created based on pixel luminance, this enabled an analysis of extrapolated Quant Value for the region. We were then able to clinically grade Peripheral Fluorescence with 0 representing no hyperfluorescence, grade 1 representing 0-500, grade 2 representing 500-1000, grade 3 representing 1000-1500 and grade 4 as 1500 and above.

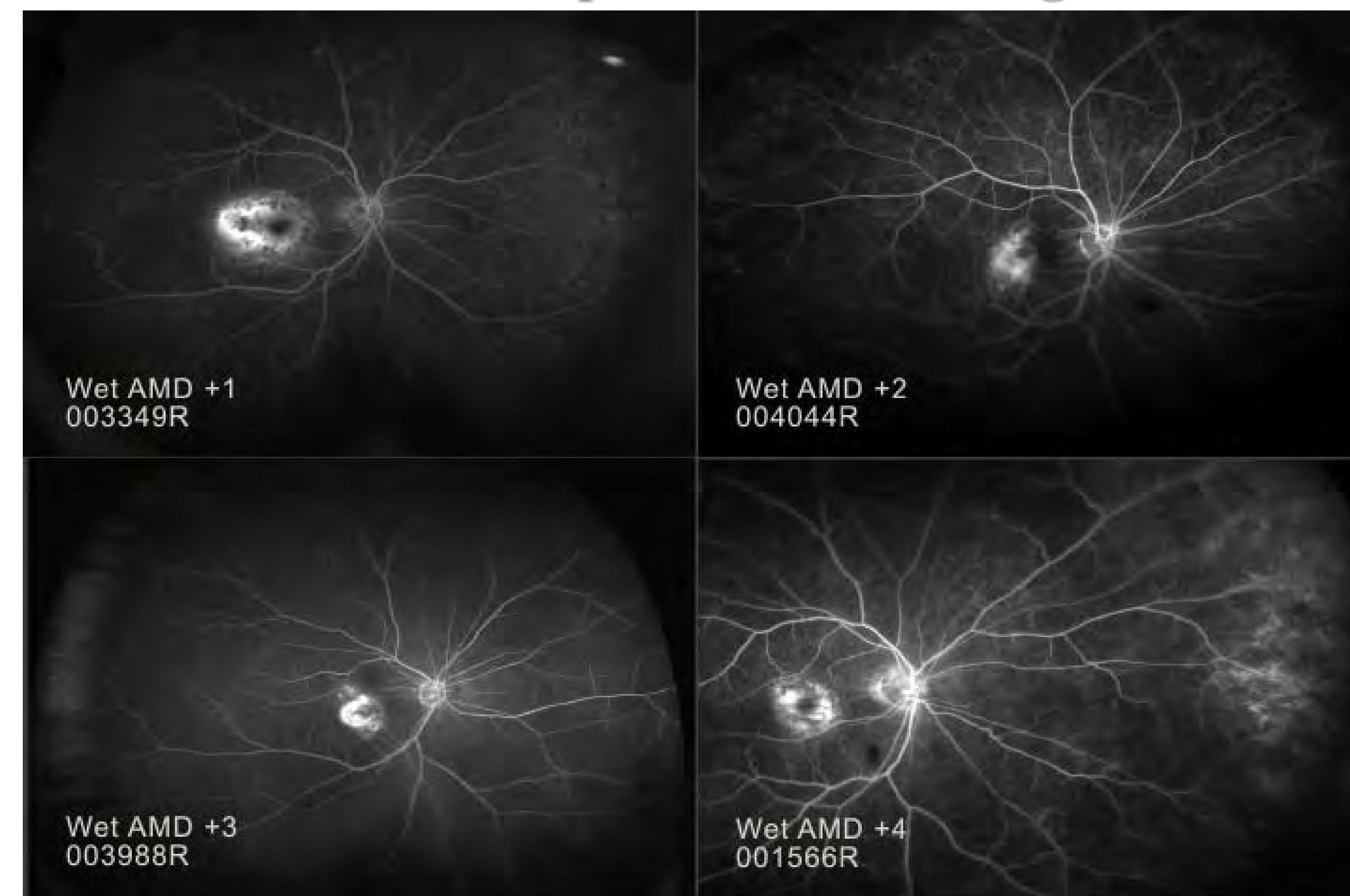
Conclusions

The quantification of peripheral perfusion and ischemia is possible using ultra-widefield fluorescein angiography and may be a useful adjunct in the determining the efficacy of anti-VEGF therapy in controlling macular edema in these patients. Dynamic widefield imaging may allow for eyes with wet AMD to be treated more effectively than previously indicated due to its ability to image and quantify vascular findings in the peripheral retina. A statistically powered prospective trial is planned to further examine the utility of quantifying peripheral angiographic hyperfluorescence in wet AMD.

