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Fatty acid profile of erythrocyte membranes as possible biomarker of longevity

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Abstract

Offspring of long-lived individuals are a useful model to discover biomarkers of longevity. The lipid composition of erythrocyte membranes from 41 nonagenarian offspring was compared with 30 matched controls. Genetic loci were also tested in 280 centenarians and 280 controls to verify a potential genetic predisposition in determining unique lipid profile. Gas chromatography was employed to determine fatty acid composition, and genotyping was performed using Taqman assays. Outcomes were measured for erythrocyte membrane percentage content of saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids (omega-6 and omega-3), geometrical isomers of arachidonic and oleic acids, and total trans-fatty acids. Also, allele and genotyping frequencies at endothelial-nitric oxide synthase and delta-5/delta-6 and delta-9 desaturase loci were considered. Erythrocyte membranes from nonagenarian offspring had significantly higher content of C16:1 n-7, trans C18:1 n-9, and total trans-fatty acids, and reduced content of C18:2 n-6 and C20:4 n-6. No association was detected at endothelial-nitric oxide synthase and delta-5/delta-6 and delta-9 desaturase loci that could justify genetic predisposition for the increased trans C18:1 n-9, monounsaturated fatty acids and decreased omega-6 synthesis. We concluded that erythrocyte membranes derived from nonagenarian offspring have a different lipid composition (reduced lipid peroxidation and increased membrane integrity) to that of the general population.

