

Longitudinal Analysis of Metamorphopsia Measurement and its Relation to Change in Drusen Size and Volume in Intermediate Age-Related Macular Degeneration

PURPOSE:

To compare the development of metamorphopsia versus drusen size and drusen volume in eyes with intermediate age-related macular degeneration (AMD).

METHODS: In a clinical practice setup, subjects with intermediate age-related macular degeneration (iAMD) were available for this study between August 2015 and November 2018. Metamorphopsia Index (MI) consisting of magnitude (d), excentricity (ϵ) and area (a) was measured with AMD – A Metamorphopsia Detector®. Elevation in retinal pigment epithelium indicating drusen was quantified with the advanced RPE analysis tool (Cirrus, Carl Zeiss Meditec®) in a 5 mm diameter centered on the fovea (area and volume) at study inclusion and ≥ 6 months later. Changes over time were intra-individually compared using dependent samples t-test. Follow up was terminated when eyes developed late AMD. All patients signed informed consent according to the declaration of Helsinki prior to the study.

RESULTS: The data of 20 eyes of 12 patients (age 66-82 years) were included. Mean follow-up was 15 months (SD 5.6, 95%-CI [12.2; 17]). Follow up of 2 eyes was terminated after 6 months when late AMD developed. Mean changes over time in drusen area was 0.11 mm² (SD 0.94, 95%CI [-0.30; 0.52]), in drusen volume 0.01 mm² (SD 0.10, 95%-CI [-0.04; 0.05]), in Metamorphopsia Index -0.62 (SD 1.34, 95%-CI [-1.21; 0.60]), in magnitude -0.56 (SD 1.17, 95%CI [-1.07; 0.52]), in excentricity -0.78 (SD 1.19, 95%-CI [-1.30; 0.53]) and in area -0.53 (SD 1.11, 95%-CI [-1.01;0.50]). Correlation of metamorphopsia measurement change over time (Δ MI, d , ϵ , a) and change in RPE-elevation was $\rho = 0.15$ ($p=0.5$), 0.09 ($p= 0.7$), 0.24 ($p=0.3$), 0.23 ($p= 0.3$) for drusen volume and 0.13 ($p= 0.6$), 0.08 ($p= 0.7$), 0.23 ($p= 0.3$), 0.20 ($p=0.4$) for drusen area (Spearman correlation coefficient rho ρ). In 14 eyes without clinical change MI did not increase, 3 eyes perceived metamorphopsia at no time point in spite of clinical deterioration, 3 eyes experienced increased MI accompanied by newly developed hyperreflective retinal foci.

CONCLUSIONS: This study showed only little changes of drusen size and area over time. Larger studies with longer follow-up may reveal whether structural changes in intermediate AMD are reflected by metamorphopsia indices thus serving as a functional marker for progression of intermediate AMD.