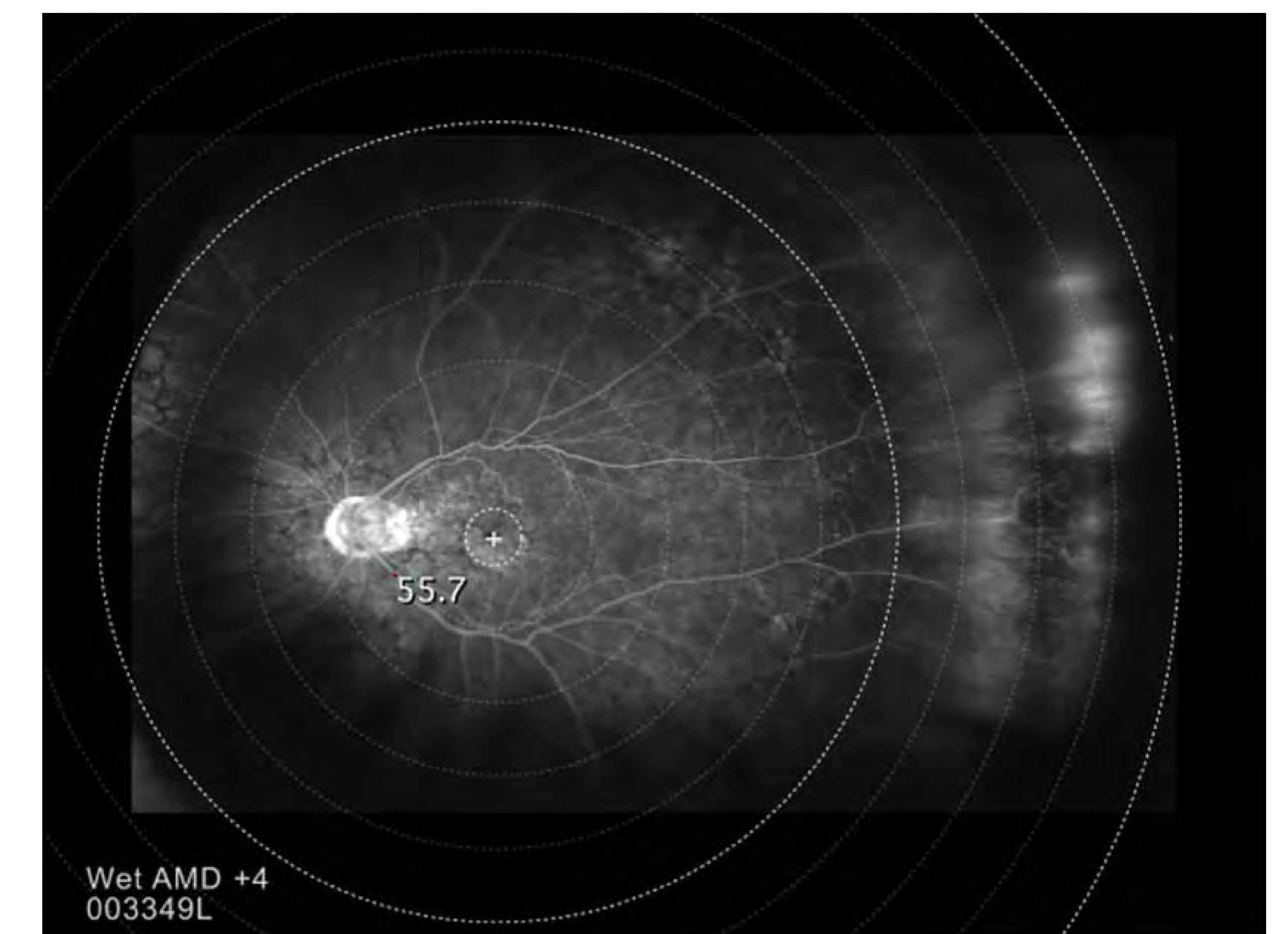
Study Design



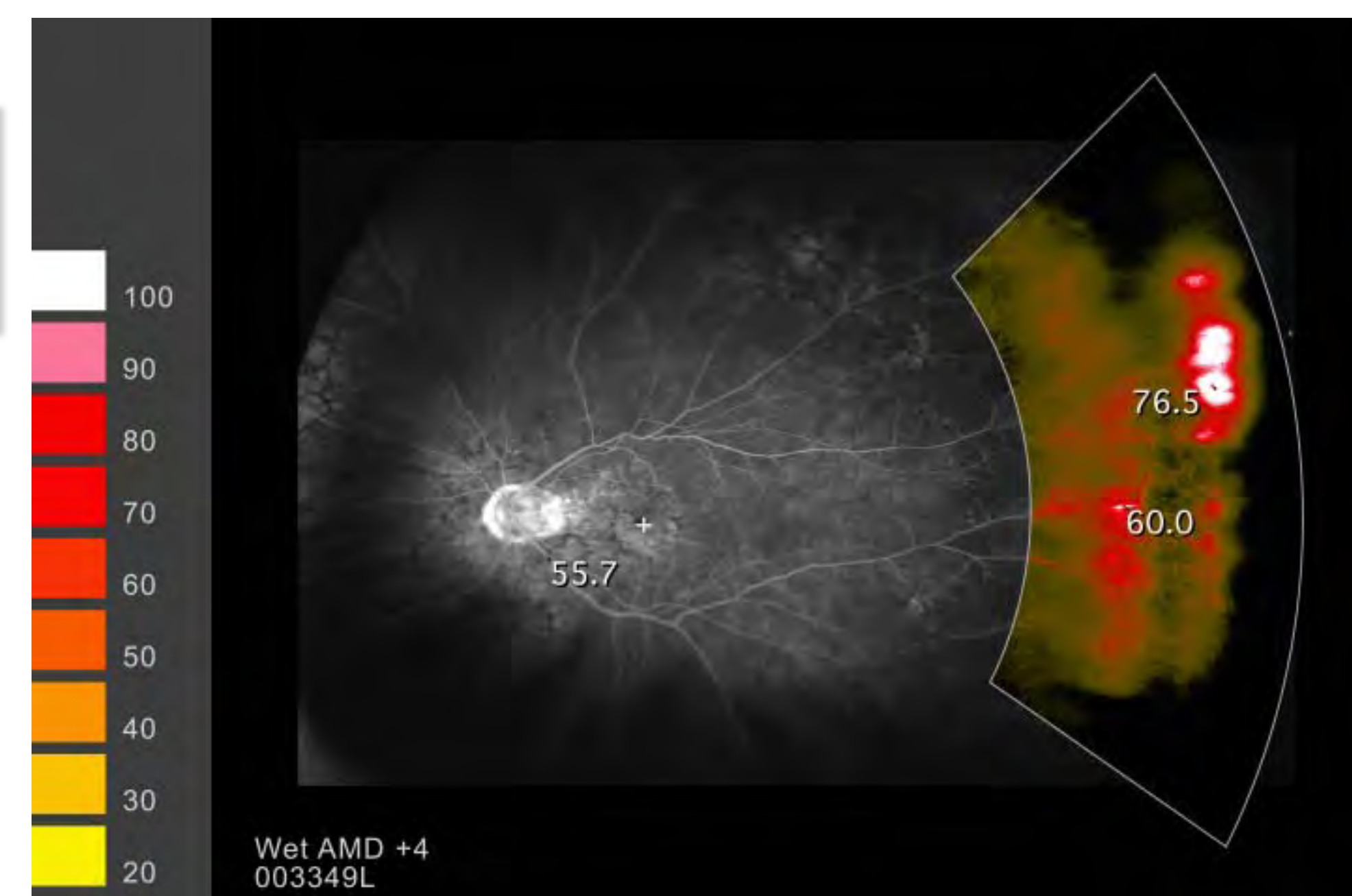
Clinical Peripheral FA Grading



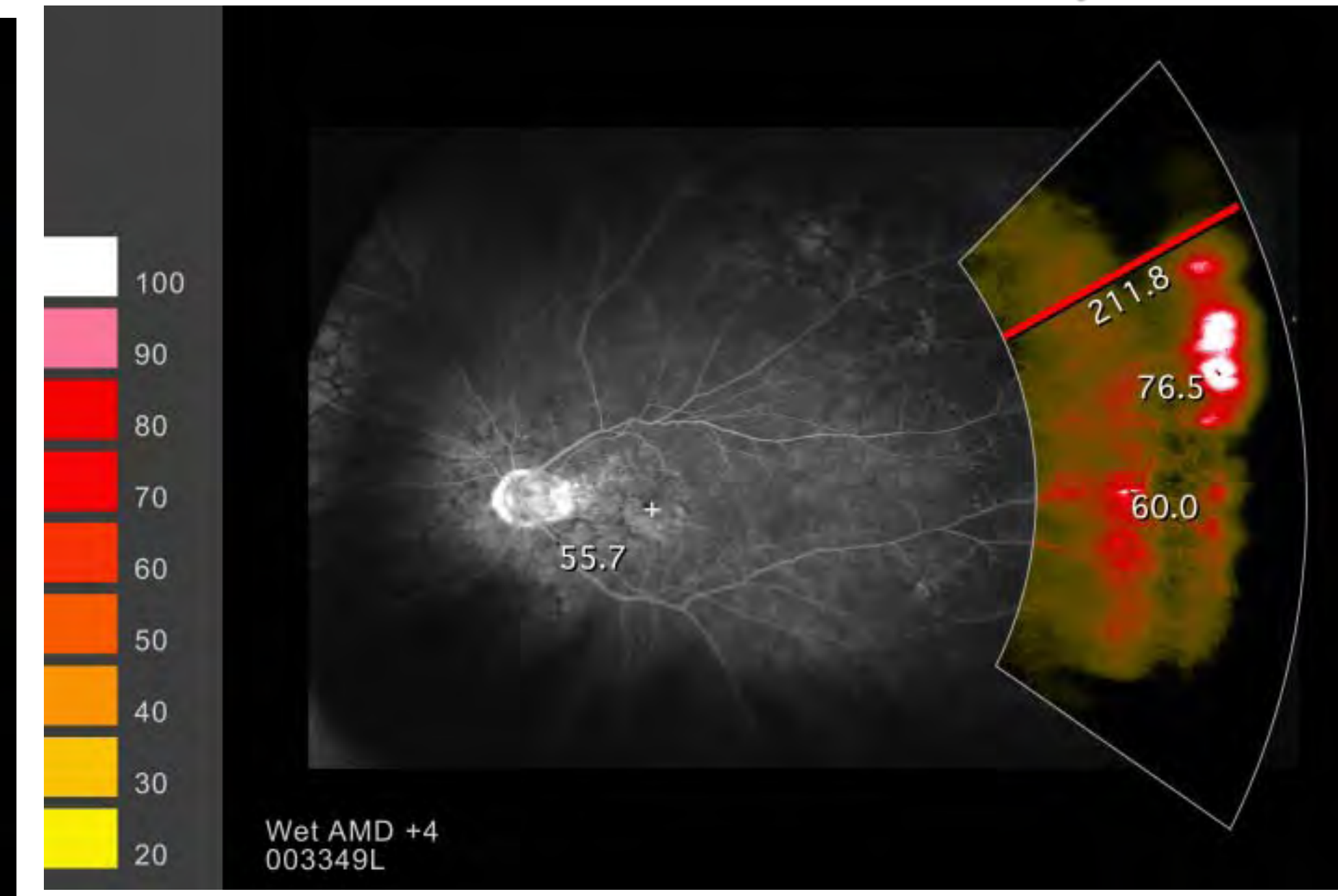
Characteristic	Wet AMD N = 80 eyes	Dry AMD N = 60 eyes	Control N = 30 eyes
Gender, n (%)			
Male	35 (43.7)	28 (46.6)	17 (56.6)
Female	45 (56.2)	32 (53.3)	13 (43.3)
Age, yr			
Mean ± SD	82.9 ± 9.2	77.9 ± 6.2	62.9 ± 9.2
Range	55-94	50-86	45-87
Baseline visual acuity			
Mean (no. of letters ± SD)	45.6 ± 13.5	69.6 ± 10.1	79.6 ± 5.9
Peripheral FA Hyperfluorescence	66 (82.5)	44 (73.3)	7 (23.3)
Baseline central retinal thickness			
Mean (µm ± SD)	371.6 ± 130.4	301.6 ± 30.4	271.6 ± 18.4
Duration of anti-VEGF treatment (months)	3 - 42		



