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Systemic Inflammatory and Choroidal Determinants of Dry AMD Progression: A Five-Year Prospective Study

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Objective: To develop a multimarker neural prognostic model integrating systemic inflammatory indices with retinal and choroidal structural parameters, and to assess the 5-year impact of combined photobiomodulation (PBM) and Nutrof® Forte therapy on the progression of dry age-related macular degeneration (AMD).

Methods: A 5-year prospective study enrolled 163 patients (304 eyes) with early or intermediate dry AMD. Two groups were compared:

Group 1: PBM + daily Nutrof® Forte

Group 2: PBM + irregular intake of non-standard vitamin supplements

Assessed parameters included BCVA, OCT biomarkers (drusen load, central choroidal thickness—CCT, hyperreflective foci—HRF, RPE defects, IRF) and systemic inflammatory indices (SII, SIRI, AISI).

Independent predictors were evaluated using Cox regression. A multilayer perceptron (MLP 10-23-2) neural network was trained for 5-year progression prediction, with performance assessed by AUC, accuracy, sensitivity and specificity.

Results: AMD progression: 36% in Group 1 vs 71% in Group 2 ($p < 0.001$).

BCVA stabilization/improvement: 24% vs 9% ($p = 0.01$).

Choroidal thinning was significantly reduced in the group 1 ($-9.2 \pm 6.5 \mu\text{m}$) versus group 2 ($-18.6 \pm 8.1 \mu\text{m}$; $p < 0.001$).

Inflammatory indices (SII, SIRI, AISI) remained consistently higher without supplementation ($p \leq 0.01$).

Independent predictors of progression (Cox model): reduced CCT, older age, larger baseline drusen burden, cardiovascular comorbidity and elevated AISI ($R^2 = 0.678$; $p < 0.0001$).

Neural-network model performance (MLP 10-23-2): AUC = 0.881; accuracy = 83.1%; sensitivity = 0.883; specificity = 0.746.

Conclusion: PBM combined with Nutrof® Forte significantly slows structural progression of dry AMD, reduces choroidal thinning and improves functional stability. Choroidal thickness and systemic inflammatory markers are key determinants of long-term outcomes. The neural-network model demonstrates high predictive value and may support personalized risk stratification and clinical decision-making in dry AMD.

Disclosure of Interest: None Declared