Using reading behaviour and eye movement analysis on the evaluation of the effectiveness of therapeutic intervention in patients with AMD.

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Aim: Reading difficulty is the most common complaint among individuals with visual deficits, especially in patients with foveal/parafoveal scotomas. The main purpose of the study was to evaluate the effectiveness of therapeutic intervention in patients with nAMD, using a new method, based on eye movement analysis in comprehensive reading.

Material & Methods: A group of 17 naive and relapsed nAMD patients (age range: 52-80 years) who underwent anti-VEGF treatment participated in the study. All were native Greek speakers and had similar education level. Both groups were examined at baseline and about 3 months following their first visit. Visual acuity was assessed using logMAR charts. Reading performance was evaluated using simple paragraphs of about 140 words each (0.4 logMAR print size at 40 cm distance). Eye movements were monitored with an infrared eyetracker (Eye-Link II, SR Research Ltd). Data analysis included computation of reading speed and fixation duration, the number of fixations, and percentage of regressions. Moreover, frequency distributions of fixation durations were analysed with an ex-Gaussian fitting, a convolution of a normal (with μ as the mean) and exponential (with τ as the mean) distribution, linked to visuo-motor vs. cognitive components, respectively.

Results: Following treatment, Central Retinal Thickness was found statistically significantly lower by 58 μm in AMD patients ($p=0.012$). No statistical significant difference was found in monocular ($p=0.248$) and binocular VA ($p=0.163$). Binocular reading performance following treatment did not show any statistical significant difference in any parameter analysed. However, monocular reading speed showed statistically significant increase of 15 wpm ($p=0.04$) after the treatment. This was mainly due to a statistical significant reduction in the number of fixations (0.2 fixations per word - $p=0.037$). No statistical significant difference was found for any other eye movement parameter. Ex-Gaussian parameters did not show statistically significant differences following treatment.

Conclusion: Evaluating reading performance using eye movement analysis seems to form a reliable outcome for assessing the effectiveness of therapeutic approaches in nAMD patients.