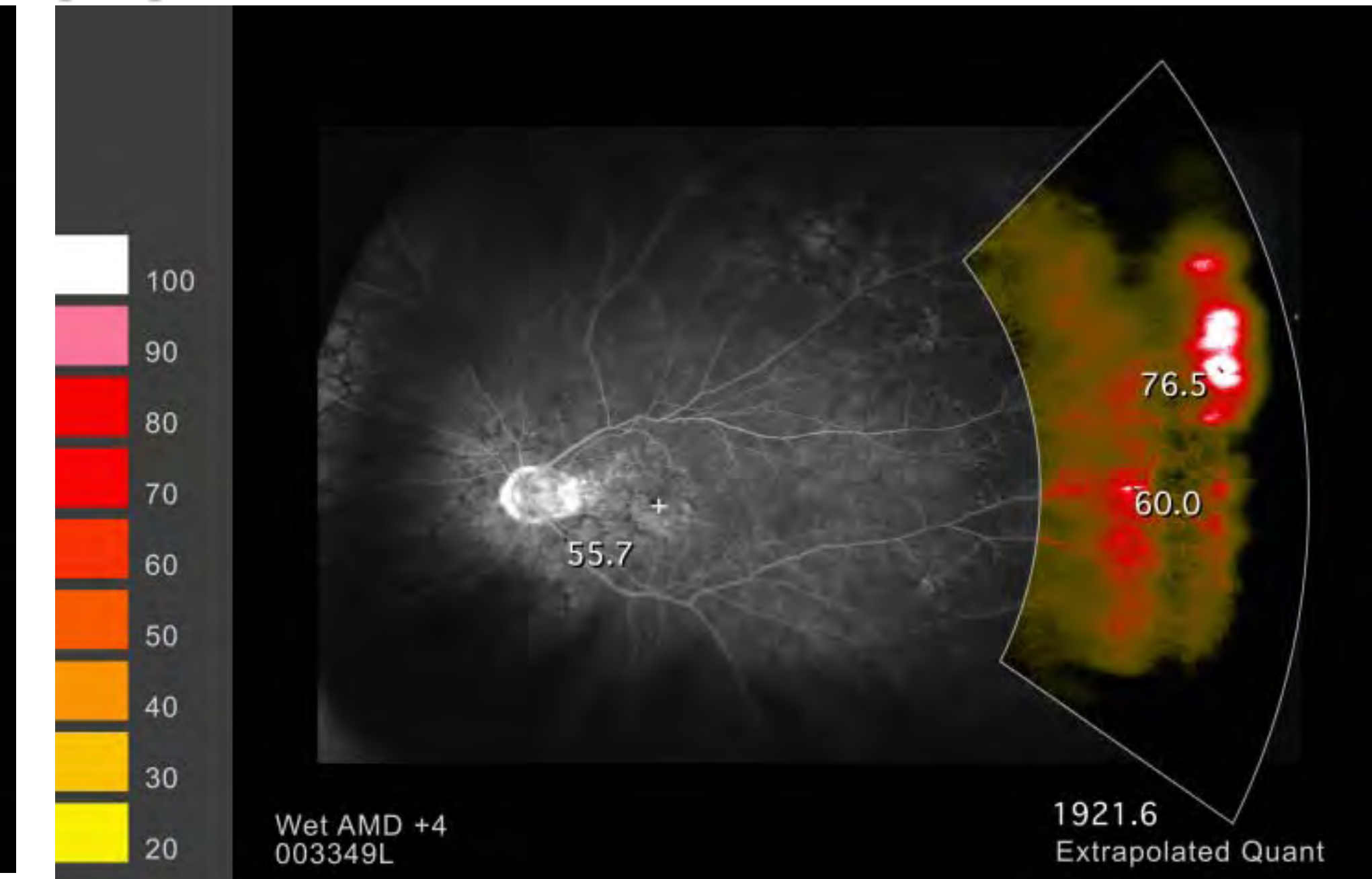
The macula was isolated and the brightest pixel was measured with an intensity of 55.7. Standardized centipetal arcs were used to register and ultimately calculate the peripheral luminance.



Final color segmentation based on pixel luminance



One slice during the calculation of the extrapolated quantification value. Each radial slice was calculated and summated to reach final extrapolated qualitative luminance value.



The summation of the extrapolated quantitative value to total 1921.6, which is considerably higher than the 257 average quantitative value that was measured in the "normal" non-AMD control population.