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Longitudinal Assessment of Rbc Membrane Dynamics in T2dm: Impact of Omega-3 On Cardiovascular Risk

Alessia Riente¹, Duaa Hatem¹, Cassandra Serantoni², Michele Maria De Giulio¹, Tommaso Marchetti², Flavio Di Giacinto³, Flavia Festinante¹, Marco De Spirito¹, Giuseppe Maulucci¹

¹ Università Cattolica del Sacro Cuore, Rome, Italy

² Fondazione Policlinico Universitario "A. Gemelli" IRCCS, Rome, Italy

³ Link Campus University, Rome, Italy

Red blood cell (RBC) membrane fluidity is emerging as a promising biomarker of diabetic complications and residual cardiovascular (CV) risk. Prior studies linked increased membrane rigidity (GEL phase) to a higher Omega-6/Omega-3 ratio in type 2 diabetes (T2DM), suggesting a role for dietary lipids in CV risk modulation [1,2]. Building on these findings, we conducted a longitudinal study in 40 T2DM patients (with/without prior CV events) who followed a high or low Omega-3 diet for 12 weeks in a randomized crossover design. Membrane fluidity was assessed by confocal microscopy using Laurdan, quantified via Generalized Polarization (GP) at baseline (T0), 3 months (T1), and 6 months (T2). GP values increased from 0.370 to 0.440, with higher values at T2 in patients without prior CV events (0.460 vs 0.420). These results confirm GP's sensitivity to membrane changes and support its potential as a biomarker to monitor nutritional interventions targeting CV risk in T2DM.

[1] Bianchetti, Giada, et al. "Erythrocyte membrane fluidity as a marker of diabetic retinopathy in type 1 diabetes mellitus." *European Journal of Clinical Investigation* » (2021)

[2] Bianchetti, Giada, et al. "Erythrocyte membrane fluidity: A novel biomarker of residual cardiovascular risk in type 2 diabetes." *European Journal of Clinical Investigation* (2024)