Abstract

Intake of blue mussels decreased disease activity in women with rheumatoid arthritis (RA) in the randomized cross-over MIRA (Mussels, inflammation and RA) trial. This study investigates potential causes of the decreased disease activity by analysing fatty acid composition in erythrocytes and plasma phospholipids and serum metabolites in the participants of the MIRA trial. Twenty-three women completed the randomized 2 × 11-week cross-over dietary intervention, exchanging one cooked meal per day, five days a week, with a meal including 75 g blue mussels or 75 g meat. Fatty acid composition in erythrocytes and plasma and 1H-Nuclear Magnetic Resonance (1H-NMR) metabolomics data were analysed with multivariate data analysis. Orthogonal Projections to Latent Structures with Discriminant Analysis (OPLS-DA) and OPLS with effect projections (OPLS-EP) were performed to compare the two diets. The fatty acid profile in erythrocytes was different after intake of blue mussels compared to the control diet, and all samples were correctly classified to either the blue mussel diet or control diet. Changes following blue mussel intake included significant increases in omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) at the group level but not for all individuals. The fatty acid profile in plasma phospholipids and 1H-NMR serum metabolites did not differ significantly between the diets. To conclude, modelling fatty acids in erythrocytes may be a better biomarker for seafood intake than only EPA and DHA content. The change in fatty acid pattern in erythrocytes could be related to reduction in disease activity, although it cannot be excluded that other factors than omega-3 fatty acids potentiate the effect.